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**MASTER**



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

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OHIO STATE BRIEFING BOOK  
FOR  
LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

Prepared for

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under  
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Prepared by

Synergic Resources Corporation  
One Bala-Cynwyd Plaza, Suite 630  
Bala Cynwyd, Pennsylvania 19004

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## 1. INTRODUCTION

The Ohio State Briefing Book for low-level radioactive waste management has been prepared to assist in the planning and formulation of an implementation strategy leading to the creation of a suitable low-level radioactive waste management program in the United States. The Ohio Briefing Book is one of a series of briefing books now being prepared that will provide coverage on waste management practices in the States, along with relevant demographic, government, and media information.

Low-level radioactive waste management is increasingly becoming a major concern in the United States. Low-level radioactive waste may contain less than 10 nanocuries of transuranic contaminants per gram of material or only be suspected of radioactive contamination.<sup>1</sup> These wastes are disposed of according to the type and/or concentration of radioactivity. Low-level radioactive waste may consist of a solid, liquid or gas. A significant amount of solid low-level waste that is buried consists of dry waste materials with low levels of radioactivity. Examples of these wastes are paper trash, packing material, protective clothing, broken glassware, plastic sheeting and tubing, defective or obsolete equipment, building rubble, etc.

The low-level radioactive waste that has been disposed of at burial sites has generally come from several different sources: institutional and industrial (41 percent); commercial power reactors (50 percent); and government/military wastes (nine percent).<sup>2</sup> Forty-nine of 50 States and the District of Columbia generate both institutional and industrial waste, 24 States generate commercial power reactor waste, and 14 States generate government waste.

Part of the reason for producing this report is to obtain more accurate information on the volume of low-level radioactive waste shipped, the sources of the waste (e.g., nuclear reactor, sealed or unsealed sources, etc.), the physical form of the waste, the disposal method (e.g., release

to sewer, ship to commercial repository, burn on site, etc.) and the type of processing of the waste (e.g., absorption, mechanical compaction, solidification, etc.).

The need to develop a program that is able to effectively manage the low-level waste in the nation is due to the fact that as medical, engineering and other disciplines use more nuclear materials for health care, academic and industrial research and for energy production, the volume of low-level waste has, and will continue to increase. To date, there are only three sites in the United States that accept low-level waste for burial. Two of these three sites have been closed intermittently because of the concern over packaging and shipping operations. The Governors of Washington State, Nevada, and South Carolina, where such commercial low-level radioactive waste facilities are located, are extremely concerned about the volume and packaging used in the disposal of waste.

When the Governors of Washington and Nevada took action in 1979 to temporarily close the commercial low-level radioactive waste burial sites located in their respective States, the action shocked many of the waste generators as well as many of the States in which large amounts of low-level waste are generated. Preliminary projections of total national low-level waste generation and capacity of existing commercial disposal facilities indicate that if no changes in current practices or trends occur, the current disposal sites could be filled by the mid-1990s.<sup>3</sup> This capacity could also be suddenly reduced if the Governors of the States where waste disposal facilities are located decide to further restrict the volumes accepted for disposal.

Limitations were imposed on the yearly burial quantities to be accepted by the Barnwell disposal site in South Carolina in October of 1979. Washington State passed an initiative in November of 1980 that will restrict the Richland site to in-State or medical waste by July of 1981. These actions will further reduce the availability of burial space. Another concern is the current escalation of costs for transporting and disposing



each drum of low-level waste. Price escalation is increasing the costs for utilities, medical institutions, and industrial facilities using nuclear materials that require commercial disposal.

These concerns have led the U.S. Department of Energy, as the lead agency for formulating a low-level waste management plan, to embark upon a cooperative effort involving the National Governors' Association (NGA), the National Conference of State Legislatures (NCSL) and other interest groups to formulate an approach for a low-level radioactive waste management program.

Section 2.0 of this briefing book presents an overview of past and present low-level radioactive waste management practices in Ohio. Section 3.0 identifies relevant topography, demography, and energy trends that may affect the quantity and nature of low-level radioactive wastes within the State. An overview of the government and politics of the State is presented in Section 4.0. Section 5.0 reviews present and proposed low-level radioactive waste management policy. Policies affecting the generation, handling and disposal of radioactive waste are reviewed. A review of interest group concerns vis a vis low-level waste management is presented in Section 6.0. A review of public official views and media concerns is presented in Section 7.0. Comparisons are made of mass media coverage of low-level radioactive waste concerns. The survey methodology used to gather information on the volume, method of disposal, physical form and other relevant information pertaining to the shipment of low-level waste is presented in Section 8.0. Finally, the results of the low-level waste generator survey are presented in Section 9.0.

## REFERENCES

1. U.S. Department of Energy, Interagency Review Group Final Report, p. 106.
2. N.U.S. Corporation, The 1979 State-by-State Assessment of Low-level Radioactive Wastes Shipped to Commercial Burial Grounds, 1979.
3. National Governors' Association, Task Force on Low-level Radioactive Waste Disposal, Final Report, (August, 1980).

## 2. OVERVIEW OF STATE LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT PRACTICES

There are 757 radioactive material licenses in Ohio. There also exist two Formerly Utilized Sites Remedial Action Program (FUSRAP) sites: Clecon Metals and Harshaw Chemical Company. Clecon Metals was formerly owned in the 1940's and 1950's by Horizons' Incorporated and produced granular thorium metal. Sixty workers are employed there. Harshaw Chemical Company produced UF<sub>4</sub> and yellow cake during 1943. Present radiation levels are believed to be close to background levels.

Of the current number of NRC licensees in Ohio, 171 have two or more licenses. Nuclear power plants are excluded from these 586 separate license holders. Currently, there are two power reactors in Ohio bringing the total number of potential low-level waste generators to 588.

Information on the disposal practices of the 588 separate license holders was solicited from the survey presented in Section 8.0 of this report. Appendix A presents the name and address of each license holder, the type of contact made to obtain information, the degree of response to the questionnaire, the type of facility, and whether waste is shipped to a commercial disposal site.

The type of facility was classified as either medical, educational, industrial power reactor, or governmental, according to Part I of the survey. It should also be noted that the medical classification includes medical education facilities, and that the governmental classification excludes both medical and educational facilities.

Of the 588 potential radioactive waste generators, contact was made with 287, of which 45 indicated that they ship waste to commercial disposal facilities. Table 2-1 presents a breakdown of license holders by priority category, type of facility, responses to the questionnaire (telephone, postcard or written), and the number of facilities using commercial disposal

TABLE 2-1. USE OF COMMERCIAL LOW-LEVEL WASTE FACILITIES

PRIORITY CATEGORY	Number of Licensees	Number of Respondents	Percent of Response	Respondents Using a Commercial Facility		
				Number	Percent of all Respondents	Percent of Respondents in Priority/Facility
1. Top Priorities	23	22	95.65	18	6.27	81.82
2. Middle Priorities	244	165	67.62	23	8.01	13.94
3. All Others	321	100	31.15	4	1.39	4.00
TYPE OF FACILITY (All Priorities)						
Medical	195	126	64.62	10	3.48	7.94
Educational	34	29	85.29	13	4.53	44.83
Industrial	322	112	34.78	16	5.57	14.29
Governmental	35	18	51.43	4	1.39	22.22
Power Reactor	2	2	100.00	2	0.69	100.00
TOTAL	588	287	48.81	45	15.68	15.68

2-2

facilities. The "percent of all respondents" was calculated as the number of respondents shipping waste divided by the total number of respondents times 100. The percent of facility respondents was calculated as the number of respondents shipping waste divided by the total number of respondents in a facility classification times 100.

When looking at the response rate by priority category, surveys were obtained from 96 percent of the "top priority" grouping, 68 percent from the "middle priority", and 31 percent from the "other" category. As expected, a much higher percentage of "top priority" respondents reported using commercial disposal facilities (82 percent), in contrast to "others", where only four percent reported using commercial disposal facilities. Educational-type license holders reported the largest percentage utilization of commercial disposal facilities (44.8 percent). The largest number of facility types reporting the use of commercial waste disposal facilities is industry (N=16). Overall, 16 percent of the respondents reported using commercial disposal facilities.

The priority categories listed in the table are based on consultation with NRC regional offices near Chicago, Illinois, and in King of Prussia, Pennsylvania, regarding the NRC category and priority codes that are expected to include generators of significant volumes of low-level radioactive waste. The following categories of licensees are expected to be major generators of low-level radioactive waste:

- I-B Processors/Distributors.
- III-F1A Academic, Type A, Broad.
- III-G1 Medical, Broad License.
- IV-41E Industrial.

- IV-EIA Industrial, Type A, Broad.
- IV-A6 Medical.
- VI-F Academic.

These categories were stratified into "top" and "middle" priorities, the top priorities being I-B, III-F1A, III-G1, and IV-E1A. Nuclear reactors were also added to the top priority. The second priority consists of VI-F, IV-6, and IV-E. The "all others" category includes the remaining NRC licensees surveyed.

Table 9-2 further disaggregates the survey data by showing the type of survey responses (written, telephone, or postcard) received from the licensees.

Table 2-2 presents the waste disposal practices employed, including disposal method other than shipment to commercial disposal facilities. In this table, the total of "number using" exceeds the total number of respondents due to the use of several disposal practices by some facilities.

Over 50 percent of the medical institutions reported combining low-level radioactive waste with common refuse, after it decayed to background levels. Close to 20 percent of the medical institutions reported venting the waste to the atmosphere. Almost three out of four educational facilities reported releasing low-level radioactive waste to the sewer. A third of total respondents reported returning radioactive material to the vendor, which is the most common method of low-level waste disposal of the respondents.

Table 2-3 provides data on the sources of radioactivity requiring disposal. The data show that 73 percent of the sources of radioactivity are

TABLE 2-2. DISPOSAL PRACTICES USED FOR LOW-LEVEL WASTES

Type Of Facility	Number Of Respondents	Ship To Commercial Repository		Release To Sever		Combine With Refuse		Vent To Atmosphere		Return To Vendor		Distribute In Product		No Waste Generated	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Medical	195	10	5.1	60	30.8	99	50.8	38	19.5	75	38.5	2	1.0	32	16.4
Educational	34	13	38.2	25	73.5	6	17.6	2	5.9	4	11.8	0	0.0	10	29.4
Industrial	322	16	5.0	19	5.9	6	1.9	16	5.0	109	33.9	19	5.9	49	15.2
Power Reactor	2	2	100.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0
Government	35	4	11.4	2	5.7	0	0.0	1	2.9	5	14.3	0	0.0	10	28.6
TOTAL	588	45	7.7	106	18.0	111	18.9	58	9.9	193	32.8	28	4.8	101	17.2

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TABLE 2-3. SOURCES OF RADIOACTIVITY REQUIRING DISPOSAL

<u>Type Of Facility</u>	<u>Number Of Respondents</u>	<u>Nuclear Reactor</u>		<u>Sealed Sources</u>		<u>Unsealed Radioactive Material</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Medical	163	0	0.0	120	73.6	84	51.5
Educational	24	2	8.3	12	50.0	18	75.0
Industrial	273	10	3.7	214	78.4	14	5.1
Power Reactor	2	2	100.0	0	0.0	0	0.0
Governmental	25	1	4.0	10	40.0	4	16.0
TOTAL	487	15	3.1	356	73.1	120	24.6

sealed sources. Close to 25 percent of the radioactive material used is unsealed.

Hospital authorities contacted as part of the telephone survey stated that all hospitals using unsealed material were required by law to have sealed calibration sources as well. Thus, though not reported as such, the number of sealed source responses should be greater than or equal to the number of unsealed material responses.

### 3. ENVIRONMENTAL CHARACTERISTICS

This section provides a description of the physical and economic parameters which impact low-level radioactive waste generation and disposal. Information is reviewed concerning the State's geology, hydrology and climate. Data describing the composition, growth and distribution of economic activity are also presented. Finally, an energy profile of the State is provided, including electrical generation activity and the present and future utilization of nuclear power.

#### 3.1 Environmental Characterization

##### 3.1.1 Location

Ohio is located in the East North Central U.S. Census region. Ohio is bordered on the north by Lake Erie, to the east by Pennsylvania, separated from West Virginia to the southeast and Kentucky to the south by the Ohio River, and shares its western border with Indiana (See Figure 3-1).

##### 3.1.2 Geology

The topography, river systems and groundwater, and soils in most of Ohio are the product of past glacial activity. Three-fourths of Ohio's surface is glaciated, with the glacial line extending from Pennsylvania west to Holmes County and irregularly south to Brown County. Great ice sheets rounded off hills and filled valleys with fertile soil.

Ohio's rolling plains are divided into three physiographic regions: the Allegheny Plateau, the Lake Plains, and the Central Plains. The Allegheny Plateau reaches westward from Pennsylvania and West Virginia into Ohio's eastern counties from Lake Erie to the Ohio River. Throughout the plateau, rivers wind among steep hills and many elevations reach 1400 feet.



Figure 3-1. Ohio county map

Source: American Map Company

The Lake Plains stretch along Lake Erie to the northwestern counties and the Michigan boundary, then irregularly to the south. These low rolling plains, once under the waters of Lake Erie, constituted the Black Swamp area. When the swamps were drained, excellent agricultural land was exposed.

The Central Plains, extending westward beyond the Mississippi, provide deep and fertile soil for western and southwestern Ohio. Within this region, the State's highest and lowest points are located.

### 3.1.3 Hydrology

The principal water sources of Ohio are the rain fed streams, lakes and reservoirs. A low watershed separates Ohio's two drainage basins. The Maumee, Sandusky, Cuyahoga and Grand Rivers draining into Lake Erie account for 30 percent of the surface drainage, while the Miami, Little Miami, Scioto, Hocking, Muskingum and Mahoning Rivers draining into the Ohio River account for 70 percent. Lake Erie, with its 230 miles of Ohio shoreline, has an average depth of only 62 feet. Its shallowness, coupled with the concentration of population and industrial plants in its watersheds, have led to a serious pollution problem.

The State contains 110 lakes of which 27, lying chiefly in the northeast, are natural. Eighty-three lakes have been built for industrial, flood control, recreational and other purposes.

Of the 16.8 billion gallons of water consumed daily statewide in 1978, groundwater constitutes 1.3 billion gallons a day (7.5 percent). All major urban areas depend upon surface water supplies. Although Ohio is situated over numerous aquifers, the abundance of surface water has precluded large scale development of groundwater resources.

### 3.1.4 Climate

Ohio has a moderate climate. Annual precipitation averages about 37 inches, with the southern portions of the State receiving slightly higher

amounts. Precipitation is also higher in the southern locations, due to the influence of wind direction during the summer, which through its clockwise flow carries moist air up from the Gulf of Mexico. Snowfall is higher near Lake Erie due to snow squalls generated by the frequent northwest winter winds. Severe weather usually occurs in spring or summer as thunderstorms and occasional tornadoes occur (Ohio averages about 12 tornadoes per year).

### 3.2 Population

Ohio, like many of the Northeastern industrial States, had experienced steady population growth from the end of the depression until the 1970 Census. Ohio's population increased from 6.9 million to almost 10.7 million during this period, equal to an annual growth rate of 1.45 percent. During the same time span the nation's population growth rate was 1.44 percent.<sup>1</sup>

The 1970's saw an abrupt change in the pattern of national growth. While the Pacific and Mountain States have been growing faster than the national average since World War II, during the decade of the 1970's the Sunbelt States grew most rapidly. According to the 1980 Census, Ohio is the sixth most populous State. During the decade of the 1970's Ohio's population growth rate was only 0.13 percent, well below the national rate of 1.09 percent. A declining birth rate and increased out-migration were responsible for Ohio's relative decline.<sup>2</sup>

There are 14 Standard Metropolitan Statistical Areas (SMSA) in Ohio (Figure 3-2). Excluding three counties which are part of SMSA's centered in adjacent States (Belmont, Washington and Lawrence counties), 76.8 percent of the State's population is presently located in these urban centers, down from 79.1 percent in 1970. There are three SMSA's containing more than a million people: Cleveland, Columbus and Cincinnati. Other large SMSA's include Akron, Dayton and Toledo with each exceeding 700,000 in population.<sup>3</sup>

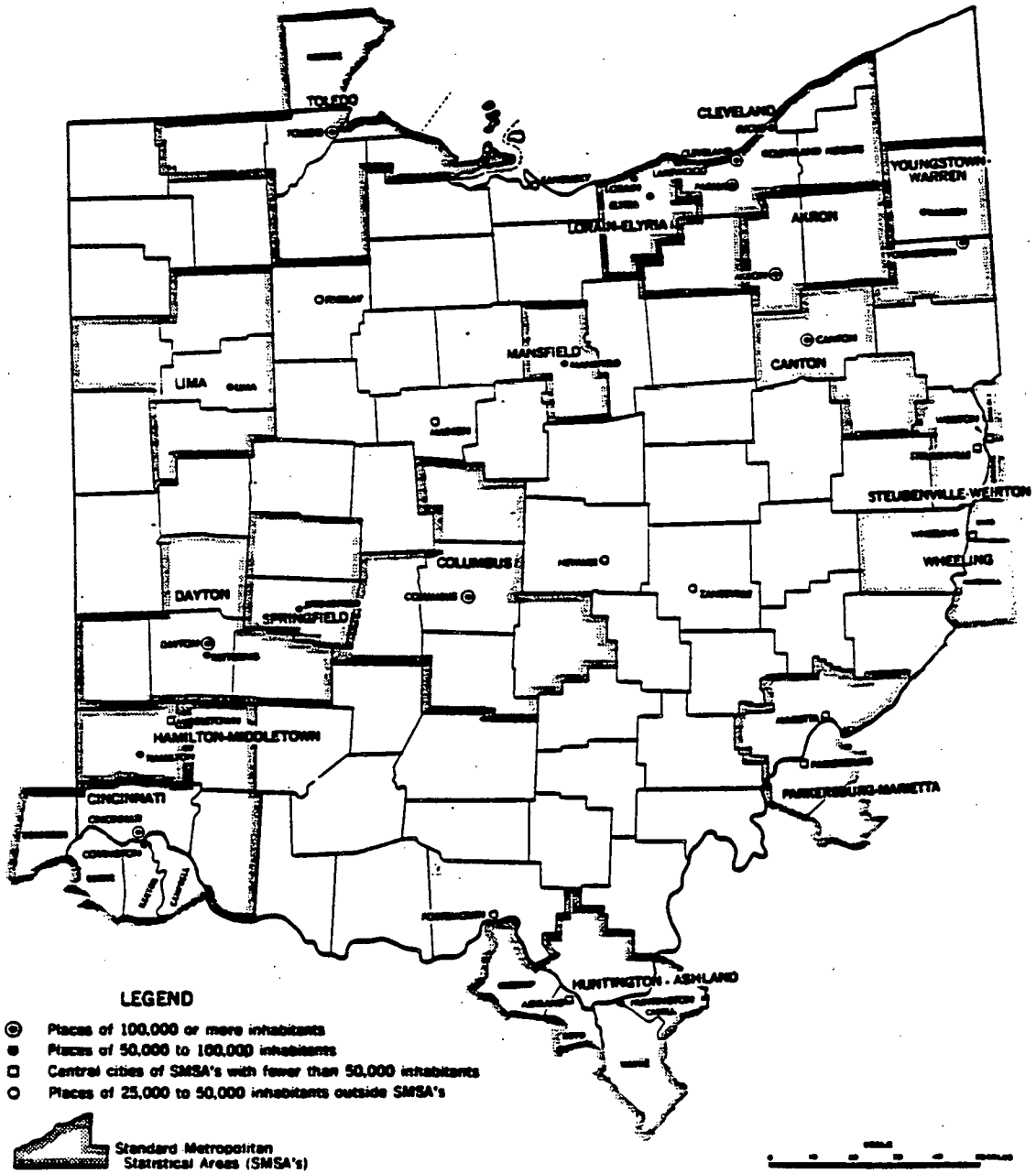


Figure 3-2. Standard Metropolitan Statistical Areas (SMSA's) map of Ohio.

Source: U.S. Dept. of Commerce, Census of Manufactures, Geographic Area Survey



Table 3-1 gives the population of Ohio SMSA's and projections for the year 2000. The population of urban areas actually declined during the last decade, led by Cleveland with a decrease of 170,559 people, followed by Dayton (26,799), Akron (19,261) and Cincinnati (15,640). The largest increase among SMSA's was recorded in Columbus (67,185), followed by Hamilton-Middleton (32,173). However it was in the rural counties that the largest increase in the State was recorded; an increase of 274,394 was recorded by the Census.

Population projections prepared by the State estimate population for the year 2000 to reach 12,019,000. This would require a substantial increase in Ohio's growth rate during a period when the Bureau of Economic Analysis (BEA) expects the national growth rate to decline to 0.8 percent. The BEA projection for Ohio, when adjusted for the 1980 Census would result in a year 2000 population of 11,592,000, with an annual growth rate of 0.4 percent. The growth rate of the last decade if continued for the rest of the century would result in a population of 11,082,000.<sup>4</sup>

### 3.3 Economy

#### 3.3.1 Economic Indicators

Ohio's economy is centered around manufacturing, which in turn is highly dependent upon the automobile. Therefore the State tends to follow the automobile industry's peaks and valleys. As Table 3-2 demonstrates, the Ohio unemployment rate exceeded the national average during the oil embargo induced recession of 1974-75 and dropped below the national average during the recovery period. For December 1980, the Ohio Bureau of Employment Service reported that the unemployment rate for the State was 8.5 percent versus a national average of 6.9 percent.<sup>5</sup>

TABLE 3-1. OHIO POPULATION DATA AND PROJECTIONS

Region	Population			Annual Growth Rate	
	1970	1980	2000	1970-1980 %	1980-2000 %
United States	203,211,926	226,504,825	265,637,000	1.09	0.80
Ohio	10,657,423	10,797,419	12,019,000	0.13	0.54
SMSA:	8,431,493	8,297,095	9,362,900	-0.16	0.61
Akron	679,239	659,978	735,100	-0.29	0.54
Canton	393,789	402,979	459,400	0.23	0.66
Cincinnati	1,106,821	1,091,181	1,176,200	-0.14	0.38
Cleveland	2,063,729	1,893,170	2,046,200	-0.87	0.39
Columbus	1,017,847	1,085,032	1,367,800	0.64	1.16
Dayton	852,531	825,732	950,900	-0.32	0.71
Hamilton-Middleton	226,207	258,380	310,200	1.34	0.92
Lima	210,074	217,756	231,100	0.36	0.30
Lorain-Elyria	256,843	273,983	328,600	0.65	0.91
Mansfield	129,997	131,310	145,000	0.10	0.50
Springfield	187,606	183,042	209,600	-0.25	0.68
Toledo	643,493	656,344	736,200	0.20	0.58
Youngstown-Warren	537,124	527,734	580,600	-0.18	0.48
Steubenville	96,193	90,474	86,000	-0.61	-0.25
Remainder of State	2,225,930	2,500,324	2,656,100	1.17	0.30

Source: Ohio Department of Economic and Community Development, Office of Research, Population Projections by County, 1980-2000

Other indicators such as total personal income (Table 3-3) and gross State product (Table 3-4) show a steady decline relative to the national economy. Ohio per capita income has also declined relative to the country as a whole, but Bureau of Economic Analysis projections expect personal per capita income to increase on a relative basis by the end of the century.<sup>6</sup>

### 3.3.2 Economic Composition

The dominant industry sectors of Ohio are manufacturing, trade, F.I.R.E. (finance, insurance and real estate), services and transportation, communications and utilities. All these sectors have been growing at an annual rate exceeding three percent for the last two decades (see Table 3-5). The sectors that will grow fastest during the next two decades, according to BEA projections, will be mining and services.<sup>7</sup>

## 3.4 Agriculture

Ohio is ranked 13 in the country in the farm value of agricultural products. Table 3-6 provides the quantity, value and rank of various crops, livestock and poultry in Ohio. The farm value of all agricultural products was about four billion dollars in 1979. Corn and soybeans were the most important field crops, while milk, cattle and calves, and hogs and pigs were the major livestock products.<sup>8</sup>

## 3.5 Energy

### 3.5.1 Energy Consumption

Energy consumption in Ohio increased steadily from 1960 to 1973, when the oil embargo and subsequent increases in energy prices changed consumption patterns. The annual growth rate of energy consumption was 2.8 percent until the embargo, but only 0.07 percent from 1974-1978. The fuel mix consumed by Ohio is still dominated by coal, petroleum and natural gas in that order, though their relative positions have shifted during the last two decades.

TABLE 3-2. OHIO UNEMPLOYMENT RATE  
(Percent)

	<u>1970</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
United States	4.9	8.5	7.7	7.0	6.0	5.8
Ohio	5.3	9.1	7.8	6.5	5.4	5.9
Ohio Metropolitan	5.2	8.9	7.8	6.5	5.3	5.8
Ohio Rural	5.9	10.3	8.3	6.9	5.8	6.5

Source: U. S. Department of Commerce, Statistical Abstract of the United States, 1979.

TABLE 3-3. TOTAL PERSONAL INCOME  
(Millions of 1980 Dollars)

	<u>1960</u>	<u>1969</u>	<u>1978</u>	<u>1990</u>	<u>2000</u>
United States	999,844	1,509,833	2,062,937	3,207,633	4,229,798
Ohio	57,015	81,613	101,910	84,127	193,132
Ohio as Percent of United States	5.70	5.41	4.94	4.75	4.57

Source: U. S. Department of Commerce, Bureau of Economic Analysis, State Projections Of Personal Income to the year 2000

TABLE 3-4. OHIO GROSS STATE PRODUCT  
(Billions of 1980 Dollars)

	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1978</u>	<u>Rate of Growth 1960-1978</u>
Ohio GSP	73.1	90.1	101.7	106.4	123.3	2.94%
U.S. GNP	1,333.6	1,675.9	1,946.3	2,176.2	2,532.6	3.63%
GSP as a Percent of GNP	5.48%	5.38%	5.23%	4.89%	4.87%	-

Source: Ohio Department of Economic and Community Development, Office of Research,  
Comparison of Ohio Gross State Product With Gross National Product

TABLE 3-5. GROSS STATE PRODUCT BY INDUSTRY SECTOR  
(Millions of 1980 Dollars)

<u>Sector</u>	<u>1960</u>	<u>1970</u>	<u>1978</u>	<u>Annual Growth Rate 1960-1978</u>
Agriculture	1,894.2	2,037.0	2,104.3	0.65
Mining	844.5	1,404.9	1,442.0	3.02
Construction	4,465.5	5,630.0	4,844.3	0.45
Manufacturing	25,373.7	35,184.2	43,985.7	3.10
T.C.U. <sup>a</sup>	5,821.7	8,858.0	11,475.6	3.84
Trade	11,530.4	16,679.9	20,630.4	3.28
F.I.R.E. <sup>b</sup>	8,593.0	11,823.6	14,638.7	3.00
Services	7,266.4	10,400.3	13,173.2	3.36
Federal Government	2,539.1	2,921.0	2,576.2	0.08
State & Local Government	4,863.8	6,864.6	8,319.3	3.03

a. Transportation, Communication and Utilities.

b. Finance, Insurance and Real Estate.

Source: Ohio Department of Community and Economic Development, Office of Research,  
Gross State Product of Ohio by Industrial Sector, 1980

TABLE 3-6. OHIO FARM PRODUCTION  
(Thousands)

<u>Crop</u>	<u>Unit</u>	<u>1979 Production</u>	<u>1979 Farm Value</u>	<u>Rank</u>	<u>Percent of U.S. Production</u>
Total Crops	-	-	2,554,094	-	3.9
Total Field	-	-	2,461,069	-	-
Corn	Bushel	417,450	1,022,753	6	5.4
Soybeans	Bushel	145,080	906,750	6	6.4
Wheat	Bushel	63,360	259,776	8	3.9
Hay	Ton	3,606	192,921	18	2.5
Oats	Bushel	23,800	34,510	6	4.5
Vegetables (Processing)	Ton	482	37,843	-	3.7
Vegetables (Market)	Cwt	2,346	30,576	-	1.0
Fruit	-	-	24,606	-	-
Livestock and Poultry			1,426,000		
Milk	Pounds	4,265,000	550,600	7	-
Cattle & Calves	Pounds	615,395	402,728	19	-
Hogs & Pigs	Pounds	746,227	320,877	9	-
Eggs	Eggs	2,199,000	96,023	10	-

Source: Ohio Crop Reporting Service, Ohio Agricultural Statistics, 1979



Figure 3-3 shows the fuel mix over time. Coal consumption, which grew rapidly during the end of the 1960's, remained constant during the 1970's. Natural gas also grew rapidly during the 1960's and declined during the decade of the 1970's. Despite the price increases of the 1970's, consumption of petroleum has increased at a faster rate than the two other major fuels.<sup>9</sup>

Figure 3-4 shows the proportion of energy used by each end-use sector. As would be expected, considering the composition of Ohio's economy, industry is responsible for almost one-half of the energy consumed in the State, followed by the residential, transportation and commercial sectors, each consuming lower amounts of energy in that order. Consumption growth rates dropped for all sectors since the oil embargo, with industrial consumption actually declining (see Table 3-7).<sup>10</sup>

### 3.6 Electrical Generation and Nuclear Power

Table 3-8 gives the projected electrical requirements for 1989 and the expected growth rate for the electric regions. The staff of the Division of Power Supply and Reliability of the Economic Regulatory Administration consider the Reliability Council estimates, derived from composite utility projections, to be excessive. They expect electric growth rates to be about two percent less than predicted by the Reliability Council for at least the next three years. Since a reserve margin of 20 percent is considered sufficient, lower growth rates would allow a reduction in capacity additions. Figure 3-5 shows that utilities in Ohio have been decreasing their demand projections for a number of years.<sup>11</sup>

As Figure 3-6 demonstrates, Ohio utilities rely on coal for baseload generation, and use natural gas and petroleum almost exclusively for generating power to meet peak demand. Nuclear power has not made deep inroads into Ohio's generation mix because it competes directly with coal. Currently there is only one nuclear plant operating in the State, the Davis-Besse plant located in Ottawa County. Three more plants are under construction but a number of proposed plants were cancelled in recent years. Details concerning the four nuclear plants are provided in Table 3-9.



Coal
  Natural Gas
  Petroleum
  Nuclear Power

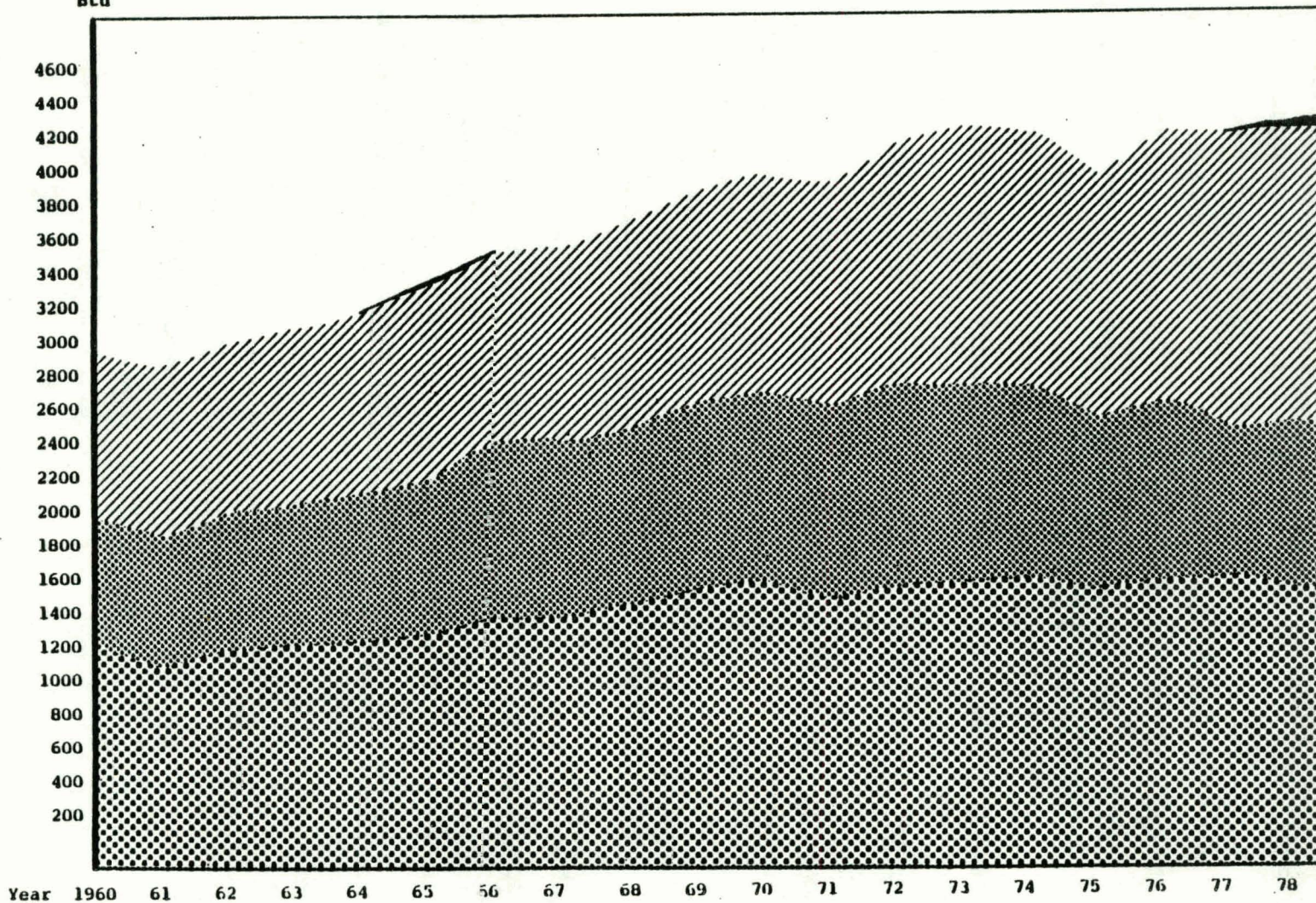


Figure 3-3. Consumption of energy by fuel type - Ohio

Source: Synergic Resources Corporation, Primary Data from U.S. D.O.E., State Energy Data Report, 1978



Ohio 1978

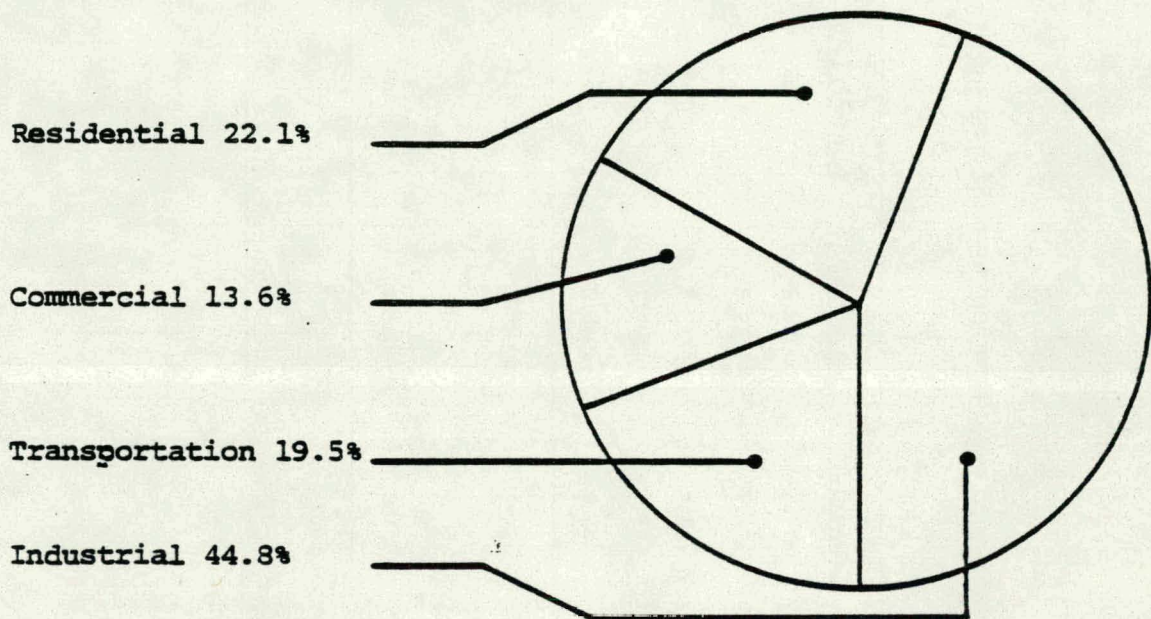


Figure 3-4. Consumption of energy by sector

Source: U.S. Dept. of Energy, State Energy Data Report, 1978

TABLE 3-7. OHIO ENERGY CONSUMPTION BY END-USE SECTOR  
(Trillion Btu)

<u>Year</u>	<u>Residential</u>	<u>Commercial</u>	<u>Industrial</u>	<u>Transportation</u>	<u>Total</u>
1960	612.5	337.3	1558.3	484.2	2992.3
1965	716.9	371.9	1729.5	543.4	3361.7
1970	869.6	515.9	1926.3	676.5	3988.4
1975	893.9	543.8	1804.1	760.4	4002.1
1978	945.0	583.4	1918.2	834.9	4281.5
1960-1973	2.98%	4.26%	1.95%	3.75%	2.77%
Growth Rate					
1974-1978	1.01%	0.10%	-0.88%	1.30%	0.07%

Source: U. S. Department of Energy, State Energy Data Report, 1978

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TABLE 3-8. PROJECTED DEMAND BY ELECTRIC REGIONS SERVING OHIO

	Electrical Requirements (GWH)	Peak Demand (MW)	Reserves Margin (%)
AEP			
1979	79,420	13,603	24.8
1989	115,620	20,527	21.9
Annual Growth	3.83%	4.20%	-
CAPCO			
1979	65,900	10,809	25.3
1989	90,420	15,479	19.5
Annual Growth	3.22%	3.66%	-
CCD			
1979	35,677	6,769	16.9
1989	53,780	10,294	22.8
Annual Growth	4.19%	4.28%	-

Source: U. S. Department of Energy, Economic Regulatory Administration, Electric Power Supply and Demand For The Contiguous United States, 1980-1989



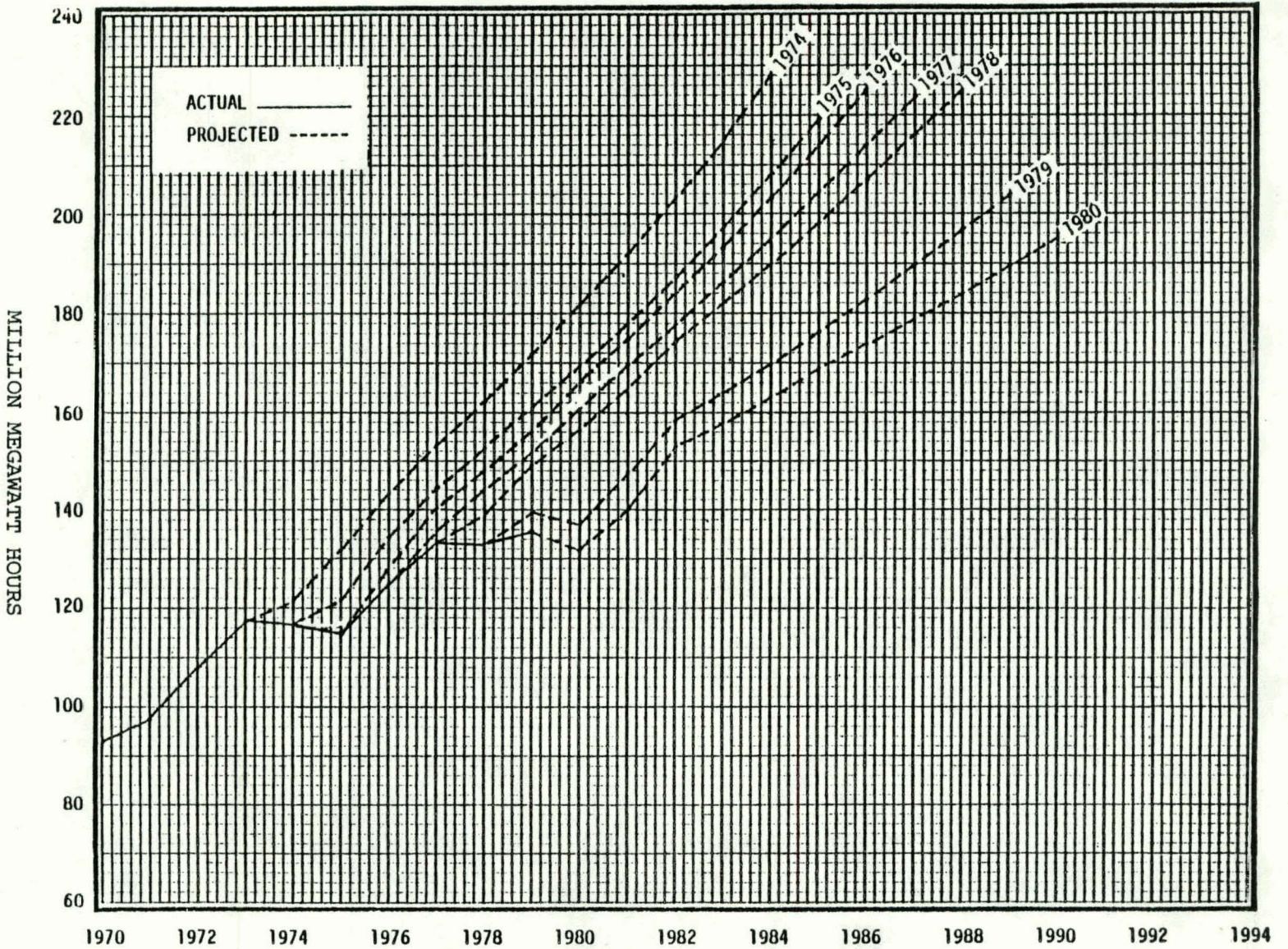


Figure 3-5. Net energy demand of all Ohio electric utilities

Source: Ohio Dept of Energy, Division of Forecasting and Information, Energy Demand of Ohio Electric Utilities

Source: FE-1 of Buckeye Power, CEI, C&SOE and Toledo Edison's Ten Year Forecasts  
 FE-1(A) of Monongahela Power Company's Ten Year Forecasts  
 FE-1(B) of CG&E, DP&L, Ohio Edison, Ohio Power and OVEC's Ten Year Forecasts.

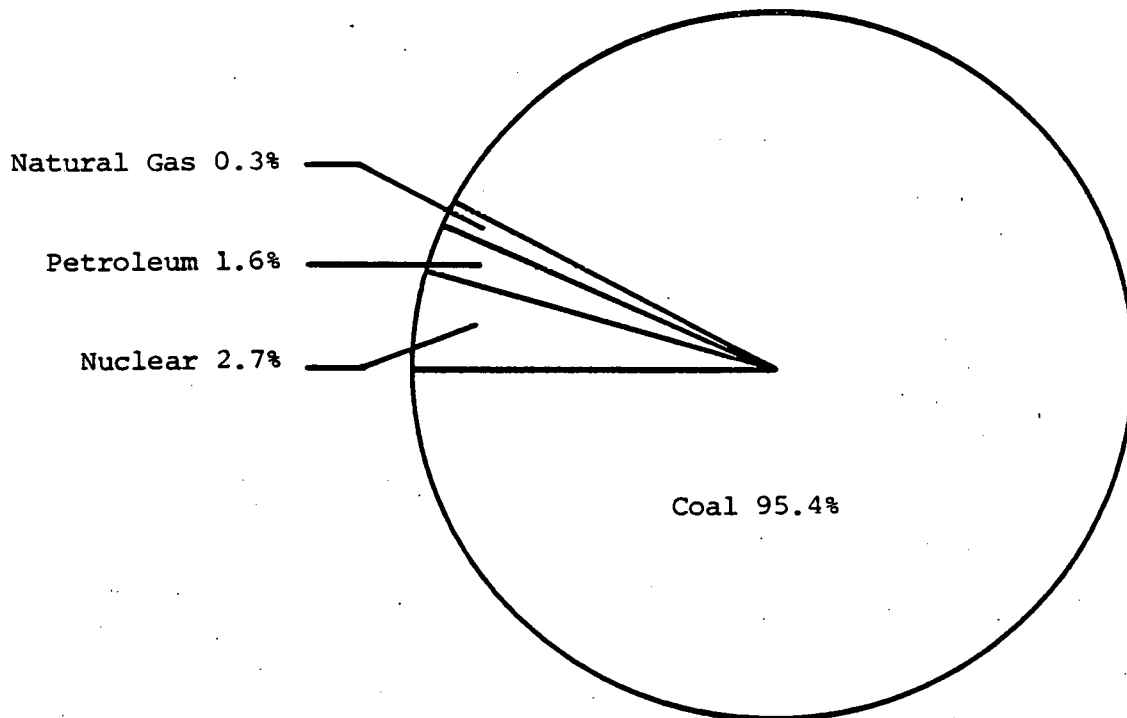


Figure 3-6. Generation fuel mix of power plants in Ohio

Source: Synergic Resources Corporation, Primary Data from Ohio Department of Energy

TABLE 3-9. OVERVIEW OF NUCLEAR PLANTS IN OHIO: PRESENT AND PROJECTED

<u>Plant</u>	<u>Location</u>	<u>Capacity</u>	<u>Ownership</u>	<u>Year Operational</u>
Davis-Besse	Oak Harbor, Ottawa County	962 MW	Toledo Edison 49.0% Ohio Edison 36.0% Cleveland Electric 15.0%	1977
Perry Unit 1	North Perry, Lake County	1205 MW	Cleveland Electric 24.5% Ohio Edison 41.9% Toledo Edison 19.9% Duquesne Light 13.7%	1984
Perry Unit 2		1205 MW		1986
W. H. Zimmer	Moscow, Clermont County	378 MW	Cincinnati Gas 40.0% Dayton Power 31.5% Columbus & South Ohio 28.5%	1981

Source: U. S. Department of Energy, Energy Information Administration, Inventory of Power Plants In The United States, December, 1979

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Ohio electric utilities are also partially involved with nuclear power plants in Pennsylvania. A nuclear plant in Beaver County is partially owned by Ohio Edison (35 percent), and the two Pennsylvania members of CAPCO\*. All five CAPCO utilities have part ownership in a second plant at the Beaver site which is currently under construction. In turn, a Pennsylvania utility has partial ownership of the two plants being built in Lake County, Ohio. All plants listed in Table 3-9 are expected to be completed and come on line according to the dates indicated.

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\*Central Area Power Coordination Group.

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#### 4. GOVERNMENTAL AND PUBLIC ASPECTS

##### 4.1 Congressional Representation

Ohio will be represented in the 97th Congress by two Democratic Senators along with 10 Democratic and 13 Republican Representatives. The 1980 election produced the same partisan alignment within the Ohio delegation that had existed in the 96th Congress. However, two incumbent representatives (one Republican and one Democrat) retired and two incumbents (one Republican and one Democrat) were defeated for reelection.

During the 1960's the size of the Ohio delegation to the House of Representatives was 24 seats. Following the 1970 Census, Ohio lost one seat, and is expected to lose two more seats following the reapportionment based on the 1980 Census. Current congressional districts are shown in Figure 4-1. Ohio's delegation in the House of Representatives has consistently held a Republican majority, with margins as large as 19 Republicans to four Democrats following the 1946 election. Recent elections have produced less lopsided margins. Democrats have fared much better in Senate races, winning seven of the last nine elections.

Ohio's two Senators are John Glenn (Democrat) and Howard Metzenbaum (Democrat). Senator Glenn has devoted much of his efforts to matters of broad national and global policy on which he is considered a moderate. He has been particularly concerned with nuclear proliferation and strategic arms limitations.<sup>1</sup> He has voted for recent legislation (HR.7590, S.2332, and S.2189)\* dealing with nuclear waste management. He also sponsored a successful amendment for S.2189 that allows a State to object to the storage of nuclear waste material within its boundaries, providing that either House of Congress concurs. Senator Glenn's primary contact with the issue of nuclear waste management comes from his service as ranking minority member

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\*HR.7590, 1981 Appropriations Bill for energy and water projects; S.2332, 1981-1982 Appropriations Bill for Department of Energy civilian programs; S.2189, a bill to establish Federal storage programs for civilian spent fuel.

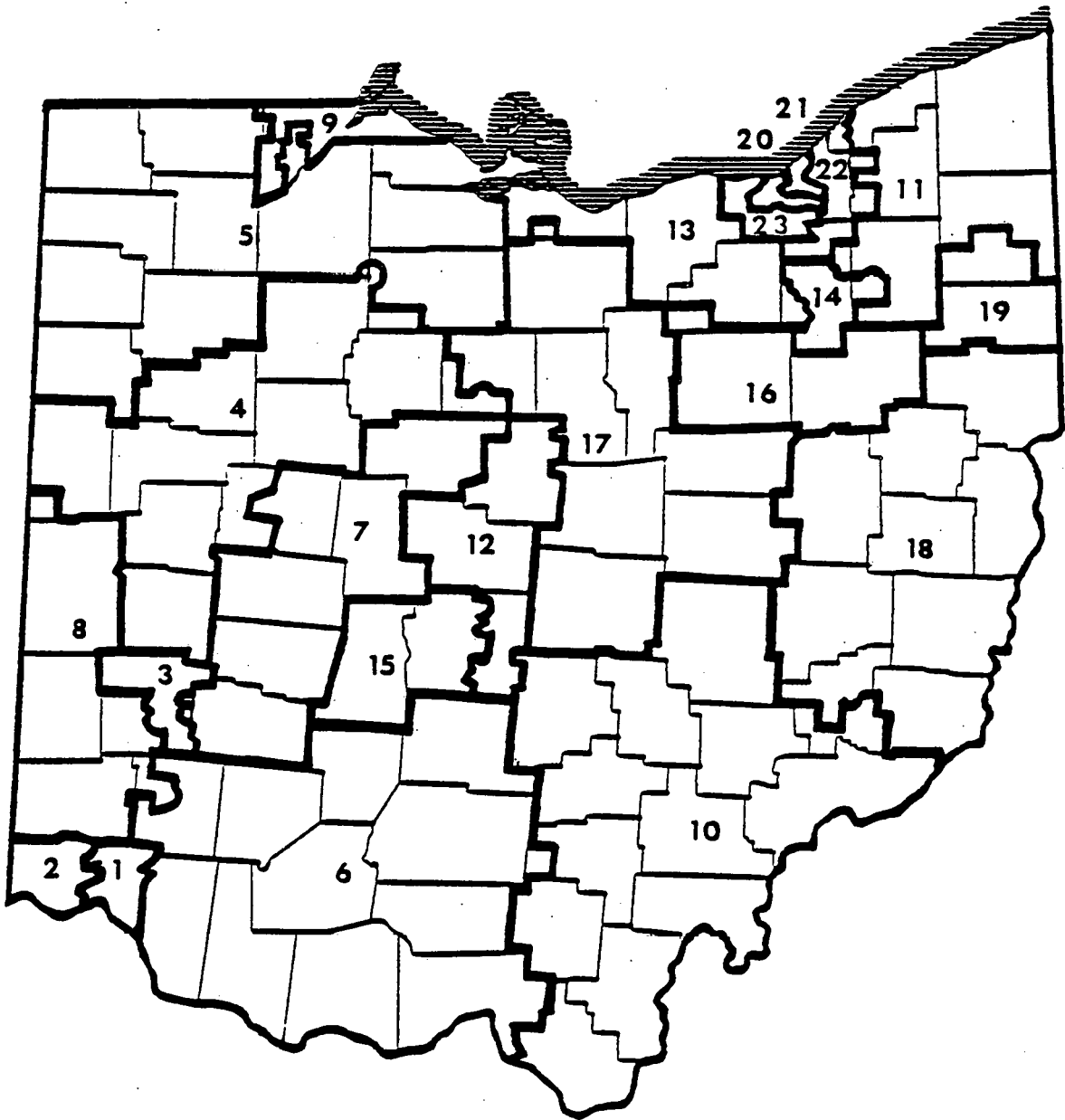


Figure 4-1. Ohio Congressional Districts.

Source: Synergic Resources Corporation

of the Energy, Nuclear Proliferation and Federal Services Subcommittee of the Governmental Affairs Committee. Senator Metzenbaum has devoted much of his attention to the economic issues that are of prime importance to Ohio. However, he has also been a strong voice in the Senate for environmental protection legislation. He is closely involved with both environmental and energy legislation through his service on the Energy and Natural Resources Committee.<sup>2</sup> He, too, has voted in favor of recent legislative measures dealing with nuclear waste management.

Ohio's 23 members of the House of Representatives are listed in Table 4-1, along with the State's two Senators. This table provides each member's district, party affiliation, date of initial election, and committee assignments.

In the 96th Congress, several of Ohio's House members served on committees relevant to issues of low-level radioactive waste.<sup>3</sup> Serving on Interstate and Foreign Commerce were Thomas Luken (D-2nd district), Clarence Brown (R-7th district), Samuel Devine (R-12th district, defeated in 1980), and Ronald Mottl (D-23rd district). Serving on Government Operations, were Clarence Brown, Thomas Kindness (R-8th district), and Lyle Williams (R-19th district). Serving on the Science and Technology Committee was Donald Pease (D-13th district).

The votes of members on recent legislation relating to radioactive waste management are provided in Table 4-2. Ohio's delegation to the House of Representatives generally supported the following bills: HR.6865, authorizing \$5.0 million for a demonstration project to solidify high-level radioactive wastes; HR.7265, authorizing \$3.5 billion for Department of Energy research, development, and production of nuclear warheads; and HR.7590, making appropriations for energy and water development, including an atomic weapons program. However, a majority of Ohio's delegation voted against HR.8378, a bill that would have included among other provisions authorization of State compacts for the establishment and operation of regional disposal sites for low-level radioactive wastes.

