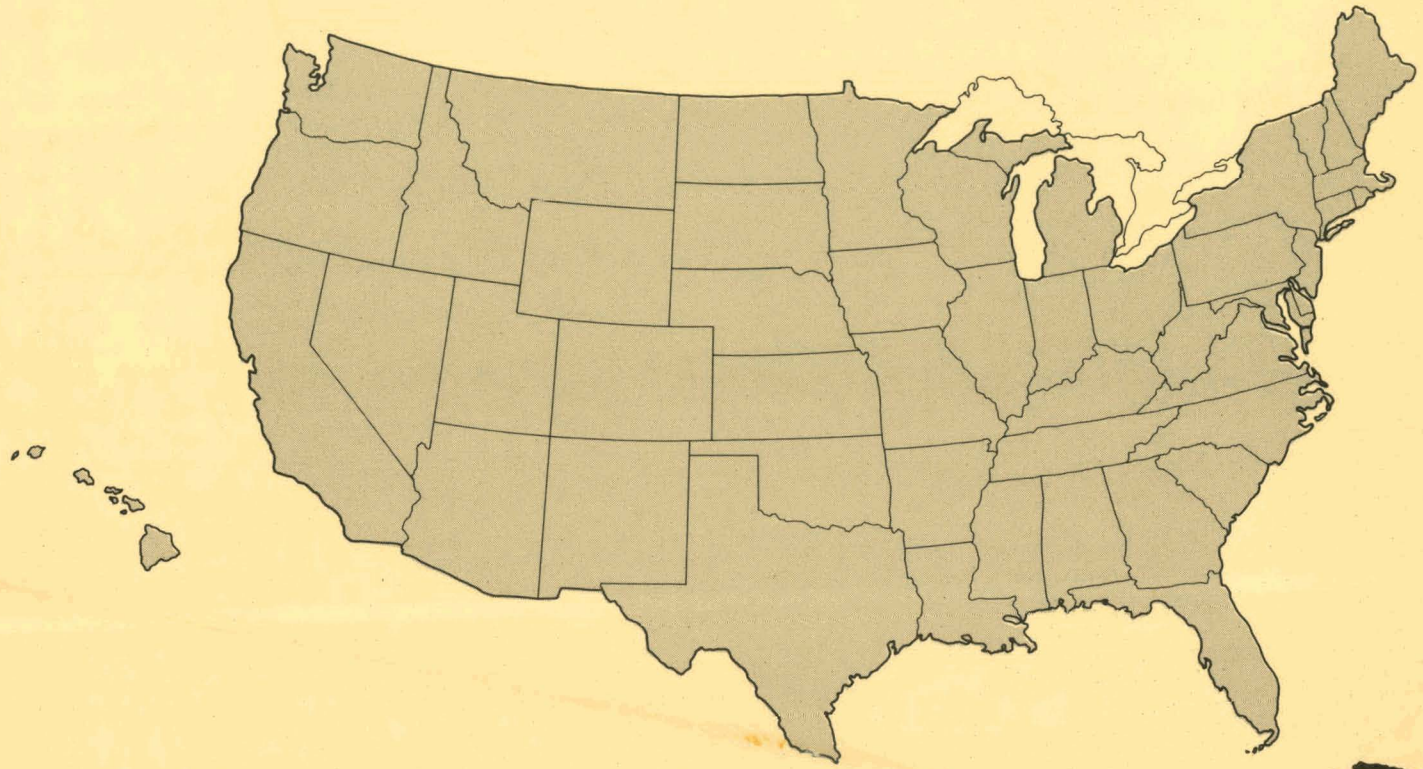
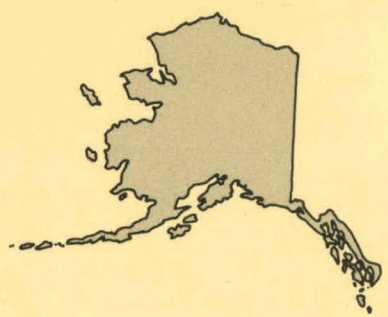


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**Puerto Rico Briefing Book
for
Low-Level Radioactive
Waste Management**

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PUERTO RICO STATE BRIEFING BOOK
FOR
LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

Prepared for
EG&G Idaho, Inc.
under
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Prepared by
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October 1981

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INTRODUCTION

This Briefing Book on Low-Level Radioactive Waste Management in the Commonwealth of Puerto Rico has been prepared to assist in the orderly planning and implementation of state and federal policy on commercial low-level radioactive waste management. The Puerto Rico Briefing Book is one of 13 books produced by the Southern States Energy Board describing states in the Southeastern region. These books are part of a series of briefing books produced under contract with the U.S. Department of Energy, Office of Nuclear Waste Management, Idaho Operations Office, through EG&G Idaho, Inc. The completed series will consist of briefing books on all 50 states and the Commonwealth of Puerto Rico. The books will provide background information on waste management practices, state government structure and jurisdiction, relevant state statutes and regulatory programs, the nature and volume of low-level waste generation, interested groups and individuals, and state print media.

Radioactive wastes are usually produced whenever radioactive materials are processed or used. Low-level radioactive wastes are generated by medical and educational facilities, scientific research, and industrial processes. Nuclear-powered electric generators also produce large quantities of low-level waste. Low-level wastes typically contain small quantities of radionuclides and less than 10 nanocuries per gram of transuranic (TRU) contaminants, therefore require little or no shielding. Low-level wastes, however, do contain potentially hazardous concentrations or quantities

of radionuclides. Shallow land burial of most low-level wastes provides adequate protection against radiation exposure to humans and the environment.

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

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

The Southern region has a particular interest in providing a solution to the problem of diminishing disposal capacities. The Barnwell, South Carolina disposal facility accepted 80 percent of all low-level radioactive wastes

shipped to commercial burial sites in 1979. Apart from the thousands of cubic feet of low-level wastes produced by Southern hospitals and universities, the Southern region already leads the nation in nuclear power generation and has a number of additional nuclear plants under construction or planned. The Tennessee Valley Authority alone is engaged in a construction program that will result in 17 nuclear-powered electric generation plants by 1990. To cope with the increasing amounts of low-level radioactive waste being produced daily, alternatives to the current disposal options must be developed.

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

2 OVERVIEW OF LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT
IN THE COMMONWEALTH OF PUERTO RICO

Puerto Rico is not an agreement state. Section 274 of the Atomic Energy Act of 1954 provides for state participation in the regulation of certain specific radioactive materials. A state may enter into an agreement with the U.S. Nuclear Regulatory Commission (NRC) to assume regulatory control and licensing authority with respect to by-product, source, and special nuclear materials in quantities insufficient to form a critical mass. Although the Commonwealth of Puerto Rico has not chosen to exercise this option, the Legislature of Puerto Rico enacted a law, Act No. 79 of 1965, that empowers the Governor to enter into an agreement with the federal government to assume regulatory authority pursuant to Section 274.

Puerto Rico produces very little radioactive waste of any type. No commercial nuclear power reactors operate there. In the early 1970s the NRC built a small test reactor located at the Puerto Rican Nuclear Center in Mayaguez. In 1976 the reactor was decommissioned. Low-level radioactive wastes generated by this reactor were disposed of by Chem-Nuclear, Inc. at the Barnwell, South Carolina disposal facility.

Wastes are generated in Puerto Rico by institutions, such as medical facilities and universities, and industrial users of radioactive materials. The NRC licenses all users of radioactive material in Puerto Rico. Approximately 52 licensees in Puerto Rico hold 74 licenses issued by the NRC. The majority of these licensees are hospitals operating X-ray machines. Wastes

generated by these hospitals are generally disposed of by the "delay and decay" method. The wastes, which have relatively short half-lives, are stored until radioactive decay renders them harmless, at which point they are buried.

Hospitals and institutions of higher education also use radioactive materials, such as hydrogen-3 and carbon-14, in biomedical research. Biomedical research generates low-level radioactive waste most commonly in the form of liquid scintillation media, scintillation vials, and animal carcasses. Disposal of biomedical wastes is governed by 10 Code of Federal Regulations Part 20.301, et seq. The biomedical wastes generated in Puerto Rico are within the standards set out in the regulation that allows such waste to be disposed of without regard to its radioactivity. Liquid scintillation media are generally released into the sewage systems, and animal carcasses are incinerated in pathogenic incinerators.

There are a few industrial licensees in Puerto Rico using sealed sources of radiation in industrial radiography. These licensees do not produce any appreciable amounts of low-level radioactive waste. After the useful life of the sealed source has ended, the industrial licensees return the still sealed source to its off-island manufacturer.

Introduction

This demographic study of Puerto Rico is designed to analyze various demographic factors, data, and trends that could be related to the quantity, nature, and potential disposal options of low-level radioactive wastes within the commonwealth.

Standard Metropolitan Statistical Areas

The study covers the Commonwealth of Puerto Rico as a whole, its Standard Metropolitan Statistical Areas (SMSAs), and the nonmetropolitan portion. The commonwealth is divided into SMSAs and nonmetropolitan areas in this demographic study because of the heterogeneity of certain areas in terms of urban-rural distributions, climate, industry, topography, population size and growth, and economic activity. Because it is infeasible to investigate these phenomena solely at the level of the larger area, it is necessary to reduce the commonwealth's geography into smaller units of analysis. The SMSA is an appropriate unit for study, midway between the area as a whole and the municipio (an area similar to a county).

According to the Bureau of the Census, a Standard Metropolitan Statistical Area consists of a municipio (or a group of contiguous municipios) which contains at least one city of 50,000 inhabitants or more, or twin cities with a combined population of at least 50,000. In addition to the municipio containing such a city, contiguous municipios are included in a SMSA if they are socially and economically integrated with the central

city. The population living within SMSAs is the metropolitan population and that living outside SMSAs is nonmetropolitan.

Puerto Rico is divided into 76 municipios. Each has legally established boundaries and constitutes a governmental unit. The municipio contains one town that is the seat of government. The rest of the municipio is divided into barrios (subdivisions). Barrios have legally established boundaries but do not constitute a governmental unit.

According to preliminary results from the 1980 Census of Population, the Commonwealth of Puerto Rico contains five SMSAs: Arecibo SMSA (Arecibo, Camuy, Hatillo); Caguas SMSA (Caguas, Gurabo, San Lorenzo); Mayaguez SMSA (Anasco, Hormigueros, Mayaguez); Ponce SMSA (Juana Diaz, Ponce, Villalba); and San Juan SMSA (Bayamon, Conovanas, Carolina, Catano, Guaynabo, Loiza, San Juan, Toa Baja, Trujillo Alto). The remaining municipios have been aggregated into a single entity, the nonmetropolitan balance of the commonwealth.

3.1 Population and Location

Population data is presented because the use of certain radioactive materials can be related to population and age structure. The population of Puerto Rico on April 1, 1980 was 3,187,570, according to preliminary returns of the 1980 Census, an increase of over 475,000 (17.5 percent) from the 2,712,033 inhabitants counted in the 1970 Census. This section describes the population of the commonwealth and its subareas in terms of estimated age composition in 1980. At the time of this writing, age

data from the 1980 Census have not yet been released. Estimates of age composition are based on age distribution reported in the 1970 census.

Age histograms have been developed for the commonwealth, its five SMSAs, and the nonmetropolitan balance. Figures 3.1.1 through 3.1.6 are for the SMSAs and the nonmetropolitan balance, and Figure 3.1.7 is for the commonwealth as a whole. These histograms are remarkably similar to one another. Each area has between 30 and 40 percent of its population in the 0 to 14-year age group, with nearly constant percentages in the 30 to 44 and 45 to 59-year age groups. Even the nonmetropolitan balance of Puerto Rico displays an age structure not too different from those of the SMSAs.

Population projections for 1990 for Puerto Rico, its SMSAs, and the nonmetropolitan balance are shown in Table 3.1. Data for 1980 are also depicted. The projections for 1990 are based on assumptions governing demographic conditions of fertility, mortality, and migration as they existed in the 1970s.

The San Juan SMSA has the largest population in 1980, over 1 million, approximately one-third of Puerto Rico's population. The remaining SMSAs are far behind San Juan in density of population, over 4,000 persons per square mile. Projections for 1990 suggest the continued prominence of the San Juan SMSA. Puerto Rico is projected to have a population of over 3.7 million in 1990.

Table 3.1 also contains rates of population growth between 1970 and 1980 and data on population density (the number of persons per square

Table 3.1 Demographic Data for the Commonwealth of Puerto Rico, Standard Metropolitan Statistical Areas, and Nonmetropolitan Areas

<u>Area</u>	<u>Population</u>		<u>Percent of Change 1970-1980</u>	<u>Persons per Square Mile in 1980</u>
	<u>1980</u>	<u>1990</u>		
Arecibo	140,519	171,249	21.9	653.6
Caguas	173,929	213,486	22.7	1,251.3
Mayaguez	132,814	151,490	14.4	1,183.5
Ponce	252,420	296,543	18.0	1,179.5
San Juan	1,083,660	1,253,695	15.7	4,028.5
Nonmetropolitan Puerto Rico	1,404,228	1,660,037	18.2	571.8
Commonwealth of Puerto Rico	3,187,570	3,746,500	17.5	931.8

mile) in 1980. The data on population growth over the 10 years between 1970 and 1980 are of particular use for an analysis of isotope use. A population with a positive rate of growth implies increasing isotope use and radioactive waste generation. All parts of Puerto Rico have grown in the 1970s.

3.2 Agriculture

Demographic data on agriculture for Puerto Rico could be influential in determining which areas within the commonwealth could be candidates for management facilities for low-level radioactive waste and which areas should not be.

Table 3.2 provides information for the commonwealth, its SMSAs, and its nonmetropolitan balance on the total amount of land in farms (expressed in cuerdas, a unit of land equal to 3.929 square meters; one square mile equals 659.2 cuerdas) in 1974 and 1978; the percent of all land devoted to farming in 1974 and 1978; and the value (in dollars) of agricultural products sold in 1974 and 1978.

