MASSACHUSETTS

STATE INFORMATION HANDBOOK

FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM

FEBRUARY 9, 1981

PREPARED FOR

U.S. DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR WASTE MANAGEMENT

OAK RIDGE OPERATIONS OFFICE

CONTRACT NO. DE-AC05-800R20769

BY

POLITECH CORPORATION
2550 M Street, N.W.
SUITE 300
WASHINGTON, D.C. 20037

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INTRODUCTION

Pursuant to the First War Powers Act of 1941 and the Atomic Energy Acts of 1946 and 1954, as amended, the Corps of Engineers' Manhattan Engineer District (MED) and its successor, the Atomic Energy Commission (AEC), conducted during the 1940's and 1950's a program involving research, development, processing, and production of uranium and thorium. This program also included the storage of radioactive ores and processing residues, e.g. mill tailings. Virtually all of this work was performed by private contractors for the Government on land that was either federally, privately, or institutionally owned. Due to the urgency and magnitude of the early nuclear materials programs and the limited knowledge available regarding the radioactive characteristics of uranium ore and residual material from its processing, many of these sites became contaminated with radioactivity as a result of work done for the Government. At the conclusion of MED/AEC activities, contaminated sites were decontaminated in accordance with existing guidelines for contamination and exposure levels. Since that time, the guidelines for radioactivity contamination have become much more stringent.

In early 1974, the AEC initiated a survey program to identify all formerly utilized sites involved with nuclear materials and to determine their radiological status. All divisions and field offices of the AEC were required to search their files to identify any such former Government-owned or leased sites and facilities that had been used in the research or production activities of the MED and the AEC. In addition, the files were searched for records identifying the radiological conditions at the termination of the MED/AEC activities and the current radiological condition of the sites. This effort identified many sites for which pertinent information was lacking or was insuffient to determine their radiological conditions.

On January 19, 1975, the AEC was abolished and its programmatic responsibilities transferred to the Energy Research and Development Administration (ERDA) which continued the activities of the survey program. Contacts were made with former and current owners and site visits were conducted under the direction of ERDA field offices to determine the need for radiological surveys. Subsequent survey results were published in radiological survey reports that analyzed the significance of the findings with respect to the potential risks to the public health.

Pursuant to the Department of Energy Organization Act of 1977, the functions and authority of ERDA were transferred to the Department Of Energy (DOE). In the DOE, the Assistant Secretary

for the Environment (ASEV) was assigned the responsibility for the site-survey program. The results of several site surveys clearly indicated that some remedial action would be needed, not only on the former sites, but also on adjacent or remote properties that had become contaminated from the original processing site. Due to the importance of this effort, the ASEV initiated the Formerly Utilized Sites Remedial Action Program (FUSRAP) and drafted a generic plan to identify all formerly utilized sites and to resolve any site radiological problems. The objectives of the FUSRAP are to:

- o Identify former MED/AEC sites;
- o Characterize their radiological conditions;
- o Decontaminate sites as required and pursuant to authorization and appropriation by Congress;
- o Develop acceptable disposal and stabilization sites in consultation with the affected states;
- o Certify the acceptability of the sites for future use.

Using the generic plan as a guide, in mid-1979 responsibility for the FUSRAP activities was divided between the ASEV and the Assistant Secretary for Energy Technology (now Assistant Secretary for Nuclear Energy [ASNE]). The ASEV is responsible for identifying the sites, characterizing the radiological conditions, determining the need for remedial action at the sites, and ultimately for certifying the post-remedial action radiological condition of the FUSRAP sites. The ASNE is responsible for implementing the required remedial actions, including suitable disposal or stabilization of residual material. The Oak Ridge Operations Office has been delegated with the responsibility for field implementation and program management of the ASNE FUSRAP responsibilities. The Environmental Protection Agency (EPA) is responsible for the promulgation of health and environmental standards which will apply to all residual radioactive materials at the formerly utilized sites. As of this time, 31 sites in 13 states have been identified that require or may require some form of remedial action.

This volume is one of a series produced under contract with the DOE, by POLITECH CORPORATION to develop a legislative and regulatory data base to assist the FUSRAP management in addressing the institutional and socioeconomic issues involved in carrying out the Formerly Utilized Sites Remedial Action Program. This Information Handbook series contains information about all relevant government agencies at the Federal and state levels, the pertinent programs they administer, each affected state legislature, and

current Federal and state legislative and regulatory initiatives. This volume is a compilation of information about the state of Massachusetts. It contains:

- o A description of the state executive branch structure;
- o A summary of relevant state statutes and regulations;
- o A description of the structure of the state legislature, identification of the officers and committee chairmen, and a summary of recent relevant legislative action;
- o The full text of relevant statutes and regulations.

The loose-leaf format used in these volumes will allow the material to be updated periodicially as the Remedial Action Program progresses.

EXECUTIVE BRANCH

The executive branch of the state of Massachusetts consists of fourteen Constitutional officers and over five-hundred departments, boards and commissions. The Constitutional Officers are the Governor, Lieutenant Governor, Attorney General, Treasurer and Receiver-General, Auditor of the Commonwealth, Secretary of the Commonwealth, and the eight members of the Governor's Council. Figure 1-1 illustrates the structure of the executive branch.

Massachusetts is not an NRC agreement state. However, most state authority within the executive branch governing the installation, usage, handling, transportation and storage of sources of radiation has been concentrated within the Radiation Control Section of the Department of Public Health.

Office of the Governor

The Governor is the "supreme executive Magistrate" of the Commonwealth of Massachusetts. He is elected to a 4-year term. Presently, the Governor of Massachusetts is Edward J. King, a Democrat from Winthrop. Governor King was elected to office in November, 1978. Prior to becoming Governor, he served as President of the New England Council and as Comptroller, Secretary-Treasurer, and Executive Director of the Massachusetts Port Authority. Governor King has also held numerous honorary positions. He is Chairman of the Board of Overseers, Salesian Boys Club; former Massachusetts general campaign chairman for the Leukemia Society of America; and former state chairman for the Easter Seals Telethon.

