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**Kentucky State Briefing Book
for
Low-Level Radioactive
Waste Management**

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KENTUCKY STATE BRIEFING BOOK
FOR
LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

Prepared for
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INTRODUCTION

This Kentucky State Briefing Book for Low-Level Radioactive Waste Management has been prepared to assist in the orderly planning and implementation of state and federal policy on commercial low-level radioactive waste management. The Kentucky Briefing Book is one of 12 books produced by the Southern States Energy Board describing states in the Southeastern region. The 12 State Briefing Books are part of a series produced under contract with the U.S. Department of Energy, Office of Nuclear Waste Management, Idaho Operations Office, through EG&G Idaho, Inc. The completed series will consist of briefing books on all 50 states and the Commonwealth of Puerto Rico. The books will provide background information on waste management practices, state government structure and jurisdiction, relevant state statutes and regulatory programs, nature and volume of low-level waste generation, interested groups and individuals, and state print media.

Radioactive wastes are usually produced whenever radioactive materials are processed or used. Low-level radioactive wastes are generated by medical and educational facilities, scientific research, and industrial processes. Nuclear powered electric generators also produce large quantities of low-level waste. Low-level wastes generally contain small quantities of radionuclides and less than 10 nanocuries per gram of transuranic (TRU) contaminants, therefore requiring little or no shielding. However, low-level wastes contain potentially hazardous concentrations or quantities of radionuclides. Shallow land burial of most low-level wastes provides adequate protection against radiation exposure to humans and the environment.

Only three facilities in the United States are currently accepting commercially generated low-level radioactive wastes for disposal. These facilities are located at Barnwell, South Carolina; Beatty, Nevada; and Richland, Washington. The U.S. Nuclear Regulatory Commission (NRC) estimates that the three sites will be filled to capacity between 1984 and 1989. The governors of South Carolina, Nevada, and Washington have stated that they do not intend to allow their states to maintain the sole facilities for disposal of the nation's low-level radioactive wastes. South Carolina will limit waste receipts to 100,000 cubic feet (2831.7 cubic meters) per month by October 1981, and Washington will likely restrict use of the Richland site to Northwestern states after 1982.

In December 1980, Congress enacted the "Low-Level Radioactive Waste Policy Act," P.L. 96-573. This law places the responsibility for commercial low-level radioactive waste management in the hands of the states. The U.S. Department of Energy (DOE) has instituted a "National Low-Level Radioactive Waste Management Program" to assist the states in meeting this responsibility. Many states and national organizations, such as the National Governors' Association and the Southern Governors' Association, have endorsed the policy of state responsibility and have advocated allowing states to enter into regional compacts to provide adequate and safe low-level radioactive waste management.

The Southern region has a particular interest in providing a solution to the problem of diminishing disposal capacities. The Barnwell, South Carolina disposal facility accepted 80 percent of all low-level radioactive wastes shipped to commercial burial sites in 1979. Apart from the thousands of cubic feet of low-level wastes produced by Southern hospitals and universities, the

Southern region already leads the nation in nuclear power generation, and has a number of nuclear plants under construction or being planned. The Tennessee Valley Authority alone is engaged in a construction program that will result in 17 nuclear powered electric generation plants by 1990. To cope with the increasing amounts of low-level radioactive waste being produced daily, alternatives to the current disposal options must be developed.

Section 2 of this Briefing Book presents an overview of past and present low-level radioactive waste management practices within the State of Kentucky. Section 3 identifies those demographic and economic factors and trends that affect or can be related to the quantity and nature of low-level radioactive wastes within the state. Section 4 presents an overview of Kentucky's state government and identifies government agencies and institutions with statutory or other responsibilities affecting the generation, handling, and disposal of radioactive wastes. Section 5 presents the methodology employed for conducting a direct mail survey of radioactive material licensees within the state. The results of this survey are in Section 6 and provide information regarding quantities and qualities of low-level radioactive wastes currently generated, current management practices, and projected future trends in generation and management.

In March 1962 Kentucky became the first state to enter into an agreement with the U.S. Atomic Energy Committee (AEC) to assume regulatory control of by-product, source, and special nuclear material. This agreement was negotiated pursuant to a 1959 amendment, Section 274, of the Atomic Energy Act of 1954. As an agreement state, Kentucky has the authority to license the disposal of low-level radioactive waste. In the early 1960s Kentucky's leaders adopted a policy of encouraging nuclear industry in the hope that Kentucky would reap the benefits of a profitable new industry.

Maxey Flats Disposal Site

In January 1963 the Kentucky Atomic Energy Authority negotiated a contract with the Nuclear Engineering Company, Inc. (NECO), now U.S. Ecology, to operate a radioactive waste disposal facility at Maxey Flats in Fleming County. This 330-acre site is located approximately 53 miles northeast of Lexington. The land on which the site is located was purchased by NECO and then deeded over to the state.

The Maxey Flats disposal site was operated by NECO until December 27, 1977, when the site was ordered closed by Peter Conn, Secretary for Human Resources, pending improvements in the on-site water management program. The closure of the site was the result of problems first noted in 1972. The Kentucky Department of Health (now the Department for Human Resources), while monitoring the site and surrounding areas, detected possible off-site

migration of radioisotopes. It was determined that water management at the site was inadequate to protect the environment from possible radioactive contamination, as small amounts of plutonium were being transported off-site via surface runoff waters. Pursuant to orders issued by the Kentucky Department of Health to correct violations of disposal regulations, NECO instituted major management changes, including an on-site water management program.

In 1974 the Department for Human Resources (DHR) issued a "Six Month Study of Radiation Concentrations and Transport Mechanisms at the Maxey Flats Area of Fleming County, Kentucky." It concluded that although the disposal site was contributing radioactivity to the environment, there was no significant threat to public health. The results of the DHR report were verified by various radiological monitoring and hydro-geological studies conducted by the U.S. Environmental Protection Agency (EPA), the U.S. Nuclear Regulatory Commission (NRC), and the U.S. Geological Survey.

In May 1978 an agreement between NECO and Kentucky terminated the remainder of NECO's lease on Maxey Flats. Responsibility for custody of the site was originally vested in the Kentucky Department of Finance; a 1979 executive order, however, transferred the responsibility to the Department for Natural Resources and Environmental Protection (DNREP). Regulatory authority over the site remains with the Radiation Control Branch of the Department of Human Resources.

DNREP is required to develop and implement a long term plan for the stabilization and eventual decommissioning of Maxey Flats. In order to

implement this mandate the Department has created the Maxey Flats program in the Secretary's Office of Special Projects. The problem of water in the disposal trenches is currently being remedied by diverting surface runoff waters to prevent percolation into the trenches. Water already in the trenches is being pumped out and evaporated or solidified.

In the 14 years that Maxey Flats was operating, approximately 135,000 cubic meters (4.75 million cubic feet) of solid and solidified low-level radioactive waste was buried. This figure accounted for approximately 38 percent of the waste buried at all six operating commercial disposal sites.

Current Low-Level Radioactive Waste Management

According to a survey conducted by the Kentucky Radiation Control Branch in September 1980, Kentucky shipped approximately 108 cubic meters (3818.3 cubic feet) of low-level radioactive waste to commercial burial sites in 1979. Ninety percent of that waste was shipped either to Beatty, Nevada or Hanford, Washington. One institution, the University of Kentucky, accounted for 90.6 cubic meters (3,200 cubic feet) of waste.

Most medical and academic licensees store wastes until they decay to background levels of radioactivity. The wastes may then be safely disposed of by conventional methods. The University of Kentucky has indicated that although it expects to produce a larger quantity of low-level radioactive waste in 1981, it will use a compactor to reduce the volume of waste shipped to commercial disposal sites.

Introduction

This demographic study of Kentucky is designed to analyze various demographic factors, data, and trends that could be related to the quantity, nature, and potential management options of low-level radioactive wastes within the state and its subunits.

State Economic Areas

The study covers the State of Kentucky as a whole, and its subunits, namely, its State Economic Areas (SEAs). State Economic Areas are frequently used in demographic studies of the subunits of states because most states are so heterogeneous in terms of urban-rural distributions, climate, industry, topography, population size and growth, economic activity, and so forth, that it is infeasible to investigate these phenomena strictly at the state level. It is necessary to reduce the state's geography into smaller units of analysis, but not so small that their number becomes too cumbersome, as might be the situation if one were to break the state down into counties. The State Economic Area is an appropriate unit for the subject in this study and is midway between the state and the county.

State Economic Areas are relatively homogeneous subdivisions of a state, consisting of single counties or groups of counties that have similar economic and social characteristics. The boundaries of these areas have been drawn in such a way that each state is subdivided into relatively few parts, with each part having significant characteristics that distinguish it from adjoining areas.

In the establishment of State Economic Areas, factors in addition to industrial and commercial activities were taken into account. Demographic, climatic, physiographic, and cultural factors, as well as factors pertaining more directly to the production and exchange of agricultural and non-agricultural goods, were examined. The result is an intermediate area for study, smaller than the state and larger than a county, with a more or less homogeneous set of characteristics.

SEAs that contain the counties of the larger Standard Metropolitan Statistical Areas (i.e., metropolitan areas that in 1960 had central cities of 50,000 or more, with total populations of 100,000 or more) are recognized as metropolitan SEAs and are designated by the name of the respective metropolitan areas. The bulk of the SEAs, however, are non-metropolitan and have names that reflect either their locations in their states, their particular economic activities, or both. The nonmetropolitan SEAs are identified numerically, the metropolitan SEAs with letters.

The State of Kentucky is divided into 14 State Economic Areas, nine of which are nonmetropolitan: SEA 1: Jackson Purchase; SEA 2: Lower Ohio Valley; SEA 3: Western Kentucky Coal Fields and Knobs; SEA 4: Kentucky Pennyroyal; SEA 5: South Central Kentucky Highland; SEA 6: Outer Bluegrass; SEA 7: Inner Bluegrass; SEA 8: Eastern Kentucky Hills; and SEA 9: Eastern Kentucky Coal Fields. The remaining five SEAs are metropolitan: SEA A: Louisville SMSA (Kentucky part); SEA B: Cincinnati SMSA (Kentucky part); SEA C: Huntington -- Ashland SMSA (Kentucky part); SEA D: Evansville SMSA (Kentucky part); and SEA E: Lexington SMSA. These State Economic Areas are outlined and identified, along with the major cities in the state, in Map 3.1.

3.1 Population and Location

The population of Kentucky on April 1, 1980 was 3,661,433, according to the final count of the 1980 Census of Population (U.S. Bureau of the Census, 1981). This figure was an increase of almost 441,000, or nearly 14 percent, from the 3,220,711 inhabitants counted in the 1970 Census. In this section the population of the state and its SEAs in terms of age composition is described for 1978, 1980, and 1990. The data for 1980 and 1990 are based on population projections and the data for 1978 on population estimates developed by the Bureau of the Census. At the time of this writing, age and sex data from the 1980 Census have not yet been released.

Population bar graphs for the state and each SEA that depict age compositions have been developed. Figures 3.1.1 through 3.1.E are for the SEAs and Figure 3.1.15 for the state as a whole.

These graphs show that in most cases the metropolitan SEAs (see especially Figures 3.1.C and Figures 3.1.D, the graphs for Huntington and Evansville) are characterized by slightly lower concentrations of very young persons and slightly higher concentrations of the very old, than are the nonmetropolitan areas. Comparisons of this type are most representative of many metropolitan and nonmetropolitan areas.

A few of the SEAs in Kentucky do show unusual age and sex distributions. The Western Kentucky Coal Fields and Knobs (Figure 3.1.3) and the Kentucky Pennyroyal (Figure 3.1.4) show high percentages of males in the age groups 15 - 29, illustrating the prominence of their military populations. Finally, the Lexington SEA (see Figure 3.1.E), the home of

Map 3.1 The State Economic Areas and Major Cities of Kentucky

the University of Kentucky, has nearly 13 percent of its population in the age group 20-24, the main ages of its college student population. This high percentage of college-age residents results in about 30 percent of this SEA's population falling in the 15-29 age group. This configuration occurs frequently in State Economic Areas with large university student populations.

In Table 3.1 rates of population growth between 1970-75 are presented for the state and its SEAs, along with growth rates due to net migration. Data on population density (the number of persons per square mile) are also presented. Finally, the two columns present population projections for each SEA and the state for 1980 and 1990.

Although at the time of this writing, detailed age and sex data were not yet available from the 1980 Census, the final 1980 population count for the state as a whole was available. The 1980 projection for the state as a whole (Table 3.1) shows a total count of 3,661,656.

The 1980 projection data show the continued prominence mainly of one SEA, the Louisville SMSA (SEA A), with a 1980 population of more than 731,000. Two additional SEAs also contain larger populations than the other SEAs: SEA 9: Eastern Kentucky Coal Fields, with more than 427,000 in 1980, and SEA 6: Outer Bluegrass, with about 436,000. The data presented for 1990 suggest the continued prominence of these SEAs as the major population focal points in the state.

Of all the SEAs in Kentucky, Louisville is the most densely populated, with 1,858 persons per square mile. SEAs B (Cincinnati - Kentucky portion)

Figure 3.1.1 SEA 1
Jackson Purchase

Figure 3.1.2 SEA 2
Lower Ohio Valley

Figure 3.1.3 SEA 3
Western Kentucky Coal Fields & Knobs

Figure 3.1.4 SEA 4
Kentucky Pennyroyal

8-3

Figure 3.1.5 SEA 5
South Central Kentucky Highland

Figure 3.1.6 SEA 6
Outer Bluegrass

Figure 3.1.7 SEA 7
Inner Bluegrass

Figure 3.1.8 SEA 8
Eastern Kentucky Hills

Figure 3.1.9 SEA 9
Eastern Kentucky Coal Fields

Figure 3.1.A SMSA A
Louisville (Kentucky Part)

Figure 3.1.B SMSA B
Cincinnati (Kentucky Part)

Figure 3.1.C SMSA C
Huntington - Ashland
(Kentucky Part)

Figure 3.1.D SMSA D
Evansville (Kentucky Part)

Figure 3.1.E SMSA E
Lexington

Figure 3.1.15
Population of Kentucky (1978)

Table 3.1 Demographic Growth and Density Information for the
State of Kentucky and its State Economic Areas

<u>State Economic Area</u>		<u>Population Growth Rate 1970 - 1975</u>	<u>Growth Rate Due to Net Migration 1970 - 1975</u>	<u>Population Density per Square Mile 1975</u>	<u>Population Projection 1980</u>	<u>Population Projection 1990</u>
SEA 1	Jackson Purchase	3.1%	3.1%	71	184,854	201,619
SEA 2	Lower Ohio Valley	3.4%	0.2%	87	129,874	141,568
SEA 3	Western Ky. Coal Fields & Knobs	6.1%	0.7%	50	380,404	399,287
SEA 4	Kentucky Pennyroyal	8.7%	6.9%	64	245,851	297,422
SEA 5	South Central Ky. Highland	8.1%	6.0%	41	193,971	221,838
SEA 6	Outer Bluegrass	6.6%	4.0%	59	436,294	512,256
SEA 7	Inner Bluegrass	8.9%	6.6%	75	153,485	187,346
SEA 8	Eastern Ky. Hills	7.6%	2.4%	43	252,887	287,786
SEA 9	Eastern Ky. Coal Fields	12.6%	6.4%	67	427,365	502,016
SEA A	Louisville SMSA	0.2%	-2.9%	1,858	731,241	762,234
SEA B	Cincinnati SMSA (Kentucky Part)	-1.5%	-4.1%	683	221,266	223,873
SEA C	Huntington-Ashland SMSA (Kentucky Part)	0.3%	-2.7%	330	52,242	50,782
SEA D	Evansville SMSA (Kentucky Part)	1.6%	-0.8%	84	39,072	42,270
SEA E	Lexington SMSA	6.7%	3.4%	664	212,850	255,825
State of Kentucky		5.1%	1.6%	85	3,661,656	4,086,112

and E (Lexington) are the next most densely populated, with densities over 600 in each. These three SEAs are the major sites of population concentration in Kentucky.

3.2 Agriculture

Demographic data on agriculture for the State of Kentucky and its State Economic Areas indicate those areas within the state heavily engaged in agricultural pursuits. Data of this type could be influential in determining which areas within the state could be candidates for disposal sites for low-level radioactive waste products, and which areas should not be.

Table 3.2 presents information for the state and its SEAs on the total amount of land in farms (expressed in thousands of acres) in 1974 and 1978, the percent of all land devoted to farming in 1974 and 1978, and the average value of land and buildings per farm (in thousands of dollars) in 1974 and 1978.

Acreage designated as "land in farms" consists primarily of agricultural land used for crops, pasture, or grazing. It also includes woodland and wasteland not actually under cultivation or used for pasture or grazing, provided it was part of the farm operator's total operation. Large acreages of woodland or wasteland held for non-agricultural purposes were deleted from individual reports during the census processing operations. Except for open range and grazing land used under government permits, all grazing land was included as "land in farms," provided the land was part of a farm or ranch.

The State Economic Area in Kentucky with the greatest number of acres devoted to farming in 1978 was SEA 6: Outer Bluegrass, with

Table 3.2 Agricultural Data for the State of Kentucky
and its State Economic Areas, 1974 and 1978

<u>State Economic Area</u>	Land in Farms Total Acres in 1,000s		Average Value of Land and Buildings per Farm in \$1,000s		Percent of Land Devoted to Farming	
	1974	1978	1974	1978	1974	1978
SEA 1 Jackson Purchase	987	999	62	149	64.3	65.0
SEA 2 Lower Ohio Valley	731	758	99	249	81.8	84.8
SEA 3 Western Ky. Coal Fields & Knobs	2,803	2,801	49	106	59.9	59.8
SEA 4 Kentucky Pennyroyal	1,557	1,611	72	167	73.2	75.7
SEA 5 South Central Ky. Highland	1,823	1,861	37	76	66.8	68.1
SEA 6 Outer Bluegrass	3,310	3,379	65	123	79.5	81.1
SEA 7 Inner Bluegrass	1,018	1,067	100	186	89.5	93.8
SEA 8 Eastern Ky. Hills	1,356	1,310	33	66	39.3	37.9
SEA 9 Eastern Ky. Coal Fields	283	240	33	71	7.8	6.6
SEA A Louisville SMSA	75	64	107	189	31.3	26.7
SEA B Cincinnati SMSA (Kentucky Part)	90	92	57	102	45.0	46.0
SEA C Huntington-Ashland SMSA (Kentucky Part)	31	32	58	88	30.7	31.7
SEA D Evansville SMSA (Kentucky Part)	217	230	133	321	78.3	83.0
SEA E Lexington SMSA	155	157	234	382	86.6	87.7
State of Kentucky	14,432	15,040	60	119	56.9	59.3

over 3.3 million acres, a slight increase over the acreage devoted to farming in 1974. The Huntington -- Ashland SMSA (SEA C) had the fewest acres devoted to farming in 1978. Regarding the total amount of land in the area devoted to farming, the Inner Bluegrass (SEA 7) had the highest percentage in 1978, with almost 94 percent of its land devoted to agriculture. The Eastern Kentucky Coal Fields (SEA 9) had the smallest portion of its land (less than 7 percent) devoted to this purpose in 1978.

The two SEAs with the highest average value of land and buildings per farm in 1978 were both metropolitan: SEA D: Evansville and SEA E: Lexington, with \$321,000 and \$382,000 average value per farm respectively. The Lower Ohio Valley (SEA 2) had the next highest average value of land and buildings per farm. The average value per farm in the State of Kentucky as a whole in 1978 was \$119,000, an adjusted increase of 51 percent over the 1974 value.

3.3 Health

This section analyzes health information for the State of Kentucky and its State Economic Areas. Table 3.3 provides the following information for 1975: number of hospitals, number of hospital beds, hospital beds per 100,000 population, and physicians per 100,000 population. The data on hospitals and beds were collected by the American Hospital Association for all hospitals accepted for registration by the Association. The data on physicians were collected by the American Medical Association and refer to professionally active non-federal physicians.

The data indicate that the Lexington and Louisville SMSAs (SEAs E and A) lead in absolute numbers of hospital beds. As anticipated, the

Table 3.3 Health Information for the State of Kentucky
and its State Economic Areas, 1975

<u>State Economic Area</u>		<u>Number of Hospitals</u>	<u>Number of Hospital Beds</u>	<u>Hospital Beds per 100,000 Population</u>	<u>Physicians per 100,000 Population</u>
SEA 1	Jackson Purchase	8	981	568	90
SEA 2	Lower Ohio Valley	4	639	525	78
SEA 3	Western Ky. Coal Fields & Knobs	13	1,309	351	58
SEA 4	Kentucky Pennyroyal	11	1,841	859	85
SEA 5	South Central Ky. Highland	10	464	264	52
SEA 6	Outer Bluegrass	18	1,863	477	67
SEA 7	Inner Bluegrass	7	518	388	62
SEA 8	Eastern Ky. Hills	8	538	230	40
SEA 9	Eastern Ky. Coal Fields	17	1,644	426	70
SEA A	Louisville SMSA	17	4,892	702	215
SEA B	Cincinnati SMSA (Kentucky Part)	4	923	430	101
SEA C	Huntington-Ashland SMSA (Kentucky Part)	2	341	648	131
SEA D	Evansville SMSA (Kentucky Part)	1	191	521	95
SEA E	Lexington SMSA	8	3,062	1,646	431
	State of Kentucky	128	19,206	567	120

tribution of hospital beds and physicians calculated on a per population basis is more even than when calculated as absolute counts, although Lexington still stands out as the major site. It would appear that both SEAs are major locations for radionuclide use in a hospital/medical context in the State of Kentucky.

3.4 Higher Education

Colleges and universities are major users of radionuclides. Table 3.4 provides baseline information on higher education in the State of Kentucky and its State Economic Areas for the academic years 1974-75 and 1977-78. In the year ending in 1975, the 37 colleges and universities in Kentucky had a student enrollment of over 110,000. Three years later, the number of institutions had increased to 41, and the student enrollment increased to more than 133,000.

The geographical distribution of institutions of higher education in Kentucky is relatively even, with five of the SEAs having at least five institutions and no SEA having more than eight. Most of the students are concentrated in two SEAs, Louisville and Lexington. These two metropolitan SEAs had more than half of the college student enrollments in 1978. The major universities located in these SEAs are the University of Kentucky, the University of Kentucky Community College System (both in Lexington), and the University of Louisville.

Consideration of isotope utilization and disposal should focus primarily on the Lexington and Louisville SEAs. They contain the bulk of the student enrollments in the State of Kentucky.

Table 3.4 Information on Institutions of Higher Education for the State of Kentucky
and its State Economic Areas: Academic Years 1974-75 and 1977-78

State Economic Area	Number of Post-Secondary Schools		Post-Secondary School Enrollments	
	1974-75	1977-78	1974-75	1977-78
SEA 1 Jackson Purchase	1	2	7,337	8,095
SEA 2 Lower Ohio Valley	2	3	1,573	2,154
SEA 3 Western Ky. Coal Fields & Knobs	1	1	693	691
SEA 4 Kentucky Pennyroyal	1	1	12,017	13,490
SEA 5 South Central Ky. Highland	1	0	301	0
SEA 6 Outer Bluegrass	6	5	15,919	17,967
SEA 7 Inner Bluegrass	5	5	3,034	3,371
SEA 8 Eastern Ky. Hills	3	3	7,566	7,938
SEA 9 Eastern Ky. Coal Fields	5	5	3,989	4,295
SEA A Louisville SMSA	5	8	16,435	25,343
SEA B Cincinnati SMSA (Kentucky Part)	3	3	6,272	7,958
SEA C Huntington-Ashland SMSA (Kentucky Part)	0	0	0	0
SEA D Evansville SMSA (Kentucky Part)	0	0	0	0
SEA E Lexington SMSA	4	5	34,976	41,832
State of Kentucky	37	41	110,112	133,134

3.5 Government

Demographic data on government employment and revenues in the State of Kentucky and its State Economic Areas provide information on the scope of local, state, and federal government activity, and the extent to which it has changed in magnitude in recent years.

Tables 3.5 presents demographic data on government employment and payrolls in Kentucky and its State Economic Areas in 1972 and 1977. The SEA with the greatest number of government employees, 22,000 in 1977, is the Louisville SMSA (SEA A). Kentucky as a whole had the equivalent of more than 93,000 full-time government employees in the same year, an increase of about 16 percent over its 1972 levels. Nearly 25 percent of the state's government employees are located in Louisville.

Table 3.6 presents general revenue data, total intergovernmental revenue data, and the amount of revenue received from the federal government. These data are provided for 1972 and 1977. The Louisville SEA had the largest amount of general governmental revenue in 1977 in the state: over \$468 million. This amount constitutes an increase of 46 percent between 1972 and 1977 in terms of adjusted 1977 dollars. The State of Kentucky had total revenues in 1977 of over \$1.6 billion, an adjusted increase of about 44 percent over 1972 revenues.

In terms of total intergovernmental revenue in 1977, the Louisville SEA again is the most prominent SEA in Kentucky. The state as a whole had over \$761 million in intergovernmental revenue in 1977. In that year the Louisville SEA received about half of its intergovernmental revenue from the federal government, while the State of Kentucky received more than 38 percent from that source.