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

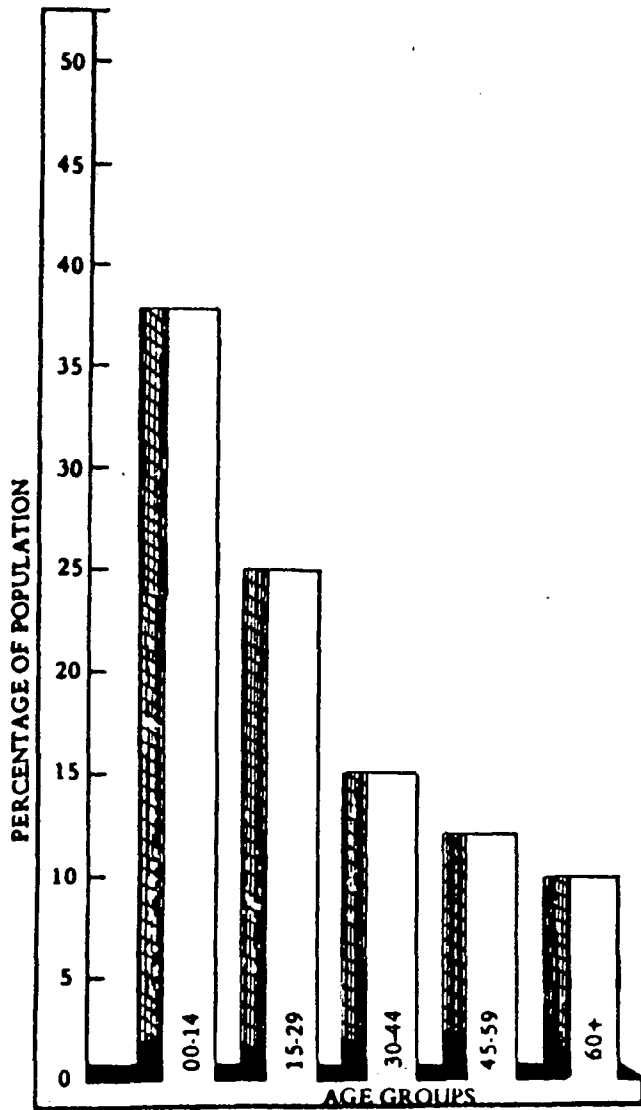


Figure 3.1.1 SMSA Arcibo

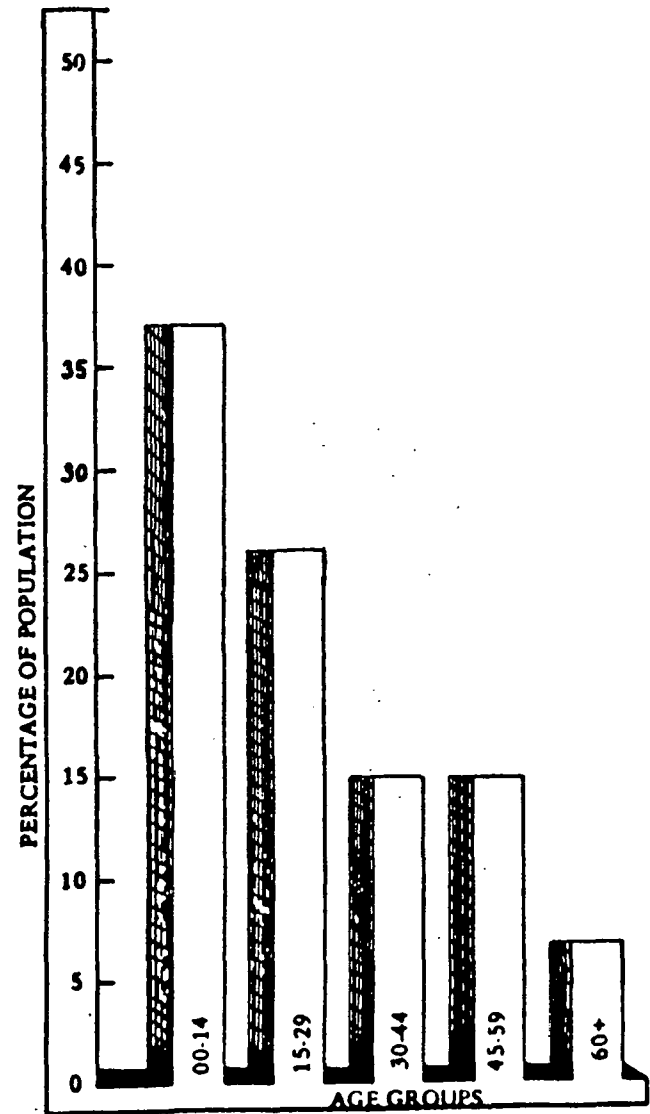


Figure 3.1.2 SMSA Caguas

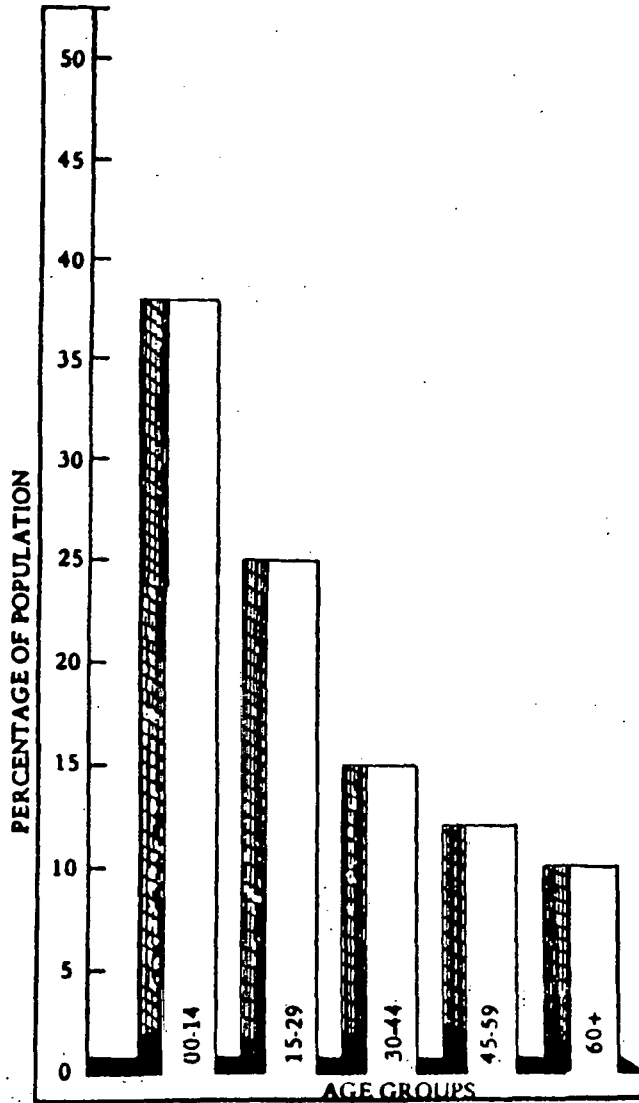


Figure 3.1.3 SMSA
Mayaguez

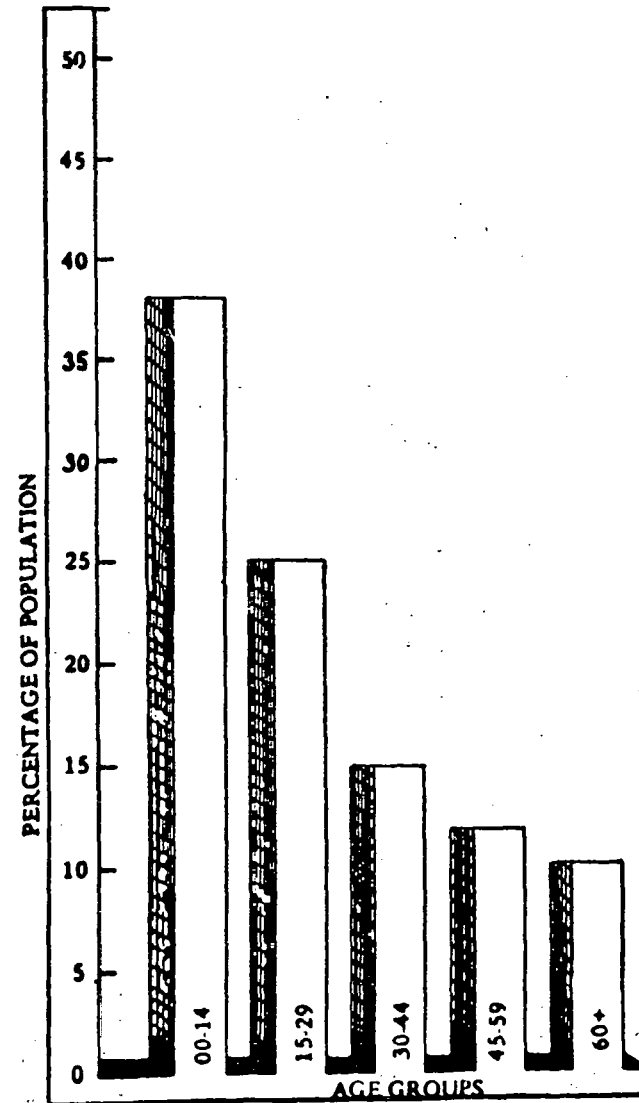


Figure 3.1.4 SMSA
Ponce

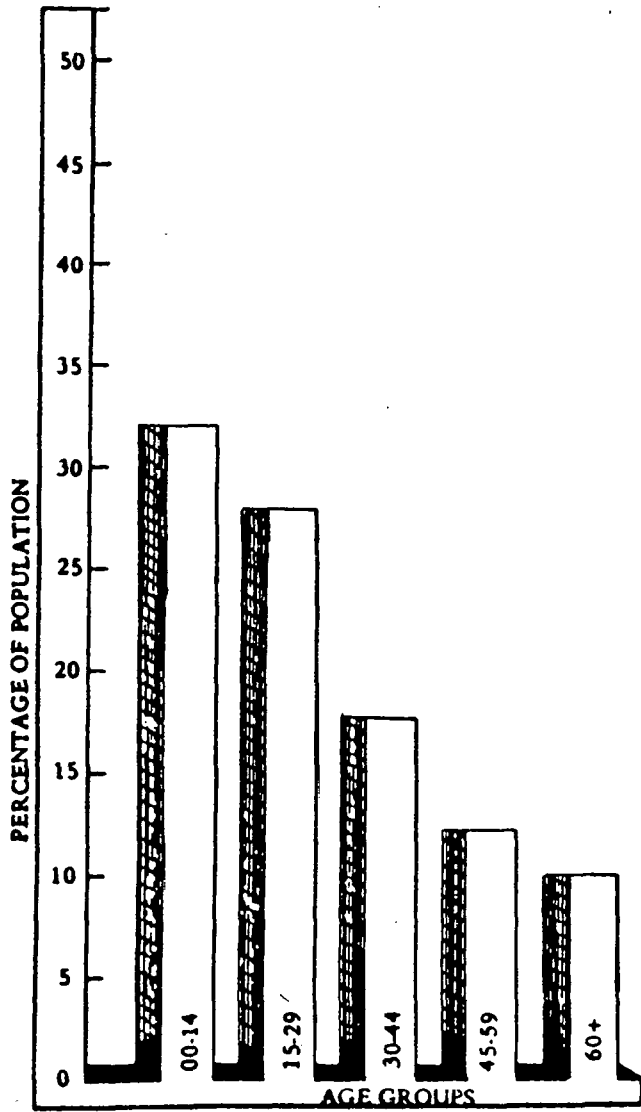


Figure 3.1.5 SMSA
San Juan

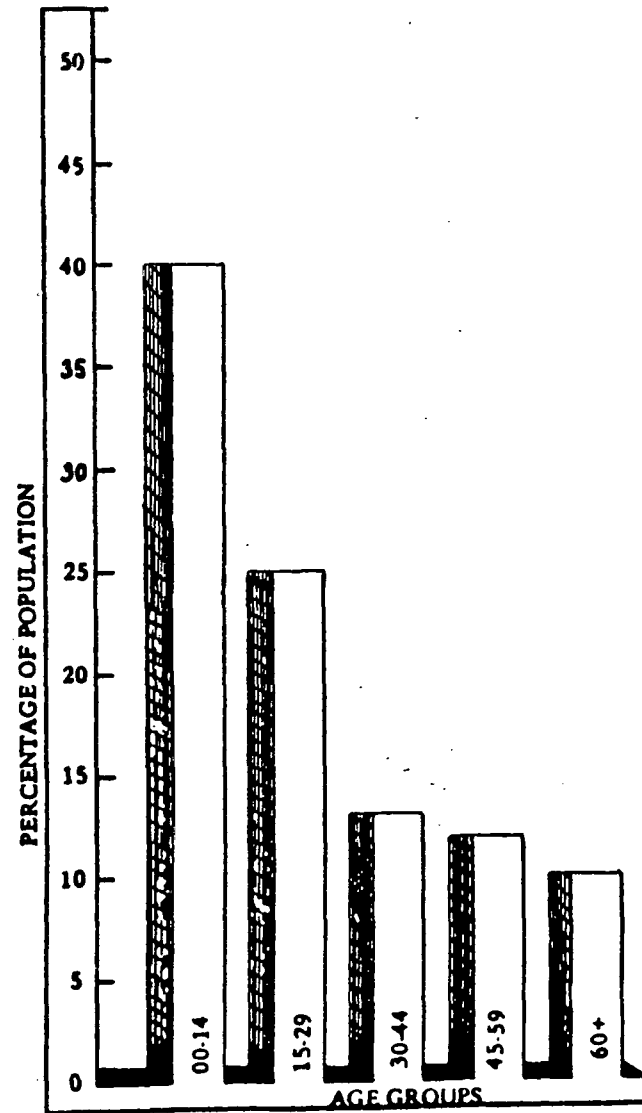


Figure 3.1.6
Nonmetropolitan
Balance of Puerto Rico

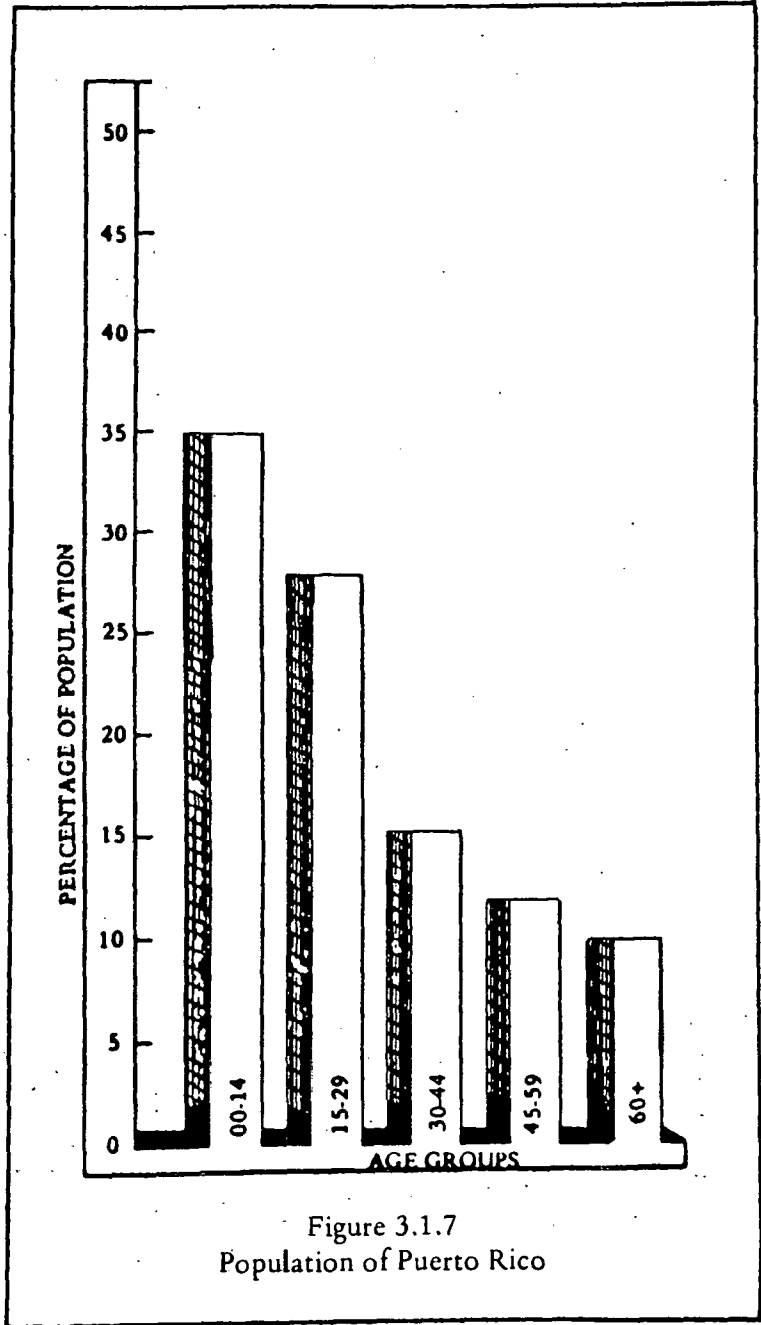


Figure 3.1.7
Population of Puerto Rico

Table 3.2 Agricultural Data for the Commonwealth of Puerto Rico and its Subareas, 1974 and 1978

Area	Land in Farms (In Cuerdas)		Percent of Land Devoted to Farming		Value of Agricultural Products Sold (In dollars)	
	1974	1978	1974	1978	1974	1978
Arecibo	73,274	76,910	52	54	37,590,249	56,490,983
Caguas	51,200	42,528	56	47	14,958,492	15,855,263
Mayaguez	34,807	32,981	41	39	8,651,196	5,794,078
Ponce	86,255	60,489	61	43	17,374,110	8,210,967
San Juan	61,309	54,261	35	31	17,669,680	16,640,058
Nonmetropolitan Puerto Rico	953,072	817,275	59	50	197,102,764	186,060,453
Commonwealth of Puerto Rico	1,259,917	1,084,444	56	48	293,346,491	289,051,802

Source of data: Agricultural productivity data were taken from Census of Agriculture, 1978: Puerto Rico, Table 35. Municipio data were aggregated into larger units.

Nonmetropolitan Puerto Rico had the most cuerdas devoted to farming in 1978, over 817,000, a 9 percent reduction from 1974. The Mayaguez SMSA had the fewest cuerdas devoted to farming in 1978. In total amount of land devoted to farming, nonmetropolitan Puerto Rico had the second highest percentage, half of its land in 1978. The Arecibo SMSA had the largest amount of its land devoted to farming in 1978, 54 percent.

Nonmetropolitan Puerto Rico had the highest value of agricultural products sold in 1978, over \$56 million, an increase over the value of products sold in 1974, after adjusting for inflation. Total 1978 agricultural sales in Puerto Rico were over \$289 million, an adjusted decrease over 1974 values.

3.3 Health

This section analyzes data on health in the Commonwealth of Puerto Rico and compares and contrasts this information with similar materials for selected states as well as the entire United States. Table 3.3 provides the following information for Puerto Rico, the States of New York, Florida, Pennsylvania, and the entire United States for the years 1970 and 1977: number of active physicians, number of active physicians per 100,000 population, number of hospitals, and number of hospital beds. The data on physicians were published in the Health Resources Statistics of the U.S. National Center for Health Statistics, and the data on hospitals were published by the American Hospital Association.

The Commonwealth of Puerto Rico has significantly fewer active physicians than New York, Florida, or Pennsylvania. The proportion (per

Table 3.3. Health Data For Puerto Rico, Selected U.S. States
and the Entire United States: 1970 and 1977

<u>Area</u>	Physicians (1970)		Hospital Data (1977)	
	Number	Rate Per 100,000 Pop.	Number of Hospitals	Hospital Beds (1000s)
Puerto Rico	3,479	91	66	11.5
New York	42,555	243	383	140.8
Florida	9,494	139	247	54.9
Pennsylvania	17,721	150	318	89.4
United States	305,306	150	7,099	1,407.1

Source of Data: U.S. Bureau of the Census, Statistical Abstract of the United States, 1979. 100th Edition. U.S. Government Printing Office: Washington, D.C., 1979, tables 161 and 175.

100,000 population) of active physicians in the United States as a whole is some 50 percent higher than in Puerto Rico. Similarly, Puerto Rico has fewer hospitals and hospital beds.

Data on physicians and hospitals were not available for the Puerto Rican municipios. From information on the distribution of other types of demographic, economic, and related data, the main location for health personnel and facilities in the commonwealth is likely to be San Juan. This metropolitan area should be the major site for radionuclide use in a hospital/medical context.

3.4 Higher Education

Colleges and universities are major users of radionuclides. Table 3.4 provides information on higher education in Puerto Rico, for the academic years 1974-75 and 1977-78. In the year ending ending in 1975, 21 colleges and universities in Puerto Rico had a student enrollment of nearly 83,000. Three years later the number of institutions had increased to 33, and the student enrollment had increased to more than 117,000.

The geographical distribution of institutions of higher education and student enrollments in Puerto Rico is uneven, with the San Juan SMSA containing more than half the institutions and over 58 percent of student enrollments. Major universities located in San Juan are the University of Puerto Rico and the University of Puerto Rico Regional Colleges. The University of Puerto Rico had a student enrollment of nearly 24,000 in 1977-78. The other major university in Puerto Rico is the Catholic University of Puerto Rico, located in the Ponce SMSA. Consideration of isotope

Table 3.4 Institutions of Higher Education in Puerto Rico, Standard Metropolitan Statistical Areas, and Nonmetropolitan Areas:
Academic Years 1974-75 and 1977-78

Area	Number of post secondary schools		Enrollment in post secondary schools	
	1974/75	1977/78	1974/74	1977/78
Arecibo	1	1	1,265	2,167
Caguas	0	2	0	5,763
Mayaguez	2	2	9,474	9,409
Ponce	2	3	7,826	13,570
San Juan	10	18	51,077	68,105
Nonmetropolitan Puerto Rico	6	7	13,181	18,701
Commonwealth of Puerto Rico	21	33	82,823	117,715

Source of Data: U.S. Department of Health, Education and Welfare, National Center for Education Statistics, Educational Directory, Colleges and Universities, 1974-75; and same issue for 1977-78, Washington, D.C., 1974 and 1979.

use and management should focus mainly on the San Juan SMSA because it contains the bulk of institutions and student enrollments in the commonwealth.

3.5 Government

Demographic data on government employment and revenues in Puerto Rico provide information on the scope of local and commonwealth government activity as of 1967. The Census of Governments is conducted by the U.S. Bureau of the Census every five years in years ending in 2 and 7. Because detailed employment and revenue data were not provided for the commonwealth and its municipios in either the 1972 or 1977 censuses, this analysis is based on 1967 data. Although the information is obviously dated, it nonetheless gives an indication of the distribution of governmental activities in the commonwealth and the degree to which they vary from one subarea to another. The distribution, rather than the actual level of activity, is important in isotope use.

Tables 3.5 presents demographic data on government employment and revenues in the commonwealth and its subareas for 1967. The San Juan SMSA had the greatest general governmental revenue, over \$44 million. San Juan is also the most prominent SMSA in intergovernmental revenue, with a total of over \$17.5 million. General revenue includes all revenues except utility, liquor store, and employee-retirement revenues. Intergovernmental revenue includes that portion of revenue from one government to another as grants-in-aid, shared revenues, payments in lieu of taxes, and reimbursements for governmental services. The San Juan SMSA is clearly the most prominent in the commonwealth. Puerto Rico as a whole had total

Table 3.5 Government Data for the Commonwealth of Puerto Rico, Standard Metropolitan Statistical Areas, and Nonmetropolitan Areas, 1967

Area	Revenue Data (\$1,000s)		Number of employees	October payroll (\$1,000s)
	General	Intergovernmental		
Arecibo	2,996.2	1,332.1	484	93.4
Caguas	2,588.6	1,466.9	584	104.4
Mayaguez	3,651.1	1,476.7	661	124.8
Ponce	5,673.7	1,997.3	1,358	242.1
San Juan	44,182.1	17,511.4	7,268	1,890.7
Nonmetropolitan Puerto Rico	22,091.7	12,819.2	5,140	855.8
Commonwealth of Puerto Rico	81,183.4	36,604.2	15,495	3,311.2

Source of Data: U.S. Bureau of the Census, Census of Governments, 1967, Vol. 7, State Reports, No. 52, Puerto Rico, Tables 9 and 14.

revenues in 1967 of over \$81 million, with nearly \$37 million in intergovernmental revenue.