TABLE 4-1. OHIO MEMBERS OF THE UNITED STATES CONGRESS

<u>State Delegate</u>	<u>District</u>	<u>Political Affiliation</u>	<u>Beginning Of Present Service</u>	<u>Congressional Committees</u>
John Glenn	State	Democrat	1974	Foreign Relations Governmental Affairs Special Committee on Aging
Howard Metzenbaum	State	Democrat	1976	Budget Environment and Public Works Finance
Willis D. Gradison	First	Republican	1974	Ways and Means
Thomas A. Luken	Second	Democrat	1976	Energy and Commerce Small Business
Tony P. Hall	Third	Democrat	1978	Rules
Tennyson Guyer	Fourth	Republican	1972	Foreign Affairs Veterans' Affairs
Delbert L. Latta	Fifth	Republican	1958	Budget
Bob McEwen <sup>a</sup>	Sixth	Republican	1980	Rules Public Works and Transportation Veterans Affairs
Clarence J. Brown	Seventh	Republican	1965	Government Operations Energy and Commerce
Thomas N. Kindness	Eighth	Republican	1974	Government Operations Judiciary
Edward Weber <sup>b</sup>	Ninth	Republican	1980	Banking, Finance and Urban Affairs Small Business

TABLE 4-1. (Continued)

<u>State Delegate</u>	<u>District</u>	<u>Political Affiliation</u>	<u>Beginning Of Present Service</u>	<u>Congressional Committees</u>
Clarence E. Miller	Tenth	Republican	1966	Appropriations
J. William Stanton	Eleventh	Republican	1964	Banking, Finance and Urban Affairs Small Business
Robert N. Shamnansky <sup>c</sup>	Twelfth	Democrat	1980	Foreign Affairs Science and Technology
Donald J. Pease	Thirteenth	Democrat	1976	Ways and Means
John F. Seiberling	Fourteenth	Democrat	1970	Interior and Insular Affairs Judiciary
Chalmers P. Wylie	Fifteenth	Republican	1966	Banking, Finance and Urban Affairs Veterans Affairs
Ralph S. Regula	Sixteenth	Republican	1972	Appropriations Budget
John M. Asbrook	Seventeenth	Republican	1960	Education and Labor Judiciary
Douglas Applegate	Eighteenth	Democrat	1976	Public Works and Transportation Veterans Affairs
Lyle Williams	Nineteenth	Republican	1978	Government Operations Small Business
Mary Rose Oakar	Twentieth	Democrat	1976	Banking, Finance and Urban Affairs Post Office and Civil Service
Louis Stokes	Twenty-First	Democrat	1968	Appropriations Standards of Official Conduct



TABLE 4-1. (Continued)

<u>State Delegate</u>	<u>District</u>	<u>Political Affiliation</u>	<u>Beginning Of Present Service</u>	<u>Congressional Committees</u>
Dennis E. Eckart	Twenty-Second	Democrat	1980	Education and Labor Foreign Affairs Small Business
Ronald M. Mottl	Twenty-Third	Democrat	1974	Energy and Commerce Veterans Affairs

- a. McEwan replaces William Harsha, a Republican first elected in 1960, who served on the Public Works and Transportation Committee. This committee deals with most air and water pollution. Harsha favored economic interests over environmental concerns.
- b. Weber defeated Thomas Ashley, a Democrat first elected in 1954, who chaired the House's special committee on energy.
- c. Shamnansky defeated Samuel Devine, a Republican first elected in 1958, who served on the Interstate and Foreign Commerce Committee and who was generally pro-business and anti-regulation.

TABLE 4-2. VOTES OF OHIO CONGRESSMEN ON RECENT RELEVANT LEGISLATION<sup>4</sup>

I. Senate		<u>HR7590</u>	<u>S2333</u>	<u>S2332(a)</u>	<u>S2189</u>	<u>S2189(a)</u>	<u>S2189(b)</u>
Glenn (D)		Y	Y	Y	Y	N	Y
Metzenbaum (D)		Y	Y	Y	Y	Y	Y

II. House		<u>HR6865</u>	<u>HR7265</u>	<u>HR7590</u>	<u>HR7590(a)</u>	<u>HR7590(b)</u>	<u>HR8378(a)</u>
1.	Gradison (R)	Y <sup>a</sup>	Y	N <sup>b</sup>	N	N	N
2.	Luken (D)	Y	Y	Y	N	Y	N
3.	Hall (D)	? <sup>c</sup>	?	Y	Y	?	?
4.	Guyer (R)	Y	Y	Y	Y	Y	Y
5.	Latta (R)	Y	Y	N	N	Y	Y
6.	Havsha (R)	?	Y	Y	Y	Y	N
7.	Brown (R)	?	?	Y	Y	N	N
8.	Kindness (R)	Y	Y	Y	N	N	Y
9.	Ashley (D)	Y	?	Y	Y	Y	?
10.	Miller (R)	Y	Y	N	N	N	Y
11.	Stanton (R)	Y	Y	Y	Y	Y	N
12.	Devine (R)	Y	Y	N	N	N	N
13.	Pease (D)	?	Y	Y	N	N	N
14.	Seiberling (D)	Y	N	Y	N	N	Y
15.	Wylie (R)	Y	Y	Y	Y	Y	N
16.	Regula (R)	Y	Y	Y	Y	Y	N
17.	Ashbrook (R)	Y	Y	Y	Y	Y	Y
18.	Applegate (D)	?	Y	Y	N	N	N
19.	Williams (R)	?	?	Y	Y	Y	Y
20.	Oaker (D)	Y	Y	Y	Y	Y	N
21.	Stokes (D)	Y	N	Y	Y	N	Y
22.	Vanik (D)	?	N	Y	?	Y	N
23.	Mottl (D)	?	Y	N	N	N	# <sup>d</sup>

\*a. Y = For

b. N = Against

c. ? = Did not vote or otherwise make position known.

d. # = Paired for.

KEY: HR7590 -- A bill to appropriate \$12 billion for energy and water projects in fiscal 1981, including \$10 million for "away-from-reactor" storage of spent nuclear fuel from commercial power plants. Passed in House. Passed in Senate 83-9.

HR7590(a) -- Conference report on HR7590. Passed 273-117.

HR7590(b) -- Motion to agree to Senate amendment to authorize a \$284 million flood control project in the Tug Fork River Valley along the Kentucky-West Virginia border. Motion agreed to 230-164.

TABLE 4-2. (Continued)

- 
- S2332 -- A bill to authorize appropriations to the Department of Energy for civilian programs for fiscal 1981 and fiscal 1982. Passed 78-14.
- S2332(a) -- An amendment to restrict the use of \$300 million authorization for interim Federal storage of nuclear waste until an overall Federal nuclear waste disposal policy was legally in place. Passed 49-44.
- S2189 -- A bill to establish a program for Federal storage of spent fuel from civilian nuclear power plants, to set forth a Federal policy and initiate a program for the disposal of nuclear waste from civilian activities. Passed 88-7.
- S2189(a) -- An amendment sponsored by Glenn (D-Ohio) to allow a state's objection to the storage of nuclear waste within its boundaries to be upheld if either house of Congress endorses the State's position. Adopted 83-0
- S2189(b) -- A motion made by Johnston (D-La.) to table the Hart (D-Colo.) amendment to restrict the use of Federal away-from-reactor storage of nuclear waste projects to those utilities that no longer had storage space available to reactor sites. Motion agreed to 51-44.
- HR6865 -- Demand for a second on the McCormack (D-Wash.) motion to suspend the rules and pass the bill to authorize \$5 million for the Energy Department demonstration project at West Valley, New York, to solidify high-level liquid radioactive wastes. Second ordered 244-0. Bill subsequently passed by voice vote.
- HR7265 -- A bill to authorize fiscal 1981 spending of \$3.5 billion by the Department of Energy for research, development, and production of nuclear warheads and other items used by the Defense Department. Two amendments, one which added \$10 million for design of a radioactive waste processing facility at Savannah River, South Carolina, were passed by voice vote. Passed on November 20, 1980, but later vacated for S3074.
- HR8378(a) -- Amendment to HR8378 (passed by voice vote) to permit states to veto Federally selected nuclear waste sites within their borders unless both houses of Congress voted to override the veto. Rejected 161-218.
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## 4.2 State Government

### 4.2.1 Constitution

The structure and authority of Ohio State government is given broad definition in the Ohio Constitution. Ohio's current Constitution is the State's second document, having been adopted in 1851. The form of government provided in the Constitution is patterned after the national government: a bill of rights; separate legislative, executive, and judicial branches; and amendment procedures. Like most State constitutions, however, it provides for more specific guidance on important legislative matters.

The Ohio Constitution provides for both the initiative and referendum procedures for direct passage of legislation by the voters. Proposed laws may be placed on the ballot by an initiative petition bearing the signatures of at least three percent of the electorate. Referendums on laws are required by the Constitution on certain matters and may also be required by a petition bearing six percent of the electorate.

### 4.2.2 Executive Branch

The Constitution of Ohio provides for an executive department consisting of a Governor, Lieutenant Governor, Secretary of State, Auditor of State, Treasurer of State, and Attorney General. All members of the executive department are elected for four-year terms. In addition to the four departments created by the State Constitution (State, Auditor, Treasurer, and Attorney General), there are currently 22 departments created by statute.

4.2.2.1 Governor. The Governor of Ohio is James A. Rhodes, a Republican whose present term expires in January, 1983. Governor Rhodes is serving in his fourth four-year term. He served as Governor from 1963 to 1971, when the State Constitution barred him from seeking a third consecutive term. He returned to office in 1975. Rhodes won his last two elections by narrow margins and in 1982 will again be ineligible for

reelection. The Governor appoints the administrative leaders of executive departments, who are responsible to him. He also appoints the Adjutant General, members of most State boards and commissions, and some division heads within departments. The Governor in Ohio has full responsibility for preparing the State's budget and has the power to veto line items within bills passed by the General Assembly. A study of State gubernatorial authority has ranked the Ohio Governor as the 12th most powerful governor of the 50 States.<sup>4</sup>

Prior to 1958 the term of office for Ohio governors was two years. Since World War II, Democrats and Republicans have evenly split the 12 gubernatorial elections, with Governor Rhodes accounting for four of the Republican's six victories. Thus, gubernatorial elections have reflected the close competition between the two parties in Ohio politics.

Governor Rhodes has pursued policies of low taxes, low levels of service, and encouragement of industrial development.

Below are listed the major executive offices and the current officeholder:

Lieutenant Governor: (Vacant)  
Secretary of State: Anthony J. Celebrezze, Jr., Democrat  
Auditor of State: Thomas E. Ferguson, Democrat  
Treasurer of State: Gertrude W. Donahey, Democrat  
Attorney General: William J. Brown, Democrat

4.2.2.2 Departments. The Statutes of the State of Ohio have established 22 departments within the executive branch. The administrative heads of these departments are appointed by the Governor and are responsible to him. These departments are:

- Department of Administrative Services.
- Department of Agriculture.
- Office of Budget and Management.

- Department of Commerce.
- Department of Economic and Community Development.
- Bureau of Employment Services.
- Department of Energy.
- Environmental Protection Agency.
- Department of Health.
- Department of Highway Safety.
- Department of Industrial Relations.
- Department of Insurance.
- Department of Liquor Control.
- Department of Mental Health and Retardation.
- Department of Natural Resources.
- Public Utilities Commission.
- Department of Public Welfare.
- Department of Rehabilitation and Correction.
- Department of Taxation.
- Department of Tax Equalization.
- Department of Transportation.
- Ohio Youth Commission.

An important department not included within the 22 cabinet departments is the Department of Education, whose head is appointed by and is responsible to the State Board of Education. A listing of State agencies by policy responsibility is provided in Figure 4-2.

There are a number of departments and advisory bodies whose authority may relate directly to nuclear energy and waste control.

The Department of Energy was established as a cabinet-level department in 1977. It is mandated to provide for the full development of all energy sources indigenous to Ohio in order to provide adequate supplies of all forms of energy at the lowest possible cost to the consumer. The department has divisions of Research and Development, Forecasting and Information, Planning, and Conservation. This department is responsible for forecasting electric and natural gas supply/demand. It also implements a number of energy conservation programs funded by the Energy Policy and Conservation Act of 1975 and the Energy Conservation and Production Act of 1976.

The Energy Advisory Council serves to advise and recommend certain energy policies for the consideration of the Director of the Department of Energy. It is made up of 15 representatives of citizen interest groups appointed by the Governor and subject to approval by the Ohio Senate, plus four members of the Ohio General Assembly.

The Environmental Protection Agency includes the following divisions: Office of Land Pollution Control; Office of Air Pollution Control; Office of Public Water Safety; Office of Wastewater Pollution Control; Office of District Operations; Office of Operational Support; Environmental Legislative Liaison; Environmental Legal Advisor; Environmental Planning Coordinator; Emergency Response; and Public Interest Center/Environmental Information.

The Office of Land Pollution Control directs the control and disposal of solid waste in the State. The Division of Solid Waste Management reviews disposal plans, prepares guidelines for site investigations, conducts local

# OHIO

## ADJUTANT GENERAL

James C. Clem, Adjutant General  
*Adjutant General's Department*  
2825 W. Dublin-Granville Rd.  
Worthington OH 43085  
(614) 889-7070

## ARCHIVES AND RECORDS

Frank Levstik, State Archivist  
*The Ohio Historical Society*  
Interstate 71 at 17th Ave.  
Columbus OH 43211  
(614) 466-2060

## ADMINISTRATION

Richard D. Jackson, Director  
*Department of Administrative Services*  
State Office Tower  
30 E. Broad St.  
Columbus OH 43215  
(614) 466-6511

## ARTS AND HUMANITIES

Wayne P. Lawson, Director  
*Ohio Arts Council*  
50 W. Broad St.  
Columbus OH 43215  
(614) 466-2613

## AERONAUTICS

Norman Crabtree, Deputy Director  
*Division of Aviation*  
*Department of Transportation*  
2829 W. Granville Rd.  
Worthington OH 43085  
(614) 466-7120

Charles C. Cole, Jr., Executive Director  
*Ohio Program in the Humanities*  
760 Pleasant Ridge Ave.  
Columbus OH 43209  
(614) 236-6879

## AGING

Martin A. Janis, Executive Director  
*Commission on Aging*  
50 W. Broad St.  
Columbus OH 43215  
(614) 466-5500

## ATTORNEY GENERAL

William J. Brown, Attorney General  
State Office Tower  
30 E. Broad St.  
Columbus OH 43215  
(614) 466-3376

## AGRICULTURE

John M. Stackhouse, Director  
*Department of Agriculture*  
713 State Office Bldg.  
65 S. Front St.  
Columbus OH 43215  
(614) 466-2732

## AUDIT

Thomas E. Ferguson, Auditor of State  
88 E. Broad St., 5th Fl.  
Columbus OH 43215  
(614) 466-4858

## AIR POLLUTION CONTROL

Chuck Taylor, Chief  
*Office of Air Pollution Control*  
*Ohio Environmental Protection Agency*  
Seneca Towers  
361 E. Broad St.  
P.O. Box 1049 (43216)  
Columbus OH 43215  
(614) 466-6116

## BANKING

R. Hal Nichols, Superintendent of Banks  
*Division of Banks*  
*Department of Commerce*  
Borden Bldg.  
180 E. Broad St.  
Columbus OH 43215  
(614) 466-2932

## ALCOHOLISM

Paul Lanham, Chief  
*Division of Alcoholism*  
*Department of Health*  
246 N. High St.  
Columbus OH 43215  
(614) 466-3445

## BUDGET

William W. Wilkins, Director  
*Office of Budget and Management*  
State Office Tower, 39th Fl.  
30 E. Broad St.  
Columbus OH 43215  
(614) 466-4034

Figure 4-2. Ohio State agencies.

Source: The National Directory of State Agencies, 1978-1979, (Washington, D.C. Information Resources Press - 1978).



**CHILD WELFARE**

David W. Schwertfager, Chief  
*Bureau of Children Services*  
*Division of Social Services*  
*Department of Public Welfare*  
 State Office Tower, 30th Fl., Sect. D  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2208

**CIVIL DEFENSE**

Curtis Griffith, Jr., Deputy Director  
*Disaster Services Agency*  
*Adjutant General's Department*  
 2825 W. Dublin-Granville Rd.  
 Worthington OH 43085  
 (614) 889-7150

**CLERK OF THE HOUSE**

Joseph J. Sommer, Executive Secretary  
*House of Representatives*  
 State House  
 Broad and High Sts.  
 Columbus OH 43215  
 (614) 466-4308

**COMMERCE**

J. Gordon Peltier, Director  
*Department of Commerce*  
 Borden Bldg.  
 180 E. Broad St.  
 Columbus OH 43215  
 (614) 466-3636

**COMMUNITY AFFAIRS**

James A. Duerk  
*Department of Economic and Community Development*  
 State Office Tower  
 30 E. Broad St.  
 P.O. Box 1001 (43216)  
 Columbus OH 43215  
 (614) 466-7610

**CONFLICT OF INTEREST**

Richard G. Terapak, Executive Director  
*Ohio Ethics Commission*  
 150 E. Broad St.  
 Columbus OH 43215  
 (614) 466-7093

**CONSUMER AFFAIRS**

Robert S. Tongren, Chief  
*Consumer Frauds and Crimes Section*  
*Office of the Attorney General*  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-8831

**CORRECTIONS**

George F. Denton, Director  
*Department of Rehabilitation and Corrections*  
 1050 Freeway Dr., N.  
 Columbus OH 43229  
 (614) 466-6190

**COURT ADMINISTRATION**

Coit H. Gilbert, Administrative Director of the Courts  
*Supreme Court of Ohio*  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2653

**DATA PROCESSING**

Jerry Hammett, Deputy Director  
*Division of Computer Services*  
*Department of Administrative Services*  
 State Office Tower, 39th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-6920

**DRUG ABUSE**

Mel Zwissler, Chief  
*Bureau of Drug Abuse*  
*Division of Mental Health*  
*Department of Mental Health and Mental Retardation*  
 1352 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-7604

**ECONOMIC DEVELOPMENT**

Al Wallace, Deputy Director  
*Economic Development Division*  
*Department of Economic and Community Development*  
 State Office Tower, 23rd Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2317

**EDUCATION (higher)**

James A. Norton, Chancellor  
*Board of Regents*  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-6000

**EDUCATION (primary, secondary, and vocational)**

Franklin B. Walter, Superintendent of Public Instruction  
*Department of Education*  
 808 State Office Bldg.  
 65 S. Front St.  
 Columbus OH 43215  
 (614) 466-3304

**ELECTIONS**

James R. Marsh, Assistant Secretary of State  
*Elections Section*  
*Office of the Secretary of State*  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2585

**EMPLOYMENT SECURITY**

Albert G. Giles, Administrator  
*Bureau of Employment Services*  
 145 S. Front St.  
 Columbus OH 43216  
 (614) 466-2100

**ENERGY**

Robert S. Ryan, Director  
*Department of Energy*  
 State Office Tower, 34th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-3465

**ENVIRONMENTAL AFFAIRS**

James A. McAvoy, Director  
*Ohio Environmental Protection Agency*  
 361 E. Broad St.  
 Columbus OH 43215  
 (614) 466-8318

**FEDERAL-STATE RELATIONS**

Thomas J. Grant, Governor's Liaison  
*Washington Office*  
*State of Ohio*  
 1150 Connecticut Ave., N.W.  
 Washington DC 20036  
 (202) 223-1725

**FINANCE**

William W. Wilkins, Director  
*Office of Budget and Management*  
 State Office Tower, 39th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-4034

**FISH AND GAME**

Clayton Lakes, Supervisor  
*Fish Management Section*  
*Division of Wildlife*  
*Department of Natural Resources*  
 Fountain Sq.  
 Columbus OH 43224  
 (614) 466-3630

Dale L. Haney, Chief  
*Division of Wildlife*  
*Department of Natural Resources*  
 Fountain Sq.  
 Columbus OH 43224  
 (614) 466-7313

**FOOD AND DRUGS**

John E. Taylor, Chief  
*Division of Foods, Dairies, and Drugs*  
*Department of Agriculture*  
 8995 E. Main St.  
 Reynoldsburg OH 43068  
 (614) 866-6361

**FORESTRY**

Ernest J. Crebhart, Chief  
*Division of Forestry*  
*Department of Natural Resources*  
 Fountain Sq.  
 Columbus OH 43224  
 (614) 466-7842

**GENERAL SERVICES**

Walter L. McCreary, Deputy Director  
*Division of Office Services*  
*Department of Administrative Services*  
 State Office Tower, 40th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-5087

**GEOLOGY**

Horace R. Collins, Chief  
*Division of Geological Survey*  
*Department of Natural Resources*  
 Fountain Sq., Bldg. B  
 Columbus OH 43224  
 (614) 466-5344

**HEALTH**

John Ackerman, Director  
*Department of Health*  
 246 N. High St.  
 Columbus OH 43215  
 (614) 466-2253

**HIGHWAY SAFETY**

Robert M. Chiaramonte, Director  
*Department of Highway Safety*  
 240 Parsons Ave.  
 Columbus OH 43215  
 (614) 466-3383

**HIGHWAYS**

David L. Weir, Director  
*Department of Transportation*  
 25 S. Front St.  
 Columbus OH 43215  
 (614) 466-2335

**HISTORIC PRESERVATION**

Thomas H. Smith, Director  
*The Ohio Historical Society*  
 Interstate 71 at 17th Ave.  
 Columbus OH 43211  
 (614) 466-1500

**HOUSING**

William A. Losoncy, Executive Director  
*Ohio Housing Development Board*  
 34 N. High St.  
 Columbus OH 43215  
 (614) 466-7970

**HUMAN RIGHTS**

Ellis L. Ross, Executive Director  
*Ohio Civil Rights Commission*  
 220 Parsons Ave.  
 Columbus OH 43215  
 (614) 466-2785

**INSURANCE**

Harry V. Jump, Director  
*Department of Insurance*  
 2100 Stella Ct.  
 Columbus OH 43215  
 (614) 466-3584

Figure 4-2. (Continued)

**JUVENILE DELINQUENCY**

William K. Willis, Director  
*Ohio Youth Commission*  
 Nitschke Bldg.  
 35 E. Gay St.  
 Columbus OH 43215  
 (614) 466-8783

**LABOR**

Helen W. Evans, Director  
*Department of Industrial Relations*  
 2323 W. 5th Ave.  
 Columbus OH 43216  
 (614) 466-3271

**LAW ENFORCEMENT PLANNING**

Alphonso Montgomery, Deputy Director  
*Administration of Justice Division*  
*Department of Economic and Community Development*  
 State Office Tower, 26th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-7610

**LEGISLATIVE RESEARCH**

David A. Johnston, Director  
*Legislative Service Commission*  
 State House  
 Broad and High Sts.  
 Columbus OH 43215  
 (614) 466-3615

**LIBRARY SERVICES**

Ira Phillips, Acting State Librarian  
*State Library of Ohio*  
 State Office Bldg.  
 65 S. Front St.  
 Columbus OH 43215  
 (614) 466-2693

**LIQUOR CONTROL**

Clifford E. Reich, Director  
*Department of Liquor Control*  
 2323 W. 5th Ave.  
 Columbus OH 43204  
 (614) 466-2142

**LOTTERY**

David R. Harbarger, Executive Director  
*Ohio Lottery Commission*  
 11001 Cedar Ave.  
 Cleveland OH 44106  
 (216) 795-5000

**MASS TRANSIT**

Richard H. Henderson, Administrator  
*Bureau of Public Transportation*  
*Division of Planning and Design*  
*Department of Transportation*  
 25 S. Front St.  
 Columbus OH 43215  
 (614) 466-8955

**MENTAL HEALTH**

Timothy B. Moritz, Director  
*Department of Mental Health and Mental Retardation*  
 1182 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2337

**MENTAL RETARDATION**

Levester Cannon, Commissioner  
*Division of Mental Retardation and Developmental Disabilities*  
*Department of Mental Health and Mental Retardation*  
 1284 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-5214

**MINING**

Henry J. Ciechomski, Chief  
*Division of Mines*  
*Department of Industrial Relations*  
 2323 W. 5th Ave.  
 P.O. Box 825  
 Columbus OH 43216  
 (614) 466-4240

**MOTOR VEHICLES**

Dean L. Dollison, Registrar  
*Bureau of Motor Vehicles*  
*Department of Highway Safety*  
 4300 Kimberly Pkwy.  
 P.O. Box 16520 (43215)  
 Columbus OH 43227  
 (614) 466-7666

**NATURAL RESOURCES**

Robert W. Teater, Director  
*Department of Natural Resources*  
 Fountain Sq.  
 Columbus OH 43224  
 (614) 466-3770

**NUCLEAR ENERGY**

Robert S. Ryan, Director  
*Department of Energy*  
 State Office Tower, 34th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-3465

**OCCUPATIONAL SAFETY AND HEALTH**

Philip A. Workman, Superintendent  
*Division of Safety and Hygiene*  
*Industrial Commission of Ohio*  
 246 N. High St.  
 Columbus OH 43215  
 (614) 466-3564

**OIL AND GAS**

Andrew Skalkos, Chief  
*Oil and Gas Division*  
*Department of Natural Resources*  
 Fountain Sq., Bldg. B  
 Columbus OH 43224  
 (614) 466-3990

Figure 4-2. (Continued)

**PARKS**

Ralph Vanzant, Chief  
 Division of Parks and Recreation  
 Department of Natural Resources  
 Fountain Sq.  
 Columbus OH 43224  
 (614) 466-2838

**PERSONNEL**

Philip S. Hamilton, Deputy Director  
 Division of Personnel  
 Department of Administrative Services  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-3455

**POLICE**

Adam G. Reiss, Superintendent  
 Highway Patrol  
 Department of Highway Safety  
 660 E. Main St.  
 Columbus OH 43205  
 (614) 466-2990

**PRINTING AND PUBLISHING**

Donald H. Wallar, Administrator  
 State Printing  
 Division of Office Services  
 Department of Administrative Services  
 183 E. Mound St.  
 Columbus OH 43216  
 (614) 466-4914

**PROBATION AND PAROLE**

Nick J. Sanborn, Chief  
 Division of Parole and Community Services  
 Department of Rehabilitation and Corrections  
 1050 Freeway Dr., N.  
 Columbus OH 43229  
 (614) 466-6170

**PUBLIC DEFENDER**

J. Tullis Rogers, Public Defender  
 Public Defender Commission  
 20 E. Broad St.  
 Columbus OH 43215  
 (614) 466-5393

**PUBLIC UTILITIES**

C. Luther Heckman, Chairman  
 Public Utilities Commission  
 180 E. Broad St.  
 Columbus OH 43215  
 (614) 466-3102

**PUBLIC WORKS**

Raymond R. Kohli, Deputy Director  
 Division of Public Works  
 Department of Administrative Services  
 State Office Tower, 35th Fl.  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-4277

**PURCHASING**

John M. Kiger, Administrator  
 State Purchasing Bureau  
 Division of Office Services  
 Department of Administrative Services  
 364 S. 4th St.  
 P.O. Box 329  
 Columbus OH 43215  
 (614) 466-8218

**RAILROADS**

Charles R. Geer, Chief  
 Railroad Section  
 Transportation Department  
 Public Utilities Commission  
 Borden Bldg.  
 180 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2304

**RETIREMENT**

W. S. McLaughlin, Executive Director  
 Public Employees Retirement System  
 277 E. Town St.  
 Columbus OH 43215  
 (614) 466-2822

**SECRETARY OF STATE**

Ted W. Brown, Secretary of State  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2530

**SECRETARY OF THE SENATE**

William H. Chavanne, Clerk  
 Senate  
 State House  
 Broad and High Sts.  
 Columbus OH 43215  
 (614) 466-4900

**SECURITIES**

James Hurd, Commissioner  
 Division of Securities  
 Department of Commerce  
 Borden Bldg., 13th Fl.  
 180 E. Broad St.  
 Columbus OH 43215  
 (614) 466-7602

**SOCIAL SERVICES**

Mildred Madry, Chief  
 Division of Social Services  
 Department of Public Welfare  
 State Office Tower  
 30 E. Broad St.  
 Columbus OH 43215  
 (614) 466-2306

**SOLID WASTE MANAGEMENT**

Donald Day, Chief  
 Office of Land Pollution Control  
 Ohio Environmental Protection Agency  
 Seneca Towers  
 361 E. Broad St.  
 P.O. Box 1049 (43216)  
 Columbus OH 43215  
 (614) 466-8934

**STATE-LOCAL RELATIONS**

Robert Stutz, Chief  
*Office of Local Government Services*  
*Community Services Division*  
*Department of Economic and Community*  
*Development*  
State Office Tower  
30 E. Broad St.  
P.O. Box 1001 (43216)  
Columbus OH 43215  
(614) 466-2285

**TAXATION AND REVENUE**

Edgar L. Lindley, Tax Commissioner  
*Ohio Department of Taxation*  
State Office Tower  
30 E. Broad St.  
P.O. Box 530 (43216)  
Columbus OH 43215  
(614) 466-2166

**TOURISM**

Philip D. DeVore, Director  
*Office of Travel and Tourism*  
*Economic Development Division*  
*Department of Economic and Community*  
*Development*  
State Office Tower  
30 E. Broad St.  
P.O. Box 1001 (43216)  
Columbus OH 43215  
(614) 466-8844

**TRANSPORTATION**

David L. Weir, Director  
*Department of Transportation*  
25 S. Front St.  
Columbus OH 43215  
(614) 466-2335

**TREASURER**

Gertrude W. Donahey, Treasurer of State  
State Office Tower  
30 E. Broad St.  
Columbus OH 43215  
(614) 466-2160

**VETERANS' AFFAIRS**

John P. Siemer, Chief  
*Soldiers' Claim Division*  
*Adjutant General's Department*  
State House Annex  
Columbus OH 43215  
(614) 466-5453

**VITAL RECORDS/STATISTICS**

Karl Wise, Chief  
*Division of Vital Statistics*  
*Department of Health*  
State Office Bldg.  
65 S. Front St.  
Columbus OH 43215  
(614) 466-2533

**WATER POLLUTION CONTROL**

Ernest Rotering, Chief  
*Office of Wastewater Pollution Control*  
*Ohio Environmental Protection Agency*  
Seneca Towers  
361 E. Broad St.  
Columbus OH 43215  
(614) 466-7427

**WATER RESOURCES**

Andrew Spencer, Administrator  
*Water Resources Development*  
*Department of Natural Resources*  
Fountain Sq.  
Columbus OH 43224  
(614) 466-6020

**WELFARE**

Kenneth B. Creasy, Director  
*Department of Public Welfare*  
State Office Tower  
30 E. Broad St.  
Columbus OH 43215  
(614) 466-6282

**WORKMEN'S COMPENSATION**

Robert C. Daugherty, Administrator  
*Bureau of Workers' Compensation*  
246 N. High St.  
Columbus OH 43215  
(614) 466-2950

Figure 4-2. (Continued)

solid waste program surveys, advises local health officers, and approves plans for hazardous waste disposal and recovery. The Division of Planning and Technical Assistance is primarily responsible for identification of planning strategies and procedures at State and local levels, along with the definition of organizational and institutional roles in plan implementation.

The Office of Wastewater Pollution Control develops state-wide water quality management plans. The Division of Industrial Wastewater issues National Pollution Discharge Elimination System (NPDES) permits and enforces these permit requirements. The Division of Surveillance, Planning, and Laboratory Services collects data and reports trends in water quality, and evaluates special toxic effluent problems.

The Office of Emergency Response provides an on-the-scene coordinator to respond to environmental emergencies. Personnel conduct field monitoring and may recommend evacuations when citizen health is endangered. Since 1972 the Office has responded to more than 4,000 pollution incidents, in addition to providing technical assistance for off-loading or removal operations of potentially hazardous materials.

The Department of Health adopts and administers health and sanitary regulations which have general application throughout the State. The department includes a Public Health Council, a director, several divisions, four district officers, and a central and four branch laboratories. The department provides a Bureau of Environmental Health and a Division of General Environmental Health Services. The Bureau of Radiological Protection is also located in this department and it is responsible for responding to incidents pertaining to radiological waste.

The Department of Natural Resources is responsible for the formulation and execution of a comprehensive plan for the development and use of natural resources within the State. The Lands and Soil Division is responsible for the inventory of soil resources of the State and assistance in soil conservation work and land use planning. The Water Division coordinates all major State and regional water resources programs.

The Public Utilities Commission regulates a wide variety of utilities in the State, including railroads, electric light companies, motor carriers, and sewage disposal companies. The commission consists of three members, each of whom is appointed by the Governor with the advice and consent of the Senate. The commission has authority over utilities rate structure, safety operations, and legal compliance.

The Department of Transportation is charged with planning, constructing, and maintaining a balanced system of transportation. There are six basic functional units within the department. These include Administrative Affairs, which is responsible for safety and operations, and supervises all activities involving maintenance and operations.

#### 4.2.3 Legislative Branch

4.2.3.1 General Features. Under the Ohio Constitution, the legislative functions of State government are assigned to the General Assembly. The General Assembly is a bicameral body consisting of a 99-member House of Representatives and a 33-member Senate. Members of the House of Representatives are elected for two-year terms. Members of the Senate are elected for four-year terms, with half the membership elected every two years.

Following each biennial election, the General Assembly meets for two sessions. The first regular session convenes on the first Monday of January in the odd-numbered year, or the succeeding day if the first Monday is a legal holiday. The first session continues throughout the year, and is usually longer than the second session. The second session convenes in the even-numbered year and continues the business of the first session.

4.2.3.2 Powers of the General Assembly. The legislative power of the General Assembly is subject to the limitations and restrictions provided by the Ohio and United States Constitutions. In addition to its policy-making powers, the General Assembly may propose constitutional amendments, impeach executive officers, regulate elections, establish State courts, provide for the qualification of its own members, and establish its own procedures.

Among its most important powers is its responsibility for local government and taxation. The General Assembly provides for alternative forms of county and municipal government, subject to the limit of constitutional provision for local home rule. In the absence of charter authority, the authority of State statutes is binding upon local government. The General Assembly is also accorded the implied power to tax. However, the Assembly may delegate its taxing authority to local governments or specially created tax districts. In the absence of specifically delegated taxing authority, local government may not levy any tax levied by the State.

4.2.3.3 Legislative Procedures. The General Assembly may enact two forms of legislation: bills and resolutions. Bills are the most common form of legislation. When approved by the General Assembly they become acts, and when signed by the Governor they become laws. Resolutions are formal expressions of the opinions and wishes of the General Assembly, and do not require the approval of the Governor.

4.2.3.4 Organization of the Senate. The membership of the Senate consists of 18 Republicans and 15 Democrats following the 1980 election. In the 113th Ohio General Assembly (1979-80), there were 18 Democrats and 15 Republicans. Ohio State Senators are elected from districts consisting of three contiguous House districts. Figure 4-3 shows current Senate districts. Table 4-3 provides information concerning members of each district.

Until January 1, 1979 the Lieutenant Governor was presiding officer of the Senate. That constitutional provision was repealed on that date. The Senate now elects all of its leaders, with the majority party selecting the President and President Pro Tempore. The President of the Senate presides over the Senate, appoints members to the Committee on Committees which chooses committee members and chairmen, and signs all bills passed by the Senate. He is now the leader of the majority party in the Senate. The majority party also selects an Assistant President Pro Tempore<sup>5</sup> to assist the President and President Pro Tempore in their party duties. The minority party chooses a minority leader, assistant minority leader, and minority



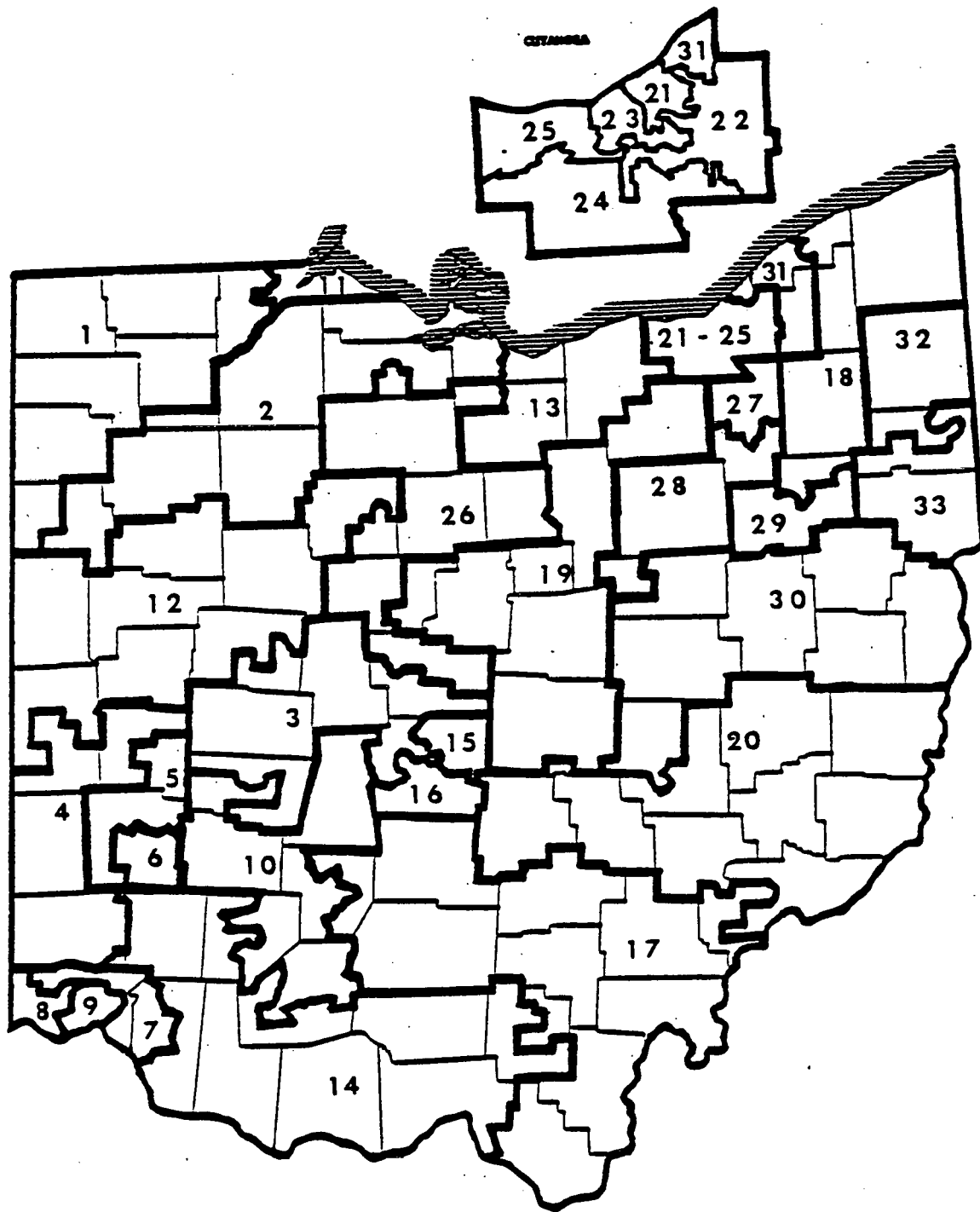


Figure 4.3. Ohio Senate Districts as Apportioned by the Governor, the Auditor of State and the Secretary of State for the Remaining Years or the Current Decennium.

Source: Synergic Resources Corporation

TABLE 4-3. OHIO STATE SENATORS 1981-1982  
 Names and Addresses of Members of State Senate  
 114th General Assembly

FIRST DISTRICT

M. Ben Gaeth Rep.  
 340 Sunset Drive  
 Defiance 43512

SECOND DISTRICT

Paul E. Gillmor Rep.  
 2253 Sand Road  
 Port Clinton 43452

THIRD DISTRICT

Theodore M. Gray Rep.  
 942 Thomas Road  
 Columbus 43212

FOURTH DISTRICT

Donald E. Lukens Rep.  
 1066 East Park Lane  
 Middletown 45042

FIFTH DISTRICT

Neal F. Zimmers, Jr. Dem.  
 4120-E Camargo Drive  
 Dayton 45415

SIXTH DISTRICT

Charles J. Curran Dem.  
 56 Constantia Avenue  
 Dayton 45419

SEVENTH DISTRICT

Richard Finan Rep.  
 3068 Stanwin  
 Cincinnati 45241

EIGHTH DISTRICT

Stanley J. Aronoff Rep.  
 220 Wyoming Avenue  
 Cincinnati 45215

NINTH DISTRICT

William F. Bowen Dem.  
 3970 Dickson Avenue  
 Cincinnati 45229

TENTH DISTRICT

Michael DeWine Rep.  
 2587 Conley Road  
 Cedarville 45314

ELEVENTH DISTRICT

Marigene Valiquette Dem.  
 3211 Parkwood  
 Toledo 43610

TWELFTH DISTRICT

Richard L. Ditto Rep.  
 711 Wildwood Drive  
 Elida 45807

THIRTEENTH DISTRICT

Ronald L. Nabakowski Dem.  
 1014 West 11th Street  
 Lorain 44052

FOURTEENTH DISTRICT

Cooper Snyder Rep.  
 10831 Watkins Bowman Rd.  
 Blanchester 45107

FIFTEENTH DISTRICT

John R. Kasich Rep.  
 2045 Hampstead Drive  
 Columbus 43229

SIXTEENTH DISTRICT

Michael Schwarzwalder Dem.  
 250 East 19th Avenue  
 Columbus 43201

SEVENTEENTH DISTRICT

Oakley C. Collins Rep.  
 1005 Kemp Lane  
 Ironton 45638

EIGHTEENTH DISTRICT

Marcus A. Roberto Dem.  
 3377 Summit Road  
 Ravenna 44260

NINETEENTH DISTRICT

Thomas A. Van Meter Rep.  
 1028 Country Club Lane  
 Ashland 44805

TWENTIETH DISTRICT

Sam Speck Rep.  
 R.D. 2, Box 79  
 New Concord 43762

TWENTY-FIRST DISTRICT

Mr. Marris Jackson Dem.  
 1723 East 70th Street  
 Cleveland 44103

TWENTY-SECOND DISTRICT

Ben M. Skall Rep.  
 2202 Acacia Park Drive  
 Lyndhurst 44124

TABLE 4-3.1 (Continued)

TWENTY-THIRD DISTRICT

Charles L. Butts           Dem.  
4514 Franklin Blvd.  
Cleveland 44102

TWENTY-FOURTH DISTRICT

Gary C. Suhadolnik       Rep.  
9313 Roxbury Road  
Parma Heights 44130

TWENTY-FIFTH DISTRICT

Paul R. Matia             Rep.  
2000 King James Parkway  
Westlake 44145

TWENTY-SIXTH DISTRICT

Paul E. Pfeifer           Rep.  
3234 Kiess Road  
Bucyrus 44820

TWENTY-SEVENTH DISTRICT

Oliver Ocasek            Dem.  
7665 North Gannett Road  
Northfield 44067

TWENTY-EIGHTH DISTRICT

Kenneth R. Cox           Dem.  
668 East Park Avenue  
Barberton 44203

TWENTY-NINTH DISTRICT

Thomas F. Walsh           Rep.  
6575 Kennebuck Cir., N.W.  
Canton 44718

THIRTIETH DISTRICT

Bill Ress                 Rep.  
168 Tuscora Avenue, N.W.  
New Philadelphia 44663

THIRTY-FIRST DISTRICT

J. Timothy McCormack     Dem.  
170 East 209th Street  
Euclid 44123

THIRTY-SECOND DISTRICT

Thomas E. Carney         Dem.  
935 North Ward  
Girard 44420

THIRTY-THIRD DISTRICT

Harry Meshel             Dem.  
786 Fairgreen Avenue  
Youngstown 44510

Source: Ohio Legislative Directory

whip. Both the majority and minority leaders have prime responsibility for developing their party's position on legislative proposals. The leaders of both parties use their party caucus as a device for establishing their party's position and developing party unity.<sup>6</sup>

Presently, the officers of the Senate are:

- President: Paul E. Gillmor (R-2nd district).
- President Pro Tempore: Thomas A. Van Meter (R-19th district).
- Assistant President Pro Tempore: Stanley J. Aronoff (R-8th district).
- Minority Leader: Harry Meshel (D-33rd district).
- Assistant Minority Leader: Neal F. Zimmers, Jr. (D-5th district).
- Minority Whip: Charles L. Butts (D-23rd district).
- Minority Floor Leader: Timothy J. McCormack (D-31st district).

The most active type of committee is the standing committee and any subcommittees that may be designated. During the 113th General Assembly (1979-80), there were 12 standing committees in the Senate. Among the standing committees relevant to low-level radioactive wastes are: Agriculture; Conservation and Environment; Education and Health; Energy and Public Utilities; Finance; and Highways and Transportation.

4.2.3.5 Organization of the House of Representatives. The membership of the House of Representatives consists of 56 Democrats and 43 Republicans following the 1980 election. In the 113th General Assembly (1979-80) there were 62 Democrats and 37 Republicans. Members of the House are elected from 99 districts, which must be relatively equal in population, compact, and composed of contiguous territory. Figure 4-4 shows current House districts. Table 4-4 provides information about the members of each district.

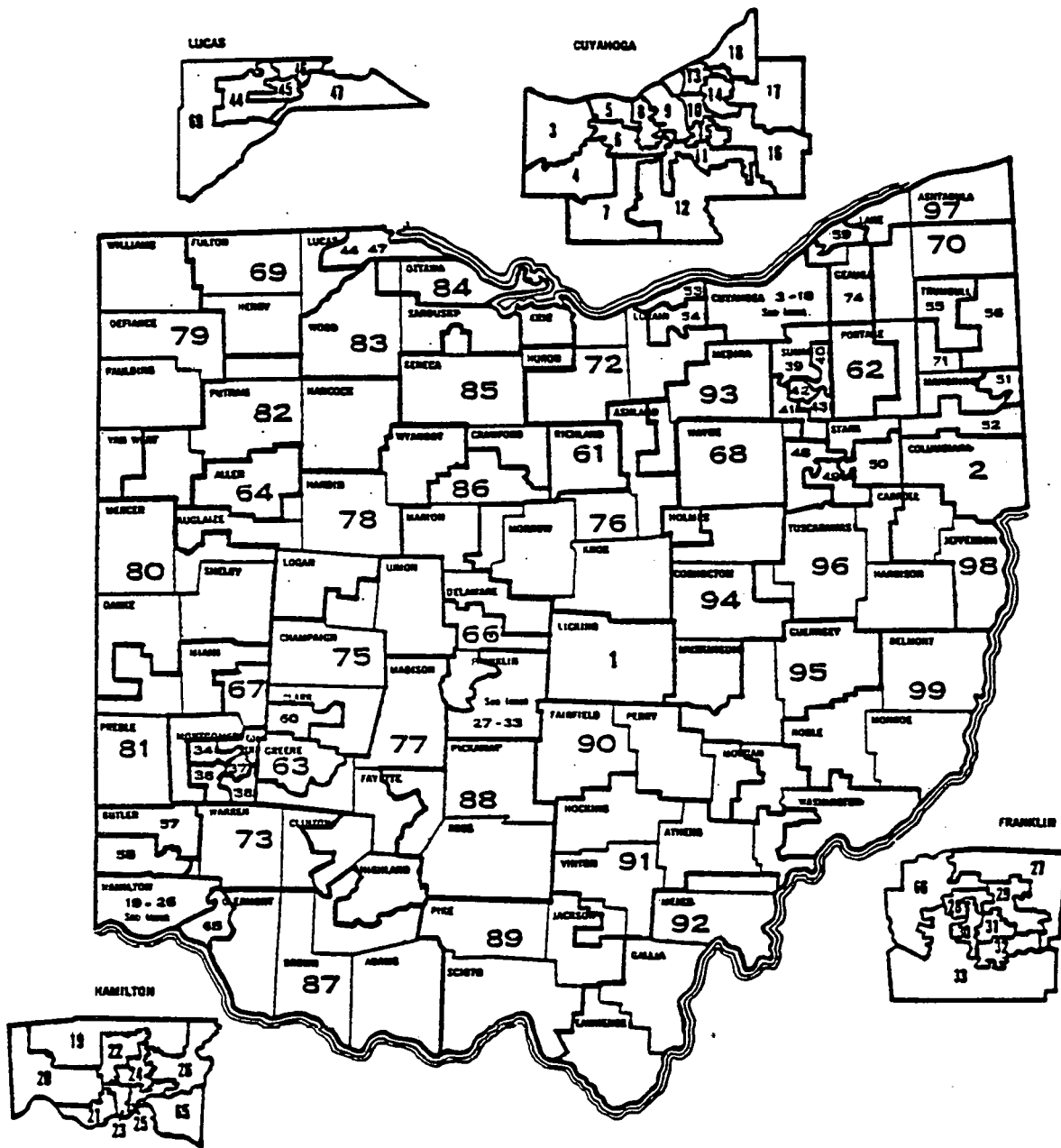


Figure 4.4. Ohio House of Representatives Districts as Apportioned by the Governor, the Auditor of State and the Secretary of State for the Remaining Years of the Current Decennium.

Source: Synergic Resources Corporation. Primary data from Ohio Secretary of State's Office.