Table 3.5 Government Employment and Payroll Data for the State of Kentucky and its State Economic Areas

State Economic Area	Government Employment ¹			Local Government Payroll ²		
	1972	1977	ratio 1977/72	Oct. 1972	Oct. 1977	adj. ratio ³ 1977/72
SEA 1 Jackson Purchase	4,235	4,797	1.13	2.4	3.8	1.21
SEA 2 Lower Ohio Valley	3,739	4,185	1.12	2.3	3.5	1.16
SEA 3 Western Kentucky Coal Fields & Knobs	7,533	9,308	1.24	3.9	7.1	1.39
SEA 4 Kentucky Pennyroyal	5,186	5,955	1.15	2.9	4.4	1.16
SEA 5 South Central Kentucky Highland	4,192	4,188	1.00	2.2	3.2	1.11
SEA 6 Outer Bluegrass	8,226	10,375	1.26	4.6	8.0	1.33
SEA 7 Inner Bluegrass	2,925	3,619	1.24	1.6	2.8	1.34
SEA 8 Eastern Kentucky Hills	5,054	5,512	1.09	2.4	4.1	1.30
SEA 9 Eastern Kentucky Coal Fields	8,022	9,679	1.21	4.2	7.0	1.27
SEA A Louisville	20,110	22,568	1.12	14.6	22.1	1.16
SEA B Cincinnati (Kentucky part)	4,245	5,014	1.18	2.6	4.6	1.35
SEA C Huntington-Ashland (Kentucky part)	1,205	1,317	1.09	0.7	1.1	1.20
SEA D Evansville (Kentucky part)	931	1,140	1.22	0.5	0.9	1.37
SEA E Lexington	4,418	5,507	1.25	3.1	5.1	1.26
State of Kentucky	80,021	93,164	1.16	48.0	77.7	1.24

1 Government Employment is expressed in terms of full-time equivalents.

2 Local government payrolls are expressed in millions of dollars.

3 As a control for inflation, the adjusted ratio of 1977 to 1972 payroll was computed after converting the 1977 payroll dollars into their equivalent on the basis of 1972 dollars.

Table 3.6 Government Finance Data for the State of Kentucky and its State Economic Areas

State Economic Area	General Revenue in millions of dollars ¹			Total Intergovernmental Revenue in millions of dollars ³			Intergovernmental Revenue from the Federal Government (percentage)	
	1972	1977	adj. ratio ² 1977/72	1972	1977	adj. ratio ² 1977/72	1972	1977
SEA 1 Jackson Purchase	42.5	74.0	1.33	19.0	42.4	1.69	7.7	7.4
SEA 2 Lower Ohio Valley	37.1	66.0	1.36	11.6	29.1	1.91	8.9	13.7
SEA 3 Western Ky. Coal Fields & Knobs	65.5	146.7	1.71	36.6	66.2	1.38	6.7	14.5
SEA 4 Kentucky Pennyroyal	55.0	115.5	1.60	23.4	51.2	1.67	13.3	5.1
SEA 5 South Central Ky. Highland	37.4	56.5	1.15	22.5	38.5	1.31	4.2	4.1
SEA 6 Outer Bluegrass	85.0	156.4	1.40	37.1	67.2	1.38	4.2	20.5
SEA 7 Inner Bluegrass	32.1	50.4	1.20	12.3	20.9	1.30	5.6	11.6
SEA 8 Eastern Kentucky Hills	43.2	63.5	1.12	30.6	43.5	1.08	4.9	1.9
SEA 9 Eastern Kentucky Coal Fields	78.1	166.3	1.63	55.1	114.6	1.59	8.3	9.1
SEA A Louisville	245.5	468.2	1.46	75.8	193.6	1.95	30.5	50.0
SEA B Cincinnati	50.5	108.6	1.64	17.3	48.5	2.14	15.4	40.0
SEA C Huntington-Ashland (Ky. part)	18.4	25.1	1.04	4.9	9.6	1.50	6.9	15.1
SEA D Evansville	9.0	17.3	1.47	3.5	7.0	1.53	0.2	16.3
SEA E Lexington	54.0	97.5	1.38	17.4	29.2	1.28	22.0	32.2
State of Kentucky	853.3	1612.0	1.44	367.3	761.5	1.58	13.0	38.2

1 General revenue data are exclusive of interlocal revenue and are for the fiscal year which closed at various dates for each government during the 12 months ending June 30 of the particular year.

2 As a control for inflation, the adjusted ratio of 1977 to 1972 payroll was computed after converting the 1977 payroll dollars into their equivalent on the basis of 1972 dollars.

3 Intergovernmental revenue data are exclusive of interlocal revenue.

3.6 Economy

This section describes the economy and distribution of economic activities in Kentucky in 1974 and 1978. The state as a whole and each SEA have been examined for the two time periods. Table 3.7 presents nine industrial categories and indicates the number of employees, the annual payroll, and the growth of payrolls between 1974 and 1978 for each category. The data reported pertain mainly to employment covered by the Federal Insurance Contributions Act (FICA). The data thus cover all workers except government and railroad employees, self-employed persons, and a small number of others.

The following information describing industrial activities for the state and its SEAs was taken from statistics provided in County Business Patterns, a data source developed and published through the U.S. Bureau of the Census. County Business Patterns provides an annual report on the economic activities of all counties in the United States. In the following analysis, county data were aggregated into SEAs.

In summarizing the major industrial activities of Kentucky's SEAs, in 1974 manufacturing provided the major economic base for the state. More than 290,000 manufacturing employees received an annual payroll of over \$2.7 billion. In 1978 the state retained the same general type of industrial concentration and distribution. For example, SEA 1 experienced an increase in its manufacturing payrolls between 1974 and 1978 of 27 percent, after adjusting for inflation. Increases in other industrial activities in this SEA included a 1978 payroll for contract construction 24 percent higher than the 1974 payroll.

Table 3.7 Economic Data¹ for the State of Kentucky

<u>Industry Group</u>	<u>1974</u>		<u>1978</u>		Change in economic payrolls ² between 1974 & 1978
	Number of employees for week including March 12	Annual Payroll in \$1,000	Number of employees for week including March 12	Annual Payroll in \$1,000s	
Agricultural services, forestry and fisheries	2,187	13,182	2,674	20,262	1.17
Mining	35,568	479,513	48,444	946,389	1.50
Contract construction	46,510	486,440	50,368	709,842	1.11
Manufacturing	293,816	2,778,510	286,670	3,858,857	1.06
Transportation and other public utilities	40,298	414,666	49,697	702,791	1.29
Wholesale trade	53,634	500,264	62,149	783,266	1.20
Retail trade	160,973	836,545	199,313	1,331,230	1.22
Finance, insurance and real estate	40,526	316,373	48,020	506,630	1.22
Services	142,546	813,565	176,758	1,369,112	1.29

1 Excludes government employees, railroad employees, and self-employed persons.

2 Change in payroll expressed as ratio of 1978 payroll to 1974 payroll (in constant dollars).

The major economic activity in the Lower Ohio Valley (SEA 2) is manufacturing, with mining in second place. Mining increased in payrolls between 1974 and 1978, while manufacturing decreased. The Kentucky Coal Fields and Knobs (SEA 3) is also characterized mainly by manufacturing, as are all but one of the remaining five nonmetropolitan State Economic Areas in Kentucky (SEAs 4 through 8). The principal industrial activity in the Eastern Kentucky Coal Fields (SEA 9) is mining: more than 54 percent of its total labor force is concentrated in this industry. The major growth industries in most of the nonmetropolitan SEAs between 1974 and 1978 were the manufacturing and services categories.

Manufacturing also constitutes the major economic activity in the five metropolitan SEAs of Kentucky in size of annual payrolls. The Louisville SEA had a manufacturing payroll in 1978 of over \$1.5 billion, the largest of any SEA in the state. The services and retail trade industries had the greatest number of employees in 1978 in both Cincinnati and Lexington. Between 1974 and 1978 no one industrial category predominated in payroll increases across the five metropolitan SEAs.

Kentucky may be characterized mainly by manufacturing, with services and retail trade next in importance. In 1978 manufacturing payrolls in the state amounted to more than \$3.8 billion, with services and retail trade totalling more than \$1.3 billion. The differential between these industries in number of employees is not as striking. There were more than 286,000 manufacturing employees as opposed to over 176,000 and 199,000 retail trade and service employees. Kentucky's manufacturing payrolls increased by about 6 percent between 1974 and 1978, while services payrolls increased by about 29 percent and retail trade by 22 percent.

References

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- Shryock, Henry S. and Siegel, Jacob S., The Methods and Materials of Demography; Volume 2, Chapter 24, U.S. Government Printing Office, Washington, D.C.: April 1981.
- U.S. Bureau of the Census, 1980 Census of Population and Housing, Final Population and Housing Unit Counts, PHC80-V-1; U.S. Government Printing Office, Washington, D.C.: April 1981.
- U.S. Bureau of the Census, County Business Patterns, 1974, and County Business Patterns, 1978; Washington, D.C.; machine readable data files.
- U.S. Bureau of the Census, County and City Data Book, 1972; Washington, D.C.; magnetic tape version.
- U.S. Bureau of the Census, Census of Governments, 1977; Washington, D.C.; machine readable data files.

This section describes the structure and jurisdiction of Kentucky state government. Key state government officials, the Kentucky delegation to Congress, and state statutes and regulations relevant to radioactive waste management are identified, and a brief synopsis of those statutes and regulations is provided. A list of citizen action organizations is also incorporated in this section.

4.1 Major Political Parties

The majority party in Kentucky is the Democratic party. In the Kentucky Senate 29 legislators are Democrats and nine are Republicans; of 100 legislators in the House of Representatives, 75 are Democrats. The executive branch of Kentucky's government is predominately Democratic. Kentucky's United States Senators are Democrats as are four of the state's seven Congressmen.

4.2 The Kentucky Delegation

The following list identifies Kentucky's United States Senators and Representatives. Congressional Districts are shown in Map 4.1 on page 4-3.

Senators:

Wendell H. Ford (D)
4107 Dirksen Senate Office Building
Washington, D.C. 20510
202-224-4343

Mr. Ford was elected in 1974 and is a member of the Commerce, Science and Transportation, Energy and Natural Resources, and Rules Committees.

Walter Huddleston (D)
2121 Dirksen Senate Office Building
Washington, D.C. 20510
202-224-2541

Mr. Huddleston was elected in 1972 and is a member of the Agriculture, Nutrition, Forestry, Appropriations, Intelligence (Select), and Small Business (Select) Committees.

Representatives:

Larry J. Hopkins
514 Cannon House Office Building
Washington, D.C. 20515
202-225-4706
(R, 6th District)

Mr. Hopkins was elected in 1978 and is a member of the Aging (Select), Agriculture, and Armed Services Committees.

Carroll Hubbard, Jr.
204 Cannon House Office Building
Washington, D.C. 20515
202-225-3115
(D, 1st District)

Mr. Hubbard was elected in 1974 and is a member of the Banking, Finance, Urban Affairs, Merchant Marine and Fisheries Committees.

Romano L. Mazzoli
2246 Rayburn House Office Building
Washington, D.C. 20515
202-225-5401
(D, 3rd District)

Mr. Mazzoli was elected in 1972 and is a member of the District of Columbia, Intelligence (Select), and Judiciary Committees.

William H. Natcher
2333 Rayburn House Office Building
Washington, D.C. 20515
202-225-3501
(D, 2nd District)

Mr. Natcher began service as a Representative in 1953. He is a member of the Appropriations Committee.

Carl D. Perkins
2328 Rayburn House Office Building
Washington, D.C. 20515
202-225-4935
(D, 7th District)

Mr. Perkins began service as a Representative in 1949. He is Chairman of the Education and Labor Committees.

Harold (Hal) Rogers
413 Cannon House Office Building
Washington, D.C. 20515
202-225-4601
(R, 5th District)

Mr. Rogers began service as a Representative in 1981. He is a member of the Energy and Commerce Committees.

Gene Snyder
2330 Rayburn House Office Building
Washington, D.C. 20515
202-225-3465
(R, 4th District)

Mr. Snyder was elected in 1967 and is a member of the Merchant Marine and Fisheries, and the Public Works and Transportation Committees.

KENTUCKY

CONGRESSIONAL DISTRICTS

June, 1972

Map No. 4.1

4-3

LEGISLATIVE RESEARCH COMMISSION

4.3 State Government

The Kentucky state government comprises executive, legislative, and judicial branches. When the territory that is now Kentucky separated from Virginia and joined the Union in 1792, the people chose the designation, Commonwealth of Kentucky. Kentucky uses the terms "state" and "commonwealth" interchangeably. The following section describes the structure and jurisdiction of Kentucky state government and identifies major state officials.

4.3.1 Executive Branch

The executive branch of Kentucky implements and enforces the laws of the commonwealth. Directing the executive branch is the Governor. The Governor, Lieutenant Governor, Secretary of State, Attorney General, State Treasurer, Commissioner of Agriculture, Superintendent of Public Instruction, Auditor of Public Accounts, and the three members of the Railroad Commission are elected to four-year terms. In addition, the Governor is assisted in the administration of state government by the Governor's Cabinet. There are seven Program Cabinets, the heads of which are appointed by the Governor. These seven Secretaries constitute the Governor's Cabinet.

A number of independent agencies, regulatory commissions, and advisory boards have been created to carry out functions assigned them by law. These organizations enforce laws, promulgate regulations, advise other bodies, or provide public services. Figure 4-1, on the following page is an organizational chart of Kentucky's executive branch.

THE GOVERNOR

Figure 4-1
4-5

Office of the Governor

The Governor is the chief executive of the commonwealth. The Governor is a constitutional officer and is responsible for the faithful execution of the laws of the commonwealth and for the protection and promotion of the general welfare of its citizens. As chief administrative officer, the Governor appoints Cabinet Secretaries and the heads of various other administrative agencies and boards. In order to implement policies or carry out his duties, the Governor is empowered to issue executive orders which have the force of law.

The Governor may address the legislature and recommend bills for its consideration. The Governor is empowered to veto bills passed by the General Assembly and to convene the General Assembly in extraordinary sessions. He must submit a biennial appropriations bill for the legislature's consideration.

The Governor's other duties include granting pardons, paroles, and extraditions. As the ceremonial head of state, the Governor represents the commonwealth at inaugurations, dedications, and other ceremonial occasions. The Governor represents the state in intergovernmental relations with the federal and other state governments.

The present Governor of Kentucky is John Y. Brown, Jr., a Democrat from Lexington. His term of office began in January 1980 and expires in December 1983. The Governor is prohibited from succeeding himself.

The Governor's office address and the names of his chief staff members are:

Governor John Y. Brown, Jr.
State Capital
Frankfort, Ky. 40601
502-564-2611

Chief of Staff: June Taylor
Fiscal Officer: Barbara Hildebrand
Administrative Assistant: Rush Dozier

General Counsel: Jerry Abramson
Press Secretary: Frank Ashley

Lieutenant Governor

The Lieutenant Governor is a constitutional officer elected to a four-year term. The Lieutenant Governor functions in both the executive and legislative branches of government. In the executive branch the Lieutenant Governor stands in direct succession to the Governor if he is unable to fulfill the term of office. The Lieutenant Governor is the acting Governor in the Governor's absence. The Lieutenant Governor is an ex-officio member of the Governor's Cabinet and serves on various boards and commissions. On the legislative side, the Lieutenant Governor is the President of the Senate. As President, the Lieutenant Governor presides over the Senate and may vote to break a tie. If the Senate resolves itself into a committee of the whole, the President may speak and vote as a member of the Senate. The Lieutenant Governor's address and her chief administrative aide are:

Lieutenant Governor Martha Layne Collins
State Capitol
Frankfort, Ky. 40601
501-564-7652

Chief Administrative Aide:
Robert M. Davis

Governor's Cabinet

The Governor's Cabinet is an advisory body which advises the Governor on decisions concerning the administration of government. The heads of several executive agencies and the Lieutenant Governor constitute the Cabinet. The members of the Cabinet are:

Secretary Bruce Lunsford
Commerce Cabinet
Capital Plaza Tower
Frankfort, Ky. 40601
502-564-7670

Secretary William B. Sturgill
Energy and Agriculture Cabinet
Iron Works Pike, P.O. Box 11888
Lexington, Ky. 40578
606-252-5535

Secretary Ray Barbar
Education and Humanities Cabinet
Capital Plaza Tower
Frankfort, Ky. 40601
502-564-4770

Secretary George Atkins
Department of Finance
Capitol Annex
Frankfort, Ky. 40601
502-564-4240

Secretary W. Grady Stumbo
Department for Human Resources
275 East Main Street
Frankfort, Ky. 40601
502-564-7130

Secretary Neil J. Welch
Department of Justice
State Office Building
Frankfort, Ky. 40601
502-564-7554

Secretary Jackie Swigart
Department for Natural Resources
and Environmental Protection
Capital Plaza Tower
Frankfort, Ky. 40601

Secretary George E. Fischer
Personnel and Management Cabinet
State Capitol, Room 101
Frankfort, Ky. 40601
502-564-2611

Secretary Foster Pettit
Public Protection and
Regulation Cabinet
Capital City Airport
Louisville Road
Frankfort, Ky. 40601
502-564-7760

Secretary Frank Metts
Department of Transportation
State Office Building
Frankfort, Ky. 40601
502-564-4890

Department for Human Resources

The Department for Human Resources has a general mandate to develop and protect the personal independence, dignity, growth and economic well-being of the citizens of the commonwealth. The head of the Department of Human Services is appointed by the Governor and is designated as Secretary. His address is:

Dr. W. Grady Stumbo
Secretary of Human Resources
275 East Main Street
Frankfort, Ky. 60401
502-564-7130

Bureau for Health Services.

Within the Department of Human Resources is the Bureau for Health Services. A major program area of the Bureau is the control and prevention of environmental health hazards. The goals of this program include minimization of radiation exposure to the population, encouragement and promotion of product safety and consumer protection, and prevention of transmission of disease.

The Radiation Control Branch is organized in the Bureau for Health Services. The Radiation Control Branch is the "NRC Agreement Agency" for Kentucky. As the agreement agency, the Radiation Control Branch licenses users of non-critical mass radioactive materials, promulgates and enforces regulations for the possession and use of sources of radiation, and prepares emergency plans to deal with nuclear accidents or incidents.

In the fall of 1980, Roy P. Osborne, Section Supervisor in the Radiation Control Branch, conducted a survey of all Kentucky facilities licensed for the use of radioactive materials to determine how each facility

managed its radioactive waste. Mr. Osborne received 259 responses to the 289 questionnaires sent out. The results of this survey indicated that Kentucky shipped 108 cubic meters (3813.3 cubic feet) of low-level radioactive waste to commercial burial grounds in 1979. Approximately 90 percent of the wastes were shipped to Beatty, Nevada or Richland, Washington. Copies of the survey form and the results are included in the Appendix section of this Briefing Book. The Manager of the Radiation Control Branch is:

Donald R. Hughes, Manager
Kentucky Department for Human Resources
Bureau for Health Services
Radiation Control Branch
275 E. Main Street
Frankfort, Ky. 40621
502-564-3700

Department for Natural Resources and Environmental Protection

The Department for Natural Resources and Environmental Protection is a cabinet-level department responsible for the protection and preservation of air, land, and water resources. The Department includes the Bureau of Environmental Protection, the Bureau of Natural Resources, General Administration and Support, and the Bureau of Surface Mining Reclamation and Enforcement. The Secretary's address is:

Secretary Jackie Swigart
Department for Natural Resources
and Environmental Protection
Capital Plaza Tower
Frankfort, Ky. 40621
502-564-2611

The Bureau of Environmental Protection includes the Maxey Flats Management Program. Maxey Flats is the only licensed radioactive waste

disposal site in Kentucky. The site operated commercially from 1963 until 1977, when it was closed because of operational problems. This program is intended to reduce and eliminate the infiltration of water at the site, provide for the safe disposal of radioactive sludge, and provide for the long-term maintenance and perpetual care required at the site. The Program Manager of Maxey Flats is:

Mr. Birney Fish, P.E., Maxey Flats Program Manager
Capital Plaza Tower, 4th Floor
Frankfort, Ky. 40601
502-564-2042

Department of Transportation

The Department of Transportation is a cabinet-level department responsible for improving delivery of transportation services. Included in the Department is the Bureau of Vehicle Regulation. This Bureau licenses drivers and vehicles, inspects and certifies carriers and junkyards, regulates boating, enforces highway laws regarding commercial vehicles, and regulates rates, fares, and services of all motor carriers. As of January 1981, all motor carriers transporting radioactive material on Kentucky highways are required to obtain a permit from the Division of Motor Carriers. The permit requirements and statutory authority are discussed in Section 4.3.4, Statutory Requirements.

Secretary Frank R. Metts
Department of Transportation
State Office Building
Frankfort, Kentucky 40622
502-564-4890

William C. Debord, Assistant
Director
Bureau of Vehicle Regulation
Division of Motor Carriers
State Office Building
Frankfort, Ky. 40622
502-564-4540

Department of Finance

The Department of Finance is responsible for Kentucky's financial management, the review of state planning processes, and the provision of numerous centralized administrative services for state agencies. The Department operates the Management of Public Properties program. Through this program the Department acquires, manages, and disposes of all real property necessary for the functioning of state government.

Secretary George L. Atkins
Department of Finance
Capitol Annex
Frankfort, Ky. 40601
502-564-4240

Southern States Energy Board

Kentucky is a member of the Southern States Energy Board (SSEB), an interstate compact of 16 Southern states and Puerto Rico. The SSEB was founded in 1961 as the Southern Interstate Nuclear Board. It provides its members with technical assistance, program development, policy analysis, and research support in the areas of energy and environment. The activities of the Board are supervised by a Board of Directors composed of one member per state appointed by the Governor. In addition, the SSEB has a Legislative Policy Advisory Council consisting of those state legislators serving on the Southern Legislative Conference Energy Committee. Kentucky's seat on the Board is held by Damon W. Harrison, Commissioner of the Bureau of Energy Management, State Department of Energy.

4.3.2 Legislative Branch

The power to enact laws is vested in the General Assembly. The legislature is a bicameral body composed of a Senate and a House of Representatives. Kentucky's Constitution requires the state be apportioned into 38 senatorial and 10 representative districts; each district elects one delegate. Senators are elected to four-year terms. The terms are staggered so that half the Senate is elected every two years. All the Representatives are elected every two years.

In 1979 the General Assembly passed an amendment to the Constitution that significantly alters the organization of the legislature. Prior to this amendment, the General Assembly convened on the first Tuesday after the first Monday in January of even-numbered years. The session was limited to 60 calendar days, excluding Sundays and legal holidays, and was required to adjourn by April 15.

The amendment to the Constitution requires the General Assembly to convene in odd-numbered years beginning in 1983. The 60-day limit per session remains effective, but only those days during which one or both Houses meet will constitute a legislative day. Another change to be implemented in 1983 will allow the legislature to meet for a 10-day organizational session for the purpose of electing leadership, adopting rules, and forming committees. The General Assembly will then adjourn until the following January at which time it will reconvene for the regular 60-day session.

The final change mandated by the constitutional amendment requires elections to be held in even-numbered years. In November 1981 all 100

Representatives will be elected for an extraordinary three-year term. In the same election, Senators from even-numbered districts will be elected for an extraordinary five-year term. Senators from odd-numbered districts will be elected to five-year terms in 1983. After the 1983 election all members of the General Assembly will be elected in even-numbered years; Representatives will serve two-year terms and Senators will serve four-year terms.

Legislative Leaders

The presiding officer of the Senate is the Lieutenant Governor acting in the ex-officio capacity of President of the Senate. The Lieutenant Governor usually only votes in the case of a tie. If the Senate resolves itself into a Committee of the Whole, the Lieutenant Governor may speak and vote as any member of the Senate. The Speaker of the House is the presiding officer of the House of Representatives, elected from the membership by the Representatives. The officers of the General Assembly are:

President:	Lieutenant Governor Martha Layne Collins
President Pro Tempore:	Joseph W. Prather
Democratic Floor Leader:	John Berry, Jr.
Republican Floor Leader:	Eugene P. Stuart
.	
Speaker of the House:	William G. Kenton
Speaker Pro Tempore:	C.M. (Hank) Hancock
Democratic Floor Leader:	Bobby H. Richardson
Republican Floor Leader:	Arthur Schmidt

Committees

Each chamber of the General Assembly has a Committee on Committees composed of the legislative leaders of the respective houses. The Committee on Committees selects the chairperson, vice chairperson, and members of each standing committee. All bills introduced in the General Assembly are assigned by the Committee on Committees to a standing committee for consideration. The committee to which a bill is assigned may report the bill back to the chamber with favorable or unfavorable reports, or without comment. Committees may also table a bill indefinitely, thereby effectively killing the bill.

Special Advisory Committee on Nuclear Waste Disposal

In 1978 the General Assembly directed that a special advisory committee composed of legislators, university experts, citizens, and state agency personnel be created to have oversight of all matters related to nuclear waste in the commonwealth. Although this special committee has primarily focused on the Maxey Flats site, other general nuclear issues have been considered. The Committee is co-chaired by Representative Pete Worthington and Senator John (Eck) Rose. The Committee members are:

Irving Bell
Department of Human Resources

Margaret Heaslip
Morehead State University

Jack Wilson
Department for Natural Resources
and Environmental Protection

Douglas Humphrey
Western Kentucky University

Charles Wickliffe
Department of Finance

Hugh T. Spencer
University of Louisville

Oscar Gerald
Environmental Quality Commission

Charles Brown
Flemingsburg

Russell McClure
Frankfort

Majorie Denton
Flemingsburg

The Legislative Research Commission provides the staff that supports the Committee. The staff members are:

Peggy Hyland
Brian Kiernan

Regina Caton
Brenda Stivers

Committee Assignments

The following is a list of committees with jurisdiction relevant to low-level radioactive waste.

Senate:

Committee on Committees

Lt. Gov. Martha Layne Collins (D), Chairman
Joseph W. Prather (D), Vice Chairman

Walter A. Baker (R)	David K. Karem (D)
John M. Berry, Jr. (D)	Eugene P. Stuart (R)
Lowell T. Hughes (D)	Joe Wright (D)

Agriculture and Natural Resources

Kenneth O. Gibson (D), Chairman Doug Moseley (R), Vice Chairman

Appropriations and Revenue

Michael R. Moloney (D), Chairman Walter A. Baker (R), Vice Chairman

Health and Welfare

Robert R. Martin (D), Chairman Benny Ray Bailey (D), Vice Chairman

Highways and Traffic Safety

Woodrow Stamper (D), Chairman Gene Huff (R), Vice Chairman

Labor and Industry

Georgia M. Powers (D), Chairman John Doug Hayes (D), Vice Chairman

Public Utilities and Transportation

William L. Sullivan (D), Chairman John D. Rogers (R), Vice Chairman

State Government

Pat M. McCuiston (D), Chairman John A. Rose (D), Vice Chairman

House of Representatives

Committee on Committees

Speaker William G. Kenton (D), Chairman

C.M. Hancock (D)
William Donnermeyer (D)

Bobby H. Richardson (D)
Woody May (D)

Arthur L. Schmidt (R)

Agriculture and Small Business

Donald J. Blandford (D), Chairman
Virgil L. Pearman (D), Vice Chairman

Clay Crupper (D), Vice Chairman
Herman W. Rattliff, (R), Vice Chm.