The Governor has numerous powers and duties. He appoints the heads of various departments and members of numerous boards and commissions, prepares and submits the state budget to the General Court, and vetos bills and initiates legislation. With the consent of the Executive Council, the Governor may appoint judges and grant pardons to convicted criminals. The Governor is Commander-in-Chief of the Massachusetts National Guard and President of the Governor's Executive Council. The Governor is also empowered to submit executive branch reorganizational plans to the General Court. If the reorganizational plan is not disapproved by the General Court within sixty days after its submission, it has the force of law.

The Governor's address, his principal staff members, and his Washington office are:

Governor Edward J. King
State House, Room 360
Boston, Massachusettts 02133
(617) 727-3600

Chief Secretary - Paul Buzzi
Legislative Aide - Jack McAlynn
Legal Aide - Neil Lynch
Communications and Press - Ron Brinn
Scheduling - Patricia Connelly
Appointments - Jeanne Marie Boylan
Special Advisor - Eric Jostrum
Correspondence - Mary Ellen Fitzpatrick

Washington Office
444 N. Capital Street
(202) 628-1065
Director - Lucy Flynn

Governor's Cabinet

The Governor's Cabinet was created by the General Court in 1971. Each Secretary is appointed by and directly accountable to the Governor for the adminsitration of the departments and agencies under their jurisdiction. Each Secretary has the authority to review and act on final and budgetary matters concerning the programs which they administer. The eleven Cabinet Secretaries are the Secretary of Administration and Finance, Secretary of Communities and Development, Secretary of Consumer Affairs, Secretary of Economic Affairs, Secretary of Educational Affairs, Secretary of Elder Affairs, Secretary of Environmental Affairs, Secretary of Human Services, Secretary of Energy, Secretary of Public Safety, and Secretary of Transportation and Construction.

Governor's Executive Council

The Governor's Executive Council was established in colonial times to serve as a check on gubernatorial power. It is comprised of eight elected members, the Lieutenant Governor and the Governor. The Governor, who is the presiding officer, possesses no vote. The Council must provide consent to the following Governor's activities:

- The appointment of persons to positions having quasi-judicial functions;
- The appointment of judicial officers;
- The granting of pardons;
- The adjournment of the General Court.

The Council may be contacted at Room 184, State House, Boston, Massachusetts 02133 (617-727-2795). The members of the Governor's Executive Council are:

Governor	Edward J. King
Lieutenant Governor	Thomas P. O'Neill, III

Members	Honorable John Britland Honorable George F. Cronin, Jr. Honorable Herbert L. Connelly Honorable Peter L. Eleey Honorable John F. Markey Honorable Joseph A. Longone Honorable Leo J. Turo Honorable Edward M. O'Brien.

Executive Office of Environmental Affairs

The Executive Office of Environmental Affairs was established to "serve as the principal agency...for the protection and improvement of the quality of the environment of the Commonwealth and the resources which together constitute it, and the improvement of the public's opportunity to enjoy and exist healthily in that environment, by controlling the man-made despoilation of such resources and directing growth and development along planned lines which preserve for all time an ecologically sound and aesthetically pleasing balance of naturally-occurring resources."

The Office administers coastal zone management, conservation services, environmental impact review, and law enforcement. The Office has five departments under its aegis: Department of Environmental Quality Engineering; Department of Environmental Management; Department of Food and Agriculture; Department of Fisheries; Wildlife and Recreational Vehicles; and Department of Metropolitan District Commission. Figure 1-2 illustrates the structure of the Executive Office of Environmental Affairs. The Secretary of the Executive Office of Environmental Affairs is John A. Bewick, 100 Cambridge Street, Boston, Massachusetts 02202 (617-727-9800).

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

The Department of Environmental Quality Engineering administers those regulatory programs for air, water, solid waste, and land use controls. The Department also performs regulatory functions designed to protect public health and provides technical advice to local communities and agencies. The Department is comprised of seven divisions: Environmental Sanitation; Outdoor Advertising; Water Pollution Control; Waterways; Wetlands; Hazardous Waste; and Air Pollution Control. The Commissioner of the Department of Environmental Quality Engineering is Dr. Anthony Cortese, 100 Cambridge Street, 20th Floor, Boston, Massachusetts 02202 (617-727-2690).

Division of Water Pollution Control

Contained within the Department of Environmental Quality Engineering is the Division of Water Pollution Control. The Division establishes programs for the prevention, control and

abatement of water pollution. It is responsible for approving plans for the construction of waste disposal facilities and for inspecting existing facilities. The Director of the Division of Water Pollution Control is Thomas McMahon, 110 Tremont Street, 3rd Floor, Boston, Massachusetts 02108 (617-727-3855).

Division of Hazardous Waste

Also contained within the Department of Environmental Quality Engineering is the Division of Hazardous Waste. The Division is responsible for managing the formulation of a system to deal with hazardous waste in Massachusetts. The Director of the Division of Hazardous Waste is William Cass, 600 Washington Street, Boston, Massachusetts 02111 (617-727-0776).

DEPARTMENT OF PUBLIC HEALTH

The Department of Public Health is responsible for providing direct health services, maintaining surveillance over the health of the citizens of Massachusetts, and regulating health care facilities, consumer products and food and drug processing. The Department is divided into seven major divisions: Health Planning, Health Protection and Prevention, Health Regulation, Health Services, Management Services, Environmental Health and Legal Office. Figure 1-3 depicts the structure of the Department. The Commission of the Department of Public Health is Alfred Frechette (600 Washington Street, Boston, Massachusetts 02111 (617-727-2700).

Environmental Health Division

Contained within the Department of Public Health is the Environmental Health Division. The Division contains six sections: Lead Poisoning, Radiation, Food and Drug, Sanitary Code, Flouridation, Safe Drinking Water, and Hazardous Waste Control. The Director of the Environmental Health Division is Gerry Parker, Room 770, 600 Washington Street, Boston, Massachusetts 02111 (617-727-2660).