TABLE 4-4. OHIO STATE REPRESENTATIVES 1981-1982  
 Names and Addresses of the Members of the Ohio  
 House of Representatives - 114th General Assembly

FIRST DISTRICT

Eugene Branstool Dem.  
 6360 Johnstown-Utica Rd.  
 Utica 43080

SECOND DISTRICT

John P. Wargo Dem.  
 344 East Chestnut Street  
 Lisbon 44432

THIRD DISTRICT

James M. Petro Rep.  
 315 Falmouth Drive  
 Rocky River 44116

FOURTH DISTRICT

Rocco J. Colonna Dem.  
 14431 Parkman Blvd.  
 Brook Park 44142

FIFTH DISTRICT

Francine M. Panehal Dem.  
 11502 Edgewater Drive  
 Cleveland 44102

SIXTH DISTRICT

Patrick A. Sweeney Rep.  
 15277 Triskett Road  
 Cleveland 44111

SEVENTH DISTRICT

Kenneth A. Rocco Dem.  
 12912 List Lane  
 Parma 44130

EIGHTH DISTRICT

Benny Bonanno Dem.  
 3311 Marvin Avenue  
 Cleveland 44109

NINTH DISTRICT

Troy Lee James Dem.  
 2177 East 43 Street  
 Cleveland 44103

TENTH DISTRICT

Thomas M. Bell Dem.  
 2941 East Boulevard  
 Cleveland 44104

ELEVENTH DISTRICT

Frank Mahnic, Jr. Dem.  
 11019 Plymouth Avenue  
 Garfield Heights 44125

TWELFTH DISTRICT

Donna Pope Rep.  
 3915 Longwood Avenue  
 Parma 44134

THIRTEENTH DISTRICT

Ike Thompson Dem.  
 899 East 128 Street  
 Cleveland 44108

FOURTEENTH DISTRICT

Mary O. Boyle Dem.  
 1285 Inglewood Drive  
 Cleveland Heights 44121

FIFTEENTH DISTRICT

John D. Thompson, Jr. Dem.  
 15611 Stockbridge Avenue  
 Cleveland 44128

SIXTEENTH DISTRICT

Lee I. Fisher Dem.  
 3286 Enderby Road  
 Shaker Heights 44120

SEVENTEENTH DISTRICT

Matthew J. Hatchadorian Rep.  
 1018 Woodlane Drive  
 Mayfield Village 44143

EIGHTEENTH DISTRICT

Ronald J. Suster Dem.  
 2111 Aberdeen Drive  
 Euclid 44143

NINETEENTH DISTRICT

Dale N. Van Vyven Rep.  
 4799 Fields-Ertel Road  
 Cincinnati 45241

TWENTIETH DISTRICT

Thomas A. Pottenger Rep.  
 2038 Danville Drive  
 Cincinnati 45238

TWENTY-FIRST DISTRICT

Jerome F. Luebbers Dem.  
 5490 Betlin Court  
 Cincinnati 45238

TWENTY-SECOND DISTRICT

Edith P. Mayer Rep.  
 10120 Winstead Lane  
 Cincinnati 45231

TABLE 4-4.1 (Continued)

TWENTY-THIRD DISTRICT

William L. Mallory Dem.  
907 Dayton Street  
Cincinnati 45214

TWENTY-FOURTH DISTRICT

Terry M. Tranter Dem.  
7303 Fair Oaks Drive  
Cincinnati 45237

TWENTY-FIFTH DISTRICT

Helen Rankin Dem.  
3461 Evanston Avenue  
Cincinnati 45207

TWENTY-SIXTH DISTRICT

Helen H. Fix Rep.  
3141 Esther Drive  
Cincinnati 45213

TWENTY-SEVENTH DISTRICT

Jo Ann Davidson Rep.  
6870 Livingston Ave  
Reynoldsburg 43068

TWENTY-EIGHTH DISTRICT

Dana A. Deshler, Jr. Rep.  
2605 York Road  
Columbus 43221

TWENTY-NINTH DISTRICT

Les Brown Dem.  
3211 East Hudson Street  
Columbus 43219

THIRTIETH DISTRICT

Mike Stinziano Dem.  
314 King Avenue  
Columbus 43201

THIRTY-FIRST DISTRICT

Otto Beatty, Jr. Dem.  
380 South Fifth Street  
Columbus 43215

THIRTY-SECOND DISTRICT

Dean Conley Dem.  
5125 "I" Stone Ridge Drive  
Columbus 43213

THIRTY-THIRD DISTRICT

Don E. Gilmore Rep.  
3131 Mary Avenue  
Columbus 43204

THIRTY-FOURTH DISTRICT

Edward J. Orlett Dem.  
3 Cambridge Avenue  
Dayton 45406

THIRTY-FIFTH DISTRICT

Tom Fries Dem.  
4129-F Camargo Drive  
Dayton 45415

THIRTY-SIXTH DISTRICT

C. J. McLin, Jr. Dem.  
1130 Germantown Street  
Dayton 45408

THIRTY-SEVENTH DISTRICT

Larry V. Ballweg Rep.  
45 East Dixon Avenue  
Dayton 45419

THIRTY-EIGHTH DISTRICT

Robert L. Corbin Rep.  
135 Shadybrook Drive  
Dayton 45459

THIRTY-NINTH DISTRICT

Vernon F. Cook Dem.  
3395 Purdue Street  
Cuyahoga Falls 44221

FORTIETH DISTRICT

Thomas C. Sawyer Dem.  
1298 North Howard Street  
Akron 44310

FORTY-FIRST DISTRICT

Robert D. Nettle Dem.  
31 - 31st Street, S.W.  
Barberton 44203

FORTY-SECOND DISTRICT

Pete Crossland Dem.  
29 Borton Avenue  
Akron 44302

FORTY-THIRD DISTRICT

Cliff Skeen Dem.  
3255 Carper Avenue  
Akron 44312

FORTY-FOURTH DISTRICT

David L. Karmol Rep.  
3642 Garrison Road  
Toledo 43613

FORTY-FIFTH DISTRICT

Casey C. Jones Dem.  
355 Pinewood Avenue  
Toledo 43602

FORTY-SIXTH DISTRICT

Arthur Wilkowski Dem.  
546 East Lake Street  
Toledo 43608

TABLE 4-4.2 (Continued)

FORTY-SEVENTH DISTRICT

Barney Quilter Dem.  
641 Woodville Road  
Toledo 43605

FORTY-EIGHTH DISTRICT

Richard F. Maier Rep.  
1222 Providence, N.E.  
Massillon 44646

FORTY-NINTH DISTRICT

Charles Red Ash Rep.  
210 39 Street, S.W.  
Canton 44706

FIFTIETH DISTRICT

William J. Healy Dem.  
1211 Havana Place, N.E.  
Canton 44714

FIFTY-FIRST DISTRICT

Thomas P. Gilmartin Dem.  
825 South Hazelwood Avenue  
Youngstown 44509

FIFTY-SECOND DISTRICT

Joseph J. Vukovich, III Dem.  
6322 A Clingan Road  
Poland 44514

FIFTY-THIRD DISTRICT

J. Leonard Camera Dem.  
1147 Tenth Street  
Lorain 44052

FIFTY-FOURTH DISTRICT

Marguerite E. Bowman Rep.  
1416 Ford Road  
Elyria 44035

FIFTY-FIFTH DISTRICT

Robert A. Nader Dem.  
798 Wildwood, N.E.  
Warren 44483

FIFTY-SIXTH DISTRICT

Joseph P. Williams Dem.  
888 Hartzell  
Niles 44446

FIFTY-SEVENTH DISTRICT

William Donham Rep.  
113 Lylburn Road  
Middletown 45042

FIFTY-EIGHTH DISTRICT

Michael A. Fox Rep.  
5881 Fairham Road  
Hamilton 45011

FIFTY-NINTH DISTRICT

Edward J. Hughes Dem.  
8241 Starburst Drive  
Mentor 44060

SIXTIETH DISTRICT

David Hartley Dem.  
1715 Prospect Street  
Springfield 45503

SIXTY-FIRST DISTRICT

Sherrod Brown Dem.  
74 Parkwood Boulevard  
Mansfield 44906

SIXTY-SECOND DISTRICT

John A. Begula Dem.  
P.O. 446  
Kent 44240

SIXTY-THIRD DISTRICT

James S. Zehner Dem.  
418 North Park Place  
Yellow Springs 45387

SIXTY-FOURTH DISTRICT

Waldo Bennett Rose Rep.  
1602 West Market Street  
Lima 45805

SIXTY-FIFTH DISTRICT

John O'Brien Rep.  
7651 Burlinohills  
Cincinnati 45244

SIXTY-SIXTH DISTRICT

Lawrence E. Hughes Rep.  
4319 Fair Oaks Drive  
Columbus 43214

SIXTY-SEVENTH DISTRICT

Russ Guerra, Jr. Rep.  
4601 Rathburn Drive  
Englewood 45322

SIXTY-EIGHTH DISTRICT

Ronald D. Amstutz Rep.  
626 Smithville Road  
Orrville 44667

SIXTY-NINTH DISTRICT

John A. Galbraith Rep.  
602 Pierce Street  
Maumee 43537

SEVENTIETH DISTRICT

Dave Johnson Rep.  
514 Marquardt Avenue, N.E.  
North Canton 44720



TABLE 4-4.3 (Continued)

SEVENTY-FIRST DISTRICT

Thomas J. Carney Dem.  
5200 W. Blvd.  
Boardman 44512

SEVENTY-SECOND DISTRICT

Marie Tansey Rep.  
1201 State Street  
Vermilion 44089

SEVENTY-THIRD DISTRICT

Corwin Nixon Rep.  
1030 Kirby Road  
Lebanon 45036

SEVENTY-FOURTH DISTRICT

Dennis L. Wojtanowski Dem.  
14458 Stone Road  
Newbury 44065

SEVENTY-FIFTH DISTRICT

Charles R. Saxbe Rep.  
177 East Sandusy Street  
Mechanicsburg 43044

SEVENTY-SIXTH DISTRICT

Harry E. Turner Rep.  
404 East Vine Street  
Mount Vernon 43050

SEVENTY-SEVENTH DISTRICT

Joseph E. Haines Rep.  
2750 E. Spring Valley-  
Paintersville Rd.  
Xenia 45385

SEVENTY-EIGHTH DISTRICT

Rod Hughes Rep.  
Route 1  
Huntsville 43324

SEVENTY-NINTH DISTRICT

Larry W. Manahan Rep.  
815 Jefferson Avenue  
Defiance 43512

EIGHTIETH DISTRICT

Dale Locker Dem.  
Box 356  
Anna 45302

EIGHTY-FIRST DISTRICT

Robert E. Netzley Rep.  
2750 Pemberton Road  
Laura 45337

EIGHTY-SECOND DISTRICT

Michael G. Oxley Rep.  
1995 Old Mill Road  
Findlay 45840

EIGHTY-THIRD DISTRICT

Robert E. Brown Rep.  
503 West Front Street  
Perrysburg 43551

EIGHTY-FOURTH DISTRICT

Frederick H. Deering Dem.  
9610 Ransom Road  
Monroeville 44847

EIGHTY-FIFTH DISTRICT

Gene Damschroder Rep.  
364 S. S.R. 53  
Fremont 43420

EIGHTY-SIXTH DISTRICT

Walter D. McClaskey Rep.  
3454 Marion Marysville Road  
Marion 43302

EIGHTY-SEVENTH DISTRICT

Harry C. Malott Dem.  
2516 St. Rt. 32  
Mt. Orab 45154

EIGHTY-EIGHTH DISTRICT

Myrl H. Shoemaker Dem.  
10479 Upper Twin Road  
Lyndon 45649

EIGHTY-NINTH DISTRICT

Vernal G. Riffe, Jr. Dem.  
703 Lakeview Avenue  
New Boston 45662

NINETIETH DISTRICT

Steven O. Williams Rep.  
1548 Lynn Drive  
Lancaster 43130

NINETY-FIRST DISTRICT

Claire M. Ball, Jr. Rep.  
48 Eden Place  
Athens 45701

NINETY-SECOND DISTRICT

Ronald H. James Dem.  
Route 2, Box 195  
Proctorville 45669

NINETY-THIRD DISTRICT

William G. Batchelder Rep.  
435 East Smith Road  
Medina 44256

NINETY-FOURTH DISTRICT

James R. Ross Rep.  
1629 Sleepy Hollow Drive  
Coshocton 43812



The membership of the House of Representatives elects by majority vote a Speaker, a Speaker Pro Tempore, a majority floor leader, an assistant majority floor leader, a minority leader, an assistant minority leader, and majority and minority whips. The Speaker and Speaker Pro Tempore are officers of the House. The Speaker presides, signs all legislation approved by the chamber, serves as an ex-officio member of committees, and selects committee members and chairmen. The Speaker Pro Tempore performs the duties of the Speaker in his absence and assists the Speaker in performing his duties.

As in the Senate, the elected leaders also serve as party leaders in formulating party positions on legislative matters. The leaders of both parties use the party caucus as a device for establishing their party's position and developing party unity.<sup>7</sup>

Presently, the officers of the House of Representatives are:

- Speaker: Vernal G. Riffe (D-New Boston).
- Speaker Pro Tempore: Barney Quilter (D-Toledo).
- Majority Floor Leader: William L. Mallory (D-Cincinnati).
- Assistant Majority Floor Leader: Vernon F. Cook (D-Cuyahoga Falls).
- Majority Leader: Corwin M. Nixon (R-Lebanon).
- Assistant Minority Leader: Waldo Bennett Rose (R-Lima).
- Minority Whip: Helen H. Fix (R-Cincinnati).

As in the Senate, all detailed legislative work in the House is performed in committee. With its larger size, the House is more dependent upon its committees than is the Senate. The House standing committees are the primary arenas of detailed legislative review.<sup>8</sup>

During the 113th General Assembly (1979-80) there were 22 standing committees in the House of Representatives. Among the standing committees relevant to low-level radioactive wastes are Agriculture and Natural Resources, Energy and Environment, Finance-Appropriations, Highways and Highway Safety, Interstate Cooperation, and Public Utilities.

4.2.3.6 Political Parties. Within both chambers of the General Assembly, the political party has been the major tool for organization and development of legislative proposals. Leadership within each chamber is chosen by the parties and issues are structured through party competition. However, inter-party conflict has generally been avoided through informal cooperation. Membership on standing committees is allocated according to each party's proportion of total membership, and committee chairmen are usually members of the majority party. Within each party and each chamber, the party caucus has been the major organizational structure of the legislative process.

#### 4.2.4 Judicial Branch

There are two classes of courts in Ohio: the constitutional courts, established by the Constitution, and the legislative courts, established by the General Assembly. The Ohio constitutional courts include the Common Pleas Court, the Court of Appeals, and the Supreme Court. The legislative courts include municipal courts, county courts, and mayors' courts.<sup>9</sup>

#### 4.2.5 Local Government

The structure of Ohio local government is typical of Midwestern States, having counties, municipalities, townships, school districts, and special districts. Ohio maintains a tradition of relatively strong local government, with heavy reliance upon local authorities for the delivery of services.<sup>10</sup>

The basic unit of rural government in Ohio has been the township which now exists for administrative purposes only. Townships and their trustees still retain responsibilities for zoning, township roads, taxes, and other township services.

County government remains strong in rural areas of Ohio. County government is also created as an administrative agent of the State, unlike municipalities. There are 88 counties in Ohio, each of which elects a three-member board of county commissioners and a variety (usually nine) of administrative officials. County government maintains responsibility for public works, sanitation, public welfare, law enforcement, finance, and recording. Counties in Ohio have increasingly assumed responsibilities for waste disposal services. Although counties may select home rule, few counties have opted to do so due to public resistance to the changes in government structure that would be required.<sup>11</sup>

There are two types of municipalities in Ohio: villages, which are those under 5,000 population; and cities, which are those with populations of 5,000 or more. Both types of municipalities may adopt home rule charters or operate under a general statutory plan. Most have opted for some variation of the latter: mayor-council, commission, or council-manager options. All municipalities provide five major types of services: finance, public services (including streets, water, sewage, garbage, and rubbish), safety, welfare, and law. A major function of municipal government is the zoning of the municipality into districts for various approved uses (primarily residential, commercial, or industrial).

Local government remains strong in Ohio, despite trends toward the centralization of government services elsewhere. County and township governments, though created for a largely rural society, continue to be important elements for the delivery of public services. Despite large numbers of metropolitan areas with critical urban problems, there has been little movement in Ohio toward metropolitan forms of government. Although cooperation in the delivery of special services such as airports, waste disposal, and water has grown, there has been little movement toward regional reforms of government.

## References

1. Michael Barone, et. al., The Almanac of American Politics 1980 (New York: E. P. Dutton, 1979), p. 674.
2. Ibid, p. 673.
3. Although there are approximately 80 subcommittees in the Congress that have some potential relationship to issues involving low-level radioactive waste, there are seven major committees that share responsibility for this area. In the House, the Committees are Science and Technology, Interstate and Foreign Commerce, Government Operations, and Interior and Insular Affairs. In the Senate, the Committees are Energy and Natural Resources, Governmental Affairs, and Environment and Public Works.
4. Joseph A. Schlesinger, "A Comparison of the Relative Positions of Governors," in Thad Beyle and J. Oliver Williams, The American Governor in Behavioral Perspective. (New York: Harper and Row, 1972), pp. 141-150.
5. A Guidebook for Ohio Legislators, p. 83.
6. Ibid, pp. 22-25.
7. Ibid, pp. 50-51.
8. Ibid, p. 84.
9. John J. Gargan and James G. Coke, "An Overview of the Ohio Political System," in Political Behavior and Public Issues in Ohio, ed. John J. Gargan and James G. Coke (Kent State University Press, 1972), pp. 50-51.
10. Rose, Ohio Government, p. 63.
11. Ibid, p. 167-168.

5. A REVIEW OF STATE LOW-LEVEL WASTE MANAGEMENT POLICY:  
PRESENT AND PROPOSED

5.1 Overview

Ohio has a substantial body of legislation dealing with low-level radioactive waste. The governmental authority established by this legislation tends to be diffused among State agencies.

What follows is a review of relevant Ohio legislation, both present and proposed, which gives an indication of radioactive waste management policy in Ohio. Appendix B contains the full text of relevant Ohio statutes pertaining to low-level waste management concerns.

5.2 Existing Nuclear Waste Management Policy In Ohio

5.2.1 Ohio Revised Code, Chapter 107.14

This section authorizes the Governor of Ohio to accomplish the transfer of authority from the Federal Government to the State of Ohio regarding certain peaceful uses of atomic energy.

5.2.2 Ohio Revised Code, Chapter 122: Department of Economic and Community Development: Sections 122.13 - 122.16: Midwest Nuclear Compact

This act provides the authority for the State of Ohio to enter into an agreement with some or all of twelve other Midwest States\* in order to form a Midwest Nuclear Compact. The Board may contain one member from each State, as well as a non-voting representative of the Federal Government. The Director of Economic and Community Development is designated as the representative of the State of Ohio.

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\*Article IX specifies that eligible parties to the compact may include the States of Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin.

Pertinent powers and duties of the Board as specified in Article V of the compact include:

- To study standards, laws, codes, rules, regulations, and administrative practices in or related to nuclear fields.
- To conduct ongoing analysis of the position of party States regarding evolving nuclear and related technologies.
- To encourage the development and use of scientific advances and discoveries in nuclear facilities, energy, materials, products, and by-products.
- To undertake non-regulatory functions with respect to non-nuclear sources of radiation.
- To recommend amendments or additions to the laws, codes, rules, regulations or administrative procedures and practices or local laws or ordinances of member States or their subdivisions in nuclear and related fields.
- To make recommendations which would facilitate the transport of nuclear equipment, materials, products, by-products, wastes, and any other related substances in order to make their availability or disposal feasible.
- To make recommendations regarding liability incurred during any aspect of operations in nuclear or related fields.
- To coordinate nuclear incident prevention and control plans of each party State.

The Midwest Nuclear Compact never operated as a functioning organization due to the fact that Federal legislative authorization was never received.



### 5.2.3 Ohio Revised Code, Chapter 3701.33-.34: Public Health Council

This law authorizes the creation of a seven member Public Health Council, appointed by the Governor. This council sits as an autonomous, rule-making body overseeing the Department of Health.

The council is empowered to:

- Make and amend the sanitary code.
- Hear appeals to administrative decisions of the Director of Health.
- Conduct such public hearings as specified by law.
- Prescribe the organization and functions of the Department of Health and its divisions, including the Bureau of Radiation Control.
- Consider any matter related to the preservation and improvement of public health in Ohio.

### 5.2.4 Ohio Revised Code, Chapter 3701.4: Radiation Control

This chapter is known as the radiation protection statute, delineating the functions, powers, and duties of the Public Health Council and the Department of Health regarding the prevention and prohibition of improper radiation (as defined in Section 3701.90 (E), improper radiation).

The Public Health Council is empowered to adopt regulations in order to identify, prohibit, and prevent improper radiation as well as require registration with the Director of Health of those using, producing, storing, or disposing of radioactive materials.

Enforcement of Sections 3701.90-.99 and any administrative regulations promulgated pursuant to these sections is delegated to the Director of Health. Additionally, the Director of Health is expected to:

- Develop comprehensive policies and programs to monitor improper radiation.
- Advise, consult, and cooperate with other Federal and interstate agencies.
- Research related issues.
- Disseminate radiation protection information.
- Review plans for radiation control.
- Register users of radioactive materials and inspect radiation sources.
- Require maintenance of records.
- Insure compliance with radiation protection rules and regulations.

The Director of Health specifically is empowered to issue, modify, or revoke orders so as to prohibit or abate "the discharge of radioactive material or waste into the ground, air, or waters of the state."

Section 3701.93 stipulates the appointment of a Radiation Advisory Council, consisting of five members appointed by the Director of Health, to review and recommend policies affecting the administration and enforcement of Sections 3701.90-.99.

#### 5.2.5 Ohio Revised Code, Chapter 4163: Atomic Energy

These sections primarily relate to the use and possession of radioactive substances. Section 4163.02 prohibits the production or possession of nuclear material without an NRC and/or State issued license.

Seven departments of the State are required to conduct studies and recommend laws in order to carry out this act: the Departments of Health, Industrial Relations, Transportation, Insurance, and Natural Resources as well as the Industrial Commission and the Public Utilities Commission. The Governor may direct other State departments or agencies to conduct similar investigations.

Enacted in 1980, Section 4163.07 requires written notification prior to the transport of nuclear material into Ohio. Notification is to be made to the Director of the Disaster Services Agency who, in turn, alerts the Directors of Highway Safety and Environmental Protection, the Chairman of the Public Utilities Commission, and the Sheriff of each county along proposed and alternate shipping routes.

#### 5.2.6 Ohio Revised Code, Chapter 6121: Water Development Authority

This chapter mandates the creation of the seven member Ohio Water Development Authority. The Directors of the Environmental Protection Agency and the Department of Natural Resources sit as ex-officio members in addition to five members appointed by the Governor with the advice and consent of the Senate.

This autonomous authority receives broad powers to initiate and implement water quality projects, including the right to issue water development revenue bonds and notes of the State (see Section 6121.06).

The Director of the Ohio Environmental Protection Agency sets water quality standards on behalf of the Water Development Authority.

This chapter authorizes water projects to alleviate existing or potential pollution from a number of sources, including industrial wastes. Section 6121.01, Definitions, defines industrial waste to be:

"any liquid, gaseous, or solid waste substance, heat, radioactivity or radiation, resulting from any process of industry, manufacture, trade, or business, or from the

development, processing, or recovery of any natural resource ... which pollutes the waters of the state, or which in the absence of a waste water facility would pollute or cause greater pollution of the waters of the State" (Emphasis Added).

#### 5.2.7 Ohio Revised Code, Chapter 6123: Solid Waste Projects

Similar to the preceding legislation, this chapter specifically empowers the Ohio Water Development Authority to (among other things) "acquire, construct, reconstruct, enlarge, improve, furnish, equip, maintain, repair, operate, lease or rent to, or contract for operation by, a person or governmental agency, solid waste projects, and establish rules and regulations for the use of such projects (Section 6123.04CD)". The authority is empowered to issue solid waste revenue bonds to fund solid waste projects.

For purposes of this chapter, solid waste is defined as:

"unwanted residual solid or semi-solid material as results from industrial operations, including those of public utility companies, and commercial, distribution, research, agricultural, and community operations, including garbage, combustible, non-combustible or radioactive material, street dirt, and debris (Section 6123.01(c))" (Emphasis Added).

Included in the definition of solid waste facilities are facilities or property for the storage or final disposal of low-level radioactive wastes.

#### 5.2.8 Ohio Administrative Code, Radiation Protection Rules 3701-38-23 to 3701-38-29 of the Ohio Radiation Protection Standards

These rules stipulate certain standards, procedures, and prohibitions regarding the storage and disposal of radioactive material.

Disposal may be accomplished only by transfer to another entity with the approval of the Director of Health, pursuant to application procedures (specified by Rule 3701-38-26). Rules are excluded for disposal by three methods: 1) by release into sanitary sewerage systems; 2) by burial in the soil; and 3) by incineration.

5.2.9 State of Ohio, Memorandum of Understanding: "Response to Hazardous Materials Incidents"

This memorandum was entered into in June 1980 in order to coordinate State agency functions concerning the response to incidents involving hazardous materials, including radioactive substances. The Disaster Services Agency assumes the primary role for coordinating activities of other State agencies in the case of incidents involving radioactive materials.

5.2.10 Amended Senate Bill No. 208

As discussed earlier in this section, this bill supplements the Ohio Revised Code, Chapter 4163: Atomic Energy. This act was a response to anticipated waste shipments through Ohio from the disabled TMI facility. This bill requires advance notification of the transport of nuclear materials into and through the State of Ohio. Senate Bill No. 208 became effective July 18, 1980.

5.2.11 Amended House Joint Resolution 27

Adopted June 26, 1979, this resolution appointed a joint committee to study the disposal of hazardous and nuclear wastes in Ohio in order to determine "what persons, corporations, or governmental entities currently regulate these procedures, and recommend any changes that are needed to establish the most effective disposal procedures."

The committee subsequently met and completed the portion of the mandated study on chemical wastes. The nuclear waste portion was not addressed prior to the termination of the 113th Ohio General Assembly. As of January 1, 1981, it is not known if the study committee will be reappointed when the General Assembly reconvenes.

5.2.12 Low-level Radioactive Waste Management in Ohio: Summary of Legislative and Administrative Mandates

As evidenced by the passage of Amended House Joint Resolution 27 (1979), authority for radioactive waste management in Ohio is dispersed among several agencies. Regulation of harmful radiation is lodged with the Public Health Council and its enforcement arm, the Ohio Department of Health. The Director of the Department of Health and the Radiation Advisory Council are charged to develop radiation monitoring programs associated with the use, possession, transport, storage and disposal of radioactive materials, pursuant to Section 3701.92 CB of the Ohio Revised Code.

The Disaster Services Agency has been designated the lead agency during any emergency or disaster situation involving radioactive materials (see Appendix B). The Departments of Health and Transportation and the Environmental Protection Agency provide support services in the case of nuclear accidents.

At the same time, the Ohio Revised Code, Chapter 4163; Atomic Energy, specifies that the following State departments are empowered to conduct studies and recommend laws necessary to ensure compliance with Chapter 4163:

- Department of Health.
  
- Department of Industrial Relations.

- Industrial Commission.
- Department of Transportation.
- Public Health Council.
- Department of Insurance.
- Department of Natural Resources.
- Any other department or agency "as the governor may direct and for purposes specified by him".

While the Department of Health monitors the long-term health effects of radioactive substances in Ohio, the Environmental Protection Agency seeks to develop programs to ensure that nuclear activities in Ohio are carried out in an environmentally acceptable manner (see Appendix B, "Nuclear Waste in Ohio: A Status Report"). Enforcement of such programs is, however, the province of the Department of Health.

Authority to acquire, construct, fund, and operate disposal sites for radioactive wastes is vested with the Ohio Water Development Authority. The Directors of the Environmental Protection Agency, the Department of Natural Resources, and the Department of Energy sit as ex-officio members of the autonomous Water Development Authority.

The Water Development Authority may issue revenue bonds to finance public or private waste water or solid waste facility projects, as mentioned earlier. Such projects must alleviate pollution resulting from industrial or solid wastes. The definitions sections of Chapter 6121 and 6123, Water Development Authority law, specifically allude to radioactive wastes. No attempts to initiate waste projects in Ohio under the provisions of Chapters

6121 and 6123 were documented. It should be noted that, although the Water Development Authority enjoys rather broad and autonomous powers to initiate and conduct waste facility projects, any projects initiated by the Authority but developed privately would be subject to local zoning restrictions (where they exist) in the State of Ohio.

Regarding interstate compacts or agreements, since 1971 the State of Ohio has authorized participation in an agency known as the Midwest Nuclear Board. Enabling legislation names the Director of the Ohio Department of Economic and Community Development as the State's representative on the proposed board.

Although a requisite number of States ratified the proposed Midwest Nuclear Compact, the Measure was not enacted by Congress. Nevertheless, the Ohio Revised Code, Sections 122.13-122.16, contain Ohio's original ratification of and amendments to the Midwest Nuclear Compact as precedent for similar future agreements.

Discussions are underway on regional solutions for low-level radioactive waste management. The Ohio Environmental Protection Agency is the State's lead agency in this matter, involving representatives of the States of Illinois, Wisconsin, Michigan, Indiana, and Ohio.

Ohio remains a "non-agreement state". Since adoption of Chapter 107.14 of the Ohio Revised Code (authorizing the Governor to implement agreement status proceedings), Governors of both parties have chosen not to enter into agreement status. While there is no indication that the State of Ohio may choose to assume management of existing and future disposal sites within its boundaries, three factors may result in greater specification of low-level waste policies and procedures: State approval of investigations conducted on behalf of the Midwest Task Force on Low-level Waste Management; the creation of a Midwest Regional Compact; and the possibility of gubernatorial reappointment of a joint committee to study nuclear wastes authority in Ohio, pursuant to Amended Joint Resolution 27 (1979); and the proposed reorganization of the Ohio Environmental Protection Agency.



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## 6. INTEREST GROUPS

### 6.1 Introduction

When considering policy options, it is advantageous for decision-makers to know the public's view of different options. As a technical issue, low-level radioactive waste disposal crosses the threshold of public awareness infrequently\*, and therefore the public will probably have little understanding and no easily defined opinions on the issue. Certain interest groups, however, may consider low-level radioactive waste as a relevant policy issue due to its potential impacts upon the set of values or economic concerns which they represent.

A survey was designed to solicit information regarding the membership, contact individual, current telephone numbers, etc., for those groups which would possibly have an interest in low-level radioactive waste management. Listed below are those organizations that have both a defined constituency and a potential interest in low-level radioactive waste activities affecting Ohio. Unless otherwise noted, all groups have a state-wide constituency.

Environmental organizations appear to be represented in larger numbers, since these organizations are public interest in nature, often rely upon a voluntary staff, and respond to a broad spectrum of value-oriented environmental questions. Professional organizations, on the other hand, tend to have a single legislative liaison organization. Medical organizations are an example of this; there are a number of topical

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\*This assertion seems to be borne out by the media survey as discussed in Section 7.

professional organizations (internists, radiologists, etc.) which are primarily involved with internal information transfer. Actual legislative activity is usually left entirely to the American Medical Association affiliate, the Ohio State Medical Society.

## 6.2 Listing of Relevant Interest Groups

### 6.2.1 List of Environmental Groups\*

#### League of Ohio Sportsmen

4330 Cline Road, Columbus, Ohio 43228 (614-279-3444)

President: Thomas King

An umbrella organization of local sportsmen's clubs affiliated with the National Wildlife Federation. Activities include the preservation and restoration of natural habitat and wildlife populations.

#### Ohio Audubon Council, Incorporated

4036 Cypress Road, N.W., Canton, Ohio 44705

President: Frank Stan, Jr.

Promotes wildlife conservation through a number of public education, information transfer and research activities.

#### Ohio Environmental Council, Incorporated

850 Michigan Avenue, Columbus, Ohio 43215 (614-221-0898)

President: William L. Howard

Promotes conservation and protection of Ohio water resources. Membership approximately 500.

#### National Water Well Association

500 West Wilson Bridge, Worthington, Ohio 43085 (614-846-9355)

Contact: David Nielsen

Professional organization of persons involved with groundwater utilization. Concerns include protection of groundwater quality and sound resource development. Membership approximately 8,500.

#### Ohio Alliance for Environmental Education

445 King Avenue, Columbus, Ohio 43201 (614-461-0136)

Ex. Director: Jane Haynes

A non-advocacy organization which provides information to Ohio citizens on all aspects of environmental issues.

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\*Contact names and telephone numbers are listed where available.

### 6.2.2 Medical/Research Interest Groups

Ohio Hospital Association  
21 West Broad Street, Columbus, Ohio 43215 (614-221-7614)  
Contact: Norman F. Clark  
Organization which represents interests of 230 Ohio hospitals and health care institutions, performing legislative and information exchange activities.

Ohio State Medical Association  
600 South High Street, Columbus, Ohio 43215 (614-228-6971)  
Contact: Catherine Wisse  
Professional organization of medical doctors involved with information transfer and legislative activities. Membership approximately 15,000.

The Ohio Academy of Science  
445 King Avenue, Columbus, Ohio 43201 (614-424-6045)  
President: Liberato Di Dio  
Non-profit organization involved with research and scientific information transfer in Ohio.

### 6.2.3 Public Interest Groups

League of Women Voters of Ohio  
65 South Fourth Street, Columbus, Ohio 43215 (614-469-1505)  
Contact: Edith Chase  
Citizens organization representing 6,000 individual members. Primary emphasis involves public education on current issues.

Ohio Public Interest Research Group  
65 South Fourth Street, Columbus, Ohio 43215 (614-461-0136)  
Contact: Matt Perrenod  
Engages in wide range of public interest and consumer oriented policy research with an active interest in nuclear power issues.

Ohio Public Interest Campaign  
1216 East McMillan Street, Cincinnati, Ohio 45206 (513-221-2100)  
Associate Director: Harriet Applegate  
Represents a coalition of 40 statewide and regional organizations concerned with environmental and social issues.

### 6.2.4 Labor Groups

Ohio AFL-CIO  
270 East State Street, Columbus, Ohio 43215 (614-224-8271)  
Contact: John Thomas  
Labor union representing approximately 1,200,000 individual members. Represents local unions at the State level; however, different unions may have different perspectives on waste issue, in particular, the International Brotherhood of Electrical Workers and the Oil, Chemical and Atomic Workers International Union.

#### 6.2.5 Other

Ohio Chamber of Commerce

17 South High Street, Room 800, Columbus, Ohio 43215 (614-228-4201)

Contact: Rosemary Martin

Represents 5,000 member businesses with a Department of Energy and Environment which tracks relevant legislation and regulations.

Ohio Municipal League

41 South High Street, Columbus, Ohio 43215 (614-221-4349)

Ex. Director: John Coleman

Represents 630 municipalities with a membership of over 7,000 municipal employees. Regularly active in environmental and land-use issues relevant to constituency.

## 7. MASS MEDIA

### 7.1 Introduction

A review of the media issue coverage provides information on the quantity and coverage of the information citizens and decision-makers are receiving. An analysis of media coverage can thus be highly instructive in determining government concerns and public views toward an issue. In order to characterize the Ohio media coverage of the low-level radioactive waste issue, a review of articles and editorials published during 1979 and 1980 was conducted. This search was not intended to be exhaustive nor yield a representation of all radioactive issues of concern in Ohio.

Generally, newspapers maintain more detailed records of coverage than either of the electronic media. Therefore, the primary focus of the media review was upon newspapers. Ohio has 99 daily newspapers. To accomplish a valid characterization of the Ohio media, the State was reduced to three "media centers", corresponding to the major urban areas within the State: Cleveland, Columbus and Cincinnati. Within these areas the following newspapers were examined:

Cleveland Plain Dealer  
Cleveland Press  
Cincinnati Enquirer  
Cincinnati Post  
Columbus Dispatch  
Columbus Citizen/Journal

### 7.2 Media Coverage

#### 7.2.1 Overview

Cleveland is the dominant media center in the State. This is due to both the presence of the Cleveland Plain Dealer and the fact that

Cleveland is the largest metropolitan area. The Plain Dealer is a regional newspaper and its influence extends well beyond the metropolitan area. The National Broadcasting Corporation also maintains a news bureau in Cleveland.

Columbus, being the State capital, is now the largest city in Ohio. The Columbus Dispatch is the major source of news about State government for both decision-makers and other media. The Citizen-Journal concerns itself with city affairs to a greater extent and has only half the readership of the Dispatch.

Cincinnati, due to its location in the southwestern corner of the State, tends to be removed from the mainstream of Ohio issues. Coverage of both the Enquirer and the Post is more narrowly focused than either the dominant Cleveland or Columbus dailies.

#### 7.2.2 Volume of Coverage

Nuclear and radiation issues in general were of secondary importance in Ohio. The Three Mile Island (TMI) story was covered through wire stories and little apparent effort was made to localize the nuclear power issue by concentration upon operations of the nearby Davis-Besse Station.

The Cleveland dailies gave cursory coverage to the detection of radiation at a formerly utilized disposal site in nearby Newburgh. The exposure of Davis-Besse workers to slight levels of radiation also merited only brief coverage in the Cleveland papers.

The Columbus papers devoted some attention to the issue of radioactive waste transportation through Ohio, and State and local efforts to regulate this transportation. The Cincinnati media gave nuclear issues even less coverage and the issue of low-level radioactive wastes was almost totally ignored until very recently.

### 7.2.3 Issues Raised

The principal preoccupation of the Ohio media was with the transportation of nuclear wastes through Ohio enroute to final disposal sites. Numerous Ohio communities have recently adopted measures to strictly regulate or disallow the transportation of wastes within their boundaries. The Columbus Dispatch in particular covered the safety issues raised as well as the political ramifications involved with local abrogation of the interstate commerce clause.

No clear and consistent distinction was made between low-level and high-level radioactive waste concerns. In most instances, radioactive wastes are associated only with the operations of electrical generation facilities, and little mention was given to medical, industrial or military radioactive waste concerns.

During the newspaper interviews, the editors contacted were unable to explain the apparent preoccupation of Ohio with radiation transportation issues. Editors consistently rated low-level radioactive wastes as a non-issue within the State, and generally supported nuclear power generation.

## 7.3 Specific Media Coverage

### 7.3.1 Cleveland

The Cleveland Press ran a few articles covering the discovery of trace radioactivity in Newburgh Heights, which resulted from the improper disposal of demolition wastes. The stories were short and were located in the City/State and suburban sections which tends to reveal their secondary importance in the eyes of the editorial staff.



The Plain Dealer devoted greater coverage to nuclear issues in general and the transportation issue in particular. The Plain Dealer was especially concerned with Federal tendencies toward secrecy of waste movement. The Plain Dealer strongly supported the State's right to be involved with planning the transportation routes of radioactive wastes.

### 7.3.2 Columbus

The Dispatch, the paper of record for State government activities, closely covered the transportation issue in Ohio. Editorially, the Dispatch supports uniform Federal regulations regarding low-level and hazardous waste transportation. These regulations should have State level input regarding allowable routes. The Dispatch takes an ambivalent stance on the proposed State ban on disposal. The Dispatch offers a luke-warm endorsement of the legislation as a method to place the State in a more advantageous position, but later argues that it is time to "bite the bullet" on the disposal issue and acknowledges Federal preeminence.

### 7.3.3 Cincinnati

Cincinnati papers showed the least interest in nuclear issues and covered low-level radioactive waste policy only in connection with local mishaps, such as traffic accidents involving waste shippers. Recently, however, the Enquirer had a cover story in its Sunday magazine on the benefits and concerns surrounding the use of radioactive materials. The Cincinnati media generally support the concept of nuclear power and considers waste and safety related issues as problems requiring a technical, rather than political solution.

#### 7.4 Conclusions

The Ohio media tend to be more conservative than other eastern media, both professionally and as a reflection of the Ohio political climate. Low-level radioactive waste is not an issue which commands much media attention and usually is considered only within the larger context of nuclear power. The media usually differentiate between low-level and high-level radioactive wastes when the context of the article requires this distinction; however, utilities are implicitly regarded as the sources of waste in most coverage. Possibly due to the position of Ohio as a trucking link between the industrial northeast and the western portions of the nation, waste transportation issues tend to receive more detailed coverage than disposal issues.

## 8. SURVEY METHODOLOGY

A mail survey was conducted during December, 1980, of Nuclear Regulatory Commission (NRC) licensees in the State of Ohio. The names of the license holders were obtained from a computerized listing provided by the NRC. Since the NRC listing did not contain the names of the Radiation Safety Officers (RSO), or an appropriate contact person, the State Radiation Safety Office was contacted in order to see if any registration was required of those licensed to handle radioactive materials. A separate list of names was provided by the Ohio Department of Health based on their records.

This survey was intended to classify license holders by type of licensed facility and to determine if they disposed of low-level radioactive waste by shipment to commercial disposal facilities and, if not, what other disposal methods were employed. The survey used and instruction sheet are presented in Figure 8-1. A letter of transmittal and a return envelope were also provided (see Figure 8-2). The letter indicated that the State Radiation Safety Office endorsed the survey and that licensee responses were encouraged.

The survey instrument used may be characterized as primarily being "closed ended" which would force respondents to answer specific alternative responses. However, for those questions where there are a variety of possible responses, some of which may not be reflected in the survey question, "open ended" responses were allowed. The questions used in the survey were limited to those which have a direct bearing on the characterization of low-level radioactive waste management practices in the State. Respondents were assured that the data obtained would only be reported in aggregate form.

Two weeks after the surveys were mailed, an assessment was made as to the response rate and the type of licensees returning surveys. Based on contacts with the NRC regional offices in Chicago, Illinois, and King of Prussia, Pennsylvania, a listing of NRC licensees was obtained by category

**SYNERGIC RESOURCES CORPORATION**  
**LOW-LEVEL WASTE GENERATOR SURVEY**

GENERAL INSTRUCTIONS

1. The enclosed Radioactive Waste Survey is self-explanatory. The following instructions provide general guidelines. If you have any specific concerns, please call Todd D. Davis or Steve Isser at:  

215-667-2160
2. If possible, all quantitative data should be taken directly from shipment records. If this is not practical, please estimate answers as accurately as possible. We prefer to have actual data rather than estimates.
3. Please explain or specify answers (where requested) as completely as possible. If additional space is needed, please use the "Additional Comments" section on the last page of this questionnaire.
4. When you have completed this questionnaire, please return it in the enclosed stamped, self-addressed envelope.
5. If your facility does not dispose of radioactive materials by use of the commercial radioactive material disposal sites, please fill out the survey form with the amount of material received in each year and where those radioactive materials received were disposed (e.g. Isotopes used in patient treatment residues decayed to background, disposed in trash, or shipped out in finished products).

THANK YOU VERY MUCH FOR YOUR CO-OPERATION

Figure 8-1

TABULATION FORM

LICENSEE NAME \_\_\_\_\_  
NAME OF FACILITY \_\_\_\_\_  
STREET ADDRESS \_\_\_\_\_  
CITY/STATE/ZIP \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_  
PERSON SUPPLYING INFORMATION \_\_\_\_\_  
TITLE \_\_\_\_\_

PART I - TYPE OF FACILITY

(CHECK THE ONE CATEGORY WHICH IS MOST APPLICABLE)

MEDICAL

- HOSPITAL
- PHARMACEUTICAL MANUFACTURER
- MEDICAL RESEARCH/EDUCATION
- OTHER (SPECIFY) \_\_\_\_\_

INDUSTRIAL

- INCORPORATES RADIOACTIVITY INTO PRODUCTS
- USES RADIOACTIVITY IN PROCESS CONTROL
- COMMERCIAL POWER REACTOR
- OTHER (SPECIFY) \_\_\_\_\_

EDUCATIONAL

- UNIVERSITY
- HIGH SCHOOL
- OTHER (SPECIFY) \_\_\_\_\_

GOVERNMENTAL (NON-MEDICAL OR EDUCATIONAL)

- FEDERAL
- MILITARY
- STATE
- LOCAL

PART II - DISPOSAL METHOD

CHECK EACH DISPOSAL METHOD WHICH YOU DO EMPLOY

- SHIP TO COMMERCIAL REPOSITORY
- RELEASE TO SEWER
- COMBINE WITH COMMON REFUSE
- VENT TO ATMOSPHERE
- BURN ON-SITE
- RETURN TO VENDOR
- DISTRIBUTE IN PRODUCT FORM
- NO WASTE GENERATED
- OTHER (SPECIFY) \_\_\_\_\_

Figure 8-1. (Continued)

PART III - SOURCE OF RADIOACTIVE WASTE

(CHECK EACH SOURCE OF YOUR POTENTIAL RADIOACTIVE WASTE AND, IF YOU SHIP, INDICATE THE PERCENTAGE OF YOUR TOTAL SHIPPED WASTE VOLUME ORIGINATING FROM EACH SOURCE CATEGORY).

<u>SOURCE OF RADIOACTIVITY</u>	<u>PERCENT OF WASTE VOLUME SHIPPED</u>
<input type="checkbox"/> NUCLEAR REACTOR	_____
<input type="checkbox"/> NEUTRON GENERATOR	_____
<input type="checkbox"/> CYCLOTRON OR SYNCHROTRON	_____
<input type="checkbox"/> SEALED SOURCE	_____
<input type="checkbox"/> UNSEALED RADIOACTIVE MATERIAL	_____
<input type="checkbox"/> NATURAL ORES OR MILL TAILINGS	_____
<input type="checkbox"/> OTHER (SPECIFY) _____	_____
	_____
	100%

IF YOU DO NOT SHIP RADIOACTIVE WASTES, YOU HAVE COMPLETED THE QUESTIONNAIRE. THANK YOU. IF YOU DO SHIP, PLEASE CONTINUE WITH THE FOLLOWING QUESTIONS.

PART IV - PHYSICAL FORM OF SHIPPED WASTES

(CHECK EACH FORM OF WASTE WHICH YOU SHIP AND INDICATE THE PERCENTAGE OF YOUR TOTAL SHIPPED WASTE VOLUME REPRESENTING EACH FORM).

	<u>PERCENT OF WASTE VOLUME SHIPPED</u>
<input type="checkbox"/> DRY SOLIDS, TRASH, IRRADIATED COMPONENTS	_____
<input type="checkbox"/> SOLIDIFIED OR ABSORBED LIQUIDS, SOLID SLUDGES, SPENT RESINS, FILTER SLUDGES OR EVAPORATOR BOTTOMS	_____
<input type="checkbox"/> ANIMAL CARCASSES OR OTHER BIOLOGICAL WASTE	_____
<input type="checkbox"/> SEALED SOURCES	_____
<input type="checkbox"/> OTHER (SPECIFY) _____	_____
	_____
	100%

DOES WASTE CONTAIN ANY MATERIAL WHICH IS POTENTIALLY:

<u>YES</u>	<u>NO</u>	
<input type="checkbox"/>	<input type="checkbox"/>	COMBUSTIBLE
<input type="checkbox"/>	<input type="checkbox"/>	EXPLOSIVE
<input type="checkbox"/>	<input type="checkbox"/>	CHEMICALLY TOXIC

WHAT SHIPPING CONTAINERS DO YOU USE?

55 GALLON STEEL DRUMS

30 GALLON STEEL DRUMS

OTHER (SPECIFY) \_\_\_\_\_

WHAT ON-SITE PROCESSING OF WASTE DO YOU EMPLOY?

NONE

MECHANICAL COMPACTION

INCINERATION

SOLIDIFICATION OR EVAPORATION OF LIQUIDS

ABSORPTION OF LIQUIDS

OTHER (SPECIFY) \_\_\_\_\_

Figure 8-1. (Continued)

PART V - WASTE QUANTITY

INDICATE TOTAL YEARLY VOLUME (IN CUBIC FEET) OF WASTE SHIPPED TO A COMMERCIAL DISPOSAL FACILITY.

	<u>CUBIC FEET SHIPPED</u>
ACTUAL SHIPPED IN 1978	_____
ACTUAL SHIPPED IN 1979	_____
ACTUAL SHIPPED IN 1980	_____

INDICATE TOTAL YEARLY VOLUME (IN CUBIC FEET) OF WASTE PROJECTED TO BE GENERATED WHICH WILL BE SHIPPED.

	<u>CUBIC FEET GENERATED</u>
ESTIMATED GENERATION IN 1981	_____
ESTIMATED GENERATION IN 1985	_____
ESTIMATED GENERATION IN 1990	_____

INDICATE THE QUANTITY OF RADIOACTIVITY (IN CURIES) SHIPPED TO A COMMERCIAL FACILITY IN THE YEARS 1978, 1979 AND 1980.

ISOTOPE	QUANTITY SHIPPED (CURIES) IN:		
	1978	1979	1980

Figure 8-1. (Continued)



## SYNERGIC RESOURCES CORPORATION

Synergic Resources Corporation (SRC) is a subcontractor to EG&G Idaho, Inc., on a project for the U.S. Department of Energy to develop state briefing books on low level radioactive waste concerns. This project is being conducted with the cooperation and endorsement of the Ohio Department of Health and Ohio Environmental Protection Agency.

A major feature of these briefing books will be information on the volume, sources, physical forms, and projections of low level waste. Surveys are being conducted for all Nuclear Regulatory Commission (NRC) licensees. Since you are an NRC licensee, we would appreciate it if you would complete the attached questionnaire today.

Data obtained from these surveys will be kept confidential and will only be reported in aggregated form by type of low level waste generators (e.g., commercial power reactors, medical institutions, etc.). The information you provide will be used to obtain a profile of low-level waste generated in your state and assist in the consideration of alternative approaches in developing a low-level waste management program. We are sure that you are aware of public concerns, government interest, and the desire on the part of the private sector to properly manage low level waste in the United States.

Again, we would appreciate your completing the survey today and returning it in the enclosed self-addressed, stamped envelope. The information you provide will remain confidential. If you need additional time to provide more detailed and accurate information, please take no more than five days to complete this survey. The more detailed the information you provide, the more meaningful the results of the surveys.

Should you have any questions regarding the completion of this survey, please call SRC at 215-667-2160, and ask for Steve Isser, or myself.

Sincerely,

Todd D. Davis, Director  
State/Regional Energy Studies

TDD:lc

ONE BALA-CYNWYD PLAZA, SUITE 630 • BALA-CYNWYD, PA. 19004 • 215-667-2160



and priority of licensed activity. Those licensees identified in categories that are known to generate a significant volume of low-level radioactive waste were then contacted by phone in order to encourage their response. Of those licensees contacted, all agreed to return the survey. Not all returned the surveys, however.

It is believed that the first two categories account for over 75 percent of the low-level radioactive waste generated. For the remaining non-respondents, a follow-up letter and postcard were sent in order to notify licensees that a survey had been sent and that their response was requested (see Figure 8-3). A postcard was provided in order to determine if the licensee received the survey and did or did not intend to respond; did not receive the survey and would respond if another was sent; or, received the survey, but only generated sealed sources of radiation. If the licensees indicated that they only generated sealed sources, no further contact was made. Postcard responses were counted as a specific type of response.

Response rates in the medical category IV-G, containing 195 hospitals and other medical licenses, were felt to be significantly low, as many in this group were believed to be potential shippers. Thus a selective telephone survey was made by first analyzing the American Hospital Association's 1979 Annual Guide to the Health Care Field to determine which hospitals had significant nuclear medicine or radiation therapy programs. These facilities were then contacted. A total of 29 hospitals was contacted of which only three turned out to be shippers of low-level radioactive waste. Data were gathered on disposal method, the source of radioactive waste, shipping container and actual shipped volume for 1978, 1979 and 1980. Five educational institutions (priority III-F1A) were also contacted, of which four were shippers.

It was discovered in the survey analysis that nuclear power plants were not included in the original NRC licensee listings, since they are licensed under a different category of licensees. Title X of the Code of Federal

Regulations was referred to for a more detailed breakdown of licensing categories. Nuclear power plants are licensed under Part 50 of the Code and have broader authorizations. Contact names were then obtained from the utilities which have active nuclear power plants in the State.

The information received from the licensees was then tabulated. The results appear in in Sections 2.0 and 9.0 of this report.

## 9. A PROFILE OF LOW-LEVEL RADIOACTIVE WASTE GENERATION AND DISPOSAL

In the State of Ohio, a total of 588 potential shippers of low-level radioactive waste were identified. These potential shippers were initially contacted by mail and some received a follow-up telephone call. The respondents were identified as either a medical, educational, industrial, power reactor, or governmental type facility. Section 2.0 presents data on the number of respondents using various disposal methods and the source of radioactivity used at facilities. Table 9-1 indicates that 15.7 percent (45 facilities) of the respondents use commercial low-level waste facilities. What follows is a summary of the characteristics and quantity of low-level radioactive waste disposed by these facilities.

### 9.1 Survey Response

Table 9-2 presents, by facility type, the number of potential shippers of low-level radioactive waste surveyed, the total number and percentage of responses obtained, and a breakdown of responses by type of response. If a facility provided at least the facility type and method of disposal, the answer to the survey was considered a response. If no information was obtained, the type of facility was determined by the NRC license category to which the licensee was assigned. The responses were classified into four groups by the type of response. Group One responses were responses in which all appropriate information was provided except estimated generation (see Figure 8-1). Group Two responses include partial responses that were missing one or two questions, but all included the type of facility and disposal method. Group Three responses were obtained by the follow-up telephone survey. Group Four responses were obtained by postcard.

Of the 588 potential shippers identified, 49 percent provided some degree of response. The range of responses by type of facility was 35

TABLE 9-1. USE OF COMMERCIAL LOW-LEVEL WASTE FACILITIES

PRIORITY CATEGORY	Number of Licensees	Number of Respondents	Percent of Response	Respondents Using a Commercial Facility		
				Number	Percent of all Respondents	Percent of Respondents in Priority/Facility
1. Top Priorities	23	22	95.65	18	6.27	81.82
2. Middle Priorities	244	165	67.62	23	8.01	13.94
3. All Others	321	100	31.15	4	1.39	4.00
TYPE OF FACILITY (All Priorities)						
Medical	195	126	64.62	10	3.48	7.94
Educational	34	29	85.29	13	4.53	44.83
Industrial	322	112	34.78	16	5.57	14.29
Governmental	35	18	51.43	4	1.39	22.22
Power Reactor	2	2	100.00	2	0.69	100.00
TOTAL	588	287	48.81	45	15.68	15.68

TABLE 9-2. ANALYSIS OF OVERALL SURVEY RESPONSE

PRIORITY CATEGORY	Degree of Response															
	Non-Shippers								Shippers							
	Group I		Group II		Group III		Group IV		Group I		Group II		Group III		Group IV	
	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.	No. of Resp.	% of Resp.
1. Top Priorities	4	18.18	0	0.00	0	0.00	0	0.00	11	50.00	3	13.64	4	18.18	0	0.00
2. Middle Priorities	68	41.21	23	13.94	27	16.36	24	14.55	18	10.91	3	1.82	2	1.21	0	0.00
3. All Others	81	81.00	15	15.00	0	0.00	0	0.00	1	1.00	0	0.00	3	3.00	0	0.00
TYPE OF FACILITY (All Priorities)																
Medical	54	42.86	24	19.05	26	20.63	12	9.52	4	3.17	3	2.38	3	2.38	0	0.00
Educational	9	31.03	1	3.45	1	3.45	5	17.24	9	31.03	0	0.00	4	13.79	0	0.00
Industrial	78	69.64	11	9.82	0	0.00	7	6.25	13	11.60	1	0.89	2	1.79	0	0.00
Governmental	12	66.67	2	11.11	0	0.00	0	0.00	3	16.67	1	5.56	0	0.00	0	0.00
Power Reactors	0	0.00	0	0.00	0	0.00	0	0.00	1	50.00	1	50.00	0	0.00	0	0.00
TOTAL	153	53.51	38	13.24	27	9.41	24	8.36	30	10.45	6	2.09	9	3.14	0	0.00

percent for industrial and 85 percent for educational. Of all respondents, 64 percent provided all requested information, while 51 percent of potential respondents provided no information or response.

## 9.2 Sources of Shipped Wastes

### 9.2.1 Distribution by Type of Facilities Shipping Wastes

Table 9-3 provides data on the number and type of facilities shipping wastes. The type of facility is also broken into subgroupings.

All facilities checking both "medical research/education" and also "university" were reported in the medical category and not in the educational. It should also be noted that pharmaceutical manufacturers were classified as "industrial", even though the survey labeled them as "Medical". The "other" category in the medical group includes doctors' offices, clinics, out-patient care facilities, blood centers, and medical laboratories.

In the educational category, the "other" response was checked by one institute and specified as "analytic training".

There were a wide range of uses included in the "other" response for the industrial category: laboratory work, soil density gauges, oil and gas exploration, centrifuge research, highway construction, glass colorant, back lighting LCD's (tritium cells), food processing, analytical testing, etc. Some of these responses might properly have belonged in the "Process Control" response and vice-versa.

The data in Table 9-3 show that hospitals represent the greatest proportion of low-level radioactive waste material shipped by medical facilities (80 percent). Of educational institutions, universities represented all the waste volumes reported to be shipped to commercial facilities. Over half of the low-level waste shipped by industrial

TABLE 9-3. TYPE OF FACILITIES SHIPPING LOW-LEVEL WASTE

<u>Type of Facility</u>	<u>Number Of Facilities Shipping</u>	<u>Percent Of All Shippers</u>	<u>Percent Of Facilities Type</u>
Medical			
Hospital	8	19.51	80.00
Research/Education	1	2.44	10.00
Other	1	2.44	10.00
Total	10	24.39	100.00
Educational			
University	12	29.27	100.00
High School	0	0.00	0.00
Other	0	0.00	0.00
Total	12	29.27	100.00
Industrial			
Pharm. Mfg.*	1	2.44	7.14
Product Use	3	7.32	21.43
Process Control	2	4.88	14.29
Other	8	19.51	57.14
Total	14	34.15	100.00
Power Reactor Total	2	4.88	100.00
Government			
Federal	3	7.32	100.00
Military	0	0.00	0.00
State	0	0.00	0.00
Local	0	0.00	0.00
Total	3	0.00	0.00
TOTAL	41	100.00	100.00

\*Pharmaceutical Manufacturing

facilities was from the "other" subgrouping. Of the government facilities reporting, only Federal facilities reported shipping low-level radioactive wastes (N=3).

### 9.2.2 Origin of Radioactivity Resulting in Shipped Wastes

Three major categories were used to define the origin of radioactivity resulting in shipped wastes: nuclear reactor operation, purchases of sealed sources, and purchases of unsealed radioactivity. Table 9-4 presents the distribution of the number of facilities to the type of facility and origin of radioactivity. It should be noted that more than one origin may be appropriate for a given facility. Seventy-eight percent of the licensees reporting the shipping of low-level waste obtain the radioactivity as unsealed radioactive material. Nuclear reactors provided 17 percent of the radioactivity shipped, and sealed sources provided 32 percent of the radioactivity resulting in shipped wastes.

### 9.3 Volume of Shipped Waste

Table 9-5 provides data on the volumes of shipped wastes for the years 1978, 1979 and 1980 for each type of facility and for subgroups of each facility type. Volumes of low-level wastes shipped to commercial disposal facilities were reported by 39 of the 45 facilities reporting that they ship wastes.

The table shows that 61,841 cubic feet of low-level radioactive waste were shipped in 1980, versus 26,740 cubic feet in 1978. In 1978, power reactors provided the greatest volume of shipped waste (12,000 cubic feet), whereas industrial wastes were the largest portion in 1980 (36,845 cubic feet). In terms of volume, hospitals, educational institutions and government facilities generated less than 15 percent of the total volumes reported in 1980.