Appropriations and Revenue

Joseph P. Clarke, Jr. (D), Chairman
Carl A. Nett (D), Vice Chairman

H. Ramsey Morris, Jr. (D), Vice Chm.
Albert Robinson (R), Vice Chairman

Energy

Terry L. Mann (D), Chairman
Ronald Ray Layman (R), Vice Chairman

David E. Boswell (D), Vice Chairman

Health and Welfare

Greta Bendl (D), Chairman
Dottie Priddy (D), Vice Chairman

Ward Burnette (D), Vice Chairman
Raymond Overstreet (R), Vice Chm.

Labor and Industry

J. R. Gray (D), Chairman
David Van Horn (D), Vice Chairman

Ray O. Brown (D), Vice Chairman
Louis R. Guenthner, Jr. (R) Vice Chm.

Natural Resources and Environment

Herbert Deskins, Jr. (D), Chairman
Hoover Dawahare (D), Vice Chairman

William T. Brinkley (D), Vice Chm.
William H. DeMarcus (R), Vice Chm.

State Government

Mark D. O'Brien (D), Chairman
Pete Worthington (D), Vice Chairman

Lloyd E. Clapp (D), Vice Chairman
E. Bruce Blythe (R), Vice Chairman

Transportation

N. Clayton Little (D), Chairman
Forest Sale (D), Vice Chairman

Roy Joe Head (D), Vice Chairman
Harold Haering (R), Vice Chairman

KENTUCKY

GENERAL ASSEMBLY SENATE DISTRICTS

LEGISLATIVE RESEARCH COMMISSION
June 1972

Map 4.2

4-18

Senate

The following roster provides the names and political affiliations of the members of the Kentucky Senate:

Jon W. Ackerson (R)	Clyde W. Middleton (R)
Nelson Robert Allen (D)	Frank Miller (D)
Benny Ray Bailey (D)	Michael R. (Mike) Moloney (D)
Walter A. Baker (R)	Doug Moseley (R)
Charles W. Berger (D)	Delbert S. Murphy (D)
John M. Berry, Jr. (D)	H. Edward O'Daniel, Jr. (D)
James P. (Jim) Bunning (R)	Georgia M. Powers (Mrs. James L.) (D)
Tom Easterly (D)	Joseph W. Prather (D)
Ed Ford (D)	W.L. (Bill) Quinlan (D)
Mrs. Helen Garrett (D)	John D. Rogers (R)
Kenneth O. Gibson (D)	John A. (Eck) Rose (D)
John Doug Hays (D)	August (Gus) Sheehan, Jr. (D)
Gene Huff (R)	Woodrow Stamper (D)
Lowell T. Hughes (D)	Eugene P. Stuart (R)
David K. Karem (D)	William L. Sullivan (D)
Robert R. Martin (D)	John E. Trevey, M.D. (R)
Pat M. McCuiston (D)	Richard Weisenberger (D)
Bill (Fibber) McGee (D)	Joe Wright (D)
Daniel J. (Danny) Meyer (D)	A.D. (Danny) Yocom (D)

House of Representatives

The following roster provides the names and political affiliations of the members of the Kentucky House of Representatives:

Buddy H. Adams (D)	Mae Street Kidd (D)
Willard (Woody) Allen (R)	Ronny Layman (R)
Adrian K. Arnold (D)	Jim LeMaster (D)
Joseph H. Barrows (D)	Phillip Lewis (R)
Gerta Bendl (D)	Henry Clay (Hank) List (D)
Al Bennett (D)	N. Clayton Little (D)
W.D. (Doc) Blair, D.M.D. (D)	Jerry Lundergan (D)
Donald J. Blandford (D)	Terry L. Mann (D)
E. Bruce Blythe (R)	Woody May (D)
David E. Boswell (D)	Lawrence Ray Maynard (D)
William T. (Bill) Brinkley (D)	William K. (Bill) McBee (D)
Jerry Bronger (D)	Lloyd McKinney (R)
Ray O. Brown (D)	Alice H. (Dolly) McNutt (D)
James E. Bruce (D)	Harry Moberly, Jr. (D)
Thomas J. Burch (D)	H. Ramsey Morris, Jr. (D)
Ward (Butch) Burnette (D)	Carl A. Nett (D)
Barry G. Caldwell (R)	Roger Noe (D)
Stephen C. Cawood (D)	Mark D. O'Brien (D)
Lloyd E. Clapp (D)	Raymond Overstreet (R)
Paul Clark (D)	Elvin Elmer Patrick (R)
Joseph P. Clarke, Jr. (D)	Virgil L. Pearman (D)

July, 1980

Map 4.3

4-20

Allene A. Craddock (D)
Clay Crupper (D)
Freed Curd (D)
Ronald R. Cyrus (D)
Marshall Davenport (R)
Hoover Dawahare (D)
Louis DeFalaise (R)
William Harold DeMarcus (R)
Herbert (Herbie) Deskins, Jr. (D)
William I. Donnermeyer, Sr. (D)
James (Jim) R. Dunn (D)
Joel Ellington (D)
Mark Farrow (D)
Lewis Foster (D)
Pat Freibert (Mrs. David) (R)
Richard Fryman (R)
J. R. Gray (D)
Louis R. Guenthner, Jr. (R)
Harold Haering (R)
C.M. (Hank) Hancock (D)
Roy Joe Head (D)
Bob Heleringer (R)
Carl R. Hines, Sr. (D)
Charles R. Holbrook III (R)
Edward L. Holloway (R)
John J. Isler (D)
Louis Johnson (D)
Robert A. (Bob) Jones (D)
William G. Kenton (D)

Charles O. Petty (D)
George M. Plummer (R)
Dottie Priddy (D)
Kenny Rapier (D)
Herman W. Rattliff (R)
Russell Reynolds (D)
Jody Richards (D)
Bobby H. Richardson (D)
Paul W. Richardson (D)
Caludia Riner (D)
Albert Robinson (R)
Archie N. Romines, Sr. (D)
Forest "Aggie" Sale (D)
Arthur L. Schmidt (R)
Frank J. Smith (D)
Philip Stone (D)
Gregory D. Stumbo (D)
Sam B. Thomas (D)
David H. Thomason (D)
Mary Ann Tobin (D)
Richard A. Turner (R)
David L. Van Horn (D)
William R. (Bill) Weinberg (D)
James H. (Jimmy) White (D)
W. Stephen Wilborn (D)
Aubrey Williams (D)
Pete Worthington (D)
Dexter S. Wright (R)
James Bernard Yates (D)

4.3.3 The Judiciary

Kentucky's judiciary is composed of a Supreme Court, a Court of Appeals, Circuit Courts, and District Courts.

Supreme Court

The Supreme Court is the court of last resort in Kentucky. It has appellate jurisdiction only. The Court has discretionary authority to hear appeals from the Court of Appeals. If a Circuit Court imposes a sentence of death, life imprisonment, or imprisonment of 20 years or more, the defendant may appeal directly to the Supreme Court.

The Supreme Court is the final interpreter of Kentucky's Constitution and laws. Decisions of the Kentucky Supreme Court may be appealed only to the United States Supreme Court, and only if a federal question or federal constitutional issue is raised.

The Kentucky Supreme Court establishes the rules of practice and procedure for the state courts, for the conduct of judges and attorneys, and for administrative procedures to be followed by clerks and judges.

One justice is elected to the Supreme Court from each of the seven appellate districts. The justices serve eight-year terms. The justices elect one of their number to be Chief Justice for four years. The Chief Justice is the administrative head of the entire judicial system. As chief administrative officer, the Chief Justice may assign judges to relieve case load problems, and prepares the court system's budget for the General Assembly.

Court of Appeals

Kentucky's Constitution requires at least one appeal from judgement as a matter of right, except for acquittal in criminal cases and dissolution of marriages. The Court of Appeals provides the forum for the appellate review. As with the Supreme Court all appeals are made upon the record only, not by retrial.

Kentucky is divided into seven appellate districts. Two justices from each district are elected for eight-year terms. Cases are heard by

panels of three justices. The panels are not permanently assigned to any one district but travel about the state to hear appeals. The justices select one justice to serve a four-year term as Chief Judge. The Chief Judge performs administrative functions for the Court of Appeals.

Circuit Courts

There are 56 judicial circuits in Kentucky, none smaller than a county. The 87 circuit judges have jurisdiction over all civil matters involving more than \$1,500, and in criminal cases which involve capital offenses and felonies. Land title cases are also tried by the Circuit Courts. Judges are elected for eight-year terms, with the judges of each circuit electing one of their number as Chief Judge for a two-year term.

District Court

The District Courts hear all criminal misdemeanor cases and local ordinance cases. The District Court's civil jurisdiction is limited to cases involving less than \$1,500. There are 56 judicial districts and 114 district judges. The judges are elected for terms of four years, and the judges elect Chief Judges for each district.

4.3.4 Statutory Regulations

The Radiation Control Branch of the Department of Human Resources is Kentucky's "agreement agency" and is charged with the responsibility of regulating and licensing users of by-product, source, and special nuclear

materials in Kentucky. The Department has promulgated Administrative Radiation Regulations, 902 KAR 100, which are comprehensive regulations governing licensing, transportation, use, and disposal of radioactive materials in Kentucky.

Kentucky Revised Statute 152.590 provides the general statutory powers of the Department of Natural Resources and Environmental Protection. Within this statute is a specific requirement that any land designated as a "radioactive waste material site" be owned by the Department and be dedicated in perpetuity for radioactive waste disposal.

The Kentucky Department of Transportation has adopted by reference the federal hazardous materials transportation regulations, 49 CFR. Any person wishing to transport radioactive material in Kentucky, either interstate or intrastate, is required by 601 KAR 1.025 to obtain a permit from the Department.

4.4. Federal Activities in the State of Kentucky

Currently, federal activities in Kentucky in the area of radioactive waste management are not extensive. The Union Carbide Nuclear Company is operating a gaseous diffusion plant for the U.S. Department of Energy (DOE) at Paducah, Kentucky. This plant is generating low-level radioactive wastes which are being disposed of by DOE. The only other federal activity in this area is research conducted by the U.S. Nuclear Regulatory Commission at the Maxey Flats site.

4.5 Public Interest Groups

There are a number of public interest groups in Kentucky that direct their efforts towards the preservation of the environment, however, all of these groups are not specifically concerned with nuclear issues. The following list provides the names, addresses and particular concerns of such citizen groups.

Appalachian Regional Defense Fund: This group of attorneys represents low-income individuals in civil cases under the federally-financed Legal Services Program. It has represented some citizen groups in cases involving the coal industry.

P.O. Box 625
Barbourville, Kentucky 40906
(606) 546-5115

Appalachian Science in the Public Interest: Begun in the early 1970s as an energy and environmental issues group that focused on coal and stripmining policies, ASPI now actively promotes alternative energy sources (e.g. solar) and operates an Appalachian Technical Network to disseminate information on energy alternatives.

180 Market Street
Lexington, Kentucky 40507
(606) 254-1425

Audubon Society: Affiliated with the National Audubon Society, this group is active in conservation efforts.

311 South Main Street
Versailles, Kentucky 40383
(606) 873-8505

Kentucky Rivers Coalition: Established in 1976 as a coalition of rural land owners, environmental and recreational groups seeking to reform Kentucky's water policies, this organization has since become involved in land use and oil shale leasing policies.

207 Woodland Avenue
Lexington, Kentucky 40502
(606) 233-7227

League of Women Voters of Kentucky: A non-partisan organization dedicated to political responsibility through informed and active citizen participation in government, the League of Women Voters promotes the wise management of natural resources and wildlife in the public interest.

115 South Ewing Avenue
Louisville, Kentucky 40206
(502) 895-5218

Save the Valley: This volunteer organization, incorporated in Kentucky and licensed in Indiana, seeks to prevent further pollution of the air, water and land in the Ohio River Valley. It opposes the construction of more coal or nuclear power plants or the introduction of new polluting industries.

P.O. Box 813
Madison, Indiana 47250
(812) 265-4779

Sierra Club: The traditional focus of this group has been issues such as air and water pollution and land management. There has been some involvement in nuclear and hazardous waste issues.

Hank Grady, Cumberland Chapter President
Route One, Hedden Road
Versailles, Kentucky 40383
(606) 846-4907

4.6 Newspapers

The appendix to this handbook contains newspaper articles, clipped from various Kentucky newspapers, relevant to radioactive waste management and nuclear issues in general. These clippings were obtained from a file maintained by the Department for Natural Resources and Environmental Protection. The majority of these articles are about the Maxey Flats site.

A survey package was developed to solicit data and information necessary to characterize generally the low-level radioactive waste management practices in the State of Kentucky. The package included a questionnaire and appropriate letters encouraging licensees to participate in the survey. Administration of the survey was carefully planned to allow licensees adequate response time and included procedures for handling inquiries concerning the data requested and for performing selected follow-up telephone calls. The following sections provide specific information relative to the survey form and administration of the survey.

5.1 Survey Form

The survey form was designed to present the data requested in a concise, easily understood, yet comprehensive format. The intent was to request sufficient data to ascertain both the qualitative and quantitative nature of low-level radioactive waste management practices. The form was designed to allow "check-off" answers wherever possible and to minimize the effort required by respondents in supplying the requested data.

The survey form proper consists of six 14 x 8 1/2-inch typeset printed sheets (three sheets, front and back), as shown in Figure 5.1. Licensees were informed that the data would be treated as CONFIDENTIAL and would be ANONYMOUSLY reported in consensus and statistical form. Each licensee was assigned a number, stamped on each sheet of the questionnaire. The first two digits identify the state and the last four the licensee. These identifying numbers were used during data processing for control purposes.

Sheet One of the questionnaire contains introductory statements consisting of a Rationale for Study and General Guidelines for completing the form. The first four sections, also a part of Sheet One, request the following information:

- 1.0 Organization and Facility Data
- 2.0 Type of Facility
- 3.0 License Information
- 4.0 Radioactive Waste Information

Section 4.0 asks a simple yes or no question about whether the facility generated and/or received radioactive waste during 1978, 1979, and/or 1980. Respondents answering NO for each year were informed that they had completed the questionnaire and were asked to return it.

Sheet Two consists of Section 5.0, Use Classification for Unsealed Radioactive Sources, and Yearly Data Sheet Instructions. The instructions require the use of a key for completing the Yearly Data Sheets. The key contains multiple answers to certain questions and the respondent had only to select the appropriate corresponding number.

The Yearly Data Sheets for 1978, 1979, and 1980 comprise sheets Three through Five. These sheets solicit data in matrix format of radionuclides versus characteristic and quantitative data in six (6) general categories. The categories are the same for each Yearly Data Sheet, except that they were sequentially numbered 6.0 through 23.0 for processing purposes. The categories are:

- 6.0, 12.0, 18.0 Radionuclides Received/Produced
- 7.0, 13.0, 19.0 Radioactive Waste Generated

- 8.0, 14.0, 20.0 Radioactive Waste Received
- 9.0, 15.0, 21.0 Radioactive Waste Processed/Reduced
- 10.0, 16.0, 22.0 Radioactive Waste Shipped
- 11.0, 17.0, 23.0 On-Site Waste Disposal

Sheet Six contains Sections 24.0 and 25.0, which inquire about the source(s) of radionuclide production and facility(ies) from which radioactive waste was received, and a comments and remarks section. This section allows the recipient of the survey to make suggestions or indicate any difficulties encountered that may have caused a particular response.

Some requests for information are included as part of the questionnaire for the sole purpose of determining the validity of other data collected. For example, the type of monitoring instrumentation that a respondent uses to collect activity data reveals the accuracy with which the data were obtained.

5.2 Survey Administration

Packages were prepared that included a questionnaire, a self-addressed prepaid return envelope, a letter from Vachon, Nix and Associates, and a letter from Mr. Don Hughes, Director of the Radiation Control Branch, Kentucky Bureau for Health Services. The Vachon, Nix and Associates letter and state letter included in the packages are presented as Figures 5.2 and 5.3.

Names and addresses of each licensee authorized to handle radioactive material in the State of Kentucky were obtained from EG&G Idaho, Inc. EG&G provided a list of U.S. Nuclear Regulatory Commission licensees. No

attempt was made to differentiate between those licensees believed not to generate radioactive waste and those known to generate waste. Survey packages were mailed to every name provided.

Large 7 1/2 x 10 1/2-inch envelopes were specifically used for the mailout so that the package would not be easily misplaced by recipients. Two special notices were printed on the envelopes: 1) DATED MATERIAL: Southern States Energy Board Radioactive Waste Management Survey, and 2) ATTN: Radioactive Material Control Officer.

The packages were mailed first class on April 23, 1981, and a sample package was subsequently mailed to Mr. Hughes. Figure 5.4 is the letter of transmittal to Mr. Hughes. After approximately two weeks had elapsed, follow-up telephone calls were made to selected licensees. Figure 5.5 is a copy of a standard form that was developed to record inquiries from licensees as well as follow-up contacts.

June 15th was established as a cut-off date for processing questionnaires. Questionnaires received after that date were monitored for the purpose of sorting out significant "waste generators." The results of the survey are presented in Chapter 6.

Figure 5.1

PAGE 1 OF 6	LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT SURVEY	01 0250																																										
<p style="text-align: center;">RATIONALE FOR STUDY</p> <p>The purpose of this survey is to compile data on the generation, handling, and disposal of low-level radioactive waste in your State. The compilation of these data will serve as a basis to analyze the time-rate-of-change of low-level radioactive waste generation and further assist in the development of sound policies and programs for low-level radioactive waste management. Each survey form will be coded by respondent. The data are CONFIDENTIAL and will be reported in consensus and statistical form.</p> <p style="text-align: center;">GENERAL GUIDELINES</p> <p>Please provide the requested information accurately and as complete as possible with typewriter, pen or pencil.</p> <p>When a request for information does not apply to your facility, leave blank and continue to the next request.</p> <p>When the selections provided for certain sections do not fit your situation, use the selection entitled other and specify in the space provided.</p> <p>Once you have completed this questionnaire, please return it in the enclosed stamped, self-addressed envelope. Thank you.</p>	<p>VACHON, NIX & ASSOCIATES P.O. Box 1303 Norcross, Georgia 30071 404/448-5235</p> <p style="text-align: center;">2.0 TYPE OF FACILITY</p> <p>Please check the block(s) which represents your major operation(s) but not more than one per group.</p> <p>2.1 Medical</p> <p>2.1.1 ☐ Hospital</p> <p>2.1.2 ☐ Medical School (Research/Testing Lab)</p> <p>2.1.3 ☐ Nursing/Convalescent Home</p> <p>2.1.4 ☐ Physician</p> <p>2.1.5 ☐ Clinic</p> <p>2.1.6 ☐ Other _____</p> <p>2.2 Educational</p> <p>2.2.1 ☐ University/College</p> <p>2.2.2 ☐ Technical/Community College</p> <p>2.2.3 ☐ High School</p> <p>2.2.4 ☐ Other _____</p> <p>2.3 Industrial</p> <p>2.3.1 ☐ Manufacturing</p> <p>2.3.2 ☐ Construction</p> <p>2.3.3 ☐ Mining</p> <p>2.3.4 ☐ Well Logging/Seismology/ Oil-Gas Exploration</p> <p>2.3.5 ☐ Engineering</p> <p>2.3.6 ☐ Research & Development</p> <p>2.3.7 ☐ Pharmaceutical Manuf.</p> <p>2.3.8 ☐ Other _____</p> <p>2.4 Critical Nuclear Reactor</p> <p>2.4.1 ☐ Commercial Power Reactor</p> <p>2.4.2 ☐ Research Reactor</p> <p>2.5 Federal Government</p> <p>2.5.1 ☐ Military</p> <p>2.5.2 ☐ Non-Military</p> <p>2.6 State Government</p> <p>2.6.1 ☐ Highway Department</p> <p>2.6.2 ☐ State Health Department</p> <p>2.6.3 ☐ Other _____</p> <p>2.7 Other Jurisdictions</p> <p>2.7.1 ☐ County</p> <p>2.7.2 ☐ City</p>	<p style="text-align: center;">3.0 LICENSE INFORMATION</p> <p>Please provide information on licenses issued by the Nuclear Regulatory Commission and/or State Agencies.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">3.1 License Number</th> <th style="width: 33%;">3.2 Issuing Agency</th> <th style="width: 34%;">3.3 Classification</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table> <p style="text-align: center;">4.0 RADIOACTIVE WASTE INFORMATION</p> <p>4.1 Did your facility generate radioactive waste during 1978, 1979 and/or 1980 that required holding, reprocessing, on-site disposal or shipment to an off-site disposal facility?</p> <table style="width: 100%;"> <tr> <td>1978</td> <td>☐ Yes</td> <td>☐ No</td> </tr> <tr> <td>1979</td> <td>☐ Yes</td> <td>☐ No</td> </tr> <tr> <td>1980</td> <td>☐ Yes</td> <td>☐ No</td> </tr> </table> <p>4.2 Did your facility receive radioactive waste from a parent organization, a branch of your organization, or another organization for holding, reprocessing, on-site disposal or shipment to an off-site disposal facility during 1978, 1979 and/or 1980?</p> <table style="width: 100%;"> <tr> <td>1978</td> <td>☐ Yes</td> <td>☐ No</td> </tr> <tr> <td>1979</td> <td>☐ Yes</td> <td>☐ No</td> </tr> <tr> <td>1980</td> <td>☐ Yes</td> <td>☐ No</td> </tr> </table> <p>If your facility did not generate and/or receive radioactive waste during 1978, 1979 or 1980, then you have completed this questionnaire. Thank you. If you answered yes to 4.1 and/or 4.2, please complete the form.</p>	3.1 License Number	3.2 Issuing Agency	3.3 Classification																						1978	☐ Yes	☐ No	1979	☐ Yes	☐ No	1980	☐ Yes	☐ No	1978	☐ Yes	☐ No	1979	☐ Yes	☐ No	1980	☐ Yes	☐ No
3.1 License Number	3.2 Issuing Agency	3.3 Classification																																										
1978	☐ Yes	☐ No																																										
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1980	☐ Yes	☐ No																																										
1978	☐ Yes	☐ No																																										
1979	☐ Yes	☐ No																																										
1980	☐ Yes	☐ No																																										
<p style="text-align: center;">1.0 ORGANIZATION AND FACILITY DATA</p> <p>1.1 Facility Name _____</p> <p>1.2 Street Location (Hdqtrs/Admin) _____</p> <p>1.3 City _____ 1.4 State _____</p> <p>1.5 Telephone No. (____) _____ 1.6 Zip Code _____</p> <p>1.7 Officer-In-Charge of Radiological Safety</p> <p>1.7.1 Name _____</p> <p>1.7.2 Title _____</p> <p>1.8 Person Completing Form</p> <p>1.8.1 Name _____</p> <p>1.8.2 Title _____</p> <p>1.8.3 Date _____</p>																																												

LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT SURVEY

5.0 USE CLASSIFICATION FOR UNSEALED RADIOACTIVE SOURCES

Please indicate the percentage of total volume of unsealed radioactive material used for each category below. Total of all categories should equal 100%.

5.1 Human

- 5.1.1 () Diagnostic _____ %
 5.1.2 () Non-Diagnostic _____ %
 5.1.3 () Research _____ %

5.2 Animal

- 5.2.1 () Diagnostic _____ %
 5.2.2 () Non-Diagnostic _____ %
 5.2.3 () Research _____ %

5.3 General Research

- 5.3.1 () Physical _____ %
 5.3.2 () Chemical _____ %
 5.3.3 () Engineering _____ %
 5.3.4 () Other _____ %

Total of 5.1, 5.2 & 5.3 _____ 100 % (Specify)

YEARLY DATA SHEET INSTRUCTIONS

The following data sheets request information on radionuclides (isotopes) received and/or produced and radioactive waste generated, received, processed, shipped and disposed of on-site for calendar years 1978, 1979 & 1980.

The sheets are identical in format. As a convenience, a list of common radionuclides has been provided. Please report data as requested for all radionuclides handled by your facility. All quantitative data should be taken directly from facility records; if records are not available, please estimate answers as accurately as possible.

"Received/Produced" in Sections 6.0, 12.0 & 18.0 refers to radioactive emitting materials to be used at your facility. The term "Waste" as used in Sections 7.0-11.0, 13.0-17.0 & 19.0-23.0 refers to all radioactive emitting materials that have no further use at your facility and must be either disposed of on-site or transported to another facility. "Waste Generated" in Sections 7.0, 13.0 & 19.0 refers to that generated at your facility while "Waste Received" in Sections 8.0, 14.0 & 20.0 refers to waste received from other facilities. In Sections 9.0, 15.0 & 21.0 entitled "Waste Processed/Reduced", the column labeled "%" refers to percent reduction from the original volume to the reduced volume. The columns labeled A thru H on each sheet require the use of the key provided on this page for completion. Please select the appropriate answer from this key and insert the corresponding number(s) in the space provided for each radionuclide.

To insure accurate compilation, please report data in accordance with the units listed. Thank you very much for your cooperation. Space for additional comments is provided on page six.