Radiation Control Section

Contained with the Environmental Health Division is the Radiation Control Section. Most authority within the executive branch governing the installation, usage, handling, transportation, and storage of sources of radiation has been concentrated within the Radiation Control Section. The Director of the Radiation Control Section is Robert M. Hallisey, Room 770, 600 Washington Street, Boston, Massachusetts 02111 (617-727-6214).

ADVISORY COUNCIL ON RADIATION PROTECTION

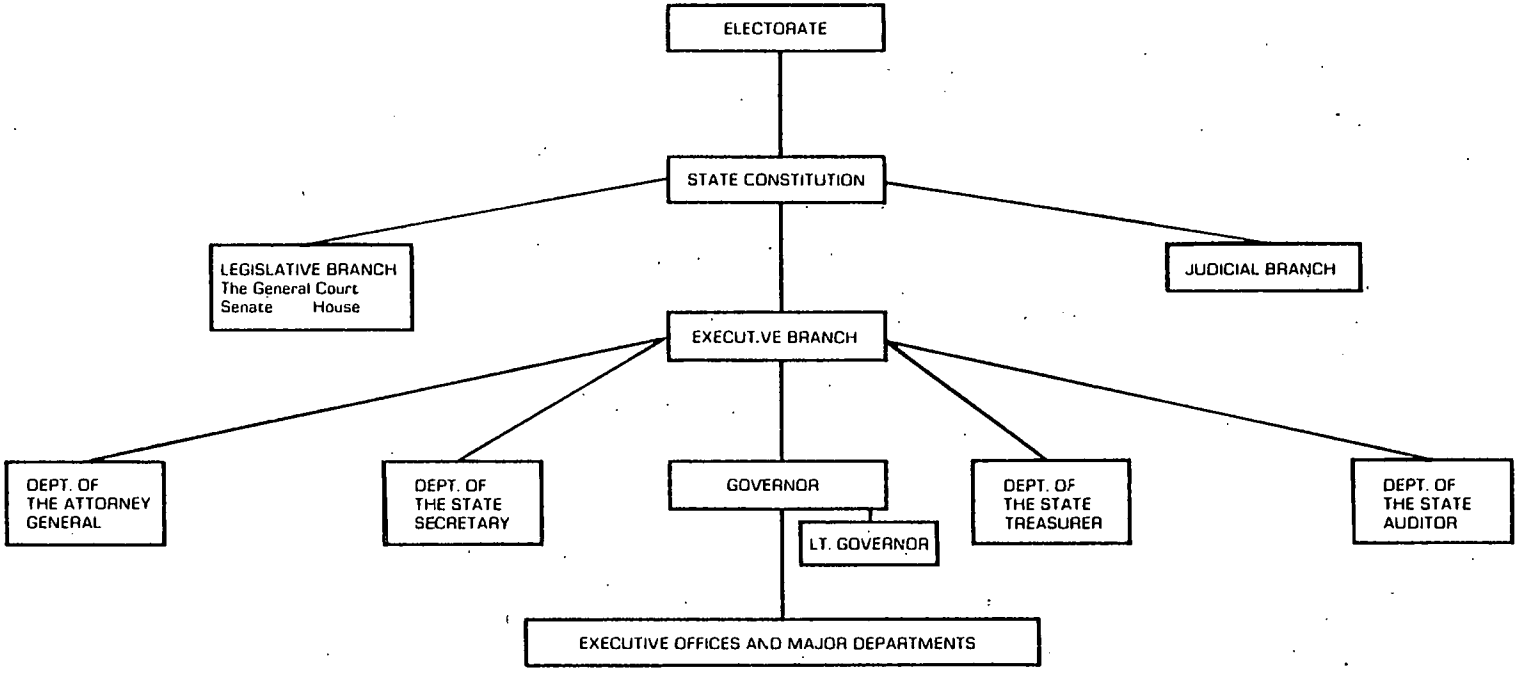
The Advisory Council on Radiation Protection consists of the Commissioner of Public Health, Commissioner of Labor and Indus-

tries, Commissioner of Public Safety, Commissioner of Administration, Personnel Administrator, Director of Civil Defense, and six persons appointed by the Governor. The Council meets at least twice yearly. It makes recommendations to the Governor, General Court, and various departments concerning ionizing radiation. The Council submitted to Governor King in November, 1980 a report on "Low Level Radioactive Waste Management in Massachusetts." A copy of the report is contained in the Appendix to this handbook. The Chairman of the Advisory Council on Radiation Protection is Constantine J. Maletskos (617-283-2339).

STATE GEOLOGIST

The State Geologist is responsible for providing state agencies with information and advice on matters relating to ground water, exploration of coal resources and offshore oil, soil formation, and mineral resources. The State Geologist is Joseph A. Sinnoter, 1-11 Winter Stret, Boston, Massachusetts (617-727-4796).

SCHEMATIC OF STATE GOVERNMENT AND AGENCIES



DEPARTMENT OF ELDER AFFAIRS
- Division of Administrative and Fiscal Services
- Division of Advocacy Services
- Division of Program Services

EXECUTIVE OFFICE OF TRANSPORTATION AND CONSTRUCTION
- Department of Public Works
- Massachusetts Bay Transportation Authority
- Massachusetts Port Authority
- Massachusetts Turnpike Authority
- Massachusetts Parking Authority
- Massachusetts Aeronautics Commission

EXECUTIVE OFFICE OF COMMUNITIES AND DEVELOPMENT
- Office of Policy Development
- Division of Community Development
- Division of Social and Economic Opportunity
- Division of Community Services

EXECUTIVE OFFICE OF PUBLIC SAFETY
- Department of Public Safety
- Registry of Motor Vehicles
- Military Division
- Division of Civil Defense

EXECUTIVE OFFICE FOR ADMINISTRATION AND FINANCE
- Department of Revenue
- Division of Personnel Administration
- Division of Fiscal Affairs
- Division of Purchasing
- Comptroller's Division

EXECUTIVE OFFICE OF ECONOMIC AFFAIRS
- Department of Commerce and Development
- Department of Labor and Industries
- Department of Manpower Development