TABLE 9-4. ORIGIN OF RADIOACTIVITY RESULTING IN SHIPPED WASTE

<u>Type Of Facility</u>	<u>Number Of Respondents</u>	<u>Nuclear Reactor</u>		<u>Sealed Sources</u>		<u>Unsealed Radioactive Material</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Medical	10	0	0.00	4	40.00	8	80.00
Educational	12	1	8.33	4	33.33	10	83.33
Industrial	14	3	21.43	5	35.71	11	78.57
Power Reactor	2	2	100.00	0	0.00	0	0.00
Government	3	1	33.33	0	0.00	3	100.00
TOTAL	41	7	17.07	13	31.71	32	78.05

TABLE 9-5. VOLUME OF WASTE SHIPPED

Type of Facility	Number Of Respondents	1978		1979		1980	
		Cu. Ft.	Percent	Cu. Ft.	Percent	Cu. Ft.	Percent
Medical							
Hospital	7	1851.10	6.92	2092.40	3.28	1973.00	3.19
Research/Education	1	0.00	0.00	525.00	0.82	270.00	0.44
Other	1	14.70	0.05	14.70	0.02	14.70	0.02
Total	9	1865.80	6.98	2632.10	4.13	2257.70	3.65
Educational							
University	12	3789.36	14.17	3710.10	5.82	4797.60	7.76
High School	0	0.00	0.00	0.00	0.00	0.00	0.00
Other	0	0.00	0.00	0.00	0.00	0.00	0.00
Total	12	3789.36	14.17	3710.10	5.82	4797.60	7.76
Industrial							
Pharm. Mfg.*	1	90.00	0.34	232.00	0.36	214.00	0.35
Product Use	3	639.10	2.39	181.80	0.29	7.50	0.01
Process Control	2	0.00	0.00	18.00	0.03	15.00	0.02
Other	7	8044.00	30.08	47407.00	74.39	36608.50	59.20
Total	13	8773.10	32.81	47838.80	75.07	36845.00	59.58
Power Reactor Total	2	12000.00	44.88	9184.00	14.41	17513.00	28.32
Government							
Federal	3	311.50	1.16	360.00	0.56	427.50	0.69
Military	0	0.00	0.00	0.00	0.00	0.00	0.00
State	0	0.00	0.00	0.00	0.00	0.00	0.00
Local	0	0.00	0.00	0.00	0.00	0.00	0.00
Total	3	311.50	1.16	360.00	0.56	427.50	0.69
TOTAL	39	26739.75	100.00	63724.99	100.00	61840.78	100.00

\*Pharmaceutical Manufacturing

Table 9-6 shows the volumes in cubic feet of estimated future waste generation, as provided by the 28 respondents who gave these projections. It should be noted that based on telephone interviews, on-site visits, and comments written by the respondents on the survey instrument, the projected volumes should be viewed at best as only crude estimates. Therefore, any interpretation of the projected waste volumes should be done cautiously. Another factor to consider is the definition of low-level radioactive waste and NRC rulemaking regarding disposal practices. An increasing number of institutions have reported holding such waste on-site until it decays to background levels, when it is disposed with common refuse. The projected volume of low-level radioactive waste in Ohio is 30,694 cubic feet in 1981, 45,337 cubic feet in 1985, and 47,012 cubic feet in 1990. The estimated volumes by type of facility show that power reactors will be the largest sources of low-level radioactive waste for 1985 and 1990. However, in 1981, power reactors and industry will each provide roughly 12,000-13,000 cubic feet of low-level radioactive waste. Universities and "other" industrial facilities are also significant generators of low-level radioactive waste.

#### 9.4 Activity of Shipped Waste

Table 9-7 shows the amount of activity in shipped waste for the years 1978, 1979 and 1980. The total number of respondents to this question (N=27) is lower than the total number of shippers (N=45) because 18 respondents provided no information on activity. Of those who did respond, most appeared to carefully and methodically present the data. Still, many of these figures may be approximations. It should also be noted that, while zeros appear for many isotopes, actual data were provided but the coding scheme used does not report data for the lower activity levels.

In 1978 and 1979, industrial facilities of various types provided the largest proportion of activity shipped to commercial disposal facilities (99 percent). In 1980, the proportion of activity of shipped waste by industry decreased to 53 percent. Of the industrial facilities, "product use" and "other" uses provided the greatest levels of activity found in shipped waste.

TABLE 9-6. ESTIMATED GENERATION (CU. FT.)

Type of Facility	1981		1985		1990	
	Respondents	Volume	Respondents	Volume	Respondents	Volume
Medical						
Hospital	4	220.7	4	256.7	4	315.0
Research/Education	0	0.0	0	0.0	0	0.0
Other	1	14.7	0	0.0	0	0.0
Total	5	235.4	4	256.7	4	315.0
Educational						
University	8	5190.8	7	4827.4	7	6347.2
High School	0	0.0	0	0.0	0	0.0
Other	0	0.0	0	0.0	0	0.0
Total	8	5190.8	7	4827.4	7	6347.2
Industrial						
Pharm. Mfg.*	1	300.0	1	400.0	1	500.0
Product Use	3	332.5	3	327.5	2	320.0
Process Control	2	17.5	2	24.0	1	20.0
Other	5	12112.5	5	12120.0	5	12129.0
Total	11	12762.5	11	12871.5	9	12969.0
Power Reactor Total	1	12000.0	2	27031.0	2	27031.0
Government						
Federal	3	505.0	1	350.0	1	350.0
Military	0	0.0	0	0.0	0	0.0
State	0	0.0	0	0.0	0	0.0
Local	0	0.0	0	0.0	0	0.0
Total	3	505.0	1	350.0	1	350.0
TOTAL	28	30693.7	25	45336.6	23	47012.2

\*Pharmaceutical Manufacturing

TABLE 9-7. ACTIVITY OF SHIPPED WASTE

Type of Facility	Number Of Respondents	1978		1979		1980	
		Curies	Percent	Curies	Percent	Curies	Percent
<b>Medical</b>							
Hospital	3	0.0298	0.00	0.0311	0.00	0.0181	0.02
Research/Education	1	1.1970	0.01	1.0300	0.03	1.0440	1.23
Other	0	0.0000	0.00	0.0000	0.00	0.0000	0.00
Total	4	1.2268	0.01	1.0611	0.03	1.0621	1.25
<b>Education</b>							
University	8	5.4844	0.06	6.5560	0.17	3.9823	4.70
High School	0	0.0000	0.00	0.0000	0.00	0.0000	0.00
Other	0	0.0000	0.00	0.0000	0.00	0.0000	0.00
Total	8	5.4844	0.06	6.5560	0.17	3.9823	4.70
<b>Industrial</b>							
Pharm. Mfg.*	1	4.6011	0.05	0.4162	0.01	0.2319	0.27
Product Use	3	122.8065	1.27	143.8870	3.62	0.0000	0.00
Process Control	2	0.0000	0.00	0.0409	0.00	0.0000	0.00
Other	6	9552.3711	98.58	3816.0688	96.10	44.3122	52.30
Total	12	9679.7793	99.90	3960.4131	99.74	44.5441	52.58
Power Reactor Total	1	3.2330	0.03	2.8350	0.07	30.8420	36.40
<b>Government</b>							
Federal	2	0.0112	0.00	0.0373	0.00	4.2924	5.07
Military	0	0.0000	0.00	0.0000	0.00	0.0000	0.00
State	0	0.0000	0.00	0.0000	0.00	0.0000	0.00
Local	0	0.0000	0.00	0.0000	0.00	0.0000	0.00
Total	2	0.0112	0.00	0.0373	0.00	4.2924	5.07
<b>TOTAL</b>	<b>27</b>	<b>9689.7305</b>	<b>100.00</b>	<b>3970.8999</b>	<b>100.00</b>	<b>84.7228</b>	<b>100.00</b>

\*Pharmaceutical Manufacturing

Tables 9-8 through 9-13 present the distribution of activity by shipped radionuclide. This listing represents the isotopes as provided by respondents; presumably, other isotopes may be in use by non-respondents. In 1978, 1979 and 1980, industrial facilities accounted for the largest number of radionuclides in shipped wastes. It should also be noted that the year-to-year levels of the largest shippers vary significantly.

#### 9.5 Physical Characteristics of Shipped Wastes

Low-level waste may be processed on-site by either reducing the volume of the waste (e.g., compaction, incineration) or by removing free liquid (e.g., solidification, absorption). Table 9-14 shows the number of facilities using these methods. The most common type of on-site processing of low-level radioactive waste is absorption (34 percent), followed by mechanical compaction (25 percent). Thirty-four percent of the respondents reported using no on-site processing of low-level radioactive waste. It should also be noted that, while zeros appear for many isotopes, actual data were provided but the coding scheme used does not report data for the lower activity levels.

Table 9-15 provides data on the type of shipping container used on-site to package waste for transport to disposal facilities. Over 90 percent of the respondents reported using 55 gallon drums, and approximately one out of four reported using 30 gallon drums and/or "Other" disposal methods (which usually include cardboard shipping containers).

In the survey, shipped waste was categorized as either dry, moist, biological, sealed, or other. Table 9-16 presents the number of facilities reporting the shipping of waste in any of these categories. Close to 90 percent of the respondents indicated that the physical form of shipped waste is "dry". "Moist/potential free liquid" and "other" were mentioned as the next two most common waste forms (38 and 31 percent, respectively).

TABLE 9-8. RADIONUCLIDES IN SHIPPED WASTE - MEDICAL

ISOTOPE	1978	1979	1980	ISOTOPE	1978	1979	1980
H 3	0.6348	0.5641	0.5241	IN 111	0.0000	0.0000	0.0000
C 14	0.1930	0.1670	0.1340	SN 119	0.0000	0.0000	0.0000
NA 22	0.0000	0.0000	0.0000	SB 125	0.0000	0.0000	0.0000
P 32	0.0880	0.0970	0.1740	TE 123	0.0000	0.0000	0.0000
P 33	0.0000	0.0000	0.0000	TE 125	0.0000	0.0000	0.0000
S 35	0.0440	0.0190	0.0230	TE 129	0.0000	0.0000	0.0000
CL 36	0.0000	0.0000	0.0000	I 123	0.0000	0.0000	0.0000
K 40	0.0000	0.0000	0.0000	I 124	0.0000	0.0000	0.0000
CA 45	0.0330	0.0110	0.0270	I 125	0.1480	0.1150	0.1240
SC 46	0.0000	0.0000	0.0000	I 131	0.0060	0.0060	0.0010
CR 51	0.0530	0.0540	0.0340	XE 131	0.0030	0.0030	0.0000
MN 54	0.0000	0.0000	0.0000	CS 134	0.0000	0.0000	0.0000
FE 55	0.0000	0.0000	0.0000	CS 137	0.0000	0.0000	0.0000
FE 59	0.0000	0.0000	0.0000	BA 133	0.0000	0.0000	0.0000
CO 57	0.0020	0.0020	0.0020	BA 140	0.0000	0.0000	0.0000
CO 58	0.0000	0.0000	0.0000	LA 140	0.0000	0.0000	0.0000
CO 60	0.0000	0.0000	0.0000	CE 141	0.0000	0.0000	0.0000
NI 63	0.0000	0.0000	0.0000	PH 147	0.0000	0.0000	0.0000
CU 64	0.0000	0.0000	0.0000	EU 152	0.0000	0.0000	0.0000
ZN 65	0.0000	0.0000	0.0000	HF 181	0.0000	0.0000	0.0000
GA 67	0.0050	0.0050	0.0060	IR 192	0.0000	0.0000	0.0000
AS 73	0.0000	0.0000	0.0000	HG 203	0.0000	0.0000	0.0000
SE 75	0.0040	0.0040	0.0050	TL 201	0.0000	0.0010	0.0010
KR 81	0.0000	0.0000	0.0000	TL 204	0.0000	0.0000	0.0000
KR 85	0.0000	0.0000	0.0000	PB 210	0.0000	0.0000	0.0000
RB 81	0.0000	0.0000	0.0000	RA 226	0.0000	0.0000	0.0000
RB 83	0.0000	0.0000	0.0000	TH 232	0.0000	0.0000	0.0000
RB 86	0.0000	0.0000	0.0000	U 235	0.0000	0.0000	0.0000
SR 85	0.0000	0.0000	0.0000	U 238	0.0000	0.0000	0.0000
SR 90	0.0000	0.0000	0.0000	AM 241	0.0000	0.0000	0.0000
MO 99 M	0.0100	0.0100	0.0000	TH MIX	0.0000	0.0000	0.0000
TC 99 M	0.0030	0.0030	0.0070	U MIX	0.0000	0.0000	0.0000
RH 100	0.0000	0.0000	0.0000	PU MIX	0.0000	0.0000	0.0000
RH 107	0.0000	0.0000	0.0000	MISC.MIX	0.0000	0.0000	0.0000
CD 109	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000
				TOTAL	1.2268	1.0611	1.0621

TABLE 9-9. RADIONUCLIDES IN SHIPPED WASTE - EDUCATIONAL

ISOTOPE	1978	1979	1980	ISOTOPE	1978	1979	1980
H 3	3.0738	4.7969	1.8880	IN 111	0.0000	0.0000	0.0000
C 14	1.1937	0.9063	1.0086	SN 119	0.0000	0.0000	0.0000
NA 22	0.0253	0.0092	0.0056	SB 125	0.0000	0.0000	0.0001
P 32	0.2311	0.1192	0.2805	TE 123	0.0000	0.0000	0.0000
P 33	0.0000	0.0000	0.0000	TE 125	0.0002	0.0000	0.0000
S 35	0.2628	0.2608	0.2896	TE 129	0.0005	0.0000	0.0000
CL 36	0.0002	0.0001	0.0000	I 123	0.0000	0.0000	0.0000
K 40	0.0000	0.0000	0.0000	I 124	0.0000	0.0000	0.0000
CA 45	0.3563	0.2809	0.2261	I 125	0.0858	0.0926	0.0872
SC 46	0.0000	0.0000	0.0000	I 131	0.0000	0.0000	0.0000
CR 51	0.0777	0.0212	0.0370	XE 131	0.0000	0.0000	0.0000
MN 54	0.0000	0.0000	0.0000	CS 134	0.0000	0.0000	0.0000
FE 55	0.0000	0.0000	0.0000	CS 137	0.0001	0.0005	0.0000
FE 59	0.0001	0.0002	0.0000	BA 133	0.0000	0.0000	0.0000
CO 57	0.0000	0.0000	0.0006	BA 140	0.0000	0.0000	0.0000
CO 58	0.0000	0.0000	0.0000	LA 140	0.0000	0.0000	0.0000
CO 60	0.0006	0.0000	0.0000	CE 141	0.0000	0.0000	0.0000
NI 63	0.0000	0.0000	0.0000	PH 147	0.0000	0.0000	0.0000
CU 64	0.0000	0.0000	0.0000	EU 152	0.0000	0.0000	0.0000
ZN 65	0.0000	0.0000	0.0000	HF 181	0.0000	0.0000	0.0000
GA 67	0.0000	0.0000	0.0000	IR 192	0.0000	0.0000	0.0000
AS 73	0.0000	0.0000	0.0000	HG 203	0.0000	0.0000	0.0000
SE 75	0.0000	0.0000	0.0000	TL 201	0.0000	0.0000	0.0000
KR 81	0.0000	0.0000	0.0000	TL 204	0.0000	0.0000	0.0000
KR 85	0.0000	0.0000	0.0000	PB 210	0.0000	0.0000	0.0000
RB 81	0.0000	0.0000	0.0000	RA 226	0.0000	0.0000	0.0000
RB 83	0.0000	0.0000	0.0000	TH 232	0.0000	0.0000	0.0000
RB 86	0.0000	0.0000	0.0000	U 235	0.0000	0.0000	0.0000
SR 85	0.0000	0.0000	0.0000	U 238	0.0000	0.0000	0.0000
SR 90	0.0200	0.0000	0.0000	AM 241	0.0000	0.0000	0.0000
MO 99 M	0.0000	0.0000	0.0000	TH MIX	0.0000	0.0000	0.0000
TC 99 M	0.1410	0.0520	0.1440	U MIX	0.0000	0.0000	0.0000
RH 100	0.0000	0.0000	0.0000	PU MIX	0.0000	0.0000	0.0000
RH 107	0.0000	0.0000	0.0000	MISC.MIX	0.0150	0.0150	0.0150
CD 109	0.0002	0.0011	0.0000		0.0000	0.0000	0.0000
				TOTAL	5.4844	6.5560	3.9823



TABLE 9-10. RADIONUCLIDES IN SHIPPED WASTE - INDUSTRIAL

ISOTOPE	1978	1979	1980	ISOTOPE	1978	1979	1980
H 3	4.6000	0.3978	0.2248	IN 111	0.0000	0.0000	0.0000
C 14	0.0016	0.0503	0.0081	SN 119	0.0000	0.0000	0.0000
NA 22	0.0000	0.0000	0.0000	SB 125	0.0000	0.0000	0.0000
P 32	0.0000	0.0000	0.0000	TE 123	0.0000	0.0000	0.0000
P 33	0.0000	0.0000	0.0000	TE 125	0.0000	0.0000	0.0000
S 35	0.0000	0.0000	0.0000	TE 129	0.0000	0.0000	0.0000
CL 36	0.0000	0.0000	0.0000	I 123	0.0000	0.0000	0.0000
K 40	0.0000	0.0000	0.0000	I 124	0.0000	0.0000	0.0000
CA 45	0.0000	0.0011	0.0000	I 125	0.0002	0.0000	0.0000
SC 46	0.0000	0.0000	0.0000	I 131	0.0000	0.0000	0.0000
CR 51	0.0000	0.0000	0.0000	XE 131	0.0000	0.0000	0.0000
MN 54	0.0000	0.0000	0.0000	CS 134	0.0000	0.0000	0.0000
FE 55	0.0003	0.0000	0.0000	CS 137	9559.2695	3810.0596	44.2500
FE 59	0.0000	0.0000	0.0000	BA 133	0.0000	0.0001	0.0000
CO 57	0.0000	0.0030	0.0000	BA 140	0.0000	0.0000	0.0000
CO 58	0.0000	0.0000	0.0000	LA 140	0.0000	0.0000	0.0000
CO 60	9.1830	34.0000	0.0000	CE 141	0.0000	0.0010	0.0000
NI 63	0.0000	1.0000	0.0000	PM 147	0.0000	0.0000	0.0000
CU 64	0.0000	0.0000	0.0000	EU 152	0.0000	0.0000	0.0000
ZN 65	0.0000	0.0000	0.0000	HF 181	0.0000	0.0000	0.0000
GA 67	0.0000	0.0002	0.0000	IR 192	0.0000	0.0000	0.0000
AS 73	0.0000	0.0000	0.0000	HB 203	0.0000	0.0000	0.0000
SE 75	0.0000	0.0003	0.0000	TL 201	0.0000	0.0000	0.0000
KR 81	0.0000	0.0000	0.0000	TL 204	0.0000	0.0000	0.0000
KR 85	95.9200	90.3100	0.0000	PB 210	0.0000	0.0000	0.0000
RB 81	0.0000	0.0000	0.0000	RA 226	0.0085	0.0010	0.0000
RB 83	0.0000	0.0000	0.0000	TH 232	0.0000	0.0000	0.0000
RB 86	0.0000	0.0000	0.0000	U 235	0.0000	0.0000	0.0000
SR 85	0.0000	0.0000	0.0000	U 238	4.3730	6.0688	0.0612
SR 90	6.4250	18.5200	0.0000	AM 241	0.0000	0.0000	0.0000
NO 99 M	0.0000	0.0000	0.0000	TH MIX	0.0000	0.0000	0.0000
TC 99 M	0.0000	0.0000	0.0000	U MIX	0.0000	0.0000	0.0000
RH 100	0.0000	0.0000	0.0000	PU MIX	0.0000	0.0000	0.0000
RH 107	0.0000	0.0000	0.0000	MISC.MIX	0.0000	0.0000	0.0000
CD 109	0.0000	0.0002	0.0000		0.0000	0.0000	0.0000
				TOTAL	9679.7793	3960.4131	44.5441

TABLE 9-11. RADIONUCLIDES IN SHIPPED WASTE - POWER REACTOR

ISOTOPE	1978	1979	1980	ISOTOPE	1978	1979	1980
H 3	0.0000	0.0000	0.0000	IN 111	0.0000	0.0000	0.0000
C 14	0.0000	0.0000	0.0000	SN 119	0.0000	0.0000	0.0000
NA 22	0.0000	0.0000	0.0000	SB 125	0.0000	0.0000	0.0000
P 32	0.0000	0.0000	0.0000	TE 123	0.0000	0.0000	0.0000
P 33	0.0000	0.0000	0.0000	TE 125	0.0000	0.0000	0.0000
S 35	3.0960	2.3510	25.1000	TE 129	0.0000	0.0000	0.0000
CL 36	0.0000	0.0000	0.0000	I 123	0.0000	0.0000	0.0000
K 40	0.0000	0.0000	0.0000	I 124	0.0000	0.0000	0.0000
CA 45	0.0000	0.0000	0.0000	I 125	0.0000	0.0000	0.0000
SC 46	0.0000	0.0000	0.0000	I 131	0.0000	0.0000	0.0000
CR 51	0.0000	0.0000	0.0000	XE 131	0.0000	0.0000	0.0000
MN 54	0.0990	0.2990	2.8030	CS 134	0.0000	0.0000	0.0000
FE 55	0.0000	0.0000	0.0000	CS 137	0.0000	0.0210	0.2590
FE 59	0.0000	0.0000	0.0000	BA 133	0.0000	0.0000	0.0000
CO 57	0.0000	0.0000	0.0000	BA 140	0.0000	0.0000	0.0000
CO 58	0.0000	0.0000	0.0000	LA 140	0.0000	0.0000	0.0000
CO 60	0.0380	0.1450	1.4030	CE 141	0.0000	0.0000	0.0000
NI 63	0.0000	0.0000	0.0000	PH 147	0.0000	0.0000	0.0000
CU 64	0.0000	0.0000	0.0000	EU 152	0.0000	0.0000	0.0000
ZN 65	0.0000	0.0000	0.0000	HF 181	0.0000	0.0000	0.0000
GA 67	0.0000	0.0000	0.0000	IR 192	0.0000	0.0000	0.0000
AS 73	0.0000	0.0000	0.0000	HG 203	0.0000	0.0000	0.0000
SE 75	0.0000	0.0000	0.0000	TL 201	0.0000	0.0000	0.0000
KR 81	0.0000	0.0000	0.0000	TL 204	0.0000	0.0000	0.0000
KR 85	0.0000	0.0000	0.0000	PB 210	0.0000	0.0000	0.0000
RB 81	0.0000	0.0000	0.0000	RA 226	0.0000	0.0000	0.0000
RB 83	0.0000	0.0000	0.0000	TH 232	0.0000	0.0000	0.0000
RB 86	0.0000	0.0000	0.0000	U 235	0.0000	0.0000	0.0000
SR 85	0.0000	0.0000	0.0000	U 238	0.0000	0.0000	0.0000
SR 90	0.0000	0.0190	1.2770	AM 241	0.0000	0.0000	0.0000
MO 99 M	0.0000	0.0000	0.0000	TH MIX	0.0000	0.0000	0.0000
TC 99 M	0.0000	0.0000	0.0000	U MIX	0.0000	0.0000	0.0000
RH 100	0.0000	0.0000	0.0000	PU MIX	0.0000	0.0000	0.0000
RH 107	0.0000	0.0000	0.0000	MISC.MIX	0.0000	0.0000	0.0000
CD 109	0.0000	0.0000	0.0000				
				TOTAL	3.2330	2.8350	30.8420

TABLE 9-12. RADIONUCLIDES IN SHIPPED WASTE - GOVERNMENTAL

ISOTOPE	1978	1979	1980	ISOTOPE	1978	1979	1980
H 3	0.0098	0.0113	4.1769	IN 111	0.0000	0.0000	0.0000
C 14	0.0002	0.0250	0.0271	SN 119	0.0000	0.0000	0.0000
NA 22	0.0000	0.0000	0.0000	SB 125	0.0000	0.0000	0.0000
P 32	0.0000	0.0000	0.0000	TE 123	0.0000	0.0000	0.0000
P 33	0.0000	0.0000	0.0000	TE 125	0.0000	0.0000	0.0000
S 35	0.0000	0.0000	0.0000	TE 129	0.0000	0.0000	0.0000
CL 36	0.0000	0.0000	0.0000	I 123	0.0000	0.0000	0.0000
K 40	0.0000	0.0000	0.0000	I 124	0.0000	0.0000	0.0000
CA 45	0.0000	0.0000	0.0000	I 125	0.0012	0.0010	0.0013
SC 46	0.0000	0.0000	0.0000	I 131	0.0000	0.0000	0.0000
CR 51	0.0000	0.0000	0.0000	XE 131	0.0000	0.0000	0.0000
MN 54	0.0000	0.0000	0.0000	CS 134	0.0000	0.0000	0.0000
FE 55	0.0000	0.0000	0.0000	CS 137	0.0000	0.0000	0.0000
FE 59	0.0000	0.0000	0.0000	BA 133	0.0000	0.0000	0.0000
CO 57	0.0000	0.0000	0.0000	BA 140	0.0000	0.0000	0.0000
CO 58	0.0000	0.0000	0.0000	LA 140	0.0000	0.0000	0.0000
CO 60	0.0000	0.0000	0.0000	CE 141	0.0000	0.0000	0.0000
NI 63	0.0000	0.0000	0.0770	PH 147	0.0000	0.0000	0.0000
CU 64	0.0000	0.0000	0.0000	EU 152	0.0000	0.0000	0.0000
ZN 65	0.0000	0.0000	0.0000	HF 181	0.0000	0.0000	0.0000
GA 67	0.0000	0.0000	0.0000	IR 192	0.0000	0.0000	0.0000
AS 73	0.0000	0.0000	0.0000	HG 203	0.0000	0.0000	0.0000
SE 75	0.0000	0.0000	0.0000	TL 201	0.0000	0.0000	0.0000
KR 81	0.0000	0.0000	0.0000	TL 204	0.0000	0.0000	0.0000
KR 85	0.0000	0.0000	0.0000	PB 210	0.0000	0.0000	0.0000
RB 81	0.0000	0.0000	0.0000	RA 226	0.0000	0.0000	0.0000
RB 83	0.0000	0.0000	0.0000	TH 232	0.0000	0.0000	0.0000
RB 86	0.0000	0.0000	0.0000	U 235	0.0000	0.0000	0.0000
SR 85	0.0000	0.0000	0.0000	U 238	0.0000	0.0000	0.0000
SR 90	0.0000	0.0000	0.0000	AM 241	0.0000	0.0000	0.0000
MD 99 M	0.0000	0.0000	0.0000	TH MIX	0.0000	0.0000	0.0000
TC 99 M	0.0000	0.0000	0.0000	U MIX	0.0000	0.0000	0.0000
RH 100	0.0000	0.0000	0.0000	PU MIX	0.0000	0.0000	0.0000
RH 107	0.0000	0.0000	0.0000	MISC.MIX	0.0000	0.0000	0.0000
CD 109	0.0000	0.0000	0.0101				
				TOTAL	0.0112	0.0373	4.2924

TABLE 9-13. RADIONUCLIDES IN SHIPPED WASTE - TOTAL

ISOTOPE	1978	1979	1980	ISOTOPE	1978	1979	1980
H 3	0.3184	5.7701	6.8138	IN 111	0.0000	0.0000	0.0000
C 14	1.3885	1.1486	1.1778	SN 119	0.0000	0.0000	0.0000
NA 22	0.0253	0.0092	0.0056	SB 125	0.0000	0.0000	0.0001
P 32	0.3191	0.2162	0.4545	TE 123	0.0000	0.0000	0.0000
P 33	0.0000	0.0000	0.0000	TE 125	0.0002	0.0000	0.0000
S 35	3.4028	2.6308	25.4126	TE 129	0.0005	0.0000	0.0000
CL 36	0.0002	0.0001	0.0000	I 123	0.0000	0.0000	0.0000
K 40	0.0000	0.0000	0.0000	I 124	0.0000	0.0000	0.0000
CA 45	0.3893	0.2930	0.2531	I 125	0.2352	0.2086	0.2125
SC 46	0.0000	0.0000	0.0000	I 131	0.0060	0.0060	0.0010
CR 51	0.1307	0.0752	0.0710	XE 131	0.0030	0.0030	0.0000
MN 54	0.0990	0.2990	2.8030	CS 134	0.0000	0.0000	0.0000
FE 55	0.0003	0.0000	0.0000	CS 137	9559.2695	3810.0811	44.5090
FE 59	0.0001	0.0002	0.0000	BA 133	0.0000	0.0001	0.0000
CO 57	0.0020	0.0050	0.0026	BA 140	0.0000	0.0000	0.0000
CO 58	0.0000	0.0000	0.0000	LA 140	0.0000	0.0000	0.0000
CO 60	9.2216	34.1450	1.4030	CE 141	0.0000	0.0010	0.0000
NI 63	0.0000	1.0000	0.0770	PH 147	0.0000	0.0000	0.0000
CU 64	0.0000	0.0000	0.0000	EU 152	0.0000	0.0000	0.0000
ZN 65	0.0000	0.0000	0.0000	HF 181	0.0000	0.0000	0.0000
GA 67	0.0050	0.0052	0.0060	IR 192	0.0000	0.0000	0.0000
AS 73	0.0000	0.0000	0.0000	HG 203	0.0000	0.0000	0.0000
SE 75	0.0040	0.0043	0.0050	TL 201	0.0000	0.0010	0.0010
KR 81	0.0000	0.0000	0.0000	TL 204	0.0000	0.0000	0.0000
KR 85	95.9200	90.3100	0.0000	PB 210	0.0000	0.0000	0.0000
RB 81	0.0000	0.0000	0.0000	RA 226	0.0085	0.0010	0.0000
RB 83	0.0000	0.0000	0.0000	TH 232	0.0000	0.0000	0.0000
RB 86	0.0000	0.0000	0.0000	U 235	0.0000	0.0000	0.0000
SR 85	0.0000	0.0000	0.0000	U 238	4.3730	6.0688	0.0612
SR 90	6.4450	18.5390	1.2770	AM 241	0.0000	0.0000	0.0000
MO 99 M	0.0100	0.0100	0.0000	TH MIX	0.0000	0.0000	0.0000
TC 99 M	0.1440	0.0550	0.1510	U MIX	0.0000	0.0000	0.0000
RH 100	0.0000	0.0000	0.0000	PU MIX	0.0000	0.0000	0.0000
RH 107	0.0000	0.0000	0.0000	MISC.MIX	0.0150	0.0150	0.0150
CD 109	0.0002	0.0013	0.0101		0.0000	0.0000	0.0000
				TOTAL	9689.7305	3970.8999	84.7228

TABLE 9-14. ONSITE PROCESSING OF WASTE

Type of Facility	Number Of Respondents	None		Mechanical Compaction		Incineration		Solidification/ Evaporation		Absorption		Other	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Medical	7	1	14.29	1	14.29	2	28.57	0	0.00	2	28.57	3	42.86
Education	8	4	50.00	0	0.00	2	25.00	2	25.00	4	50.00	1	12.50
Industrial	12	6	50.00	3	25.00	1	8.33	2	16.67	3	25.00	0	0.00
Power Reactor	2	0	0.00	2	100.00	0	0.00	2	100.00	0	0.00	1	50.00
Government	3	0	0.00	2	66.67	1	33.33	1	33.33	2	66.67	0	0.00
<b>TOTAL</b>	<b>32</b>	<b>11</b>	<b>34.38</b>	<b>8</b>	<b>25.00</b>	<b>6</b>	<b>18.75</b>	<b>7</b>	<b>21.88</b>	<b>11</b>	<b>34.38</b>	<b>5</b>	<b>15.63</b>

TABLE 9-15. SHIPPING CONTAINER USED

<u>Type Of Facility</u>	<u>Number Of Respondents</u>	<u>55 Gallon Drum</u>		<u>30 Gallon Drum</u>		<u>Other</u>	
		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Medical	10	10	100.00	0	0.00	0	0.00
Educational	12	11	91.67	4	33.33	1	8.33
Industrial	14	12	85.71	5	35.71	7	50.00
Power Reactor	2	2	100.00	0	0.00	2	100.00
Government	3	3	100.00	1	33.33	0	0.00
<b>TOTAL</b>	41	38	92.68	10	24.39	10	24.39

TABLE 9-16. PHYSICAL FORM OF SHIPPED WASTE

Type Of Facility	Number Of Respondents	Dry		Moist/Potential Free Liquid		Biological Waste		Sealed Sources		Other	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Medical	7	5	71.43	3	42.86	0	0.00	3	42.86	2	28.57
Educational	8	8	100.00	2	25.00	3	37.50	1	12.50	4	50.00
Industrial	12	10	83.33	6	50.00	1	8.33	5	41.67	3	25.00
Power Reactor	2	2	100.00	1	50.00	0	0.00	0	0.00	1	50.00
Government	3	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00
<b>TOTAL</b>	32	28	87.50	12	37.50	4	12.50	9	28.13	10	31.25

APPENDIX A

LIST OF NRC LICENSEES



LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Harshaw Chemical Company 6801 Cochran Road Solon, OH. 44139	Y	T	I	N	Combine with refuse, distribute with product.
St. John Hospital Steubenville, OH. 43952	Y	T	H	2	Return to vendor.
B. F. Goodrich Chemical Company Independence Technical Center P. O. Box 7728 Independence, OH. 44131	N	-	I	-	
Federal Paper Board Company Inc. Federal Glass Division 555 Woodrow Avenue Columbus, OH. 43207	N		I		
Oberlin College Oberlin, OH. 44074	Y	2	E	N	Burn, vent and release to sewer.
Ross Laboratories Division of Abbott Laboratories 625 Cleveland Avenue Columbus, OH. 43216	N	-	I	-	Release to sewer, combine with refuse.
Holzer Medical Center 385 Jackson Pike Gallipolis, OH. 45631	Y	2	M	N	
General Tire & Rubber Company One General Street Akron, OH. 44329	N	-	I	-	
Stouder Memorial Hospital Department of Nuclear Medicine Troy, OH. 45373	Y	T	M	N	Unsealed material.
Mead Corporation Central Research Laboratories Chillicothe, OH. 45601	Y	2	I	N	Return to vendor.
Ohio Department of Transportation Bureau of Construction 25 B. Front Street Columbus, OH. 43215	Y	2	G	N	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Medusa Cement Company Division of Medusa Corporation P. O. Box 5668 Cleveland, OH. 44101	N	-	I	-	
Veterans Administration Medical Center 4100 West Third Street Dayton, OH. 45428	Y	2	M	N	Sealed and unsealed sources used.
Suburban Community Hospital Dept. of Radiology & Nuclear Medicine 4180 Warrensville Center Road Warrensville Height, OH. 44122	Y	2	M	N	Vent, return to vender.
IMC Chemical Group Inc. Middle Road, Ashtabula, OH. 44004	N	-	I	-	
Akron General Medical Center 400 Wabash Avenue. Akron, OH. 44307	Y	T	M	N	Sealed, unsealed sources used. Decay to background and combine with refuse.
Grant Hospital Depts. of Pathology & Radiology 309 East State Street Columbus, OH. 43215	Y	2	M	N	
Deaconess Hospital Radiology Department 311 Straight St. & Clifton Cincinnati, OH. 45219	Y	2	M	N	Return to vendor.
Richardson-Merrell Inc. Merrell-National Laboratories 110 E. Amity Road Cincinnati, OH. 45215	N	-	I	-	
Cleveland Metropolitan General Hospital Department of Radiology 3395 Scranton Road Cleveland, OH. 44109	N	-	M	-	
Christ Hospital 2139 Auburn Avenue Cincinnati, OH. 45219	N	-	M	-	
Elyria Memorial Hospital 630 East River Street Elyria, OH. 44035	Y	I	M	N	Sealed, unsealed sources.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Massillon Steel Casting Company Research, Development & Inspection Dept. 577 Oberlin Ave. S.W. Massillon, OH. 44646	N	-	I	-	
Southwestern Portland Cement Co. 506 East Xenia Drive Fairborn, OH. 45324	Y	2	T	N	Return to vendor.
U. S. Industrial Chemical Company 1275 Section Road Cincinnati, OH. 45237	N	-	I	-	
Herron Testing Laboratories Crobaugh Division 5405 East Schaaf Road Cleveland, OH. 44131			I		
Farrell-Cheek Steel Company Inspection Department 706 Lane Street Sandusky, OH. 44870	N	-	I	-	
Sawyer Research Product Inc. Quartz Production Department 35400 Lakeland Blvd. Eastlake, OH. 44094	Y	2	I	N	Return to vendor.
B. F. Goodrich Research Center 9921 Brecksville Road Brecksville, OH. 44141	N	-	I	-	
Fort Hamilton Hospital 630 Easton Avenue Hamilton, OH. 45013	Y	T	M	N	
St. Anthony Hospital 1450 Hawthorne Avenue Columbus, OH. 43203	Y	2	M	N	Last commercial shipment in 1976.
Babcock & Wilcox Co. B & W Construction Company 3333 Copley Road Copley, OH. 44321	Y	2	I	N	Return to vendor.
Fairview General Hospital 13101 Lorain Avenue Cleveland, OH. 44111	Y	2	M	N	Return to vendor. Decay to background.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Hygenic Corporation 1245 Home Avenue Akron, OH. 44310			I		
St. Elizabeth Hospital Dept. of Radiology 49 Hopeland Street Dayton, OH. 45408	Y	2	M	N	Return to sewer. Return to vendor.
Lancaster-Fairfield County Hospital Dept. of Nuclear Medicine Lancaster, OH. 43130	Y	2	M	N	Material decayed to background level.
St. Vincent Charity Hospital 2351 East 22nd Street Cleveland, OH. 44515	Y	2	M	N	Release to sewer. Return to vendor.
Luthern Medical Center Department of Radiology 2609 Franklin Boulevard Cleveland, OH. 44113	Y	2	M	N	Return to vendor. Unsealed sources used.
Barberton Citizens Hospital Department of Radiology 155 Fifth Street N.E. Barberton, OH. 44203	Y	2	M	N	
Akron City Hospital Department of Radiology 525 East Market Street Akron, OH. 44309	N	-	M	-	
Timken Mercy Hospital Dept. of Radiology 12th & Harrison Ave., N.W. Canton, OH. 44708	Y	T	M	-	Release to sewer. Return to vendor.
Mansfield General Hospital Dept. of Radiation Therapy 335 Glessner Ave. Mansfield, OH. 44903	Y	T	M	-	Unsealed material used.
Wheeling-Pittsburgh Steel Corp. 219 Public Road Yorkville, OH. 43971	Y	2	I	N	Return to vendor.
Charles F. Kettering Foundation 150 East South College St. Yellow Springs, OH. 45387	N	-	E	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Proctor & Gamble Co. Miami Valley Laboratories Research & Development Dept. P. O. Box 39175 Cincinnati, OH. 45247	N	-	I	-	
Providence Hospital Dept. of Radiology 1912 South Hayes Ave. Sandusky, OH. 44870	Y	T	M	N	Unsealed sources used.
Toledo Hospital 2142 North Cove Blvd. Toledo, OH. 43606	Y	2	M	N	
Gladstone Labs. Inc. 1034 Woodrow St. Cincinnati, OH. 45204	N	-	I	-	
Owen-Illinois Inc. Corporate Engineering Dept. 1700 North Westwood Ave. Toledo, OH. 43607	N	-	I	-	
Health Education and Welfare Dept. of Public Health Service (FDA) 1090 Tusculum Ave. Cincinnati, OH. 45226	N	1	G	Y	100% dry solids shipped.
Aultman Hospital Radiology Dept. 2600 6th St. S.W. Canton, OH. 44710	Y	T	M	N	Unsealed sources used. Decay to background.
Miami University Oxford, OH. 45056	Y	1	E	Y	Liquid scintillation fluid.
Bay View Hospital Dept. of Nuclear Medicine 23200 Lake Road Bay Village, OH. 44140	N	-	M	-	
Ashtabula General Hospital Dept. of Radiology 2240 Lake Ave. Ashtabula, OH. 44004	Y	2	M	N	Primarily unsealed materials used.
General Motors Corp. Terex Division Plant No. 4 Hudson, OH. 44236	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Huron Road Hospital 13951 Terrace Road East Cleveland, OH. 44112	N	-	M	-	
Marathon Oil Co. 539 South Main St. Findlay, OH. 45840	N	-	I	-	
Midland-Ross Corp. Unitcast Division Toledo, OH. 43605	N	-	I	-	
St. Elizabeth Hospital Dept. of Radiology 1044 Belmont Ave., Youngstown, OH. 44505	Y	2	M	N	
Goodyear Aerospace Corp. 1210 Massillon Rd. Akron, OH. 44315	Y	1	1	Y	
Lakewood Hospital Nuclear Medicine Dept. 14519 Detroit Ave. Lakewood, OH. 44107	N	-	M	-	
St. Vincent Hospital & Medical Center Radiology Dept. 2213 Cherry St. Toledo, OH. 43608	Y	2	M	N	Unsealed materials used.
Ohio University College of Arts and Sciences Athens, OH. 45701	Y	1	E	Y	Unsealed material.
Standard Oil Co. (OHIO) Research Department 4440 Warrensville Center Road Cleveland, OH. 44128	Y	2	1	N	
Good Samaritan Hospital and Health Center 222 Philadelphia Drive Dayton, OH. 45406	Y	1	M	Y	
Mercy Medical Center Isotopes Laboratory Dept. of Radiology 1343 North Fountain Ave. Springfield, OH. 45501	Y	2	M	N	Release to sewer.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Jewish Hospital of Cincinnati 3200 Burnet Ave. Cincinnati, OH. 45229	Y	T	M	N	Decay to background.
St. John's Hospital of Cleveland Ohio Nuclear Medicine 7911 Detroit Ave. Cleveland, OH. 44102	Y	T	M	N	Return to vendor. Unsealed sources.
Good Samaritan Hospital Radiology Dept. Clifton Aves. & Dixmyth Cincinnati, OH. 45220	Y	T	M	N	Sealed/unsealed sources used.
Union Carbide Corp. Parma Technical Center 12900 Snow Road, Parma, OH. 44130	Y	2	I	N	
Youngstown Hospital Dept. of Radiology 345 Oak Hill, Youngstown, OH. 44501	Y	C	M	N	
Riverside Methodist Hospital Dept. of Radiation Therapy 3535 Olentangy River Road Columbus, OH. 43214	Y	T	M	Y	
Toledo Radiological Assoc. Inc. Doctors Bldg. 3939 Monroe St., Toledo, OH. 43606	N	-	M	-	
General Motors Corp. Delco Moraine Division 1420 Wisconsin Blvd. Dayton, OH. 45401	N	-	I	-	
General Motors Corp. Inland Division P. O. Box 1224 Dayton, OH. 45402	N	-	I	-	
Warren General Hospital Nuclear Medicine 667 Eastland Ave. Warren, OH. 44484	Y	2	M	N	Vendor, sewer, refuse disposal methods used.
George H. Scott Fairview General Hospital 18101 Lorain Ave. Cleveland, OH. 44111	Y	-	M	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Benton Ridge Telephone Co. P. O. Box 180 Benton Ridge, OH. 45816	N	-	I	-	
Wallace-Murray Corp. Eljer Plumbingware Division 921 S. Ellsworth Ave. Salem, OH. 44460	Y	2	I	N	
Eastern Well Surveys, Inc. 433 South Grant Street, Wooster, OH. 44691	Y	2	I	N	
City of Toledo Division of Water Reclamation Bay View Park Toledo, OH. 43611	Y	2	G	N	Vendor.
Bowling Green State University Bowling Green, OH. 43403	Y	1	E	Y	Unsealed material.
Armco Steel Corp. Marion Works 912 Cheney Ave. Marion, OH. 43302	N	-	I	-	
Dow Chemical USA Hanging Rock Plant Irononton, OH. 45638	N	-	I	-	
Huron Lime Co. 100 Meeker St. Huron, OH. 44839	N	-	I	-	
Glyco Chemicals Inc. 679 Hardy Road Painesville, OH. 44077	N	-	I	-	
Ohio Medical Products Ohio Medical Products Division 1177 Marquette St. Cleveland, OH. 44114	N	-	I	-	
Marietta Memorial Hospital Matthew & Ferguson Sts. Marietta, OH. 45750	N	-	H	-	



LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
St. Rita's Hospital 730 West Market Street Lima, OH. 45801	N	T	M	N	Return to vendor.
Pfizer Inc. Cr.85 & Sr.300 Gibsonburg, OH. 43431	Y	2	I	N	Return to vendor.
Monsanto Company River Road Addyston, OH. 45001	N	-	F	-	
Christian Holmes Radiology Dept. Eden & Bethesda Aves. Cincinnati, OH. 45219	N	-	M	-	
Brentwood Hospital 4110 Warrensville Center Road Cleveland, OH. 44122	Y	2	M	N	Return to vendor. Decay to background.
Barnebey-Cheney Co. 835 N. Cassady Ave. Columbus, OH. 43219	N	-	I	-	
State of Ohio Disaster Services Agency P. O. Box 660 2825 W. Granville Road Worthington, OH. 43095	N	-	G	-	
United States Steel Corp. Lorain Works 1807 East 28th St. Lorain, OH. 44055	Y	2	I	N	Return to vendor.
Ottawa Park Medical Group 2361 Bancroft at Evansdale Toledo, OH. 43607	N	-	M	-	
College of Wooster Dept. of Biology Wooster, OH. 44691	N	-	E	-	
Dayton Power & Light Co. Courthouse Plaza Southwest P. O. Box 1247 Dayton, OH. 45401	N	-	G	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Chillicothe Hospital DBA Medical Center Hospital Route 159 Chillicothe, OH. 45601	N	-	M	-	
Good Samaritan Hospital 703 Tyler St. Sandusky, OH. 44870	Y	T	M	N	Return to vendor.
Wright State University 7751 Colonel Glenn Highway Dayton, OH. 45435	Y	1	E	Y	Unsealed materials shipped.
Vistron Corporation P. O. Box 628 Lima, OH. 45802	Y	2	I	N	
Magruder Hospital Department of Radiology Fulton Street Port Clinton, OH. 43452	Y	C	M	N	
Lake County Memorial Hospital 71 East High Street Painesville, OH. 44077	Y	2	M	N	Decay in storage.
Wittenberg University Physics Dept. Springfield, OH. 45501	Y	2	E	N	Return to vendor.
Akzona Inc. Armak Abrasives Division 16123 Armour St. N.E. Alliance, OH. 44601	N	-	I	-	
American Ship Building Co. 400 Colorado Ave. Lorain, OH. 44052	N	-	I	-	
Technicare Inc. 29100 Aurora Road Solon, OH. 44139	Y	1	I	Y	Sealed sources.
Johns-Manville Sales Corp. Third and Perry St. Defiance, OH. 43512	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Crystal Tissue Co. Middletown, OH. 45042	Y	2	I	N	
RMI Inc. P. O. Box 579 East 21st St. Ashtabula, OH. 44004	Y	I	I	Y	Dry solids, spent resins.
Marion General Hospital Dept. of Nuclear Medicine McKinley Park Drive Marion, OH. 43302	N	-	M	-	
Muskingum College Science Division Physics Dept. New Concord, OH. 43762	Y	2	E	N	Release to sewer.
Bethesda Hospital 619 Oak Street Cincinnati, OH. 45206	N	-	M	-	
Emery Industries Inc. 4900 Este Ave. Cincinnati, OH. 45232	Y	2	I	N	
Basic Inc. Basic Refractories Div. 845 Hanna Building Fostoria, OH. 44030	N	-	I	-	
Cuyahoga Falls General Hospital Nuclear Medicine 1900 23rd St. Cuyahoga Falls, OH. 44223	Y	2	M	N	Return to vendor.
Dayton Malleable Iron Co. G. H. R. Foundry Division 400 Detrick St. Dayton, OH. 45404	N	-	I	-	
Schenley Distillers Inc. 36 E. Fourth St. Cincinnati, OH. 45202	Y	2	I	N	Return to vendor.
Ohio Dept. of Agriculture Consumer Analytical Laboratories 8995 E. Main St. Reynoldsburg, OH. 43068	N	-	G	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
University of Toledo 2801 W. Bancroft St. Toledo, OH. 43606	Y	T	E	Y	Unsealed sources.
Shelwell Services Inc. Route #1 Harbor Hills Hebron, OH. 43025	N	-	I	-	
Montgomery Animal Hospital Inc. 7700 Montgomery Road Cincinnati, OH. 45236	N	-	M		
Cyclops Corp. Empire-Detroit Steel Division 3879 Rhodes Avenue Portsmouth, OH. 45662	N	-	I	-	
Jones & Laughlin Steel Corp. Cleveland Works Division P. O. Box 6088 Cleveland, OH. 44101	N	-	I	-	
Hillcrest Hospital Complex Chairman, Radioisotope Committee 6760/6780 Mayfield Road Mayfield Heights, OH. 44124	Y	2	M	N	Decay to background levels, sewer.
Health Education and Welfare Dept. of Food & Drug Administration 1141 Central Parkway Cincinnati, OH. 45202	N	-	G	-	
Ranco Inc. 601 West Fifth Ave. Columbus, OH. 43201	N	-	I	-	
Children's Hospital Medical Center of Akron Buchtel Ave. at Bowery St. Akron, OH. 44308	N	-	M	-	
General Motors Corp. Delco Air Conditioning Division 300 Taylor St. Dayton, OH. 45401	N	-	I	-	
Gulf Oil Company - U.S. Cincinnati Refinery P. O. Box 7 Cleveland, OH. 45002	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
State of Ohio Dept. of Liquor Control 2323 W. Fifth Ave. Columbus, OH. 43204	N	-	G	-	
Columbia Cement Corp. Filtrol Corp. P. O. Box 1531 Zanesville, OH. 43701	N	-	I	-	
Container Corp. of America 401 West Mill Street Circleville, OH. 43113	N	-	I	-	
Anchor Hocking Corp. 109 North Broad Lancaster, OH. 43130	N	-	I	-	
Nestle Co. Inc. Quality Assurance Laboratory P. O. Box 70 Marysville, OH. 43040	N	-	I	-	
Geauga Community Hospital Nuclear Medicine Department Chardon, OH. 44024	Y	-	M	-	
Cuyahoga County Coroner's Office 2121 Adelbert Road Cleveland, OH. 44106	Y	2	M	N	Return to vendor. Combine with refuse.
Robinson Memorial Portage County Hospital Dept. of Radiology 449 South Meridian St. Ravenna, OH. 44266	Y	2	M	N	Release to sewer. Decay on site.
National Distillers & Chemical Corp. Research Division 1275 Section Road Cincinnati, OH. 45237	N	-	I	-	
Stone Container Corp. 500 N. Fourth St., Coshocton, OH. 43312	N	-	I	-	
Xavier University Victor Parkway Cincinnati, OH. 45207	Y	2	E	N	Release to sewer.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
B. F. Goodrich Co. D/3201 B/10-B 500 S. Main St. Akron, OH. 44318	N	-	I	-	
DBA General Testing & Engineering Co. P. O. Box 116 Washingtonville, OH. 44490	N	-	I	-	
Shelter-Rite Division of Seaman Corp. Route 1 Millersburg, OH. 44654	N	-	I	-	
Galion Community Hospital Portland Way South Galion, OH. 44902	Y	2	M	N	Return to vendor.
Cleveland State University Euclid Ave. at 24th St. Cleveland, OH. 44115	T	2	E	N	Return to vendor.
New Jersey Zinc Co. Middle Road Ashtabula, OH. 44004	N	-	I	-	
Department of the Air Force Aerospace Guidance & Metrology Center Newark Air Force Station Newark, OH. 43055	N	-	G	-	
CTL Engineering Inc. 2860 Fisher Road Columbus, OH. 43204	Y	2	I	N	Return to vendor.
Marathon Pipe Line Co. 539 South Main St. Findlay, OH. 45840	N	-	I	-	
B. F. Goodrich Chemical Co. Technical (Development) Center P. O. Box 122, Moore & Walker Rd. Avon Lake, OH. 44012	Y	2	I	N	Return to vendor.
Union Carbide Corp. Battery Products Division 1280 West 73rd Street Cleveland, OH. 44101	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Bearfoot Corporation First & Water Sts. Wadsworth, OH. 44281	N	-	I	-	
Borden Inc. - QAL 990 Kingsmill Parkway Columbus, OH. 43229	N	-	I	-	
Brush Wellman Inc. South River Road Elmore, OH. 43416	Y	2	I	M	Return to vendor.
Westreco Inc. 809 Collins Avenue Marysville, OH. 43040	N	-	I	-	
Hoffman Birmingham & Assoc. Inc. 40 Clay Tiffin, OH. 44883	N	-	I	-	
Ormet Corporation P. O. Box 176 Hannibal, OH. 43931	N	-	I	-	
University of Dayton Research Institute 300 College Park Dayton, OH. 45469	N	-	E	-	
Parma Community General Hospital Dept. of Radiology 7007 Powers Blvd. Parma, OH. 44129	Y	2	M	I	Decayed in storage.
Union Carbide Corporation Metals Division P. O. Box 299 Marietta, OH. 45750	N	-	I	-	
Middletown Hospital Assoc. 105 McKnight Drive Middletown, OH. 45042	N	-	M	-	
Otterbein College Westerville, OH. 43081	N	-	E	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Dow Chemical U.S.A. 3441 North Main Street Findlay, OH. 45840	N	-	I	-	
Cincinnati Gas & Electric Co. Electric Production 4th & Main Sts. Cincinnati, OH. 45202	N	-	I	-	
Inmont Corp. 837 Buckingham St. Toledo, OH. 43601	N	-	I	-	
Standard Oil Co. Toledo Refinery Cedar Point Road Toledo, OH. 43694	Y	-	I	N	Return to vendor.
Sandusky Memorial Hospital Nuclear Medicine 2020 Haynes Street Sandusky, OH. 44870	N	-	M	-	
Massillon Community Hospital 876 Amherst Road, N.E. Massillon, OH. 44646	Y	T	M	N	Combine with refuse. Vent to atmosphere.
Columbus Coated Fabrics Division of Borden Chemical Co. 1280 North Grant Ave. Columbus, OH. 43216	N	-	I	-	
Dayton Malleable Inc. Ironton Division 2520 South Third Street Ironton, OH. 45638	N	-	I	-	
Dayton X-Ray Company Non-Destructive X-Ray Lab. 1150 West 2nd Street Dayton, OH. 45407	N	-	I	-	
Johns-Manville Sales Corp. Halophane Division 214 Oakwood Avenue Newark, OH. 43055	N	-	I	-	
Cleveland Electric Illuminating Co. P. O. Box 5000 Cleveland, OH. 44101	N	-	I	-	



LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Monsanto Research Corp. Dayton Laboratory 1515 Nicholas Road Dayton, OH. 45407	Y	T	I	Y	Transuranic material sent.
Dept. of Health Education and Welfare National Institute of Occupational Safety & Health, R. A. Taft Labs 4767 Columbia Parkway Cincinnati, OH. 45226	N	-	G	-	
John Carroll University Biology Dept. North Park & Miramar Blvd. Cleveland, OH. 44118	Y	2	E	N	Release to sewer. Decay to background.
Picker Corporation Picker X-Ray Mfg. Div. 595 Miner Road Cleveland, OH. 44143	N	-	I	-	
Pharmatopes Inc. 2208 West Central Avenue Toledo, OH. 43606	Y	2	I	N	Unsealed materials.
Warren Outpatient Services Inc. 4687 Mahoning, N.W. Warren, OH. 44483	Y	2	M	N	Combine with refuse.
Bethesda Hospital North Maple Street Zanesville, OH. 43701	N	-	M	-	
Good Samaritan Hospital 300 Forest Avenue Zanesville, OH. 43701	N	-	M	-	
Coshocton County Memorial Hospital 1460 Ornage Street Coshocton, OH. 43812	N	-	M	-	
Eco-Labs Inc. 1836 Euclid Avenue Cleveland, OH. 44115	N	-	I	-	
Northeastern Ohio General Hospital 2041 Hubbard Road North Madison, OH. 44057	N	-	M	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Tedia Company Inc. 96 Ardnt Court Fairfield, OH. 45014	N	-	I	-	
Southern Ohio Coal Co. P. O. Box 490 Athens, OH. 45701	N	-	I	-	
Pori Inc. 3341 Jennings Road Cleveland, OH. 44109	N	-	I	-	
Mercy Memorial Hospital of Urbana Ohio 904 Scioto Street Urbana, OH. 43078	Y	2	M	N	Return to vendor.
Grace Hospital 2307 West 14th Street Cleveland, OH. 44113	N	-	M	-	
Massillon, City of Wastewater Treatment Plant 2695 Erie Avenue Aouth Massillon, OH. 44646	N	-	G	-	
Guernsey Memorial Hospital Nuclear Medicine 1341 N. Clark Street Cambridge, OH. 43725	N	-	M	-	
Associates in Radiology Inc. 1027 Boardman-Canfield Road Youngstown, OH. 44512	N	-	M	-	
Sherwin Williams Chemicals 501 Murray Road Cincinnati, OH. 45217	Y	2	I	N	Return to vendor.
CLC Labs Busch Corporate Center 1046 Crupper Ave. Columbus, OH. 43229	Y	2	I	N	Sealed sources.
Clow Corporation P. O. Box 479 Coshocton, OH. 43812	Y	2	I	N	Sealed sources.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
State of Ohio Arson Laboratory 333 Columbus, OH. 43215	N	-	G	-	
Nuclear Pharmacies International Inc. 10900 Carnegie Ave. Suite 308 Cleveland, OH. 44106	N	-	I	-	
Medina Community Hospital Nuclear Medicine Department 990 E. Washington Medina, OH. 44256	N	-	M	-	
RCA Corporation Route 12, Fostoria Road Findlay, OH. 45840	Y	2	I	N	Sealed sources.
Horizons Research Inc. Photohorizons Division 23800 Mercantile Road Cleveland, OH. 44122	N	-	I	-	
Medical Diagnostic Services Inc. Division of Chemed Corp. 4531 Reading Road Cincinnati, OH. 45229	N	-	I	-	
Owens-Corning Fiberglas Corp. Environmental Control Lab Case Avenue, Newark, OH. 43055	N	-	I	-	
Montgomery County Coroner's Office 120 Ziegler Street Dayton, OH. 45402	Y	2	M	N	Sealed/unsealed sources. Release to sewer.
University Suburban Health Center Dept. of Clinical Pathology 1611 South Green Road South Euclid, OH. 44121	N	-	M	-	
Lawrence County General Hospital Radioisotope Service Hospital Square 2228 S. 9th St. Ironton, OH. 45638	N	-	M	-	
Cuyahoga County Engineer 1926 Northern Ohio Bank Bldg. Cleveland, OH. 44113	Y	2	G	N	Return to vendor.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Nuclear Medicine Associates Inc. 9726 Park Heights Cleveland, OH. 44125	N	-	M	-	
Calhio Chemicals, Inc. P. O. Box 69 - Shephard Road Perry, OH. 44081	N	-	I	-	
Perfection Services Inc. P. O. Box 77 Stone Creek, OH. 43840	Y	2	I	N	No waste generated.
Procter & Gamble Mfg. Co. P. O. Box 1900 Reservoir & Muma Lima, OH. 45802	N	-	I	-	
Cincinnati Electronics Corp. 2630 Glendale-Milford Road Cincinnati, OH. 45241	N	-	I	-	
Hardin Memorial Hospital 921 East Franklin Street Kenton, OH. 43326	N	-	M	-	
American Red Cross Northwest Ohio Regional Red Cross Blood Center 2275 Collingwood Boulevard Toledo, OH. 43620	Y	2	M	N	Decay to background level. Release to sewer.
Kelsey-Hayes Company Fremont Foundry 1017 Dickinson Street Fremont, OH. 43420	N	-	I	-	
Solar Testing Laboratories Inc. 4471 Broadview Road Cleveland, OH. 44109	Y	2	I	N	Use nuclear densometer gauge.
Horvitz Company 5533 Canal Road Valley View, OH. 44125	Y	2	I	N	
Cardinal Operating Company P. O. Box B, Brilliant, OH. 43913	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Med-Topes Inc. 831 Carew Tower Cincinnati, OH. 45202	N	-	I	-	
Champion International Paper Division 601 North "B" Street Hamilton, OH. 45013	N	-	I	-	
Packaging Corp. of America Industrial Street Rittman, OH. 44270	N	-	I	-	
Barnesville Hospital Assoc. Inc. Barnesville, OH. 43713	N	-	M	-	
Ashland Petroleum Co. 2408 Gambrinus Road Canton, OH. 44708	Y	2	I	N	Return to vendor. Source used in process control.
Corning Glass Works Greenville, OH. 45331	Y	2	I	N	No waste generated.
Biogenics Research Corp. 12728 Aquilla Road Chardon, OH. 44024	N	-	I	-	
O. M. Scott & Sons Co. East 6th & Plum Streets Marysville, OH. 43040	N	-	I	-	
Mercy Hospital Dept. of Radiology 1430 South High Street Columbus, OH. 43207	N	-	M	-	
Consolidated Biomedical Labs Inc. 6370 Wilcox Road Dublin, OH. 43017	N	-	M	-	
E. I. du Pont de Nemours & Co. Inc. Industrial Chemicals Dept. 2981 Independence Road Cleveland, OH. 44115	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Marietta College Biology Dept. 215 5th St. Marietta, OH. 45750	Y	1	E	Y	Unsealed source. Waste shipped to Ohio University where combined with their waste.
Koehring Road Division 1210 Kenton St., P. O. Box 95 Springfield, OH. 45501	N	-	I	-	
Walworth Co. Columbus Plant 611 Marion Road Columbus, OH. 43207	N	-	I	-	
Scioto Memorial Hospital 1805 27th St. Portsmouth, OH. 45662	N	-	M	-	
Diamond Shamrock Corp. 1100 Superior Ave. Cleveland, OH. 44114	N	-	I	-	
Bayless Pathology Associates Inc. Severance Medical Arts Building 5 Severance Circle, Suite #804 Cleveland Heights, OH. 44118	N	-	M	-	
Wooster Community Hospital 1761 Beall Avenue Wooster, OH. 44691	Y	2	M	N	Release to sewer. Combine with refuse.
Cincinnati Milacron Chemicals Inc. Production Department West Street Reading, OH. 45213	N	-	I	-	
Bryan Community Hospital Inc. W. High Street Bryan, OH. 43506	Y	2	M	N	Return to vendor.
Neurological Diagnostic Clinic 932 Belmont Avenue Youngstown, OH. 44504	N	-	M	-	
Defiance Hospital 1206 E. Second Street Defiance, OH. 43512	N	-	M	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
East Liverpool City Hospital 425 West Fifth Street East Liverpool, OH. 43920	Y	2	M	N	Combine with common refuse.
Union Carbide Corporation Metals Division Lake Road East Ashtabula, OH. 44004	Y	2	I	N	Sealed source used.
Union Hospital Association 659 Boulevard Dever, OH. 44622	Y	2	M	N	Combine with refuse. Return to vendor.
Community Hospital of Springfield 2615 East High Street Springfield, OH. 45501	Y	2	M	N	Vent, release to sewer. Return to vendor.
American Red Cross Northern Ohio Red Cross Blood Center 3950 Chester Avenue Cleveland, OH. 44114	Y	2	M	N	Release to sewer. Combine with refuse.
American Red Cross Central Ohio Red Cross Blood Center 995 E. Broad Street Columbus, OH. 43205	Y	2	M	N	Combine with refuse.
Bucyrus Community Hospital 629 N. Sandusky Avenue Bucyrus, OH. 44820	Y	2	M	N	Return to vendor. Combine with refuse.
Therm-O-Disc Inc. Subsidiary of Emerson Electric Co. 1320 South Main Street Mansfield, OH. 44907	N	-	I	-	
Wood County Hospital Radiology Department 950 W. Wooster Street Bowling Green, OH. 43402	N	-	M	-	
Lake County Memorial Hospital c/o Dept. of Radiology 36000 Euclid Avenue Willoughby, OH. 44094	Y	-	M	-	Decay in storage.
General Motors Corporation Central Foundry Div. Defiance Plant State Highway No. 281 Defiance, OH. 43512	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Shelby Memorial Hospital Morris Road Shelby, OH. 44875	N	-	H	-	
Miami Conservancy District 38 East Monument Avenue Dayton, OH. 45402	N	-	G	-	
Gulf Oil Company - U.S. Toledo Refinery P. O. Box 1023 Toledo, OH. 43601	N	-	I	-	
Lake County Ohio Board of County Commissioners Sanitary Engineering Dept. H.T. Nolan Bldg. 105 Main Street Painesville, OH. 44077	N	-	G	-	
Mogul Corporation P. O. Box 200 Cragin Falls, OH. 44022	Y	-	I	N	
Department of the Navy Bureau of Medicine and Surgery Navy Environmental Health Center 3333 Vine Street Cincinnati, OH. 45220	N	-	G	-	
St. Charles Hospital 2600 Navarre Avenue Oregon, OH. 43616	N	-	M	-	
James E. Hough & Associates 3398 West Galbraith Road Cincinnati, OH. 45239	Y	2	I	N	Use density gauge.
Dresser Industries Inc. J. G. Castings Operations 550 South Liberty Road Delaware, OH. 43015	N	-	I	-	
Flower Hospital 5200 Harroun Road Sylvania, OH. 43560	Y	2	M	N	Release to sewer, vent. Return to vendor.
City of Cincinnati Department of Sewers Cincinnati, OH. 45204	N	-	G	-	



LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Timken Company, Inc. 1835 Dueber Ave., S.W. Canton, OH. 44706	Y	2	I	N	
Nuclear Consulting Services Inc. Research and Field Testing P. O. Box 29151 Columbus, OH. 43229	Y	2	I	N	Decay to background levels, vent.
Defense Supply Agency Defense Construction Supply Center 3990 E. Broad St. Columbus, OH. 43215	N	-	G	-	
Youngstown State University 410 Wick Avenue Youngstown, OH. 44503	Y	T	E	N	Sealed, unsealed sources used.
Imperial Glass Corporation 29th & Belmont Sts., Bellaire, OH. 43906	N	-	I	-	
City of Elyria Department of Health 202 Chestnut Street Elyria, OH. 44035	N	-	G	-	
Rhone Poulenc Inc. Hess & Clark Division 7th & Orange Sts. Ashland, OH. 44805	N	-	I	-	
H. C. Nutting Co. 4120 Airport Road Cincinnati, OH. 45226	Y	2	I	N	Return to vendor.
Diamond International Corp. 407 Charles Street Middletown, PA. 45042	N	-	I	-	
Our Lady of Mercy Hospital Rowan Hills Drive Mariemount Cincinnati, OH. 45227	Y	1	M	Y	Ship to repository. Return to vendor.
American Aggregates Corp. Garst & Avenue B Greenville, OH. 45331	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Owens-Illinois Inc. Technical Center 711 Southwood Avenue Station G Columbus, OH. 43207	N	-	I	-	
Kenyon College Department of Biology Gambier, OH. 43022	N	-	I	-	
Wauseon Foundry Company W. Leggett Street Wauseon, OH. 43567	N	-	I	-	
Bellevue Hospital 811 Northwest Street Bellevue, OH. 44811	Y	2	M	N	Combine with refuse. Return to vendor.
Alliance City Hospital 207 E. College Street Alliance, OH. 44601	Y	2	M	N	Decay to background levels.
Ashland Oil Inc. 5200 Paul E. Blazer Memorial Py. Dublin, OH. 43017	N	-	I	-	
Ohio Dept. of Natural Resources Division of Geological Survey Fountain Square Dr., Bldg. B Columbus, OH. 43224	N	-	G	-	
Woodville Lime & Chemical Co. 543 Lime Road Woodville, OH. 43469	Y	2	I	N	
Malone Electronic Service Co. 949 Havensport Drive Cincinnati, OH. 45240	N	-	I	-	
City of Lorain Water Pollution Control Dept. Alabama and Lakeside Aves. Lorain, OH. 44052	Y	2	G	N	
Providence Hospital Dept. of Nuclear Medicine 2446 Kipling Avenue Cincinnati, OH. 45239	N	-	M	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
MCB Manufacturing Chemists Inc. 2909 Highland Avenue Cincinnati, OH. 45212	N	-	I	-	
Northern Columbiana County Community Hospital, East Unit 1995 East State Street Salem, OH. 44460	N	-	M	-	
Industrial Inspection Industries Inc. 2001 Center Road Clinton, OH. 44216	N	-	I	-	
Woman's General Hospital 1940 E. 101st St. Cleveland, OH. 44106	N	-	M	-	
John C. Haynes Co. 800 Hebron Road Newark, OH. 43055	N	-	I	-	
Peoples Hospital Park Ave. East at Madison Rd. Mansfield, OH. 44905	Y	2	M	N	Return to vendor (Pharmatopes)
Bicron Corporation 12345 Kinsman Road Newbury, OH. 44065	N	-	I	-	
The City Hospital Bellaire, OH. 43906	Y	2	M	N	Vent, incinerate.
Ohio Ferro-Alloys Corp. P. O. Box 8228 Canton, OH. 44709	Y	2	I	N	Return to vendor.
CVI Corporation 100 Lyman Court Hilliard, OH. 43026	N	-	I	-	
Dayton Tire & Rubber Co. 2342 West Riverview Ave. Dayton, OH. 45407	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Children's Medical Center 1735 Chapel Street Dayton, OH. 45404	Y	2	M	N	Return to vendor.
Jones Haynes & Safko 932 Market Street Zanesville, OH. 43701	N	-	I	-	
Babcock & Wilcox Co. 1501 Raff Road S.W. Canton, OH. 44710	Y	2	I	N	Return to vendor.
Dosimeter Corp. of America Engineering & Production Dept. 6106 Interstate Circle Cincinnati, OH. 45242	N	-	I	-	
Cooper Tire & Rubber Company Department 17 Lima & Western Avenues Findlay, OH. 45840	N	-	I	-	
Martin Marietta Chemicals 755 Lime Road Woodville, OH. 43469	N	-	I	-	
Standard Oil Company Lima Refinery 1150 South Metcalf Street Lima, OH. 45804	N	-	I	-	
SCM Corporation Glidden-Durkee Division 2900 Middle Road, P. O. Box 310 Ashtabula, OH. 44004	N	-	I	-	
RCA Picture Tube Division 1650 South US 23 Circleville, OH. 43113	N	-	I	-	
Campbell Soup Co. East Maumee Avenue Napoleon, OH. 43545	Y	2	I	N	Vent to atmosphere.
Riverside Hospital 1600 Superior Street Toledo, OH. 43604	N	-	M	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Medical Radiologists Inc. 33 W. First Street Dayton, OH. 45402	Y	2	M	N	Return to vendor.
E. I. Du Pont de Nemours & Co. Inc. P. O. Box 89 Circleville, OH. 43113	N	T	I	-	
William Powell Company 2503-31 Spring Grove Avenue Cincinnati, OH. 45214	N	-	I	-	
Babcock & Wilcox Company Alliance Research Center 1562 Beeson Street Alliance, OH. 44601	Y	1	I	Y	Research and development.
Children's Hospital and the Children's Hospital Research 700 Children's Drive Columbus, OH. 43205	N	-	M	-	
Nicolet Industries Inc. Hamilton Plant Hamilton, OH. 45012	N	-	I	-	
Akron University Institute of Polymer Science Chemistry, Physics, Biology and Engineering 302 East Buchtel Avenue Akron, OH. 44325	Y	T	E	Y	Waste volume expected to increase in future.
St. Thomas Hospital Nuclear Medicine 444 North Main Street Akron, OH. 44310	N	-	M	-	
State of Ohio Dept. of Health Div. of Public Health Lab, Industrial Chem. Sec. 1571 Perry Street Columbus, OH. 43216	N	-	G	-	
Trumbull Memorial Hospital Radiology Department 1350 East Market Street Warren, OH. 44483	Y	2	M	M	Sealed, unsealed.
Consolidated Rail Corporation Technical Service Laboratory 577 East 152nd Street Cleveland, OH. 44110	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Johns-Manville Fiber Glass Inc. River Road Waterville, OH. 43566	N	-	I	-	
Overhoff & Associates, Inc. P. O. Box 8091 Cincinnati, OH. 45208	N	-	I	-	
Reuter Stokes Instruments Inc. Instrument Assembly/Testing 19530 South Miles Parkway Warrensville, OH. 44128	N	-	I	-	
Clinton Memorial Hospital Radiology Department 610 W. Main Street Wilmington, OH. 45177	Y	2	M	N	Return to vendor.
Bio-Science Laboratory 19701 South Miles Road Warrensville, OH. 44128	N	-	I	-	
Pharmatopes Inc. 4172 Crossgate Square Blue Ash, OH. 45236	N	-	I	-	
Sera Inc. 3723-B Olentangy River Road Columbus, OH. 43214	N	-	I	-	
Pharmatopes Inc. 1100 Rarig Road Columbus, OH. 43219	Y	2	I	N	Combine with refuse.
Isotec Corporation 1029 Senate Drive Centerville, OH. 45459	Y	2	I	N	As soon as license is approved, will be sending waste to commercial repository.
Greene Memorial Hospital Inc. 1141 North Monroe Drive Xenia, OH. 45385	Y	2	M	N	Release to sewer.
Allied Technology Inc. Manufacturing Department 6104 Poe Avenue Dayton, OH. 45414	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Ex-Lax Pharmaceutical Company Inc. Quality Assurance Laboratory P. O. Box 777 Dayton, OH. 08810	N	-	I	-	
Buckeye Well Surveys Inc. 5115 Oakridge Drive N.E. Louisville, OH. 44641	N	-	I	-	
Knox Community Hospital 200 N. Mulberry St. Mount Vernon, OH. 43050	Y	2	M	N	Decay to background levels.
Precision Reflex Inc. 201 North Main Street New Bremen, OH. 45869	N	-	I	-	
RS Holding Inc. Electronic-Nuclear Testing Dept. 18530 South Miles Parkway Cleveland, OH. 44128	N	-	I	-	
Northeastern Ohio Universities College of Medicine Rootstown, OH. 44272	Y	T	E	Y	
Memorial Hospital of Sandusky County 715 Taft Avenue Fremont, OH. 43420	N	-	M	-	
Richmond Heights General Hospital 27100 Chardon Road Richmond Hts., OH. 44143	N	-	M	-	
Rus/Mar Industries Inc. 103 Plymouth East Road, Rt. 1 Plymouth, OH. 44865	N	-	I	-	
Adria Laboratories Inc. 6071 State Rt. 161 E. Plain City, OH. 43064	Y	2	I	N	Release to sewer; burn on-site.
Euclid General Hospital 101 E. 185th Street Euclid, OH. 44119	Y	T	M	N	Unsealed sources.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Bio-Nuclear Assays Inc. 3728 B Olentangy River Rd. Columbus, OH. 43214	N	-	I	-	
Deaconess Hospital of Cleveland 4229 Pearl Road Cleveland, OH. 44109	Y	2	M	N	Return to vendor.
Cleveland Regional Sewer District 6000 Canal Road Cuyahoga Heights, OH. 44233	N	-	G	-	
Crystaloid Electronics Company 4976 Hudson Drive Stow, OH. 44224	Y	2	I	N	No waste generated.
Perstorp Inc. Toledo Division 600 Matzinger Road Toledo, OH. 43612	N	-	I	-	
Radiology Physicians Inc. 30 West Rahn Road Kettering, OH. 45429	Y	2	M	N	Return to vendor. Decay to background level.
Community Hospital of Bedford Inc. 44 Blaine Street Bedford, OH. 44146	N	-	M	-	
Lorain Community Hospital 3700 Kolbe Road Lorain, OH. 44053	N	-	M	-	
Quality Testing Inc. 5021 W. 161st Street Cleveland, OH. 44142	N	-	I	-	
Piqua Memorial Hospital 624 Park Avenue Piqua, OH. 45356	N	-	M	-	
City of Bryan Ohio 103 N. Beech St., P. O. Box 190 Bryan, OH. 43506	Y	2	C	N	Sealed source used in equipment.



LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Dow Chemical U. S. A. Granville Research & Development Center P. O. Box 515 Granville, OH. 43023	N	-	I	-	
Joint Hospital Services Inc. 103 Hemm Road Piqua, OH. 45356	N	-	M	-	
Hydro-Clear Corporation 604 Moore Road Avon Lake, OH. 44012	N	-	I	-	
North American Carbon Inc. P. O. Box 19737 Columbus, OH. 43219	N	-	I	-	
Kaiser-Permanente Medical Center 11203 Fairhill Road Cleveland, OH. 44104	N	-	M	-	
Randam Electronics Inc. 3091 Shadycrest Drive Cincinnati, OH. 45239	N	-	I	-	
Capmas Medical Corporation 421 Michigan Street Toledo, OH. 43624	N	-	I	-	
The Andersons 507 Illinois Avenue Maumee, OH. 43537	N	-	I	-	
Georgia-Pacific Corporation 125 North River Street Franklin, OH. 45005	N	-	I	-	
Sybron Corporation Taylor Instrument Company Division 557 East Tallmadge Avenue Akron, OH. 44310	N	-	I	-	
S. D. Myers Inc. Transformer Consultants Division Box 3575 Akron, OH. 44310	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Davidson Laboratory 267 E. Broad Street Columbus, OH. 43215	N	-	M	-	
Parkview Hospital 1920 Parkwood Avenue Toledo, OH. 43624	N	-	M	-	
Ohio Valley Hospital Radiology Department 380 Summit Avenue Steubenville, OH. 43952	Y	T	M	N	Return to vendor.
Sharon Steel Corporation Brainard Strapping Division Larchmont Avenue Warren, OH. 44482	Y	2	I	N	Return to vendor.
Doctors Hospital Inc. 420 Austin Avenue, N.W. Massillon, OH. 44640	N	-	I	-	
St. Joseph Riverside Hospital Dept. of Radiology 1400 Tod Avenue N.W. Warren, OH. 44485	Y	T	I	N	Unsealed sources. Return to vendor.
United States Gypsum Company Genoa, OH. 43430	N	-	I	-	
Medical College of Ohio at Toledo Department of Radiology P. O. Box 6190 Toledo, OH. 43614	Y	2	M	N	Release to sewer. Decay to background level, burn.
Shell Chemical Company 2982 Washington Boulevard Belpre, OH. 45714	Y	2	I	N	Return to vendor.
Wilson Memorial Hospital 915 West Michigan Street Sidney, OH. 45365	Y	2	M	N	
City of Columbus Ohio Dept. of Public Service City Hall Columbus, OH. 43215	Y	2	G	N	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Osco Industries Inc. 11th & Chillicothe Street Portsmouth, OH. 45662	Y	2	I	N	Return to vendor.
Dayton Testing Laboratory 5551 Webster Street Dayton, OH. 45414	Y	2	I	N	
Dr. T. C. Hobbs & Associates, Inc. Nuclear Medicine 5340 E. Main Street Columbus, OH. 43213	N	-	M	-	
E. C. Gerken & Associates Inc. 1939 B. East Second Street Defiance, OH. 43512	Y	2	I	N	
Jones & Henry Laboratories Inc. 2000 W. Central Avenue Toledo, OH. 43606	Y	2	I	N	
Black Clawson Shartle Pandia Division 605 Clark Street Middletown, OH. 45042	Y	2	I	N	
Ohio Valley Paving Corporation 343 W. Main Street St. Clairsville, OH. 43950	N	-	I	-	
L. R. Skelton & Company 3099 Sullivant Avenue Columbus, OH. 43204	Y	2	I	N	Return to vendor.
Tremco Inc. 10701 Shaker Boulevard Cleveland, OH. 44104	N	-	I	-	
Sterling Drug Inc. Hilton-Davis Chemical Company Division 2235 Langdon Farm Road Cincinnati, OH. 45237	N	-	I	-	
Medical Diagnostic Services 143 Westpark Road Centerville, OH. 45459	N	-	M	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Analytical Laboratories of Ohio 15322 St. Clair Avenue Cleveland, OH. 44110	Y	1	I	K	
St. Ann's Hospital 1555 Bryden Road Columbus, OH. 43205	N	T	M	-	Refused to answer survey.
Shelly & Sands Inc. P. O. Box 951 Zanesville, OH. 43701	N	-	I	-	
Memorial Hospital of Union County London Avenue Marysville, OH. 43040	N	-	M	-	
Bowser-Morner Testing Laboratories Inc. 420 Davis Avenue Dayton, OH. 45401	N	-	I	-	
Ares Inc. P. O. Box 459 Port Clinton, OH. 43452	N	-	I	-	
Clermont County Hospital 3000 Hospital Drive Batavia, OH. 45103	N	-	M	-	
Shelly Company P. O. Box 266 Thronville, OH. 43076	Y	2	-	N	
Neurosurgical Clinic & Associates Inc. 153 North Fourth Street Staubenville, OH. 43952	N	-	M	-	
Blood Alliance Inc. 3204 W. 25th Street Cleveland, OH. 44109	N	-	M	-	
CAR-MI Inc. 5640 Brentlinger Drive Dayton, OH. 45414	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Cargill Inc. 3201 Needmore Road, Box 1400-A Dayton, OH. 45414	N	-	I	-	
Dresser Industries Inc. Galion Mfg. Division 352 South St. Galion, OH. 44833	N	-	I	-	
Quaker Oats Company 1171 W. Center Street Marion, OH. 43302	Y	2	-	N	Sealed sources. Process control.
Mary Rutan Hospital 205 Palmer Avenue Bellefontaine, OH. 43311	N	-	M	-	
Vanwert County Hospital 1250 South Washington Street Vanwert, OH. 45891	Y	2	M	N	Combine with refuse; return to vendor.
Fedco-Environmental Inc. 11499 Chester Road Cincinnati, OH. 45246	N	-	I	-	
St. Luke's Hospital 5901 Monclova Road Maumee, OH. 43537	Y	2	M	N	Return to vendor. Decay to background level.
Russell, Burdsall & Ward Inc. 8100 Tyler Boulevard Mentor, OH. 44060	N	-	I	-	
Veterans Memorial Hospital Mulberry Heights Pomeroy, OH. 45769	N	-	M	-	
Schoen Paving Inc. 310 South Westwood Avenue Toledo, OH. 43609	N	-	I	-	
Randam Electronics Inc. 3091 Shadycrest Drive Cincinnati, OH. 45239	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Madison County Hospital 210 N. Main Street London, OH. 43140	N	-	M	-	
Qual-X Inc. 4065 North Leap Road Hilliard, OH. 43026	N	-	I	-	
Fulton County Health Center 725 South Shoop Avenue Wauseon, OH. 43567	Y	2	M	N	Combine with refuse, return to vendor.
Vulcan Mfg. Co. P. O. Box 46465 Glendale Rd. Wdlwn Cincinnati, OH. 45246	Y	2	I	N	
Anderson-Bolds Inc. 5720 Dragon Way Cincinnati, OH. 45227	N	-	I	-	
Stilson Laboratories Inc. 170 North High Street Columbus, OH. 43215	Y	2	I	N	Return to vendor.
Tri-State Asphalt Corporation East Jefferson Street Martins Ferry, OH. 43935	Y	2	I	N	No waste generated.
Licking Memorial Hospital 1320 West Main Street Newark, OH. 43055	Y	T	M	N	Unsealed sources irradiated.
Ohio Valley Testing Laboratory Inc. P. O. Box 93 - 120 Third St. Marietta, OH. 45750	N	-	I	-	
Newport News Industrial Corp. of Ohio P. O. Box 25 Perry, OH. 44081	N	-	I	-	
City of Lima Ohio Utilities Department 219 East Market Street Lima, OH. 45807	Y	2	C	N	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Howard Paper Mills Inc. 115 Columbia Street Dayton, OH. 45401	N	-	I	-	
Grady Memorial Hospital 561 West Central Avenue Delaware, OH. 43015	N	-	M	-	
Metal Processing Corporation 5800 Longwood Avenue Maple Heights, OH. 44137	N	-	I	-	
Howard Laboratories Inc. 3601 S. Dixie Dayton, OH. 45439	Y	2	I	N	
Pharmatopes Inc. 2719 Manchester Road Akron, OH. 44319	N	-	I	-	
Sherex Chemical Company Inc. P. O. Box 646 Diblin, OH. 43017	Y	1	I	Y	Used for Research Studies.
High Voltage Maintenance Corporation Insulating Liquid Testing Dept. 7200 Industrial Park Blvd. Mentor, OH. 44060	N	-	I	-	
Advanced Medical Systems Inc. 1020 London Road Cleveland, OH. 44110	Y	1	M	Y	Mostly unsealed material used. Dry solids, trash shipped.
Krause Lubert & Associates Inc. 11811 Shaker Blvd. Young Med. Cleveland, OH. 44120	Y	2	M	N	
Rawdon Myers Inc. P. O. Box 42216 Cincinnati, OH. 45216	N	-	I	-	
B. G. Danis Company P. O. Box 1722 Dayton, OH. 45401	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Benedict, Bowman, Crag & Moos 195 Chittenden Avenue, Columbus, OH. 43201	Y	2	-	N	Return to vendor. Sealed sources used.
Joint Twp. Dist. Memorial Hospital Hager & St. Clair Sts. St. Mary's, OH. 45891	N	-	M	-	
Alan Stone Co. Inc. S. R. 377 - P. O. Box 127 Chesterhill, OH. 43728	Y	2	I	N	
Systems Engineering Associates 7349 Worthington-Galena Road Columbus, OH. 43085	N	-	I	-	
Systems Technology Corporation 245 North Valley Road Xenia, OH. 45385	N	-	I	-	
Dodson-Lindblom Associates, Inc. 5 East Long Street Columbus, OH. 43225	N	-	I	-	
Pharmatopes Inc. 300 Forest Avenue Dayton, OH. 45405	Y	2	I	N	Combine with refuse; return to vendor.
Pollution Control Science Inc. 6015 Manning Road Miamisburg, OH. 45342	N	-	I	-	
Lubrizol Corporation P. O. Box 428 Painesville, OH. 44077	N	-	I	-	
Hessmore Testing & Supervision Inc. 265 E. Market Street Akron, OH. 44308	Y	2	I	N	Return to vendor. Sealed source.
Otto C. Epp Memorial Hospital 3000 Kenwood Road Cincinnati, OH. 45236	Y	2	M	N	Sealed sources.



LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Community Blood Center 349 South Main Street Dayton, OH. 45402	N	-	M	-	
Terra Technical College 1220 Cedar Street Fremont, OH. 43420	N	-	E	-	
City of Akron Water Supply Division 65 South High Street Akron, OH. 44308	Y	2	G	N	
Lambda Research Inc. 4213 Market Place Cincinnati, OH. 45216	Y	2	I	N	Return to vendor. Sealed source.
Davy McKee Engineers and Constructors 6200 Oak Tree Boulevard Cleveland, OH. 44131	N	-	I	-	
Columbus Gas System Service Corp. 1600 Dublin Road Columbus, OH. 43215	Y	2	I	N	Sealed source.
Carl M. Geupel Construction Co. Inc. P. O. Box 20232 Columbus, OH. 43220	N	-	I	-	
Mercy Hospital 1248 Kenneys Lane Portsmouth, OH. 45662	N	-	M	-	
S. Wilkoff & Sons Co. 2700 East 47th Street Cleveland, OH. 44104	Y	2	I	N	Sealed.
Morton Salt Company 151 S. Industrial Avenue Rittman, OH. 44270	N	-	I	-	
R & F Coal Company P. O. Box 247 Cadix, OH. 43907	Y	2	I	N	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Owens-Corning Fiberglas Corp. Fiberglas Tower Toledo, OH. 43659	N	-	I	-	
Armco Inc. P. O. Box 1529 Zanesville, OH. 43701	Y	2	I	N	Return to vendor. Sealed source.
Wadsworth Testing Laboratories Inc. 1600 4th St., S.E. P. O. Box 20 Canton, OH. 44701	N	-	I	-	
McCallough-Hyde Hospital 110 W. Poplar Street Oxford, OH. 45056	N	-	M	-	
Central Ohio Medical Clinic 497 D. Town St. Columbus, OH. 43215	N	-	M	-	
Packard Electric Div. of General Motors Box 431 Warren, OH. 44482	N	-	I	-	
Springborn Institute for Bioresearch Inc. 553 North Broadway Spencerville, OH. 45887	N	-	I	-	
Cravat Coal Company Road 4 Cadiz, OH. 43907	N	-	I	-	
Anderson-Lynn Inc. P. O. Box 166 Piketon, OH. 45661	N	-	I	-	
Standard Slag Company Inc. 1200 Stambasth Building Youngstown, OH. 44503	N	-	I	-	
Dalton, Dalton, Newport Inc. 34 N. Hawkins Avenue Akron, OH. 44313	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Mobile Medical Imaging of Ohio Inc. 1380 Dublin Road, Suite 108 Columbus, OH. 43215	N	-	M	-	
Samaritan Hospital Dept. of Radiology & Nuclear Medicine 1025 Center Street Ashland, OH. 44805	Y	2	M	N	
O. H. Materials Inc. Chemistry Laboratory State Route 224 East Findlay, OH. 45840	N	-	I	-	
City of Canton Water Department Laboratory Division 2664 Harrisburg Road, N.E. Canton, OH. 44705	Y	2	G	N	Return to vendor. Sealed sources.
Maumee River Wastewater Treatment Plant 5858 North River Road Waterville, OH. 43566	N	-	G	-	
City Hospital 4697 Harrison Street Bellaire, OH. 43986	N	-	M	-	
Finnigan Institute Atkinson Square 11750 Chester Cincinnati, OH. 45246	Y	2	M	N	
General Motors Corporation Fisher Body Division Elyria, OH. 44035	N	-	I	-	
County of Montgomery Environmental Services 451 West Third Street Dayton, OH. 45402	Y	2	G	N	Vent to atmosphere.
Firestone Tire & Rubber Co. 1200 Firestone Parkway Akron, OH. 44317	N	-	I	-	
Potters Medical Center 332 W. 6th Street E. Liverpool, OH. 43920	Y	2	M	N	Decay to background levels.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
National Lime & Stone Company P. O. Box 120 Findlay, OH. 45840	N	-	I	-	
Kahns & Company 3241 Spring Grove Avenue Cincinnati, OH. 42225	N	-	I	-	
Borden Chemical Printing Ink Division 630 Glendale-Milford Road Cincinnati, OH. 45215	Y	2	I	N	Sealed source used.
Allied Chemical Corporation Environmental Control Laboratory 3330 S. Third Street Ironton, OH. 45638	Y	2	I	N	Return to vendor.
Ferro Corporation Coatings Division 4150 East 56 Street Cleveland, Oh. 44105	Y	2	I	N	Return to vendor.
Cyclops Corporation Empire Detroit Steel Division 3879 Rhodes Avenue New Boston, OH. 45662	N	-	I	-	
Southwest General Hospital 18697 E. Bagley Road Middleburg Hts., OH. 44130	N	-	M	-	
John D. Tonkovich & Son Inc. P. O. Box 208 Shadyside, OH. 43947	Y	2	I	N	Return to vendor.
Gulf Oil Chemicals Company P. O. Box 1000 Marietta, OH. 45750	Y	2	I	N	Return to vendor.
Kokosing Construction Company Inc. Construction Department P. O. Box 226, Waterford Road Fredericktown, OH. 43019	Y	2	I	N	Sealed source used in soil testing.
Resource International Inc. 130 East Wilson Bridge Road Worthington, OH. 43229	N	-	I	-	

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
CTL Engineering Inc. 2860 Fisher Road Columbus, OH. 43204	Y	2	I	N	Sealed source. Return to vendor.
Koppers Company Inc. Organic Materials Group P. O. Box 1137, 1359 Logan Ave. Youngstown, OH. 44501	N	-	I	-	
Babcock & Wilcox Company Research Center 1562 Beeson Street Alliance, OH. 44601	Y	1	I	Y	Mostly smears and sludge produced.
Harshaw Chemical Company 6801 Cochran Road Solon, OH. 44139	Y	T	I	N	Unsealed material. Distribute in product form, combine with refuse.
University of Cincinnati, Radioisotope Laboratory Cincinnati General Hospital Cincinnati, OH. 45229	Y	1	E	Y	Mostly scintillation vials.
Ohmart Corporation 4241 Allendorf Drive Cincinnati, OH. 45209	N	-	I	-	
Cleveland-Cliffs Iron Company 1460 Union Commerce Building Cleveland, OH. 44115	N	-	I	-	
Tri-Weld Inc. 1217 Main Street Cleveland, OH. 44113	N	-	I	-	
Amax Specialty Metals Corporation 21801 Tungsten Road Cleveland, OH. 44117	N	-	I	-	
Pesses Company 29605 Hall Street Solon, OH. 44139	N	-	I	-	
Brush Wellman Inc. 17876 St. Clair Avenue Cleveland, OH. 44110	Y	2	I	N	Sealed sources. Return to vendor.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Advanced Medical Systems Inc. 1020 London Road Cleveland, OH. 44110	Y	1	M	Y	Mostly dry solids, irradiated components.
Aluchem Inc. 01 Landy Lane Reading, OH. 45215	N	-	I	-	
Kettering Medical Center 3535 Southern Boulevard Kettering, OH. 45429	Y	2	M	N	Release to sewer, combine with refuse, return to vendor.
Imperial Glass Corporation 29th Street Bellaire, OH. 43906	N	-	I	-	
Kayar Manufacturing Co. 3301 Train Ave. Cleveland, OH. 44113	N	-	I	-	
Lancaster Glass Corp. 220 West Main Street Lancaster, OH. 43130	Y	2	I	N	Distributed in product form.
Vernitron Corporation Vernitron Piezoelectric Division 232 Forbes Road Bedford, OH. 44146	N	-	I	-	
Victory White Metal Company 6100 Reland Avenue Cleveland, OH. 44127	N	-	I	-	
I. Deutch & Sons Inc. 311 Baymiller Street Cincinnati, OH. 45203	N	-	I	-	
Ferro Corporation One Erieview Plaza Cleveland, OH. 44114	Y	2	I	N	Distribute in product form, return to vendor.
Good Samaritan Hospital 1425 West Fairview Avenue Dayton, OH. 45406	Y	1	M	Y	Mostly dry trash, solids, irradiated components shipped.

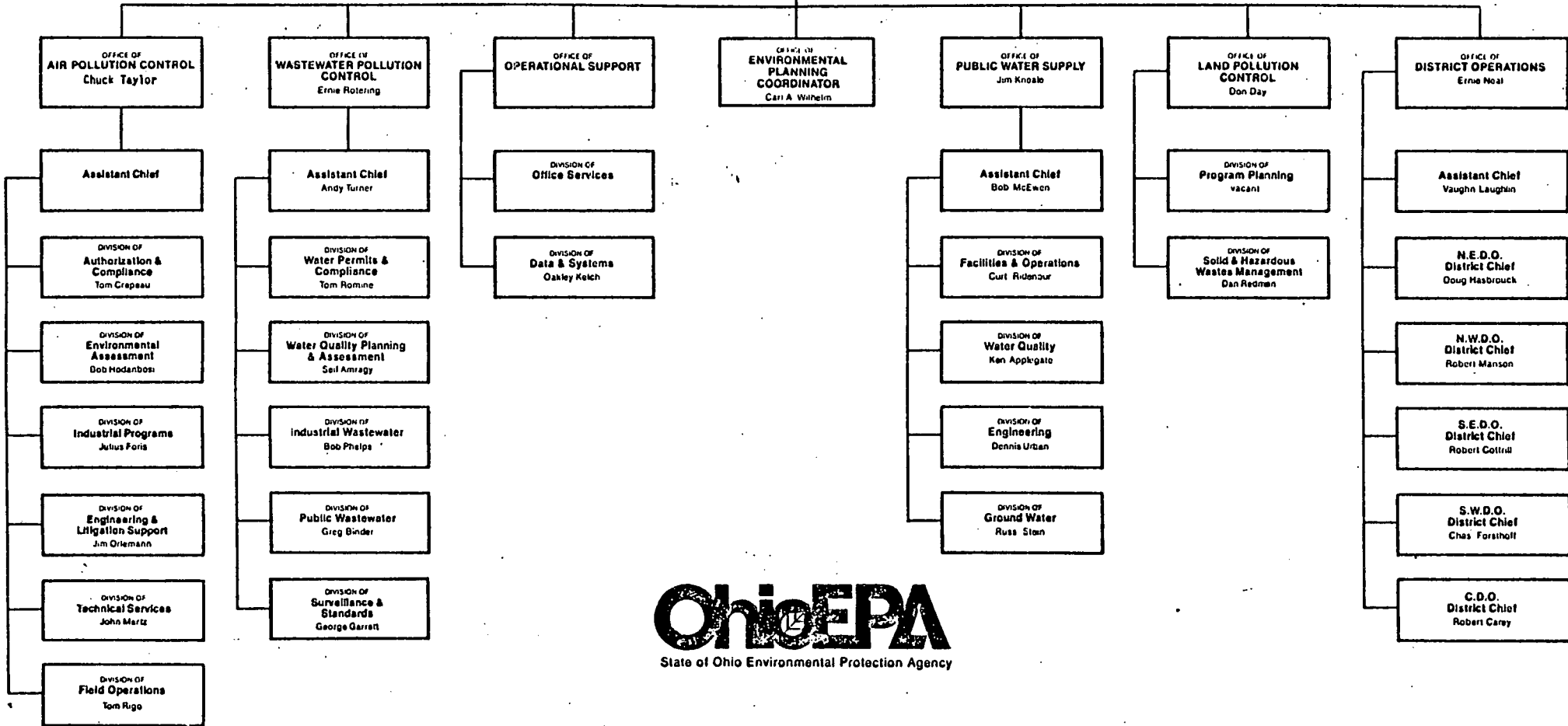
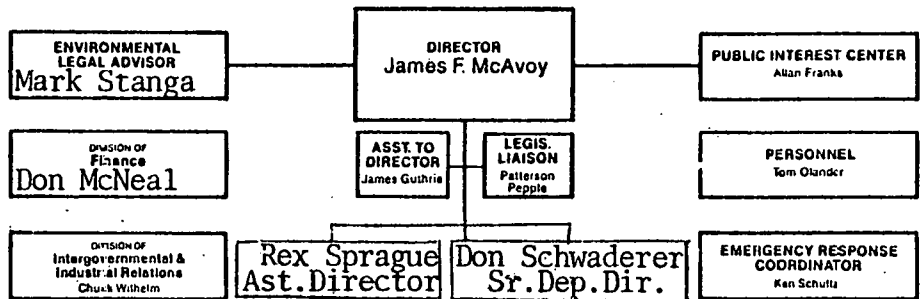
LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Babcock & Wilcox Alliance Research Center 1562 Beeson St. Alliance, OH. 44601	Y	1	I	Y	Mostly smears and sludge.
Battelle Columbus Laboratories 505 King Avenue Columbus, OH. 43201	Y	1	I	Y	Dry trash irradiated components.
University of Cincinnati, Cincinnati General Hospital Cincinnati, OH. 45229	Y	1	E	Y	Mostly scintillation vials shipped.
University of Toledo, Dept. of Physics & Astronomy West Bancroft Street Toledo, OH. 43606	Y	T	E	Y	
RMI Company Extrusion Plant P. O. Box 579 Ashtabula, OH. 44004	Y	-	I	Y	Spent resins, absorbed liquids, filter sludged and dry trash.
Vistron Corporation Fort Amenda Road P. O. Box 628 Lima, OH. 45802	Y	2	I	N	
General Electric Company Lamp Division Nela Park Cleveland, OH. 44112	N	-	I	-	
Ohio State University 410 West 10th Avenue Columbus, OH. 43210	Y	T	E	Y	Sealed, unsealed.
General Electric Company Aircraft Engine Group 1 Jimson Road Cincinnati, OH. 45215	N	-	I	-	
National Aeronautics & Space Administration Lewis Research Center 21000 Brookpark Road Cleveland, OH. 44135	Y	1	G	Y	Dry solids, trash, irradiated components.
University of Cincinnati Metallurgical Engineering Department Cincinnati, OH. 45221	Y	1	E	Y	Unsealed material.

LICENSEE NAME AND ADDRESS	SURVEY		TYPE OF FACILITY	SHIPS WASTE	COMMENTS
	RECEIVED	RESPONSE			
Case Western Reserve University 10900 Euclid Avenue Cleveland, OH. 44106	Y	1	E	Y	Mostly small liquid vials.
Standard Oil Company (Ohio) Midland Building, Cleveland, OH. 44115	N	-	I	-	
Cincinnati Gas & Electric Company Columbus & Southern Ohio Electric Co. Dayton Power & Light Company P. O. Box 960 Cincinnati, OH. 45201	N	-	I	-	
Union Carbide Corporation Metals Division Box 299 Marietta, OH. 45750	Y	2	I	N	
Muskingum College Physics Department New Concord, OH. 43762	Y	2	E	N	Release to sewer.
Kenyon College Gambier, OH. 43022	N	-	E	-	
Hiram College Department of Physics Hiram, OH. 44234	Y	2	E	N	Release to sewer; combined with refuse.
St. Charles Hospital 2600 Navarre Avenue Oregon, OH. 43616	N	-	M	-	
Scioto Memorial Hospital 1805-27th Street Portsmouth, OH. 45662	Y	T	M	N	Unsealed sources.
RS Holding Inc. 12530 South Miles Parkway Cleveland, OH. 44123	N	-	I	-	



APPENDIX B

OHIO LEGISLATION AND REGULATION



**OhioEPA**  
State of Ohio Environmental Protection Agency

HAZARDOUS SUBSTANCES TRANSPORTATION BOARD

EX OFFICIO MEMBERS

THOMAS D. LARSON, P.E.  
Secretary of Transportation  
1200 Transportation & Safety Bldg.  
787-5574

EDWARD G. BIESTER, JR.  
Attorney General  
Room 1, Main Capitol Annex  
787-3391

GEOFFREY STENGEL, JR.  
Secretary of Commerce  
419 South Office Bldg.  
787-3003

CHARLES J. LEIBERTEH  
Secretary of Labor & Industry  
1700 Labor & Industry Bldg.  
787-3157

H. ARNOLD MULLER, MD  
Secretary of Health  
802 Health & Welfare Bldg.  
787-6436

CLIFFORD L. JONES  
Secretary of Environmental Resources  
9th Floor, Fulton Bank Bldg.  
787-2814

DANIEL F. DUNN  
Commissioner Pennsylvania State Police  
PSP Hdqtrs., 1800 Elmerton Ave., Hbg.  
783-5558

MS. SUSAN M. SHANAMAN  
Chairman, Public Utility Commission  
104 North Office Bldg.  
783-3601

JOHN A. PACHUTA (Proxy)  
Director, Safety Programming & Analysis  
202 Transportation & Safety Bldg.  
787-7350

RONALD H. SKUBECZ (Proxy)  
Deputy Attorney General  
Room 25 "H", Main Capitol Annex  
783-1466

Business Consultant  
412 South Office Bldg.  
783-5700

CHARLES A. HENRY (Proxy)  
State Fire Commissioner  
1547 Labor & Industry Bldg.  
787-1325

WILLIAM C. DEITHEFS (Proxy)  
Director, Division Emergency Health Services  
1031 Health & Welfare Bldg.  
787-8741

THOMAS M. GERUSKY (Proxy)  
Director, Radiation Protection  
500 Fulton Bank Bldg.  
787-2480

MAJ. BERNARD G. STANALONIS (Proxy)  
Bureau of Patrol  
PSP Hdqtrs., 1800 Elmerton Ave., Hbg.  
783-5517

GEORGE C. HOGAN (Proxy)  
Representative of Public Utility Commission  
26 Hillcroft Rd., Feasterville, PA 19047  
(215) 238-6960

APPOINTED MEMBERS

GEORGE MAWHINNEY  
Representing General Public  
R D #1  
Canonsburg, PA 15317  
(412) 391-3540

EDWIN A. ROBB  
Representing Fire Services  
434 Claremont Rd.  
Springfield, PA 19064  
(215) 543-2908

GEORGE L. GRIFFITH  
Representing Manufacturer or Shipper  
130 Wall St.  
Bethlehem, PA 18018  
(215) 867-2487

ROBERT T. HINDLE  
Representing Common Carrier - Matlack Inc.  
Beaver Hill Rd.  
Chester Springs, PA 19425  
(215) 259-9800

ROBERT F. VARNER  
Representing Highway Safety  
19 N. Russell St.  
York, PA 17402  
(717) 755-1506

GERALD F. HAGERTY  
Representing Private Carrier  
129 Norman Way  
Erie, PA 16508  
(814) 454-6231

March 1979

MEMBERS

ADVISORY COMMITTEE ON ATOMIC ENERGY  
DEVELOPMENT AND RADIATION CONTROL

Mr. James G. Terrill, Jr. (Chairman)

4111 Dundee Drive  
Murrysville, PA 15668  
Tele: 412-325-1770  
Office: 412-351-5800 Ext. 105

Mr. Frederick J. Bissert

Technical Assistant-Nuclear  
Beaver Valley Power Station  
P.O. Box 4  
Shippingport, PA 15077  
Tele: 412-643-5255

Mailing Address: 2446 Silver Oak Place  
(Home) Pittsburgh, PA 15220

Mr. R. F. Gilkeson

Chairman of the Board  
Philadelphia Electric Company  
2301 Market Street  
Philadelphia, PA 19101  
Tele: 215-841-4211

Robert C. Good, Jr., Ph.D.

10 Wellesly Road  
Swarthmore, PA 19081  
Tele: Home: 215-KI3-8766  
Office: 215-L06-6010

Dr. Alexander Lewis, Jr. (Consultant)

Gulf Oil Foundation  
Gulf Building Danville Farm  
Pittsburgh, PA 15230 717-275-4709  
Tele: 412-263-5206

Mailing Address: 807 Valley View Rd.  
Pittsburgh, PA 15243  
Tele: 412-531-1094

Mr. C. J. Sevick

419 Argonne Drive  
New Kensington, PA 15068  
Tele: 412-335-0818

Niel Wald, M.D.

Chairman, Department of Radiation  
Health  
University of Pittsburgh  
RC508 Scaife Hall  
Pittsburgh, PA 15261  
Tele: 412-647-3495, Ext. 691

Warren Witzig, Ph.D.

Professor and Head  
Department of Nuclear Engineering  
The Pennsylvania State University  
University Park, PA 16802  
Tele: 814-865-1342 (231 Sackett Bldg.  
(475)

Theodore Tristan, M.D.

Department of Radiology  
Harrisburg Polyclinic Hospital  
2601 N. 3rd Street  
Harrisburg, PA 17105  
Tele: 717-782-4250

Mailing Address: 353 N. 28th Street  
Camp Hill, PA 17011  
Tele: 717-761-2958

Secretary of Commerce

Rep. Bob Laughlin  
400 South Office  
Tele: 7-7120

Secretary of Environmental Resources

Clifford L. Jones  
7-2814

MEMBERSHIP OF THE OHIO WATER DEVELOPMENT AUTHORITY

Edwin F. Mulligan  
40 Sheridan Rd.  
P.O. Box 386  
Coshocton, OH 43812

William Amicon  
2815 Pickwick Drive  
Upper Arlington, OH 43221

Ned Skeldon  
2251 Burroughs  
Toledo, OH 43614

Philip Zannella  
994 West Mill Drive  
Highland Heights, OH 44143

Martha C. Moore  
501 Oakland Blvd.  
Cambridge, OH 43725

James F. McAvoy, Director  
Ohio E.P.A.  
361 E. Broad Street  
Seneca Towers - Room 201  
Columbus, OH 43215

Wayne S. Nichols, Director  
Ohio Dept. of Energy  
30 E. Broad Street - 34th Floor  
Columbus, OH 43215

Dr. Robert W. Teater, Director  
Ohio Dept. of Natural Resources  
Fountain Square  
1952 Belcher Drive  
Columbus, OH 43224

STATE OF OHIO

MEMORANDUM OF UNDERSTANDING

RESPONSE TO HAZARDOUS MATERIALS INCIDENTS

A. General

1. The Director, Ohio Disaster Services Agency, pursuant to the authority contained in Chapter 5915.02, Ohio Revised Code, to coordinate the activities of all agencies for civil defense and disaster preparedness within the state, has developed this agreement in coordination with agencies concerned. This document addresses the procedures to be followed by the Ohio Disaster Services Agency (DSA), the Ohio Environmental Protection Agency (EPA), the State Fire Marshal (SFM), the Ohio Department of Highway Safety/State Highway Patrol (SHP), the Public Utilities Commission of Ohio (PUCO), and the Ohio Department of Transportation (DOT) when responding to incidents involving hazardous materials. The EPA enters into this Memorandum of Understanding pursuant to the intent of the General Assembly set forth in Section 3745.011 of the Revised Code and the statutory authority provided for in Sections 3704.03; 3734.02; 6109.03; 6109.04 and 6111.03 of the Revised Code. The SFM's Office enters into this Memorandum of Understanding pursuant to Chapter 3737 of the Revised Code.
2. Hazardous materials include flammable liquids and solids, compressed gases, corrosive liquids, and other substances which may be poisonous, radioactive, oxidizing, or explosive.
3. In order to provide for funding for transportation related hazardous materials incidents, the roles prescribed in this agreement will establish a basis for applicability of funds. Training provided through such funding is available to all participants in emergency response organizations and will be conducted accordingly by all agencies.