KEY FOR COMPLETING
YEARLY DATA SHEETS

SECTIONS 9.0, 15.0 & 21.0

[A] REDUCTION PROCESS

- 1 = Compaction
 2 = Solidification
 3 = Evaporation
 4 = Adsorption (Ion Exchange)
 5 = Absorption
 6 = Incineration
 7 = Other

SECTIONS 10.0, 11.0, 16.0, 17.0, 22.0 & 23.0

[B] WASTE FORM

- 1 = Dry Solid(s)
 2 = Solid Liquid(s)
 3 = Nonsolid Liquid(s)
 4 = Scintillation Vials
 5 = Biological
 6 = Gaseous
 7 = Sealed Source
 8 = Other

SECTIONS 10.0, 16.0 & 22.0

[C] SHIPPING CONTAINER

- 1 = Kraft Container
 2 = 55 Gallon Drum
 3 = 30 Gallon Drum within
 55 Gallon Drum
 4 = Other

SECTIONS 10.0, 16.0 & 22.0

[D] ADDITIONAL HAZARD POTENTIALS

- 1 = Corrosive
 2 = Toxic
 3 = Flammable
 4 = Volatile
 5 = Explosive
 6 = Other

SECTIONS 10.0, 16.0 & 22.0

[E] DESTINATION

- 1A = Barnwell, South Carolina
 1B = Beatty, Nevada
 1C = Richland (Hanford), Washington
 1D = Other
 2 = Distribution in Product Form
 3 = Return to Vendor
 4 = Other

SECTIONS 10.0, 16.0 & 22.0

[F] TRANSPORT METHOD

- 1 = Facility Truck
 2 = Motor Express
 3 = Air
 4 = Rail
 5 = Other

SECTIONS 11.0, 17.0 & 23.0

[G] METHOD

- 1 = Release to Sewer
 2 = Combine with Common Refuse
 3 = Incinerate to Atmosphere
 4 = Evaporate or Distill
 5 = Vent to Atmosphere
 6 = Bury On Site
 7 = Redistribute to Facility Users
 In Original Form
 8 = Other

[H] MONITORING INSTRUMENTATION

- 1 = Ion Chamber
 2 = Thermoluminescent Dosimetry
 3 = End Window > 1.4 mgm/cm²
 Geiger-Mueller
 4 = Thin Window < 0.5 mgm/cm²
 Geiger-Mueller
 5 = Gas Proportional Counter
 6 = Liquid Scintillation Spectrometry
 7 = Electron Capture
 8 = Other

COMMERCIAL
Nuclear Facility

[illegible]

5100

5-9

LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT SURVEY

24.0 SOURCE(S) OF RADIONUCLIDE PRODUCTION

- 24.1 Subcritical Reactor
24.2 Critical Reactor
24.3 Power Reactor
24.4 Cyclotron
24.5 Linear Accelerator
24.6 Neutron Generator
24.7 Synchrotron
24.8 Van de Graaff Generator
24.9 Other _____
24.10 Other _____
24.11 Other _____

POWER/FLUX LEVEL	RADIOACTIVE SOURCE	ACTIVITY IN CURIES	MODERATOR	MANUFACTURER

Comments & Remarks by Respondent:

25.0 FACILITY(S) FROM WHICH RADIOACTIVE WASTE WAS RECEIVED

25.1 FACILITY NAME	25.2 CITY	25.3 STATE	25.4 FACILITY LICENSE NUMBERS (IF KNOWN)

VACHON, NIX & ASSOCIATES

6855 Jimmy Carter Boulevard
Building J, Suite 1020
Norcross, Georgia 30071
404/448-5235

VACHON, NIX & ASSOCIATES

SUBJECT: Low-Level Radioactive Waste Management Survey

Dear Licensee:

VACHON, NIX AND ASSOCIATES and the SOUTHERN STATES ENERGY BOARD, under a U.S. Department of Energy Contract, are developing State Briefing Books on Low-Level Radioactive Waste Management Issues. This project is being conducted with the encouragement of your State Radiological Control Officer as indicated by the attached letter. We need your help to ensure that your State issues are presented correctly. Thus, we ask you to provide us with data on the generation, handling and disposal of low-level radioactive wastes relative to your facility.

The enclosed questionnaire and return envelope are designed to help you provide these data. Please complete the form and mail to us within seven (7) days. I am sure you share my dislike for filling out forms. However, in this case we will be working together to ensure the safe and continued use of radioactive materials.

As soon as the project is completed for the twelve-state area of our survey, we will send the results to each of the states. Your State Radiological Agency will share the results with you.

Your facility will remain anonymous and data provided will be CONFIDENTIAL and reported in consensus and statistical form.

Thank you for your time and interest. Please call us at (404)448-5235 if you need assistance with the questionnaire, wish to ask questions or make specific comments relative to the project.

Cordially,

VACHON, NIX & ASSOCIATES

Reginald I. Vachon, Ph.D., P.E.
President

RIV/caw

DIVISION OF OPTIMAL SYSTEMS INCORPORATED
6855 Jimmy Carter Blvd., N.W. • Norcross/Atlanta, Ga. 30071 • Phone: 404-448-5235 • Telex: 708403 OPTIMAL NRCS

DEPARTMENT FOR HUMAN RESOURCES
COMMONWEALTH OF KENTUCKY
FRANKFORT 40621

BUREAU FOR HEALTH SERVICES

M E M O R A N D U M

TO: All Kentucky and NRC Radioactive Material Licensees

FROM: Donald R. Hughes, Manager *DRH*
Kentucky Radiation Control Branch

SUBJECT: Low-Level Radioactive Waste Generation

DATE: March 13, 1981

The U. S. Department of Energy is conducting a survey of all U. S. Nuclear Regulatory Commission and Kentucky Licensees in this State. The purpose of this survey is to determine the amount and types of low-level radioactive wastes produced in Kentucky and the current disposal practices.

This survey will provide information for the U. S. DOE's Nation Low-Level Radioactive Waste Management Program. An early return of accurately completed survey information is necessary for the success and usefulness of this survey. Your cooperation in this matter will be gratefully appreciated.

If you have any questions concerning this survey, please contact the persons designated in the accompanying instruction letter.

DRH:ns

VACHON, NIX & ASSOCIATES

April 24, 1981

Mr. Donald R. Hughes
Manager
Radiation Control Branch
Dept. of Human Resources
275 East Main
Frankfort, KY 40621

Dear Mr. Hughes:

VACHON, NIX & ASSOCIATES and the SOUTHERN STATES ENERGY BOARD appreciate your assistance to our project of developing a Briefing Book on Low-Level Radioactive Waste Management Issues for the state of Kentucky.

I have enclosed a copy of the survey package which is being mailed to all Kentucky Licensees today. This package includes your letter, a letter from VNA and the Low-Level Radioactive Waste Management Survey Form. After an elapsed period of twelve (12) days, follow-up phone calls will be made to selected non-respondents. Afterwards, thirteen (13) days will be allowed for a final response. Responses received after May 19 may not be included in data processing due to contractual time restraints.

Thanks again for your cooperation. If I can answer any questions, please call me at (404) 448-5235.

Cordially,

VACHON, NIX & ASSOCIATES

John Allen Gunn
Project Manager

JAG/caw
Enclosure

SURVEY STATUS LOG

STATE CODE:

SERIAL NO:

DATE FORM MAILED: _____

DATE FORM RECEIVED: _____

DID FACILITY GENERATE AND/OR RECEIVE RADIOACTIVE WASTE DURING 1978, 1979 AND/OR 1980?

☐

YES

☐

NO

Inquiry From: _____

Date: _____

Received By: _____

Phone #: _____

Type of Inquiry: _____ Letter

_____ Phone

Questions: _____

Answers: _____

Action Items: _____

Action Taken By: _____

Date: _____

Telecon Follow-Up By: _____

Date: _____

Telecon With (Name): _____

Phone #: _____

Questions: _____

Answers: _____

Action Items: _____

Action Taken By: _____

Date: _____

Figure 5.5

The purpose of this study was to compile data on the generation, handling, and disposal of low-level radioactive waste in the State of Kentucky. A total of 254 licensees were identified as producers or users of radioactive materials in the state. The licensees range from an individual physician to a nuclear power generating plant. Each licensee was sent via the U.S. Postal Service a packet containing the "Low-Level Radioactive Waste Management Survey" and other information as explained in Chapter 5.0. Figure 5 is a copy of the survey.

Compilation of the data generated by the survey is reported in Tables 6.1 through 6.13. Respondents to the survey were identified by one of the following seven broad categories: (1) Medical, (2) Educational, (3) Industrial, (4) Critical Nuclear Reactor, (5) Federal Government, (6) State Government, and (7) Other Jurisdictions (political subdivisions). Data in each of the above tables are presented for each category. A large number of respondents chose to identify multiple operations within a category. Thus, it is impossible to correlate between tables. Error analysis programs corrected for this problem wherever and whenever possible, but data presented in each table should be treated independently.

Two basic types of tables are presented, one revealing qualitative and quantitative data and the other revealing only qualitative data. The first table presents information on quantity of waste shipped by category and individual isotope. The latter presents information on type of container used for shipping, frequency of shipments containing hazardous materials, and techniques for volume and activity reduction.

hazardous materials, and techniques for volume and activity reduction.

Table 6.14 provides a forecast for low-level radioactive waste based on the limited information produced by this study. Additional studies covering a minimum of 10 years and a higher response rate would be necessary to add the desirable credibility to the forecast.

6.1 Summary

Of the 254 licensees, 85 (33.46 percent) responded to the survey. Of the 85 responding, 82 percent reported no waste generated and 18 percent reported both generation and shipment of low-level radioactive waste.

The total millicuries of low-level radioactive waste reported shipped during 1978, 1979, and 1980 was 42,701, 39,675, and 66,200.

The major limitation of this study is the large number of licensees who failed to return the survey. Another limitation is the small percentage of licensees who indicated that they generated and/or received waste but considered the information proprietary and did not report data for their facility. A final limitation of this study is the failure to respond of licensees who are known to manufacture and/or fabricate devices or items containing radioactive materials or devices capable of producing ionizing radiation that could generate nuclear waste.

Table 6.1 Respondents Reporting Nuclear Waste

Table 6.1 represents only those respondents to the survey who reported shipping nuclear waste in one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the total number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category.

TABLE 6.1 RESPONDENTS REPORTING NUCLEAR WASTES IN KENTUCKY

Facility	Number	%	Cumulative %
MEDICAL			
Hospital	6	75.0	75.0
Other	2	25.0	100.0
EDUCATIONAL			
University-College	3	75.0	75.0
Other	1	25.0	100.0
INDUSTRIAL			
Construction	2	100.0	100.0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT			
Military	1	50.0	50.0
Non-Military	1	50.0	100.0
STATE GOVERNMENT			
Health Department	1	50.0	50.0
Other	1	50.0	100.0
TOTAL	18		

Table 6.2 Respondents Reporting Use of Sealed Sources Not Producing Nuclear Wastes

Table 6.2 represents those licensees using nuclear materials in the form of sealed sources who reported not shipping nuclear waste during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of licensees reporting not shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. Examples of Sealed Source devices were Strontium-90 eye applicators (Physicians); Radium-226 needles (Physicians); Iridium-192 (Manufacturing; Well-Logging and State Governments); Cobalt-60 (Manufacturing); and Cesium-137 (Manufacturing).

TABLE 6.2 RESPONDENTS REPORTING USE OF SEALED SOURCES NOT PRODUCING
NUCLEAR WASTES FROM KENTUCKY

Facility	Number	%	Cumulative %
MEDICAL			
Hospital	1	100.0	100.0
EDUCATIONAL	0	0	0
INDUSTRIAL			
Manufacturing	3	25.0	25.0
Construction	1	8.3	33.3
Mining	3	25.0	58.3
Engineering	3	25.0	83.3
Other	2	16.7	100.0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT	0	0	0
STATE GOVERNMENT	0	0	0

TOTAL	13		

Table 6.3 Respondents Reporting No Waste

Table 6.3 represents those licensees using nuclear materials who reported not shipping nuclear waste during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of licensees reporting not shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The numbers reported in this table represented all licensees from all categories.

TABLE 6.3 RESPONDENTS REPORTING NO WASTE IN KENTUCKY

Facility	Number	%	Cumulative %
MEDICAL			
Hospital	1	33.3	33.3
Physician	1	33.3	66.7
Other	1	33.3	100.0
EDUCATIONAL			
University/College	3	100.0	100.0
INDUSTRIAL			
Manufacturing	12	27.9	27.9
Construction	2	4.6	32.5
Mining	9	20.9	53.5
Well logging/ Seismology/ Oil-gas exploration.	4	9.3	62.8
Engineering	9	20.9	83.7
R & D	1	2.3	86.0
Other	6	13.9	100.0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT			
Non-Military	2	100.0	100.0
STATE GOVERNMENT			
Highway Department	1	100.0	100.0
OTHER JURISDICTIONS			
County	2	66.7	66.7
City	1	33.3	100.0
TOTAL	55		

Table 6.4 Sealed Sources Producing Shipped Nuclear Waste

Table 6.4 represents those respondents to the survey who reported using nuclear materials as sealed sources and produced nuclear waste that was shipped during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The respondents represented in this table were from the Medical and Industrial categories. Devices using Iridium-192 or combinations with other isotopes were used at the licensee's site until a marked specific nuclear activity dropped. This usually took place between six months and a year. When the activity was sufficiently low to interface with the device, the licensee shipped it to the original manufacturer-fabricator for a new sealed source in accordance with the licensee's authorized specific nuclear activity. The survey indicates that several users of these types of devices repeated the process of packing and shipping the source for another after decay as many as four times in the three-year period covered by this study. Those who responded by answering the appropriate questions on the survey form indicated that the sources were sent to manufacturer-fabricators in Louisiana and North Carolina. Others responding did not indicate the location of the manufacturer-fabricator. Other sealed sources included Cobalt-60 and Radium-226 which were shipped for disposal.

TABLE 6.4 SEALED SOURCES PRODUCING SHIPPED NUCLEAR WASTE FOR
KENTUCKY, 1978

Facility	Number	%	Cumulative %
MEDICAL			
Other	1	100.0	100.0
EDUCATIONAL			
Other	1	100.0	100.0
INDUSTRIAL			
Construction	1	100.0	100.0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT			
Military	1	100.0	100.0
STATE GOVERNMENT			
Other	1	100.0	100.0
TOTAL	5		

TABLE 6.4 SEALED SOURCES PRODUCING SHIPPED NUCLEAR WASTE FOR
KENTUCKY, 1979

Facility	Number	%	Cumulative %
MEDICAL			
Other	1	100.0	100.0
EDUCATIONAL			
Other	1	100.0	100.0
INDUSTRIAL			
Construction	1	100.0	100.0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT			
Military	1	100.0	100.0
STATE GOVERNMENT			
Other	1	100.0	100.0
TOTAL	5		

TABLE 6.4 SEALED SOURCES PRODUCING SHIPPED NUCLEAR WASTE FOR
KENTUCKY, 1980

Facility	Number	%	Cumulative %
MEDICAL			
Other	1	100.0	100.0
EDUCATIONAL			
Other	1	100.0	100.0
INDUSTRIAL			
Construction	1	100.0	100.0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT	0	0	0
STATE GOVERNMENT			
Other	1	100.0	100.0
TOTAL	4		

Table 6.5 Millicuries of Nuclear Waste Shipped by Facility Type

Table 6.5 represents those respondents to the survey who reported shipping nuclear waste produced from all sources and categories during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of millicuries reported shipped. When a specific category was not reported by any licensee, a 0 is shown for that particular category. Each isotope reported on pages 3, 4, and 5 of the survey was included in this table. Isotopes and totals for the three years are shown in millicuries. By using a validation program, multiple reporting of the same isotope and quantity has been corrected in the totals; i.e., respondents were found to report duplicated data in both the Medical category and Educational categories.

TABLE 6.5 MILLICURIES OF NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1978 BY FACILITY TYPE

Facility	Millicuries	% Of Total
MEDICAL		
Other	42700	100.0*
EDUCATIONAL		
Other	42700	100.0*
INDUSTRIAL		
Construction	42700	100.0*
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT		
Military	1	0
STATE GOVERNMENT		
Other	42700	100.0*
TOTAL	42700	

*One respondent reported in multiple categories.

TABLE 6.5 MILLICURIES OF NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1979 BY FACILITY TYPE

Facility	Millicuries	% Of Total
MEDICAL		
Other	29100	73.35*
EDUCATIONAL		
Other	29100	73.35*
INDUSTRIAL		
Construction	29100	73.35*
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT		
Military	10575	26.65
STATE GOVERNMENT		
Other	29100	73.35*
TOTAL	39675	

*One respondent reported in multiple categories.

TABLE 6.5 MILLICURIES OF NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1990 BY FACILITY TYPE

Facility	Millicuries	% Of Total
MEDICAL		
Other	66200	100.0*
EDUCATIONAL		
Other	66200	100.0*
INDUSTRIAL		
Construction	66200	100.0*
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT	0	0
STATE GOVERNMENT		
Other	66200	100.0*
TOTAL	66200	
TOTAL MILLICURIES FOR ALL 3 YEARS:		148,575.00

* One respondent reported in multiple categories.

Table 6.6 Cubic Meters of Solid Nuclear Waste Shipped by Facility Type

Table 6.6 represents those respondents to the survey who reported shipping nuclear waste produced from all sources and categories during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of cubic meters reported shipped. When a specific category was not reported by any licensee, a 0 is shown for that particular category. Each isotope reported on pages 3, 4, and 5 of the survey was included in this table. Isotopes and totals for the three years are shown in millicuries. By using a validation program, multiple reporting of the same isotope and quantity has been corrected in the totals; i.e., respondents were found to report duplicated data in both the Medical category and Educational categories.

TABLE 6.6 CUBIC METERS OF SOLID NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1978 BY FACILITY TYPE

Facility	Cubic Meters	% Of Total
MEDICAL	0	0
EDUCATIONAL	0	0
INDUSTRIAL	0	0
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT		
Military	6.00	100.0
STATE GOVERNMENT	0	0

TABLE 6.6 CUBIC METERS OF SOLID NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1979 BY FACILITY TYPE

Facility	Cubic Meters	% Of Total
MEDICAL	0	0
EDUCATIONAL	0	0
INDUSTRIAL	0	0
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT		
Military	2.00	100.0
STATE GOVERNMENT	0	0

TABLE 6.6 CUBIC METERS OF SOLID NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1980 BY FACILITY TYPE

Facility	Cubic Meters	% Of Total
MEDICAL	0	0
EDUCATIONAL	0	0
INDUSTRIAL	0	0
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT	0	0
STATE GOVERNMENT	0	0
TOTAL CUBIC METERS FOR ALL 3 YEARS:		0

Table 6.7 - Liters of Liquid Nuclear Waste Shipped by Facility Type

Table 6.7 represents those respondents to the survey who reported shipping nuclear waste produced from all sources and categories during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of liters reported shipped. When a specific category was not reported by any licensee, a 0 is shown for that particular category. Each isotope reported on pages 3, 4, and 5 of the survey was included in this table. Isotopes and totals for the three years are shown in liters. By using a validation program, multiple reporting of the same isotope and quantity has been corrected in the totals; i.e., respondents were found to report duplicated data in both the Medical category and Educational categories.

TABLE 6.7 LITERS OF LIQUID NUCLEAR WASTE SHIPPED FROM KENTUCKY
FOR 1978 BY FACILITY TYPE

Facility	Liters	% Of Total
MEDICAL	0	0
EDUCATIONAL	0	0
INDUSTRIAL	0	0
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT	0	0
STATE GOVERNMENT	0	0

TOTAL LITERS FOR ALL 3 YEARS: 0

NOTE: NO LIQUID WASTE REPORTED SHIPPED FOR 1978, 1979, 1980

Table 6.8 Percent Responses to the Survey

Table 6.8 represents all licensees responding to the survey. When a respondent reported no waste shipped during the three years of the study period (1978, 1979, and 1980), the respondent's survey was divided into one of two major separations in the computer processing. This table illustrates the two groups: no waste generated and waste generated.

STATE	NO WASTE GENERATED	WASTE GENERATED	CUMULATIVE FIGURE
Kentucky	82	18	85

Table 6.9 Nuclear Waste Shipped in Millicuries Isotopes

Table 6.9 represents those respondents to the survey who reported shipping nuclear waste produced from all sources and categories during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of millicuries reported shipped. When a specific category was not reported by any licensee, a 0 is shown for that particular category. Each isotope reported on pages 3, 4, and 5 of the survey was included in this table. Isotopes and totals for the three years are shown in millicuries. By using a validation program, multiple reporting of the same isotope and quantity has been corrected in the totals; i.e., respondents were found to report duplicated data in both the Medical category and Educational categories.

TABLE 6.9 NUCLEAR WASTE SHIPPED IN MILLICURIES FOR KENTUCKY IN 1978

Isotope	1	2	3	4	5	6	7	8
IR194	42700	42700	42700	0	0	42700	0	42700
TOTAL	42700	42700	42700	0	1	42700	0	42701

NOTE: SOME RESPONDENTS REPORTED IN MORE THAN ONE CATEGORY. THE CUMULATIVE TOTAL DOES NOT REFLECT DOUBLE ENTRIES.

1=Medical	5=Federal Government
2=Educational	6=State Government
3=Industrial	7=Not Specified
4=Critical Reactor	8=Cumulative Total

TABLE 6.9 NUCLEAR WASTE SHIPPED IN MILLICURIES FOR KENTUCKY IN 1979

Isotope	1	2	3	4	5	6	7	8
SR90	0	0	0	0	10575	0	0	10575
IR194	29100	29100	29100	0	0	29100	0	29100
TOTAL	29100	29100	29100	0	10575	29100	0	39675

NOTE: SOME RESPONDENTS REPORTED IN MORE THAN ONE CATEGORY. THE CUMULATIVE TOTAL DOES NOT REFLECT DOUBLE ENTRIES.

1=Medical	5=Federal Government
2=Educational	6=State Government
3=Industrial	7=Not Specified
4=Critical Reactor	8=Cumulative Total

TABLE 6.9 NUCLEAR WASTE SHIPPED IN MILLICURIES FOR KENTUCKY IN 1960

Isotope	1	2	3	4	5	6	7	8
IR194	66200	66200	66200	0	0	66200	0	66200
TOTAL	66200	66200	66200	0	0	66200	0	66200

NOTE: SOME RESPONDENTS REPORTED IN MORE THAN ONE CATEGORY. THE CUMULATIVE TOTAL DOES NOT REFLECT DOUBLE ENTRIES.

1=Medical	5=Federal Government
2=Educational	6=State Government
3=Industrial	7=Not Specified
4=Critical Reactor	8=Cumulative Total

Table 6.10 Nuclear Waste Shipped Classified by Hazard

Table 6.10 represents those licensees reporting the use of nuclear materials in all forms who reported shipping hazardous forms of nuclear waste during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The number of times a shipment took place is represented in this table. Each hazardous classification reported in Sections 10, 16, and 22 of the survey are reported in this table. Potentially hazardous materials such as corrosive, toxic, flammable, volatile, and explosive materials are reported.

TABLE 6.10 NUCLEAR WASTE SHIPPED CLASSIFIED BY HAZARD FROM KENTUCKY

Facility	HAZARD CLASS					
	Corros.	Toxic	Flamm.	Volat.	Exp.	N.S.
MEDICAL						
Other	0	0	0	0	0	3
EDUCATIONAL						
Other	0	0	0	0	0	3
INDUSTRIAL						
Construction	0	0	0	0	0	13
CRITICAL NUCLEAR REACTOR	0	0	0	0	0	0
FEDERAL GOVERNMENT	0	0	0	0	0	0
STATE GOVERNMENT						
Other	0	0	0	0	0	0
TOTALS	0	0	0	0	0	12

Corros.=Corrosive

Toxic=Toxic

Flamm.=Flammable

Volat.=Volative

Exp.=Explosive

N.S.=Not Specified

Table 6.11 Nuclear Waste Shipped Classified by Container Type

Table 6.11 represents those licensees using nuclear materials who reported the types of shipping containers used for transporting nuclear waste during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The number of times a shipment took place is represented in this table. Each container type classification reported in Sections 10, 16, and 22 of the survey are reported in this table. Shipping container types include Kraft containers, 55 gallon drums, 30 gallon drums within 55 gallon drums, and types not specified.

TABLE 6.11 NUCLEAR WASTE SHIPPED CLASSIFIED BY CONTAINER TYPE FROM KENTUCKY

Facility	CONTAINER CLASS			
	Kraft	55-Gal. Drum	30-55 Gal. Drum	Type Not Specified
MEDICAL				
Hospital	0	0	0	1
Other	0	0	0	3
EDUCATIONAL				
Other	0	0	0	3
INDUSTRIAL				
Construction	0	0	0	3
CRITICAL NUCLEAR REACTOR	0	0	0	0
FEDERAL GOVERNMENT				
Military	0	2	0	0
STATE GOVERNMENT				
Health Department	0	0	0	6
Other	0	0	0	3
TOTALS	0	2	0	19

Corros.=Corrosive
Toxic=Toxic
Flamm.=Flammable

Volat.=Volatile
Exp.=Explosive
N.S.=Not Specified

Table 6.12 Nuclear Waste Shipped Classified by Physical Form

Table 6.12 represents those licensees using nuclear materials who reported the specific forms of waste shipped during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The number of times a shipment took place is represented in this table. Each physical form classification reported in Sections 10, 11, 16, 17, 22, and 23 of the survey have been tabulated in this table. The waste forms reported were dry solids, solid liquids, non-solid liquids, scintillation vials, biological, gaseous, and sealed sources.

TABLE 6.12 NUCLEAR WASTE SHIPPED CLASSIFIED BY PHYSICAL FORM FROM KENTUCKY

Facility	PHYSICAL CLASS							
	1	2	3	4	5	6	7	8
MEDICAL								
Hospital	1	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	3	0
EDUCATIONAL	0	0	0	0	0	0	0	0
INDUSTRIAL								
Construction	0	0	0	0	0	0	10	0
CRITICAL NUCLEAR REACTOR	0	0	0	0	0	0	0	0
FEDERAL GOVERNMENT								
Military	0	0	0	0	0	0	2	0
STATE GOVERNMENT								
Health Department	3	0	0	0	0	0	3	0
Other	0	0	0	0	0	0	3	0
TOTALS	4	0	0	0	0	0	21	0

1=Dry Solids

2=Solid Liquids

3=Non Solid Liquids

4=Scintillation Vials

5=Biological

6=Gaseous

7=Sealed Source

8=Type Not Specified

Table 6.13 Nuclear Waste Shipped Classified by Reduction Process Used

Table 6.13 represents those licensees using nuclear materials who reported the reduction process of the waste shipped during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the Total Column represent the total number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The number of times a shipment took place is represented in this table. Each reduction process classification reported in Sections 9, 15, and 21 of the survey have been tabulated in this table. The reduction processes reported were compaction, solidification, evaporation, absorption and incineration.