EXECUTIVE OFFICE OF CONSUMER AFFAIRS
- Department of Public Utilities
- Consumers Council
- Community Antenna Television Commission
- Division of Registration
- Department of Banking and Insurance
- Division of Standards
- Alcoholic Beverages Control Commission
- State Racing Commission

EXECUTIVE OFFICE OF EDUCATIONAL AFFAIRS
- Board of Education
- Department of Education
- Board of Higher Education
- Council on the Arts and Humanities
- Board of Trustees of the State Library

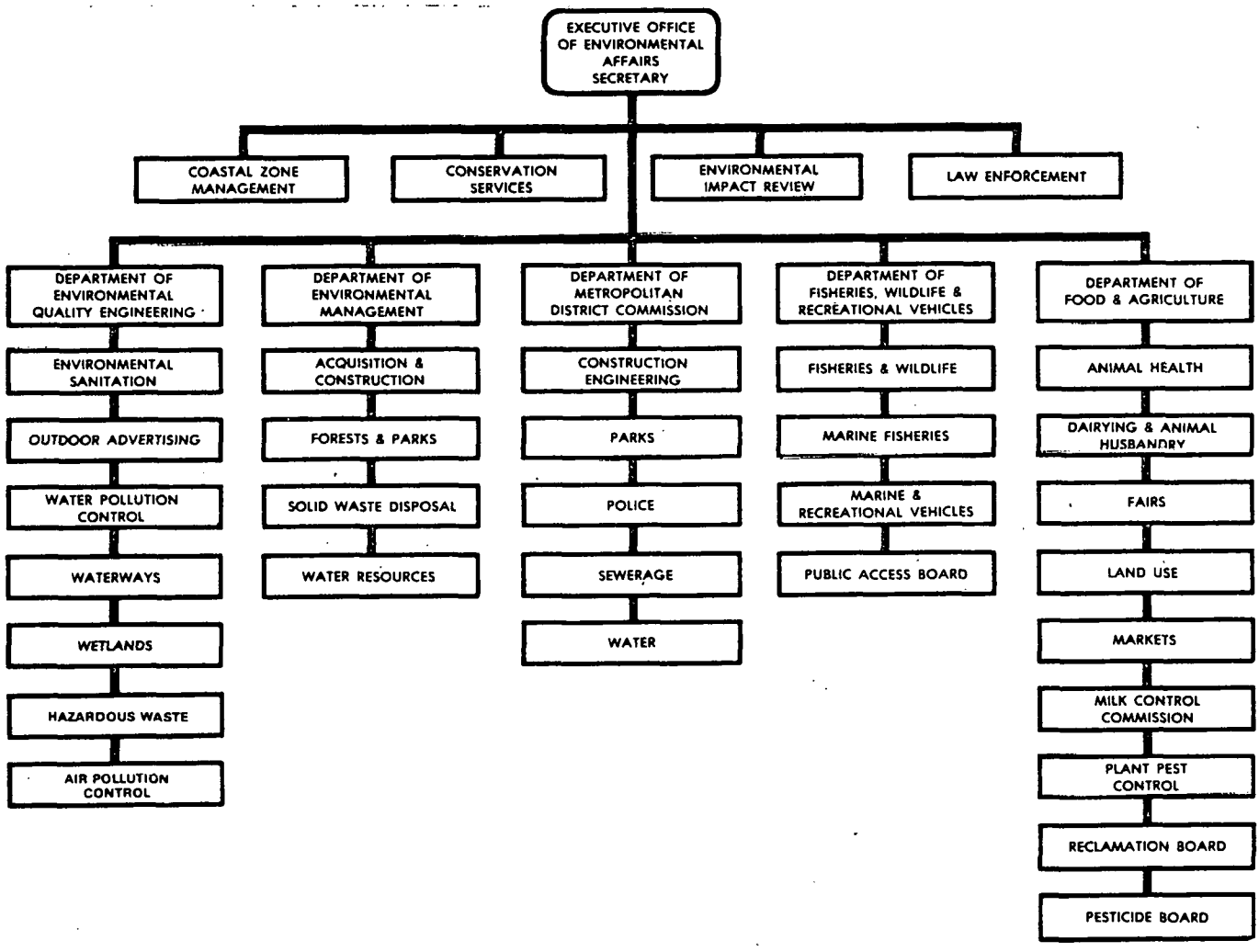
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
- Department of Environmental Quality Engineering
- Department of Environmental Management
- Metropolitan District Commission
- Department of Fisheries, Wildlife & Recreational Vehicles
- Department of Food & Agriculture

EXECUTIVE OFFICE OF HUMAN SERVICES
- Department of Public Health
- Department of Mental Health
- Department of Youth Services
- Massachusetts Commission for the Blind
- Department of Correction
- Department of Public Welfare
- Office for Children
- Rate Setting Commission

Figure 1-1
1-6

(02/09/81)