San Juan also has the largest number of government employees (full-time equivalents) in Puerto Rico, over 7,200 in 1967. This SMSA also has the most extensive government payroll, nearly \$1.9 million for the month of October 1967. The commonwealth as a whole had over 15,000 employees with a monthly payroll for October 1967 of over \$3.3 million.

The government data presented in this section indicate the overwhelming prominence of the San Juan SMSA. The other areas of Puerto Rico have considerably smaller shares of government enterprise as measured by employment and revenue. Analysis of isotope use is necessarily concerned primarily with San Juan.

3.6 Economy

This section describes the economy and distribution of economic activities in Puerto Rico in 1973 and 1978. The following detailed economic information on employment and annual payrolls for each of nine industrial categories is presented for each area and for the commonwealth as a whole: the number of employees for the week ending March 12 and the annual payroll for the year (expressed in \$1,000s).

The source of this economic information is County Business Patterns, published by the U.S. Bureau of the Census. County Business Patterns provides an annual report on the economic activities of all counties

(municipios in Puerto Rico) in the United States and its possessions. The data reported pertain mainly to employment covered by the Federal Insurance Contributions Act (FICA). The data thus cover all workers except government and railroad employees, self-employed persons, and a small number of others. The data for 1973 are always comparable to that issued in 1978 (for example, reporting unit definitions changed in 1974), but 1973 data with 1978 comparisons should provide an approximate picture of the amount of change in the economic structure of the commonwealth.

Table 3.6 depicts the nine industrial categories and indicates the number of employees and annual payrolls for the commonwealth, each SMSA, and the nonmetropolitan balance of Puerto Rico. The table also provides a summary of changes in payrolls between 1973 and 1978, after adjusting for inflation.

Summarizing the major industrial activities of the Puerto Rican SMSAs, in 1973 manufacturing provided the major economic base for Arecibo, which had over 4,400 manufacturing employees with an annual payroll of over \$16 million. Data from 1978 show the same general industrial concentration and distribution. Manufacturing payrolls in Arecibo significantly increased between 1973 and 1978. After adjusting for inflation, the 1978 payroll was about 125 percent greater than in 1973. Increases also occurred in three other industries in Arecibo, with decreases in another three. The 1978 payroll in the services category, for example, was 53 percent higher than the 1973 payroll. Table 3.5 gives a summary of economic conditions between 1973 and 1978 for the entire commonwealth.

Table 3.6 Economic Data for the Commonwealth of Puerto Rico

<u>Industry Group</u>	<u>1973</u>		<u>1978</u>		<u>Ratio of change in economic payrolls between 1973 & 1978</u>
	Number of employees for week including March 12	Annual Payroll in \$1,000	Number of employees for week including March 12	Annual Payroll in \$1,000s	
Agricultural services, forestry, fisheries	1,389	7,148	466	7,692	.77
Mining	879	4,420	617	5,914	.96
Contract construction	51,717	233,720	29,826	226,616	.70
Manufacturing	138,876	632,664	153,156	1,133,967	1.29
Transportation and other public utilities	19,015	116,584	15,981	169,747	1.05
Wholesale trade	24,232	158,860	80,958	274,456	1.24
Retail trade	66,450	283,420	80,958	465,451	1.18
Finance, insurance and real estate	24,233	145,244	22,194	199,057	.99
Services	54,277	259,844	76,642	504,313	1.40

Source of Data: U.S. Bureau of the Census, County Business Patterns, 1973 and County Business Patterns, 1978. Municipio data were aggregated into the larger areas. Data exclude government employees, railroad employees, and self-employed persons. Ratios of 1973 and 1978 annual payroll data have been adjusted for inflation.

The major economic activity of the Caguas SMSA is manufacturing, with retail trade in second place. Both economic sectors increased in payrolls between 1973 and 1978. The Mayaguez SMSA is also characterized mainly by manufacturing, as are Ponce and San Juan, but the services industry in San Juan has more employees, even though annual manufacturing payrolls in 1978 were higher. In both Ponce and San Juan, slight declines in the adjusted size of manufacturing payrolls between 1973 and 1978 occurred, while services payrolls increased in both SMSAs during the five-year period. The major industrial activity in nonmetropolitan Puerto Rico was also manufacturing, although payrolls for services were high.

Puerto Rico as a whole is characterized mainly by manufacturing, with services second in importance. In 1978 manufacturing payrolls in the commonwealth amounted to more than \$1.1 billion, with services totaling more than \$500 million. The difference between the two industries in employee numbers is not as striking: more than 153,000 manufacturing employees and more than 76,000 services employees. The retail trade industry had more employees in 1978, although services payrolls were greater. Manufacturing payrolls increased in Puerto Rico by some 29 percent between 1973 and 1978, and services payrolls rose approximately 40 percent.

References

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

This section describes the structure and jurisdiction of the government of the Commonwealth of Puerto Rico. Key government officials, Puerto Rico's representative in the U.S. Congress, and commonwealth statutes and regulations relevant to radioactive waste management are identified, and a brief synopsis of those statutes and regulations is provided. A list of citizen action organizations is also included in this section.

4.1 Major Political Parties

The New Progressive Party (NPP) and the Popular Democratic Party (PDP) are the two major political parties in Puerto Rico. The New Progressive Party, to which the Governor belongs, is a pro-U.S. statehood party. The Popular Democratic Party advocates continued commonwealth status. Two other parties favor independence from the United States: the Puerto Rican Independence Party and the Puerto Rican Socialist Party. In the 1976 and 1980 elections, combined votes for the independence parties totalled less than 7 percent.

The 1976 election was the first time that a pro-statehood party won a majority of the elective offices in Puerto Rico. The New Progressive Party won the Governorship, control of both Houses of the legislature, and the majority of municipal elections. The New Progressives suffered a partial setback in 1980 elections. Although Governor Romero-Barcelo was re-elected, the Popular Democratic Party has regained control of the Senate. Control of the House of Representatives is still in doubt. Three

seats are currently vacant in the House. A Youth Party Candidate, elected in November 1980, is not 25 years old, the age mandated in the constitution as the minimum age for a representative. Whether or not he will be allowed to serve and, if not, who will replace him, is currently the subject of litigation. Another seat is also being contested in court. The court must decide how to count votes that were marked outside the margins of the ballot form. The third vacant seat was won by a New Progressive Party candidate who died shortly after the election. This seat will most likely go to a member of the New Progressive Party. Until the controversies concerning the two contested seats are decided, no majority exists in the House of Representatives.

4.2 Congressional Representation

Puerto Rico is represented in the U.S. Congress by a Resident Commissioner sitting in the House of Representatives. The Resident Commissioner is an elected official, and like all elected commonwealth officials, he serves a four-year term. Although the Resident Commissioner is not empowered to vote on the floor of the House, he is empowered to speak and is a voting member of House Committees. The present Resident Commissioner, Baltasar Corrada of the New Progressive Party, is a member of the Education, Labor, and Interior and Insular Affairs Committees.

Baltasar Corrada
Room 1410, Longworth House Office Building
Washington, D.C. 20515
202-225-2615

4.3 Commonwealth Government

Puerto Rico became a territory of the United States in 1898 when, as a result of the Spanish-American War, Spain ceded the island to the country. Puerto Rico remained a non-autonomous territory until 1952, when it attained commonwealth status under the Federal Relations Act (P.L. 600), enacted in 1950. This Act, in the nature of a compact between the United States and Puerto Rico, authorized Puerto Rico to draft a constitution establishing a commonwealth government. The Federal Relations Act defines the relationship between the federal government and Puerto Rico.

The government of Puerto Rico consists of executive, legislative, and judicial branches. The following section describes the structure and jurisdiction of the commonwealth's government and identifies principal Puerto Rican officials. An organizational chart, depicting the structure of the government, appears on page 4-4.

4.3.1 Executive Branch

The executive branch of the commonwealth government consists of the Governor and the secretaries of the executive departments. Although the constitution empowers the legislature to "create, reorganize and consolidate executive departments and to define their functions", it also established the Departments of State, Justice, Education, Health, Treasury, Labor, Agriculture and Commerce, and Public Works. The Governor, with the advice and consent of the Senate, appoints the heads of departments. The secretaries collectively constitute the Governor's advisory council, which is designated the Council of Secretaries.

The following roster provides the secretaries' names and departments:

Jose A. Olivari Lopez
Agriculture

Héctor Ricardo Ramos Díaz
Consumer Affairs

Sila Nazario de Ferrer
Drug Addiction

Maria Socorro Lacot
Education

Dr. Jaime Riveria-Dueno
Health

Jorge Pierluisi
Housing

Hector Reichard de Cardona
Justice

Pedro Barez Rosario
Labor and Human Resources

Hilda Diaz Soltero
Natural Resources

Jose Barbosa
Parks and Recreation and Sports

Dr. Genaro Collazo
Social Services

Carlos S. Quirós
State

Rafael Faria González
Transportation and Public Works

Carmen A. Culpepper (acting)
Treasury

Juan H. Cintrón Garcia
Commerce

Office of the Governor

The Puerto Rican constitution defines the powers and duties of the Governor. He appoints the heads of the executive departments and the members and chairmen of various boards and commissions. The Governor also executes the laws of the commonwealth, submits an annual budget to the legislature, may convene the legislature in extraordinary sessions, and has the power to veto legislation.

The Governor is elected to a four-year term with no limit to the number of times he may succeed himself. He is the only elected officer in the executive branch. If the Governor is temporarily or permanently unable to perform his functions, the office of the Governor devolves

upon the Secretary of State, who is appointed by the Governor with the advice and consent of the Senate and the House of Representatives.

Governor Carlos Romero-Barcelo is serving his second term of office. Governor Romero, the head of the New Progressive Party, was first elected in 1976.

The Governor's address and the names of his key aides are:

Governor Carlos Romero-Barcelo
La Fortaleza
Apartado 82
San Juan, Puerto Rico 00902
809-724-2100
809-723-8951

Washington office:
Puerto Rico Federal Affairs
Administration
734 15th Street, N.W.
Washington, D.C. 20036
202-383-1300

Frederick E. Rushford - Federal Programs Officer
Gladys Batista-Torres - Special Aide to the Governor
Amador Cobas - Science Advisor, Governor's Office of Energy
Joaquín Márquez - Administrator, Federal Affairs Administration

Southern States Energy Board

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

Environmental Quality Board

The Environmental Quality Board is a component of the Governor's office. Members are appointed by the Governor with the advice and consent of the Senate. The Board monitors environmental conditions and trends and makes recommendations to other executive agencies and the Governor regarding these conditions. Mr. Santos Rohena: 809-725-5140

Department of Health

The Department of Health operates the radiological health program for Puerto Rico. The radiation control officer is Dr. David A. Saldana. Since Puerto Rico is not an agreement state, the Department regulates only radiation machines, such as x-ray machines. A Commission for the Control of Radiation is empowered to promulgate rules and regulations for the control of Radiation. In 1972 the Commission promulgated regulations that are currently in force. The Commission for the Control of Radiation is composed of the Secretaries of Health and Labor and a third person appointed by the Governor. To provide technical assistance to the Commission, a Radiation Advisory Board was created, with five members appointed by the Governor. The members must possess scientific training in one of the following areas: radiology, nuclear medicine, atomic energy, or radiation physics. According to Dr. Saldana, the Commission for the Control of Radiation and the Radiation Advisory Board have been inactive for the last eight years.

Dr. David A. Saldana, Radiation Health Program
Department of Health
Building A, Medical Center
Cappara Heights Station
San Juan, Puerto Rico
809-767-3563

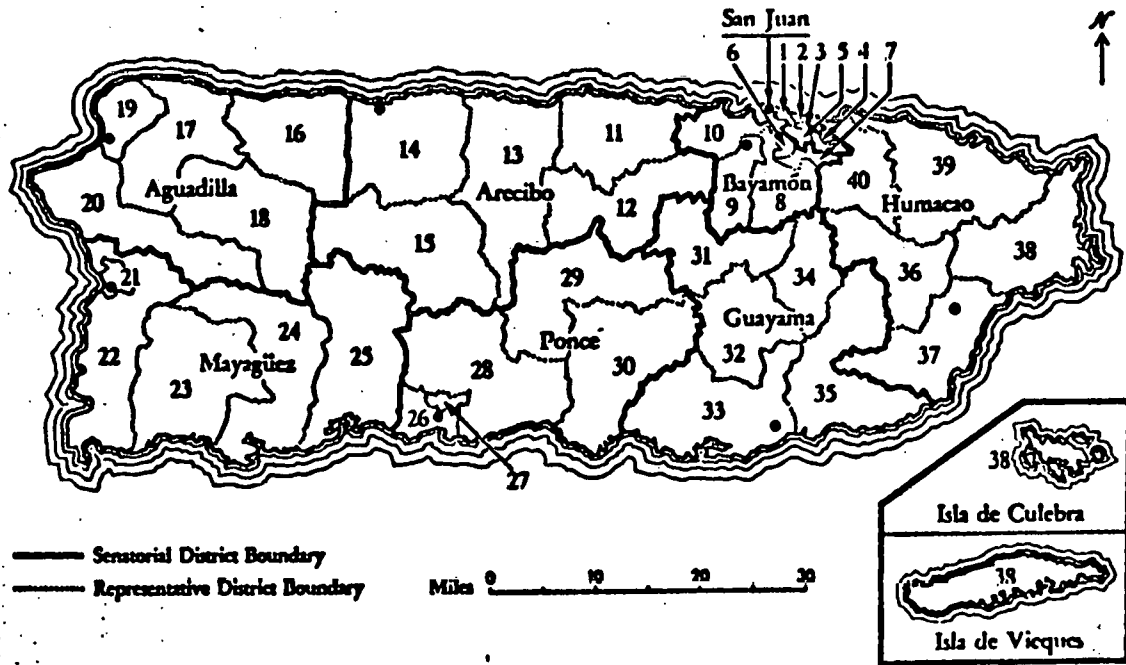
4.3.2 Legislative Branch

The Puerto Rican legislature is a bicameral body composed of a Senate and House of Representatives. The constitution provides for 27 Senators and 51 Representatives in eight senatorial and 40 representative districts. Two Senators are elected for each senatorial district and one Representative for each representative district, all to four-year terms. Each house has 11 members elected at-large with no specific geographic constituency. Map 4.1 on the following page depicts the Senate and House districts of Puerto Rico.

The constitution provides a safeguard for a minority voice in the legislature. If two-thirds or more of the seats in either House are won by a single party, the number of seats is increased. These extra seats, a maximum of nine in the Senate and 17 in the House, are reserved for minority party legislators.

The legislature convenes in regular session each year on the second Monday in January. Sessions may end in April, but are often extended through June in order to complete business. The members of each House elect their respective presiding officers, a President of the Senate and a Speaker of the House. The presiding officers of the Legislature assign the members and chairmen of committees.

All bills introduced in the legislature are referred to a committee for consideration before being voted on in the chamber. Committees must report bills out with a written report containing their recommendations.



Political Districts of Puerto Rico
Above: Municipios. Below: Senatorial and Representative Districts

After a bill has been passed by a majority of the members of each House, it is submitted to the Governor for approval. If the Governor signs the bill, or does not return it to the legislature within 10 days with his objections, the bill becomes law. If the legislature adjourns sine die during the 10-day period of consideration, the Governor may pocket veto the bill. Any bill vetoed by the Governor may be enacted into law by the vote of two-thirds of the members of both Houses.

A roster of Senators in the 1981-84 Legislative Assembly, their districts, and political affiliations follows:

President of the Senate: Miguel A. Hernández Agosoto
Vice-President of the Senate: Sergio Peña Clos

Oreste Ramos Díaz, 1st, NPP	Ana Nisi Goyco, 5th, PDP
Rolando Silva, 1st, NPP	José A. García Ortiz, 5th, PDP
José Manuel Ramos Barroso, 2nd, NPP	Juan Rivera Ortiz, 6th, PDP
Guillermo Campos Ayala, 2nd, NPP	José Mariano Ríos Ruiz, 6th, PDP
Gladys R. Acevedo de Galarza, 3rd, PDP	Jesús Santa Aponte, 7th, PDP
Américo Martínez, 3rd, PDP	Gilberto Rivera Ortiz, 7th, PDP
Miguel A. Deynes Soto, 4th, PDP	Mercedes Torres de Pérez, 8th, NPP
Antonio J. Fas Alzamora, 4th, PDP	Danny López Soto, 8th, NPP

Senators at large:

Etraín Santiago, NPP	Miguel A. Hernández Agosto, PDP
Nicolás Noguerras, NPP	Velda González Modestí, PDP
Calixto Calero Juarbe, NPP	Sergio Peña Clos, PDP
Edwin Ramos Yordán, NPP	Francisco Aponte Pérez, PDP
Luis A. Ferré Aguayo, NPP	Justo Méndez, PDP
Miguel (Mickey) Miranda, NPP	

NPP is the New Progressive Party and is pro-statehood.
PDP is the Popular Democratic Party and is pro-commonwealth.

Secretary of the Senate: Hipólito Marcana, 809-724-2030

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

Speaker of the House: Angel Viera Martinez, NPP

Vice-Speaker of the House: Severo Colberg Ramirez, PDP

Benjamin Vélez Hernández, 1st, NPP	Presby Santiago Garcia, 21st, PDP
Jaime Rosario Báez, 2nd, NPP	Héctor López Galarza, 22nd, PDP
Néctor R. Collazo Irizarry, 3rd, NPP	Samuel Ramirez, 23rd, PDP
Adolfo Dones Rosario, 4th, NPP	Héctor Martínez Colón, 24th, NPP
Edison Mísla Aldarondo, 5th, NPP	Pedro Juan Herrera Cotal, 25th, NPP
Luis Gonzalo de Jesús Rivera, 6th, NPP	José Uriel Zayas Bonilla, 26th, PDP
Herbert Torres Quiles, 7th, NPP	Carlos L. Torres Santiago, 27th, PDP
Luisito Figueroa Hernández, 8th, PDP	Gumersindo Carmona, 28th, PDP
Manuel Marrero Hueca, 9th, NPP	Rafael Coca Navas, 29th, PDP
Manuel Morales Garcia, 10th, NPP	Cirilo Tirado Delgado, 30th, PDP
Gacpar Jiménez Meléndez, 11th, PDP	Ramón Muñiz, 31st, PDP
Juan R. Colón Lugo, 13th, NPP	Juan López Hernández, 32nd, PDP
Héctor González, PDP, 14th	Gilberto Castro Diaz, 33rd, NPP
Roberto Soriano González, 15th, PDP	Antonio Rosa Guzmán, 34th, PDP
Noel Calero Bermúdez, 16th, PDP	Luis A. de Jesús Cortijc, 36th, NPP
Mabel Vélez de Acevedo, 17th, PDP	Victor Rivera Morales, 37th, NPP
Estéban Rosado Báez, 18th, PDP	Armando Batista Montañez, 38th, NPP
Hernán Peña Quiñones, 19th, PDP	Jorge L. Navarro Alicea, 39th, NPP
Harry Luis Pérez Rivera, 20th, PDP	Salomón Rondón Tolléns, 40th, NPP

Representatives at large:

Freddy Valentín Acevedo, NPP	Fernando Tonos, PDP
Luis M. Ayala del Valle, NPP	Luis Muñoz-Arjona, PDP
Angel Viera Martinez, NPP	Severo Colberg, PDP
Oswaldo Torres Valesquez, NPP	José (Rony) Járago, PDP
Jose Granados, NPP	José Enrique Arrarás, PDP
Charles Rodriguez Colón, NPP	

The 12th, 31st, and 36th district seats are currently vacant. Possession of these seats is being contested. Until the controversy is resolved, no clear majority exists in the House. As the result of a compromise between the NPP and the PDP, Viera Martinez (NPP) and Severo Colberg (PDP) have been appointed interim Speaker and Vice-Speaker. These appointments are to expire December 31, 1981.