TABLE 3.13 NUCLEAR WASTE SHIPPED CLASSIFIED BY REDUCTION PROCESS USED BY KENTUCKY

Facility	REDUCTION PROCESS						
	1	2	3	4	5	6	7
MEDICAL							
Hospital	3	0	0	0	0	1	0
Other	3	0	0	0	0	0	0
EDUCATIONAL	0	0	0	0	0	0	0
INDUSTRIAL							
Construction	3	0	0	0	0	0	0
Other	0	0	1	0	0	0	0
CRITICAL NUCLEAR REACTOR	0	0	0	0	0	0	0
FEDERAL GOVERNMENT	0	0	0	0	0	0	0
STATE GOVERNMENT							
Health Department	3	0	0	0	0	0	0
TOTALS	12	0	1	0	0	1	0

1=Compaction

2-Solidification

3=Evaporation

4=Adsorption(Ion Exchange)

5=Adsorption

6=Incineration

7=Method Not Specified

APPENDIX A: Annotated Bibliography

ANNOTATED BIBLIOGRAPHY FOR KENTUCKY

An Aerial Radiological Survey of the Paducah Gaseous Diffusion Plant.

Paducah, Kentucky. Date of Aerial Survey: August 1976. Date of Ground Survey: May 1977. U.S. Department of Energy. Division of Operational and Environmental Safety. Nevada Operations. Idaho Falls, ID. EG&G, Inc. April 1978. (EGG-1183-1727).

The aerial measurements data indicated that patches of low-level radioactivity existed along the waterways that drained areas on or near the plant.

A Classification System for Radioactive Waste Disposal - What Waste Goes

Where? U.S. Nuclear Regulatory Commission. Division of Fuel Cycle and Material Safety. June 1978. (NUREG-0456).

Parameters representative of the Maxey Flats, KY commercial burial site include facility description and history of operations; general description of the area; meteorology; radioactive nuclide inventory; environmental pathways and exposure mechanisms, including inhalation of dust by a reclamer; well water scenario; direct gamma exposure; atmospheric releases of contamination; groundwater migration; and surface water transport. Population dose calculations are made from groundwater migration and surface water transport. Pages 155-178 include Figure 5.2, "generalized geological cross-section of the Maxey Flats region."

"Disposal of Low-Level Radioactive Wastes" Issue Brief. Science and Technology for the Legislatures. Vol. V. no. 4. Fall 1979.

"The Department of Energy has completed a draft study concerning the acceptance of commercial LLW at 14 sites." DOE sites that could be affected include the Paducah Gaseous Diffusion Plant, Paducah, Kentucky.

Evaluation of Alternative Methods for the Disposal of Low-Level Radioactive Wastes. U.S. Nuclear Regulatory Commission. Low-Level Waste Branch. July 1979. (NUREG/CR-0680).

A review of existing low-level waste disposal facilities. Table B.1 (Appendix B) lists the capacity or volume of waste that can be readily accommodated at the existing sites, the size of trenches or pits employed, cover types and procedures, and quantities of waste buried. Table B.2 shows climatological and hydrogeological parameters at existing sites, and Table B-3 lists commercial low-level waste burial history and by-product material buried. All tables include a listing for the Morehead, Kentucky site.

Identification and Assessment of the Social Impacts of Transportation of Radioactive Materials in Urban Environments. Battelle Human Affairs Research Centers. U.S. Nuclear Regulatory Commission. July 1980. (NUREG/CR-0744; SAND 79-7032; B-HARC-411-049).

Table lists state statutes governing transportation of radioactive materials. For Kentucky, studies are governed by KY Rev. Stat. Ann. Sec. 152.120 (Baldwin). Certain shipments are prohibited under KY Rev. Stat. Ann. Sec. 152.125. Table 5 indicates that the Kentucky Bureau of Vehicle Regulations undertakes studies and may license vehicles for transportation on highways under KY Rev. Stat. Ann. Sec. 152.120, .125. The Railroad Commission undertakes studies and may license for transportation by common carriers in intrastate commerce under KY Rev. Stat. Ann. Sec. 152.120, .125. The Department of Transportation has the same authority for transportation by air.

Identification of Technical Problems Encountered in the Shallow Land Burial of Low-Level Radioactive Wastes. Oak Ridge National Laboratory. Oak Ridge, Tennessee. March 1980. (ORNL/SUB-80/ 13619/1).

Pages 102-112 outline data for the site at Maxey Flats, Kentucky, giving site characteristics of location, climate geology, hydrology, and ecology. The data and authority of the license for Maxey Flats, with license conditions, dates of operation, operations techniques, and usage are referenced. Monitoring and identification of problem areas in the site are followed by a performance evaluation.

Improvements Needed in the Land Disposal of Radioactive Wastes - A Problem of Centuries. U.S. General Accounting Office. Report to the Congress. January 12, 1976. (RED-76-54).

Morehead, KY (Maxey Flats) was licensed in 1963. Of the total radioactive waste buried in the U.S. from 1962-1973, KY has received about 38 percent. Included among ERDA disposal sites is the gaseous diffusion plant at Paducah, KY. Disposal activities at Maxey Flats are reviewed, and it is noted that the KY Department of Human Resources initiated a special study to identify the source of increased radiation levels (1973). KY has also recognized the need for additional detailed hydrogeological studies at Maxey Flats. In May 1975, KY requested financial and technical assistance from USGS, EPA, NRC, and ERDA to carry out the recommended study. The estimated total cost for the study was \$1.1 million over a five-year period. In July 1975, NRC and ERDA notified the state that they could provide technical but not financial assistance. USGS advised that it would provide both. In a January 1975 letter to NRC, a KY official asked for NRC's advice on applying the maximum permissible concentrations to disposal sites. The NRC reply stated that "the MPC values should not be used. . . what appears to be needed is the establishment of action levels." A table (p. 23) shows the disposal site of Maxey flats with reference to the frequency of radiation monitoring programs for water, air, vegetation, and soil. Discussion (pp. 26-7) of licensing problems in KY, with reference to water accumulation in trenches and radioactivity migration, includes a review of actions taken to eliminate the problems. On p. 31 it is noted that "EPA officials . . . were developing, in cooperation with the KY Department for Human Resources, a computerized inventory system of materials buried at the Maxey Flats site. When the system is implemented at the site, EPA intends to make it available to other states." Chapter 4, long-term care of disposal sites, outlines funding arrangements. KY receives 4 percent of the licensee's customer charge for each cubic foot of waste buried. The licensee's current charge is \$1.25 for each cubic foot. These fees are placed in an escrow fund administered by the KY Science and Technology Commission.

"Inventory (1962-1978) and Projections (to 2000) of Shallow-Land Burial of Radioactive Wastes at Commercial Sites: An Update." Nuclear Safety. V. 21. No. 3. May-June 1980.

Table 1 shows commercial shallow land burial sites and includes Maxey Flats, KY. Table 2 lists waste volumes in cubic meters at the KY burial site from 1962 through Dec. 27, 1977. Table 3 lists by-product material, Ci for the KY site from 1963 through 12/27/77. Table 4 lists special nuclear material, g, and Table 5 shows source material in kg for the same period. Table 6 shows the capacities of the existing waste burial sites including Maxey Flats.

List of DOE Radioisotope Customers with Summary of Radioisotope Shipments.
Pacific Northwest Laboratory. U.S. Department of Energy.
June 1980. (PNL-3274).

Listing includes the University of Kentucky at Lexington (p. 21).

Low-Level Radioactive Waste Management. Proceedings of Health Physics Society Twelfth Midyear Topical Symposium. February 11-15, 1979.
Williamsburg, VA. U.S. Environmental Protection Agency. Office of Radiation Programs. May 1979, (EPA 520/3-79-002).

Table 2 (p.32) includes a breakdown by destination of waste volumes shipped which covers Maxey Flats, KY. Table II (p. 164) gives the history of low-level waste burial sites and includes Maxey Flats, which was "closed due to operational problems." A major problem has been the migration of radioactivity away from the sites in concentrations that have caused political concerns. The migration of radioactivity at Maxey Flats has been attributed primarily to the accumulation of water in the trenches and subsequent hydrological transport of radioactivity from the site. Table 1 (p.230) gives the volume of wastes buried at low level sites, and level of activity, through 1977.

Low-Level Radioactive Waste Technology-A Selected, Annotated Bibliography. Vol. 2. Oak Ridge National Laboratory. October 1980. (ORNL/EIS-133/V2).

Item #91, "Operational Experience of the KY Radioactive Waste Disposal Site," by C.M. Hardin (CONF-770512), reviews the establishment, operation, licensing, and financial requirements of the Maxey Flats KY site. Item #159 cites the BNL-NUREG-22838 report of May 1977 wherein A.J. Wein, et al. discuss the "characterization of trench water at the Maxey Flats low-level radioactive waste disposal site." Sixty-one organic cpds. were identified in trench water samples, and the presence of such a variety suggests that they may play an important role in the transport of radionuclides.

"Low-Level Waste Management." Science and Technology for the Legislatures. September 1980.

Included in the list of commercial burial sites is Maxey Flats, Kentucky, which has "closed indefinitely." Three solutions to the interim capacity problem have been proposed, including the re-opening of any or all of three closed facilities in Illinois, Kentucky and New York.

Low Level Waste Management Issue Brief. National Conference of State Legislatures. Office of Science and Natural Resources. August 1, 1980.

Primary issues considered in a comprehensive low-level waste management program are enumerated. Case studies include Maxey Flats, Kentucky on p. 7.

Low-Level Waste: A Program for Action. Final Report of the National Governors' Association Task Force on Low-Level Radioactive Waste Disposal. National Governors' Association. Washington, DC. August 1980.

"Recommendation 3: a total of six regional conferences should be organized as soon as possible to discuss the need for additional disposal sites and the formation of low-level waste management regions. States such as Kentucky not included in the listed groups should participate in their choice of one or more of the suggested conferences" (pp. 10-11).

Management of Low-Level Radioactive Waste. Vol. Two. E.M. Carter, et al. Pergamon Press. New York. 1979.

Chapter VIII, "Land Burial Case Histories," includes a report by A.J. Weiss, et al. entitled, "Characterization of Trench Water at the Maxey Flats Low-Level Radioactive Waste Disposal Site" and one by D.M. Montgomery & R.L. Blanchard entitled, "Radioactive Measurements in the Environment of the Maxey Flats Waste Burial Site." Also included is a report by C.M. Hardin entitled, "Operation Experience of the Kentucky Radioactive Waste Disposal Site" (pp. 747ff., 763ff., and 831ff.).

Means for Improving State Participation in the Siting, Licensing and Development of Federal Nuclear Waste Facilities. A

Report to Congress. U.S. Nuclear Regulatory Commission. Office of State Programs. March 1979. (NUREG-0539)

Inventory of relevant state laws includes the notice of Special Advisory Committee on Waste, HR-70: appointed on behalf of the General Assembly of the State of Kentucky to assume an oversight role on all matters pertaining to nuclear waste during 1978-1980. Report of findings and recommendations to the legislature by January 1, 1980.

NRC Task Force Report on Review of the Federal/State Program for Regulation of Commercial Low-Level Radioactive Waste Burial Grounds.

U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. March 1977. (NUREG-0217).

Table B-1 lists commercial waste burial grounds in the U.S. Environmental concerns relating to the Maxey Flats burial ground are reviewed. NRC recommendations concerning methods to minimize potential health and safety hazards are cited. The imposition by the Kentucky Legislature of a 10¢ per pound excise tax on the waste in 1976 is noted. Conclusions show "total capacity should be adequate until 1989 and may suffice collectively until 1993." Concern for financing of the site is reviewed. "The State sees no advantage to closing the site. Closing the site will remove the escrow charge as a source of income for long-term care."

Need for Greater Regulatory Oversight of Commercial Low-Level Radioactive Waste. U.S. General Accounting Office. Report by the U.S. August 16, 1978. (EMD-78-101).

At present, Morehead, KY (Maxey Flats) is cited as one of six low-level waste burial grounds. GAO recommendations include greater emphasis on the licensing, inspection, and monitoring of low-level waste treatment systems and actions aimed at reducing waste volumes.

"Nuclear Waste: Concern Growing over Problem, But Congress Can't Agree on Bill." Congressional Quarterly Weekly Report. November 1, 1980.

Map (p. 3261) shows storage sites for commercial nuclear waste, both existing and potential. It is noted that Morehead, KY was closed in 1977 because of water contamination problems (p. 3262).

Nuclear Waste Facility Siting. Oversight Hearing before the Subcommittee on Energy and the Environment. 96th Congress. 1st Session on Public Participation and Equity in Nuclear Waste Facility Siting. U.S. Congress. House. Committee on Interior and Insular Affairs. Washington, DC. June 28, 1979. (Serial No. 96-8; Part V).

In the testimony of Peter Franchot, Union of Concerned Scientists, it is stated "in December 1977 the Maxey Flats, Kentucky commercial disposal site was closed when plutonium contamination was found in surface soil, 90 centimeter deep soil cores, monitoring wells, and in drainage stream." "Many states have laws concerning the siting of a Federal radioactive waste facility within their borders . . . including Kentucky." "With reference to H.R. 2762, the siting of a radioactive waste site is such an important public policy decision that the people of an affected state should be considered as full partners with the Federal government through their elected state representatives."

Nuclear Waste: A Problem With a Present Solution. American Nuclear Society. September 1979. (mimeographed)
Lists low-level waste site in Kentucky as no longer accepting shipments.

Preliminary State-by-State Assessment of Low-Level Radioactive Wastes Shipped to Commercial Burial Grounds. NUS Corporation. Rockville, MD. February 1980.

Tabulations include total low-level radioactive waste generated within each state (percentages by source); institutional wastes (medical facilities & universities); industrial wastes and government and military wastes (buried at commercial sites). Table 3 shows number of institutional facilities by state (U.S.), and Table 4 gives waste volume distribution by state. Figures for Table 4 are 1978 volume (cubic meters) and percentage of total 1978 U.S. volume.

The Problem of Disposing of Nuclear Low-Level Waste: Where Do We Go From Here? U.S. General Accounting Office. Report to the Congress. March 31, 1980. (EMD-80-68).

The history of low-level radioactive waste burial includes Maxey Flats, KY. The Maxey Flats site ceased operating in December 1977 after the Kentucky Legislature imposed a 10¢ per pound excise tax as a contingency against unforeseen problems. "The tax discouraged use of the site." "A decision on the continued use of the Maxey Flats, Kentucky, site would also seem warranted."

Radioactive Materials Transportation Study. Project One. Identification of Socioeconomic and Institutional Barriers to Radioactive Materials Transportation. (Draft Two). Southern States Energy Board. Atlanta, GA. October 1980.

A listing of relevant statutes and regulations and state agency responsibilities appears on pp. 3-5.

Radioactive Waste Management Integrated Data Base: A Bibliography.

Oak Ridge National Laboratory. Oak Ridge, TN. September 1980.
(ORNL/TM-7385/V2)

Item 361 cites report by D.T. Clark on "A History and Preliminary Inventory Report on the Kentucky Radioactive Waste Disposal site" (1973). This report is noted as "useful as an introduction to the waste contained in the Maxey Flats Disposal Site." Item #766 cites a report by U. Gat, et al. entitled, "Radioactive Waste Inventory at the Maxey Flats Nuclear Waste Burial site," from Health Physics (1976). This report is "a general review and evaluation of the radioactive shipment records of Maxey Flats. Deposited activity is corrected for decay and the postulated present (1974) activity is presented." Another report by U. Gat, presented at the Annual Meeting of the American Nuclear Society in New Orleans, June 8, 1975 is cited in Item #570.

Results of Department for Human Resources Survey of Kentucky Licensees'

Management of Radioactive Wastes. by Roy P. Osborne. Kentucky Department of Human Resources. [n.d.]

This report reviews the volumes of radioactive waste generated (in 1979) at institutions such as the University of Kentucky; University of Louisville, etc; specific radionuclides associated with these wastes; methods of handling the wastes; and problems noted by the various institutions pertaining to the closing of low-level radioactive waste disposal sites in Nevada and Washington State. Costs are estimated for handling wastes at these institutions, waste volumes are projected for 1980-81, and suggestions are made for future consideration of the problem.

Stable Isotope Sales: Mound Facility Customer and Shipment Summaries, FY

1979. Miamisburg, Ohio. Monsanto Research Corporation-Mound Facility. U.S. Department of Energy. October 24, 1980. (MLM2718).

State organizations listed include Murray State University and the University of Kentucky, Department of Physics and Astronomy.

"State Regulation of Radioactive Material Transportation." Hazardous Waste Report. Vol. 1. No. 16. March 10, 1980.

Included in the state laws and regulations governing the transportation of radioactive materials (p. 21) is the citation covering registration, fees, permits, and licensing for the State of Kentucky, whereby the State Department of Human Resources grants general license to carriers in compliance with DOT laws. Inspection is by authorized agencies. Lead agency in Kentucky is the Department of Human Resources.

Study of Chemical Toxicity of Low-Level Wastes. Monographs.

U.S. Nuclear Regulatory Commission. Division of Waste Management. November 1980. (NUREG/CR-1793).

Methodologies by which compounds identified as possible constituents of low-level waste burial sites were selected for toxicological review. To reduce the extensive list of potential low-level waste burial site constituents, only those reported by Columbo, Weiss, and Francis (1977) in trench water analyses at the Maxey Flats, Kentucky disposal site (Table 2-11) were used as a basis of discussion.

Survey of Current State Radiological Emergency Response Capabilities for Transportation Related Incidents. U.S. Nuclear Regulatory Commission. Division of Engineering Standards. September 1980. (NUREG/CR-1620).

Summaries by question and by state cover organization and responsibility, communications, first-on-scene, personnel, equipment, transportation, training, legal issues, funding, and actual experience. Table 3-23, covering "actual experience" question 53, shows KY reporting six transportation accidents in an average year. The response team was activated in each case. Kentucky has never requested federal assistance, but the state does file a federal notification.

System Analysis of Shallow Land Burial. Appendix. U.S. Nuclear Regulatory Commission. Division of Waste Management. March 1981.
(NUREG/CR-1963, Vol. 3).

In Appendix A (site visits), following a brief description of locale and operations, the major emphasis is on the potential pathways of radionuclide release. "The major problem has been the collection of water in the trenches. . . . Tritium migration is a major concern. . . in about five years, Maxey Flats will probably be placed in a retired status."

System Analysis of Shallow Land Burial. Technical Background.

U.S. Nuclear Regulatory Commission. Division of Waste Management. March 1981. (NUREG/CR-1963, Vol. 2).

Maxey Flats is included in the site descriptions. The location, topography, climate, geology, and hydrology were studied, and the descriptions were generated to focus on factors concerning nuclide release and transport (pp. 2-1 through 2-3). In discussing the Maxey Flats environmental exposure pathways, the statement is made that "the possibility of the site being reopened for acceptance of waste appears to be very slim. . . . The hydrogeology at Maxey Flats is poorly understood."

Technology, Safety and Costs of Decommissioning a Reference Low-Level Waste Burial Ground. Appendices. Battelle-Pacific Northwest Laboratory. U.S. Nuclear Regulatory Commission. June 1980.
(NUREG/CR-0570. App., Vol. 2).

Table B-1-2 lists radioactive waste buried at commercial sites as of December 31, 1976. Information includes date of initial operation, status as of 1/1/79; burial area, buried waste volume, total by-product activity; by-product specific activity; total special nuclear material; SNM concentration; total source material; and source material concentration. Table B-1-3 gives a comparison of annual volumes of radioactive waste buried at the six commercial sites, 1974-1977.

Technology, Safety and Costs of Decommissioning a Reference Low-Level Waste Burial Ground. Main Report. Battelle-Pacific Northwest Laboratory. U.S. Nuclear Regulatory Commission. June 1980. (NUREG/CR-0570 Vol.1).

The six commercial waste burial grounds that have operated in the U.S. are listed in Table 3.1-1. Table 3.1-2 shows commercial burial site characteristics, including those for Morehead, KY. Table 3.1-3 covers the operating practices at commercial burial grounds such as Morehead, KY. "Trenches at Morehead . . . are excavated in soil material of low permeability . . . subsurface movement of radionuclides leached by impounded water along fissured or more permeable zones is believed to have occurred at Morehead." Site licensing, operation, and monitoring for Morehead, KY are reviewed. "The Morehead site was closed in December 1977, by order of the Kentucky Department of Human Resources, until agreement is reached on the administration of the site water management program and on other provisions for the long-term care of the site."

Transportation Issues Regarding Low-Level Nuclear Waste. U.S. Department of Transportation. Office of Intermodal Transportation. Washington, DC. June 1979. (DOT-P-10-79-25).

Table 6 shows commercial low-level burial ground summary and includes Morehead, KY (Maxey Flats) with year licensed, licensing agency, current status, buried wastes, volume in cubic feet, activity (Ci), SNM, source material, and remaining burial acreage (as of 1978).

Transportation of Radioactive Material in Kentucky. October 1978 - December 1979. Frankfort, Kentucky. Commonwealth of Kentucky. Department of Human Resources. Radiation Control Branch. U.S. Nuclear Regulatory Commission. September 1980. (NUREG/CR-1671).

Shipments of radioactive materials were surveyed to determine the types of materials, pattern of transportation, and magnitude of activity, the extent of compliance with shipping regulations, and the radiation exposure to persons handling the materials. The transported radioactive materials were categorized as (1) local delivery service, (2) air carrier, (3) nuclear pharmacy, (4) highway carriers, and (5) nuclear fuel cycle. The shipments indicating the greatest volume or amount were those associated with the nuclear fuel cycle. The transportation workers whose radiation exposures were measured did not receive excessive doses from radioactive materials, but practices for reducing the radiation doses can be instituted and are discussed in the report.

APPENDIX B: General Bibliography

GENERAL BIBLIOGRAPHY

Addressing Public Concern in Siting a Regional Low-Level Radioactive Waste Facility. Waltham, MA. Energy Research Group, Inc. February 1981.

A Classification System for Radioactive Waste Disposal - What Waste Goes Where? Ford, Bacon & Savid Utah. U.S. Nuclear Regulatory Commission. July 1978. (NUREG-0456;FBDU-224-10).

Docket Book. (Fourth Meeting, Arlington, VA: September 8-9, 1980). (Fifth Meeting, Phoenix, AZ: January 8-9, 1981). (Interim Report, February 24, 1981). State Planning Council on Radioactive Waste Management. Washington, DC.

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Identification of Technical Problems Encountered in the Shallow Land Burial of Low-Level Radioactive Wastes. Evaluation Research Corporation. Oak Ridge National Laboratory. March 1980. (ORNL/SUB/80-13619/1).

Low-Level Radioactive Waste Management. Proceedings of Health Physics Society, 12th Midyear Topical Symposium. February 11-15, 1979. U.S. Environmental Protection Agency. Office of Radiation Programs. May 1979. (EPA 520/3-79-002).

Low-Level Radioactive Waste Management Report. Response to Public Law 96-573, the Low-Level Radioactive Waste Policy Act. U.S. Department of Energy. March 13, 1981.

Low-Level Waste: a Program for Action. Final Report of the National Governors' Association Task Force on Low-Level Radioactive Waste Disposal. National Governors' Association. August 1980.

Management of Low-Level Radioactive Waste. Volumes 1 and 2. Edited by M.W. Carter, et al. Based on papers presented at a symposium sponsored by Georgia Institute of Technology and others. May 23-27, 1977. Atlanta, GA. New York: Pergamon Press. 1979.

Managing Low-Level Radioactive Wastes: a Proposed Approach. EG&G Idaho, Inc; U.S. Department of Energy. August 1980. (LLWMP-1).

NRC Task Force Report on Review of the Federal/State Program for Regulation of Commercial Low-Level Radioactive Waste Burial Grounds. U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. March 1977. (NUREG-0217).

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Need for Greater Regulatory Oversight of Commercial Low-Level Radioactive Waste. Report by the U.S. General Accounting Office. August 16, 1978. (EMD-78-101).

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The Nuclear Regulatory Commission Low-Level Radioactive Waste Management Program. U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. September 1977. (NUREG-0240).

Nuclear Waste Disposal. Hearings before the Subcommittee on Nuclear Regulations. Part I. U.S. Congress, Senate. Committee on Environment and Public Works. 96th Congress, 1st Session, September 11 and December 11, 1979. (Serial No. 96-H27).

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M.W. Carter, et al. Based on papers presented at a symposium sponsored by Georgia Institute of Technology and others. May 23 , . Atlanta, Ga. Pergamon Press. New York. 1979.

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Screening of Alternative Methods for the Disposal of Low-Level Radioactive Wastes. Ford, Bacon & Davis Utah, Inc. U.S. Nuclear Regulatory Commission. October 1978. (NUREG/CR-0308).

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A State-of-the Art Report on Low-Level Radioactive Waste Treatment. Oak Ridge National Laboratory. Chemical Technology Division. September 1980. (ORNL/TM-7427).

State-of-the-Art Review of Alternatives to Shallow Land Burial of Low-Level Radioactive Waste. Gilbert/Commonwealth. Oak Ridge National Laboratory. April 1980. (ORNL/SUB-79/13837/1).

Study of Chemical Toxicity of Low-Level Wastes. Main Report, Vol.1; Monographs, Vol.2. General Research Corporation. U.S. Nuclear Regulatory Commission. November 1980. (NUREG/CR-1793).

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Technical Background, Vol. 2; Appendix, Vol.3. Science
Applications, Inc. U.S. Nuclear Regulatory Commission.
March 1981. (NUREG/CR-1963).

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Low-Level Waste Burial Ground. Main Report and Appendices.
Vols. 1 & 2. Battelle-Pacific Northwest Laboratory. U.S.
Nuclear Regulatory Commission. June 1980. (NUREG/CR-0570).