STRUCTURE OF THE
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

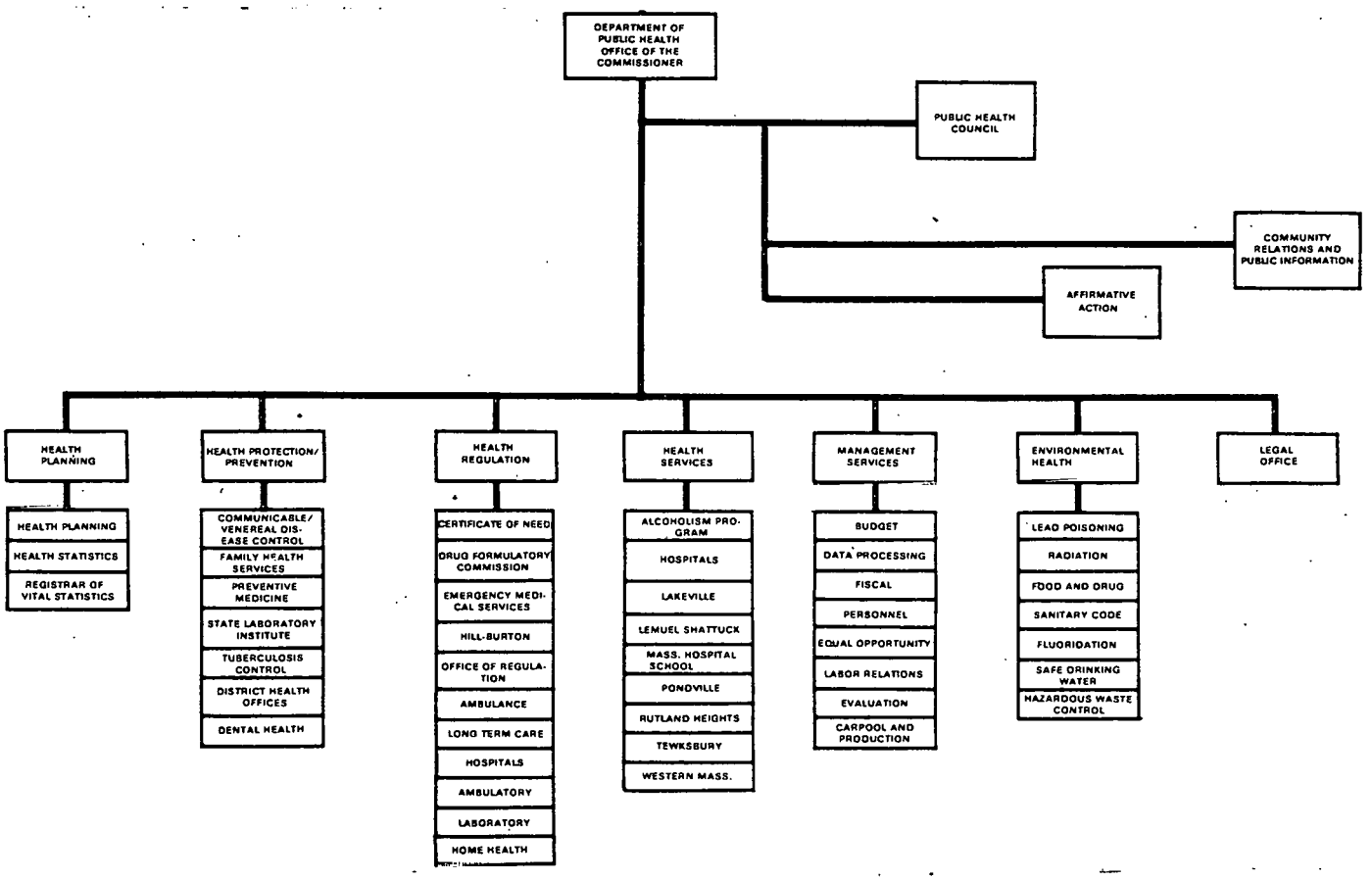


*This figure was taken from "Your Massachusetts Government," by Donald Levitan and Elwyn E. Mariner

Figure 1-2*

(02/09/81)

STRUCTURE OF THE DEPARTMENT OF PUBLIC HEALTH



*This figure was taken from "Your Massachusetts Government," by Donald Levitan and Elwyn E. Mariner

Figure 1-3*

(02/09/81)

RELEVANT STATUTES AND REGULATIONS

The purpose of this section is to summarize Massachusette statutes and regulations which may be relevant to the Formerly Utilized Sites Remedial Action Program. The full text of all statutes and regulations cited in this section is included in the Appendix to this handbook.

(Chapter 474) Acts and Resolves of 1980

Chapter 474 of the "Acts and Resolves of 1980" authorizes the Department of Health to require registration of sources of ionizing and nonionizing radiation. It also empowers the Department to promulgate rules and regulations for the control of radiation hazards associated with the use, transportation, storage, packaging, sale, distribution, production, and disposal of radioactive materials.

Department of Public Health Regulations

The Massachusetts Department of Public Health has promulgated "Rules and Regulations to Control the Radiation Hazards of Radioactive Materials and of Machines Which Emit Ionizing Radiation." The purpose of these rules is to protect the Massachusetts citizenry from hazards associated with the use, transportation, storage, packaging, sale, distribution, production and disposal of radioactive materials. (Section A.1)

Radioactive materials which do not exceed the quantities set forth in Table 1 of Section D.1 and which do not result in exposure levels exceeding .5 rem per year are exempt from these regulations. Also exempt are radioactive materials which are transported intrastate in conformance with the regulations of any agency which maintains jurisdiction over interstate transportation, providing that such regulations meet the ionizing radiation protection requirements of the Department of Health. (Section D)

All radioactive material must be kept or stored in a manner that provides reasonable assurance that no individual will receive an absorbed dose in excess of the Radiation Protection Guides outlined in Table 2 of the regulations. All radioactive material must be stored in a manner which will prevent unauthorized removal from the place of storage. (Section J)

All work performed with radioactive material must be conducted in a manner which minimizes the possibility of contamination that would result in an individual receiving an absorbed dose of radiation in excess of the Radiation Protection Guides. All persons who work with radioactive material not contained in a sealed source must have immediate access to instruments suitable for determining and measuring contamination levels. (Section K)

The presence of ionizing radiation in an area must be indicated by conspicuous signs which bear the radiation caution symbol and the appropriate wording specified in Table 4 of the regulations. All containers used for the transfer or storage of radioactive material must indicate the kind and quality of material and the name of the person responsible for that material. (Section L)

No radioactive material may be released into the air or water or buried in a manner which would result in individual exposure levels in excess of the Radiation Protection Guides. No radioactive material which occurs in a quantity greater than that stated in Table 1 of the regulations may be disposed of by burial or stored in or on unenclosed ground without first obtaining the approval of the Department of Health. (Section M)

Hazardous Waste Regulations

The Massachusetts Hazardous Waste Board has promulgated regulations which specify the manner in which hazardous substances may be handled and disposed.

(Section 2.03) Handling of Hazardous Wastes

No person may dispose of a classified hazardous waste at a site within Massachusetts unless the Division of Water Pollution Control has approved of the disposal. No person may dispose of hazardous waste at an off-shore disposal site unless that site has been approved by the Division of Water Pollution Control. In no instance may radioactive material be dumped in the waters of the Commonwealth of Massachusetts.