Fifteen committees, known as "Comisiones Permanentes," exist in the Senate of Puerto Rico and 19 in the House of Representatives. The following list provides the names of committees that may have jurisdiction relevant to low-level radioactive waste management, as well as the names of the President, Vice-President, and Secretary of each committee.

Senate:

Government

José Mariano Rios Ruiz, Pres.
Antonio Fas Alzamora, Vice-Pres.
Velda González de Modestti, Sec.

Industry and Commerce

Américo Martínez Cruz, Pres.
Ana Nisi Goyco, Vice-Pres.
Francisco Aponte Pérez, Sec.

Health and Environment

Ana Nisi Goyco, Pres.
Américo Martínez Cruz, Vice-Pres.
Miguel A. Deynes Soto, Sec.

Rules and Calendar

Gilberto Rivera Ortiz, Pres.
Justo A. Méndez, Vice-Pres.
Miguel A. Deynes Soto, Sec.

House:

Government

Edison Mislá Aldarondo, Pres.
Víctor Rivera Morales, Vice-Pres.
Juan López Hernández, Sec.

Commerce and Industry

Adolfo S. Dones Rosario, Pres.
Herbert Torres Quiles, Vice-Pres.
Mabel Vélez de Acevedo, Sec.

Plans & Socioeconomic Development

Esteban Rosado Báez, Pres.
Gaspar Jiménez Maléndez, Vice-Pres.
Manuel Morales García, Sec.

Transportation & Public Works

Harry Luis Pérez, Pres.
Gumersindo Carmona, Vice-Pres.
Herbert Torres Quiles, Sec.

Health and Welfare

Mabel Vélez de Acevedo, Pres.
Esteban Rosado Báez, Vice-Pres.
Salmon Rondón Tollens, Sec.

Calendar and Rules

José Granados Navedo, Pres.
Rony Jarbo, Sec.
Luis M. Ayala del Valle, Member

4.3.3 Judiciary

The constitution of Puerto Rico established a unified court system. The Supreme Court of Puerto Rico consists of a Chief Justice and eight Associate Justices. In addition to being the court of last resort, the Supreme Court adopts rules of evidence and procedure for all lower courts. The Chief Justice directs the administration of the courts of Puerto Rico and appoints an administrative director of the court system. Justices are appointed for life by the Governor with the advice and consent of the Senate.

The Courts of First Instance, which are courts of general jurisdiction, are composed of nine Superior and 37 District Courts. The Superior Courts hear all civil cases in which the amount in controversy is more than \$10,000 and all felony cases. All condemnation or eminent domain cases are also adjudicated by the Superior Courts. The District Courts hear all other civil cases and all misdemeanors not specifically within the jurisdiction of the Superior Courts, such as misdemeanor and manslaughter. Forty-two Municipal Judges, whose duties are equivalent to those of a Justice of the Peace, handle local disputes and swearing of warrants.

The federal District Court for Puerto Rico sits in San Juan. Four federal judges are appointed by the President of the United States. The federal District Court has jurisdiction over all cases arising under the laws and treaties of the United States and may also hear a diversity of cases involving citizens of different states. Appeals from this court may be taken by the First Circuit Court of Appeals in Boston.

4.3.4 Statutory Regulations

Act 79 of June 24, 1965, provides the statutory basis for the promulgation of regulations "to protect the public health and safety against the hazards of ionizing radiation." This Act also created the Commission for the Control of Radiation and the Radiation Advisory Board.

Pursuant to Act 79, the Commission for the Control of Radiation issued Regulations for the Control of Radiation on November 14, 1972. These were modeled on the Suggested State Regulations for the Control of Radiation produced by the National Conference of State Radiation Control Directors. The Regulations for the Control of Radiation in Puerto Rico regulate all radiation sources, provide for the issuance of licenses and the registration of radiation sources, establish radiation safety requirements in industrial radiography operations, and provide for the use of X-rays and sealed sources of radiation in the healing arts. The regulations apply to all persons who receive, possess, use, transfer, own, or acquire any source of radiation in the Commonwealth of Puerto Rico. They do not apply to any person subject to regulation by the U.S. Nuclear Regulatory Commission.

Act 79 empowers the Governor to enter into agreements with the federal government to transfer regulatory authority over certain radioactive materials, pursuant to Section 274 of the Atomic Energy Act of 1954, as amended.

4.4 Federal Activities

Since Puerto Rico is not an agreement state, the U.S. Nuclear Regulatory Commission issues all licenses for radioactive materials in the commonwealth. The licensing and monitoring of licensees is the only major federal activity related to the use of radioactive materials. In the early 1970s the NRC built a small test reactor in the city of Mayaguez known as the Puerto Rican Nuclear Center of Mayaguez. This test reactor was decommissioned in 1976 and has been dismantled.

4.5 Interest Groups

This section identifies groups in Puerto Rico that have expressed an interest in radioactive waste management issues.

Puerto Rico Industrial Mission, Inc.

The Puerto Rico Industrial Mission, Inc. (PRIM) was created in 1969 by the Episcopal Diocese of Puerto Rico. Although the original objective of PRIM was evangelizing within the developing industrial community on the island, PRIM now concentrates on environmental and community development issues. PRIM publishes a monthly newsletter, in Spanish, entitled:

Misión Industrial Informa.

Victor M. Agrait Defillo, Executive Director
Apartado 376
Hato Rey, Puerto Rico 00919
809-725-3946

League of Women Voters of Puerto Rico

The League of Women Voters of Puerto Rico is the local chapter of the national League of Women Voters. The national organization is involved in both energy and environmental programs. The concerns of the League regarding radioactive waste are outlined in the League's Criteria for Evaluating Suitability of Storage and Disposal Sites for Hazardous and Nuclear Waste. The League advocates decision-making that allows for public and government participation at all levels and procedures for mediation of intergovernmental conflict. The League also states that storage or disposal of radioactive waste should not occur on or near drinking water sources, fragile land areas, areas with significant renewable resource value, or areas where rare or valuable ecosystems or geological formations exist. The president of the Puerto Rico Chapter is Blanca Arcen.

League of Women Voters of Puerto Rico
Apartado 3724
San Juan, Puerto Rico 00936
809-726-8337

4.6 Newspapers

Radioactive waste management and nuclear power have not been topics covered in Puerto Rican newspapers. A review of newspapers in the San Juan library failed to produce any articles relevant to radioactive waste management. The State Planning Council on Radioactive Waste Management employs a clipping service that reviews newspapers and news reports across the nation. This clipping services has not identified any news articles from Puerto Rico relevant to radioactive waste. The Puerto Rico Federal Affairs Administration in Washington, D.C., which regularly monitors all

Puerto Rican newspapers, said that there have not been any news articles relevant to radioactive waste management. The Governor's Office of Energy also maintains a news-clipping file. According to Amador Cobas of that office, no articles relevant to radioactive waste management have appeared. Gladys Batista-Torres, Special Aide to the Governor, who supervises monitoring of newspapers for issues of interest to the Governor, also said that no articles relevant to radioactive waste management have appeared in Puerto Rican news services.

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

5.1 Survey Form

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

The survey form proper consists of six 14 x 8 1/2-inch typeset printed sheets (three sheets, front and back), as shown in Figure 5.1. Licensees were informed that the data would be treated as CONFIDENTIAL and would be ANONYMOUSLY reported in consensus and statistical form. Each licensee was assigned a number, stamped on each sheet of the questionnaire. The

first two digits identify the state and the last four the licensee. These identifying numbers were used during data processing for control purposes.

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

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

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

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

The Yearly Data Sheets for 1978, 1979, and 1980 comprise sheets Three through Five. These sheets solicit data in matrix format of radionuclides versus characteristic and quantitative data in six general categories.

The categories are the same for each Yearly Data Sheet, except that they were sequentially numbered from 6.0 through 23.0 for processing purposes.

The categories are:

- 6.0, 12.0, 18.0 Radionuclides Received/Produced
- 7.0, 13.0, 19.0 Radioactive Waste Generated
- 8.0, 14.0, 20.0 Radioactive Waste Received
- 9.0, 15.0, 21.0 Radioactive Waste Processed/Reduced
- 10.0, 16.0, 22.0 Radioactive Waste Shipped
- 11.0, 17.0, 23.0 On Site Waste Disposal

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

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

5.2 Survey Administration

Mailout packages were prepared that included a questionnaire, a self-addressed prepaid return envelope, and a letter from Vachon, Nix

and Associates. The Vachon, Nix and Associates letter included in the packages is presented as Figure 5.2.

Names and addresses of each licensee authorized to handle radioactive material in the Commonwealth of Puerto Rico were obtained from EG&G Idaho, Inc. EG&G provided a list of U.S. Nuclear Regulatory Commission licensees. No attempt was made to differentiate between those licensees believed not to generate radioactive waste and those known to generate waste. Survey packages were mailed to every name provided.

Large 7 1/2 x 10 1/2-inch envelopes were specifically used for the mailing so that the package would not be easily misplaced by recipients. A special notice was printed in Spanish on the envelopes: 1) Material Fechado: Estudio del Manejo de desechos Radioactivos del Consejo de Energia Official de Control de Material Radioactivo.

The packages were mailed first class on August 15, 1981. September 15th was established as the cut-off date for processing questionnaires. Questionnaires received after that date were monitored to sort out significant waste generators. The results of the survey are presented in Chapter 6.

ESTUDIO DEL MANEJO DE DESECHOS RADIOACTIVOS DE BAJO GRADO

RAZON FUNDAMENTAL PARA HACER EL ESTUDIO

El propósito de este estudio es el de recopilar información sobre la generación, el manejo y la evacuación de desechos radioactivos de bajo grado en su Estado. La recopilación de estos datos servirá de base para el análisis de la duración del ritmo de cambio de la generación radioactiva de desechos de bajo grado y ayudar en mejor forma al desarrollo de regulaciones y programas que ofrezcan mayor seguridad en el manejo de desechos radioactivos de bajo grado. Cada uno de los cuestionarios estudiados tendrá una clave por respondedor. La información es CONFIDENCIAL y referida en consenso y en forma de estadística.

INDICACIONES GENERALES

Sírvase dar la información que se le pide en forma precisa y tan completa como le sea posible, escrita a máquina, pluma o lápiz. Si alguna parte de la información que se le pide no es pertinente a sus instalaciones, déjela en blanco y continúe con la siguiente. Cuando en alguna sección se listen selecciones que no tienen relación a su planta, use la selección que dice "otra" y explíquelo en el espacio que se provee. Cuando termine de llenar el cuestionario, sírvase devolvérselo en el sobre adjunto que tiene nuestra dirección y estampilla de correo. Muchas gracias.

1.0 DATOS SOBRE SU INSTALACION Y SU ORGANIZACION

- 1.1 Nombre de la instalación _____
- 1.2 Ubicación (Sede/Administración) _____
- 1.3 Ciudad _____ 1.4 Estado _____
- 1.5 Teléfono # (____) _____ 1.6 Zip Code _____
- 1.7 Oficial encargado de Seguridad Radiológica
 - 1.7.1 Nombre _____
 - 1.7.2 Título _____
- 1.8 Persona llenando el cuestionario
 - 1.8.1 Nombre _____
 - 1.8.2 Título _____
 - 1.8.3 Fecha _____



VACHON, NIX & ASSOCIATES
 P.O. Box 1305
 Norcross, Georgia 30071
 404/448-5235

2.0 TIPO DE INSTALACION (PLANTA)

Por favor marque el paréntesis que indique la principal función de su establecimiento, pero no más de uno por cada grupo.

- 2.1 Médica
 - 2.1.1 () Hospital
 - 2.1.2 () Asilo de Ancianos/Convalecencia
 - 2.1.3 () Médico
 - 2.1.4 () Clínica
 - 2.1.5 () Otro _____
- 2.2 Educacional
 - 2.2.1 () Universidad/Facultad
 - 2.2.2 () Tecnológico/Universidad pequeña
 - 2.2.3 () Escuela de Medicina (Laboratorio de Investigación/tests)
 - 2.2.4 () Escuela Secundaria
 - 2.2.5 () Otra _____
- 2.3 Industrial
 - 2.3.1 () Fábrica
 - 2.3.2 () Construcción
 - 2.3.3 () Mina
 - 2.3.4 () Registro de Pozos/sismología/ Exploración de Gas y Petróleo
 - 2.3.5 () Ingeniería
 - 2.3.6 () Investigación y Desarrollo
 - 2.3.7 () Manufactura Farmacéutica
 - 2.3.8 () Otra _____
- 2.4 Reactor Nuclear Crítico
 - 2.4.1 () Reactor de Energía Comercial
 - 2.4.2 () Reactor de Investigación
- 2.5 Gobierno Federal
 - 2.5.1 () Militar
 - 2.5.2 () No Militar
- 2.6 Gobierno Estatal
 - 2.6.1 () Departamento de Caminos
 - 2.6.2 () Departamento de Salud Estatal
 - 2.6.3 () Otra _____
- 2.7 Otras Jurisdicciones
 - 2.7.1 () Condado
 - 2.7.2 () Ciudad

3.0 INFORMACION SOBRE LICENCIA

Por favor dé información sobre las licencias que le haya otorgado la Comisión Reguladora Nuclear (Nuclear Regulatory Commission) y/o Agencias Estatales.

3.1 Número de la Licencia	3.2 Agencia que la Otorgó	3.3 Clasificación*

*GENERAL, ESPECIFICA, EXENTO, ETC.

4.0 INFORMACION SOBRE DESECHOS RADIOACTIVOS

La palabra "desecho" usada en este estudio se refiere a todos los materiales que emiten radioactividad y que ya no tienen ningún uso en su instalación y de los cuales se tiene que deshacer en su planta o tienen que ser transportados a otra instalación. Por favor responda las siguientes preguntas.

- 4.1 ¿Generó desecho radioactivo su planta durante 1978, 1979 y/o 1980 que requirió guardarse, reprocesarse, desecharse en su ubicación o enviarse a algún lugar fuera de la misma para que se le desechara?
 - 1978 () Si () No
 - 1979 () Si () No
 - 1980 () Si () No
 - 4.2 ¿Recibió en su planta desecho radioactivo proveniente de una casa matriz o de un ramo de su organización para que se le guardara, se reprocesara, se desechara en su planta o para que fuera enviado a alguna otra instalación para que se le desechara durante 1978, 1979 y/o 1980?
 - 1978 () Si () No
 - 1979 () Si () No
 - 1980 () Si () No
- Si su instalación no generó ni recibió desecho radioactivo durante 1978, 1979 o 1980, entonces Ud. ya terminó con este cuestionario. Muchas gracias. Pero si contestó "Sí" a las preguntas 4.1 y o 4.2, por favor prosiga llenando el cuestionario.

5.0 CLASIFICACION USADA PARA FUENTES RADIOACTIVAS SIN SELLAR

Sírvase indicar el porcentaje del volumen total de material radioactivo sin sellar usado en cada una de las categorías que se indican abajo. El total de todas las categorías debe ser 100%.

- 5.1 Humano
 - 5.1.1 () Diagnóstico _____%
 - 5.1.2 () No Diagnóstico _____%
 - 5.1.3 () Investigación _____%
 - 5.2 Animal
 - 5.2.1 () Diagnóstico _____%
 - 5.2.2 () No Diagnóstico _____%
 - 5.2.3 () Investigación _____%
 - 5.3 Investigación General
 - 5.3.1 () Física _____%
 - 5.3.2 () Química _____%
 - 5.3.3 () Ingeniería _____%
 - 5.3.4 () Otra _____%
- Total de 5.1, 5.2 & 5.3 100% (Especifique)

INSTRUCCIONES PARA LLENAR LA HOJA DE INFORMACION ANUAL

Las siguientes hojas se deben llenar con la información sobre radionúclidos (Isótopos) recibidos y/o producidos, y sobre la generación de desechos radioactivos, recibidos, procesados, o enviados fuera de su planta para ser desechados, o que hayan sido desechados en la misma en los años calendarios de 1978, 1979 y 1980.

El formato de las hojas es idéntico. Por conveniencia, se puso una lista de los radionúclidos comunes. Sírvase dar la información sobre todos los radionúclidos usados en su planta en la forma que se indica. Todos los datos cuantitativos deben sacarse directamente de los registros de su planta; si los registros no están disponibles, por favor responda en la forma más acertada posible.

"Recibido/Producido" en las Secciones 6.0, 12.0, y 18.0 se refiere a materiales usados en su planta que emiten radioactividad. La palabra "Desecho" usado en las secciones 7.0-11.0, 13.0-17.0 y 19.0-23.0 se refiere a todos los materiales que emiten radioactividad y que ya no tienen ninguna utilidad en su planta y que deben ser evacuados allí mismo en la planta o enviados a otra. "Desecho Generado" que aparece en las secciones 7.0, 13.0 y 19.0 se refiere al desecho producido en su planta, mientras que "Desecho Recibido" que aparece en las secciones 8.0, 14.0 y 20.0 se refiere a desecho recibido de otras plantas. En las secciones 9.0, 15.0 y 21.0 tituladas "Desecho Procesado/Reducido", la columna en la que aparece el signo "%" se refiere al porcentaje de reducción del volumen original al volumen reducido. Las columnas de la A hasta la H en cada hoja se deben llenar usando la clave que aparece en esta misma hoja. Sírvase seleccionar la respuesta apropiada de la clave y ponga el número(s) correspondiente(s) en el espacio que le corresponde a cada radionúclido.

Para asegurar una recopilación exacta, sírvase poner los datos de acuerdo a la lista de las unidades. Muchas gracias por su valiosa cooperación. Si tiene algún comentario adicional, pongalo en el espacio que se provee para eso en la página seis.