Understanding Low-Level Radioactive Waste. EG&G Idaho, Inc. U.S.
Department of Energy. November 1980. (LLWMP-2).

APPENDIX C: Selection of Newspaper Articles

Lexington, Ky.

U.S. Control For Maxey Flats?

Nuclear Waste 'National' Matter

AP And UPI Dispatches

FRANKFORT, Ky. —

The federal government should assume responsibility for perpetual care of existing low-level radioactive waste disposal sites, a U.S. Nuclear Regulatory Commission task force has recommended.

Gov. Julian Carroll has long been an advocate of federal takeover of the state's nuclear waste burial ground at Maxey Flats.

James Neel, president of the Nuclear Engineering Co. of Louisville, which operates the Maxey Flats site under a lease with the state, said he agreed with the task force.

National Fees

Neel said he also felt the NRC should help develop a national policy for determining the perpetual care fees.

Neel and the state have been in a long-standing dispute over the fees he must pay and Neel has been particularly critical of a special tax placed on all nuclear material buried at the site. The tax was enacted by the 1976 General Assembly.

The NRC task force also recommended that no new disposal sites be licensed until alternative disposal methods have been studied, an NRC spokesman said yesterday.

G. Wayne Kerr, assistant

director for the state agreement program in NRC's office of state programs, told the Interim Special Advisory Committee on Radioactive Waste Disposal that the task force recommendations were not drafted in response to an existing health or safety problem at any of the commercial nuclear waste dumps in six states, but were based on the recognition that the problem is a national one.

The task force concluded that the present system for disposing of low level radioactive waste lacks national organization and direction, but noted that the six states with commercial burial sites (Kentucky, Illinois, Nevada, Washington, New York and South Carolina) have taken adequate steps to protect public health and safety.

But the panel also said that the states don't have the resources — or the obligation — to find solutions to what is a national problem.

The task force recommended that the federal government assume responsibility for perpetual care of

low level burial sites through federal ownership of the sites. The states should participate in site selection process and day-to-day monitoring, the panel said.

The NRC should develop criteria and standards for the disposal of low level radioactive waste, the task force also said.

National planning is essential "to ensure adequate disposal capacity beyond 1990, and to control the indiscriminate construction of new sites, the task force said.

The task force said a comprehensive federal examination of alternative disposal methods must be made. Until that is completed, "additional licensing of new shallow land burial sites should be avoided," it said.

It also said existing commercial burial grounds should be used effectively.

Kerr said federal legislation would be required for the U.S. government to assume ownership of the disposal sites.

Wasting away

Nuclear power should go on hold until it can dispose of its garbage

The nuclear industry and its supporters have been breezily reassuring us that radioactive waste is nothing to lose any sleep over.

The spent fuel that must periodically be removed from a nuclear power plant is not, they say, nearly so dangerous as environmentalist hysteria would have you believe. Scientists have figured out how to get rid of the stuff and in due course storage areas will be ready.

The appropriate public response to such assertions is, "Prove it."

That is essentially what the Commission on Environmental Quality, a White House advisory agency, has recommended to President Carter.

J. Gustav Speth, a commission member, said last week that nuclear power should be put on hold until there is proof that its "deadly by-products" can be safely contained.

He suggested that the government set deadlines for a waste management plan and for a field demonstration to show that it works. If the deadlines are missed, no more nuclear plants would be licensed.

That may sound like a drastic step, especially since the Carter administration believes nuclear power must play a role in meeting energy needs.

But the waste problem is the industry's Achilles heel and the source of much public criticism.

Times editorial

further expansion. It can no longer be dismissed as inconsequential.

Nuclear garbage contains plutonium and other materials that are not only extremely dangerous, but remain so for hundreds and thousands of years. Yet there is no place to deposit them permanently after

they've been removed from the reactor.

Interim arrangements have been made for the storage of about 75 million gallons of high level waste, much of it from military weapons programs. Nuclear plants must now keep their spent fuel on the premises and some are short of space.

Kentucky's unhappy experience with the leaky Maxey Flats dump for low-level materials indicates how backward disposal technology is. It's no wonder Ohio Valley residents are

concerned at the prospect that hundreds of pounds of plutonium may be stored at the proposed Marble Hill plant, upstream from Louisville.

Relax, say the pro-nuclear forces. We've figured out a way to turn the waste into glass, and then we plan to bury it in stable salt deposits hundreds of feet underground.

And why, they ask, in a tone of injured innocence, is there so much worry about plutonium when the emissions from coal-fired plants kill dozens of people every year and when almost every home is stocked with poisons that are routinely sprayed at bugs and weeds?

Well, in the first place, the feasibility of the underground disposal process that is supposed to be safe and easy has not been demonstrated yet and probably won't be until at least 1985, according to the U.S. General Accounting Office.

Secondly, if we've learned a lesson from sulphur dioxide and chemical pollution, it's that toxic substances should be placed under control before they start killing people.

So Mr. Speth is right on course. Instead of producing more waste and hoping that somehow, some time, somebody will figure out what to do with it, let's prove it can be safely disposed of before we get involved with nuclear power.

U.S. should take care of sites for nuclear wastes, panel says

Associated Press

FRANKFORT, Ky. — The federal government should assume responsibility for perpetual care of existing low-level radioactive-waste disposal sites, a U.S. Nuclear Regulatory Commission task force has recommended.

The task force also recommended that no new disposal sites be licensed until alternative disposal methods are studied.

G. Wayne Kerr, assistant director for the state agreement program in NRC's office of state programs, told the Interim Special Advisory Committee on Radioactive Waste Disposal that the recommendations were not in response to an existing health or safety problem.

The task force said the present system for disposing low-level radioactive waste lacks national organization and direction. But it noted that the six states with commercial burial sites (Kentucky, Illinois, Nevada, Washington, New York and South Carolina) have taken adequate safety steps.

But the panel also said the states don't have the resources — or the obligation — to find solutions to what is a national problem.

The task force recommended that the federal government provide perpetual care of the sites through federal ownership. The states should participate in the site-selection process and daily monitoring, the panel said.

Gov. Julian Carroll has long been an advocate of federal takeover of the state's waste site at Maxey Flats.

The NRC should develop criteria and

standards for the disposal of radioactive wastes, the task force said.

National planning is essential "to ensure adequate disposal capacity beyond 1990, and to control the indiscriminate construction of new sites," the task force said.

Kerr said legislation would be required for the government to assume ownership, to reassert regulatory authority over the dumping grounds and to administer a perpetual-care program.

Kerr said development of criteria for site selection should be completed in about two years. He said all recommendations could be implemented within five years.

The panel was composed of members of NRC's Office of Nuclear Material Safety and Safeguards and the Office of State Programs. The group met with government officials in the six states involved and visited the sites, Kerr said.

Plan for U.S. to own Maxey Flats is backed

By HOWARD FINEMAN

Courier-Journal Staff Writer

The Kentucky official overseeing Maxey Flats says he welcomes a recommendation that the federal government assume ownership of the controversial nuclear-waste dump, which has belonged to the state since it opened in 1963.

But Charles M. Hardin, who heads the state's radiological health program, says he can support only "with qualifications" a recommendation that the federal government take over licensing of the Fleming County site.

Hardin said he is concerned that the state could lose any say in the operation of the 242-acre site, which has been leased to the Nuclear Engineering Co. (NECo) of Louisville since it opened.

"We don't want to be in a position where the state has no veto power over regulation of what goes there," he said. "We'd want to maintain some jurisdiction and regulatory responsibility."

A task force of the U.S. Nuclear Regulatory Commission (NRC) recommended last week that Maxey Flats and the other five commercial dumps for "low-level" radioactive waste be brought under much stricter federal control.

As a way of doing that, the task force said, the government should take over ownership of the sites, immediately prepare nationwide standards on proper burial practices and, "with state participation," begin licensing and supervising the operations.

Despite its name, some "low-level" waste is very radioactive. Federal rules define it as anything other than used nuclear-reactor fuel or byproducts of the reprocessing of reactor fuel. It thus includes everything from pieces of old reactor pipes to discarded clothing worn by workers who use radioactive materials in research.

Some of the materials at Maxey Flats will have to be kept out of the environment for at least a few hundred years, according to G. Wayne Kerr, an NRC

official who works with the states now supervising the burial sites.

Five of the six sites are owned by the supervising states. Only one is owned by the federal government.

A federal take-over, should the NRC decide it wants one, will take months and perhaps years, according to NRC and state officials working on the matter.

The task force's recommendations will go to the commission itself within a few months. Further planning and coordination of state and federal action, could take many more months, according to Andrew Robert, who is in charge of state-federal relations for the NRC.

And Congress will probably have to approve the move, several officials said.

Group to discuss nuclear wastes

By BILL BERGSTROM
Associated Press Writer

Workers at the Hanford nuclear plant in the state of Washington apparently run a higher than average risk of dying of cancer, according to a report to be discussed today before a group studying nuclear waste disposal in Kentucky.

The study, by two physicians and a statistician at the University of Pittsburgh, dealt with causes of death among workers at the plant, according to Brian Kiernan, Legislative Research Commission staff member assigned to the Interim Special Advisory Committee on Radioactive Waste Disposal.

Professor Hugh Spencer, a University of Louisville environmental scientist and biochemist, will talk about the March, 1977, draft report during the meeting at Morehead State University's student center, Kiernan said Monday.

The committee will discuss the future of the Maxey Flats nuclear waste dump in Fleming County, about 25 miles north of Morehead, he said.

Kiernan said less material is being brought to Maxey Flats since the state started taxing waste buried there by the pound, but the material that does come for disposal is more highly radioactive.

The state imposed a 10-cent-a-pound tax on the material last June with the aim of building up a fund for

perpetual care of the site. Maxey Flats currently is operated by Nuclear Engineering Co. of Louisville under contract with the state.

Kiernan said companies that have nuclear wastes to dispose of "don't mind paying the 10 cents if the stuff is hot."

"But if they have concrete liners from a reactor, which are not that hot, and they have 40 tons of them, they'll transport them to South Carolina where they have a site where they don't have to pay a tax," Kiernan said.

It has the effect of reducing the volume material brought to the site, but it increases its radioactivity," he said.

Among the materials buried at Maxey Flats are resins used to clean water in reactors, he said. "They become highly radioactive."

"Though the material coming to the site is 'hotter,' the reduction in volume means slow growth for the perpetual care fund," Kiernan added.

The fund now amounts to about \$217,000, he said. "It costs about \$100,000 a year to monitor the site."

Kiernan said there are materials buried at Maxey Flats that will have to be monitored for hundreds of years. Today's agenda includes discussion of ways this can be accomplished.

STATE BURIAL BANS

Legislatures act nationwide

Twenty-three states have passed laws or resolutions, or have considered legislation during the most recent legislative sessions, controlling radioactive waste materials, according to a survey by the Nuclear Regulatory Commission. Laws or resolutions are in effect in the following states:

- Colorado—a law has been enacted memorializing Congress, the President, and the Department of Energy to drop the state from consideration as a site for the nuclear waste repository.
- Delaware—a resolution was passed asking its Congressional delegation to support legislation letting states veto site selections.
- Hawaii—a resolution was passed expressing concern over plans for ocean dumping of wastes 600 miles to the north, and asking a halt by the EPA until safety is proven.
- Kentucky—an advisory committee will consider waste matters and make recommendations to the legislature by January 1, 1980.
- Louisiana—use of salt domes for waste storage has been banned and testing for such use requires prior notification; also Congress has been memorialized to require prior notice before the state is searched for disposal sites.
- Maryland—the time limit on temporary storage may be extended beyond the former two-year period.
- Michigan—wastes, except mill tailings and spent fuel in pools, will not be allowed burial.
- Minnesota—construction of any nuclear waste management facility is prohibited without legislative approval; also, wastes may not be transported from out of state for storage for longer than one year.
- Montana—out-of-state wastes in large quantities are forbidden disposal.
- Oregon—construction or operation of a repository is banned.
- South Dakota—processing or storage of wastes, except mill tailings, is banned without approval of the legislature.
- Texas—the Water Quality Board is empowered to restrict releases of radioactive effluents to state waterways.
- Vermont—waste repository construction is banned without legislative approval.

In addition, bills are pending or have been defeated in California, Illinois, Louisiana, Massachusetts, Michigan, Mississippi, Nebraska, New Mexico, New York, Ohio, Rhode Island,

Huntington, W.Va.

Maxey Flats Analysis For Costs Requested

United Press International

FRANKFORT — A frustrated legislative subcommittee yesterday requested two state agencies involved with the Maxey Flats nuclear waste disposal site prepare a current and projected cost analysis for its maintenance.

The Costs and Financing subcommittee of the Special Advisory Committee on Nuclear Waste Disposal made the request after it was unable to pinpoint an exact figure for perpetually maintaining the 252-acre site in Fleming County.

The motion, introduced by Rep. Pete Worthington, D-Ewing, requests that representatives of the Department for Human Resources and the Finance Department appear at the next subcommittee meeting.

SUBCOMMITTEE members, frustrated at failing to receive accurate figures, were also disappointed to hear that a long-term maintenance study undertaken by the Council of Economic Advisors is apparently not currently valid.

Dr. Lawrence Lynch of the Council noted the September, 1977 study theorized a fund for the perpetual care of the now state-owned site must

amount to between \$3.2 million and \$4.2 million to meet rising inflation.

However, Lynch pointed out those figures are only valid if the site could be brought in line with seven basic assumptions on which the study is based. He said it was now unlikely this could be done before 1988 when site problems will presumably be solved.

The site was closed indefinitely last December after leakage from an old trench was discovered to have contaminated a new unused trench 200 feet away. About 4.5 million cubic feet of waste is buried at the site.

The Lexington economist noted that a fund of this size, gathering interest from its creation, would stabilize and be able to keep pace with inflation, which would raise annual maintenance and surveillance costs at the site.

But, he added, since at least three of the assumptions have not been met — and will probably not be met until a 25-year maintenance lease with the Nuclear Engineering Co. of Louisville expires — the figures are inaccurate.

THE ASSUMPTIONS Lynch re-

ferred to are the basis for a series of possible scenarios under which the state, which purchased the site for \$1.25 million from NECo last May, could operate the low-level radioactive disposal site.

Worthington noted that estimates, which he acknowledged could be wrong, suggested it would cost \$350,000 annually to maintain the site, one of three low-level radioactive sites now closed across the country.

However, he and subcommittee members agreed firm figures on the present and future maintenance costs are needed if the subcommittee is to make recommendations to the 1980 General Assembly.

Worthington's motion also requested an analysis of the source for the maintenance funds and what actions must be done before accurate financial figures can be compiled.

According to the subcommittee, the state — as the site's owner — is now responsible for maintaining the "integrity" of the site and for fence repair to prevent trespassers.

Kentucky Unhappy with Atom Dump

The state of Kentucky seems to have joined the burgeoning ranks of those who are getting disillusioned with the nuclear age. On 15 December it temporarily, and perhaps permanently, closed the nuclear waste disposal site that has operated at Maxey Flats, near Lexington, since 1963.

Maxey Flats is one of 17 low-level radioactive burial sites in the country. Twelve are owned by the federal government; the rest are state-licensed and commercially run.

Over the past 7 years, there has been continuous uncertainty about whether a long-term hazard was posed by seepage of contaminated water from the site, where the waste is buried in shallow trenches. Last August radioactivity was found in a new, unused trench, providing "unequivocal evidence" of subsurface migration of contaminated water. No immediate public health hazard was ascertained, but since no one could make any long-term assurances, the state and the commercial operator, Nuclear Engineering Company, agreed on a temporary shutdown. For the next 2 years the state

will take over maintenance of the dump while further studies are conducted.

The Maxey Flats problem is described in an October report of the state's special advisory committee on nuclear waste disposal, which asserts: "The decision to locate a nuclear burial site at Maxey Flats was a mistake, at least for geological and hydrological reasons." It appears that it was also an economic mistake.

Back in the late 1950's, a nuclear burial site seemed like a great idea—it would attract power plants and "it was thought that nuclear power might do for Kentucky what TVA had done for Tennessee." But as it turned out, virtually all the waste came from outside the state. The neighbors do not like the dump; neither do the environmentalists or the coal people. Kentucky has no nuclear plants and the state is opposing the Marble Hill power plant in neighboring Indiana. In short, as the report says, "All the hopes and aspirations expressed for nuclear industry in the early sixties have come to nothing."

Maxey Flats is now something of an albatross around Kentucky's neck. In 1963 people were only dimly aware of the fact that once you accept nuclear garbage you have to deal with it, for all practical purposes, forever. The costs of "perpetual care and maintenance" are far higher than used to be thought.

Kentucky now seems inclined to get out of the nuclear dump business altogether, but it will not be able to if the site is reopened, because it does not trust the federal government to take over. Barring an abrupt turnaround in public sentiment, the most likely fate for Maxey Flats is that it will be kept closed and foisted on the federal government for perpetual care.

STATE HEADLINES Oct. 19, 1979
(Council of State Governments)

**NUKE WASTE
SHIPMENTS
STOPPED**

SOUTH CAROLINA Governor Richard Riley has announced he will prohibit the Commonwealth Edison Company of Chicago from shipping low-level radioactive wastes to South Carolina's radioactive waste dumping ground in Barnwell because of the company's pattern of improper packaging. Meanwhile, hospitals and research laboratories in the northeast reportedly are cutting back on tests using radioactive materials because of the closing of the Richland, WASHINGTON, low-level radioactive waste dump site by Governor Dixy Lee Ray. In KENTUCKY, Governor Julian Carroll signed an emergency order October 17 giving the state a comprehensive program to regulate industrial waste. Kentucky is the site of a low-level radioactive waste dump site which was closed because of leakage several years ago.

Feb. 13, 1980

Radioactive-waste-management program proposed by Carter

By JAMES GERSTENBERG
Associated Press

WASHINGTON — President Carter proposed yesterday the nation coordinate its efforts to store nuclear garbage by spending \$700 million to examine salt domes and other sites in the South and West as potential radioactive dumps.

Sending his proposal to Congress, Carter said the government would study about 15 sites where the poisonous by-products of nuclear power, weapons tests and medical research could be hidden at no risk to the environment.

The proposal contains funding of \$730 million for fiscal 1981. Funding for nuclear storage in the previous two fiscal years averaged \$530 million a year.

Questions remain as to whether the wastes can be stored safely. The highly radioactive materials could have a life of from 1,000 to 500,000 years.

"A technical consensus exists among experts that no insurmountable barriers are known" to prevent the safe storage, Carter's domestic policy adviser, Stuart Eizenstat, told reporters. His statement was supported by Frank Press, the president's science adviser.

But one paper the White House distributed in support of the program said that the Nuclear Regulatory Commission "is determining whether or not it has confidence that radioactive wastes can be disposed of safely."

Carter also created a state planning council, with Gov. Richard Riley of

South Carolina as chairman, to work with the administration and Congress on radioactive-waste-management issues.

The need for such a program has been demonstrated by controversies surrounding several sites holding radioactive materials. The White House estimated that the nation turns out almost 100,000 cubic feet of high- and low-level radioactive waste, a figure that may grow to about 350,000 cubic feet by the year 2000.

Some storage facilities have been closed by local authorities and others are filling up at such a rate that medical research producing nuclear garbage is being threatened.

Utilities with nuclear plants have been forced to keep spent fuel at reac-

tor sites where storage space is expected to be scarce by the end of the decade. Carter said he would continue to seek legislation to build or buy limited temporary storage facilities for such spent fuel until permanent sites can be developed.

Carter's recommendations stem from a two-year study. Final decisions on waste sites to develop into actual permanent storage facilities are not likely to be made until 1984 or 1985, officials said. The first site might then be in operation by the early 1990s.

John M. Deutch, under secretary of the Department of Energy, said that scientists would study at each site the geological, water, and geological characteristics to determine the best location

for the stainless steel canisters that would contain the spent fuel from nuclear reactors and other nuclear by-products.

Deutch added that the facilities also would hold a "limited quantity of spent fuel from abroad."

Until a permanent facility is established, individual utilities whose nuclear reactors produce spent fuel will be responsible for their storage.

Carter's plan quickly drew fire from one western senator, James A. McClure, Idaho, who criticized the president for canceling a pilot plant near Carlsbad because he would rather explore several sites with a variety of structural characteristics. Although the Waste Isolation Pilot Plant project there will be

canceled, the site will still be considered for permanent storage.

The government has already spent \$80 million on the storage of military nuclear waste.

Representatives of environmental groups, after a private White House briefing, voiced generally favorable opinions of the plan.

But Thomas Cochran of the Natural Resources Defense Council said "This may be a sugar-coated arsenic pill, if it is not implemented properly."

"It is generally a good policy," said Drew Dethl of the Sierra Club. But he suggested that the White House keep tight reins on the Energy Department's involvement.

In Congress, Sen. Jennings Randolph, D-W. Va., chairman of the Senate Committee on Environment and Public Works, commended Carter for focusing on a program for permanent disposal of nuclear waste instead of recommending a program of long-term storage "which would only postpone still further resolution of permanent disposal issues."

But Republicans said Carter's proposal needlessly delays a final solution to a pressing national problem.

"This issue has been studied and studied to death," said Rep. Barry Goldwater Jr., R-Calif., a member of the House Science and Technology Committee. "The need for action is now, instead, the president is adopting a cover-up mentality. We need a demonstration project now."

Mar 24, 1980

KENTUCKY PROPOSES NEW REGULATIONS—USES DEGREE OF HAZARD

The Kentucky Department of Natural Resources and Environmental Protection (DNR) last month proposed a comprehensive set of hazardous waste regulations which incorporate a degree of hazard scheme. DNR will

conduct a public hearing on the proposed regulations on April 7 in Frankfort. The state is currently operating under emergency hazardous waste regulations (See *HWR*, Vol. 1, No. 7, p. 12) which have been renewed once and will expire on June 12.

The proposed regulations distinguish "hazardous waste," "extremely hazardous waste" and "moderately hazardous waste." The definition of extremely hazardous waste is that it "contains any organic substance which has a calculated human LD₅₀ of less than 50 mg/kg, at a concentration in mg/L greater than or equal to 0.35 times its LD₅₀ expressed in units of mg/kg." This is distinguished from moderately hazardous waste which contains an "LD₅₀ equal to 50 mg/kg but less than 425 mg/kg." The proposed regulations also provide separate definitions for toxic waste, ignitable waste, corrosive waste, radioactive waste, incompatible waste and reactive hazardous waste.

DNR may require that any "extremely hazardous waste" be treated before it is disposed and DNR must be notified before extremely hazardous waste is transported on a public road.

The distinction among types of hazardous waste is most acute in terms of annual generator registration and renewal fees. The fee is based on the volume and type of waste generated using the formula $Y = AX^{0.75}$. Y equals the fee, X equals the annual tonnage and A equals 125 for hazardous waste, 250 for moderately hazardous waste and 500 for extremely hazardous waste. The regulations also impose a maximum annual fee which is \$1,250 for hazardous, \$2,500 for moderately hazardous and \$5,000 for extremely hazardous waste.

The regulations will also require the generator, as a condition of the permit, to post a bond "sufficient to provide for the cleanup of spills of hazardous waste at the generating facility or during transport, based on the character, quantity and routing of the waste."

The disposer will be required to show evidence of financial responsibility for injuries to persons or property sustained as a result of an escape or release of hazardous waste. He must also establish both a closure and a post-closure monitoring and maintenance fund.

The proposed hazardous waste manifest will require both the generator and disposer to submit copies or summaries of completed manifests to DNR. The generator must notify DNR of out-of-state shipments and the disposer must notify DNR of receipt of out-of-state shipments.

DNR anticipates that they will be able to incorporate any changes necessitated by the April EPA regulations prior to expiration of their emergency regulations. The proposed regulations appear in the March 1 Kentucky Administrative Register.

Covington, Ky.

Maxey Flats Closing Plan Still Question

FRANKFORT — State officials Thursday told a special legislative advisory committee that there are still no detailed plans decommissioning of the Maxey Flats Nuclear Disposal Site.

However, they said they hopefully will have a better picture in the next year as to how to proceed with the permanent closing of the controversial Fleming County facility.

"We do not have a detailed analysis at this point as to what is needed to decommission the site," said Nancy Osborne, special assistant to Natural Resources Secretary Jackie Swigart.

"This is an extremely complex problem," added Roger Blair, director of the Division of Hazardous Waste Management. "By this time next year, hopefully we can map out where we have been and where we are going."

THE STATE took over full-time maintenance responsibility for Maxey Flats in 1973 after radioactive leaks were discovered at the site.

The 1980 General Assembly charged the Natural Resources department with developing and implementing a plan to stabilize and decommission the facility, where low level radioactive waste is buried.

It is believed to be the first permanent closing of a nuclear waste disposal site in the United States.

Osborne said the department is drafting two requests for federal funds to help with the work.

She said a proposal should be ready by the first of September to the Nuclear Regulatory Commission for \$371,000 in funds to help with water run-off at the site.

Another, more complex proposal for \$3.7 million from the Department of Energy, will probably be ready by early November. It will largely involve remedial work to the site and the burial trenches.

Both proposals cover a three-year period.

THE DEPARTMENT has been given \$1.6 million in state funds this year to help stabilize the site.

Blair said the department faced serious problems with water collecting in the burial trenches and becoming contaminated when it took over maintenance of the facility.

He said most of the work so far has involved stabilizing the site.

"But if we get the grants, an extreme amount of remedial work will be done on the site," Blair said.

Osborne and Blair presented their report to the first meeting of the Legislative Research Commission's special Advisory Committee on Nuclear Issues.

The committee was created by the 1980 General Assembly as a continuation of two previous committees that have studied the problem of the Maxey Flats facility for the past three years.

However, the new committee was given expanded responsibilities to oversee all matters relating to the nuclear industry in Kentucky and to present recommendations to the 1982 legislature concerning the disposal of radioactive waste generated in Kentucky.

OSBORNE SAID engineering studies found no traces of damage to the site from the July 27 earthquake whose cen-

ter was located just a few miles from Maxey Flats.

However, committee member Dr. Hugh Spencer of the University of Louisville noted that possible new underground cracks for the migration of radioactive material may not be detected for years.