B. Functional Responsibilities

1. STATE FIRE MARSHAL

The SFM is the responsible State agency for primary coordination of activities of State agencies when a hazardous materials incident results in fire or explosion or when the potential for fire or explosion is greater than the environmental hazard. During such emergencies, SFM may require support from EPA, DSA and other State agencies, depending upon the severity of the emergency and agency capabilities. The SFM shall be considered the primary State agency for preventing or mitigating the effects of hazardous materials incidents which involve fire or explosion. When in the judgement of the Director of EPA or his

authorized representative(s), the environmental hazards are greater than the potential for fire or explosion, the EPA shall assume the primary role, retaining close coordination with the SFM and/or local fire authority.

## 2. ENVIRONMENTAL PROTECTION AGENCY

The EPA is particularly concerned with hazardous materials incidents which involve one or more of the following conditions:

- a. Release of toxic fumes or runoff which threatens the public health or safety.
- b. The air, water, or lands of the state could be adversely affected.
- c. A public water supply, sewage treatment system or water disposal site could be adversely affected.

In the event the hazardous materials incident does not involve fire or explosion, the potential for fire or explosion, or radioactive materials, EPA will assume the State primary role for coordinating activities of State agencies, supported by SFM, DSA and other State agencies as appropriate (Department of Health, Department of Agriculture, Department of Natural Resources). If the fire or explosion potential is greater than the environmental hazards, as determined by the Director of EPA or his authorized representative(s), the EPA will assume an advisory role to the SFM until the threat of fire or explosion subsides. EPA will support the other agencies when not employed in a primary role and will provide advice, monitoring and coordination of the removal, neutralization and/or disposal of hazardous materials from the incident site.

## 3. DISASTER SERVICES AGENCY

In hazardous materials incidents involving radioactive materials, DSA will assume the primary State role for coordinating activities of the other State agencies. In incidents not involving radioactive materials, DSA will support the SFM and EPA.

## C. Coordination

1. In all hazardous materials incidents, the State agency receiving the first notification will notify the other State agencies as described in Section F. When notified, designated representatives of each agency will assess the actual or potential hazard for fire or explosion, release of toxic substances, radiation, or any other environmental concern. Coordination shall be made whereby the primary response agencies (SFM, EPA, and DSA) can collectively assess the problem and identify the actions required for immediate response.
2. While this document requires notification and exchange of information between responding agencies, actual on-scene State response will be at the discretion of the particular agency director or his designated

representative, based upon the nature of the incident and the type of needs existing.

**D. Support Agencies**

Three State agencies have been identified as having primary roles in responding to hazardous materials incidents. There are other State agencies which routinely support these types of operations. The agencies and their roles/capabilities are identified in this section.

1. The STATE HIGHWAY PATROL shall assist with communications, area security, traffic control, evacuation and emergency rescue as needed, in coordination with local law enforcement agencies, or function as required on State property or highways.
2. The DEPARTMENT OF TRANSPORTATION shall assist with alternate routing and scheduling of traffic and provide additional heavy equipment and communications support as needed.
3. The PUBLIC UTILITIES COMMISSION shall establish regulations to prevent hazardous materials transportation incidents and conduct inspections of vehicles transporting hazardous materials.

**E. Training**

To effectively respond to emergencies involving hazardous materials so that the environment, health, welfare and property of Ohio's citizens are adequately protected, each primary response agency conducts training of local and State response personnel in its particular area of concern as follows:

1. STATE FIRE MARSHAL - Fire Aspects of Hazardous Materials Incidents  
(Resident and Nonresident)
2. ENVIRONMENTAL PROTECTION AGENCY - Hazardous Materials Spill Control  
(Nonresident Only)
3. DISASTER SERVICES AGENCY - Radiological Awareness, Monitoring and  
Decontamination

**F. Notification**

1. The following State agencies will be immediately notified of any incident involving hazardous materials. The notification to all agencies listed will be made by the agency receiving the first notification that an incident has occurred.



Agencies

24 Hour Numbers

DISASTER SERVICES AGENCY	(614) 889-7150
ENVIRONMENTAL PROTECTION AGENCY	(800) 282-9378
STATE FIRE MARSHAL	(614) 864-5510
STATE HIGHWAY PATROL	(614) 466-3830 or 466-2660

2. The following State agencies will be notified as indicated, as soon as practicable, but not later than the next business day. The notification will be made by the agency receiving the first notification that an incident has occurred.

DEPARTMENT OF TRANSPORTATION (614) 466-4698  
 (If not already notified for emergency response purpose, notify (DOT) on all incidents in which State highways are involved)

PUBLIC UTILITIES COMMISSION (614) 466-3682  
 (Notify PUCO on all incidents involving transportation of hazardous materials)

3. The following State agencies will be notified by EPA as necessary, depending upon the requirement for their participation.

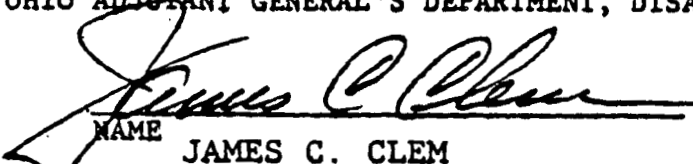
DEPARTMENT OF AGRICULTURE  
 DEPARTMENT OF HEALTH  
 DEPARTMENT OF NATURAL RESOURCES

G. Modification

This Memorandum of Understanding shall not be modified except by an agreement in writing signed by the Agencies and Departments signatory below.

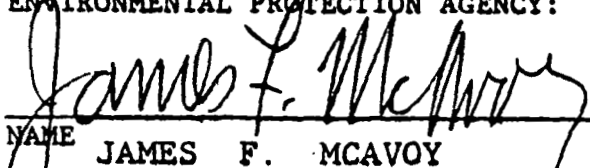
ENTERED INTO THIS DAY OF JUNE, 1980:

FOR THE OHIO ADJUTANT GENERAL'S DEPARTMENT, DISASTER SERVICES AGENCY:

  
 NAME JAMES C. CLEM

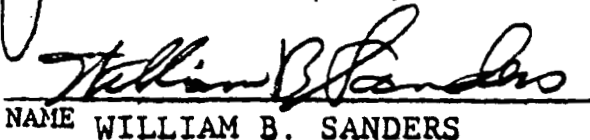
The Adjutant General and  
 Director of Disaster Services  
 TITLE

OR THE OHIO ENVIRONMENTAL PROTECTION AGENCY:

  
 NAME JAMES F. MCAVOY

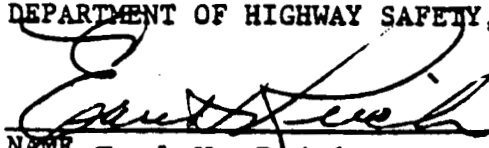
Director  
 TITLE

OR THE OHIO DEPARTMENT OF COMMERCE, STATE FIRE MARSHAL:

  
 NAME WILLIAM B. SANDERS


State Fire Marshal  
 TITLE

FOR THE OHIO DEPARTMENT OF HIGHWAY SAFETY, STATE HIGHWAY PATROL:

  
NAME Earl H. Reich

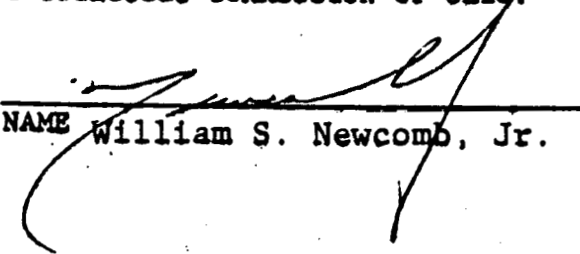
Director  
TITLE

FOR THE OHIO DEPARTMENT OF TRANSPORTATION:

  
NAME David L. Weir

Director  
TITLE

FOR THE PUBLIC UTILITIES COMMISSION OF OHIO:

  
NAME William S. Newcomb, Jr.

Chairman  
TITLE

EXECUTIVE DEPARTMENT

OFFICE OF THE GOVERNOR

Columbus

EXECUTIVE ORDER

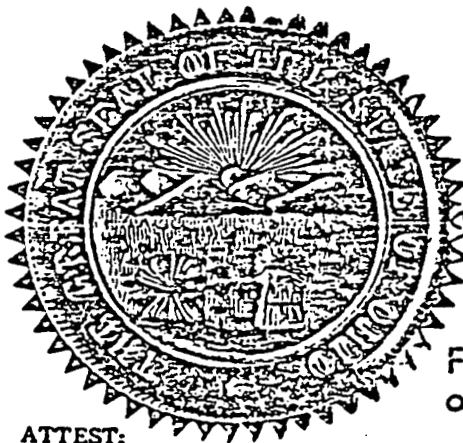
WHEREAS, Section 5915.08 of the Ohio Revised Code requires the Governor, in fulfilling his civil defense and disaster services responsibility, to use to the maximum extent practicable, the personnel, services, equipment, supplies and facilities of the State's departments, offices, agencies and political subdivisions; and

WHEREAS, Section 5915.08 of the Ohio Revised Code also requires officers and personnel of all State departments, offices and agencies to cooperate and extend such services to the Governor and to the State Disaster Services Agency upon request; and

WHEREAS, Section 5915.05 of the Ohio Revised Code requires the Governor to issue and enforce civil defense and disaster services regulations relating to the defense of the state and its people against enemy action or other disaster; and

WHEREAS, certain assignments of disaster related responsibilities have previously been made by Executive Order, and because current concepts in disaster related procedures necessitate a change in established plans;

NOW THEREFORE, I, JAMES A. RHODES, Governor of the State of Ohio do hereby revoke all previous Executive Orders making assignments of civil defense or other related responsibilities and services; moreover, pursuant to Chapter 5915 of the Ohio Revised Code, I order into effect the assignment of disaster related functions to the departments, offices, agencies and bureaus of the State of Ohio as set forth in the attachment hereto.



IN WITNESS WHEREOF, I have hereunto subscribed my name and caused the Great Seal of the State of Ohio to be affixed at the City of Columbus, this 16th day of June, in the year of our Lord, One Thousand Nine Hundred and Seventy-Eight

GOVERNOR

Filed in the Office of the Secretary of State at Columbus, Ohio

on June 16, 1978 A.M. P.M. 4:00

TED W. BROWN  
SECRETARY OF STATE

ATTEST:

## GENERAL ASSIGNMENTS

The Head of Each Agency:

1. Shall provide for the protection of its personnel, vital records, essential equipment and critical supplies against disaster effects.
2. Shall perform such of its essential normal functions as are not inconsistent with its emergency assignments.
3. Shall designate a staff member to supervise and coordinate disaster planning.
4. Shall provide liaison and staff personnel to the Disaster Services Agency and the Emergency Operations Center as required during an emergency or disaster situation.
5. Shall provide personnel for temporary assignments during an emergency or disaster situation as requested by the Disaster Services Agency and as directed by the Governor.
6. Shall conduct personnel training programs in civil defense and disaster operations.
7. Shall make its buildings and facilities available for use as fallout shelters, mass care centers, disaster assistance centers and interdepartmental uses as required.
8. Shall assist local governments and other state agencies by providing personnel, equipment and other resources as required.
9. Shall establish lines of emergency interim succession as required by Sec. 161.01 - 161.29 of the Ohio Revised Code.
10. Shall establish economic stabilization controls.
11. Shall cooperate with all federal and state agencies in planning and executing disaster related functions.
12. Shall assist in the implementation of the Emergency Resources Management Program.
13. Shall utilize existing communications resources for warning and disaster operations.
14. Shall provide technical assistance to state and local organizations to assist in the development and coordination of plans for emergency operations.

## SPECIFIC ASSIGNMENTS

The Adjutant General as Director of Disaster Services:

1. Shall be responsible for the coordination of all emergency communications during an emergency or disaster situation.
2. Shall coordinate all damage assessment operations in a disaster area.
3. Shall be responsible for alerting and mobilizing all state departments and agencies at the time of an emergency or disaster situation.
4. Shall prepare and maintain, in cooperation with Federal and State departments and agencies, disaster preparedness plans, civil defense plans, community shelter plans, and crisis relocation plans.
5. Shall supervise and coordinate the disaster and civil defense planning and activities of State departments and agencies.
6. Shall establish and maintain an Emergency Operations Center to assist the Governor in coordinating and directing civil defense and disaster services activities.
7. Shall coordinate all emergency disaster and civil defense operations with contiguous states.
8. Shall coordinate the establishment, staffing and administration of the State portion of Disaster Assistance Centers.
9. Shall be responsible for public information programs during an emergency or disaster.
10. Shall coordinate and forward requests for federal disaster assistance under Public Law 93-228 and shall be the state coordinating agency responsible for assisting in the administration of federal disaster assistance programs.
11. Shall monitor nuclear accidents and incidents involving hazardous materials during an emergency or disaster situation to be assisted by the Environmental Protection Agency and the Departments of Health and Transportation.

The Adjutant General as Commander of the Ohio National Guard:

1. Shall coordinate the utilization of the Ohio National Guard with local governments during an emergency or disaster situation.
2. Shall make available the resources, services, and equipment of the Ohio National Guard as required during a disaster or emergency.

3. Shall provide air and ground transportation assets as required during a disaster or emergency.
4. Shall provide limited emergency potable water to a disaster area in coordination with the monitoring efforts of the Ohio Environmental Protection Agency and the Ohio Department of Health.

The Superintendent of Public Instruction:

1. Shall encourage and promote disaster preparedness planning and training in educational institutions.
2. Shall assist local government in obtaining federal assistance for the restoration of damaged public facilities and property.
3. Shall encourage the cooperation of local school districts in providing personnel and other resources for use in housing, feeding, transporting and evacuating victims following a disaster.

The Administrator of Employment Services:

1. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
2. Shall provide the resources for the procurement of additional manpower required during a disaster.
3. Shall administer the federal program of Disaster Unemployment Assistance pursuant to Section 407, Public Law 93-288.
4. Shall provide disaster employment information.

The Director of Energy:

1. Shall control the emergency distribution and use of all fuels and energy sources during disaster periods.
2. Shall control the emergency distribution and use of alternate and supplementary sources of power during disaster periods.
3. Shall maintain an inventory of all fuels in the State of Ohio which would be available during a period of disaster, and plan for their availability and use at such time.

The Director of Administrative Services:

1. Shall plan for the emergency use of buildings, lands and facilities during a disaster situation.
2. Shall acquire land, facilities, or other resources from the private sector as required for state operations in a disaster area.

3. Shall provide personnel for staffing of Disaster Assistance Centers as required.
4. Shall assist local government in obtaining federal assistance for the restoration of damaged public facilities and property.
5. Shall provide technical personnel to local government for the inspection, emergency repair or demolition of damaged public structures.
6. Shall conduct training programs in civil defense and disaster operations.
7. Shall maintain an alternate seat of state government as required.
8. Shall provide damage assessment teams to the Disaster Services Agency upon call.
9. Shall establish procedures for the preservation of public records during disasters.
10. Shall establish temporary mobile home sites as required.
11. Shall provide and operate a state administrative telephone system in a disaster area.

The Director of the Commission on Aging:

1. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
2. Shall provide specialized services to the aged in a disaster area to include outreach programs, meals and counseling.
3. Shall coordinate with the local commissions for the use of their facilities for Disaster Assistance Centers, mass feeding centers and other disaster related activities.
4. Shall coordinate with local commissions to provide qualified senior citizens to assist in disaster related activities.

The Director of Youth Commission:

1. Shall provide land and facilities under its control for use as mass care centers and mobile home sites during an emergency.
2. Shall assist local governments in juvenile counseling and related programs following a disaster.

The Director of Agriculture:

1. Shall plan for the emergency supply and distribution of food products and livestock feed during disaster periods.
2. Shall be responsible for obtaining additional assistance from U.S. Department of Agriculture through the State Emergency Board.
3. Shall provide damage assessment teams to the Disaster Services Agency upon call.

The Director of Commerce:

1. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
2. Shall provide assistance to local building and construction associations in a disaster area.
3. Shall provide assistance to local government in obtaining rights of way to private property.
4. Shall provide, as required, information on the availability of fire fighting equipment on a state wide or area basis.

The Director of Economic and Community Development:

1. Shall maintain an inventory of Ohio industries.
2. Shall promote industrial preparedness and recovery planning.
3. Shall constitute a planning group in a disaster area to:
  - a. Obtain federal and state financial assistance; and
  - b. Coordinate local and regional planning agencies in recovery programs.
4. Shall determine the availability of temporary housing in a disaster area and be prepared to administer the Temporary Housing Program pursuant to Section 404, Public Law 93-288.
5. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.

The Director of Environmental Protection:

1. Shall protect public water sources from the effects of chemical contamination.
2. Shall provide damage assessment teams to the Disaster Services Agency upon call.
3. Shall monitor contamination and pollution during disaster periods.



4. Shall assist local government in obtaining federal assistance for the restoration of damaged public facilities and property.
5. Shall be responsible for the disposal of hazardous materials following a disaster, including the selection of disposal sites and disposal procedures.
6. Shall advise local government of selection of debris disposal sites as it relates to environmental protection.
7. Shall be responsible for the decontamination of public waterways for use as a source of potable water during disaster periods.

The Director of Health:

1. Shall coordinate the County Health Departments for the implementation of programs for emergency health and medical services.
2. Shall be responsible for coordinating all health and medical activities between state and local agencies and agencies of the federal government.
3. Shall seek and administer any health assistance programs which may be available for immediate aid to individuals during a disaster.
4. Shall be responsible for insuring adequate supplies of blood, eye glasses, dentures, hearing aids, other prosthetic devices and therapeutic supplies in coordination with other state, local and volunteer organizations.
5. Shall insure the maintenance and restoration of public health and sanitation standards in a disaster area.
6. Shall be responsible for certifying the safeness of private water supply sources in a disaster area.
7. Shall prescribe methods for protection from the effects of biological contamination.
8. Shall maintain an inventory of hospitals, health care facilities and emergency medical equipment available for use during disaster situations.
9. Shall procure emergency medical supplies and equipment during a disaster situation.
10. Shall monitor disaster areas to insure rodent and vector control.
11. Shall provide damage assessment teams to the Disaster Services Agency upon call.

The Director of Highway Safety:

1. Shall develop and operate a warning system for alerting the general populace and State departments and agencies in case of emergencies.

The Director of Industrial Relations:

1. Shall provide to the Disaster Services Agency a listing of all mines, quarries, oil wells and open pits as required.

The Director of Insurance:

1. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
2. Shall determine the extent and type of insurance required in a disaster area to meet the prerequisite of Section 314, Public Law 93-288.

The Director of Liquor Control:

1. Shall provide auxiliary law enforcement personnel as required.
2. Shall provide and distribute liquor and alcohol necessary for medical purposes during a disaster.

The Director of Mental Health and Mental Retardation:

1. Shall provide land and facilities under its control for use as mass care centers and mobile home sites during an emergency.
2. Shall coordinate the activities necessary to provide the staff, supplies and facilities necessary to treat victims suffering from disaster related mental disorders with particular emphasis on Section 413, Public Law 93-288.
3. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
4. Shall provide auxiliary law enforcement personnel as required, when commissioned by local government authority.

The Director of Natural Resources:

1. Shall provide land and facilities under its control for use as mass care centers and mobile home sites during an emergency.
2. Shall provide damage assessment teams to the Disaster Services Agency as required.

3. Shall provide information on available water resources within the state.
4. Shall provide access for fire fighting equipment in forested areas.
5. Shall provide watercraft for rescue and related operations.
6. Shall develop a plan for the use of privately owned watercraft and dock facilities.
7. Shall assist local government in obtaining federal assistance for the restoration of damaged public facilities and property.
8. Shall coordinate with the U. S. Army Corps of Engineers in assisting local governments in the emergency repair of dikes, levees, channels and drainage facilities.

**The Public Utilities Commission:**

1. Shall actively encourage emergency and disaster planning by public and private utility and transportation companies.
2. Shall issue guidelines covering the use of utility and transportation resources during an emergency.
3. Shall coordinate the commitment of additional utility and transportation companies during an emergency.
4. Shall coordinate all public and private utilities and transportation resources in a designated disaster area and also serve as the state liaison with federal agencies.
5. Shall provide damage assessment teams to the Disaster Services Agency upon call.
6. Shall provide for the inter-utility exchange of engineers and trained technicians required for emergency operations.
7. Shall enforce Interstate Commerce Commission and U. S. Department of Transportation regulations for shipments of radioactive and other hazardous materials transported within the border of the state.

**The Chancellor of the Board of Regents:**

1. Shall encourage and promote disaster preparedness planning and training in educational institutions.
2. Shall assist local government in obtaining federal assistance for the restoration of damaged public facilities and property.
3. Shall represent all institutions of higher education in obtaining federal disaster assistance.

The Director of Public Welfare:

1. Shall coordinate the County Welfare Departments for the implementation of a comprehensive program of emergency assistance to families following a disaster to include:
  - a. Child welfare
  - b. Food stamps
  - c. Inter-county welfare operations
  - d. Non-deferable grants
  - e. Welfare inquiries
  - f. Medical treatment
2. Shall maintain liaison with private relief organizations and public agencies during the operation of mass care centers.
3. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
4. Shall assist private relief organizations and/or public agencies during the operation of food and clothing supply and distribution points in disaster areas.

The Director of Rehabilitation and Correction:

1. Shall provide land and facilities under its control for use as mass care centers and mobile home sites during an emergency.
2. Shall provide inmate labor for use in a disaster area.
3. Shall furnish support to correctional activities of local government during periods of disaster.

The Administrator of Rehabilitation Services:

1. Shall provide for emergency vocational rehabilitation services in a disaster area.
2. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.

The Tax Commissioner:

1. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.
2. Shall assist local government in determining tax revenue losses as it pertains to Section 414, Public Law 93-288.

The Chairman of the Ohio Turnpike Commission:

1. Shall develop traffic control plans for the Ohio Turnpike for use in an emergency or disaster situation.
2. Shall provide for the emergency issuance of special use permits for travel on the turnpike during emergencies.
3. Shall provide for the suspension of oversize and overweight regulations for vehicles, mobile homes and trailers during a disaster situation.

The Administrator of Worker's Compensation:

1. Shall provide representatives in a Disaster Assistance Center to give advice and assistance to disaster affected individuals.

The Director of Transportation:

1. Shall activate and operate the State Emergency Highway Traffic Regulation Center and the Emergency Highway Traffic Regulation posts.
2. Shall develop traffic control plans for use in an emergency or disaster situation.
3. Shall provide for the emergency issue of special use permits to authorize specific travel over designated routes during emergency or disaster situations.
4. Shall establish special provisions for the issuance of oversize and overweight permits and suspend any conditions deemed necessary by the Department of Transportation to facilitate the movement of vehicles and mobile homes during an emergency situation.
5. Shall provide damage assessment teams to the Disaster Services Agency upon call.
6. Shall provide technical resources for the inspection, repair, alteration, condemnation and destruction of damaged transportation facilities following a disaster.
7. Shall be responsible for construction and engineering services in a disaster area to include the procurement of equipment and materials from private contractors.
8. Shall assist local government in obtaining federal assistance for the restoration of damaged public facilities and property.

Nuclear Waste In Ohio  
A Status Report: March 1980

Harold W. Kohn

Introduction: Like every state in the union Ohio generates nuclear waste. The amount is not excessive, about three percent of the U.S. total which ranks Ohio fourteenth in the nation. Waste is generated not only by power reactors and fuel processing plants but also from research institutions, defense related activities, industrial sources and especially medical facilities.

Recent national actions have precipitated a near crisis in low-level waste management. In October, 1979, Governors Ray of Washington and List of Nevada closed their low-level waste sites leaving only the Barnwell site in South Carolina open. Governor Riley of South Carolina has announced his intention of not only of limiting the amount of waste shipped to Barnwell, but also of reducing each month the amount of low-level waste which will be accepted there.

Policy Statement: Nuclear energy is an area of controversy in some circles. The Ohio E.P.A. does not assume an advocacy position vis-a-vis nuclear energy. Nuclear energy is a fact of present-day life. The function of the Ohio E.P.A. is to see that nuclear activities are carried out in an environmentally acceptable manner.

In 1978, the Office of Waste Isolation, then in Oak Ridge, Tennessee, contacted thirty-six state governors concerning research effects aimed towards locating a high-level waste repository in their states. Governor Rhodes directed Ohio DOE director Ryan to inform U.S. DOE that Ohio was not to be considered as a candidate for a high-level nuclear waste repository. The Governor cited the congestion in transportation and population in the candidate area (the Salina formation underlying northeast Ohio) as well as the non-arid character of the State. We support the Governor's viewpoint, and believe that for at least the first two high-level waste repositories more suitable sites would be available in the arid western U.S. Furthermore, we do not believe that extended, sophisticated and expensive studies as proposed by USDOE are necessary to belabor this point. Such studies help postpone the implementation of a solution.

The situation concerning low-level radioactive waste is considerably different. Low-level waste repositories do not present anything like the problems that a high-level waste repository does. Hence Ohio feels a certain responsibility for caring for its low-level radwaste. We support the concept of a regional (North Central) low-level waste repository and, given a suitable siting study and appropriate tradeoffs would consider the siting of such

a repository in Ohio. As a matter of record, there are already two such repositories in the state.

Ohio's Nuclear Waste: The following two diagrams show the amounts and sources of low-level radioactive waste for the United States and for Ohio. Unfortunately this study does not identify industrial sources; these have been calculated by difference. An update of this study which will have a better estimate of industrial waste is expected shortly. The principal nuclear waste generators are, briefly described in the following paragraphs.

Davis-Besse Nuclear Power Plant. The 910 megawatt (electrical) pressurized water reactor at Port Clinton is Ohio's only operating nuclear power reactor. During 1978, about 340 cubic meters\*, of low-level waste containing about 3.3 curies of activity (mostly 58 Co, 54 Mn, and 60 Co) were shipped off-site. One truck shipment went to Sheffield Illinois, the other nineteen shipments went to Barnwell, South Carolina. In 1979, all thirteen truck shipments went to Barnwell, carrying about 260 cubic meters containing about three curies of activity. If Davis-Besse were operated more nearly at capacity, the total amount of waste might be greater. Larger waste shipments should be anticipated for 1980 inasmuch as a refueling is scheduled for this spring and refuelings generate more waste. Davis-Besse is unique inasmuch it is the only Ohio facility which generates high-level waste. About 400 people are employed at the Davis-Besse facility.

Portsmouth Gaseous Diffusion Plant. This plant has operated since 1954 separating uranium isotopes by the gaseous diffusion process. An expansion of the plant to include a centrifuge facility has been planned for the future. During 1979, Portsmouth generated 7600 cubic feet of radioactive waste containing 1.4 curies of radioactivity, mostly uranium and radium. This waste is buried on site. Portsmouth employs about 3500 people.

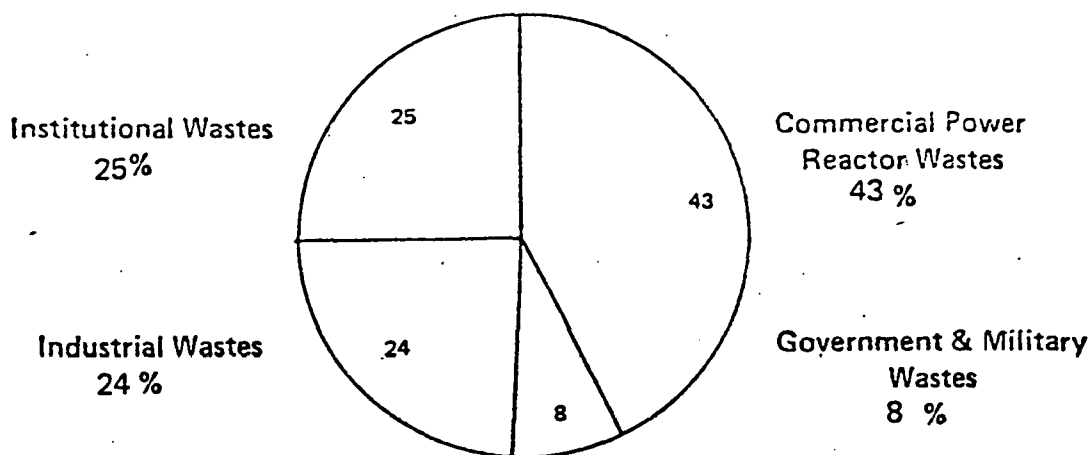
National Lead Co, Fernald Ohio. National Lead is a "feed materials plant", making fuel elements for government reactors since 1951. In 1979, 56,712 cubic feet of radioactive waste containing 49.169 curies of radioactivity, mostly uranium, thorium, radium 226 and radium 228 were generated. This material has been buried on site in clay-lined and (more recently) rubber-lined pits. National Lead employs 538 people.

Accuray (Formerly Industrial Nucleonics) Columbus, Ohio. Accuray has been making thickness gauges since 1950. About twice a year a shipment of three to four 30 gallon drums containing from 100 to 300 curies each is sent to Barnwell, South Carolina. These are sealed sources of isotopes such as 137 Caesium,

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\* A cubic meter is slightly greater than a cubic yard, or is about 30 cubic feet.

UNITED STATES



Total Low-Level Radioactive Waste Generated  
(Percentages by Sources)

Commercial Power Reactor Wastes (a,b,c,d)

(No. of Installations 66 )

<u>Waste Form</u>	<u>m<sup>3</sup>/yr</u>	<u>Ci/yr</u>	<u>Typical Radionuclides</u>
Spent resins, filter sludges, and evaporator bottoms	17,116	41,316	<sup>51</sup> Cr
			<sup>54</sup> Mn
Dry compressible waste and contaminated equipment	16,653	2,723	<sup>59</sup> Fe
			<sup>58</sup> Co
			<sup>60</sup> Co
			<sup>65</sup> Zn
			<sup>134</sup> Cs
Irradiated components	1,794	360,515	<sup>135</sup> Cs
			<sup>137</sup> Cs
Total	35,563	404,554	<sup>140</sup> Ba
			<sup>141</sup> Ce

Institutional Wastes (Medical Facilities & Universities)(e)

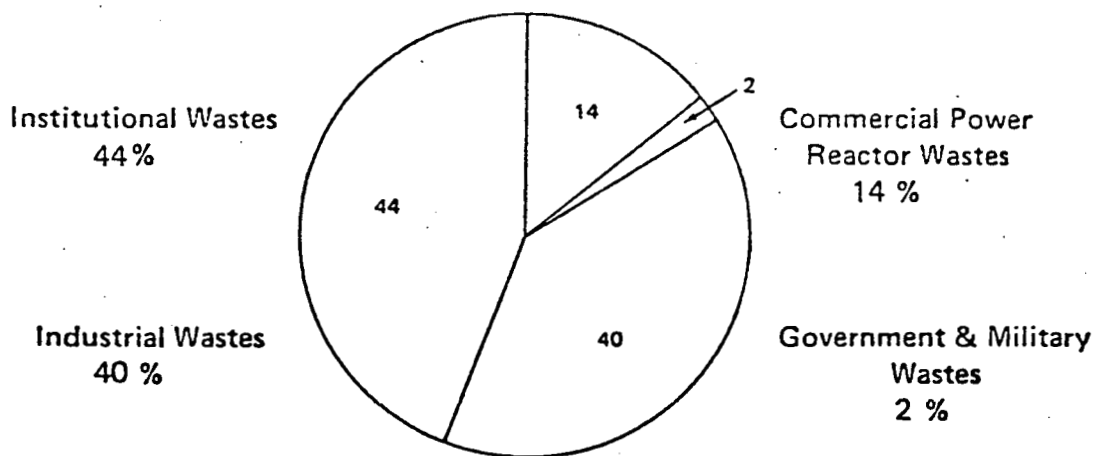
(No. of Installations 2,390 )

<u>Waste Form</u>	<u>m<sup>3</sup>/yr</u>	<u>Ci/yr</u>	<u>Typical Radionuclides and % of Total</u>			
Biological	1,803	209	<sup>3</sup> H	29.1%	<sup>67</sup> Ga	0.1%
			<sup>14</sup> C	8.9%	<sup>Tc</sup> <sup>99m</sup>	30.9%
Scintillation Vials	9,223	1,081	<sup>32</sup> P	5.3%	<sup>125</sup> I	3.5%
			<sup>35</sup> S	2.0%	<sup>131</sup> I	5.9%
Solidified and Absorbed Liquids	1,461	171	<sup>51</sup> Cr	1.6%	Misc.	12.7%
Dry Trash	8,761	1,026				
Total	21,248	2,487				





OHIO



Total Low-Level Radioactive Waste Generated Within the State  
(Percentages by Source)

Commercial Power Reactor Wastes (a)

(No. of Installations 1 )

<u>Waste Form</u>	<u>m<sup>3</sup>/yr</u>	<u>Ci/yr</u>	<u>Typical Radionuclides</u>
Spent resins, filter sludges, and evaporator bottoms	261	1	<sup>51</sup> Cr <sup>54</sup> Mn <sup>59</sup> Fe <sup>58</sup> Co <sup>60</sup> Co
Dry compressible waste and contaminated equipment	49	2	<sup>65</sup> Zn <sup>134</sup> Cs <sup>136</sup> Cs <sup>137</sup> Cs
Irradiated components	0	0	<sup>140</sup> Ba <sup>141</sup> Ce
<b>Total</b>	<b>310</b>	<b>3</b>	

Institutional Wastes (Medical Facilities & Universities) (e)

(No. of Installations 91 )

<u>Waste Form</u>	<u>m<sup>3</sup>/yr</u>	<u>Ci/yr</u>	<u>Typical Radionuclides</u>
Biological	79	9	<sup>3</sup> H <sup>67</sup> Ga
Scintillation Vials	408	46	<sup>14</sup> C <sup>Tc</sup> <sup>99m</sup>
Solidified and Absorbed Liquids	64	7	<sup>32</sup> P <sup>125</sup> I
Dry Trash	387	44	<sup>35</sup> S <sup>131</sup> I
<b>Total</b>	<b>938</b>	<b>106</b>	<sup>51</sup> Cr

OHIO

Industrial Wastes (f)			(No. of Licensees 313 )
	<u>m<sup>3</sup>/yr</u>	<u>Ci/yr</u>	<u>Typical Radionuclides</u>
Estimated State Total	844	N/A	N/A

Government & Military Wastes (Buried at Commercial Sites) (i)			(No. of Installations 1 )
<u>Waste Classification</u>	<u>m<sup>3</sup>/yr</u>	<u>Ci/yr</u>	<u>Typical Radionuclides</u>
Biological Wastes			
Dry Solids	42	4	N/A
Solid Sludge			
Not Classified			
Total	42	4	

**Total Volume Generated Within State** m<sup>3</sup>/yr 2,134

- a. These are based on USNRC records for 1978.
- b. An NUS study for the U.S. Office of Nuclear Waste Isolation (Report No. ONWI-20 NUS-3314) is the basis for these data.
- c. These data are based both on USNRC records for 1978 and on NUS Report No. ONWI-20 NUS-3314.
- d. These data were based on communication with the reactor plant operator.
- e. These data were based on a draft of the update of the USNRC Institutional Radioactive Wastes Report, No. NUREG/CR-0028.
- f. These data were based on a ratio: the number of industrial NRC licenses by state to the total non-agreement state industrial NRC licenses.
- g. The basis for these data is the ratio of the state population to the total U.S. population.
- h. The basis for the total United States volume and curie content was the difference between all other waste and the total amount buried.
- i. The basis for this information is the USDOE Solid Waste Information Management Systems Report for FY 1978.

**SOURCE:** Preliminary State-by-State Assessment of Low-Level Radioactive Wastes Shipped to Commercial Burial Grounds, NUS Corporation

60 Cobalt, 90 Strontium or 85 Krypton, and are generally heavily shielded with concrete. Accuray employs about 1500 people.

Ohmart Industries, Cincinnati, Ohio. Ohmart has also been making thickness gauges since 1957. Last year they shipped six 55 gallon drums to Barnwell containing about fifty curies of Cs 137. Most of their sources are returned to the producer for recycle, or are recycled in the plant. Ohmart employs 130 people.

Institutional wastes: One further source of Ohio's low-level radioactive waste comes from its 91 medical facilities and universities. Most of this material, scintillation vials and dry trash, could be safely incinerated, but at present there are no installations in the U.S. which can process commercial waste this way. (It is interesting to note that low-level radwaste can be incinerated at Mound Laboratories, but this is not commercial waste). There are also six V.A. Hospitals in Ohio who are authorized to incinerate their low-level waste and who indeed do so.

Condensed History of Low-level Waste Disposal: The following table shows the low-level waste burial sites in the contiguous United States. The DOE sites were initiated during the war and handle exclusively DOE wastes. Some high-level waste is also stored at these sites. The first commercial site to open was the Beatty, Nevada site (1962), followed by West Valley, N.Y. (1963) Morehead, Kentucky (1963), Richland, Washington (1965), Sheffield, Illinois (1967) and Barnwell, South Carolina, (1971).

Three of these sites are now closed. West Valley was closed in 1975 after experiencing difficulties with water in the trenches. The land and site are presently owned by the State of New York. At present USDOE is encouraging re-opening of the site, but there are serious difficulties with both the problem of the neutralized high-level reprocessing waste sludge on the same site, the suit between the State of New York and the Federal Government, and the politics generated by this situation.

The Sheffield facility ran out of available space in early 1978. The operators (Nuclear Engineering Co.) had applied for a license to expand the facility but this had not been acted upon by last year. Accordingly NECO, finding the operation unprofitable, has withdrawn their license application.

The Morehead (Maxey Flats) facility began experiencing water management difficulties around the middle of the last decade and finally at the end of 1977, the State of Kentucky bought out the operator (for \$2 million) and is presently operating the site. Although there is still burial space available at Maxey Flats, the State of Kentucky has placed a 1.0¢ per pound tax on all waste going to this facility, thus pricing it out of the market. It has remained essentially unused for the last two years.

TABLE  
Survey of Existing Low-Level Waste Disposal Facilities

<u>Operator</u>	<u>Location</u>	<u>Commercial Capacity (m<sup>3</sup>)</u>	<u>Climate</u>	<u>Nearby Rivers</u>	<u>Cover Depth (m)</u>	<u>Observed Radionuclide Migration</u>
DOE	Hanford, WA		Semi-Arid	10 km to Columbia	2.5	Through Uptake by Deep Rooted Plants
NECO	Richland, WA	9 x 10 <sup>5</sup>	Semi-Arid	10 km to Columbia	2	Not Observed
NECO	Beatty, NV	7 x 10 <sup>5</sup>	Arid	3 km to Amorgosa	2	Not Observed
DOE	Inel, ID		Semi-Arid	3 km to Big Lost	1	Possibly by On-Site Ground Water
DOE	Los Alamos, NM		Semi-Arid	8 km to Rio Grande	1.5	On Site Vadose Water Site
NECO	Sheffield, IL	2 x 10 <sup>6</sup>	Humid	Site Boundary	1	Not Observed
NECO	Morehead, KY	3 x 10 <sup>6</sup>	Humid	500 m	1	On and Off-Site Ground and Surface Water
DOE	Oak Ridge, TN		Humid	On-Site	1	On-Site Ground Water, Off-Site Surface Water
DOE	Savannah River, SC		Humid	On-Site Savannah	1.2	On-Site Ground Water
CHEM NUC	Barnwell, SC	2 x 10 <sup>6</sup>	Humid	Site Boundary	3	Not Observed
NFS	West Valley, NY	2 x 10 <sup>5</sup>	Humid	On-Site	3	On-Site Ground Water, Off-Site Surface Water

During October of 1979, both the Beatty, Nevada site and the Richland Washington site were closed by their respective governors. The reasons given were slovenly packaging of the waste (several containers were found to be leaking). This created a considerable pressure upon radwaste generators and also upon the Barnwell site. The sites were reopened in November but the governors involved served notice upon the United States in general and the nuclear industry in particular; the status quo cannot continue. New sites will have to be found.

Apparently enough pressure was generated on the executive branch to result in an executive order on February 12, 1980, creating a State Planning Council on Radioactive Waste Management as had been recommended last year by the Inter-Agency Review Group report (IRG). Part of the text of this announcement follows:

By the authority vested in me as President by the Constitution and laws of the United States of America, and in order to create, in accordance with the provisions of the Federal Advisory Committee Act, as amended (5 U.S.C. App. I), an advisory committee on radioactive waste management, it is hereby ordered as follows:

1-1. Establishment

1-101. There is established the State Planning Council on Radioactive Waste Management.

1-102. The Council shall be composed of eighteen members as follows:

(a) Fourteen members designated by the President as follows:

- (1) Eight Governors of the various states.
- (2) Five State and local elected government officials other than governors.
- (3) One tribal government representative.

(b) The heads of the following Executive agencies:

- (1) Department of the Interior.
- (2) Department of Transportation.
- (3) Department of Energy.
- (4) Environmental Protection Agency.

The members appointed by the President are:

Richard Riley, Chairman, Governor of South Carolina  
Paul Hess, Vice Chairman, State Senator of Kansas  
John Evans, Governor of Idaho  
Dixie Lee Ray, Governor of Washington  
Robert List, Governor of Nevada  
Bruce King, Governor of New Mexico  
Harry Hughes, Governor of Maryland  
John Dalton, Governor of Virginia

Ella Grassō, Governor of Connecticut  
Mary Louise Simons, Chairman, Dane County Board of Commissioners  
(Wisconsin)  
Gordon Voss, State Representative Minnesota  
Ernest Morial, Mayor of New Orleans  
Stanley Fink, Assemblyman, New York  
Peter McDonnell, Chairman, Navaho Nation

There have also been a series of meetings initiated late last year by the National Governors Conference. The North Central Regional meeting was held in East Lansing, Michigan and a meeting of governors was held in February in Phoenix. Another regional meeting is scheduled for March 27, 1980 in East Lansing.

Although the President's council is expected to deal principally with the high-level waste problem and The Governor's Conference was formed to deal principally with low-level waste, interaction between the two groups is inevitable. Low-level and high-level waste present the same institutional and political problems. This is indeed unfortunate since low-level waste would be easily dealt with given a reasonable site selection and management program coupled with a vigorous promotion of incineration (of very low-level, i.e. hospital and institutional waste). The same can scarcely be said of the high-level problem.

A more complete description of this waste disposal problem is given in the appendix. This material is abstracted from a draft report prepared for the Ohio Department of Energy.

INTERSTATE NUCLEAR COMPACT

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A DRAFT COMPACT

INTERSTATE NUCLEAR COMPACT

(1) The Interstate Nuclear Compact is hereby enacted into law by the State of \_\_\_\_\_ as a party along with the other States joining therein in accordance with the terms of the Compact.

(2) The Compact shall become effective when it has been enacted into law by the legislatures of at least \_\_\_\_\_ signatory States, and has been consented to by the Congress of the United States as provided in Article IX of the Compact.

ARTICLE I

POLICY AND PURPOSE

The party States recognize that the proper employment of scientific and technological discoveries and advances in nuclear and related fields, and the direct and collateral application and adaptation of processes and techniques developed in connection therewith, properly correlated with the other resources of the region, can assist substantially in the industrial progress <sup>and</sup> further development of the economy of the region. They also recognize that optimum benefit from nuclear and related scientific or technological resources, facilities and skills requires systematic encouragement, guidance, assistance and promotion from the party States on a cooperative basis. It is further recognized by the

party States that a regional concept for the safe handling, transport, treatment and storage or disposal of low-level radioactive waste is necessary to provide for long-term management of the waste to protect the population and environment and to assist in the orderly economic development of the party States. It is the purpose of this Compact to promote interstate comity, to remove causes of present and future controversies and to provide the instrument and framework for a cooperative effort relating to such low-level radioactive waste concerns.

## ARTICLE II

### DEFINITION OF TERMS

As used in this Compact:

(a) The term "Board" shall mean the Interstate Nuclear Compact Board as created by Article III of this Compact.

(b) The term "Disposal" shall mean the placement or distribution of low-level radioactive waste in its final placement medium.

(c) The term "Extended Care" shall mean those procedures instituted at a disposal site to protect man and his environment after said disposal site has reached the end of its useful life.

(d) The term "Facility" shall mean the structures, equipment or devices related to the treatment, storage, transportation or disposal of low-level radioactive wastes.

(e) The term "Generator" shall mean any person or concern, who in the course of their activity, produce waste containing radioactive matter.

(f) The term "Low-Level Radioactive Waste" shall mean waste containing radioactive nuclides emitting primarily Beta and/or Gamma radiation, and which is not spent fuel or high level waste and containing less than ten nanocuries per gram of any transuranic elements or as otherwise defined in 10 CFR 61, "Disposal of Low-Level Radioactive Waste and Low-Activity Bulk Solid Waste."

(g) The term "Radiation" shall mean the energy in the form of waves or particles emitted from a nuclide.

(h) The term "Site" shall mean all property, real or personal, considered for or dedicated to the treatment, storage, or disposal of low-level radioactive waste.

(i) The term "State" or "States" shall mean a State or States of the United States and more specifically that State, or those States that are a party to this Compact.

(j) The term "Storage" shall mean the containment of low-level radioactive waste prior to treatment or disposal.

(k) The term "Treatment" shall mean the physical processing of low-level radioactive waste primarily for volume reduction purposes.

(l) The term "Transport" shall mean the movement of radioactive waste from one point to another by means of a common carrier.

(m) The term "Transuranic" shall mean all elements above Uranium in the Periodic Table and including Uranium-233.

### ARTICLE III

#### THE BOARD

(a) There is hereby created an agency of the party States to be known as the "Interstate Nuclear Board" (hereinafter called the Board). The Board shall be composed of one member from each party State designated or appointed in accordance with the laws of the State which he represents, and each such member shall serve and be subject to removal in accordance with such laws. Any member of the Board may provide for the discharge of his duties and the performance of his functions (either for the duration of his membership or for any lesser period of time) by a deputy or assistant, if the laws of his State make specific provisions therefor. The Federal Government may be represented without vote if provision is made by Federal law for such representation.

(b) The Board members of the party States shall each be entitled to one vote on the Board. No action of the Board shall be binding unless a majority of those members cast their votes in favor thereof.

(c) The Board shall have a seal.

(d) The Board shall elect annually, from among its members, a chairman, a vice chairman, and a treasurer. The Board shall appoint and fix the compensation of an Executive Director who shall serve at its pleasure and who shall also act as Secretary, and who, together with the Treasurer, and such other personnel as the Board may direct, shall be bonded in such amounts as the Board may require.

(e) The Executive Director, with the approval of the Board, shall appoint and remove or discharge such personnel as may be necessary for the performance of the Board's functions irrespective of the civil service, personnel or other merit system laws of any of the party States.

(f) The Board may establish and maintain, independently or in conjunction with any one or more of the party States, or its institutions or subdivisions, a suitable retirement system for its full-time employees. Employees of the Board shall be eligible for social security coverage in respect of old age and survivors insurance provided that the Board takes such steps as may be necessary pursuant to Federal law to participate in such program of insurance as a governmental agency or unit. The Board may establish and maintain or participate in such additional programs of employee benefits as may be appropriate.

(g) The Board may accept, or contract for the services of personnel from any State or the United States or any subdivision or agency thereof, from any interstate agency, or from any institution, person, firm or corporation.

(h) The Board may accept for any of its purposes and functions under this Compact any and all donations, and grants of money, equipment, supplies, materials and services (conditional or otherwise) from any State or the United States or any subdivision or agency thereof, or interstate agency, or from any institution, person, firm, or corporation, and may receive, utilize, and dispose of the same. The nature, amount and conditions, if any, attendant upon any donation or grant accepted pursuant to this paragraph together with the identity of the donor grantor or lender, shall be detailed in the annual report of the Board.

(i) The Board shall adopt bylaws, rules and regulations for the conduct of its business, and shall have the power to amend and recind these bylaws, rules, and regulations. The Board shall publish its bylaws, rules, and regulations in convenient form and shall file a copy thereof, and shall also file a copy along with any amendments thereto, with the appropriate agency or officer in each of the party States.

(j) The Board annually shall make to the Governor of each party State, a report covering the activities of the Board for the preceding year, and embodying such recommendations as may have been adopted by the Board, which report shall be transmitted to the legislature of said State. The Board may issue such additional reports as it may deem desirable.

## ARTICLE IV

### FINANCES

(a) The Board shall submit to the governor or designated officer or officers of each party State a budget of its estimated expenditures for such period as may be required by the laws of that State for presentation to the legislature thereof.

(b) The Board's budgets of estimated expenditures for its operation shall each contain specific recommendations of the amount or amounts to be appropriated by each of the party States. Each of the Board's requests for appropriations pursuant to a budget of estimated expenditures shall be apportioned equally among the party States. Subject to appropriation by their respective legislatures, the Board shall be provided with such funds by each of the party States as are necessary to provide the means of establishing and maintaining facilities, a staff of personnel, and such activities as may be necessary to fulfill the powers and duties imposed upon and entrusted to the Board, but not including costs of disposal site(s) preparation or operation.

(c) The Board may meet any of its obligations in whole or in part with funds available to it under Article III (h) of this Compact, provided that the Board takes specific action setting aside such funds prior to the incurring of any obligations to be met in whole or in part in this manner. Except where the Board makes use of funds available to it under Article III (h) hereof, the Board shall not incur any obligation prior to

the allotment of funds by the party jurisdictions adequate to meet the same.

(d) Any expenses and any other costs for each member of the Board in attending Board meetings shall be met by the Board.

(e) The Board shall keep accurate accounts of all receipts and disbursements. The receipts and disbursements of the Board shall be subject to the audit and accounting procedures established under its bylaws. However, all receipts and disbursements of funds handled by the Board shall be audited yearly by a certified or licensed public accountant and the report of the audit shall be included in and become a part of the annual report of the Board.

(f) The accounts of the Board shall be open at any reasonable time for inspection to persons authorized by the Board, and duly designated representatives of governments contributing to the Board's support.

## ARTICLE V

### ADVISORY COMMITTEES

The Board may establish such advisory and technical committees as it may deem necessary, membership on which may include but not be limited to private citizens, expert and lay personnel, representatives of industry, labor, commerce, agriculture, civic associations, medicine, education, voluntary health agencies, and officials of local, State and Federal



Government, and may cooperate with and use the services of any such committees and the organizations which they represent in furthering any of its activities under this Compact.

## ARTICLE VI

### POWERS

The Board shall have power to--

(a) Encourage and promote cooperation among the party States in developing and instituting those technologies and procedures necessary for the safe handling, transport, treatment, and storage or disposal of low-level radioactive waste.

(b) The Board shall, in cooperation with the party States, determine those areas within their geographic boundaries suitable for the storage or disposal of that low-level radioactive waste generated within the party States.

(c) The Board shall, from those areas identified in paragraph (b), select that area or areas to be developed into low-level radioactive waste storage or disposal site(s). The Board shall be responsible for <sup>(MAY CONTRACT →)</sup> contracting with a private party or concern for the development and for the operation of the radioactive waste storage or disposal site(s) selected.

(d) The Board shall establish those fees and charges to be assessed against generators for the storage or disposal of their low-level radioactive waste. Said fees and charges shall cover but not necessarily be limited to:

1. Cost of operation and maintenance of the storage or disposal site(s),
2. Cost of liability insurance if said insurance is required by the laws of the State in which the storage or disposal site(s) is located.
3. A prorated portion of the fees and charges, the amount of which to be established by the Board, shall be placed in a trust fund with the State in which the storage or disposal site(s) is located to cover the cost of decommissioning and subsequent extended care of the storage or disposal site(s) after said site has reached the end of its useful life.
4. Should the Board contract with a private party or concern for the operation of a low-level radioactive waste disposal site, the fees and charges shall contain a profit margin for the party or concern. Said profit margin is to be established by the Board.
5. At the discretion of the Board, the fee and charges may also include a profit margin for the host State. Said revenue to be

transferred to the General Operating Fund of the host State at the end of that State's each fiscal year.

(e) The Board shall establish those specifications relative to type of radiation or nuclide limitations, radiation levels, moisture fixation, packaging, segregation, and any other specification which the Board may deem necessary for the low-level radioactive waste to be in suitable form prior to disposal.

(f) The Board shall establish those disposal site monitoring requirements necessary to ensure short- and long-term containment of the radioactive waste, and for protection of the surrounding population and the environment.

(g) The Board shall develop a reporting and manifest system which will render complete accounting of the low-level radioactive waste from the generator to final disposal including disposal location within the storage or disposal site of each waste shipment.

(h) The Board shall develop site security measures which will include but need not be limited to, site security fencing, alarms, posting, security personnel, radiation monitoring (personnel and equipment), property security, and exclusion of unauthorized personnel.

(i) The Board shall establish personnel training requirements which shall include but need not be limited to radiation protection, equipment operation, contingency plans, and site security.

(j) The Board shall develop contingency plans which shall address but need not be limited to such contingencies as spills and repackaging, natural phenomena (fires, explosions, earthquakes, floods, etc.), sabotage, and public incidents.

(k) The Board shall develop decommissioning and extended care plans for the low-level radioactive waste disposal site(s) when said site(s) reach the end of their useful life.

(l) The Board shall prepare, maintain, and implement a regional plan or regional plans for carrying out the duties, powers, or functions conferred upon the Board by this Compact.

## ARTICLE VII

### SUPPLEMENTARY AGREEMENTS(a)

(a) To the extent that the Board has not undertaken an activity or project which would be within its power under the provisions of Article VI of this Compact, any two or more of the party States (acting by their duly constituted administrative officials) may enter into supplementary

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a. Supplementary agreements give state(s) the right to perform studies pertaining to low-level waste without first obtaining Board approval, yet keeping the Board informed of said studies and the results obtained. It also gives the Board the option of assisting in the funding of these studies if it is to their benefit to do so.

agreements for the undertaking and continuance of such an activity or project. Any such agreements shall specify the purpose or purposes; its duration and the procedure for termination thereof or withdrawal therefrom; the method of financing and allocating the costs of the activity or project; and such other matters as may be necessary or appropriate.

No such supplementary agreement entered into pursuant to this article shall become effective prior to its submission to and approval by the Board. The Board shall give such approval unless it finds that the supplementary agreement or activity or project contemplated thereby is inconsistent with the provisions of this Compact or with a program or activity conducted by or participated in by the Board.

(b) Unless all of the party States participate in a supplementary agreement, any cost or costs thereof shall be borne separately by the States party thereto. However, the Board may administer or otherwise assist in the operation of any supplementary agreement.