CLAVE PARA LLENAR LAS HOJAS DE INFORMACION ANUALES

SECCIONES 9.0, 15.0 y 21.0

[A] PROCESO DE REDUCCION

- 1 = Compactación
- 2 = Solidificación
- 3 = Evaporación.
- 4 = Adsorción (intercambio iónico)
- 5 = Absorción
- 6 = Incineración
- 7 = Otra

SECCIONES 10.0, 11.0, 16.0, 17.0, 22.0 y 23.0

[B] CLASE DE DESECHO

- 1 = Sólido(s) seco(s)
- 2 = Sólido(s) líquido(s)
- 3 = Líquido(s) no sólido(s)
- 4 = Tubo de centelleo
- 5 = Biológico
- 6 = Gaseoso
- 7 = Fuente sellada
- 8 = Otra

SECCIONES 10.0, 16.0, y 22.0

[C] RECIPIENTES USADOS PARA ENVIOS

- 1 = Recipiente Kraft
- 2 = Cilindro de 55 galones
- 3 = Cilindro de 30 galones metido en cilindro de 55 galones
- 4 = Otra (especifique en la página 6)

SECCIONES 10.0, 16.0 y 22.0

[D] PELIGRO POSIBLE ADICIONAL

- 1 = Corrosivo
- 2 = Tóxico
- 3 = Inflamable
- 4 = Volátil
- 5 = Explosivo

SECCIONES 10.0, 16.0 y 22.0

[E] DESTINACION

- 1A = Barnwell, South Carolina
- 1B = Beatty, Nevada
- 1C = Richland (Hanford), Washington
- 1D = Otra
- 2 = Distribución en forma de producto
- 3 = Devolver al vendedor
- 4 = Otra (especifique en la página 6)

SECCIONES 10.0, 16.0 y 22.0

[F] METODO DE TRANSPORTE

- 1 = Camión de la instalación
- 2 = Expreso de motor
- 3 = Aéreo
- 4 = Ferrocarril

SECCIONES 11.0, 17.0 y 23.0

[G] METODO

- 1 = Evacuación por alcantarilla
- 2 = Mezclado con desechos comunes
- 3 = Incinerado a la atmósfera
- 4 = Evaporado o Destilado
- 5 = Ventilado a la atmósfera
- 6 = Enterrado en el lugar de la instalación
- 7 = Redistribuido en su forma original a los que usan la planta
- 8 = Otra (especifique en la página 6)

[H] INSTRUMENTACION MONITGRA

- 1 = Cámara de Iones
- 2 = Dosímetro termoluminiscente
- 3 = Ventana final > 1.4 mgm/cm² Geiger-Mueller
- 4 = Ventana delgada < 0.5 mgm/cm² Geiger-Mueller
- 5 = Contador de la proporción de gas
- 6 = Espectrofotometría del centelleo en líquidos
- 7 = Captura de electrones
- 8 = Otra

PLANTA COMERCIAL PARA DISPOSICION DE DESECHOS

RUBRO DE LA ACTIVIDAD	18.0 RECIBIDO PRODUCCION		19.0 DESECHO GENERADO		20.0 DESECHO RECIBIDO		21.0 DESECHO PROCESADO/REDUCIDO			22.0 DESECHO ENVIADO					23.0 EVACUACION EN SITIO			
	TONELADAS	LIBRAS	TONELADAS	LIBRAS	TONELADAS	LIBRAS	ACUMULADO EN CUBIERTA	RECICLADO	OTRO	TONELADAS	LIBRAS	B	C	D	E	F	TONELADAS	LIBRAS
1010																		
1100																		
1200																		
1300																		
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9800																		
9900																		
10000																		



VACHON, NIX & ASSOCIATES

TEMA: Estudio del manejo de desechos radioactivos de bajo grado

Estimado Concesionario:

Vachon, Nix y Asociados y el Consejo de Energía de los Estados del Sur, bajo Contrato con el Departamento de Energía de los Estados Unidos, están desarrollando Libros de Información Estatal sobre cuestiones de manejo de desechos radioactivos de bajo grado. Este proyecto se está llevando a cabo con el apoyo del oficial de Control Radiológico Estatal como lo indica la carta adjunta y, necesitamos la cooperación suya para estar seguros de que los problemas en su Estado se planteen correctamente. Por consiguiente, le rogamos nos provea información sobre la generación, manejo y eliminación de desechos radioactivos de bajo grado pertinentes a sus instalaciones.

El cuestionario y el sobre adjuntos están diseñados con el objeto de ayudarlo a proporcionar dicha información. Tenga la amabilidad de completar el cuestionario y de enviarnoslo por correo dentro del lapso de siete (7) días. Estoy seguro que Ud. y yo compartimos la misma aversión a llenar cuestionarios. Sin embargo, en éste caso trabajaremos juntos para tomar un margen de seguridad que permita el uso inocuo y continuo de materiales radioactivos.

Tan pronto como se termine el proyecto del área de los doce Estados de nuestro estudio, enviaremos los resultados a cada uno de ellos. La Agencia Radiológica de su Estado le podrá informar sobre dichos resultados.

Sus instalaciones mantendrán su anonimidad y la información proveída será CONFIDENCIAL y referida en consenso y en forma de estadística.

Gracias por su tiempo y por su interés. Sírvase llamar al (404) 448-5235 si necesita ayuda con el cuestionario, o si desea hacer preguntas o comentarios pertinentes al proyecto.

Cordialmente,

Vachon, Nix y Asociados

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

RIV/caw

RAMO DE "OPTIMAL SYSTEMS" S.A.

6855 Jimmy Carter Blvd., N.W. • Norcross/Atlanta, Ga. 30071 • Phone: 404-448-5235 • Telex: 708405 OPTIMAL NRCS

SURVEY STATUS LOG

STATE CODE: _____

SERIAL NO: _____

DATE FORM MAILED: _____

DATE FORM RECEIVED: _____

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

YES

NO

Inquiry From: _____ Date: _____

Received By: _____ Phone #: _____

Type of Inquiry: ___ Letter ___ Phone

Questions: _____

Answers: _____

Action Items: Action Taken By: _____ Date: _____

Telecon Follow-Up By: _____ Date: _____

Telecon With (Name): _____ Phone #: _____

Questions: _____

Answers: _____

Action Items: Action Taken By: _____ Date: _____

INTRODUCTION

The purpose of this study was to compile data on the generation, handling, and disposal of low-level radioactive waste in the Commonwealth of Puerto Rico. Each of the 50 licensees producing or using radioactive materials was sent, via the U.S. Postal Service, a packet containing the "Low-Level Radioactive Waste Management Survey" for completion and return. (Figure 5.1 in Chapter 5 is a copy of the survey).

Compilation of the data generated by the survey is reported in Tables 6.1 through 6.7. Respondents to the survey were identified by one of the following seven broad categories: (1) medical, (2) educational, (3) industrial, (4) critical nuclear reactor, (5) federal government, (6) state government, and (7) other jurisdictions (political subdivisions).

Each table has been designed so that the reader can easily determine the status of all components of the survey.

Table 6.1 Respondents Reporting Nuclear Waste in Puerto Rico

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

TABLE 6.1 RESPONDENTS REPORTING NUCLEAR WASTES IN PUERTO RICO

Facility	Number	%	Cumulative %
MEDICAL			
Hospital	0	0	0
Other	0	0	0
EDUCATIONAL	0	0	0
INDUSTRIAL			
Engineering	1	100.0	100.0
Construction	0	0	0
CRITICAL NUCLEAR REACTOR	0	0	0
FEDERAL GOVERNMENT			
Non-Military	0	0	0
STATE GOVERNMENT	0	0	0
OTHER JURISDICTIONS	0	0	0
TOTAL	1		

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

Table 6.2 represents those licensees using nuclear materials in the form of sealed sources who reported not shipping nuclear waste during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the total column represent the number of licensees reporting not shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category.

The numbers reported in this table represent licensees from the medical, industrial, and state government categories. Examples of sealed source devices were Strontium-90 eye applicators (physicians); Americium-241 and Cesium-137 (manufacturing); and Nickel-63 as the electron capture detectors for gas chromatography (pharmacy, manufacturing, and state government).

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

Facility	Number	%	Cumulative %
MEDICAL			
Hospital	1	20.0	20.0
Physician	4	80.0	100.0
EDUCATIONAL			
	0	0	0
INDUSTRIAL			
Engineering	1	20.0	20.0
Construction	1	20.0	40.0
Pharmaceutical Mfg.	1	20.0	60.0
Other	2	40.0	100.0
CRITICAL NUCLEAR REACTOR			
	0	0	0
FEDERAL GOVERNMENT			
Non-Military	0	0	0
STATE GOVERNMENT			
	1	100.0	100.0
OTHER JURISDICTIONS			
	0	0	0
TOTAL	11		

Table 6.3 Respondents Reporting No Waste in Puerto Rico

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

TABLE 6.3 RESPONDENTS REPORTING NO WASTE IN PUERTO RICO

Facility	Number	%	Cumulative %
MEDICAL			
Hospital	1	20.0	20.0
Physician	4	80.0	100.0
Other	0	0	0
EDUCATIONAL			
	0	0	0
INDUSTRIAL			
Engineering	1	20.0	20.0
Construction	1	20.0	40.0
Pharmaceutical Mfg.	1	20.0	60.0
Other	2	40.0	100.0
CRITICAL NUCLEAR REACTOR			
	0	0	0
FEDERAL GOVERNMENT			
Non-Military	0	0	0
STATE GOVERNMENT			
	1	100.0	100.0
OTHER JURISDICTIONS			
	0	0	0
TOTAL			
	11		

Table 6.4 Sealed Sources Producing Shipped Nuclear Waste

Table 6.4 represents those respondents to the survey who reported using nuclear materials as sealed sources and produced nuclear waste that was shipped during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the total column represent the number of licensees reporting shipping nuclear waste. Percentages were computed for each category to equal 100 percent. When a specific category was not reported by any licensee, a 0 is shown for that particular category. The respondents represented in this table were from the industrial category. Devices using Americium-241 and Cesium 137 required shipment and disposal.

TABLE 6.4 SEALED SOURCES PRODUCING SHIPPED NUCLEAR WASTE FOR
 PUERTO RICO, 1978

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

TABLE 6.4 SEALED SOURCES PRODUCING SHIPPED NUCLEAR WASTE FOR
 PUERTO RICO, 1979

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

TABLE 6.4 SEALED SOURCES PRODUCING SHIPPED NUCLEAR WASTE FOR
PUERTO RICO, 1980

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

NONE REPORTED FOR 1980

Table 6.5 Millicuries of Nuclear Waste Shipped by Facility Type

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

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

Facility	Millicuries	% Of Total
MEDICAL		
Hospital	0	0
Physician	0	0
Other	0	0
EDUCATIONAL		
Other	0	0
INDUSTRIAL		
Engineering	50000.0	100.0
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT		
Non-Military	0	0
STATE GOVERNMENT	0	0
TOTAL	50000.0 Millicuries	

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

Facility	Millicuries	% Of Total
MEDICAL		
Hospital	0	0
Physician	0	0
Other	0	0
EDUCATIONAL		
Other	0	0
INDUSTRIAL		
Engineering	50.0	100.0
CRITICAL NUCLEAR REACTOR	0	0
FEDERAL GOVERNMENT		
Non-Military	0	0
STATE GOVERNMENT	0	0
TOTAL	50.0 Millicuries	

TABLE 6.5 MILLICURIES OF NUCLEAR WASTE SHIPPED FROM PUERTO RICO
FOR 1980 BY FACILITY TYPE

Facility	Millicuries	% Of Total
MEDICAL		
Hospital	0	0
Physician	0	0
Other	0	0
EDUCATIONAL		
Other	0	0
INDUSTRIAL		
Engineering	0	0
CRITICAL NUCLEAR REACTOR		
FEDERAL GOVERNMENT		
Non-Military	0	0
STATE GOVERNMENT		
	0	0
COMBINED TOTAL:	50050.0 Millicuries	

NONE REPORTED FOR 1980

Table 6.6 Percent Responses to the Survey

Table 6.6 represents all respondents to the survey. When a respondent reported no waste shipped during the three years of the study period (1978, 1979, and 1980), the respondent's survey was divided into one of two major separations in the computer processing. This table illustrates the two groups: those not generating waste and those generating waste.

TABLE 6.6 RESPONSES TO THE SURVEY FROM PUERTO RICO

LICENCEES	NUMBER	%	CUMULATIVE %
NO WASTE GENERATED	11	91.67	91.67
WASTE GENERATED	1	8.33	100.00

Table 6.7 Nuclear Waste Shipped in Millicuries

Table 6.7 represents those respondents to the survey who reported shipping nuclear waste produced from all sources and categories during one or more years of the study period (1978, 1979, and 1980). The categories of facilities are the same. The numbers reported in the total column represent the number of millicuries reported shipped. When a specific category was not reported by any licensee, a 0 is shown for that particular category.

Each isotope reported on pages 3, 4, and 5 of the survey was included in this table. Isotopes and totals for the three years are shown in millicuries. By using a validation program, multiple reporting of the same isotope and quantity has been corrected in the totals; i.e., respondents were found to report duplicated data in both the medical and educational categories.

TABLE 6.7 NUCLEAR WASTE SHIPPED IN MILLICURIES FOR PUERTO RICO IN 1978

isotope	1	2	3	4	5	6	7	8
CS137	0	0	50000.0	0	0	0	0	50000.0
TOTAL	0	0	50000.0	0	0	0	0	50000.0

CUMULATIVE TOTAL FOR 3 YEARS: 50050.0 Millicuries

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

TABLE 6.7 NUCLEAR WASTE SHIPPED IN MILLICURIES FOR PUERTO RICO IN 1979

Isotope	1	2	3	4	5	6	7	8
AM241	0	0	50.0	0	0	0	0	50.0
TOTAL	0	0	50.0	0	0	0	0	50.0
CUMULATIVE TOTAL FOR 3 YEARS:			50050.0 Millicuries					

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

TABLE 6.7 NUCLEAR WASTE SHIPPED IN MILLICURIES FOR PUERTO RICO IN 1980

Isotope	1	2	3	4	5	6	7	8
CS137	0	0	0	0	0	0	0	0
AM241	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0

CUMULATIVE TOTAL FOR 3 YEARS: 50050.0 Millicuries

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

NONE REPORTED FOR 1980

APPENDIX A: Annotated Bibliography for Puerto Rico

ANNOTATED BIBLIOGRAPHY FOR PUERTO RICO

Energy in Puerto Rico's Future. Final Report of the Committee on Future Energy Alternatives for Puerto Rico. National Academy of Sciences Energy Engineering Board: Washington, D.C., 1980.

"The rapid growth in the Puerto Rican economy was accompanied by a corresponding increase in the demand for electric power. . . . This demand was met by the Puerto Rico Electric Power Authority. . . . the expansion program of PREPA also included plans for the construction of a 614-megawatt nuclear generating plant. . . . delays were experienced in obtaining a licensed site and the start-up date was expected around 1980."

"Governors Resolve to Plan Long-term Care; Waste Disposal," State Headlines (CSG), October 17, 1980, p. 2.

"Puerto Rico Governor Carlos Romero-Barcelo is the new Chairman of the Southern Governors' Association. Resolutions adopted at the September annual meeting include state responsibility for low-level radioactive waste disposal generated by non-federal activities."

"Puerto Rico Energy Plan Cites Conservation, Diversification Needs," Energy Users' Report (BNA) - Current Report. July 12, 1979, pp. 39-42.

With regard to policy on the production of electricity in Puerto Rico, "PREPA (Puerto Rico Electric Power Authority) would determine the need for increased producing capacity to keep up with Puerto Rico's expanding economy. It may be necessary to consider coal, natural gas and nuclear energy before developing the technology needed to use energy obtained from the sun or the sea."

Puerto Rico Nuclear Center Annual Report. July 1, 1975 - September 30, 1976. University of Puerto Rico. Center for Energy and Environmental Research. October 1977 (CEER-5).

"Nuclear power could begin to provide part of the electric energy supply in 1985 if the Puerto Rican Government decides within the next few months to go ahead with construction of a 600-MW plant previously planned and then postponed. . . . The best projections now available are those of the PRWRA, which cover only electric power and are based on a steady 6 percent consumption increase into the 1990s. Assuming that one nuclear plant can go into operation in 1985, PRWRA considers it feasible that three others, each of 800-MW capacity, could go into operation in the next few years, so that by 1991 nuclear plants would be generating two-thirds of the islands electricity."

Spent Fuel and Waste Inventories and Projections. U.S. Department of Energy. Oak Ridge Operations Office. August 1980. (ORO-778).

Table 7.5 details volumes by state of Surplus Facilities Management Program (SFMP) low-level waste to be generated and lists Puerto Rico at 570 cubic meters of waste volume. The SFMP includes approximately 500 DOE facilities that are surplus, or will become surplus, in the near future. These facilities, located throughout the United States and Puerto Rico, include such installations as reactors and support facilities, solid waste burial grounds, laboratories, waste treatment systems, etc. The objective of SFMP is to decontaminate these facilities to permit other productive uses. The SFMP is a 20-year program that is scheduled to begin in FY 1980."

Symposium on Nuclear Energy and Latin American Development. Tenth Anniversary, University of Puerto Rico. Puerto Rico Nuclear Center. October 30-31, 1967. (PRNC-112).

Upon inauguration at the University of Puerto Rico, the Center "aimed at converting the atom into a friend of man." At this time, the Center is "looking into some fundamental questions on the possible direct nonthermal conversion of nuclear energy to other, usable, forms—electrical, chemical, or some other form adapted to every day use. . . .plans exist for the use of nuclear energy on a large scale for producing fresh water from seawater."

APPENDIX B: General Bibliography for Puerto Rico

GENERAL BIBLIOGRAPHY

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

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

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

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

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

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

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

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

Low-Level Waste Management: A Compilation of Models and Monitoring Techniques. Volume 1-3. Science Applications, Inc. Oak Ridge National Laboratory. April 1980. (ORNL/SUB-79/13617/2; SAI/OR-565-2).

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

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

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

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

NRC Task Force Report on Review of the Federal/State Program for Regulation of Commercial Low-Level Radioactive Waste Burial Grounds. Analysis of Public Comments. U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. October 1977. (NUREG-0217. Supp.1).

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

The 1979 State-by-State Assessment of Low-Level Radioactive Wastes Shipped to Commercial Burial Grounds. NUS Corporation: San Francisco, November 1980.

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

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

Nuclear Waste Disposal. Hearings before the Subcommittee on Nuclear Regulations. Part II. U.S. Congress, Senate. Committee on Environmental and Public Works. 96th Congress, 2nd Session, January 23-24, 1980. (Serial No. 96-H27).

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

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

Programmatic Assessment of Radioactive Waste Management. Nuclear Fuel and Waste Programs. Gilbert/Commonwealth. Oak Ridge National Laboratory. June 1980. (ORNL/SUB-80/13837/3).

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

Report of the Task Force on Low-Level Radioactive Waste. United States Radiation Policy Council. August 1980. (RPC-80-004).

Screening of Alternative Methods for the Disposal of Low-Level Radioactive Wastes. Ford, Bacon & Davis Utah, Inc. U.S. Nuclear Regulatory Commission. October 1978. (NUREG/CRO308).

Shallow Land Burial of Low-Level Radioactive Waste. A Selected, Annotated Bibliography. Vol 1. Oak Ridge National Laboratory, Ecological Science Information Center. September 1978. (ORNL/EIS-133/V1).

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

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

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

System Analysis of Shallow Land Burial. Code Manual. Vol. 1; Technical Background, Vol. 2; Appendix, Vol.3. Science Applications, Inc. U.S. Nuclear Regulatory Commission. March 1981. (NUREG/CR-1963).

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

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

APPENDIX C: Regulations for the Control of Radiation in Puerto Rico

234. Rules and regulations.

235. Enforcement; suspension or annulment of licenses.

§ 231. Report of abortion

Sixty (60) days after the approval of this chapter it shall be compulsory to report to the Department of Health, as hereinafter set forth, any case of abortion that may take place in Puerto Rico.—June 19, 1964, No. 65, p. 172, § 1, eff. June 19, 1964.

Penal Code. Abortion prohibited, see sections 4010–4012 of Title 33.

§ 232. Persons required to report: forms

Any physician who practices medicine and surgery or any branch of those professions and who may have knowledge of any case of abortion, complete or incomplete, for therapeutic or any other purpose, on any patient treated or visited by him, shall report such case to the Department of Health within the five (5) days following the date on which it came to his knowledge.