(Section 2.05) Disposal Methods and Locations

Disposal of radioactive material may be permitted at an off-shore site if that site has been designated by the Division of Water Pollution Control. Disposal may also be permitted at those land-sites licensed by the Division.

(Section 2.06) Licensing

Any person who desires to handle or dispose of hazardous waste must submit an application for a license to the Division of Water Pollution Control.

LEGISLATURE

The official name of the Massachusetts Legislature is the General Court. The General Court consists of a Senate, which has fifty members, and a House of Representatives, which has one-hundred and sixty members. All legislators are elected to two-year terms. The General Court convenes annually on the first Wednesday in January and adjourns when both houses agree and request the Governor and the Governor's Council to adjourn the session. The General Court convened on January 7, 1981. All legislators receive an annual salary of $20,335.64.

The General Court is empowered to enact laws, administer oaths of office, levy an income tax, charter cities, and authorize the state to obtain land.

Figure 3-1 illustrates how a bill becomes a law in the state of Massachusetts. Figure 3-2 depicts the structure of the Massachusetts General Court. Table 3-1 provides a listing of the various legislative information services.

SENATE

Membership

The membership of the Massachusetts Senate consists of thirty-three Democrats, seven Republicans, and one Independent. A roster of Senate members, including their political affiliations, hometowns and State House phone numbers, is contained on pages 3-9 and 3-10.

Leadership

The presiding officer of the Senate is the President, who is elected by the members of the Senate. The President appoints the Majority and Assistant Majority Leader, decides on all questions of order, appoints the members and chairmen of Senate Standing Committees, and serves as the Chairman of the Senate Rules Committee. He may vote and participate in all floor debate. The President is empowered to appoint another Senator to preside over the Senate for a period not to exceed three days at any one time. If the Chair is vacated or the President's designee is absent at the hour of business, the eldest senior member of the Senate shall preside until a President pro Tempore is elected by ballot. The officers of the Senate are:

President: William M. Bulger (D, Boston)
Majority Leader: Daniel J. Foley (D, Worcester)
Assistant Majority Leader: Mary L. Fonseca (D, Fall River)
Minority Leader: John F. Parker (R, Taunton)
Assistant Minority Leader: David H. Locke (R, Wellesley)
Assistant Minority Leader: John F. Aylmen (R, Barnstable)
Assistant Minority Leader: Robert A. Hall (R, Fitchburg)

Committee Structure

Joint Standing Committees bear the major burden of conducting hearings and recommending action on legislative proposals. Joint Standing Committees are comprised of six Senators and eleven Representatives. The President appoints the Senate members of the Joint Standing Committees and a Senate Chairman for each committee. Joint Standing Committees must issue their final reports not later than the fourth Wednesday in April on all matters referred to them by April 15th and within ten days on all matters referred to them on or after that date. All Joint Standing Committee meetings are open to the public unless voted otherwise by a majority of the committee members. A list of those Joint Standing Committees which may be relevant to the Formerly Utilized Sites Remedial Action Program and their members is contained on pages 3-18 through 3-20.

Senators from Watertown, Beverly and Norton

Watertown, where the Watertown Arsenal site is located, is in the Middlesex and Suffolk District. The Senator from the Middlesex and Suffolk District is George Bachrach. Senator Bachrach, an Independent, is a member of the following Joint Standing Committees: Commerce and Labor, Human Services and Elderly Affairs, Public Safety, and Urban Affairs. He may be contacted at Room 518, State House, Boston, Massachusetts 02133 (617-727-1280).

Beverly, where the Ventron Corporation site is located, is in the Second Essex District. The Senator from the Second Essex District is John G. King. Senator King, a Democrat, is the Senate Chairman of the Joint Standing Committee on State Administration. He also serves on the following Joint Standing Committees: Commerce and Labor, Federal Financial Assistance, Health Care, Human Services and Elderly, and Taxation. Senator King may be contacted at Room 416-B, State House, Boston, Massachusetts 02133 (617-727-1280).

Norton, where the Shpack Landfill site is located, is in the First Bristol District. The Senator from the First Bristol District is John F. Parker. Senator Parker, a Republican, may be contacted at Room 306, State House, Boston, Massachusetts 02133 (617-727-2490).

HOUSE OF REPRESENTATIVES

Membership

The membership of the Massachusetts House of Representatives consists of one-hundred and twenty-eight Democrats, thirty-eight Republicans, and one Independent. A roster of House members, including their political affiliations, hometowns and State House phone numbers, is contained on pages 3-11 through 3-17.

Leadership

The presiding officer of the House is the Speaker, who is elected by the members of the House. The Speaker decides all questions of order, appoints chairmen and members of all House Standing committees, appoints the Majority and Assistant Majority Leader of the House, and serves as the Chairman of the House Rules Committee. He may vote and participate in all floor debate. The Speaker is empowered to appoint a member of the House to perform the duties of the Chair. If a vacancy of the Chair occurs and no appointment has been made by the Speaker, the Majority Leader shall serve as speaker. The officers of the House of Representatives are:

Speaker: Thomas W. McGee (D, Lynn)
Majority Leader: George Keverian (D, Everett)
Majority Whip: John E. Murphy, Jr. (D, Peabody)
Assistant Majority Whip: Vincent J. Piro (D, Somerville)
Minority Leader: William G. Robinson (R, Melrose)
Assistant Minority Leader: Edward W. Connelly (R, Agawam)
Assistant Minority Leader: Iris K. Holland (R, Longmeadow)
Assistant Minority Leader: Andrew H. Card, Jr. (R, Holbrook)

Committee Structure

Joint Standing Committees bear the major burden of conducting hearings and recommending action of legislative proposals. Joint Standing Committees are comprised of six Senators and eleven Representatives. The Speaker appoints the House members of the Joint Standing Committees and a House Chairman for each committee. Joint Standing Committees must issue their final reports not later than the fourth Wednesday in April on all matters referred to them by April 15th and within ten days on all matters referred to them on or after that date. All Joint Standing Committee meetings are open to the public unless otherwise voted by a majority of the committee members. A list of those Joint Standing Committees which may be relevant to the Formerly Utilized Sites Remedial Action Program and their members is contained on pages 3-18 through 3-20.