(c) No party to a supplementary agreement entered into pursuant to this article shall be relieved thereby of any obligation or duty assumed by said party State under or pursuant to this Compact, except that timely and proper performance of such obligation or duty by means of the supplementary agreement may be offered as performance pursuant to the Compact.

(d) The provisions of this article shall apply to supplementary agreements and activities thereunder, but shall not be construed to repeal or impair any authority which officers or agencies of party States may have pursuant to other laws to undertake cooperative arrangements or projects.

## ARTICLE VIII

### OTHER LAWS AND RELATIONS

Nothing in this Compact shall be construed to--

(a) Permit or require any person or other entity to avoid or refuse compliance with any law, rule, regulation, order or ordinance of a party State or subdivision thereof now in existence or hereinafter enacted.

(b) Limit, diminish, or otherwise impair jurisdiction exercised by the Nuclear Regulatory Commission, any agency successor thereto, or any other federal department, agency or officer pursuant to and in conformity with any valid and operative act of Congress; nor limit, diminish, affect, or otherwise impair jurisdiction exercised by any officer or agency of a party State, except to the extent that the provisions of this Compact may provide therefor.

(c) Alter the relations between, and the respective internal responsibilities of, the government of a party State and its subdivisions.

(d) Permit or authorize the Board to own or operate any disposal facility, process equipment, transport equipment or any other appurtenances thereto for commercial purposes.

## ARTICLE IX

### ELIGIBLE PARTIES ENTRY INTO FORCE AND WITHDRAWAL

(a) Any or all of the States of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ shall be eligible to become party to this Compact.

(b) As to any eligible party State, this Compact shall become effective when its legislature shall have enacted the same into law; provided that it shall not become initially effective until enacted into law by \_\_\_\_\_ States, and after ratification by the Congress of the United States pursuant to Article I, Section 10, cl. 3 of the Constitution of the United States which States that any State may with "the consent of Congress... enter into any AGREEMENT or COMPACT with another State."

(c) Any party State may withdraw from this Compact by enacting a statute repealing the same, but no such withdrawal shall become effective until two years after the Governor of the withdrawing State shall have sent formal notice in writing to the Governor of each other party State informing said Governors of the action of the legislature in repealing the Compact and declaring an intention to withdraw. A withdrawing State shall

be liable for any obligations which it may have incurred on account of its party status up to the effective date of withdrawal, except that if the withdrawing State has specifically undertaken or committed itself to any performance of an obligation extending beyond the effective date of withdrawal it shall remain liable to the extent of such obligation.

## ARTICLE X

### SEVERABILITY AND CONSTRUCTION

The provisions of this Compact and of any supplementary agreement entered into hereunder shall be severable and if any phase, clause, sentence or provision of this Compact or such supplementary agreement is declared to be contrary to the Constitution of any participating State or of the United States or the applicability thereof to any government, agency, person, or circumstance is held invalid, the validity of the remainder of this Compact or such supplementary agreement and the applicability thereof to any government, agency, person, or circumstance shall not be affected thereby. If this Compact or any supplementary agreement entered into hereunder shall be held contrary to the Constitution of any State participating therein, the Compact or such supplementary agreement shall remain in full force and effect as to the State affected as to all severable matters. The provisions of this Compact and of any supplementary agreement entered into pursuant thereto shall be liberally construed to effectuate the purposes thereof.



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**CHAPTER 3701-38**

**GENERAL RADIATION PROTECTION STANDARDS**

*Adopted February 15, 1969; effective July 1, 1969*

*Authority: Section 3701.91, Ohio Revised Code*

**Rule 3701-38-01. Definitions.**

As used in rules 3701-38-01 to 3701-38-37 of the Ohio Administrative Code.

(A) "Act" means sections 3701.90 to 3701.99 of the Revised Code

(B) "Airborne radioactive material" means any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors, or gases.

(C) "Calendar quarter" means any period determined according to either of the following subdivisions:

(1) The first period of any year may begin on any date in January provided that the second, third and fourth periods accordingly begin on the same date in April, July and October, respectively, and that the fourth period extend into January of the succeeding year if necessary to complete a three-month quarter. During the first year of use of this method of determination by a registrant, the first period for that year shall also include any additional days in January preceding the starting date of the first period.

(2) The first period in a calendar year of thirteen (13) complete, consecutive calendar weeks; the second period in a calendar year of thirteen (13) complete, consecutive calendar weeks; the third period in a calendar year of thirteen (13) complete, consecutive calendar weeks; the fourth period in a calendar year of thirteen (13) complete, consecutive calendar weeks. Alternatively, the four periods may consist of the first fourteen (14) complete, consecutive calendar weeks; the next twelve (12) complete, consecutive calendar weeks; the next fourteen (14) complete, consecutive calendar weeks; and the last twelve (12) complete, consecutive calendar weeks. If at the end of a calendar year there are any days not falling within a complete calendar week of that year, such days shall be included within the last complete calendar week of the previous year. No registrant shall change the method observed by him of determining calendar quarters except at the beginning of a calendar year.

(D) "Curie" (Ci) means that quantity of radioactive material which decays at the rate of  $3.7 \times 10^{10}$  disintegrations per second. One microcurie (uCi) equals 0.000001 curie or  $3.7 \times 10^4$  disintegrations per second.

- (E) "Director" means the director of the department of health of the state of Ohio.
- (F) "Dose" means the quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body. When a dose during a period of time is specified, the dose means the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time.
- (G) "High radiation area" means any area, accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of one hundred (100) millirems.
- (H) "Individual" means any human being.
- (I) "Occupational dose" means exposure of an individual to radiation (1) in a restricted area; or (2) in the course of employment in which the individual's duties involve exposure to radiation; provided, that occupational dose shall not include any exposure of an individual to radiation for medical purposes by or under the direction of a licensed practitioner of the healing arts.
- (J) "OAC" means the Ohio Administrative Code.
- (K) "Person" means the state, any municipal corporation, political subdivision, public or private corporation, individual, partnership, or other entity.
- (L) "Personnel monitoring equipment" means devices designed to be worn or carried by an individual for the purpose of measuring the dose received (e.g., film badges, pocket chambers, pocket dosimeters, film rings, etc.)
- (M) "Rad" means a measure of the dose of any radiation to body tissues in terms of the energy absorbed per unit mass of the tissue. One rad is the dose corresponding to the absorption of one hundred (100) ergs per gram of tissue. One millirad (mrad) equals 0.001 rad.
- (N) "Radiation" means gamma rays and X-rays, alpha and beta particles, high-speed electrons, neutrons, and other nuclear particles; but not sound or radio waves, or visible, infra-red, or ultra-violet light.
- (O) "Radiation area" means any area, accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of five (5)

millirems or in any five (5) consecutive days a dose in excess of one hundred (100) millirems.

- (P) "Radioactive material" means any material, solid, liquid, or gas, which emits radiation spontaneously.
- (Q) "Radiation machine" means any device capable of producing radiation except devices which produce radiation only from radioactive material.
- (R) "Radiation source" means a radiation machine or radioactive material.
- (S) "Registrant" means a person required by rule 3701-38-06, OAC, to register with the director.
- (T) "Rem" means a measure of the dose of any radiation to body tissue in terms of its estimated biological effect relative to a dose of one roentgen (R) of X-ray. One millirem (mrem) equals 0.001 rem. The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions of irradiation. Any of the following is considered to be equivalent to a dose of one rem:
- (1) A dose of one (1) roentgen due to X-radiation or gamma radiation;
  - (2) A dose of one (1) rad due to X-radiation, gamma radiation, or beta radiation;
  - (3) A dose of 0.1 rad due to neutrons or high energy protons;
  - (4) A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye.
- (U) "Restricted area" means any area access to which is controlled by the registrant for purposes of protection of individuals from exposure to radiation and radioactive materials; provided, area used for residential quarters are not included, although a separate room or rooms in a residential building may be set apart as a restricted area.
- (V) "Roentgen" (R) means a measure of the radiation dose resulting from exposure to X-radiation or gamma radiation of such quantity that the associated corpuscular emission, per 0.001293 grams of air produces in air ions carrying one electrostatic unit of quantity of electricity of either sign. One milliroentgen (mR) equals 0.001 roentgen.
- (W) "Sealed source" means radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release

and dispersal of the radioactive material under the most severe conditions which are likely to be encountered in normal use and handling.

(X) "Survey" means an evaluation of the radiation protection practices incident to the production, use, release, disposal, or presence of radiation sources under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present.

(Y) "Unrestricted area" means any area access to which is not controlled by the registrant for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

#### Rule 3701-38-02. Scope.

Except as otherwise specifically provided, rules 3701-38-01 to 3701-38-37, OAC, apply to all persons to the extent they receive, possess, use, transfer, own, or acquire any radiation source which is not subject to regulation by the United States Atomic Energy Commission;<sup>1</sup> provided that nothing in these rules shall be construed to limit or to require the measurement or the reporting of radiation which is intentionally applied to a patient for medical purposes by or under the direction of a practitioner of the healing arts licensed by the state of Ohio.

#### Rule 3701-38-03. Exemptions

The director may, upon application therefor or upon his own initiative, grant such exemptions or exceptions from the requirements of rules 3701-38-01 to 3701-38-37, OAC, as he determines are authorized by law and will not result in undue hazard to public health and safety or property.

#### Rule 3701-38-04. Prohibited application of radiation to humans.

No person other than a licensed practitioner of the healing arts shall direct or order the application of radiation to any individual; nor shall any person other than a licensed practitioner or a person working under the direction or order of a licensed practitioner apply radiation to any individual. Such direction or order to apply or application of radiation shall be in the course of the practitioner's professional

<sup>1</sup>Radiation sources not subject to regulation by the U.S. Atomic Energy Commission include X-ray machines, radium and certain other naturally occurring radioactive materials, particle accelerators, and radioactive materials produced in particle accelerators.

practice and shall comply with the requirements of 3701-38-01 to 3701-38-37 and 3701-40-01 to 3701-40-13, OAC.

#### Rule 3701-38-05. Communications.

All communications and reports concerning rules 3701-38-01 to 3701-38-37, OAC, and registrations filed thereunder, should be addressed to the director at his office in Columbus, Ohio.<sup>2</sup>

#### Rule 3701-38-06. Registration.

(A) Every person having possession of any radiation source, except persons specifically exempted in rule 3701-38-07, OAC, shall:

(1) Register with the director within ten (10) days after the initial acquisition of a radiation source, on forms<sup>3</sup> prescribed and furnished by the director, indicating the maximum numbers or quantities of radiation sources such person will have on hand at any time during the current registration period; provided, the registration of a person who registered with the director under rules in effect prior to the adoption of this rule shall remain in full force and effect through December 31, 1969.

(2) Designate an individual who will be responsible for carrying out such procedures as may be necessary to assure effective compliance with the applicable requirements of rules 3701-38-01 to 3701-38-37, OAC. Such individual shall be qualified by training and experience to be able to inform himself of any hazards or precautions involved in handling or operating the radiation source for which he is responsible. The duties of the responsible individual may include:

(a) Recommending a detailed program of radiation safety for compliance with all applicable rules.

(b) Giving instructions concerning hazards and safety practices to individuals who may be exposed to radiation from the radiation source.

(c) Making or arranging for surveys and carrying out other procedures as required by rules 3701-38-01 to 3701-38-37, OAC.

When, in the opinion of the director, the individual designated does not have qualifications sufficient to insure safety of the radiation source for which he is responsible, the director may order the registrant to designate another individual who meets the requirements of this subdivision.

<sup>2</sup>Director of Health, Ohio Department of Health, P.O. Box 118, Columbus, Ohio 43216.

<sup>3</sup>Form No. 5514 for radiation sources used for medical purposes; form No. 5515 for radiation sources used for non-medical purposes.

(B) The registrant shall renew his registration with the director on or before January 1, 1970 and biennially thereafter as long as the activity requiring such registration continues.<sup>4</sup>

(C) An acknowledgement of registration will be provided by the director and shall be retained by the registrant for the registration period indicated thereon.

(D) The registrant shall notify the director within ten (10) days after any change which renders the information on the initial registration no longer accurate.

(E) No person, in any advertisement, shall refer to the fact that a radiation source is registered with the director and no person shall state or imply that any activity under such registration has been approved by the director or the department of health.

**Rule 3701-38-07. Exemptions from registration.**

(A) Radioactive materials.

Any person is exempt from rule 3701-38-06, OAC, to the extent that such person receives, possesses, uses, transfers, owns, or acquires:

- (1) Quantities of radioactive material listed in division (B) of this regulation, provided that the possession or use of more than a total of ten (10) such scheduled quantities is not exempt.
- (2) Products or materials containing radioactive material in concentrations not in excess of those listed in division (C) of this regulation.
- (3) Hands or dials of timepieces and other instruments containing luminous radioactive material, provided that persons who apply luminous radioactive material to hands or dials of timepieces and other instruments are not exempt.
- (4) Radioactive materials and products containing radioactive materials which are subject to regulation by the United States Atomic Energy Commission.

<sup>4</sup>A form for the renewal of registration will be mailed to each registrant during the month of December, 1969, and biennially thereafter.

(B) Table of exempt quantities.

Radioactive Material	Column I Not as a Sealed Source (microcuries)	Column II As a Sealed Source (microcuries)
Bismuth 210 (Bi 210)	10	10
Lead 210 (Pb 210)	1	10
Polonium 210 (Po 210)	0.1	1
Radium 224 (Ra 224)	1	10
Radium 226 (Ra 226)	0.1	1
Radium 228 (Ra 228)	0.1	1
Radon 220 (Rn 220)	1	10
Radon 222 (Rn 222)	1	10
Radioactive material not listed above	1	10

(C) Table of exempt concentrations.

Radioactive Material	Column I Gas concentration uCi/ml	Column II Liquid and solid concentration uCi/ml
Bismuth 210 (Bi 210)		4X10 <sup>-4</sup>
Lead 210 (Pb 210)		1X10 <sup>-6</sup>
Polonium 210 (Po 210)	2X10 <sup>-10</sup>	7X10 <sup>-6</sup>
Radium 224 (Ra 224)	2X10 <sup>-9</sup>	2X10 <sup>-5</sup>
Radium 226 (Ra 226)	1X10 <sup>-11</sup>	1X10 <sup>-7</sup>
Radium 228 (Ra 228)	3X10 <sup>-11</sup>	3X10 <sup>-7</sup>
Radon 220 (Rn 220)	1X10 <sup>-7</sup>	
Radon 222 (Rn 222)	1X10 <sup>-8</sup>	
Beta and/or gamma emitters not listed above with half life less than 3 years.	1X10 <sup>-10</sup>	1X10 <sup>-6</sup>
Radioactive material not listed above	1X10 <sup>-11</sup>	1X10 <sup>-7</sup>

Note 1: Many radioisotopes disintegrate into isotopes which are also radioactive. In expressing the concentrations in this division (C), the activity stated is that of the parent isotope and takes into account the daughters.

Note 2: For a combination of isotopes, the limit for the combination should be derived as follows: Determine for each isotope in the product the ratio between its concentration in the product and the exempt concentration. The sum of such ratios may not exceed "1" (unity).

(D) Other exemptions.

The following machines and equipment are exempt from rule 3701-38-06, OAC.

- (1) Domestic television receivers, providing the dose rate at 5 cm from any outer surface is less than 0.5 mrem per hour.
- (2) Other electrical equipment that produces radiation incidental to its operation for other purposes, provided the dose rate to the whole body at the point of nearest approach to such equipment when any external shielding is removed does not exceed 0.5 rem per year. The production testing or factory servicing of such equipment is not exempt.
- (3) Radiation-producing machines while in transit or storage incident thereto.

**Rule 3701-38-08. Records (of radiation sources).<sup>5</sup>**

Each registrant shall keep records showing the receipt, transfer, and disposal of all radiation sources.

**Rule 3701-38-09. Inspections.**

- (A) Each registrant shall afford the director or his agents at all reasonable times opportunity to inspect radiation sources and the premises and facilities wherein such radiation sources are used or stored.
- (B) Each registrant shall make available to the director or his agents for inspection, upon reasonable notice, records maintained pursuant to rule 3701-38-08, OAC.

**Rule 3701-38-10. Tests.**

Each registrant shall perform, upon instructions from the director, or shall permit the director to perform, such reasonable tests as the director deems appropriate or necessary including, but not limited to, tests of:

- (A) Radiation sources;
- (B) Facilities wherein radiation sources are used or stored;
- (C) Radiation detection and monitoring instruments;
- (D) Other equipment and devices used in connection with utilization or storage of registered radiation sources.

<sup>5</sup>Other records — pertaining to surveys, radiation monitoring, and the disposal of radioactive material — may be required to be kept by some registrants. See rule 3701-38-30.

**Rule 3701-38-11. Exposure of individuals to radiation in restricted areas.<sup>6</sup>**

- (A) Except as provided in division (B) of this regulation, no registrant shall possess, use, receive, or transfer radiation sources in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from all radiation sources in the registrant's possession a dose in excess of the limits specified in the following table:

	<u>Rems per calendar quarter</u>
Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads.	1¼
Hands and forearms; feet and ankles.	18¾
Skin of whole body.	7½

- (B) A registrant may permit an individual in a restricted area to receive a dose to the whole body greater than that permitted under division (A) of this rule, provided:
  - (1) During any calendar quarter the dose to the whole body from sources of radiation in the registrant's possession shall not exceed three (3) rems;
  - (2) The dose to the whole body, when added to the accumulated occupational dose to the whole body, shall not exceed 5 (N-18) rems where "N" equals the individual's age in years at his last birthday.
  - (3) The registrant has determined the individual's accumulated occupational dose to the whole body on a form<sup>7</sup> prescribed and provided for this purpose by the director or on a clear and legible record containing all the information required in that form, and has otherwise complied with the requirements of rule 3701-38-12, OAC. As used in division (B) of this rule, "dose to the whole body" shall include any dose to the whole body, gonads, active blood-forming organs, head and trunk, or lens of eye.

<sup>6</sup>Most registrants will not find it necessary to permit exposures in excess of the limits established in division (A) of this rule and may, therefore, ignore division (B) of this rule and all of rule 3701-38-12.

<sup>7</sup>Form No. 4816.

**Rule 3701-38-12. Determination of accumulated dose.**

(A) This regulation contains requirements which must be satisfied by registrants who propose, pursuant to division (B) of rule 3701-38-11, OAC, to permit individuals in restricted areas to receive exposure to radiation in excess of the limits specified in division (A) of rule 3701-38-11, OAC.

(B) Before permitting any individual in a restricted area to receive exposure to radiation in excess of the limits specified in division (A) of rule 3701-38-11, OAC, each registrant shall:

(1) Obtain a certificate on the form<sup>7</sup> referred to in subdivision (B) (3) of 3701-38-11, OAC, or on a clear and legible record containing all the information required in 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;

(2) Calculate on the form in accordance with the instructions appearing therein, or on a clear and legible record containing all the information required in the form, the previously accumulated occupational dose received by the individual and the additional dose allowed for that individual under division (B) of rule 3701-38-11, OAC.

(C) (1) In the preparation of the form, or a clear and legible record containing all the information required in the form, the registrant shall make a reasonable effort to obtain reports of the individual's previously accumulated occupational dose. For each period for which the registrant obtains such reports, he shall use the period shown in the report in preparing the form. In any case where a 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:

Part of body	Assumed dose in rems for calendar quarters prior to January 1, 1961	Assumed dose in rems for calendar quarters beginning on or after January 1, 1961
Whole body, gonads, active blood-forming organs, head and trunk, lens of eye	3/4	1/4

(2) The registrant shall retain and preserve records used in preparing the form. If calculation of the individual's accumulated occu-

pational 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 division (B) of rule 3701-38-11, OAC, the excess may be disregarded.

**Rule 3701-38-13. Exposure of individuals to concentrations of radioactive material in restricted areas.**

(A) No registrant 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 division (D), Part I, of this rule. "Expose," as used in this rule, 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 director pursuant to division (C) of this rule.

(B) The limits given in division (D), Part I, of this rule 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, the limits specified in division (D), Part I, of this rule may be increased proportionately. In any such period where the number of hours of exposure is greater than forty (40), the limits specified in division (D), Part I, of this rule shall be decreased proportionately.

(C) (1) Except as authorized by the director pursuant to this division, 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 specified in division (D), Part I, of this rule.

(2) The director may authorize a registrant to expose an individual in a restricted area to airborne concentrations in excess of the limits specified in division (D), Part I, of this rule 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 division (D), Part I, of this rule. Each application under this subdivision shall include an analysis of particle sizes in the concentrations and a description of the methods used in determining the particle sizes.

(3) The director may authorize a registrant to expose an individual in a restricted area to airborne concentrations in excess of the

limits specified in division (D), Part I, of this rule, upon receipt of an application demonstrating 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 40-hour week. Each application under this subdivision shall contain the following information:

- (a) A description of the protective equipment to be employed, including the efficiency of the equipment for the material involved;
- (b) Procedure for the fitting, maintenance, and cleaning of the protective equipment;
- (c) 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 an individual shall not be of such duration as would discourage observance by the individual of the proposed procedures;
- (d) The average concentrations present in the areas occupied by individuals.

(D) Table of concentrations in air and water above natural background.

Radioactive material	Solubility <sup>8</sup>	Part I		Part II	
		Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)	Column 1 Air (uCi/ml)	Column 2 Water (uCi/ml)
Bismuth 210 (Bi 210)	S	6X10 <sup>-9</sup>	1X10 <sup>-3</sup>	2X10 <sup>-10</sup>	4X10 <sup>-5</sup>
	I	6X10 <sup>-9</sup>	1X10 <sup>-3</sup>	2X10 <sup>-10</sup>	4X10 <sup>-5</sup>
Lead 210 (Pb 210)	S	1X10 <sup>-10</sup>	4X10 <sup>-6</sup>	4X10 <sup>-12</sup>	1X10 <sup>-7</sup>
	I	2X10 <sup>-10</sup>	5X10 <sup>-3</sup>	8X10 <sup>-12</sup>	2X10 <sup>-4</sup>
Polonium 210 (Po 210)	S	5X10 <sup>-10</sup>	2X10 <sup>-5</sup>	2X10 <sup>-11</sup>	7X10 <sup>-7</sup>
	I	2X10 <sup>-10</sup>	8X10 <sup>-4</sup>	7X10 <sup>-12</sup>	3X10 <sup>-5</sup>
Radium 224 (Ra 224)	S	5X10 <sup>-9</sup>	7X10 <sup>-5</sup>	2X10 <sup>-10</sup>	2X10 <sup>-6</sup>
	I	7X10 <sup>-10</sup>	2X10 <sup>-4</sup>	2X10 <sup>-11</sup>	5X10 <sup>-6</sup>
Radium 226 (Ra 226)	S	3X10 <sup>-11</sup>	4X10 <sup>-7</sup>	3X10 <sup>-12</sup>	3X10 <sup>-8</sup>
	I	5X10 <sup>-11</sup>	9X10 <sup>-4</sup>	2X10 <sup>-12</sup>	3X10 <sup>-5</sup>
Radium 228 (Ra 228)	S	7X10 <sup>-11</sup>	8X10 <sup>-7</sup>	2X10 <sup>-12</sup>	3X10 <sup>-8</sup>
	I	4X10 <sup>-11</sup>	7X10 <sup>-4</sup>	1X10 <sup>-12</sup>	3X10 <sup>-5</sup>
Radon 220 (Rn 220)	-	3X10 <sup>-7</sup>	-	1X10 <sup>-8</sup>	-
Radon 222 (Rn 222)	-	1X10 <sup>-7</sup>	-	3X10 <sup>-9</sup>	-
Beta and/or gamma emitters not listed above with half life less than 2 hours	-	1X10 <sup>-6</sup>	-	3X10 <sup>-8</sup>	-
Beta and/or gamma emitters not listed above with half life greater than 2 hours	-	3X10 <sup>-9</sup>	9X10 <sup>-5</sup>	1X10 <sup>-10</sup>	3X10 <sup>-6</sup>
Alpha emitters not listed above	-	6X10 <sup>-13</sup>	4X10 <sup>-7</sup>	2X10 <sup>-14</sup>	3X10 <sup>-8</sup>

Note: In any case where there is a mixture in air or water of more than one radionuclide, the limiting values for purposes of this Table should be determined as follows:

1. If the identity and concentration of each radionuclide in the mixture are known, the limiting value should be derived as follows: Determine, for each radionuclide in the mixture, the ratio between its concentration in the mixture and its limiting concentration established in this table. The sum of such ratios for all radionuclides in the mixture shall not exceed "1" (unity).
2. If either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of this table shall be the same as those shown at the bottom of the table for "Alpha emitters not listed above."
3. If the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in this table for the radionuclide in the mixture having lowest concentration limit.

#### Rule 3701-38-14. Exposure of minors.

(A) No registrant shall possess, use, or transfer radiation sources 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 calendar quarter, from all radiation sources in such registrant's possession, a dose in excess of ten (10) percent of the limits specified in the table in division (A) of rule 3701-38-11, OAC.

(B) No registrant 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 division (D), Part II, of rule 3701-38-13, OAC. For purposes of this rule, concentrations may be averaged over periods not greater than a week.

(C) The provisions of division (C) of rule 3701-38-13, OAC, shall apply to exposures subject to division (B) of rule 3701-38-14, OAC.

#### Rule 3701-38-15. Permissible levels of radiation from external sources in unrestricted areas.

(A) Except as authorized by the director pursuant to division (B) of this rule no registrant shall possess, use, or transfer radiation sources in such a manner as to create in any unrestricted area from such radiation sources in his possession:

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



(2) 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 consecutive days.<sup>9</sup>

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

#### Rule 3701-38-16. Concentration in effluents to unrestricted areas.

A) A registrant shall not possess, use, or transfer radioactive material so as to release to an unrestricted area radioactive material in concentrations which exceed the limits specified in division (D), Part II, of rule 3701-38-13, OAC, except as authorized pursuant to rule 3701-38-26, OAC, or division (B) of this rule. For purposes of this rule concentrations may be averaged over a period not greater than one year.

B) Any person may apply to the director for proposed limits upon concentrations of radioactive material released into air or water in unrestricted areas in excess of those specified in division (A) of this rule as a result of applicant's proposed activities. The director shall approve the proposed limits if the applicant demonstrates:

- (1) That the applicant has made a reasonable effort to minimize the radioactivity contained in effluents to unrestricted areas;
- (2) 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 division (D), Part II, of rule 3701-38-13, OAC.

C) An application for higher limits pursuant to division (B) of this rule 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:

- (1) 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 year at the point where the effluent leaves a stack, tube, pipe, or similar conduit.

(2) A description of the properties of the effluents, including:

- (a) Chemical composition;
- (b) Physical characteristics, including suspended solids content in liquid effluents, and nature of gas or aerosol for air effluents;
- (c) The hydrogen ion concentrations (pH) of liquid effluents;
- (d) The size range of particulates in effluents released into air.

(3) 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.

(4) Information as to the highest concentration of each radionuclide in an unrestricted area, including anticipated concentrations averaged over a period of one year:

- (a) In air at any point of human occupancy; or,
- (b) In water at points of use downstream from the point of release of the effluent.

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

(6) 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.

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

(D) For the purposes of this rule, the concentration limits in division (D), Part II, of rule 3701-38-13, OAC, 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 points of discharge and the boundary.

(E) In addition to limiting concentrations in effluent streams, the director 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

<sup>9</sup> Applying subdivision (A) (2) of rule 3701-38-15 it must be assumed that an individual shall be present in the area 24 hours per day for a total of 168 hours in 7 consecutive days unless it can be demonstrated that such continuous occupancy is not possible.

suitable sample of an exposed population group, averaged over a period not exceeding one year, would otherwise exceed the daily intake resulting from continuous exposure to air or water containing one-third the concentration of radioactive materials specified in division (D), Part II, of rule 3701-38-13, OAC.

(F) The provisions of this rule do not apply to disposal of radioactive material into sanitary sewerage systems, which is governed by rule 3701-38-27, OAC.

**Rule 3701-38-17. 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 director may issue an order requiring a registrant to make available to the individual appropriate bio-assay services and to furnish a copy of the reports of such service to the director.

**Rule 3701-38-18. Surveys.**

Each registrant shall make or cause to be made such surveys as may be necessary for him to comply with rules 3701-38-01 to 3701-38-37, OAC.

**Rule 3701-38-19. Personnel monitoring.** <sup>10</sup>

Each registrant shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

(A) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive,<sup>11</sup> a dose in any calendar quarter in excess of twenty-five (25) percent of the applicable value specified in division (A) of rule 3701-38-11, OAC.

(B) Each individual under eighteen (18) years of age who enters a restricted area under such circumstances that he receives, or is likely to receive,<sup>11</sup> a dose in any calendar quarter in excess of five (5) percent of the applicable value specified in division (A) of rule 3701-38-11, OAC.

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

**Rule 3701-38-20. Caution signs, labels, and signals.**

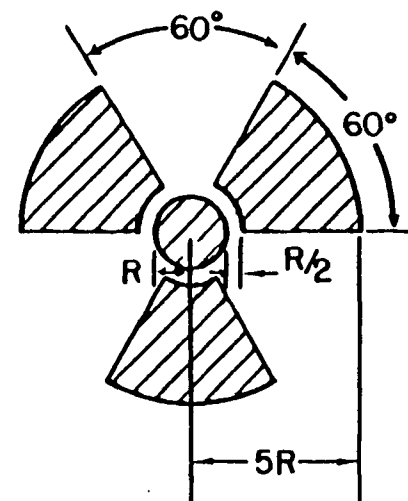
(A) General.

(1) Except as otherwise authorized by the director, the radiation caution symbol shall be the conventional three-bladed design as

<sup>10</sup>See also rule 3701-38-30, subdivision (A).

<sup>11</sup>In the absence of reasonable evidence that an individual is not likely to receive the stated dose it should be assumed that he is likely to receive it.

follows with the cross-hatched area to be magenta or purple and the background to be yellow:



(2) In addition to the contents of signs and labels prescribed in this regulation, a 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.

(B) Radiation areas.<sup>12</sup>

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

(C) High radiation areas.<sup>12</sup>

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

(2) Each high radiation area shall be equipped with a control device which shall either cause the level of radiation to be reduced below that at which an individual might receive a dose of 100 millirem in one hour upon entry into the area or shall energize a conspicuous visible or audible alarm signal in such manner that the individual entering and the registrant or supervisor of the activity are made aware of the entry. In the case of a high radiation area established for a period of thirty (30) days or less, such control device is not required.

<sup>12</sup>See definitions of "radiation area" and "high radiation area" in rule 3701-38-01.

(D) Airborne radioactivity areas.

- (1) As used in this rule "airborne radioactivity area" means (1) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations in excess of the amounts specified in division (D), Part I, Column I of rule 3701-38-13, OAC, or (2) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations which, averaged over the number of hours in any week during which individuals are in the area, exceed twenty-five (25) percent of the amounts specified in division (D), Part I, Column 1, of rule 3701-38-13, OAC.
- (2) Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words "CAUTION" and "AIRBORNE RADIOACTIVITY AREA," or "DANGER" and "AIRBORNE RADIOACTIVITY AREA."

(E) Additional requirements.

Each area or room in which any radioactive material is used or stored in an amount exceeding ten (10) times the quantity of radioactive material specified in division (H) of this rule shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words "CAUTION" and "RADIOACTIVE MATERIAL," or "DANGER" and "RADIOACTIVE MATERIAL."

(F) Containers.

- (1) Each container in which is transported, stored or used radioactive material greater than the quantity of such material specified in division (H) of this rule shall bear a durable, clearly visible label bearing the radiation caution symbol and the words "CAUTION" and "RADIOACTIVE MATERIAL," or "DANGER" and "RADIOACTIVE MATERIAL."
- (2) Notwithstanding the provision of subdivision (1) of this division, a label shall not be required:
  - (a) If the concentration of the material in the container does not exceed that specified in division (D), Part I, Column 2, of rule 3701-38-13, OAC.
  - (b) For laboratory containers, such as beakers, flasks, and test tubes, used transiently in laboratory procedures, when the person using such containers is present.
- (3) When containers are used for storage, the labels required in this paragraph shall state also the quantities and kinds of radioactive materials in the containers and the date of measurement of the quantities.

(G) All devices and equipment capable of producing radiation when

operated shall be labeled in a manner which cautions individuals of such fact.

(H) Table of quantities applicable to posting and disposal requirements.

Radioactive Material	Quantity (microcuries)
Bismuth 210 (Bi 210)	10
Lead 210 (Pb 210)	1
Polonium 210 (Po 210)	0.1
Radium 224 (Ra 224)	10
Radium 226 (Ra 226)	0.1
Radium 228 (Ra 228)	1
Radon 220 (Rn 220)	1
Radon 222 (Rn 222)	1
Radioactive material not listed above or unknown mixture of above	0.1

Rule 3701-38-21. Exceptions from posting requirements.

- (A) 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.
- (B) 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 individual to radiation or radioactive material in excess of the limits established in rules 3701-38-11 to 3701-38-15, OAC.
- (C) 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 (1) 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 rules 3701-38-11 to 3701-38-15, OAC, and (2) such area or room is subject to the registrant's control.
- (D) Radioactive materials packaged and labeled in accordance with the regulations of the United States Department of Transportation shall be exempt from the labeling and posting requirements of

rule 3701-38-20, OAC, during shipment provided that the inside containers are labeled in accordance with rule 3701-38-20, OAC.

**Rule 3701-38-22. Instruction of personnel; posting of notice to employees.**

(A) Each registrant shall inform individuals working in or frequenting any portion of a restricted area of the occurrence of radiation or radiation sources in such portions of the restricted area; shall instruct such individuals in the safety problems associated with exposure to such radiation sources and in precautions or procedures to minimize exposure; shall instruct such individuals in the applicable rules for the protection of personnel from exposures to radiation or radioactive materials; and shall advise such individuals of reports of radiation exposure which those individuals may request pursuant to this rule.

(B) Each registrant shall post a current copy of rules 3701-38-01 to 3701-38-37, OAC, a copy of the acknowledgement of registration, and a copy of operating procedures applicable to work under the registration, conspicuously in a sufficient number of places in every establishment where employees are employed in activities involving potential exposure to radiation, to permit them to observe a copy on the way to and from their place of employment, or shall keep such documents available for examination upon request.

(C) Each registrant shall conspicuously post the form, "Notice to Employees,"<sup>13</sup> in a sufficient number of places in every establishment to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment. The form, "Notice to Employees," shall be prescribed and furnished by the director and shall contain in brief form information as to (1) the subjects covered by rules 3701-38-01 to 3701-38-37, OAC; (2) the employer's responsibility to apply the rules and to post or otherwise make available to employees a copy of the rules, a copy of the acknowledgement of registration, and a copy of operating procedures which apply to employees' work under the rules; (3) the employee's responsibility to become familiar with rules and operating procedures which apply to his work and to observe them; (4) the written reports detailing an employee's exposure to radiation which an employer is required to provide under certain conditions; and, (5) the name and address of the agency which provides inspection of radiation facilities and to which an employee may direct inquiries regarding radiation protection matters.

**Rule 3701-38-23. Storage of radiation sources.**

Radiation sources shall be secured against unauthorized removal from the place of storage.

**Rule 3701-38-24. Leak testing of sealed sources.**

(A) Except as authorized by the director pursuant to division (D) of this rule, each sealed source shall be tested for leakage at intervals not to exceed six (6) months. In the absence of a certificate from a transferor that a test has been made within the six (6) month period prior to the transfer or at any time there is reason to suspect that a sealed source may have been damaged, the sealed source shall not be put into use until tested for leakage.

(B) The leak test shall be capable of detecting the presence of 0.005 microcurie of removable contamination on the sealed source or, in the case of radium, the actual escape of radioactive material at a rate of 0.001 microcurie per twenty-four (24) hours. For sealed sources installed in manufactured devices constructed in such manner as to prevent easy access to the sealed source itself, an acceptable leak test would be to test at the nearest accessible point to the sealed source storage position or other appropriate measuring point by a procedure approved by the director. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the director or his agents.

(C) Any test conducted pursuant to division (A) and (B) of this rule which reveals the presence of 0.005 microcurie or more of removable radioactive material or, in the case of radium, the actual escape of radioactive material at a rate of 0.001 microcuries or more per twenty-four (24) hours shall be considered evidence that the sealed source is leaking. The registrant shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with the applicable provisions of rule 3701-38-25, OAC.

(D) The director may, upon application therefor or upon his own initiative, approve a leak test interval longer than six (6) months for sealed sources of a specific type or size or for a specific condition of usage or storage of sealed sources if it has been demonstrated to the satisfaction of the director that such longer leak test interval will not result in undue hazard to public health and safety or property.

**Rule 3701-38-25. General requirements for disposal of radioactive material.**

No registrant shall dispose of any radioactive material except:

(A) By transfer to another person, or

(B) As authorized pursuant to rules 3701-38-26, 3701-38-27, 3701-38-28 or 3701-38-16, OAC.

**Rule 3701-38-26. Method of obtaining approval of proposed disposal procedures.**

Any person may apply to the director for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in rule 3701-38-25, OAC. 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 director shall not approve any application to receive radioactive material from other persons for disposal on land not owned by the state or federal government.

**Rule 3701-38-27. Disposal by release into sanitary sewerage systems.**

(A) No registrant 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 registrant in any one day does not exceed the larger of subdivisions (a) or (b) of this division:

(a) The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the registrant, will result in an average concentration not greater than the limits specified in division (D), Part I, Column 2, of rule 3701-38-13, OAC, or,

(b) Ten times the quantity of such material specified in division (H) of rule 3701-38-20, OAC.

(3) The quantity of any radioactive material released in any one month, if diluted by the average monthly quantity of water released by the registrant, will not result in an average concentration exceeding the limits specified in division (D), Part I, Column 2, of rule 3701-38-13, OAC;

(4) The gross quantity of radioactive material released into the sewerage system by the registrant does not exceed one curie per year.

(B) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this rule.

**Rule 3701-38-28. Disposal by burial in soil.**

No registrant shall dispose of radioactive material by burial in soil unless:

(A) The total quantity of radioactive materials buried at any one location and time does not exceed, at the time of burial, 1,000 times the amount specified in division (H) of rule HE-38-20, OAC;

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

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

**Rule 3701-38-29. Disposal by incineration.**

No registrant shall incinerate radioactive material for the purpose of disposal or preparation for disposal except as specifically approved by the director pursuant to rule 3701-38-16 and rule 3701-38-26, OAC.

**Rule 3701-38-30. Records of surveys, radiation monitoring, and disposal.**

(A) Each registrant shall maintain records showing the radiation exposures of all individuals for whom personnel monitoring is required under rule 3701-38-19, OAC. Such records shall be kept on a form<sup>14</sup> prescribed and furnished by the director in accordance with the instructions contained in that form, or on clear and legible records containing all the information required by that form. The doses entered on the forms or records shall be for periods of time not exceeding one calendar quarter.

(B) Each registrant shall maintain records in the same units used in rules 3701-38-11 to 3701-38-16, OAC, showing the results of surveys required by rule 3701-38-18 and disposals made under rules 3701-38-26, 3701-38-27, and 3701-38-28, OAC.

(C) Records of individual radiation exposure which must be maintained pursuant to the provisions of division (A) of this rule shall be preserved until December 31, 1970, or until a date five (5) years after termination of the individual's employment or association

<sup>14</sup>Form No. 4785.

with the registrant, whichever is later, or such other time as the director may determine. Records which must be maintained pursuant to this rule may be maintained in the form of microfilm.

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

**Rule HE-38-31. Reports of theft or loss of radiation sources.**

Each registrant shall report by telephone and telegraph to the director the theft or loss of any radiation source immediately after such occurrence becomes known.

**Rule HE-38-32. Notification of incidents.**

(A) Immediate notification.

Each registrant shall immediately notify the director by telephone and telegraph of any incident<sup>15</sup> involving any radiation source possessed by him and which may have caused or threatens to cause:

- (1) Exposure to the whole body of any individual to twenty-five (25) rems or more of radiation; exposure of the skin of the whole body of any individual to one hundred fifty (150) rems or more of radiation; or exposure of the feet, ankles, hands, or forearms of any individual to three hundred seventy-five (375) rems or more of radiation; or,
- (2) The release of radioactive material in concentrations which, if averaged over a period of twenty-four (24) hours, would exceed five thousand (5,000) times the limits specified for such materials in division (D), Part II, of rule 3701-38-13, OAC; or,
- (3) A loss of one working week or more of the operation of any facilities affected; or,
- (4) Damage to property in excess of one hundred thousand dollars (\$100,000).

(B) Twenty-four hour notification.

Each registrant shall within twenty-four (24) hours notify the director by telephone and telegraph of an incident<sup>15</sup> involving any radiation source possessed by him and which may have caused or threatens to cause:

- (1) Exposure of the whole body of any individual to five (5) rems

<sup>15</sup>As used in rule 3701-38-32, the term "incident" implies loss of normal control over the health and safety aspects of a radiation source or radiation facility.

or more of radiation; exposure of the skin of the whole body of any individual to thirty (30) rems or more of radiation; or exposure of the feet, ankles, hands, or forearms to seventy-five (75) rems or more of radiation; or,

- (2) The release of radioactive material in concentrations which, if averaged over a period of twenty-four (24) hours, would exceed five hundred (500) times the limits specified for such materials in division (D), Part II, of rule 3701-38-13, OAC; or,
- (3) A loss of one day or more of the operation of any facilities affected; or,
- (4) Damage to property in excess of one thousand dollars (\$1,000).

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

**Rule 3701-38-33. Report to former employees and others of exposure to radiation.**

- (A) A registrant, at the request of any individual formerly employed or associated with him, shall furnish to such individual a report of his exposure to radiation as shown in records maintained pursuant to division (A) of rule 3701-38-30, OAC. Such report shall be furnished within thirty (30) days from the time the request is made; shall cover each calendar quarter of the individual's employment or association involving exposure to radiation, or such lesser period as may be requested by the individual. The report shall also include the results of any calculations and analyses of radioactive material deposited in the body of the individual and made pursuant to rule 3701-38-17, OAC. The report shall be in writing and contain the following statement:

"This report is furnished to you under the provisions of the Ohio Public Health Council's rules entitled 'General Radiation Protection Standards', (Chapter 3701-38 of the Ohio Administrative Code). You should preserve this report for future reference."

- (B) The individual's request should include appropriate identifying data, such as social security number and dates and locations of employment or association.

**Rule 3701-38-34. Reports of exposures, levels, and concentrations in excess of applicable limits.**

- (A) In addition to any notification required by rule 3701-38-22, OAC, each registrant shall make a report in writing within thirty

(30) days to the director of (1) each exposure of an individual to radiation or concentrations of radioactive material in excess of any applicable limit as set forth in rules 3701-38-11 to 3701-38-14, OAC, or as otherwise approved by the director; (2) any incident for which notification is required by rule 3701-38-32, OAC; and (3) 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 set forth in rules 3701-38-15 and 3701-38-16, OAC, or as otherwise approved by the director. Each report required under this division 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, or concentrations; and corrective steps taken or planned to assure against a recurrence.

(B) In any case where a registrant is required pursuant to this rule to report to the director any exposure of an individual to radiation or to concentrations of radioactive material, the registrant shall, not later than the making of such report to the director, also notify such individual of the nature and extent of exposure. Such notice shall contain the following statement:

"This report is furnished to you under the provisions of the Ohio Public Health Council's rules entitled 'General Radiation Protection Standards.' (Chapter 3701-38 of the Ohio Administrative Code). You should preserve this report for future reference."

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

**Rule 3701-38-35. Notice to employees and others of exposure to radiation.**

Each registrant, at the request of any individual employed or associated with him, shall advise such individual annually of the individual's exposure to radiation as shown in records maintained by the registrant pursuant to division (A) of rule 3701-38-30, OAC.

**Rule 3701-38-36. Vacating premises.**

Each registrant shall, no less than thirty (30) days before vacating or relinquishing possession or control of premises which may have been contaminated with radioactive material as a result of his activities, notify the director in writing of intent to vacate.

**Rule 3701-38-37. Intrastate transportation of radioactive materials.**

(A) This rule applies to transportation of radioactive material, or the delivery of radioactive material to a carrier for transportation, which is not subject to the rules and regulations of the United States Department of Transportation and other federal agencies having jurisdiction.

(B) No registrant shall transport any radioactive material outside of the confines of his plant, office, hospital, or other authorized location of use, or deliver any radioactive material to a carrier for transportation, unless the registrant complies with all requirements, appropriate to the mode of transportation, relating to the packaging of the radioactive material and to the marketing and labeling of the package and transporting vehicle, of the rules and regulations, as amended, of the United States Department of Transportation (currently 49 CFR Parts 170-189 and 14 CFR Part 103) to the same extent as if the transportation were subject to the rules and regulations of that agency.



## CHAPTER 3701-39

### SPECIAL RADIATION PROTECTION REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS

*Adopted February 15, 1969; effective July 1, 1969*

*Authority: Section 3701.91, Ohio Revised Code*

#### Rule 3701-39-01. Definitions

Terms defined in rule 3701-38-01 of the Sanitary Code shall have the same meaning when used in rules 3701-39-01 to 3701-39-16, OAC, and additionally as used in rules 3701-39-01 to 3701-39-16, OAC.

- (A) "Radiographer" means any individual who performs or who, in attendance at the site where radiation sources are being used, personally supervises industrial radiographic operations and who is responsible to the registrant for assuring compliance with the requirements of rules 3701-39-01 to 3701-39-16, OAC.
- (B) "Radiographer's assistant" means any individual who, under the personal supervision of a radiographer, uses radiation sources, related handling tools, or survey instruments in industrial radiography.
- (C) "Radiographic exposure device" means any instrument containing a sealed source fastened or contained therein, in which the sealed source or shielding thereof may be moved, or otherwise changed, from shielded to unshielded position for purposes of making a radiographic exposure.
- (D) "Industrial radiography" means the examination of the macroscopic structure of materials by nondestructive methods utilizing radiation sources.
- (E) "Storage container" means a device in which sealed sources are transported or stored.
- (F) "Cabinet radiography"<sup>1</sup> means industrial radiography, using radiation machines, which is conducted in an enclosed, interlocked cabinet, such that the radiation machine will not operate unless all openings are securely closed, and which cabinet is so shielded that every location on the exterior meets conditions for an unrestricted area as specified in rule 3701-38-15, OAC.
- (G) "Shielded room radiography"<sup>1</sup> means industrial radiography, using radiation machines, which is conducted in an enclosed room, the interior of which is not occupied during radiographic opera-

<sup>1</sup>Cabinet radiography and shielded room radiography using radiation machines are exempt from rules 3701-39-03 to 3701-39-15. See rule 3701-39-16.

tions, which is so shielded that every location on the exterior meets conditions for an unrestricted area as specified in rule 3701-38-15, OAC, and the only access to which is through openings which are interlocked so that the radiation machine will not operate unless all openings are securely closed.

- (H) "Field radiography"<sup>2</sup> means all industrial radiography using radiation machines other than cabinet radiography and shielded room radiography.

#### Rule 3701-39-02. Purpose and scope.

Rules 3701-39-01 to 3701-39-16, OAC, establish special radiation safety requirements for persons utilizing radiation sources for industrial radiography. These requirements are in addition to and not in substitution for the requirements of rules 3701-38-01 to 3701-38-37, OAC, and apply to all registrants who use radiation sources not subject to United States Atomic Energy Commission regulation<sup>3</sup> for industrial radiography. These requirements do not apply to uses of radiation sources in the healing arts.

#### Rule 3701-39-03. Limits on levels of radiation for radiographic exposure devices and storage containers.

Radiographic exposure devices measuring less than four (4) inches from the sealed source storage position to any exterior surface of the device shall have no radiation level in excess of fifty (50) milliroentgens per hour at six (6) inches from any exterior surface of the device. Radiographic exposure devices measuring a minimum of four (4) inches from the sealed source storage position to any exterior surface of the device, and all storage containers for sealed sources or outer containers for radiographic exposure devices, shall have no radiation level in excess of two hundred (200) milliroentgens per hour at any exterior surface, and ten (10) milliroentgens per hour at one (1) meter from any exterior surface. The radiation levels specified are with the sealed source in the shielded (i.e., "off") position.

#### Rule 3701-39-05. Locking of sources of radiation.

Each radiation source shall be provided with a lock or outerlocked container designed to prevent unauthorized or accidental production of radiation or removal or exposure of a sealed source and shall be kept locked at all times except when under the direct surveillance of a

<sup>2</sup>Field radiography using radiation machines is exempt from rules 3701-39-03, 3701-39-06, 3701-39-07, and 3701-39-15. See rule 3701-39-16.

<sup>3</sup>Radiation sources not subject to regulation by the U.S. Atomic Energy Commission include X-ray machines, radium, and particle accelerators.



radiographer or radiographer's assistant, or as may be otherwise authorized pursuant to rule 3701-39-13, OAC. Each storage container likewise shall be provided with a lock and kept locked when containing sealed sources except when the container is under the direct surveillance of a radiographer or radiographer's assistant.

**Rule 3701-39-05. Storage precautions.**

Locked radiographic exposure devices and storage containers shall be physically secured to prevent tampering or removal by unauthorized personnel.

**Rule 3701-39-06. Radiation survey instruments.**

The registrant shall maintain sufficient calibrated and operable radiation survey instruments to make physical radiation surveys as required by rules 3701-38-18 and 3701-39-15, OAC. Each radiation survey instrument shall be calibrated at intervals not to exceed three (3) months and after each instrument servicing and a record maintained of the latest date of calibration. Instrumentation required by this section shall have a range such that two milliroentgens per hour through one roentgen per hour can be measured.

**Rule 3701-39-07. Leak testing, repair, tagging, opening, modification, and replacement of sealed sources.**

(A) The replacement of any sealed source fastened to or contained in a radiographic exposure device and leak testing, repair, tagging, opening, or any other modification of any sealed source shall be performed only by persons specifically authorized to do so by the director.

(B) The registrant shall provide for the leak testing of sealed sources in accordance with the requirements of rule 3701-38-24, OAC.

(C) A sealed source which is not fastened to or contained in a radiographic exposure device shall have permanently attached to it a durable tag at least one (1) inch square bearing the prescribed radiation caution symbol in conventional colors, magenta or purple on a yellow background, and at least the instructions: "Danger - Radioactive Material - Do Not Handle - Notify Civil Authorities if Found."

**Rule 3701-39-08. Quarterly inventory.**

Each registrant shall conduct a quarterly physical inventory to account for all radiation sources received or possessed by him. The records of the inventories shall be maintained for inspection by the director or his agents and shall include the quantities and kinds of radioactive

material, the location of all radiation sources, and the date of the inventory.

**Rule 3701-39-09. Utilization logs.**

Each registrant shall maintain current logs, which shall be kept available for inspection by the director or his agents, showing for each radiation source the following information:

(A) A description or make and model number of each radiation source or storage container in which a sealed source is located;

(B) The identity of the radiographer to whom assigned;

(C) Locations where used and dates of use;

(D) The voltage, current, and exposure time for each radiographic exposure employing a radiation machine.

**Rule 3701-39-10. Limitations.**

(A) No registrant shall permit any person to act as a radiographer as defined in division (A) of rule 3701-39-01, OAC, until such person:

(1) Has been instructed in the subjects outlined in division (C) of this rule and shall have demonstrated understanding thereof;

(2) Has received copies of and instruction in rules 3701-38-01 to 3701-38-37 and 3701-39-01 to 3701-39-16, OAC, and the registrant's operating and emergency procedures, and shall have demonstrated understanding thereof;

(3) Has demonstrated competence to use the radiation source, related handling tools, and survey instruments which will be employed in his assignment.

(B) No registrant shall permit any person to act as a radiographer's assistant as defined in division (B) of rule 3701-39-01, OAC, until such person:

(1) Has received copies of and instruction in the registrant's operating and emergency procedures, and shall have demonstrated understanding thereof;

(2) Has demonstrated competence to use under the personal supervision of the radiographer the radiation sources, related handling tools, and radiation survey instruments which will be employed in his assignment.

(C) Outline of instruction of radiographers.

(1) Fundamentals of radiation safety

(a) Characteristics of gamma and X-radiation

(b) Units of radiation dose (mrem) and quantity of radioactivity (curie)

- (c) Hazards of excessive exposure of radiation
- (d) Levels of radiation from radiation sources
- (e) Methods of controlling radiation dose
  - I. Working time
  - II. Working distances
  - III. Shielding
- (2) Radiation detection instrumentation to be used
  - (a) Use of radiation survey instruments
    - I. Operation
    - II. Calibration
    - III. Limitations
  - (b) Survey techniques
  - (c) Use of personnel monitoring equipment
    - I. Film badges
    - II. Pocket dosimeters
    - III. Pocket chambers
- (3) Radiographic equipment to be used
  - (a) Remote handling equipment
  - (b) Radiographic exposure devices and sealed sources
  - (c) Storage containers
  - (d) Operation and control of X-ray equipment
- (4) The requirements of pertinent federal and state regulations
- (5) The registrant's written operating and emergency procedures

**Rule 3701-39-11. Operating and emergency procedures.**

The registrant's operating and emergency procedures shall include instructions in at least the following:

- (A) The handling and use of radiation sources to be employed such that no person is likely to be exposed to radiation doses in excess of the limits established in rules 3701-38-11 to 3701-38-16, OAC;
- (B) Methods and occasions for conducting radiation surveys;
- (C) Methods for controlling access to radiographic areas;
- (D) Methods and occasions for locking and securing radiation sources;
- (E) Personnel monitoring and the use of personnel monitoring equipment;
- (F) Transportation to field locations, including packing of radiation sources in the vehicles, posting of vehicles, and control of radiation sources during transportation;
- (G) Minimizing exposure of persons in the event of an accident;

- (H) The procedure for notifying proper persons in the event of an accident;
- (I) Maintenance of records.

**Rule 3701-39-12. Personnel monitoring control.**

- (A) No registrant shall permit any person to act as a radiographer or as a radiographer's assistant unless, at all times during radiographic operations, each such person shall wear a film badge and either a pocket dosimeter or pocket chamber. Pocket dosimeters and pocket chambers shall be capable of measuring doses from zero to at least two hundred (200) milliroentgens.
- (B) Pocket dosimeters and pocket chambers shall be read and doses recorded daily. A film badge shall be immediately processed if a pocket chamber or pocket dosimeter is discharged beyond its range. The film badge reports received from the film badge processor and records of pocket dosimeter and pocket chamber readings shall be maintained for inspection by the director or his agents.