Any supervisor or person in charge of a private or public hospital, sanatorium, clinic or polyclinic, rest home, health home, convalescent home, or other like institution, who may have knowledge of any abortion, complete or incomplete, for actual or apparent therapeutic purposes or other purposes, of any person secluded in said institutions shall report the case to the Department of Health within the term of ten (10) days from the date it came to his knowledge.

Said report shall be made on a blank form specially provided by the Department of Health and shall contain such information as the Department of Health may deem necessary.—June 19, 1964, No. 65, p. 172, § 2, eff. June 19, 1964.

§ 233. Confidential nature

The reports made under the provisions of this chapter shall be of a confidential nature and shall not be disclosed to the public; Provided, however, That they may be furnished to the judges, prosecutors, policemen or peace officers, for proper action.—June 19, 1964, No. 65, p. 172, § 3, eff. June 19, 1964.

§ 234. Rules and regulations

The Secretary of Health shall prescribe such rules and regulations as he may deem necessary for the enforcement of this chapter.—June 19, 1964, No. 65, p. 172, § 4, eff. June 19, 1964.

Text of regulation. For text of regulation authorized by this section, see section 234-1 et seq. of Title 24, Rules and Regulations of Puerto Rico.

§ 235. Enforcement; suspension or annulment of licenses

Any person who shall violate the provisions of this chapter or of the regulations prescribed thereunder, or who shall refuse to comply with the requirements of this chapter or its regulations, or who shall fail to send the required reports within the time fixed by this chapter, shall be guilty of a misdemeanor and upon conviction punished by a maximum fine of two hundred and fifty (250) dollars or by confinement in jail for a maximum term of one year, or by both penalties, in the discretion of the court.

The Board of Medical Examiners shall, upon request of the Secretary of Health, have power to withdraw and annul, temporarily or definitively, the license of any physician who shall have failed to comply with the provisions of this chapter or the regulations prescribed thereunder. The procedure for the temporary suspension or annulment of licenses shall be in accordance with the provisions of sections 31–53 of Title 20.

The Secretary of Health may cancel the license and order the closing of any public or private hospital, sanatorium, clinic or polyclinic, rest home, health home, convalescent home, or other like institution wherein the provisions of this chapter or of the regulations prescribed thereunder are not complied with.—June 19, 1964, No. 65, p. 172, § 5, eff. June 19, 1964.

Penal Code. Abortion prohibited, see sections 4010–4012 of Title 33.

Chapter 12. Ionizing Radiation

SECTION ANALYSIS

- 251. Definitions.
- 251a. Commission for control of radiation; creation.
- 251b. Powers of Commission.
- 251c. Annual report.
- 251d. Radiation Advisory Board; creation and composition.
- 251e. Duties of the board.
- 251f. Compensation and reimbursement for expenses.
- 251g. Publication of notice and public hearings.
- 251h. Authorized personnel of Department of Health.
- 251i. Notification to licensees.
- 251j. Records obligatory.
- 251k. Agreements with Federal Government.
- 251l. Agreements on inspections.
- 251m. Hearings.
- 251n. Orders and rules in case of emergency.

- 251o. Review.
- 251p. Injunctions.
- 251q. Illegal acts.
- 251r. Impounding in case of emergency.
- 251s. Construction in connection with other powers.
- 251t. Penalties.

§ 251. Definitions

The following terms as used in this chapter shall have the meanings set forth below:

(1) "By-product material" means any radioactive material, except special nuclear material, derived from the process of producing or utilizing special nuclear material or material made radioactive, through exposure to radiation incident to this process.

(2) "Ionizing radiation" means X rays, gamma rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other nuclear particles; but does not mean sound or radio waves, nor visible light, infrared or ultraviolet.

(3) "Licenses—general and specific"

(a) "General license" means a license effective pursuant to regulations promulgated by the Commission, without the requirement of an application, for transferring, acquiring, possessing, or using quantities of by-product material, source material, special nuclear material or other naturally occurring or artificially produced radioactive material, or for transferring, acquiring, possessing, or using devices or equipment utilizing by-product material, source material or special nuclear material or other naturally occurring or artificially produced radioactive material.

(b) "Specific license" means a license issued upon application to the Commission, for using, manufacturing, producing, transferring, receiving, acquiring or possessing quantities of by-product material, source material, special nuclear material or other naturally occurring or artificially produced radioactive material; or for using, manufacturing, producing, transferring, receiving, acquiring or possessing devices or equipment utilizing by-product material, source material, special nuclear material, or other naturally occurring or artificially produced radioactive material.

(4) "Person" includes any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, department, instrumentality, public corporation, organization, or political subdivision of the Commonwealth of Puerto Rico,

any state of the Union, its agencies or political subdivisions, or the legal successor, representative or agent thereof, but not the Atomic Energy Commission of the United States or its successor, nor any agency of the Federal Government licensed by the Atomic Energy Commission of the United States, or its successor.

(5) "Commission" means the Commission for the control of radiation.

(6) "Source material" means uranium, thorium, or any other material declared source material by order of the Governor of the Commonwealth of Puerto Rico after the Atomic Energy Commission of the United States or its successor has determined that said material is source material; or minerals containing one or more of the foregoing materials in the concentrations that the Governor of the Commonwealth of Puerto Rico declares by order source material after the Atomic Energy Commission of the United States or its successor has determined that said material in such concentration is "source material".

(7) "Special nuclear material" means (1) plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material declared special nuclear material by the Governor of the Commonwealth of Puerto Rico after the Atomic Energy Commission of the United States or its successor has determined that said material is special nuclear material, but does not include source material; or (2) any material artificially enriched by plutonium, uranium 233, uranium enriched in the isotope 233, or in the isotope 235, or by any other material declared special nuclear material by the Governor of the Commonwealth of Puerto Rico, as aforesaid excluding source material, (fertile material).—June 24, 1965, No. 79, p. 182, § 1, eff. July 1, 1965; amended May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—The 1967 Act excluded source material from definition of special nuclear material set out in paragraph (7).

Effective date. Section 23 of Act June 24, 1965, No. 79, provided: "This act [this chapter] shall take effect, as to control of by-product material, source material and special nuclear material, on the effective date of the agreement between the Federal Government and the Commonwealth of Puerto Rico, in accordance with section 12 hereof [section 251k of this title]. As to everything concerning control of other sources of ionizing radiation, it shall take effect July 1, 1965."

Separability. Section 22 of Act June 24, 1965, No. 79, provided: "If any provision of this act [this chapter], or the application of said provision to any person or circumstances is held invalid, the remainder of this act [this chapter] and the application of said provision to persons or circumstances other than those as to which same was held invalid shall not be affected by said declaration of nullity."

Statement of motives. Act June 24, 1965, No. 79, contained a statement of motives.

§ 251a. Commission for control of radiation; creation

The Commission for the control of radiation is hereby created.

The Commission shall consist of the Secretary of Health and the Secretary of Labor, or their representatives, and a third person conversant with the matter, to be appointed by the Governor of the Commonwealth of Puerto Rico and who shall not belong in any of the departments above mentioned.

The Commission shall hold at least four regular meetings a year and such special meetings as it may deem necessary.—June 24, 1965, No. 79, p. 182, § 2, eff. July 1, 1965; amended Mar. 27, 1967, No. 7, p. 155, § 1, eff. Mar. 27, 1967.

1967—The 1967 Act deleted the last paragraph of this section which specified the proceedings when no agreement was reached by the Commission.

§ 251b. Powers of Commission

The Commission shall have power to:

(a) Promulgate, amend and repeal rules and regulations for the control of sources of ionizing radiation.

(b) Provide, and it shall provide, through rules or regulations, everything concerning the granting of general or specific licenses in relation with by-product material, source material and special nuclear material, or devices or equipment using such materials. Such rules or regulations shall contain provisions on the causes and procedure for amending, suspending or revoking such licenses.

(c) Require, through rules or regulations, the registration of or the licensing for other sources of ionizing radiation.

(d) Exempt certain sources of ionizing radiation, or certain uses, or certain classes of persons using certain classes of sources of ionizing radiation, from the registration or the licensing requirements referred to by this section, whenever the Commission shall find that the exemption of such sources of ionizing radiation, or of such uses, or of such persons using such sources, does not constitute a significant risk to public health and safety.

(e) Recognize, through rules or regulations, state or federal licenses, subject to such requirements as the Commission may establish through such rules or regulations.

(f) Maintain, and it shall maintain, a register of all licenses granted by the Commission and of all sources of ionizing radiation registered with the Commission.

(g) Vest in the Department of Health and the Department of Labor the responsibility of determining compliance with or violation

of the provisions of this chapter or of the rules or regulations hereunder, subject to the following conditions:

(1) The Department of Health shall be responsible for the regulatory control of sources of ionizing radiation used in the healing arts (medicine, dentistry, veterinary medicine, chiropractic, osteopathy, and podiatry, among others), commercial establishments, educational institutions, and/or in any place or situation in which the safety of the public health may be affected.

(2) The Department of Labor shall be responsible for the regulatory control of sources of ionizing radiation used in industry and industrial research or testing laboratories, or in any place or situation where the worker's safety may be affected in accordance with sections 321-335a of Title 29.

(3) Overlapping in the work of the Department of Health and the Department of Labor related with the control of sources of ionizing radiation shall be reduced to a minimum.—June 24, 1965, No. 79, p. 182, § 3, eff. July 1, 1965; amended Mar. 27, 1967, No. 7, p. 155, § 1, eff. Mar. 27, 1967.

1967—Subsection (g): The 1967 Act substituted in paragraph (1) "the safety of the public health may be affected" for "the public health and safety may be substantially affected"; and in paragraph (2) substituted "situation where the worker's safety may be affected in accordance with Act No. 112 of May 5, 1939 [sections 321-335a of Title 29]" for "situation where occupational health and safety are primarily affected".

Regulations. Regulations for the control of radiation in Puerto Rico, approved Nov. 3, 1972, File No. 1613.

§ 251c. Annual report

The Commission shall render an annual report of its work and activities to the Governor of the Commonwealth of Puerto Rico.—June 24, 1965, No. 79, p. 182, § 4, eff. July 1, 1965.

§ 251d. Radiation Advisory Board; creation and composition

A Radiation Advisory Board is hereby created.

The Radiation Advisory Board shall consist of five members who shall be appointed by, and shall hold office at the will of, the Commission.

The members of the board must possess scientific training and experience in radiology, nuclear medicine, atomic energy, radiation or radiation physics or related sciences, with specialization in ionizing radiation; but there shall be not more than two specialists in any one field.

The board shall hold at least four regular meetings a year and

such special meetings as it may deem necessary.—June 24, 1965, No. 79, p. 182, § 5, eff. July 1, 1965.

§ 251e. Duties of the board

The board shall:

(a) Review and evaluate the policies and programs of the Commonwealth of Puerto Rico related to the control of ionizing radiation and make recommendations thereon to the Commission.

(b) Provide the Commission with such technical advice as it may require on matters relating to licensing and the regulation of sources of ionizing radiation.—June 24, 1965, No. 79, p. 182, § 6, eff. July 1, 1965.

§ 251f. Compensation and reimbursement for expenses

The members of the Radiation Advisory Board shall receive a compensation of \$20.00 for each meeting they attend or for each day or fraction thereof they devote to affairs entrusted to them by the Commission, and shall be entitled to reimbursement for the necessary expenses actually incurred by them in the performance of their official duties hereunder.—June 24, 1965, No. 79, p. 182, § 7, eff. July 1, 1965.

§ 251g. Publication of notice and public hearings

Before adopting, amending or repealing any rule or regulation, the Commission shall publish notice to that effect in two newspapers of general circulation and shall hold public hearings when so requested and to afford interested persons opportunity to submit data or views on the matter involved.

Rules and regulations approved by the Commission shall become effective 30 days after approval, provided copies thereof have been filed in the office of the Secretary of State of Puerto Rico as required by sections 1041–1059 of Title 3, and without need of complying with the other provisions of said sections.—June 24, 1965, No. 79, p. 182, § 8, eff. July 1, 1965; amended May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—The 1967 Act amended this section to provide that public hearing shall be held when so requested.

§ 251h. Authorized personnel of Department of Health

The duly authorized personnel of the Department of Health and of the Department of Labor is hereby empowered to enter any building, house, store or premise at any time of day, to examine

the conditions thereof and to report thereon, or to cause to be removed or corrected, urgently, any conditions of ionizing radiation in the manner and way prescribed by the regulations. Notwithstanding the previous authorization, the investigations or inspections of private dwellings or rooms shall not be conducted without the previous permission of the tenant of the private dwelling or room the object of inspection. If the tenant refuses to give permission for said inspection any district judge or justice of the peace may, upon receipt of a sworn statement to the effect that there is probable cause therefor, issue an order authorizing said official to enter such private dwelling or room for the purpose of conducting such investigation or inspection.

Entry and inspection in areas under federal jurisdiction shall require the authorization of the Federal Government or its duly authorized representatives.—June 24, 1965, No. 79, p. 182, § 9, eff. July 1, 1965; amended Mar. 27, 1967, No. 7, p. 155, § 1, eff. Mar. 27, 1967.

1967—The 1967 Act in first paragraph of this section authorized the Department of Labor to carry out inspections; added rooms to places requiring previous permission for inspections; and omitted proviso which dispensed previous permission when entrance was effected in good faith.

§ 251i. Notification to licensees

Every person who has obtained a license from the Commission, or who has registered with the Commission any source of ionizing radiation in accordance with this chapter, shall be informed by the Commission as to the agency which shall determine whether he is complying with the provisions of this chapter and of the rules and regulations hereunder.—June 24, 1965, No. 79, p. 182, § 10, eff. July 1, 1965.

§ 251j. Records obligatory

(a) The Commission shall require each person who possesses or uses a source of ionizing radiation to maintain record of its receipt, storage, transfer or disposal, and any other records that the Commission may require, subject to such exemption as the Commission may by regulation provide.

(b) The Commission shall require each person who possesses or uses a source of ionizing radiation to maintain appropriate records showing the radiation exposure of all individuals for whom rules or regulations promulgated by the Commission require a continuous or periodic measurement of the individual's radiation exposure (per-

sonnel monitoring). Copies of these records and of all those required by this section to be kept shall be submitted to the Commission on request. Every person who possesses or uses a source of ionizing radiation shall provide to every employee for whom is required a continuous or periodic measurement of the radiation exposure (personnel monitoring), a copy of the record of personal radiation exposure of the employee, at any time such employee has received an excessive exposure, at the termination of his employment when so requested by the employee.—June 24, 1965, No. 79, p. 182, § 11, eff. July 1, 1965; amended May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—Subsection (b): The 1967 Act omitted the obligation to provide the personal exposure record annually.

§ 251k. Agreements with Federal Government

The Governor of Puerto Rico is hereby authorized, in behalf and in representation of the Commonwealth of Puerto Rico, to enter into such agreements with the Federal Government as may be necessary for discontinuance by the Federal Government of certain responsibilities with respect to sources of ionizing radiation and the assumption thereof by the Commonwealth of Puerto Rico, pursuant to the provisions of congressional Public Law No. 86-373, approved September 23, 1959.

Any license issued by the Federal Government prior to the effective date of any such agreement under this section shall be considered valid and shall expire on the expiration date specified in such license, or ninety (90) days after the effective date of the agreement, whichever occurs earlier.—June 24, 1965, No. 79, p. 182, § 12, eff. July 1, 1965; amended May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—The 1967 Act substituted "whichever occurs earlier" for "whichever occurs later".

Text references. Public Law No. 86-373, mentioned in text, is set out in sections 2021 and 2138 of 42 U.S.C.

§ 251l. Agreements on inspections

The Department of Health and the Department of Labor are hereby authorized, with the approval of the Governor, to enter into agreements with the Federal Government, states, interstate agencies, territories or possessions of the United States, the District of Columbia and the Panama Canal Zone whereby the Commonwealth of Puerto Rico may perform, in cooperation with any of them, inspections or other functions related with the control

of sources of ionizing radiation.—June 24, 1965, No. 79, p. 182, § 13, eff. July 1, 1965.

§ 251m. Hearings

In any proceeding under this chapter for granting, suspending, revoking or amending any license, or for determining compliance with the rules or regulations of the Commission, or for granting exceptions from said rules or regulations, the Commission shall hear, on request, any person whose interests may be affected by the proceeding, and shall consider said person a party of such proceeding.—June 24, 1965, No. 79, p. 182, § 14, eff. July 1, 1965.

§ 251n. Orders and rules in case of emergency

Whenever the Commission, the Department of Health or the Department of Labor, or a duly authorized representative of either, determines that an emergency exists requiring immediate action for the protection of the public's health and safety, said department or representative may issue orders, or make rules, without subjection to the requirements of publication and public hearings, and operative immediately, giving details of the existence of the emergency and the action to be taken.

Any person to whom such order or rule is addressed shall forthwith comply with it but shall, upon petition to the Commission, be granted a hearing within thirty (30) days after said petition.

The Commission shall confirm, modify or revoke such order or rule within the thirty (30) days following the hearing.—June 24, 1965, No. 79, p. 182, § 15, eff. July 1, 1965; amended May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—The 1967 Act granted to the Commission the powers previously given by this section to the Departments of Health and of Labor only.

§ 251o. Review

Any finding of the Commission in any proceeding under sections 251m and 251n of this title, shall be reviewable by the Superior Court, through the proper petition for review filed by the aggrieved party within ten days after notice of the Commission's decision.—June 24, 1965, No. 79, p. 182, § 16, eff. July 1, 1965.

§ 251p. Injunctions

Whenever in the judgment of the Department of Health or the Department of Labor, any person has engaged or intends to engage in any act or practice that might constitute a viola-

tion of the provisions of this chapter or of any rule, regulation or order issued hereunder, the Secretary of Justice, at the request of the Commission, may petition the Superior Court for an order enjoining such acts or practices, or an order requiring compliance with this chapter, or the rules, regulations or orders issued hereunder. Upon proving that such person has engaged or intends to engage in such acts or practices, the court shall issue a temporary or permanent injunction or other directive enjoining said person from engaging in such acts, or any other order that the court may deem pertinent.—June 24, 1965, No. 79, p. 182, § 17, eff. July 1, 1965; amended Mar. 27, 1967, No. 7, p. 155, § 1, eff. Mar. 27, 1967; May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—Act May 31, 1967, No. 86, substituted "Upon proving that such person" for "Upon proof by the Commission that such person"; but did not reproduce the proviso added by Act March 27, 1967, No. 7, which stated: "provided, that the Court may issue the temporary injunction or pertinent directive without the need of holding a previous hearing or the requirement of rendering a bond when so justified by the urgency of the situation."

§ 251q. Illegal acts

It shall be unlawful for any person to use, manufacture, produce, transport, transfer, receive, acquire, or possess any source of ionizing radiation without obtaining a license from the Commission in accordance with the provisions of this chapter for using, manufacturing, producing, transporting, transferring, receiving, acquiring or possessing such sources of ionizing radiation or unless such person has registered such source of ionizing radiation with the Commission in accordance with the provisions of this chapter.—June 24, 1965, No. 79, p. 182, § 18, eff. July 1, 1965.