Representatives from Watertown, Beverly and Norton

Watertown, where the Watertown Arsenal Site is located, is in the 32nd Middlesex district. The Representative from the 32nd Middlesex District is Salvatore Ciccarelli. Representative Ciccarelli, a Democrat, is a member of the following Joint Standing Committees: Banks and Banking, Election Laws, and Judiciary. He may be contacted at Room 20, State House, Boston, Massachusetts 02133 (617-727-0290).

Beverly, where the Ventron Corporation site is located, is in the 6th Essex District. The Representative from the 6th Essex

District is F. John Monohan. Representative Monohan, a Democrat, may be contacted at Room 439, State House, Boston, Massachusetts 02133 (617-727-2355).

Norton, where the Shpack Landfill site is located, is in the 1st Bristol District. The Representative from the 1st Bristol District is Leon J. Lombardi. Representative Lombardi, a Republican, is a member of the following Joint Standing Committees: Counties, Government Relations, and Urban Affairs. Representative Lombardi may be contacted at Room 33, State House, Boston, Massachussets 02133 (617-727-7790).

PENDING LEGISLATION

The following is a summary of pending legislation in the General Court which may be relevant to the Formerly Utilized Sites Remedial Action Program.

House, No. 655

This bill would prohibit persons, corporations, or other associations from conducting explorations, testings, drillings, or investigations related to the siting or potential siting of a low-level radioactive waste repository in Massachusetts. This bill would also prohibit the construction or creation of a low-level radioactive waste repository within Massachusetts, with the exception of hospitals and other medical facilities, which could do so only after receiving approval from the Department of Environmental Quality Engineering and the Department of Public Health.

House, No. 1002

This bill would prohibit the transportation of radioactive material through any city or town until the legislative body of the affected municipality had been informed and approved of the proposed transport and the State Department of Health has ascertained that the proposed transport is in compliance with all pertinent safety regulations. The Department of Health would also be empowered to order changes in the time or date of travel and the proposed route.

House, Number 2294

This bill would require that the General Court be notified before "any exploration, testing, drilling or investigation relating to the siting or potential siting of radioactive waste storage repositories is conducted." Such notification would be required not less than thirty days before the exploration, testing, drilling or investigation begins.

HOW A BILL BECOMES A LAW

How A Bill Becomes A Law

Chart shows normal procedure of non-controversial Bill. Bills may originate in either Branch excepting Budget and Money Bills, which originate in House.

1 Petition filed in office of Clerk by member.

2 Petition processed by Clerk, printed and referred to Joint Committee.

3 Public hearing held by Committee.

4 If the bill relates to State finances it is read and referred to Ways and Means and if it relates to county finances to the committee on Counties on the part of the House.

5 Subsequently reported by standing committee (if so referred) and placed on Calendar for second reading.

6 At next session, Clerk reads title second time and bill is before House subject to debate and amendment.

At this point the member carrying the bill usually offers explanation and answers any questions relating to bill. Bill is then ordered to a third reading.

7 At which time it is again open for debate and amendment. At this point bill must be approved by committee on Bills in the Third Reading. Bill is then passed to be engrossed.

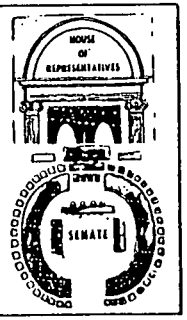
and it is

8 SENT TO THE SENATE
Where the bill goes through substantially the same process as in the House — three readings and passed to be engrossed.

9 After bill has been passed to be engrossed by both branches it is sent to the Legislative Engrossing Division to be placed on parchment in accordance with General Law.

10 Bill is delivered by Legislative Engrossing Division to House of Representatives where it is enacted then to

Senate for enactment. Bill is always enacted in House first and Senate last where it is then delivered to Governor.