**Rule 3701-39-13. Security.**

During each radiographic operation, the radiographer or radiographer's assistant shall maintain direct surveillance of the operation to protect against unauthorized entry into a high radiation area, as defined in rule 3701-38-01, OAC, except (1) where the high radiation area is equipped with a control device or an alarm system as described in subdivision (C) (2) of rule 3701-38-20, OAC, or (2) where the high radiation area is locked to protect against unauthorized or accidental entry.

**Rule 3701-39-14. Posting.**

Notwithstanding any provisions in division (C) of rule 3701-38-21, OAC, areas in which radiography is being performed shall be conspicuously posted as required by division (B) of rule 3701-38-20, OAC, and subdivision (C) (1) of 3701-38-20, OAC.

**Rule 3701-39-15. Radiation surveys and survey records.**

- (A) No radiographic operation shall be conducted unless calibrated and operable radiation survey instrumentation, as described in rule 3701-39-06, OAC, is available and used at each site where radiographic exposures are made.
- (B) A physical radiation survey shall be made after each radiographic exposure utilizing radiographic exposure devices or sealed sources of radioactive material to determine that the sealed source has been returned to its shielded condition.

(C) A physical radiation survey shall be made to determine that each sealed source is in its shielded condition prior to securing the radiographic exposure device or storage container as specified in rule 3701-39-04, OAC.

(D) Records shall be kept of the surveys required by division (C) of this rule and maintained for inspection by the director or his agents.

**Rule 3701-39-16. Special requirements for radiography employing radiation machines.**

(A) Cabinet radiography.

Cabinet radiography shall be exempt from the requirements of rules 3701-39-03 to 3701-39-15, OAC; however, no registrant shall permit any individual to operate a cabinet radiography unit until such individual has received a copy of, and instruction in, and demonstrated an understanding of operating procedures for the unit, and has demonstrated competence in its use.

(B) Shielded room radiography.

Shielded room radiography shall be exempt from the requirements of rules 3701-39-03 to 3701-39-15, OAC; however:

- (1) No registrant shall permit any individual to operate a radiation machine for shielded room radiography until such individual has received a copy of, and instruction in, and demonstrated an understanding of operating procedures for the unit, and has demonstrated competence in its use;
- (2) Each registrant shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by, every individual who operates, who makes "set-ups", or who performs maintenance on a radiation machine for shielded room radiography.

(C) Field radiography.

Field radiography shall be exempt from rules 3701-39-03, 3701-39-05, 3701-39-07 and 3701-39-15, OAC; however:

- (1) A physical radiation survey shall be conducted to determine that the radiation machine is "off" prior to each entry into the radiographic exposure area. Such surveys shall be made with a radiation measuring instrument capable of measuring radiation of the energies and at the dose rates to be encountered, which is in good working order, and which has been properly calibrated within the preceding three months or following the last instrument servicing, whichever is later. Survey results and records of boundary locations shall be maintained and kept available for inspection.
- (2) Mobile or portable radiation machines shall be physically secured to prevent removal by unauthorized personnel.

## CHAPTER 3701-40

### SPECIAL RADIATION PROTECTION REQUIREMENTS FOR THE USE OF RADIATION IN THE HEALING ARTS

*Adopted February 15, 1969; effective July 1, 1969*

*Authority: Section 3701-91, Ohio Revised Code*

**Rule 3701-40-01. Definitions.**

Terms defined in rule 3701-38-01, OAC, shall have the same meaning when used in rules 3701-40-01 to 3701-40-13, inclusive, OAC, and additionally, as used in rules 3701-40-01 to 3701-40-13, OAC.

- (A) "Aluminum equivalent" means the thickness of aluminum affording the same attenuation, under specified conditions, as the material in question.
- (B) "Dead-man switch" means a switch so constructed that a circuit-closing contact can only be maintained by continuous pressure by the operator.
- (C) "Diagnostic-type tube housing" means an X-ray tube housing so constructed that the leakage radiation at a distance of one (1) meter from the target cannot exceed one hundred (100) milliroentgens in one (1) hour when the tube is operated at any of its specified ratings.
- (D) "Filter" means material placed in the useful beam to absorb preferentially the less penetrating radiations.
- (E) "Half-value layer" (hvl) means the thickness of an absorber required to reduce a beam of radiation to one-half its incident exposure rate.
- (F) "Inherent filtration" means the filtration in the useful beam due to the window of the X-ray tube and any permanent tube enclosure.
- (G) "Interlock" means a device for precluding access to an area of radiation hazard either by preventing entry or by automatically removing the hazard.
- (H) "Kilovolts peak" (kVp) means the crest value of kilovolts of the potential of a pulsating potential generator. When only one-half of the wave is used, the value refers to the useful half of the wave.
- (I) "Lead equivalent" means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.
- (J) "Leakage radiation" means all radiation coming m within the

tube housing except the useful beam.

- (K) "Primary protective barrier" means a barrier sufficient to attenuate the useful beam to the required degree.
- (L) "Protective apron" means an apron made of attenuating materials, used to reduce radiation exposure.
- (M) "Protective barrier" means a barrier of attenuating materials used to reduce radiation exposure.
- (N) "Protective glove" means a glove made of attenuating materials used to reduce radiation exposure.
- (O) "Scattered radiation" means radiation that, during passage through matter, has been deviated in direction.
- (P) "Secondary protective barrier" means a barrier sufficient to attenuate stray radiation to the required degree.
- (Q) "Shutter" means a device, generally of lead, fixed to an X-ray tube housing to intercept the useful beam.
- (R) "Stray radiation" means radiation not serving any useful purpose and includes leakage and scattered radiation.
- (S) "Therapeutic-type tube housing" means an X-ray tube housing so constructed that the leakage radiation at a distance of one (1) meter from the target cannot exceed one (1) roentgen in one (1) hour; and at a distance of five (5) centimeters from any point on the surface of the housing accessible to the patient cannot exceed thirty (30) roentgens in one (1) hour when the tube is operated at any of its specified ratings.
- (T) "Useful beam" means that part of the radiation which passes through the window, aperture, cone, or other collimating device of the tube housing.

**Rule 3701-40-02. Purpose and scope.**

Rules 3701-40-01 to 3701-40-13, OAC, establish specific radiation protection requirements for the use of radiation in the healing arts by a practitioner licensed by law to use or direct the use of radiation in the course of his professional practice. These requirements are in addition to, and not in substitution for, the requirements of rules 3701-38-01 to 3701-38-37, OAC, and apply to all persons engaged in the healing arts who possess, use, or transfer radiation sources not subject to regulation by the United States Atomic Energy Commission.<sup>1</sup>

<sup>1</sup>Radiation sources not regulated by the U.S. Atomic Energy Commission include X-ray machines, radium and certain other naturally occurring radioactive materials, particle accelerators, and radioactive materials produced in particle accelerators.

**Rule 3701-40-03. General X-ray safety provisions.**

- (A) The director may waive compliance with specific requirements of rules 3701-40-01 to 3701-40-13, OAC, by an existing machine or installation if (1) such compliance would require replacement or substantial modification of the machine or installation and (2) the registrant demonstrates, to the director's satisfaction, achievement through other means of radiation protection equivalent to that required by the rules.
- (B) No person shall make, sell, lease, transfer, lend, or install X-ray equipment or the supplies used in connection with such equipment unless such supplies and equipment, when properly placed in operation and properly used, will meet the requirements of rules 3701-40-01 to 3701-40-12, OAC.
- (C) Use.
  - (1) The registrant shall be responsible for assuring that all requirements of rules 3701-40-01 to 3701-40-12, OAC, are met.
  - (2) The registrant shall assure that all X-ray equipment under his control is operated only by individuals adequately instructed in safe operating procedures and competent in safe use of the equipment.
  - (3) The registrant shall provide safety rules to each individual operating X-ray equipment under his control, including any restrictions of the operating technique required for the safe operation of the particular X-ray apparatus, and require that the operator demonstrate familiarity with these rules.

(D) Shielding.

Each installation shall be provided with such primary protective barriers and/or secondary protective barriers as are necessary to assure compliance with rules 3701-38-11, 3701-38-14, and 3701-38-15, OAC.

**Rule 3701-40-04. Prohibited use.**

No registrant shall operate or permit the operation of X-ray equipment unless the equipment and installation meet the applicable requirements of rules 3701-40-01 to 3701-40-12, OAC.

**Rule 3701-40-05. Fluoroscopic X-ray installations.**

(A) Equipment.

- (1) The tube housing shall be a diagnostic-type tube housing.
- (2) The target-to-panel or target-to-table top distance of equipment installed or re-installed after the effective date of this rule shall not be less than twelve (12) inches.

- (3) The total filtration permanently in the useful beam shall not be less than 2.5 millimeters aluminum equivalent. This requirement may be assumed to have been met if the half-value layer is not less than 2.5 millimeters aluminum at normal operating voltages.
- (4) The equipment shall be so constructed that the entire cross-section of the useful beam is attenuated by a primary barrier. This barrier is usually the viewing device, either a conventional fluoroscopic screen or an image intensification mechanism.
- (5) For equipment installed or re-installed after the effective date of this rule the required lead equivalent of the primary barrier shall not be less than 1.5 millimeters for equipment operating up to 100 kVp, shall not be less than 1.8 millimeters for equipment operating from 101 to 125 kVp, or shall not be less than 2.0 millimeters for equipment operating from 126 to 150 kVp. For conventional fluoroscopes these requirements may be assumed to have been met if the exposure rate measured at the viewing surface of the fluorescent screen does not exceed fifty (50) milliroentgens per hour with the screen in the primary beam of the fluoroscope without a patient, under normal operating conditions.
- (6) Collimators shall be provided to restrict the size of the useful beam to less than the area of the barrier. For conventional fluoroscopes this requirement is met if, when the adjustable diaphragm is opened to its fullest extent, an unilluminated margin is left on the fluorescent screen with the screen centered in the beam at a distance of fourteen (14) inches from the panel or table top.
- (7) The tube mounting and the barrier shall be so linked together, that, under conditions of normal use, the barrier always intercepts the useful beam.
- (8) Collimators and adjustable diaphragms or shutters to restrict the size of the useful beam shall provide a minimum of 2.0 millimeters lead-equivalent protection for equipment operating up to 100 kVp, 2.4 millimeters for equipment operating from 101 to 125 kVp, or 2.7 millimeters for equipment operating from 126 to 150 kVp.
- (9) The exposure switch shall be of the dead-man type.
- (10) A manual-reset, cumulative timing device shall be used which will either indicate elapsed irradiation time by an audible signal or turn off the apparatus when the total exposure exceeds a predetermined limit, not to exceed five (5) minutes, in one or a series of exposures.
- (11) For routine fluoroscopy, the exposure rate measured at the panel or table top should be as low as practicable but shall not exceed ten (10) roentgens per minute.

- (12) Mobile fluoroscopic equipment shall meet the requirements of this rule where applicable, except that:
  - (a) In the absence of a table top, a cone or spacer frame shall limit the target-to-skin distance to not less than twelve (12) inches.
  - (b) Image intensification shall always be provided. Conventional fluoroscopic screens shall not be used.
  - (c) It shall be impossible to operate a machine when the collimating cone or diaphragm is not in place.
  - (d) The exposure rate measured at the minimum target-to-skin distance should be as low as practicable but shall not exceed ten (10) roentgens per minute.

**(B) Structural shielding.**

Ordinarily, only secondary barriers are necessary except for combined fluoroscopic-radiographic installations.

**Rule 3701-40-06. Radiographic installations other than dental and veterinary medicine.**

**(A) Equipment.**

- (1) The tube housing shall be a diagnostic-type tube housing.
- (2) Diaphragms, cones or adjustable collimators<sup>2</sup> capable of restricting the beam to the area of clinical interest shall be provided and shall provide the same degree of protection as is required in the housing.
- (3) Except when contraindicated for a particular medical purpose, the aluminum equivalent of the total filtration in the useful beam shall not be less than 0.5 millimeters for equipment operating below 50 kVp, shall not be less than 1.5 millimeters for equipment operating from 50 kVp to 70 kVp, and shall not be less than 2.5 millimeters for equipment operating above 70 kVp. These requirements may be assumed to have been met if the half-value layer for the useful beam, in millimeters of aluminum, is not less than 0.6 at 50 kVp, is not less than 1.6 at 70 kVp, or is not less than 2.6 at 90 kVp.
- (4) A device shall be provided to terminate the exposure after a preset time or exposure.
- (5) A dead-man type of exposure switch shall be so arranged that it cannot be conveniently operated outside a shielded area. Exposure switches for "spot film" devices used in conjunction with fluoroscopic tables are excepted from this shielding requirement.

<sup>2</sup>The department of health strongly recommends the use of a modern adjustable collimator employing a beam-defining light except for X-ray machines used for a single purpose with a fixed target-to-film distance and fixed film size, e.g. chest radiographs only, in which case a permanently installed diaphragm or cone of the proper size would be preferred.

(B) Structural shielding.

- (1) All wall, floor, and ceiling areas exposed to the useful beam shall have primary barriers.<sup>3</sup> Primary barriers in walls shall extend to a minimum height of eighty-four (84) inches above the floor.
- (2) Secondary barriers shall be provided in all wall, floor, and ceiling areas not having primary barriers or where the primary barrier requirements are lower than the secondary barrier requirements.<sup>3</sup>
- (3) The operator's station at the control shall be behind a protective barrier, either in a separate room, in a protected booth, or behind a shield which will intercept the useful beam and any radiation which has been scattered only once.
- (4) A window of lead-equivalent glass equal to that required by the adjacent barrier or a mirror system shall be provided large enough and so placed that the operator can see the patient without having to leave the protected area during exposure.

(C) Operating procedures.

- (1) No individual occupationally exposed to radiation shall be permitted to hold patients during exposures except during emergencies, nor shall any individual be regularly used for this service. If a patient must be held by an individual, that individual shall be protected with appropriate shielding devices such as protective gloves and apron and he shall be so positioned that no part of his body, except hands and arms, will be struck by the useful beam.
- (2) Only individuals required for the radiographic procedure shall be in the radiographic room during exposure; and, except for the patient, all such persons shall be equipped with appropriate protective devices.
- (3) The useful beam shall be restricted to the area of clinical interest.<sup>4</sup>

**Rule 3701-40-07. Special requirements for mobile diagnostic radiographic equipment.**

(A) Equipment.

- (1) All requirements of rule 3701-40-06, OAC, apply except subdivision (A) (5) of rule 3701-40-06, OAC.
- (2) The exposure control switch shall be of the dead-man type and

<sup>3</sup>In radiographic installations where the average radiographic workload is comparatively low, the conventional structural materials in ordinary walls, floors and ceilings may suffice as primary and/or secondary barriers without the addition of special shielding materials, particularly if the useful beam is never directed at occupied areas.

<sup>4</sup>As a minimum criterion for compliance with subdivision (C) (3) of rule 3701-40-06, the size of the useful beam at the plane of the film should not exceed either dimension of the film (width or length) by more than 2 inches for a target-to-film distance of 72 inches or 1 inch for a target-to-film distance of 36 inches. For circular beams, compliance with this criterion will result in all four corners of a rectangular film being left unexposed.

shall be so arranged that the operator can stand at least six (6) feet from the patient and well away from the useful beam.

(B) Structural shielding.

When a mobile unit is used routinely in one location, it shall be considered a fixed installation subject to the shielding requirements specified in division (D) of rule 3701-40-03 and division (B) of rule 3701-40-06, OAC.

(C) Operating procedures.

- (1) All provisions of division (C) of rule 3701-40-06, OAC, apply except subdivision (C) (2).
- (2) The target-to-skin distance shall not be less than twelve (12) inches.
- (3) Personnel monitoring shall be required for all individuals operating mobile X-ray equipment.

**Rule 3701-40-08. Special requirements for chest photofluorographic installations.**

(A) Equipment.

- (1) All provisions of division (A) of regulation 3701-40-06, OAC, apply.
- (2) A collimator shall restrict the useful beam to the area of the photofluorographic screen.

(B) Structural shielding.

- (1) All provisions of division (D) of rule 3701-40-03 and division (B) of rule 3701-40-06, OAC, apply.

(C) Operating procedures.

- (1) All provisions of division (C) of rule 3701-40-06, OAC, apply except subdivision (C) (2).
- (2) All individuals except the patient being examined shall be in shielded positions during exposures.
- (3) Personnel monitoring shall be required for all individuals operating the equipment.

**Rule 3701-40-09. Dental radiographic installations.**

(A) Equipment.

- (1) The tube housing shall be a diagnostic-type tube housing.
- (2) Diaphragms or cones shall be used for collimating the useful beam and shall provide the same degree of protection as the housing. The diameter of the useful beam at the cone tip shall not be more than three (3) inches for intra-oral radiography.
- (3) A cone or spacer frame shall provide a target-to-skin distance of

not less than seven (7) inches with apparatus operating above fifty (50) kVp or four (4) inches with apparatus operating at fifty (50) kVp or below.

- (4) The aluminum equivalent of the total filtration in the useful beam shall not be less than 0.5 millimeters for equipment operating below fifty (50) kVp, shall not be less than 1.5 millimeters for equipment operating from fifty (50) kVp to seventy (70) kVp, and shall not be less than 2.5 millimeters for equipment operating above seventy (70) kVp. These requirements may be assumed to have been met if the half-value layer for the useful beam, in millimeters of aluminum, is not less than 0.6 at fifty (50) kVp, is not less than 1.6 at seventy (70) kVp, or is not less than 2.6 at ninety (90) kVp.
- (5) A device shall be provided to terminate the exposure after a preset time or exposure.
- (6) The exposure control switch shall be of the dead-man type.
- (7) Each installation shall be provided with a protective barrier for the operator or shall be so arranged that the operator can stand at least six (6) feet from the patient and well away from the useful beam.

**(B) Structural shielding.**

- (1) Dental rooms containing X-ray machines shall be provided with primary barriers at all areas struck by the useful beam. Consideration may be given to the attenuation provided by the patient.
- (2) When dental X-ray units are installed in adjacent rooms or areas, protective barriers shall be provided between the rooms or areas. In many cases structural materials of ordinary walls suffice as a protective barrier without addition of special shielding material.

**(C) Operating procedures.**

- (1) Neither the dentist nor his assistant shall be permitted to hold patients or films during exposure, nor shall any individual be regularly used for this service.
- (2) During each exposure, the operator shall stand at least six (6) feet from the patient or behind a protective barrier.
- (3) Only the patient shall be in the useful beam.
- (4) Neither the tube housing nor the pointer cone shall be hand-held during exposure.
- (5) Fluoroscopy shall not be used in dental examinations.

**Rule 3701-40-10. Therapeutic X-ray installations.**

**A) Equipment.**

- (1) The tube housing shall be a therapeutic-type tube housing.

- (2) Permanent diaphragms or cones used for collimating the useful beam shall afford the same degree of protection as the tube housing. Adjustable or removable beam-defining diaphragms or cones shall transmit not more than five (5) percent of the useful beam obtained at the maximum kilovoltage and with maximum treatment filter.
- (3) Filters shall be secured in place to prevent them from dropping out during treatment. The filter slot shall be so constructed that the radiation escaping through it does not exceed one (1) roentgen per hour at one (1) meter, or, if the radiation from the slot is accessible to the patient, thirty (30) roentgens per hour at five (5) centimeters from the external opening.
- (4) The X-ray tube shall be so mounted that it cannot turn or slide with respect to the aperture.
- (5) Means shall be provided to immobilize the tube housing during stationary portal treatment.
- (6) A timer shall be provided to terminate the exposure after a preset time regardless of what other exposure limiting devices are present.
- (7) Equipment utilizing shutters to control the useful beam shall have a shutter position indicator on the control.
- (8) There shall be on the control panel an easily discernible indicator which will give positive information as to whether or not the X-ray tube is energized.

**(B) Structural shielding.**

- (1) All wall, floor and ceiling areas that can be struck by the useful beam, plus a border of one foot, shall be provided with primary protective barriers.
- (2) All wall, floor, and ceiling areas that, because of restrictions in the orientation of the useful beam, cannot be struck by the useful beam shall be provided with secondary barriers.
- (3) With equipment operating above one hundred twenty-five (125) kVp, the required barriers shall be an integral part of the building.
- (4) With equipment operating above one hundred fifty (150) kVp, the control station shall be within a protective booth or outside the treatment room.
- (5) Interlocks shall be provided so that when any door of the treatment room is opened either the machine will shut-off automatically or the radiation level within the room will be reduced to an average of not more than two (2) milliroentgens per hour and a maximum of ten (10) milliroentgens per hour at a distance of one (1) meter in any direction from the target. After such shut-off or reduction in output it shall be possible to restore the machine to full operation only from the control pane



(6) Provision shall be made to permit continuous observation of patients during irradiation.

(7) Windows, mirror systems, or closed-circuit television viewing screens used for observing the patient shall be so located that the operator may see the patient and the control panel from the same position.

(C) Operating procedures.

(1) All new installations, and existing installations not previously surveyed, shall have a protection survey made by, or under the direction of, a qualified expert. This shall also be done after any change in the installation which might produce a radiation hazard. The expert shall report his findings in writing to the person in charge of the installation and a copy of the report shall be kept available for inspection by the director or his agents.

(2) The installation shall be operated in compliance with any limitations indicated by the protection survey.

(3) The output of each therapeutic X-ray unit shall be calibrated by, or under the direction of, a qualified expert. The calibration shall be repeated after each X-ray tube replacement and after any change or replacement of the X-ray generating equipment which could effect a change in the X-ray output. Check calibrations shall be made at least once a year thereafter. Records of the calibration results shall be maintained for inspection by the director or his agents.

(4) No individual who works with radiation, unless he is the patient, shall be in the treatment room during exposure. No other individual shall be there except when it is clinically necessary. If an individual is required to be in the treatment room with the patient during exposure, he shall be protected as much as possible from scattered radiation, and shall not be in the useful beam.

**Rule 3701-10-11. Special requirements for X-ray therapy equipment operated at potentials of sixty (60) KV and below.**

(A) Equipment.

(1) All provisions of division (A) of rule 3701-40-10, OAC, apply, except, for equipment used for "contact therapy," subdivision (A) (1), in which instance the leakage radiation at the surface of the tube housing shall not exceed 0.1 roentgen per hour.

(2) There shall be on the control panel some easily discernible device which will give positive information as to whether or not the tube is energized.

(3) Automatic timers shall be provided which will permit accurate presetting and determination of exposures as short as one second.

(B) Structural shielding.

All provisions of division (B) of rule 3701-40-10, OAC, apply except that portable shields may be used as protective barriers and interlocks are not required.

(C) Operating procedures.

(1) All provisions of division (C) of rule 3701-40-10, OAC, apply except that the operator and other individuals may be permitted in the treatment room during exposure provided that protective aprons having a lead equivalent of at least 0.25 millimeter are worn or protective barriers are utilized.

(2) In the therapeutic application of apparatus constructed with beryllium or other low-filtration windows the registrant shall insure that the unfiltered radiation reaches only the part intended and that the useful beam is blocked at all times except when actually being used.

(3) Machines having an output of more than one thousand (1,000) roentgens per minute at any accessible place shall not be left unattended without the power being shut-off at the primary disconnecting means.

(4) If the tube is hand-held during irradiation, the operator shall wear protective gloves.

**Rule 3701-40-12. Veterinary medicine radiographic installations.**

(A) Equipment.

(1) The tube housing shall be a diagnostic-type tube housing.

(2) Diaphragms, cones or adjustable collimators shall be provided for restricting the useful beam to the area of clinical interest and shall provide the same degree of protection as is required of the housing.

(3) Except when contraindicated for a particular radiographic purpose, the total filtration permanently in the useful beam shall not be less than 1.5 millimeters aluminum-equivalent for equipment operating up to seventy (70) kVp and 2.0 millimeters aluminum-equivalent for machines operating in excess of seventy (70) kVp. These requirements may be assumed to have been met if the half-value layer for the useful beam, in millimeters of aluminum, is not less than 1.4 at sixty (60) kVp, is not less than 1.6 at seventy (70) kVp, and is not less than 2.1 at eighty (80) kVp.

(4) A device shall be provided to terminate the exposure after a preset time or exposure.

(5) A dead-man type of exposure switch shall be provided, together with an electrical cord of sufficient length so that the operator can stand out of the useful beam and at least six (6) feet from the animal during all X-ray exposures.



## CHAPTER 3701-41

### PREVENTING THE USE OF FLUOROSCOPES FOR SHOE FITTING PURPOSES

*Adopted April 12, 1958; effective May 1, 1958*

*Authority: Section 3701.13, Ohio Revised Code*

#### **Rule 3701-41.01.**

On and after May 1, 1958, the use of fluoroscopes for shoe fitting purposes, other than by a physician or chiropodist, is hereby prohibited.

#### **Rule 3701-41-02.**

The sale, lease, loan, donation, or other transfer of shoe fitting fluoroscope equipment, used prior to the effective date of this regulation except to physicians, chiropodists, hospitals, medical and dental schools, accredited colleges and universities, and manufacturers, wholesalers, and retailers of such equipment, is hereby prohibited.

#### **(B) Structural shielding.**

All wall, ceiling, and floor areas shall be equivalent to or shall be provided with applicable protective barriers as required in division (B) of rule 3701-40-06, OAC.

#### **(C) Operating procedures.**

- (1) The operator shall stand well away from the tube housing and the animal during radiographic exposures. Provisions shall be made so that the operator will not be required to stand in the useful beam. Hand-held fluoroscopic screen shall not be used. The tube housing shall not be held by the operator. No individual other than the operator shall be in the X-ray room while exposures are being made unless such individual's assistance is required.
- (2) In any application in which the operator or other assisting individual is not located behind a protective barrier, clothing consisting of a protective apron having a lead-equivalent of not less than 0.5 millimeter shall be worn by the operator and any other individuals in the room during exposures.
- (3) No individual shall be regularly employed to hold or support animals or hold film during radiation exposures. Occupationally exposed individuals shall not perform this service except in cases in which no other method is available. Any individual holding or supporting an animal during radiation exposure shall wear protective gloves and apron having a lead-equivalent of not less than 0.5 millimeter and shall be so positioned that no part of his body, except hands and arms, will be struck by the useful beam.

#### **Rule 3701-40-13. Interstitial, intracavitary and superficial applications of radiation from sealed sources.**

##### **(A) Accountability, storage and transit.**

- (1) Except as otherwise specifically authorized by the director, each registrant shall provide accountability of sealed sources and shall keep a permanent record of the issue and return of all sealed sources.
- (2) When not in use, sealed sources and applicators containing sealed sources shall be kept in a protective enclosure of such material and wall thickness as may be necessary to assure compliance with rules 3701-38-11, 3701-38-14, and 3701-38-15, OAC.<sup>5</sup>

##### **(B) Testing sealed sources for leakage and contamination.**

- (1) The registrant shall provide for the leak testing of sealed sources in accordance with rule 3701-38-24, OAC.
- (2) The registrant shall provide for the testing of sealed sources for contamination prior to initial use.

<sup>5</sup>See also rule 3701-40-06 and divisions (E) and (F) of rule 3701-38-20.

## PART II

### RADIATION PROTECTION STATUTES, OHIO REVISED CODE

Sections 3701.90 to 3701.98, inclusive, and amended section 3701.99, of the Revised Code, relative to radiation protection and to the functions, powers, and duties of the department of health relative to the prevention and prohibition of improper radiation.<sup>1</sup>

#### Section 3701.90 Definitions.

As used in sections 3701.90 to 3701.98, inclusive, of the Revised Code:

- (A) "Radiation" means gamma rays and X-rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other atomic or nuclear particles or rays, but does not mean sound or radio waves, or visible, infrared, or ultraviolet light.
- (B) "Radioactive material" means any material, solid, liquid, or gas, that emits radiation spontaneously.
- (C) "Radiation device" means any device that produces radiations when the associated control devices are operated.
- (D) "Radiation source" means a radiation device or radioactive material.
- (E) "Improper radiation" means gamma rays, X-rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other nuclear particles or rays in such quantity and under such circumstances as may impair the health of the people, as determined from time to time by regulations adopted by the public health council.
- (F) "Person" means the state, any municipal corporation, political subdivision, public or private corporation, individual, partnership, or other entity.

#### Section 3701.91 Regulations.

The public health council, subject to sections 119.01 to 119.13, inclusive, of the Revised Code, may adopt regulations as may be necessary to identify, prohibit, and prevent improper radiation, including the registration of persons with the director, who produce, use, store, or dispose of radiation sources. In adopting such regulations, the public health council may exempt certain sources of radiation which do not present a public health hazard, and shall not formulate more restrictive standards than those established by the federal government. In

formulating such regulations, due consideration shall be given to standards recommended by nationally recognized authorities in the field of radiation protection.

#### Section 3701.92 Power and duties of director.

The director of health:

- (A) Shall administer and enforce sections 3701.90 to 3701.98, inclusive, of the Revised Code and regulations promulgated pursuant to such sections;
- (B) Shall develop comprehensive policies and programs for the evaluation and determination of improper radiation associated with the production, use, storage, or disposal of radiation sources;
- (C) May advise, consult, and cooperate with other agencies of the state, the federal government, other states, and interstate agencies, and with affected groups, political subdivisions, and industries in furtherance of the purposes of sections 3701.90 to 3701.98, inclusive, of the Revised Code.
- (D) May accept and administer grants from the federal government and from other sources, public or private, for carrying out any of its functions. All such moneys shall be deposited in the state treasury, and kept by the treasurer of state in a separate fund subject to the lawful orders of the director;
- (E) May encourage, participate in, or conduct studies, investigations, training, research, and demonstrations, relating to the control of improper radiation, the measurement of radiation, the effects on health of exposure to radiation, and related problems as he may deem necessary or advisable;
- (F) May review plans and specifications for the control of improper radiation from radiation sources submitted pursuant to regulations adopted by the public health council;
- (H) Shall register persons who produce, use, store, or dispose of radiation sources in accordance with regulations adopted by the public health council;
- (I) May inspect radiation sources, their shielding and surroundings for the determination of any possible improper radiation; and provide the owner, user, or operator with a report of any known or suspected deficiencies;
- (J) Shall require the maintenance of records pertaining to the radiation source and such records may be examined by any authorized

<sup>1</sup> Filed with the Secretary of State, August 5, 1959; effective November 4, 1959.

representative of the director pursuant to regulations adopted by the public health council subject to sections 119.01 to 119.13, inclusive, of the Revised Code;

(K) May issue, modify, or revoke orders, subject to section 3701.97 of the Revised Code, (1) prohibiting or preventing improper radiation; (2) requiring the modification or alteration of radiation sources to prevent, control, or abate improper radiation; (3) prohibiting or abating the discharge of radioactive material or waste into the ground, air, or waters of the state;

(L) May exercise all incidental powers necessary to carry out the purposes of sections 3701.90 to 3701.98, inclusive, of the Revised Code.

#### Section 3701.93 Radiation advisory council; duties.

(A) The director of health, subject to the approval of the governor, shall appoint a radiation advisory council which shall consist of the following:

- (1) One individual of recognized ability in the field of radiation physics;
- (2) One individual with experience in radiation protection;
- (3) One individual of recognized ability in the field of medicine with experience in radiation problems;
- (4) One individual of recognized ability in the field of atomic energy;
- (5) One individual of recognized ability in the field of industrial application of radiation devices.

Of those first appointed, one shall serve for one year, one shall serve for two years, one shall serve for three years, one shall serve for four years, and one shall serve for five years, as designated by the director at the time of appointment. Thereafter, the term of office for the five individuals shall be for five years. If a vacancy occurs, a successor shall be appointed for the unexpired term. Members of the radiation advisory council shall serve without compensation but shall be reimbursed for actual expenses incurred in the performance of their official duties.

(B) The radiation advisory council shall:

- (1) Consult with the department of health in matters of policy affecting administration and enforcement of sections 3701.90 to 3701.98, inclusive, of the Revised Code, and in the development of regulations;
- (2) Meet quarterly each year and additionally at the call of the director.

#### Section 3701.94 Handling sources of radiation.

All sources of radiation shall be shielded, transported, handled, used, and kept in such a manner as to prevent all persons from being exposed to improper radiation.

#### Section 3701.95 Prosecution for violations; injunctions.

(A) The attorney general or prosecuting attorney of each county to whom the director of health reports any violation of sections 3701.90 to 3701.98, inclusive, of the Revised Code, shall cause appropriate proceedings to be instituted in the court of common pleas without delay and to be prosecuted in the manner required by law.

(B) In addition to the remedies provided and irrespective of whether or not there exists an adequate remedy at law, the director is hereby authorized to apply to the court of common pleas in the county wherein any of the provisions of sections 3701.90 to 3701.98, inclusive, of the Revised Code are being violated, or violation appears imminent, for a temporary or permanent injunction restraining any person from such violation or threatened violation. In an action for injunction to enforce any final order of the director brought pursuant to this section, the finding by the director, after hearing, is prima facie evidence of the facts found therein.

#### Section 3701.96 Exception of radiation for medical purposes.

Sections 3701.90 to 3701.98, inclusive, of the Revised Code shall not be construed to limit the kind and amount of radiation that may be intentionally applied to a person for diagnostic or therapeutic purposes by or under the direction of a physician or dentist.

#### Section 3701.97 Notice of violation; proceedings; declaration of emergency.

(A) Whenever it appears to the director of health, after inspection, that there has been a violation of sections 3701.90 to 3701.98, inclusive, of the Revised Code, or any order of the director or any regulation of the public health council promulgated pursuant to such sections, the director shall give written notice to the alleged violator setting forth any thing or act done or omitted to be done or claimed to be in violation of such sections, order, or regulation. Said notice shall state that, unless the matters complained of are corrected within sixty days from the date of said notice, or unless the alleged violator requests a hearing before the director on said matters within thirty days of the date of said notice, as specified in section 119.07 of the Revised Code, the director at the end of said

sixty-day period may make and issue such order as he deems appropriate. At the expiration of the period of sixty days from the date of said notice, if the matters complained of have not been corrected, or if such alleged violator has not requested a hearing on said matters, the director shall proceed to make such determination and order as is appropriate.

(B) All proceedings of the director or his agents under sections 3701.90 to 3701.98, inclusive, of the Revised Code shall be subject to and governed by sections 119.01 to 119.13, inclusive, of the Revised Code.

(C) Whenever the director officially determines that an emergency exists requiring immediate action to protect the public health or welfare, he may, without notice or hearing, issue an order reciting the existence of the emergency and requiring that such action be taken as is necessary to meet the emergency. Notwithstanding divisions (A) and (B) of this section, such order shall be effective immediately. Any person to whom such order is directed shall comply therewith immediately, but on application to the director shall be afforded a hearing as soon as possible, and not later than twenty days after such application. On the basis of such hearing, the director shall continue such order in effect, revoke it, or modify it.

#### Section 3701.98 Prohibition.

No person shall violate or fail to perform any duty imposed by sections 3701.90 to 3701.98, inclusive, of the Revised Code, or violate any valid order of the director of health, or regulation of the public health council adopted pursuant to such sections. Each day such violation continues is a separate offense.

#### Section 3701.99 Penalties.

(A) Whoever violates section 3701.18 or 3701.19 of the Revised Code shall be fined not less than one hundred nor more than five hundred dollars.

(B) Whoever violates section 3701.25 of the Revised Code shall be fined not more than one hundred dollars or imprisoned for not more than ninety days, or both. No person shall be imprisoned under this division for a first offense and the prosecution shall always be as for a first offense unless the affidavit upon which the prosecution is instituted contains the allegation that the offense is a second or repeated offense.

(C) Whoever willfully violates section 3701.46 to 3701.50, inclusive, of the Revised Code shall, upon conviction in a summary proceeding in the county wherein such offense was committed, be fined not less than twenty nor more than one hundred dollars to be paid into the general fund of the county, and, upon failure to pay such fine and the cost of the prosecution, shall be imprisoned not less than ten nor more than thirty days.

(D) Whoever violates sections 3701.51 to 3701.55, inclusive, of the Revised Code shall be fined not less than fifty nor more than one hundred dollars for a first offense; for each subsequent offense such person shall be fined not less than one hundred nor more than three hundred dollars.

(E) Whoever violates section 3701.59 of the Revised Code shall be fined not more than five hundred dollars.

(F) Whoever violates section 3701.98 of the Revised Code shall be fined not more than five hundred dollars or imprisoned not more than one year, or both.

APPENDIX C

SELECTED NEWSPAPER ARTICLES

May 12, 1980

# Opinions vary on low-level radiation at Davis-Besse

By James Lawless

About 10 days ago, a radiation technician at the Davis-Besse nuclear power plant near Clinton walked into a high-radiation area at the plant. In about 45 seconds, he was exposed to as much dangerous radiation as the federal government said he should get in a year.

The exposure was treated seriously by the Nuclear Regulatory Commission, which sent in nuclear medical experts and then cited Toledo Edison Co., the plant operator, for three violations.

Edison also treated the matter seriously by notifying the media, though two days later, and by immediately flying out data regarding the mishap for testing.

And yet, the man, whose name was not released, returned to work the next day.

Numerous experts were asked about the danger of the exposure. Their responses show the division of scientific opinions on low-level radiation, despite nearly 30 years and \$1.8 billion in federal research.

"This exposure should not result in any medically detectable effects now or during the lifetime of a person so exposed," said Dr. Roger Linneman, a consultant to Toledo Edison and a researcher at the University of Pennsylvania Medical School.

Dr. Thomas Winters, a researcher with the University of Massachusetts Medical School, challenges Linneman's assurances.

"What it comes down to is that that man was exposed to excessive

radiation," he said. "There is no way to know what will happen. That man had his gonads, testes, sperm and every organ in his body exposed.

"That could potentially affect him genetically or cause cancer. It is fine for Linneman to make a statement like that, but there is no way for him to say it definitely won't cause cancer."

Strangely, Linneman agrees.

"The true answer is we don't know," he admitted. "We have been unable to detect any effect in animal and human studies. Does that mean there are no effects? We don't know."

For Dr. Hymer L. Friedell, a man intimately involved with radiation all of his life, the confusion is understandable.

"We live in a sea of radiation," he said. "We get about 100 millirads (a 1,000th of a unit of absorbed radiation) a year. One-third comes from cosmic rays, another third comes from the Earth and more from the radiation within

you right now."

He said we receive more radiation from X rays, from television and from plane trips and even certain medical tests. But, Friedell said, "How can you tell the difference between 100 millirads and 101?"

Friedell was part of a nuclear-medical team which went into Hiroshima, three weeks after the first atomic bomb was used in wartime there. He said most of the 95,000 deaths resulted from the fires and explosions from the bomb, but several thousand subsequently died from radiation exposure.

Retired director of radiology at Case Western Reserve University, Friedell said, "We know what radiation can do. It tears out the electron from the atom. The atom doesn't exist by itself but in a chain of atoms. Unless the bond goes back, it disturbs the molecule."

Friedell said. It affects molecules in the body in random fashion. It might affect a molecule in the skin

or in the thyroid or one which carries critical genetic information about how a child will develop.

If the molecule were in the skin, the individual would never know it. Hundreds of thousands of skin molecules are lost every day and are never missed.

If however, it were a DNA molecule — one which controls the

function of everything in the body — "relatively modest doses will create serious effects," Friedell said. The effects could result in birth defects in offspring or even cancer.

These dangers are well-known and are the basis of the fear of nuclear power, whether in electric generating plants or in bombs.

Sept. 13, 1980

# Tritium-Tank Truck Tilts, Tying Up I-75

BY **JOHN ECKBERG**  
and **SIDNEY HILL**  
Enquirer Reporters

A flat-bed truck carrying 21 low-level radioactive tanks tipped on southbound I-75 in Fort Wright, Ky., at about 4:30 p.m. Friday, jamming rush-hour traffic through Northern Kentucky to Ezzard Charles Drive in Cincinnati.

Officials said there was no radiation leakage and no likelihood of radiation danger. There were no injuries in connection with the accident.

Police rerouted southbound traffic around the accident at Fifth Street in Covington, and northbound traffic was stopped at Interstate 275 in Kentucky.

The highway and the Brent-Spence Bridge were reopened about 11 p.m.

The truck, owned by All-State Trucking Co., was transporting empty containers once used to haul tritium and other gases at the Monsanto Research Corp. plant in Miamisburg, Ohio, according to Howard Charbeneau, Monsanto public relations manager.

Tritium is a low-level radioactive isotope of hydrogen that is used in nuclear weapons, watch dials, compasses and the exit signs in airplanes, Charbeneau said.

The truck was bound for a U.S. Department of Energy site in Nevada where the tanks were to be buried.

"THE CITY of Covington got so backed up with traffic that they were afraid they couldn't get any emergency equipment through on their side so we shut down I-75 at their request," Cincinnati Police dispatcher Dave Holloway said. Cincinnati police closed the Brent-Spence bridge at 8 p.m.

"Everything is jacked up tight," a Covington police dispatcher said. Traffic on the Covington side began to clear at about 8:30 p.m. and northbound traffic was opened in Kentucky from I-275 to the Dixie Highway exit.

John Highley, 4200 Indian Riffle Rd., Dayton, was the driver of the truck. He said he pulled to the berm near the Kyle Lane exit when a piece of equipment broke on the back of the truck. He refused further comment.

Police said the truck tipped when a rear wheel caught on the berm as Highley pulled over. Charbeneau said the tanks had a level of radioactivity that could only be detected in a laboratory situation.

"IN TERMS of tritium in the tanks, we are talking about tritium that is bound up in the metal of the tanks. I do not believe that somebody coming in with a detector could detect radioactivity in there, it's so low," he said.

"There is no danger. If the tanks were breached, it would be impossible to separate background radiation from the tanks," he said.

Kentucky authorities alerted radiation control officials with the Kentucky Consumer Health Protection Division of the Department of Human Resources in Frankfort to monitor radioactive levels at the accident.

"Tritium oxide is not considered a toxic gas unless it is in extremely large doses," said Don Hughes, manager of the department, at the scene.

"As far as radiological hazard is concerned, tritium is not particularly toxic," said Chuck Debevec, a Nuclear Regulatory Commission duty officer from Chicago. "I would guess that there is a relatively small danger level."

"In terms of safety, we would be more concerned if the trucks were carrying chlorine, for instance," Charbeneau said.

"IN ANY sort of accident situation, people tend to overreact, and I think that's very reasonable about what at the time is unknown."

He said that vacuum was applied to the tanks at the Monsanto plant before they left the plant on Thursday, so that if an opening occurred, there would be no leak.

However, the company may be in violation of a Covington ordinance regarding transportation of hazardous material through the city without prior notification. The law went into effect May, 1980. The law carries a \$500 fine, said Joseph T. Condit, Covington solicitor.

Covington Mayor Bernard Moorman said barge companies and railroads were notified of the law, but truck companies were not notified directly. Both Moorman and Condit quoted the adage "ignorance of the law is no excuse for breaking it."

The law requires anybody taking hazardous materials through the city to first notify the fire department. The fire department was not notified of the All-States shipment.

"I know the inconvenience to a shipper, but I know the potential problem for a community," Moorman said.

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(continued)

**PART OF** this effort was ostensibly to "contain" the government's regulatory costs. But the promotional effort clearly had the object of making nuclear power economically competitive with other forms of energy.

Though this attitude lasted 30 years, it ended in 1957 when public scrutiny finally compelled the government to take the management of radioactive wastes seriously.

Now it is proposed mining and milling tailings be managed as transuranic and high level wastes! The probable cost, in the billions of dollars.

## Low Level Wastes Given Shallow Burial

• Low Level Wastes (LLW): These encompass a large variety of substances which remain radioactive for up to several hundred years.

They are created throughout the uranium cycle, in both military and commercial operations. Low level wastes evolve as wet solids and compact and non-compact dry solids.

Historically, they have been managed by what is called "shallow land burial," that is, in trenches 20 to 30 feet deep, with a soil overburden of 5 feet. This 5-foot backfill shields radiation from the atmosphere and is also intended to prevent erosion from exposing the waste to the surface.

**SITES ARE** selected and trenches designed to minimize migration of waste fluids underground and contamination of the water table. There are 14 Department of Energy LLW burial sites (and two closed sites), used almost exclusively for military nuclear wastes, and six commercial LLW sites.

Three of the commercial sites have been closed for safety reasons. The West Valley, N.Y., site was abandoned by the commercial company that operated it, leaving its management to the state and, lacking that, to the federal government.

The initial estimated cost is \$500 million. The state of New York says it cannot afford that, and is trying to transfer ownership to the U.S. Department of Energy (DOE).

One of the problems with these two commercial sites and with DOE military LLW sites at Savannah River, S.C., and Hanford, Wash., is that some higher level transuranic wastes were included among LLW wastes in earlier years.

**ALSO, AS WITH** the uranium tailings sites, leaching of radioactive substances into the water table at LLW sites has brought the "shallow land burial" concept under questioning, primarily by a special committee of the National Academy of Sciences.

Involved are the regulatory process itself, long-term (hundreds of years) institutional management of LLW sites, and a redefinition of low level ionizing radiation standards.

Approximately 3 million cubic feet of LLW are generated each year. About 20 million cubic feet are stored at commercial sites and 50 million cubic feet at military sites.

## High Level Wastes Can Be Used In Weapons

• High Level Wastes (HLW): These wastes derive from two main sources: intact reactor fuel assemblies which remain after serving their useful life (spent fuel) and those wastes from the "reprocessing" of spent reactor fuel that contain both the radioactive byproducts of the fission process and most of the "heavy" radioactive elements not separated out during reprocessing.

To date, reprocessing of spent reactor fuel has had two main purposes: first, to separate the unused, enriched uranium from the plutonium in the spent fuel so the plutonium could be used to make nuclear weapons, and second, to provide plutonium for experimental purposes to develop the liquid metal-cooled, fast-breeder reactor for the production of electric power.

**FROM THIS,** one can see that spent fuel from commercial nuclear power plants is not necessarily a radioactive waste. But it has been classified as such for the time being because President Carter declared an indefinite moratorium on spent fuel reprocessing in 1977.

The purpose of the prohibition was to give the world's nations using and/or planning to use nuclear power reactors time to determine if there was an effective alternate fuel-making technology which would prevent access to plutonium and thereby prevent its diversion to weapons making.

Aside from this non-proliferation issue, spent fuel is the prospective main source of nuclear fuel for decades to come for a second-generation breeder power reactor (which can "breed" more plutonium fuel than it uses).

**THE PLUTONIUM** needed by the United States to make nuclear weapons is made by small (generally experimental-size) reactors and reprocessing facilities DOE owns to serve the military.

What makes spent fuel for the moment a high level radioactive waste is the plutonium in its pellets — the unused, enriched uranium — plus the other radioactive byproducts and heavy isotopes produced in the fission process while the fuel is in the reactor.

Spent fuel is stored above ground at reactor sites in pools of water. The water serves as a shield against radiation escape and dissipates the immense heat produced by the decaying of the radioactive materials in the fuel.

The fuel contains virtually all of the fission byproducts, along with heavy radioisotopes. The fission byproducts emit beta-gamma radiation. The heavy isotopes emit alpha radiation.

**MOST OF THE** beta-gamma byproducts emit great heat, but lose practically all of their radioactivity within 1,000 years. The few which yield little or no heat, such as iodine-129, technetium-99, zirconium-93, and cesium-135, remain radioactive from 2 million to 17 million years.

The alpha-emitting heavy isotopes (high atomic number), such as plutonium-238 (plutonium-239 is the weapons material), neptunium-237, and Americium-241, spawn "daughter" isotopes as they decay.

These daughters are also alpha emitters, and as they decay they produce additional daughters, which likewise emit alpha radiation.

Depending on the type of original heavy isotope, these daughter chains of alpha radiation go on for thousands of years to 2 million years.

**SO WHILE** heat is a formidable initial problem in storing spent fuel in media other than water, the greater long-range isolation problem is containing the radiation.

The challenges are roughly the same.



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when it comes to "ultimate" or "terminal" isolation, or final storage, of the other main type of high level radioactive waste — the residue of military reprocessing.

The residue remaining after the enriched uranium and plutonium-239 are separated from spent fuel is produced in liquid form and also contains fission byproducts and heavy radioisotopes.

While this residue does not create the amount of heat unreprocessed fuel creates, it contains the short- and long-lived beta-gamma emitters, and the long-lived alpha emitters. Yet, heat generation remains a significant problem.

HEAVY SHIELDING is required to contain the radiation of military HLW.

At least 77 million gallons of this HLW are stored in tanks at Savannah River, S.C., Hanford, Wash., and Idaho Falls, Idaho. Leaks from holding tanks have occurred at two of these sites.

At Hanford, 430,000 gallons have contaminated the soil and at Savannah River, a 100-gallon leak is recorded.

The contaminant at Savannah River may be recoverable, but the contaminated area at Hanford may, for all practical purposes, become the nation's first "perpetual repository" of nuclear waste to be institutionally managed for as long as present mankind can foresee.

## Contamination Leads To Transuranic Wastes

• **Transuranic Wastes (TRU):** These are generally solids containing radioisotopes of higher atomic number than uranium. They are generated in all uranium cycle operations, beginning with uranium enrichment to produce reactor fuel.

They consist chiefly of equipment and structures contaminated by exposure to radiation and are produced in large volume, mainly in military reprocessing of spent fuel.

TRU wastes do not require much shielding, nor do they generate much heat. However, they contain long-lived radioactivity (more than 1,000 years), and must be managed as high level waste.

**CURRENTLY DEEMED** more hazardous than previously rated, TRU wastes are undergoing redefinition.

• **Gaseous Effluents:** These are radioactive gases released into the biosphere (air and water) in small, controlled amounts (except for radon from tailings piles) from various installations in the uranium cycle.

They become so diffused that their radiation, often short-lived, is generally regarded as a contamination tolerable to life without residual hazard.

• **Decontamination and Decommissioning (D&D) wastes:** Periodically, certain parts of facilities, including reactors, in the nuclear energy cycle require decontamination to permit their continued operation.

This produces a large variety of radioactive wastes which must be managed according to the nature of each variety.

**DECOMMISSIONING OF facilities,** however, is another, and tortuous, story. Operations of facilities are terminated for any number of reasons.

Certain facilities, reactors in particular, become so contaminated eventually with radioactivity they cannot be used.

The life span of the typical 500-700

MW(e) (megawatts-electricity) commercial power reactor is generally regarded as being about 40 years before contamination overtakes it.

Since 1980, five nuclear power reactors, four demonstration reactors and six test reactors have been decommissioned. Another 50 research-type reactors have been decommissioned, mostly by dismantling.

The other methods are protective storage, or mothballing, and entombment.

**A COMBINATION,** safe storage for a period of years to permit cooling and decay followed by dismantling, has been proposed.

Scientists have observed no man-made structure could last long enough to safely entomb or protectively store a full-life, commercial-size reactor or nuclear fuel reprocessing facility.

It is argued on one hand that immediate dismantling would be cheaper, though worker exposure to radiation hazard would be greater and waste volume reduction more difficult.

On the other hand, it is argued the facility should be held in safe storage indefinitely, or for 10 to 20 years, for 30 years, or from 50 to 100 years to allow a period of radioactivity decay.

While there are differing and severe problems with all these modes, the cost of decommissioning lies more in cost and who will pay it. Many arguments call for consumers of the present generation to pay, through the states and the federal government.

**OVER THE YEARS,** the old Atomic Energy Commission and its successors have chosen not to approach decommissioning frontally. Hypothetical studies however, have been commissioned to Battelle Northwest Laboratories at Hanford, Wash.

For major facilities, such as commercial-size reactors or the abandoned West Valley, N.Y., reprocessing plant, costs would likely begin with hundreds of millions. Much would depend on the type, size and age of each facility.

While decommissioning technology is generally available, hypothetical models to determine probable costs remain generally lacking. All these costs, thus remain to be figured in, particularly for commercial nuclear power.

In the meantime, the larger question also remains as to how this country and the other nations with nuclear energy are going to ultimately sequester their radioactive garbage at the least risk.

Nov. 11, 1979

# NUCLEAR WASTE

## UC problems grow more acute with delays

THE SUDDEN bar on atomic waste in Nevada, Washington and South Carolina threatens the University of Cincinnati, Christ Hospital and other medical centers across America with the cutoff of massive millions of dollars worth of research.

The atomic-junk crisis at UC is indeed serious. For what was, by comparison, a modest amount of nuclear waste there in the early 1970s has mushroomed along with the nation's crash drive for cancer answers.

Thus only 30-50 55-gallon drums of low-level radiation waste in glass vials were generated at UC six or eight years ago. But a whopping 300 — budgeted for \$30,000 in transport and disposal costs — are expected in 1980. Most — maybe 75% — is extremely low-level, according to Kenneth M. Fritz, radiation safety officer for the UC College of Medicine. It's so low, in fact, the Nuclear Regulatory Commission (NRC) told him it could be handled much like any other hazardous chemical waste. But Mr. Fritz can't find a dump for it. Operators of two waste sites told him the Ohio Environmental Protection Agency (OEPA) won't let them accept it.

Research-generated waste — stored in fireproof areas (in short supply) until

dispatch — is mainly what Mr. Fritz calls "liquid scintillation cocktail fluid." The fluid is inflammable, and its fumes, inhaled, could be dangerous, he said. The weird "cocktail" mix helps researchers track radioactive materials. The other kind of radioactive medical waste is of the diagnostic short "half-life" variety posing no problem. Six hours behind a lead shield and "there's nothing left of it," a UC medical expert says.

NRC has asked every state governor to consider nuclear waste — including that from reactors — a national problem. And it's taken a blood oath, so to speak, to upgrade federal surveillance to ensure against transport-and-packaging abuses of the kind that brought the three-state halt. A study commission recommended to President Carter the regional handling of low-level wastes under a national plan. Meanwhile, OEPA says it won't license landfills to accept such wastes until the U. S. Environmental Protection Agency comes out with its guidelines — originally scheduled by the end of the year but, predictably, not expected now before next April.

So goes the bureaucratic merry-go-round. But before desperation sets in at UC and elsewhere, the U. S. Department of Energy (DOE) may pull a rabbit out of the hat: A contingency plan, we're told, calls for emergency disposal of atomic wastes in DOE's abundant facilities in such places as its Sandia laboratory in New Mexico and at Oak Ridge, Tenn. But regional action under national plans — with governors and all affected agencies involved — may indeed be the long-range answer.