§ 251r. Impounding in case of emergency

The Commission, the Department of Health or the Department of Labor shall have authority, in cases of emergency, to impound or order the impounding of sources of ionizing radiation in the possession of any person who is not equipped to comply, or who does not comply with the provisions of this chapter or of any rules or regulations hereunder, or in possession of any person who violates any provision of this chapter or of any rule or regulation hereunder.—June 24, 1965, No. 79, p. 182, § 19, eff. July 1, 1965; amended May 31, 1967, No. 86, p. 294, eff. May 31, 1967.

1967—The 1967 Act granted to the Commission the powers previously given by this section to the Departments of Health and of Labor only.

§ 251s. Construction in connection with other powers

Nothing in this chapter or in the rules or regulations hereunder shall be construed as repealing or in any way affecting, impairing or limiting any power conferred by any other act, rule or regulation on the Secretary of Health or the Secretary of Labor of Puerto Rico.—June 24, 1965, No. 79, p. 182, § 20, eff. July 1, 1965.

§ 251t. Penalties

Any person violating any provision of this chapter or of the rules, regulations or orders issued by the Commission, the Department of Health or the Department of Labor shall be guilty of a misdemeanor and upon conviction punished by a fine of not less than one hundred (100) nor more than one thousand (1,000) dollars, or by imprisonment for a term of not less than three (3) nor more than six (6) months, or both, in the discretion of the court.—June 24, 1965, No. 79, p. 182, § 21, eff. July 1, 1965.

§ 251u. Expenses of the Board

The expenses of the Radiation Advisory Board shall be defrayed from the annual budget of expenses of the Department of Health.—June 24, 1965, No. 79, p. 182, § 24, added Mar. 27, 1967, No. 7, p. 155, § 2, eff. Mar. 2, 1967.

Chapter 13. Physicians' and Dentists' Service Contracts

§§ 271-274. [Omitted.]

Provisional licenses for foreign physicians and authorization to the Secretary of Health to hire such physicians as residents in commonwealth or municipal hospital.

1977—Act June 29, 1977, No. 2, p. 539, which contained a statement of motives, amended section 7 of Act June 29, 1963, No. 96, to read: "This act shall take effect immediately after its approval and shall be in force until September 30, 1978, when all provisional licenses issued under this act shall become automatically null and void."

1974—Act May 8, 1974, No. 27, Part 1, p. 161, which contained a statement of motives, amended section 7 of Act June 29, 1963, No. 96, to read: "This act shall take effect immediately after its approval and shall be in force until September 30, 1976, on which date all provisional licenses granted hereunder shall automatically become cancelled and null."

1972—Act May 31, 1972, No. 65, p. 142, amended section 7 of Act June 29, 1963, No. 96, to read: "This act shall take effect immediately after its approval and shall be in force until September 30, 1974, on which date all provisional licenses granted hereunder shall automatically become cancelled and null."

1969—Act June 19, 1969, No. 42, p. 77, amended section 7 of Act June 29, 1963, No. 96, to read as follows: "This act shall take effect immediately after its approval and shall be in force until September 30, 1972, on which date all provisional licenses granted hereunder shall automatically become cancelled and null."

COMMONWEALTH OF PUERTO RICO
COMMISSION FOR THE CONTROL OF RADIATION
SAN JUAN, PUERTO RICO

Regulations for the Control of Radiation in
Puerto Rico No. 1, promulgated pursuant to
the provisions of Act No. 79 of June 24,
1965, as amended.

ISSUED FOR OFFICIAL USE
No fees collected

FOR THE REGULATION OF ALL RADIATION SOURCES; PROVIDE FOR THE ISSUANCE OF LICENSES AND THE REGISTRATION OF RADIATION SOURCES; ESTABLISH RADIATION SAFETY REQUIREMENTS IN INDUSTRIAL RADIOGRAPHY OPERATIONS; PROVIDE FOR THE USE OF X-RAYS IN THE HEALING ARTS; AND FOR THE USE OF SEALED SOURCES OF RADIATION IN THE HEALING ARTS.

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**PART ONE
DEFINITIONS**

ARTICLE I - GENERAL DEFINITIONS

The following terms used in these Regulations will have the definitions set forth below:

- 1- **AGREEMENT STATE** - Any State with which the United States Atomic Energy Commission has entered into an effective agreement under Section 274 b. of the Atomic Energy Act of 1954, as amended (73 Stat. 689).
- 2- **AIRBORNE RADIOACTIVE MATERIAL** - Any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors, or gases.
- 3- **AIRBORNE RADIOACTIVITY AREA** - (a) Any room, enclosure, or operating area in which airborne radioactive material exists in concentrations in excess of the amounts specified in Annex I, Table I, Column I of Part Six, or (b) Any room, 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 25 percent of the amounts specified in Annex I, Table I, Column I, of Part Six.
- 4- **BYPRODUCT MATERIAL** - Any radioactive material, except special nuclear material, derived from the process of producing or utilizing special nuclear material or material made radioactive, through exposure to radiation incident to this process.
- 5- **CALENDAR QUARTER**- Not less than 12 consecutive weeks nor more than 14 consecutive weeks. The first calendar quarter of each year shall begin in January and subsequent calendar quarters shall be so arranged such that no day is included in more than one calendar quarter and no day in any one year is omitted from inclusion within a calendar quarter. No licensee or registrant shall change the method observed by him of determining calendar quarters for purposes of these Regulations except at the beginning of a calendar year.
- 6- **CFR** - Code of Federal Regulations
- 7- **COMMISSION** - The Commission for the Control of Radiation of the Commonwealth of Puerto Rico or its authorized representative.
- 8- **CURIE** - Is a unit of measurement of radioactivity. One curie (Ci) is that quantity of radioactive material which decays at the rate of 3.7×10^{10} disintegrations per second (dps). A commonly used submultiple of the curie is the microcurie (uCi). One uCi = $0.000001 \text{ Ci} = 3.7 \times 10^4$ dps. For the purpose of these Regulations, one curie of natural uranium means the sum of 3.7×10^{10} dps from U-238 plus 3.7×10^{10} dps from U-234 plus 1.7×10^9 dps from U-235; this is equivalent to 3,000 kilograms, or 6,615 pounds of natural uranium. One curie of natural thorium means the sum of 3.7×10^{10} dps from Th-232 plus 3.7×10^{10} dps from Th-228; this is equivalent to 9,000 kilograms or 19,850 pounds of natural thorium.
- 9- **DOSE**- The quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body. When these Regulations specify a dose during a period of time, 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.
- 10- **DOSE RATE**- The quantity of radiation absorbed, per unit mass, per unit time by the body or any portion of the body.
- 11- **HIGH RADIATION AREA**- 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 100 millirems.
- 12- **HUMAN USE**- The internal or external administration of radiation or radioactive materials to human beings.
- 13- **INDIVIDUAL**- Any human being.
- 14- **IONIZING RADIATION** - X-rays, gamma rays, alpha and beta particles, high speed electrons, neutrons, protons, and other nuclear particles, but does not mean sound or radio waves, nor visible light, infrared or ultraviolet.
- 15- **LICENSE** - Except where otherwise specified, means a license issued pursuant to Part Five of these Regulations.
- 16- **LICENSEE** - A person to whom a license has been issued by the Commission.

- 17- OCCUPATIONAL DOSE - Radiation absorbed by an individual (a) in a restricted area; or (b) in the course of employment in which the individual's duties involve exposure to radiation; provided, that the occupational dose shall not be deemed to include any exposure of an individual to radiation for the purpose of diagnosis or therapy of such individual.
- 18- PERSON - Any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, department, instrumentality, public corporation, organization, or political subdivision of the Commonwealth of Puerto Rico, any state of the Union, its agencies or political subdivisions, or the legal successor, representative or agent thereof, but not the Atomic Energy Commission of the United States or its successor, nor any agency of the Federal Government licensed by the Atomic Energy Commission of the United States; or its successor.
- 19- PERSONNEL MONITORING EQUIPMENT - 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.)
- 20- PHARMACIST - Any person who has fulfilled all the requirements of Act No. 282 of May 15, 1945, as amended, and has been licensed to practice the profession of pharmacist in the Commonwealth of Puerto Rico.
- 21- PHYSICIAN - Any person authorized by the Physicians Board of Examiners to practice medicine in the Commonwealth of Puerto Rico.
- 22- RAD - Is 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 100 ergs per gram of tissue. (One millirad (mrad) = 0.001 rad).
- 23- RADIATION - IONIZING RADIATION
- 24- RADIATION AREA - 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 5 millirems, or in any 5 consecutive days a dose in excess of 100 millirems.
- 25- RADIATION INSPECTOR - An individual authorized by the Commission to carry out inspections and surveys of radiation machines and/or radiation machines installations, except accelerators, in order to evaluate radiation hazards and safety techniques and to advise on radiation protection measures.
- 26- RADIATION MACHINE - Any device capable of producing radiation except devices which produce radiation only from radioactive material.
- 27- RADIATION MACHINE INSTALLATION - The place in which one or more radiation machine capable of producing radiation are located, or the place where a mobile radiation machine is stored or used.
- 28- RADIOACTIVE MATERIAL - Any material, solid, liquid, or gas, which emits radiation spontaneously.
- 29- REGISTRANT - Any person who has registered a radiation machine in the Commission.
- 30- REM - Is a measure of the dose of any radiation to body tissue in terms of its estimated biological effect relative to a dose received from an exposure to one roentgen (R) of X-rays. (One millirem (mrem) = 0.001 rem). For the purpose of these Regulations, any of the following is considered to be equivalent to a dose of one rem:
 - (a) An exposure to 1R of X-, or gamma radiation;
 - (b) A dose of 1 rad due to X-, gamma, or beta radiation;
 - (c) A dose of 0.1 rad due to neutrons or high energy protons. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, one rem of neutron radiation may, for purposes of these Regulations, be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if there exists sufficient information to estimate with reasonable accuracy the approximate distribution in energy of the neutrons, the incident number of neutrons per square centimeter equivalent to one rem may be estimated from the following table:

NEUTRON FLUX DOSE EQUIVALENTS

Neutron Energy (Mev)	Number of neutrons per square centimeter equivalent to a dose of 1 rem (neutrons/cm ²)	Average flux to deliver 100 millirem in 40 hours (neutrons/cm ² per second)
Thermal	970 x 10 ⁶	670
0.0001	720 x 10 ⁶	500
0.005	820 x 10 ⁶	570
0.02	400 x 10 ⁶	280
0.1	120 x 10 ⁶	80
0.5	43 x 10 ⁶	30
1.0	26 x 10 ⁶	18
2.5	29 x 10 ⁶	20
5.0	26 x 10 ⁶	18
7.5	24 x 10 ⁶	17
10.0	24 x 10 ⁶	17
10 to 30	14 x 10 ⁶	10

(d) A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye.

- 31- RESEARCH AND DEVELOPMENT- (a) Theoretical analysis, exploration, or experimentation; or (b) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes. Research and development does not include the internal or external administration of radiation or radioactive material to human beings.
- 32- RESTRICTED AREA - Any area access to which is controlled by the licensee or registrant for purposes of protection of individuals from exposure to radiation and radioactive materials. "Restricted area" shall not include any areas used for residential quarters, although when authorized by the Commission, a separate room or rooms in a residential building may be set apart as a restricted area.
- 33- SEALED SOURCE - 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.
- 34- SOURCE MATERIAL - Uranium, thorium, or any other material declared source material by order of the Governor of the Commonwealth of Puerto Rico after the Atomic Energy Commission of the United States, or its successor, has determined that said material is source material; or minerals containing one or more of the foregoing materials in the concentrations that the Governor of the Commonwealth of Puerto Rico declares by order source material after the Atomic Energy Commission of the United States, or its successor, has determined that said material in such concentration is "source material".
- 35- SOURCE OF RADIATION - Any radioactive material, or any device or equipment emitting or capable of producing radiation.
- 36- SPECIAL NUCLEAR MATERIAL - (1) Plutonium, Uranium 233, uranium enriched in the isotope U-233 or in the isotope U-235, and any other material declared special nuclear material by the Governor of the Commonwealth of Puerto Rico after the Atomic Energy Commission of the United States or its successor has determined that said material is special nuclear material, but does not include source material; or (2) Any material artificially enriched by plutonium, Uranium 233, uranium enriched in the isotope U-233, or in the isotope U-235, or by any other material declared special nuclear material by the Governor of the Commonwealth of Puerto Rico as aforesaid excluding source material.
- 37- SPECIAL NUCLEAR MATERIAL IN QUANTITIES NOT SUFFICIENT TO FORM A CRITICAL MASS - Uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained

U-235; Uranium -233 in quantities not exceeding 200 grams, plutonium in quantities not exceeding 200 grams; or any combination of them in accordance with the following criterion: For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of such ratios for all of the kinds of special nuclear material in combination shall not exceed "1" (i.e. unity). For example, the following quantities in combination, 175 grams contained U-235, 50 grams of U-233 and 50 grams of Pu do not exceed the limitation established by this criterion:

$$\frac{175 \text{ grams contained U-235}}{350} + \frac{50 \text{ grams U-233}}{200} + \frac{50 \text{ grams Pu}}{200} = 1$$

- 38- SURVEY- An evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of sources of radiation 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.
- 39- UNREFINED AND UNPROCESSED ORE - Ore in its natural form prior to any processing, such as grinding, roasting, beneficiating, or refining.
- 40- UNRESTRICTED AREA - Any area access to which is not controlled by the licensee or registrant for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

ARTICLE II - DEFINITIONS USED IN INDUSTRIAL RADIOGRAPHY

The following terms will have the definitions set forth below:

- 1- CABINET RADIOGRAPHY - 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 Section E, Article II, Part Six.
- 2- INDUSTRIAL RADIOGRAPHY - The examination of the macroscopic structure of materials by nondestructive methods utilizing sources of radiation.
- 3- RADIOGRAPHER- Any individual who performs or who, in attendance at the site where sources of radiation are being used, personally supervises industrial radiographic operations and who is responsible to the licensee or registrant for assuring compliance with the requirements of these Regulations and all license conditions.
- 4- RADIOGRAPHER'S ASSISTANT - Any individual who, under the personal supervision of a radiographer, uses sources of radiation, related handling tools or survey instruments in industrial radiography.
- 5- RADIOGRAPHIC EXPOSURE DEVICE - 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 a shielded to unshielded position for purposes of making a radiographic exposure.
- 6- SHIELDED ROOM RADIOGRAPHY - Industrial radiography using radiation machines, which is conducted in an enclosed room, the interior of which is not occupied during radiographic operations, which is so shielded that every location on the exterior meets conditions for an unrestricted area as specified in Section E, Article II, Part Six; and the only access to which is through openings which are interlocked so that radiation machine will not operate unless all openings are securely closed.
- 7- STORAGE CONTAINER - A device in which sealed sources are transported or stored.

ARTICLE III - DEFINITIONS APPLYING TO THE USE OF X-RAYS IN THE HEALING ARTS

The following terms will have the definitions set forth below:

- 1- ABSORBER - That material which decreases or attenuates the quantity of radiation passing through it.
- 2- ALUMINUM EQUIVALENT - The thickness of aluminum affording the same attenuation, under specified conditions, as the material in question.
- 3- COLLIMATOR - A device or mechanism which restricts the useful beam to an appropriate area.
- 4- DEAD-MAN SWITCH - A switch so constructed that a circuit-closing contact can be maintained only by continuous pressure on the switch by the operator.
- 5- DIAGNOSTIC-TYPE PROTECTIVE TUBE HOUSING - An X-ray tube housing so constructed that the leakage radiation measured at a distance of one (1) meter from the source cannot exceed one hundred

- (100) mR in one (1) hour when the tube is operated at its maximum continuous rated current for the maximum rated tube potential.
- 6- DIAPHRAGM- A device or mechanism with a central aperture so placed as to restrict the useful beam to the appropriate area at the point of interest.
 - 7- FILTER - Material placed in the useful beam to absorb preferentially the less penetrating radiations.
 - 8- HALF - VALUE LAYER (HVL) - The thickness of a specified substance which, when introduced into the path of a given beam of radiation, reduces the exposure rate by one-half.
 - 9- INHERENT FILTRATION - The filtration permanently in the useful beam; it includes the window of the X-ray tube and any permanent tube or source enclosure.
 - 10- INTERLOCK - A device for precluding access to a high radiation area by automatically reducing the exposure rate upon entry by personnel.
 - 11- KILOVOLTS PEAK (kVp) - The crest value in 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.
 - 12- LEAD EQUIVALENT - The thickness of lead affording the same attenuation, under specified conditions, as the material in question.
 - 13- LEAKAGE RADIATION - All radiation coming from within the tube housing except the useful beam.
 - 14- PERSONNEL MONITORING - The determination of exposure to a person.
 - 15- PRIMARY BARRIER - A barrier sufficient to attenuate the useful beam to the required degree to assure compliance with Sections A and E, Article II, Part Six.
 - 16- PROTECTIVE APRON - Apron made of radiation absorbing materials, used to reduce radiation exposure.
 - 17- PROTECTIVE BARRIER - A barrier of radiation absorbing materials used to reduce radiation exposure.
 - 18- PROTECTIVE GLOVE - Glove made of radiation absorbing materials used to reduce radiation exposure.
 - 19- SCATTERED RADIATION - Radiation that, during passage through matter, has been deviated in direction.
 - 20- SECONDARY BARRIER - A barrier sufficient to attenuate stray radiation to the required degree to assure compliance with Sections A, D and E, Article II, Part Six.
 - 21- SHUTTER - An adjustable device, generally of lead, fixed to an X-ray tube housing to intercept or collimate the useful beam.
 - 22- SOURCE-FILM DISTANCE (SFD) - The distance measured along the central ray from the center of the front surface of the source (X-ray focal spot or sealed radioactive source) to the surface of the X-ray film.
 - 23- SOURCE-SURFACE DISTANCE (SOURCE-SKIN DISTANCE (SSD)) - The distance measured along the central ray from the center of the front surface of the source (X-ray focal spot or sealed radioactive source) to the surface of the irradiated object.
 - 24- STRAY RADIATION - The sum of leakage and scattered radiation.
 - 25- THERAPEUTIC-TYPE PROTECTIVE TUBE HOUSING - (a) For X-ray therapy equipment not capable of operating at 500 kVp or above, the following definition applies: An X-ray tube housing so constructed that the leakage radiation averaged over any one hundred square centimeters (100 cm²) area at a distance of one (1) meter from the source does not exceed one roentgen (1R) in an hour when the tube is operated at its maximum rated continuous current for the maximum rated tube potential. (b) For X-ray therapy equipment capable of operation at 500 kVp or above, the following definition applies: An X-ray tube housing so constructed that leakage radiation averaged over any one hundred square centimeters (100 cm²) area at a distance of one (1) meter from the source does not exceed one tenth (0.1) of a percent of the useful beam dose rate at one meter from the source for any of its operating conditions.
 - 26- USEFUL BEAM - Radiation which passes through the window, aperture, cone or other collimating device of the source housing. Sometimes called "primary beam".

PART TWO RULES OF PROCEDURE

ARTICLE I - PENALTIES

Any person who violates any part of these Regulations, or orders issued by the Commission, the Department of Health, or the Department of Labor given under the authority of these Regulations, shall be guilty of a misdemeanor and upon conviction punished by fine of not less than one hundred dollars (\$100) nor more than one thousand dollars (\$1,000), or by imprisonment for a term of not less than three (3) months nor more than six (6) months or both in the discretion of the court.