"These will be concerns the state will be faced with, possibly for eternity," Spencer said.

Allen Holbrook, a Morehead attorney representing concerned citizens in the area, said that because of the geology of the site, especially in view of the earthquake, the radioactive material should be removed from the trenches and put into adequate containers.

Lexington, Ky.

Closing a Chapter at Maxey Flats: A Problem Not So Easily Solved

For Kentuckians, the name Maxey Flats carries some of the same dangerous connotations Pennsylvanians must apply to Three Mile Island. The source of the danger is different but the danger itself is much the same: radioactive leakage. At Three Mile Island, the source was a nuclear power plant that malfunctioned. At Maxey Flats, the source was, and remains, radioactive waste stored over the years in what was presumed to be a safe disposal site.

Maxey Flats, however, was not safe. The geology of the Fleming County site, its water table and the prevailing weather combined to make Maxey Flats susceptible to radioactive leakage — leakage that threatened to contaminate local water supplies and endanger the health of area residents.

The state put a stop to dumping at the site in 1977, and earlier this year the General Assembly enacted legislation directing the Department for Natural Resources and Environmental Protection to stabilize the site and close it permanently. This week the Department hired a management team to determine how the stabilizing and closing of Maxey Flats can best be accomplished. It will be neither a quick or an easy process. Years of work and millions of dollars will be spent correcting the problems that produce lateral seepage of contaminated water.

Even when Maxey Flats is stabilized to the point that regular monitor-

ing and routine maintenance are sufficient to safeguard it, the danger will not be wholly eliminated. From its opening in 1962 until it was closed in 1977, radioactive waste totaling 4.8 million cubic yards was buried in the site. Ninety percent of the waste will decay in the next 100 years, but the remaining 10 percent will continue to pose a danger for hundreds, perhaps thousands, of years to come.

In a sense, Maxey Flats is a microcosm of the problems associated with the nuclear age. Eager for its many benefits, we rushed into it without a full understanding of its effects. Now that radioactive materials are so widely used — from nuclear power plants to medical treatment — we are faced with a growing stockpile of waste that poses a danger not only for us, but also for many generations to come.

No answer to the problem has been found. To the contrary, Congress earlier this year enacted legislation that, in effect, left the solution for future generations to find. That legislation set up a program for interim above-ground storage facilities designed to last 100 years. Private companies could dump their radioactive wastes at the facilities, but the government would pick up the tab for storage.

If there is a lesson to be learned from places like Maxey Flats and Love Canal, it is that stopgap measures are not enough when you are dealing with radioactive wastes.

KY NEW ERA Dec. 26, 1980

Hopkinsville, Ky.

Team Hired To Study Site

FRANKFORT, Ky. (AP) — The state Department for Natural Resources and Environmental Protection has hired a management team to work toward the decommissioning of the Maxey Flats nuclear waste-disposal site.

Secretary Jackie Swigart said that she also has transferred the responsibility for the site to her office from the state division of hazardous materials and waste management.

The first step in bringing the site to a condition where minimal maintenance can meet safety needs is resolving problems caused by rain water, the department said.

"We're investigating what is feasible, lasting and economical to quickly reduce the water problems and eventually stop water from seeping into the trenches where the waste was deposited," said Birney Fish, the new project manager.

Fish is a professional engineer who has specialized in environmental and radiological health, according to a department release.

Owningville, Ky.

Danger for thousands of years

State management team hired to decommission Maxey Flats burial dump

The nuclear waste burial site at Maxey Flats in Fleming County will be "decommissioned" to get the dump area in shape for minimum maintenance by the state.

Last week the State Department for Natural Resources and Environmental Protection hired a management team to work toward the decommissioning of the site.

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Fish is a professional engineer who has specialized in environmental and radiological health, according to a department release.

Maxey Flats came under fire

— See STATE, page 9

— FROM FRONT PAGE

when it was learned some of the radioactive waste was leaking from its burial containers and possibly getting into the water plain in that area. It was finally closed down to further dumping and the state stepped in to perpetually maintain the nuclear waste buried there.

The state put a stop to dumping at

the site in 1977, and earlier this year the General Assembly enacted legislation directing the Depart-

ment for Natural Resources and Environmental Protection to stabilize the site and close it permanently.

Even when Maxey Flats is stabilized to the point that regular monitoring and routine maintenance are sufficient to safeguard it, the danger will not be wholly eliminated, officials say. From its opening in 1962 until it was closed in 1977, radioactive waste totaling 4.8 million cubic yards was buried at the site. Ninety percent of the waste will decay in the next 100 years, but the remaining ten percent will continue to pose a danger for hundreds, or perhaps thousands, of years to come.

ENERGY USERS REPORT - CURRENT REPORT
(Bureau of National Affairs)

Feb. 5, 1981

Nuclear Energy

**FIVE TO 10 YEAR ON-SITE CAPACITY
ADVISED FOR LOW-LEVEL WASTE STORAGE**

MONTEREY, Calif. — (By a BNA Staff Correspondent) — Electric utilities building nuclear power plants should be prepared to store low-level waste material on site for at least 10 years because of a possible shortage of disposal sites, a Department of Energy official warned here February 2.

Addressing an American Nuclear Society conference on state and federal roles in waste management, George B. Levin, program manager of DOE's low-level waste management program in Idaho, noted that the three existing disposal sites are adequate for only three more years.

"If I were a utility executive, I'd be concerned," Levin said when asked how low-level waste generators should plan for the future. During the 1970s the number of disposal sites dropped from six to three, and there is considerable uncertainty about when new sites will be opened.

Despite his warning to utilities, Levin said he is optimistic that new sites can be approved and opened in the coming decade. It takes three to five years to complete that process, he said. But given that lead time and other uncertainties of the siting process, it is prudent for utilities to plan for the worst case and be prepared to store waste on site for five to 10 years, he advised.

Levin reported on progress in four studies being conducted by DOE on low level waste projections for the 1980s. In 1979, commercially operated low-level waste disposal facilities received 2.8 million cubic feet of waste, while DOE sites received some 1.5 million cubic feet, he said. The bulk of the commercially generated waste, nearly 80 percent, goes to the Barnwell, S.C., site and the remainder is divided between Hanford, Wash., and Beatty, Nev.

Fully half of the waste is generated from commercial nuclear power plants, Levin reported. Most of the low level waste comes from eastern states, he added, yet Barnwell is the only eastern disposal site in operation.

Disposal Site Squeeze

The Barnwell site gradually is reducing the amount of waste it will accept for disposal, Levin said. That decision will put more pressure on the Beatty and Hanford sites. In 1982, the Barnwell facility will accept only 1.2 million cubic feet of waste.

Previous DOE estimates have put the low-level waste generation rate in 1990 at 11 million cubic feet, Levin said. At that rate, 10 sites the size of Barnwell will have to be in operation, each accepting 1.2 million cubic feet, he explained.

Levin said he believes adequate disposal sites can be found and approved to handle that volume of waste. The six-site network that existed in the early 1970s is a good model on which to build, he suggested. Besides Barnwell, Beatty, and Hanford, that network included sites at Sheffield, Ill., Maxey Flats, Ky., and West Valley, N.Y.

Levin praised the efforts of some states and utilities to speed up the siting of disposal sites. A potential squeeze in availability of disposal sites is recognized by those officials, he said. Most of the sites probably will be located in eastern states, near the waste generation sites, he predicted.

The potential squeeze on existing disposal sites and a need to insure adequate electric power are combining to force states to confront the low-level waste disposal issue. John J. Stucker, executive director, State Planning Council on Radioactive Waste Management, outlined some progress toward siting state and regional disposal facilities.

Legislation enacted by Congress last year orders the states to provide capacity for disposal of low-level wastes generated within their borders, he noted. The law also authorizes states to enter into compacts with neighboring states for regional sites. Preliminary discussions about such regional compacts already are under way in New England, the Midwest, Southeast, and West, he reported.

To assist the states, the State Planning Council is working on a model interstate compact for low-level waste disposal, Stucker said. It likely will be a few years, however, before any new sites are opened under the authority of an individual state or multi-state compact, he cautioned. The Nuclear Regulatory Commission could facilitate such work by establishing uniform, national standards for the states to follow, he suggested.

NUCLEONICS WEEK Feb. 9, 1981

MEMBERS OF A SPECIAL COMMITTEE STUDYING NUCLEAR ISSUES IN KENTUCKY have adopted a resolution calling for the federal government to pay for decommissioning the Maxey Flats nuclear disposal site. The committee has also adopted a resolution requesting a specific timetable from the Kentucky Dept. for Natural Resources & Environmental Protection for decommissioning the site. Maxey Flats stopped accepting materials for disposal about three years ago. The committee, appointed by the governor, is made up of professionals, citizens, and lawmakers. It plans to seek funds during the next session of the state legislature to close Maxey Flats if federal money is not forthcoming.

NEWS Aug. 22, 1981

Morehead, Ky.

Citizens Concerned About Maxey Flats To Have Speaker

Citizens Concerned about Maxey Flats will hold a meeting on Wednesday, Aug. 27, at 7:30 p.m. in the Rowan County Public Library.

A representative from the Department of Natural Resources is expected to attend the session. The representative will be familiar with the maintenance at Maxey Flats waste disposal site and will be available to answer any questions from the group concerning the operation.

Also members of the citizens group who attended a recent meeting with the special advisory committee on nuclear wastes will report on that session.

Allen W. Holbrook, chairman of Citizens Concerned about Maxey Flats, will read a statement he presented to the advisory committee.

APPENDIX D: List of Counties in the State Economic Areas of Kentucky

LIST OF COUNTIES IN EACH STATE ECONOMIC AREA OF THE STATE OF KENTUCKY

Area 1

Ballard
Calloway
Carlisle
Fulton
Graves Hickman
McCracken
Marshall

Area 2

Daviess
McLean
Union Webster

Area 3

Breckinridge
Bullitt
Butler
Caldwell
Crittenden
Edmonson
Grayson
Green
Hancock
Hardin
Hart
Hopkins
Larue
Livingston
Lyon
Meade
Muhlenberg
Ohio
Taylor

Area 4

Barren
Christian
Logan
Simpson
Todd
Trigg
Warren

Area 5

Adair
Allen
Casey
Clinton
Cumberland
Lincoln
Metcalf
Monroe
Pulaski
Rockcastle
Russell
Wayne

Area 6

Anderson
Bath
Boone
Boyle
Bracken
Carroll
Fleming
Franklin
Gallatin
Garrard
Grant
Henry
Madison
Marion
Mason
Montgomery

Area 6 (cont'd.)

Nelson
Nicholas
Oldham
Owen
Pendleton
Robertson
Shelby
Spencer
Trimble
Washington

Area 7

Bourbon
Clark
Harrison
Jessamine
Mercer
Scott
Woodford

Area 8

Carter
Clay
Elliott
Estill
Greenup
Jackson
Laurel
Lawrence
Lee
Lewis
Magoffin
Menifee
Morgan
Owsley
Powell
Rowan
Wolfe

LIST OF COUNTIES (continued)

Area 9

Bell
Breathitt
Floyd
Harlan
Johnson
Knott
Knox
Leslie
Letcher
McCreary
Martin
Perry
Pike
Whitley

Area A

Jefferson

Area B

Campbell
Kenton

Area C

Boyd

Area D

Henderson

Area E

Fayette

APPENDIX E: Kentucky Radiation Regulations

902 KAR 100:005. General applicability.

RELATES TO: KRS 152.690 to 152.990

PURSUANT TO: KRS 13.082, 152.690, 194.050, 211.090

NECESSITY AND FUNCTION: The Department for Human Resources is empowered by KRS 152.690 to 152.990 to regulate the possession or use of any source of ionizing or electronic product radiation and to regulate the handling and disposal of radioactive waste. The purpose of this regulation is to specify the general applicability of the Department for Human Resources' radiation regulations.

Section 1. General Applicability of State Radiation Regulations. The Department for Human Resources' regulations relating to radiation are applicable to the possession and use of all sources of ionizing and electronic product radiation in Kentucky and to the handling and disposal of radioactive waste in Kentucky except where exclusive jurisdiction has been retained by the United States Nuclear Regulatory Commission pursuant to applicable federal laws and regulations. Nothing in the department's radiation regulations shall be interpreted as limiting the exposure of patients to radiation by licensed state practitioners of the healing arts who are authorized by virtue of their license to use sources of radiation, or by qualified individuals acting under their direction. The classification and certification of operators of sources of radiation as provided by KRS 211.870, 211.890, and 211.993 are not included within the scope of these regulations.

Section 2. Existing Licenses and Certificates. All licenses, registration certificates and other actions of the department taken pursuant to previous State Board of Health regulations bearing the code letters "RAD" or "RH" shall continue in full force and effect subject to the provisions of the department's current regulations relating to radiation. (1 Ky.R. 380; eff. 2-5-75; Am. 2 Ky.R. 477; eff. 4-14-76.)

902 KAR 100:020. Standards.

RELATES TO: KRS 152.690 to 152.990

PURSUANT TO: KRS 13.082, 152.690, 194.050,
211.090

NECESSITY AND FUNCTION: The Department for Human Resources is empowered by KRS 152.690 to 152.990 to regulate the possession or use of any source of ionizing or electronic produced radiation and the handling and disposal of radioactive waste. The purpose of this regulation is to provide for standards for the protection to the user and general public against radiation exposure.

Section 1. Applicability. This regulation applies to all persons licensed or registered pursuant to the department's radiation regulations.

Section 2. Exposure of Individuals to Radiation in Restricted Areas. (1) Except as provided in subsection (2) of this section, no licensee or registrant shall possess, use, receive, or transfer sources of radiation in such a manner as to cause any individual in a restricted area to receive in any period of one (1) calendar quarter from all sources of radiation in the licensee's or registrant's possession a dose in excess of the limits specified in the following:

(a) Whole body; head and trunk; active blood-forming organs; lenses of eyes; or gonads: one and one-fourth ($1 \frac{1}{4}$) Rems per calendar quarter;

(b) Hands and forearms; feet and ankles: eighteen and three-fourths ($18 \frac{3}{4}$) Rems per calendar quarter;

(c) Skin of whole body: seven and one-half ($7 \frac{1}{2}$) Rems per calendar quarter.

(2) A licensee or registrant may permit an individual eighteen (18) years of age or over to receive an occupational dose to the whole body greater than that permitted under subsection (1) of this section, provided:

(a) During any calendar quarter the dose to the whole body from sources of radiation in the licensee's or registrant's possession shall not exceed three (3) rem; and

(b) The dose to the whole body, when added to the accumulated occupational dose to the whole body, shall not exceed five (5) (N-18) rem where "N" equals the individual's age in years at his last birthday; and

(c) The licensee or registrant has determined the individual's accumulated occupational dose to the whole body on department Form KR-411, or on a clear and legible record containing all information required in that form and has otherwise complied with the requirements of Section 3 of this regulation. As used in subsection (2) of this section "dose to the whole body" shall be deemed to include any dose to the whole body, gonads, active blood-forming organs, head and trunk, or lens of eye.

(3) For determining the doses specified in this section, a dose from x- or gamma rays up to three (3) MeV may be assumed to be equivalent to the exposure measured by a properly calibrated, appropriate instrument in air at or near the body surface in the region of the highest dose rate.

Section 3. Determination of Accumulated Dose. (1) This section contains requirements which must be satisfied by licensees or registrants who propose, pursuant to subsection (2) of Section 2 of this regulation, to permit individuals in a restricted area to receive exposure to radiation in excess of the limits specified in subsection (1) of Section 2.

(2) Before permitting any individual eighteen (18) years of age or over to receive an occupational exposure to radiation in excess of the limits specified in subsection (1) of Section 2, each licensee or registrant shall:

(a) Obtain a certificate on department Form KR-411, or on a clear and legible record containing all the information required on that form, signed by the individual, showing each period of time after the individual attained the age of eighteen (18) in which the individual received an occupational dose of radiation; and

(b) Calculate on department Form KR-411, in accordance with the instructions appearing therein, or on a clear and legible record containing all the information required on that form, the previously accumulated occupational dose received by the individual and the additional dose allowed for that individual under Section 2(2).

(3)(a) In the preparation of department Form KR-411, or a clear and legible record containing all the information required on that form, the licensee or registrant shall make a reasonable effort to obtain reports of the individual's previously accumulated occupational dose. For each period for which the licensee or registrant obtains such reports, he shall use the dose shown in the report in preparing the form. In any case where a licensee or registrant is unable to obtain reports of the individual's occupational dose for a previous complete calendar quarter, it shall be assumed that the individual has received the occupational dose specified in whichever of the following columns apply:

	Column 1	Column 2
	Assumed dose in rem for calendar quarters prior to January 1, 1961	Assumed dose in rem for calendar quarters beginning on or after January 1, 1961
Part of Body		
Whole body, gonads, active blood-forming organs, head and trunk, lens of eye	3 $\frac{3}{4}$	1 $\frac{1}{4}$

(b) The licensee or registrant shall retain and preserve records used in preparing department Form KR-411. If calculation of the individual's accumulated occupational dose for all periods prior to January 1, 1961, yields a result higher than the applicable accumulated dose value for the individual as of that date, as specified in subsection (2) of Section 2, the excess may be disregarded.

Section 4. Exposure of Individuals to Concentrations of Radioactive Material in Restricted Areas. (1) No licensee shall possess, use, receive, or transfer radioactive material in such a manner as to cause an individual in a restricted area to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Table I of 902 KAR 100:025, relating to concentrations in air and water above natural background.

"Exposed" as used in this section means that the individual is present in an airborne concentration. No allowance shall be made for the use of protective clothing or equipment, or particle size, except as authorized by the department pursuant to subsection (3) of this section.

(2) The limits given in Table I of 902 KAR 100:025, relating to concentrations in air and water above natural background, are based upon exposure to the concentrations specified for forty (40) hours in any period of seven (7) consecutive days. In any such period where the number of hours of exposure is less than forty (40), the limits specified in the table may be increased proportionately. In any such period where the number of hours of exposure is greater than forty (40), the limits specified in the table shall be decreased proportionately.

(3)(a) Except as authorized by the department pursuant to this section, no allowance shall be made for particle size or the use of protective clothing or equipment in determining whether an individual is exposed to an airborne concentration in excess of the limits given in Table I of 902 KAR 100:025, relating to concentrations in air and water above natural background.

(b) The department may authorize a licensee to expose an individual in a restricted area to airborne concentrations in excess of the limits specified in Table I of 902 KAR 100:025, upon receipt of an application demonstrating that the concentration is composed in whole or in part of particles of such size that such particles are not respirable and that the individual will not inhale the concentrations in excess of the limits established in Table I. Each application under this paragraph shall include an analysis of particle sizes in the concentrations and a description of the methods used in determining the particle sizes.

(c) The department may authorize a licensee to expose an individual in a restricted area to airborne concentrations in excess of the limits specified in Table I of 902 KAR 100:025 upon receipt of an application demonstrating that the individual will wear appropriate protective equipment and that the individual will not inhale, ingest, or absorb quantities of radioactive material in excess of those which might otherwise be permitted under this regulation for individuals in restricted areas during a forty (40) hour week. Each application under this paragraph shall contain the following information: 1. A description of the protective equipment to be employed, including the efficiency of the equipment for the material involved; 2. Procedures for the fitting, maintenance, and cleaning of the protective equipment; 3. Procedures governing the use of the protective equipment, including supervisory procedures and length of time the equipment will be used by the individuals in each work week. The proposed periods for use of the equipment by any individual should not be of such duration as would discourage observance by the individual of the proposed procedures; and 4. The average concentrations present in the areas occupied by individuals.

Section 5. Exposure of Minors. For determining the doses specified in this section, a dose from x-, or gamma rays up to three (3) MeV may be assumed to be equivalent to the exposure measured by a properly calibrated, appropriate instrument in air at or near the body surface in the region of the highest dose rate.

(1) No licensee or registrant shall possess, use, or transfer sources of radiation in such a manner as to cause any individual within a restricted area, who is under eighteen (18) years of age, to receive in any period of one (1) calendar quarter from all sources of radiation in such licensee's or registrant's possession a dose in excess of ten (10) percent of the limits specified in Section 2(1)(a),(b) and (c).

(2) No licensee shall possess, use, or transfer radioactive material in such a manner as to cause any individual within a restricted area, who is under eighteen (18) years of age, to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background. For purposes of this subsection, concentrations may be averaged over periods not greater than a week.

(3) The provisions of subsection (3), Section 4 of this regulation, shall apply to exposures subject to subsection (2) of this section.

Section 6. Exposure of the fetus. No licensee or registrant should possess, use, or transfer sources of radiation in such a manner as to knowingly cause a fetus to receive a dose, except for the intentional exposure of patients to radiation for the purpose of medical diagnosis or medical therapy, in excess of 0.5 rem for the entire gestation period.

Section 7. Permissible Levels of Radiation from External Sources in Unrestricted Areas. It is the intent of this section to limit radiation levels so that it is unlikely that individuals in unrestricted areas would receive a dose to the whole body in excess of 0.5 rem in any one (1) year. If in specific instances, it is determined by the department that this intent is not being met, the department may impose such additional requirements on the licensee or registrant as may be necessary to meet the intent.

(1) Except as authorized by the department pursuant to subsection (2) of this section, no licensee or registrant shall possess, use, or transfer sources of radiation in such a manner as to create in any unrestricted areas from such sources of radiation in his possession:

(a) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two (2) millirem in any one (1) hour; or

(b) Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in any seven (7) consecutive days.

(2) Any person may apply to the department for proposed limits upon levels of radiation in unrestricted areas in excess of those specified in subsection (1) of this section resulting from the applicant's possession or use of sources of radiation. Such applications should include information as to anticipated average radiation levels and anticipated occupancy times for each unrestricted area involved. The department will approve the proposed limits if the applicant demonstrates to the satisfaction of the department that the proposed limits are not likely to cause any individual to receive a dose to the whole body in any period of one (1) calendar year in excess of 0.5 rem.

Section 8. Concentration in Effluents to Unrestricted Areas. (1) A licensee shall not possess, use, or transfer licensed material so as to release to an unrestricted area radioactive material in concentrations which exceed the limits specified in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background, except as authorized pursuant to subsection (2) of this section. For purposes of this subsection, concentrations may be averaged over periods not greater than one (1) year.

(2) An application for a license or amendment may include proposed limits higher than those specified in subsection (1) of this section. The department will approve the proposed limits if the applicant demonstrates:

(a) That the applicant has made a reasonable effort to minimize the radioactivity contained in effluents to unrestricted areas; and,

(b) That it is not likely that radioactive material discharged in the effluent would result in the exposure of an individual to concentrations of radioactive material in air or water exceeding the limits specified in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background.

(3) An application for higher limits pursuant to subsection (2) of this section shall include information demonstrating that the applicant has made a reasonable effort to minimize the radioactivity discharged in effluents to unrestricted areas, and shall include, as pertinent:

(a) Information as to flow rates, total volume of effluent, peak concentration of each radionuclide in the effluent, and concentration of each radionuclide in the effluent averaged over a period of one (1) year at the point where the effluent leaves a stack, tube, pipe, or similar conduit;

(b) A description of the properties of the effluents, including: 1. Chemical composition; 2. Physical characteristics, including suspended solids content in liquid effluents, and nature of gas or aerosol for air effluents; 3. The hydrogen ion concentrations (pH) of liquid effluents; and, 4. The size range of particulates in effluents released into air.

(c) A description of the anticipated human occupancy in the unrestricted area where the highest concentration of radioactive material from the effluent is expected, and, in the case of a river or stream, a description of water uses downstream from the point of release of the effluent;

(d) Information as to the highest concentration of each radionuclide in an unrestricted area, including anticipated concentrations averaged over a period of one (1) year: 1. In air at any point of human occupancy; or, 2. In water at points of use downstream from the point of release of the effluent.

(e) The background concentration of radionuclides in the receiving river or stream prior to the release of liquid effluent;

(f) A description of the environmental monitoring equipment, including sensitivity of the system, and procedures and calculations to determine concentrations of radionuclides in the unrestricted area and possible reconcentrations of radionuclides;

(g) A description of the waste treatment facilities and procedures used to reduce the concentration of radionuclides in effluents prior to their release.

(4) For the purposes of this section, the concentration limits in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background, shall apply at the boundary of the restricted area. The concentration of radioactive material discharged through a stack, pipe, or similar conduit may be determined with respect to the point where the material leaves the conduit. If the conduit discharges within the restricted area, the concentration at the boundary may be determined by applying appropriate factors for dilution, dispersion, or decay between the point of discharge and the boundary.

(5) In addition to limiting concentrations in effluent streams, the department may limit quantities of radioactive materials released in air or water during a specified period of time if it appears that the daily intake of radioactive material from air, water, or food by a suitable sample of an exposed population group, averaged over a period not exceeding one (1) year, would otherwise exceed the daily intake resulting from continuous exposure to air or water containing one-third ($1/3$) the concentration of radioactive materials specified in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background.

(6) The provisions of this section do not apply to disposal of radioactive material into sanitary sewerage systems, which is governed by Section 17.

Section 9. Orders Requiring Furnishing of Bio-assay Services. Where necessary or desirable in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, the department may incorporate license provisions or issue an order requiring a licensee to make available to the individual appropriate bio-assay services and to furnish a copy of the reports of such services to the department.

Section 10. Surveys. Each licensee or registrant shall make or cause to be made such surveys as may be necessary for him to establish compliance with these regulations.

Section 11. Personnel Monitoring. Each licensee or registrant shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

(1) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of twenty-five (25) percent of the applicable value specified in subsection (1) of Section 2.

(2) Each individual under eighteen (18) years of age who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of five (5) percent of the applicable value specified in subsection (1) of Section 2.

(3) Each individual who enters a high radiation area.

Section 12. Caution Signs, Labels and Signals. (1) General:

(a) Except as otherwise authorized by the department, symbols and lettering prescribed by this section shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol prescribed by this section is the conventional three (3) bladed design.

(b) In addition to the contents of signs and labels prescribed in this regulation, a licensee or registrant may provide on or near such signs and labels any additional information which may be appropriate in aiding individuals to minimize exposure to radiation.