ARTICLE II - SEPARABILITY PROVISION

If any provision, article, paragraph, section or part of these Regulations or the application thereof to any person or circumstance is declared invalid, the validity of the other provisions, articles, sections or parts, and their application to other persons or circumstances, shall not be affected thereby.

ARTICLE III - EFFECTIVENESS OF THE REGULATIONS

These Regulations shall be in effect thirty (30) days after its approval and in accordance with Section 8 of Act 79 approved June 24, 1965, as amended, which creates the Commission for the Control of Radiation of the Commonwealth of Puerto Rico.

ARTICLE IV - EMERGENCIES

Whenever the Commission, the Department of Health or the Department of Labor or a duly authorized representative of either, determines that an emergency exists requiring immediate action for the protection of the public's health and safety, said department or representative may issue orders, or make rules without subjection to the requirements of publication and public hearings, and operative immediately, giving details of the existence of such emergency and requiring the action to be taken.

Any person to whom such order or rule is addressed shall forthwith comply with it but shall, upon petition to the Commission be granted a hearing within thirty (30) days after said petition.

The Commission shall confirm, modify or revoke such order or rule within thirty (30) days following the hearing.

ARTICLE V - SUSPENSION OF LICENSES AND CANCELLATION OF REGISTRATIONS OF RADIATION MACHINES

SECTION A-

The Commission may suspend a license or cancel the registration of a radiation machine when it is determined that a violation to these Regulations has occurred.

SECTION B-

In case of failure to observe any provisions of these Regulations the licensee or registrant shall be notified by writing reciting the deficiencies observed and will be given a reasonable period of time to correct such deficiencies. This period shall run from the date of despatch of the notification by the Commission. If the deficiencies are not corrected within the period of time given the Commission shall suspend the license or cancel the registration of the radiation machine and shall give the licensee or registrant the opportunity to appear at an administrative hearing for the submission of allegations.

SECTION C-

The administrative hearing shall be requested in writing by the affected person within ten (10) days following the term given for the correction of deficiencies.

The administrative hearing shall take place on the date, hour, and place designated by the Commission. The final decision made by the Commission shall be based on the entire record provided that if the licensee or registrant fails to appear without justified reason the Commission may issue its decision immediately.

SECTION D-

Any licensee to whom the license has been suspended or any registrant to whom the registration of a radiation machine has been canceled may request by writing to the Commission the concession of the license or registration certifying that the deficiencies have been corrected.

The Commission shall verify the corrections made and may authorize the concession of the license or registration of the machine if the conditions causing the suspension or cancellation are corrected to the satisfaction of the Commission.

ARTICLE VI - REVOCATION OF LICENSE

SECTION A-

It shall be understood that a revocation of license is the permanent retirement of a license that has been granted under the disposition of these Regulations for the operation of any source of radiation described herein.

SECTION B-

The Commission shall notify to the interested party its intention to revoke a license granted when the revocation is considered necessary.

SECTION C-

The party to whom the notification has been served may request a hearing to the Commission within ten (10) days following the day of notification. If the interested party does not request the hearing within the ten (10) days, the Commission shall revoke the license permanently.

SECTION D-

When requested, the hearing shall take place within five (5) days following the period of ten (10) days granted for requesting the same and it shall take place on the date, hour, and place designated by the Commission.

SECTION E-

The Commission shall determine the action to be taken on the evidence presented and accepted during the hearing and within the next ten (10) days following the end of such hearing. The Commission shall notify immediately its ruling in writing to the affected party.

ARTICLE VII - JUDICIAL REVIEW

Any order or decision of the Commission in any proceeding regarding the granting, suspending, revoking, or amending any license or prohibiting the receipt, possession, use, sale, renting, acquisition or transference of any radiation machine; or for determining compliance with the provisions of these Regulations; or for the concession of exceptions to such provisions; or for the confirmation, modification or revocation of any emergency order or rule promulgated by the Commission, the Department of Health or the Department of Labor, shall be subject to review by the Superior Court upon a petition of review filed by the affected person within ten (10) days after the notification of the Commission's order or decision.

ARTICLE VIII - INJUNCTIONS

Whenever in the judgment of the Department of Health or the Department of Labor, any person has engaged or intends to engage in any act or practice that might constitute a violation of the provisions of these Regulations or of any rule, regulation or order issued hereunder, the Secretary of Justice, at the request of the Commission may petition the Superior Court for an order enjoining such acts or practices, or an order requiring compliance with the Regulations, or the rules, regulations or orders issued hereunder.

Upon providing that such person has engaged or intends to engage in such acts or practices, the court shall issue a temporary or permanent injunction or other directive enjoining said person from engaging in such acts, or any other order that the court may deem pertinent.

ARTICLE IX - TIME COMPUTATION

Except as when it is established in these Regulations that the computation of time is a calendar quarter in which case no day could be excluded in computing any period of time prescribed or allowed by these Regulations, or by the Commission, the day of the event, act or default after which the designated period of time begins to run is not to be included.

The last day of the period so computed is to be included unless it is a Saturday, Sunday or a legal holiday, in which event the period runs until the end of the next day which is neither a Saturday, a Sunday, nor a holiday. When the period of time prescribed or allowed is less than seven (7) days, intermediate Saturdays, Sundays and legal holidays shall be excluded in the computation. A half holiday shall be considered as a full holiday.

ARTICLE X - EXTENSION OF TIME

When by these Regulations or by notice given thereunder, or by order of the Commission an act is required or allowed to be done at or within a specified time, the Commission for cause shown may at any time in its discretion (1) upon motion or notification or "motu proprio", order the period extended or shortened if request thereof is made before the expiration of the period originally prescribed or as extended by a previous order, or (2) upon motion made after the expiration of the specified period, permit the act to be done when the failure to act was the result of excusable neglect.

ARTICLE XI - SERVICE

The Commission shall notify any party or parties whose interest may be affected by any action to be taken. Service shall be made personally by a person designated by the Commission for that purpose or by the United States mail. When any party or parties have appeared by attorney, service upon the attorney shall be deemed service upon such party or parties.

ARTICLE XII - ANSWER

The party upon which the Commission serves a notification for a hearing shall, within the period indicated in the notification, answer the same in writing and state in plain terms his defenses to each claim asserted, and shall admit or deny the averments upon which the adverse party relies.

If he is without knowledge or sufficient information to form a belief as to the truth of any averment, he shall so state and this has the effect of a denial. Denials shall fairly meet the substance of the averments denied. When a pleader intends in good faith to deny only a part or a qualification of an averment, he shall specify so much of it as is true and material and shall deny the remainder. When he intends to controvert in good faith all the averments of such preceding pleading, he may do so by a general denial.

ARTICLE XIII - ADMISSION

After commencement of any hearing, a party may serve upon any other party a written request for the admission by the latter of the genuineness of any relevant documents, described and exhibited with the request or of the truth of any relevant matters of fact set forth in the request. If any party desires to serve a request for admission within ten (10) days after commencement of the hearing, permission of the Commission must be obtained.

Copies of the documents shall be served with the request unless copies have already been furnished. Each of the matters of which an admission is requested shall be deemed admitted unless, within a period designated in the request, not less than 10 days after service thereof or within such shorter or longer time as the Commission may allow on motion and notice, the party to whom the request is directed serves upon the party requesting the admission either (1) a sworn statement denying specifically the matters of which an admission is requested or setting forth in detail the reasons why he cannot truthfully admit or deny those matters, or (2) written objections on the ground that some or all the requested admissions are privileged or irrelevant, or that the request is otherwise improper in whole or in part together with a notice of hearings the objections at the earliest practicable time. If written objections to a part of the request are made, the remainder of the request shall be answered within the period designated in the request. A denial shall fairly meet the substance of the requested admission, and when good faith requires that a party deny only a part or a qualification of a matter of which an admission is requested, he shall

specify so much of it as is true and deny only the remainder if the request for admission is rejected for lack of information or knowledge of the party required, the latter shall further set forth in his sworn statement that he does not have the reasonable means to obtain such information or acquire such knowledge.

ARTICLE XIV - REPRESENTATION

Any person required to appear before the Commission may do so in person or represented by attorney. In case of juridic persons, appearance shall be represented by attorney.

ARTICLE XV - INTERVENTION

Upon a timely application, anyone shall be permitted to intervene in an action before the Commission when the representation of the applicant's interest by existing parties is or may be inadequate and the applicant is or may be bound by a judgment in the action or when an applicant's claim or defense and the main action have a question of law or fact in common. In exercising its discretion, the Commission shall consider whether the intervention will unduly delay or prejudice the adjudication of the rights of the original parties. Any person desiring to intervene shall file the petition before the Commission before the beginning of the hearing or during any other time authorized by the Commission. He shall notify the petition upon all parties affected thereby and shall state the grounds therefor and shall be accompanied by a pleading setting forth the claim or defense for which intervention is sought.

After the petition for intervention has been filed, the Commission shall, within a reasonable period, emit an order conceding or denying said intervention.

ARTICLE XVI - PREHEARING CONFERENCE

In any hearing the Commission may in its discretion direct the parties to appear before it for a conference to consider:

- 1- The simplification of the issues;
- 2- The possibility of obtaining admissions of fact and of documents which will avoid unnecessary proofs;
- 3- The disclosure of the identity of the witnesses which they propose to use at the trial and the limitation of the number of expert witnesses; and
- 4- Such other matters as may aid in the disposition of the action by the Commission.

The Commission shall issue an order in which everything agreed upon at the prehearing conference is stated, and such order, once issued, shall rule the hearing subsequently.

ARTICLE XVII - FORMAL HEARINGS

SECTION A-

Formal hearings will be held in cases of adjudication of rights, such as, but without excluding any other possibility, the followings:

- 1- Granting, denegation, suspension, revocation or amendment of licenses for radioactive material.
- 2- Prohibition for the receipt, possession, use, sale, rent, acquisition or transference of radiation machines.
- 3- Determinations in relation to the compliance or non-compliance with these Regulations or order issued in accordance with the same.

SECTION B-

The Commission shall guarantee the compliance with at least the following requisites:

- 1- Notification before the hearing so that the parties may have time for an adequate defense;
- 2- Opportunity to present evidence;
- 3- Opportunity to be present in all and every hearing to be held, listen to the witnesses and conduct cross-examinations;
- 4- Public hearings except in cases and occasions where confidential information classified as such by the Commission will be presented.

ARTICLE XVIII - INFORMAL HEARINGS

Informal hearings will be held for the purpose of obtaining necessary or useful information. Informal hearings may consist of oral argument or may consist of the submissions of written data at the discretion of the Commission.

ARTICLE XIX - PUBLIC DOCUMENTS

All original records shall be deemed public and shall be opened to public inspection except:

- 1- Documents relating to medical matters and any other personal information;
- 2- Intra-agency and inter-agency communications including memoranda, reports, correspondence and staff papers prepared by members of the Commission personnel or by any other government agency for exclusive use of the Commission;
- 3- Documents classified as restricted data under the Atomic Energy Act of 1954 or classified under executive order of the President of the United States as restricted data;
- 4- Confidential correspondence received by the Commission relating to alleged or possible violations of any statute, rule, regulations, order, license or permit;
- 5- Any other document involving matters of internal Commission management.

Provided that, the Commission may prohibit public inspection of any or part of any document if the interested party does not prove the existence of public interest or if the Commission determines that the inspection of the document may affect the interest of any person or the Commonwealth of Puerto Rico. This will not affect the right of inspection of documents by persons properly affected.

ARTICLE XX - FINDINGS AND ORDER

The Commission shall after the hearing and the review of the entire record make its finding and enter its order within ten (10) days after termination of the hearing.

The statement of fact and conclusions of law, as well as the order, shall be notified in writing to the party or parties concerned and shall be duly signed by the members of the Commission. The original documents containing the statement of facts and conclusion of law shall be filed in the Commission and under its custody. The Commission shall send a certified copy of the statement of fact and conclusions of law to the Secretary of Justice if any of the parties decides to appeal the ruling of the Commission.

PART THREE GENERAL PROVISIONS

ARTICLE I - SCOPE

These Regulations promulgated by the Commission for the Control of Radiation in Puerto Rico apply to all persons who receive, possess, use, transfer, own or acquire any source of radiation and will be subject to the provisions of Act No. 79 of June 24, 1965, of the Commonwealth of Puerto Rico, as amended provided, however, that nothing in these Regulations shall apply to any person to the extent such person is subject to regulation by the United States Atomic Energy Commission.

ARTICLE II - EXEMPTIONS

SECTION A- GENERAL PROVISION

The Commission may, upon application therefor or upon its own initiative, grant such exemptions or exceptions from the requirements of these Regulations as it determines are authorized by law and will not result in undue hazard to public health and safety or property.

SECTION B - CARRIERS

Common and contract carriers operating within the Commonwealth of Puerto Rico are exempt from these Regulations to the extent that they transport or store sources of radiation in the regular course of their carriage for another or storage incident thereto (See Article V, Part Five).

SECTION C- UNITED STATES ATOMIC ENERGY COMMISSION CONTRACTORS

Any United States Atomic Energy Commission contractor or subcontractor of the following categories operating within the Commonwealth of Puerto Rico is exempt from these Regulations to the extent that such contractor or subcontractor under his contract receives, possesses, uses, transfers or acquires sources of radiation:

- 1- Prime contractors performing work for the United States Atomic Energy Commission at United States Government-owned or controlled sites;
- 2- Prime contractors performing research in, or development, manufacture, storage, testing or transportation of, atomic weapons or components thereof;
- 3- Prime contractors using or operating nuclear reactors or other nuclear devices in a United States Government-owned vehicle or vessel; and,
- 4- Any other prime contractor or subcontractor when the Commonwealth of Puerto Rico and the United States Atomic Energy Commission jointly determine (a) that, under the terms of the contract or subcontract, there is adequate assurance that the work thereunder can be accomplished without undue risk to the public health and safety and (b) that, the exemption of such contractor or subcontractor is otherwise appropriate.

ARTICLE III - RECORDS

SECTION A*

Each licensee and registrant shall keep records showing the receipt, transfer, and disposal of all sources of radiation and any other records the Commission deems necessary, subject to the exemptions granted by rules and regulations issued by the Commission.

SECTION B-

Additional records requirements are specified elsewhere in these Regulations.

* This Section corresponds to paragraph (a), Section II of Act 79 of June 24, 1965, as amended.

the restricted area; shall instruct such individuals in the safety problems associated with exposure to such sources of radiation and in precautions or procedures to minimize exposure; shall instruct such individuals in the applicable provisions of Commission regulations and licenses 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 Part.

- 2- Each licensee or registrant shall post a current copy of this Part, a copy of the license or certificate of registration, and a copy of operating procedures applicable to work under the license or registration conspicuously in a sufficient number of places in every establishment where employees are employed in activities registered or licensed pursuant to Part Four or Part Five to permit them to observe a copy on the way to or from their place of employment or shall keep such documents available for examination upon request.
- 3- Each licensee or registrant shall conspicuously post Commission Form CCR-100, "Notice to Employees", in a sufficient number of places in every establishment where employees are employed in activities registered or licensed pursuant to Part Four or Five, by the Commission 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. Note: Copies of Commission Form CCR-100 may be obtained by writing to the Commission.

SECTION F- STORAGE OF SOURCES OF RADIATION

Sources of radiation shall be secured against unauthorized removal from the place of storage.

ARTICLE IV- WASTE DISPOSAL

SECTION A- GENERAL REQUIREMENT

No licensee shall dispose of any radioactive material except:

- 1- By transfer to an authorized recipient as provided in Part Five, or
- 2- As authorized pursuant to Section F, Article II or Sections B,C or D, Article IV of this Part.

SECTION B- METHOD OF OBTAINING APPROVAL OF PROPOSED DISPOSAL PROCEDURES

Any person may apply to the Commission for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in this Part. 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 Commission will not approve any application for a license to receive radioactive material from other persons for disposal on land not owned by the Commonwealth of Puerto Rico or the Federal Government.

SECTION C- DISPOSAL BY RELEASE INTO SANITARY SEWERAGE SYSTEMS

No licensee shall discharge radioactive material into a sanitary sewerage system unless:

- 1- It is readily soluble or dispersible in water; and,
- 2- The quantity of any radioactive material released into the system by the licensee in any one day does not exceed the larger of subparagraph (a) or (b) of this paragraph:
 - a- The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the licensee, will result in an average concentration not greater than the limits specified in Annex I, Table I, Column 2, of this Part; or
 - b- Ten (10) times the quantity of such material specified in Annex II of this Part; and,
- 3- The quantity of any radioactive material released in any one month, if diluted by the

average monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Annex I, Table I, Column 2, of this Part; and,

- 4- The gross quantity of radioactive material released into the sewerage system by the licensee does not exceed one curie per year.

Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this Section.

SECTION D- DISPOSAL BY BURIAL IN SOIL

No licensee shall dispose of radioactive material by burial in soil unless:

- 1- The total quantity of radioactive materials buried at any one location and time does not exceed, at the time of burial, one thousand (1,000) times the amount specified in Annex II of this Part; and,
- 2- Burial is at a minimum depth of four (4) feet; and,
- 3- Successive burials are separated by distances of at least six (6) feet and not more than twelve (12) burials are made in any year.

SECTION E- DISPOSAL BY INCINERATION

No licensee shall incinerate radioactive material for the purpose of disposal or preparation for disposal except as specifically approved by the Commission pursuant to Section F, Article II and Section B, Article IV of this Part.

ARTICLE V- RECORDS, REPORTS AND NOTIFICATION

SECTION A- RECORDS OF SURVEYS, RADIATION MONITORING, AND DISPOSAL

- 1- Each licensee or registrant shall maintain records showing the radiation exposures of all individuals for whom personnel monitoring is required under Section B, Article III of this Part. Such records shall be kept on Commission Form CCR-102, in accordance with the instructions contained in that form, or on clear and legible records containing all the information required by the Commission Form CCR 102. The doses entered on the forms or records shall be for periods of time not exceeding one calendar quarter.
- 2- Each licensee or registrant shall maintain records in the same units used in this Part, showing the results of surveys required by Section A, Article III of this Part and disposals made under Sections B, C and D, Article IV of this Part.
- 3- Records of individual exposure to radiation and to radioactive material which must be maintained pursuant to the provisions of paragraph (1) of this Section and records of bio-assays, including results of whole body counting examinations, made pursuant to Section G, Article II of this Part shall be preserved indefinitely or until the Commission authorizes their disposal.
- 4- The discontinuance of or curtailment of activities, does not relieve the licensee or registrant of responsibility for retaining all records required by this Section.

SECTION B- REPORTS OF THEFT OR LOSS OF SOURCES OF RADIATION

Each licensee or registrant shall report by telephone and telegraph to the Commission the theft or loss of any source of radiation immediately after such occurrence becomes known.

SECTION C- NOTIFICATION OF INCIDENTS

1- Immediate Notification

Each licensee or registrant shall immediately notify the Commission by telephone and telegraph of any incident involving any source of radiation possessed by him and which may have caused or threatens to cause:

- a- A dose to the whole body of any individual of twenty-five (25) rems or more of radiation; a dose to the skin of the whole body of any individual of one hundred