(2) Radiation areas. Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: CAUTION (or DANGER), RADIATION AREA.

(3) High radiation areas:

(a) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: CAUTION (or DANGER), HIGH RADIATION AREA.

(b) Each entrance or access point to a high radiation area shall be: 1. Equipped with a control device which shall cause the level of radiation to be reduced below that at which an individual might receive a dose of 100 millirems in one hour upon entry into the area; or 2. Equipped with a control device which shall energize a conspicuous visible and audible alarm signal in such a manner that the individual entering the high radiation area and the licensee, registrant, or a supervisor of the activity are made aware of the entry; or 3. Maintained locked except during periods when access to the area is required, with positive control over each individual entry.

(c) The controls required by subsection (3)(b) of this section shall be established in such a way that no individual will be prevented from leaving a high radiation area.

(d) For those entrances requiring controls as indicated in paragraph (b): 1. The controls required by subsection (3)(b)1. of this section shall be constructed in such a manner that the primary radiation cannot be reactivated until all entrances have been secured, and the radiation on-off control is reset at the control panel. 2. The controls required by subsection (3)(b)2. of this section shall be constructed in such a manner that when the warning device is activated, it shall be necessary to shut off or secure the source of radiation and secure all tripped entrances prior to being able to inactivate the alarm system.

(e) In the case of a high radiation area established for a period of thirty (30) days or less, direct surveillance to prevent unauthorized entry may be substituted for the controls required by subsection (3)(b) of this section.

(f) Any licensee, or registrant, or applicant for a license or registration, may apply to the department for approval of methods not included in subsections (3)(b) and (e) of this section for controlling access to high radiation areas. The department may approve the proposed alternatives if the licensee, or registrant, or applicant demonstrates that the alternative methods of control will prevent unauthorized entry into a high radiation area, and that the requirement of subsection (3)(c) of this section is met.

(4) Airborne radioactivity areas. Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: CAUTION (or DANGER), AIRBORNE RADIOACTIVITY AREA.

(5) Additional Requirements:

(a) Each area or room in which any radioactive material, other than natural uranium or thorium, is used or stored in an amount exceeding ten times the quantity of radioactive material specified in 902 KAR 100:030, relating to quantity bases for posting and disposal, shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: CAUTION (or DANGER), RADIOACTIVE MATERIAL.

(b) Each area or room in which natural uranium or thorium is used or stored in an amount exceeding 100 times the quantity specified in 902 KAR 100:030, relating to quantity bases for posting and disposal, shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: CAUTION (or DANGER), RADIOACTIVE MATERIAL.

(6) Containers:

(a) Except as provided in paragraph (c) of this subsection, each container of radioactive material shall bear a durable, clearly visible label identifying the radioactive contents.

(b) A label required pursuant to paragraph (a) of this subsection shall bear the radiation caution symbol and the words: CAUTION (or DANGER), RADIOACTIVE MATERIAL. It shall also provide sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures. As appropriate, the information shall include radiation levels, kinds of material, estimate of activity, date for which activity is estimated, and other relevant information.

(c) Notwithstanding the provisions of paragraph (a) of this subsection, labeling is not required: 1. For containers that do not contain radioactive materials in quantities greater than the applicable quantities listed in 902 KAR 100:030, relating to quantity bases for posting and disposal; 2. For containers containing only natural uranium or thorium in quantities no greater than ten (10) times the applicable quantities listed in 902 KAR 100:030, relating to quantity bases for posting and disposal; 3. For containers that do not contain radioactive materials in concentrations greater than the applicable concentrations listed in Column 2, Table I of 902 KAR 100:025, relating to concentrations in air and water above natural background; 4. For containers when they are attended by an individual who takes the precautions necessary to prevent the exposure of any individual to radiation or radioactive materials in excess of the limits established by the requirements in this regulation; 5. For containers when they are in transport and packaged and labeled in accordance with regulations published by the United States Department of Transportation; 6. For containers which are accessible (for example, containers in locations such as water filled canals, storage vaults, or hot cells) only to individuals authorized to handle use them, or to work in the vicinity thereof, provide that the contents are identified to such individuals by readily available written record; and 7. For manufacturing and process equipment such as piping and tanks.

(d) Where containers are used for storage, the labels required in paragraph (a) shall state also the quantities and kind of radioactive materials in the containers and the date of measurement of the quantities.

(7) All x-ray equipment capable of producing radiation when operated shall be labeled in a manner which cautions individuals of such fact. This label shall be affixed in a clearly visible location on the face of the control unit.

Section 13. Exceptions from Posting and Labeling Requirements. Notwithstanding the provisions of Section 12 of this regulation: (1) A room or area is not required to be posted with a caution sign because of the presence of a sealed source, provided the radiation level twelve (12) inches from the surface of the source container or housing does not exceed five (5) millirem per hour.

(2) Rooms or other areas in hospitals are not required to be posted with caution signs because of the presence of patients containing radioactive material, provided that there are personnel in attendance who shall take the precautions necessary to prevent the exposure of any individuals to radiation or radioactive material in excess of the limits established in this regulation.

(3) Caution signs are not required to be posted at areas or rooms containing radioactive materials for periods of less than eight (8) hours provided that:

(a) The materials are constantly attended during such periods by an individual who shall take the precautions necessary to prevent the exposure of any individual to radiation or radioactive materials in excess of the limits established in this regulation; and

(b) Such area or room is subject to the licensee's control.

(4) A room or other area is not required to be posted with a caution sign, and control is not required for each entrance or access point to a room or other area which is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with regulations of the United States Department of Transportation.

Section 14. Storage of Sources of Radiation. Sources of radiation shall be secured against unauthorized removal from the place of storage.

Section 15. General Requirements for Waste Disposal. No licensee shall dispose of any radioactive material except:

(1) By transfer to an authorized recipient as provided in 902 KAR 100:055, relating to the licensing of radioactive materials; or

(2) As authorized pursuant to Sections 8, 16, 17, or 18 of this regulation.

Section 16. Method of Obtaining Approval of Proposed Disposal Procedures. Any person may apply to the department for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in this regulation. Each application shall include a description of the radioactive material, including the quantities and kinds of radioactive material and the

levels of radioactivity involved, and the proposed manner and conditions of disposal. The application, where appropriate should also include an analysis and evaluation of pertinent information as to the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics; usage of ground and surface waters in the general area; the nature and location of other potentially affected facilities; and procedures to be observed to minimize the risk of unexpected or hazardous exposures. The department will not approve any application for a license to receive radioactive material from other persons for disposal on land not owned by the Commonwealth of Kentucky or the federal government.

Section 17. Disposal by Release Into Sanitary Sewerage Systems. No licensee shall discharge radioactive material into a sanitary sewerage system unless:

(1) It is readily soluble or dispersible in water; and

(2) The quantity of any radioactive material released into the system by the licensee in any one (1) day does not exceed the larger of paragraphs (a) or (b) of this subsection:

(a) The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the licensee, will result in an average concentration not greater than the limits specified in 902 KAR 100:025, relating to concentrations in air and water above natural background; or

(b) Ten (10) times the quantity of such material specified in 902 KAR 100:030, relating to quantity bases for posting and disposal; and

(3) The quantity of any radioactive material released in any one (1) month, if diluted by the average monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Table I, Column 2 of 902 KAR 100:025, relating to concentrations in air and water above natural background; and

(4) The gross quantity of radioactive material released into the sewerage system by the licensee does not exceed one (1) curie per year. Excreta, blood and blood plasma from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this regulation; provided that, the licensee provides for appropriate radiological monitoring whenever any waste line in the licensee's installation which may carry such excreta, blood or blood plasma is opened.

Section 18. Disposal by Burial in Soil. No licensee shall dispose of radioactive material by burial in soil unless:

(1) The total quantity of radioactive materials buried at any one (1) location and times does not exceed, at the time of burial, 1,000 times the amount specified in 902 KAR 100:030, relating to quantity bases for posting and disposal; and

(2) Burial is at a minimum depth of four (4) feet; and

(3) Successive burials are separated by distances of at least six (6) feet and not more than twelve (12) burials are made in any year.

Section 19. Disposal by Incineration. No licensee shall incinerate radioactive material for the purpose of disposal or preparation for disposal except as specifically approved by the department pursuant to Sections 8 and 16 of this regulation.

Section 20. Records of Surveys, Radiation Monitoring, and Disposal. (1) Each licensee or registrant shall maintain records showing the radiation exposure of all individuals for whom personnel monitoring is required under Section 11 of this regulation. Such records shall be kept on form KR-401, in accordance with the instructions contained in that form, or on clear and legible records containing all the information required by form KR-401. The doses entered on the forms or records shall be for periods of time not exceeding one (1) calendar quarter.

(2) Each licensee or registrant shall maintain records in the same units used in this regulation, showing the results of surveys required by Section 10 of this regulation, and disposal made under Sections 8, 16, 17, and 18 of this regulation.

(3) Records of individual radiation exposure shall be maintained pursuant to the provisions of subsection (1) of this section and records of bioassays, including results of whole body counting examinations, made pursuant to Section 9 of this regulation shall be preserved indefinitely or until the department authorizes their disposal. Records which must be maintained pursuant to this section may be maintained in the form of microfilm.

(4) The discontinuance of or curtailment of activities, does not relieve the licensee or registrant of responsibility for retaining all records required by this section. A licensee or registrant may, however, request the department to accept such records. The acceptance of the records by the department relieves the licensee or registrant of subsequent responsibility only in respect to their preservation as required by this section.

Section 21. Reports of Theft or Loss of Sources of Radiation. (1) Each licensee or registrant shall report promptly by telephone to the department the theft or loss of any source of radiation after such theft or loss becomes known.

(2) Each licensee or registrant who is required to make a report pursuant to subsection (1) of this section shall within thirty (30) days after he learns of the loss or theft, make a report in writing to the department setting forth the following information:

(a) A description of the device, or if radioactive material is involved, the kind, quantity, chemical and physical form;

(b) A description of the circumstances under which the loss or theft occurred;

(c) A statement of disposition or probable disposition of the device or radioactive material involved;

(d) Radiation exposure, circumstances under which the exposures occurred, and the extent of possible hazard to persons in unrestricted areas;

(e) Actions which have been taken, or will be taken, to recover the device or material; and

(f) Procedures or measures which have been or will be adopted to prevent a recurrence of the loss or theft of the device or radioactive materials.

(3) Subsequent to filing the written report, any substantive additional information on the loss or theft which becomes available to the licensee or registrant shall be reported to the department within thirty (30) days after he learns of such information.

(4) Any report filed with the department pursuant to this section shall be so prepared that names of individuals who may have received exposure to radiation are stated in a separate part of the report.

Section 22. Notification of Incidents. (1) Immediate notification. Each licensee or registrant shall immediately notify the department by telephone and telegraph of any incident involving any source of radiation possessed by him which may have caused or threatens to cause:

(a) A dose to the whole body of any individual to twenty-five (25) Rems or more of radiation; a dose to the skin of the whole body of any individual of 150 Rems or more of radiation or a dose to the feet, ankles, hands, or forearms of any individual to 375 Rems or more of radiation; or

(b) The release of radioactive material in concentrations which, if averaged over a period of twenty-four (24) hours, would exceed 5,000 times the limits specified for such materials in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background; or

(c) A loss of one (1) working week or more of the operations of any facilities affected; or

(d) Damage to property in excess of \$100,000.

(2) Twenty-four (24) Hour Notification. Each licensee or registrant shall within twenty-four (24) hours notify the department by telephone and telegraph of any incident involving any source of radiation possessed by him which may have caused or threatens to cause:

(a) A dose to the whole body of any individual to five (5) Rems or more of radiation; a dose to the skin of the whole body of any individual to thirty (30) Rems or more of radiation; or a dose to the feet, ankles, hands, or forearms to seventy-five (75) Rems or more of radiation; or

(b) The release of radioactive material in concentrations which, if averaged over a period of twenty-four (24) hours, would exceed 500 times the limits specified for such materials in Table II of 902 KAR 100:025, relating to concentrations in air and water above natural background; or

(c) A loss of one (1) day or more of the operations of any facilities affected; or

(d) Damage to property in excess of \$1,000.

(3) Any report filed with the department pursuant to this section shall be prepared in such manner that names of individuals who have received exposure to radiation will be stated in a separate part of the report.

Section 23. Report to Former Employees and Others of Exposure to Radiation. Each licensee or registrant shall furnish to any individual reports of his exposure to radiation as required by these regulations.

Section 24. Reports of Overexposures and Excessive Levels and Concentrations. (1) In addition to any notification required by Section 22 of this regulation, each licensee or registrant shall make a report in writing within thirty (30) days to the department of:

(a) Each exposure of an individual to radiation or concentrations of radioactive material in excess of any applicable limit as set forth in this regulation or as otherwise approved by the department; or

(b) Any incident for which notification is required by Section 22 of this regulation; or

(c) Levels of radiation or concentrations of radioactive material (not involving excessive exposure of any individual) in an unrestricted area in excess of ten (10) times any applicable limit as set forth in this regulation or as otherwise approved by the department. Each report required under this subsection shall describe the extent of exposure of individuals to radiation or to radioactive material; levels of radiation and concentrations of radioactive material involved; the cause of the exposure, levels of concentrations; and corrective steps taken or planned to assure against a recurrence.

(2) Any report filed with the department pursuant to this section shall be prepared in such a manner that names of individuals, with social security numbers and dates of birth, who have received exposure to radiation will be stated in a separate part of the report.

Section 25. Notifications and Reports to Individuals. When a licensee or registrant is required pursuant to Section 24 of this regulation to report to the department any exposure of an individual to radiation or radioactive material, the licensee or registrant shall also notify the individual. Such notice shall be transmitted at a time not later than the transmittal to the department, and shall comply with other applicable provisions of these regulations.

Section 26. Vacating Installations. Each licensee before vacating any installation which may have been contaminated by radioactive material as a result of the licensee's activities shall, no less than fifteen (15) days prior to such vacating, notify the department in writing of intent to vacate. The department may require that the licensee provide for decontamination of the installation to a degree consistent with subsequent use as an uncontrolled area. The details are to be specified in each case by the department. (1 Ky.R. 384; eff. 2-5-75.)

APPENDIX F

Kentucky Department of Human Resources Low-Level Waste Survey

DEPARTMENT FOR HUMAN RESOURCES
COMMONWEALTH OF KENTUCKY
FRANKFORT 40621

BUREAU FOR HEALTH SERVICES

M E M O R A N D U M

TO: Kentucky Radioactive Material Licensees

FROM: Roy P. Osborne
Acting Section Supervisor

SUBJECT: Request of Information on Radioactive Waste

DATE: September 11, 1980

On August 7, 1980, the Special Advisory Committee on Nuclear Issues, which was created by the Kentucky Legislature, requested that the Radiation Control Branch of the Department for Human Resources conduct a written survey of all facilities licensed for the use of radioactive material to determine how each facility is managing radioactive waste. This memo is an attempt to fulfill that request.

Attached you will find a questionnaire which should be completed and returned to this office by November 1, 1980:

Roy P. Osborne
Kentucky Department for Human Resources
Bureau for Health Services
Radiation Control Branch
275 E. Main Street
Frankfort, Kentucky 40621

Information obtained from the responses to this memo will be organized and tabulated and made available to the Special Advisory Committee on Nuclear issues.

This information may assist in the development of a plan to deal with Kentucky's radioactive waste. Your cooperation will be greatly appreciated. If you should have questions or comments about this matter do not hesitate to contact me at (502) 564-3700.

Please respond to these questions with the most accurate data available in the blank space left below each question. If you need to use additional pages, please do so.

1. Indicate the volume of radioactive waste generated at your facility during calendar year 1979.
2. List the specific radionuclides associated with your radioactive waste and the estimated activity associated with each radionuclide.
3. Indicate the physical state of the waste (i.e., gas, liquid or solid). Also, identify the chemical form of the waste (i.e. such as the amount of toluene involved in your wastes).
4. Describe your current method for handling radioactive waste. Specifically, indicate the quantity of waste which are stored for decay, legally released to sewer systems or to the air, sent to licensed burial grounds, or any other method of management.

If a commercial burial site is used, indicate which location.

5. In November 1979, the Nevada and Washington sites were temporarily closed. The problem of the disposal of low level radioactive waste became a potentially serious problem to several licensees. Indicate what problems this temporary closing posed to your facility.
6. Indicate the estimated cost to your facility in the management of radioactive wastes.

7. Project the volume of waste for your facility for 1980 and 1981.

8. Please make any additional comments you think pertinent to the subject of radioactive material wastes.

Results of Department for Human Resources' Survey of
Kentucky Licensees' Management of Radioactive Wastes

Roy P. Osborne

1. Indicate the volume of radioactive waste generated at your facility during calendar year 1979.

University of Kentucky	-	3200	cubic feet
University of Louisville	-	485.8	cubic feet
Hospital (in vitro)	-	30.0	cubic feet
Hospital (in vitro)	-	30.0	cubic feet
In Vitro Lab	-	15.0	cubic feet
NRC Licensed Hospital (in vitro)	-	50.0	cubic feet
One Industrial Licensee	-	<u>7.5</u>	cubic feet

3818.3 Total shipped to commercial
waste sites in 1979.
(obtained from questionnaire)

There is a problem as to when the radioactive material becomes "waste". Please note the following with regard to the above statement.

Have 110 licensees who have device with sealed source. This source is returned to manufacturer for disposal. An estimated total would include 200 Curies of Ir-192, 25 Curies of Cs-137, 5 Curies of Ra-226, and Am-241, Sr-90 in 1979.

Also licensees will allow waste to decay to background, survey this waste, then dispose in regular trash. This was indicated in the questionnaire, however, the volume and activities of waste in this category were not included in all questionnaires received.

2. List the specific radionuclides associated with your radioactive waste and the estimated activity associated with each radionuclide.

U.K. data revealed: 14 shipments in 1979, 100 millicuries/shipment, with H-3, C-14, I-125, Mo/Tc99m composing the isotopes. No breakdown was reported as to activity per isotope in these shipments. Also, other isotopes which would be decayed to background were not reported.

U.L. reveals isotopes shipped:

H-3 (33.08 millicurie)	Co-57 (0.82 millicurie)
C-14 (6.47 millicurie)	Co-60 (0.025 millicurie)
Na-22 (.14 millicurie)	Ni-63 (.015 millicurie)
P-32 (4.4 millicurie)	Zn-65 (.01 millicurie)
S-35 (3.27 millicurie)	I-125 (3.88 millicurie)
Cl-36 (4.13 millicurie)	Cs-137 (0.25 millicurie)
Cr-51 (.41 millicurie)	

Total activity of isotopes shipped for U.L. 56.87 millicuries

2. Continued

Medical licensees would commonly possess the following isotopes:

Tc-99m	In-111
Mo-99	Co-57
Tl-201	Se-75
I-131	P-32
I-123	Cr-51
Xe-133	I-125
Ga-67	Fe-59

Usually a 1330 or 1440 millicurie Mo99/Tc99m generator per week is obtained by the licensee or the licensee is supplied by a nuclear pharmacy. Other isotopes would be in millicurie range with waste being decayed to background. These generators may be returned to the manufacturer.

Industrial licensees:

The two nuclear pharmacies in the state have the same material as the above medical licensees.

One industrial licensee referred to in question 1 had sealed sources which were shipped to a commercial site in 1979.

Ra-226 (0.1 millicurie)
Co-57 (0.01 millicurie) (2)
Sr-90 (0.005 millicurie) (2)

Results for questions 3 and 4 are included below:

3. Indicate the physical state of the waste (i.e., gas, liquid, or solid). Also, identify the chemical form of the waste (i.e., such as the amount of toluene involved in your wastes).
4. Describe your current method for handling radioactive waste. Specifically, indicate the quantity of wastes which are stored for decay, legally released to sewer systems or to the air, sent to licensed burial grounds, or any other method of management. If a commercial site is used, indicate the location.

U.K. data:

120 cubic feet stored for decay
3200 cubic feet shipped (approximately 1400 millicuries) 14 shipments
< curie to sewer and to air (Xe-133)

3. and 4. Continued

- Waste referred to as solid with 57 drums (55 gallon) of liquid scintillation vials shipped. (H-3, C-14) (toluene)

Commercial site: Beatty, Nevada or Richland, Washington

U.L. data:

485.6 cubic feet shipped (56.8 millicuries)
(with breakdown as dry solids 47.7 millicuries
Toluene (LSC waste) 9.1 millicuries
56.8

Incinerated - 7 millicuries (exempt quantities
(animal carcass) according to KDHR
902 KAR 100.080)

Liquid release to sewer - 373.4 millicuries
Decay - 169224 millicuries
Air - 204 millicuries (Xe-133)

Commercial site: Beatty, Nevada; Richland, Washington

Medical Licenses:

Medical licensees would possess inorganic salts, proteins, inert gas or amino acid.

Medical licensees would either hold to background, return Mo99/Tc99m generator to manufacturer (supplier) or obtain their individual patient doses of radiopharmaceuticals from a nuclear pharmacy.

Kentucky hospital (in-vitro) licensees mentioned in question 1 would legally release less than 5 millicuries each per year of I-125 to the sewer. Approximately 20 percent of the I-125 used would be left as contaminate in test tubes which are shipped to commercial burial grounds.

Other in-vitro licensees (50) would use approximately one millicurie each of I-125 per year releasing 80 percent to sewer annually and storing contaminated test tubes for decay to background.

Industrial Licenses:

One industrial licensee referred to in question 1 shipped sealed sources to a commercial site. Two Nuclear pharmacies which are included under industrial category decays waste to background.

3. and 4. Continued

Other industrial licensees return sources to manufacturer.

Academic Licensees (excluding U.K. and U.L.)

Academic licensees decay waste to background and release to sewer system. Activities would be in microcuries to very low millicurie range. Isotopes would be as those listed for U.L. but in less volume and activity. One academic license would ship approximately 7.5 cubic feet of waste every three years.

It appears 90% of the waste shipped in 1979 was sent to Beatty, Nevada and Richland, Washington (Neco).

Total volume: 3818.3 cubic feet. Activity less than 1.5 Curie in 1979.

NOTE: Further comment on this volume at end of question 8.

5. In November 1979, the Nevada and Washington sites were temporarily closed. The problem of the disposal of low level radioactive waste became a potentially serious problem to several licensees. Indicate what problems this temporary closing posed to your facility.

Licensees responded as follows:

1. Storage of our waste became a problem.
2. Normal storage space was exhausted. Additional temporary space was required, resulting in the disruption of other activities. Individual laboratories were required to store waste generated on site. This created space problems, threatening speciality lab certification approvals, etc.
3. Had a backlog of RIA (I-125) waste. Storage problem.
4. Backlog of RIA (I-125) waste storage problem.

6. Indicate the estimated cost to your facility in the management of radioactive wastes.

Questionnaire revealed costs from zero dollars to thirty thousand dollars per year.

U.K. indicated \$30,000.00/yr.

U.L. indicated \$5,760.00/yr.

Other Kentucky licensees who shipped waste indicated \$600 to \$1,500 per licensee per year. Labor costs were not included in this total according to the licensees.

According to RSO at U.K., compaction will decrease waste volume by one-half and will decrease cost associated with waste by one-half. This compaction system was started in late fall of 1980.

7. Project the volume of waste for your facility for 1980 and 1981.

U.K. data indicated 3200 cubic feet projection for 1980 and 1981. However, with compaction this is supposed to be reduced to 1600 cubic feet for 1981.

U.L. Data indicated 1000 cubic feet for 1980 and 1385 cubic feet for 1981.

Hospitals (in vitro) which are referred to in question 1 indicate 60 cubic feet for 1980 and 1981 (30 cubic feet, 1979).

In vitro lab which is referred to in question 1 indicates the same as 1979 (15 cubic feet).

NRC licensee referred to in question 1 unknown as to volume for 1980-81.

Industrial licensee referred to in question 1 projected no waste for 1980-81. One industrial licensee plans to ship three cubic feet of contaminated paper, etc., in 1981.

One industrial licensee has shipped a sealed source to Barnwell, South Carolina in 1980 (10 millicurie Cs-137, 4 cubic feet).

Other licensees indicated waste situation and their method of waste management would remain the same as in 1979.

8. Please make any additional comments you think pertinent to the subject of radioactive material wastes.

The following comments were noted:

1. Incineration
2. Incineration as a means of volume reduction and detoxification of associated chemical components must be more actively considered as a disposal tool. Smaller and less expensive approved incinerators must be made available to permit a broad range of institutions to use this approach.

Partitioning of waste could establish discrete groups of radioactive components which can be rationally processed for final disposal by incineration, decay, release as "non-radioactive" material via ordinary refuse channels, unlicensed burial and burial under licensed authority for low relative hazard potential materials.

Attention must be given to the public decision process of siting hazardous waste processing and disposal facilities to ensure the uninterrupted availability of this essential service.

3. Please don't place more restrictions on the disposal of low level waste.
4.
 - a. I feel strongly as I have for years, that a short comprehensive procedure manual be developed for both medical and industrial users of radioactive materials.
 - b. This manual should include the currently accepted guidelines for disposing of liquid, and solid radioactive contaminated waste. Inc. limits permitted a via sewer, and how each institution can calculate their safe dilution factor for each daily discharge. It should also include how low levels i.e. (uCi) quantities can safely be decayed prior to disposal via normal waste.
 - c. I also believe some method of compacting solid contaminated waste would be perfectly safe, and provide each institution with a means of storing more radioactive decaying waste in as small an area as possible.
 - d. I also believe that the public and politicians, and the regulatory agencies take every effort possible to develop an educational program, and make all those who associate the word "nuclear" with something dirty or lethal and that we could not function today without using radioactive materials.

8. Continued

- e. Without knowing it we have been using all sorts of radioactive materials for years, but it has only been within recent years that the public and media have become overly concerned.
- f. Incidentally, the Germans have been using Deep Salt Mines for disposal of radioactive waste for years with a great deal of success. We should explore such means with our salt mines. In case of disruption in the earth, the buried waste would automatically be sealed in place.