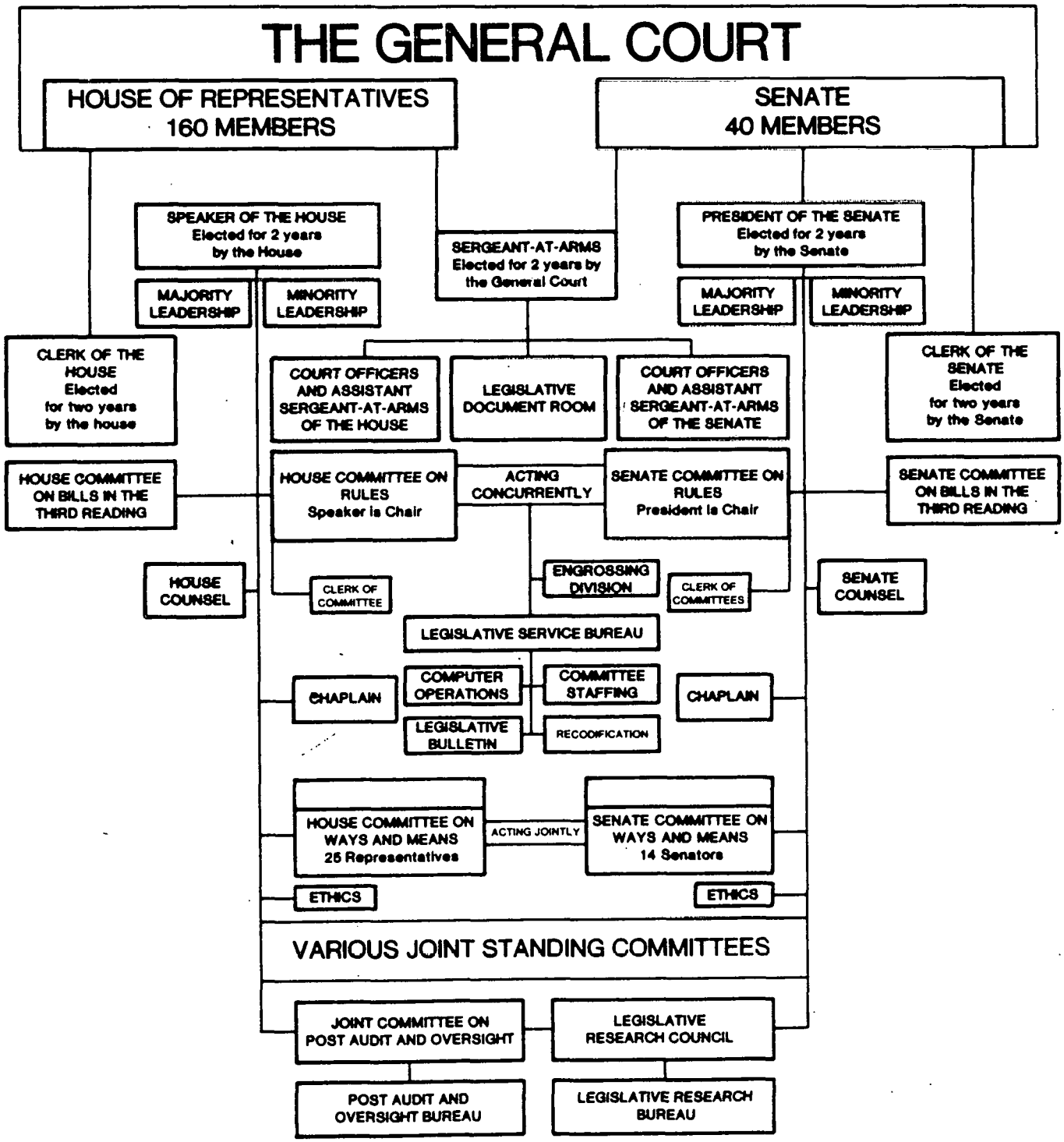


11 Governor has ten days to sign, return with amendment, veto or let bill become law without signature (if bill remains on desk without action).

Prepared by NORMAN L. PIDGEON, *Former Senate Clerk and Parliamentarian*

Figure 3-1
3-6

(02/09/81)



*This figure was taken from "Your Massachusetts Government," by Donald Levitan and Elwyn E. Mariner

Figure 3-2*

(02/09/81)

TABLE 3-1
LEGISLATIVE INFORMATION SERVICES

Type of Information	Source	Phone Number
General information	Central Exchange	(617)727-2121
Information pertaining to the previous years legislative activity and laws	State House News Service	727-2416
Information on pending legislation	Senate Clerk's Office	727-2476
	House Clerk's Office	727-2356
Information on bills pending before the Governor	Governor's Office	727-3600
To obtain copies of bills	Legislative Document Room	727-2349
To obtain copies of laws	State House Bookstore	727-2834

ROSTER OF SENATORS
1981-82 SESSION

This roster provides each Senator's name, political affiliation, hometown, and capital office phone number (area code 617).

Name	Political Affiliation and Hometown	
Amick, Carol C.	D, Bedford	727-2572
Atkins, Chester G.	D, Concord	727-2481
Aylmer, John F.	R, Barnstable	727-2570
Bachrach, George	I, Watertown	727-1280
Backman, Jack H.	D, Brookline	727-7295
Bertonazzi, Loius P.	D, Milford	727-0120
Boverini, Walter J.	D, Lynn	727-8762
Brennan, John A.	D, Malden	727-8853
Buckley, Anna P.	D, Brockton	727-8100
Buell, Robert C.	R, Boxford	727-2600
Bulger, William M.	D, Boston	727-2525
Burke, Edward L.	D, Framingham	727-7332
Burke, John P.	D, Holyoke	727-0115
D'Amico Gerard	D, Worcester	727-2558
Doris, Francis D.	D, Revere	727-4318
Foley, Daniel J.	D, Worcester	727-2485
Fonseca, Mary L.	D, Fall River	727-5095
Hall, Robert A.	R, Fitchburg	727-8830
Harold, Paul D.	D, Quincy	727-0194
King, John G.	D, Danvers	727-0110
Kirby, Edward P.	R, Whitman	727-9811
Lewis, Arthur Joseph, Jr.	D, Boston	727-8760
Locke, David H.	R, Wellesley	727-2510

LoPresti, Michael, Jr.	D, Boston	727-7188
MacLean, William Q., Jr.	D, Fairhaven	727-5455
McGovern, Patricia	D, Lawrence	727-7234
McKenna, Denis L.	D, Somerville	727-2578
McKinnon, Allan R.	D, Weymouth	727-8820
Olver, John W.	D, Amherst	727-8832
Owens, Bill	D, Boston	727-8934
Parker, John F.	R, Taunton	727-2490
Pollard, Sharon M.	D, Methuen	727-8770
Reilly, Martin T.	D, Springfield	727-8134
Rotondi, Samuel	D, Winchester	727-8822
Shea, Philip L.	D, Lowell	727-6992
Sisitsky, Alan D.	D, Springfield	727-8850
Timilty, Joseph F.	D, Boston	727-8212
Walsh, Joseph B.	D, Boston	727-7337
Webber, Peter C.	R, Great Barrington	727-7616
Wetmore, Robert D.	D, Barre	727-1540

ROSTER OF REPRESENTATIVES
1981-82 SESSION

This roster provides each Representatives name, political affiliation, hometown, and capital office phone number (area code 617).

Name	Political Affiliation and Hometown	
Aguiar, Antone S., Jr.	D, Swansea	727-7502
Aleixo, Theodore J., Jr.	D, Taunton	727-8137
Alexander, Lawrence R.	D, Marblehead	727-4646
Ambler, Robert B.	D, Weymouth	727-7660
Angelo, Stephen	D, Saugus	727-2400
Asiaf, Peter George	D, Brockton	727-2380
Barrett, Michael J.	D, Reading	727-4646
Bassett, Timothy A.	D, Lynn	727-7676
Benson, William D.	D, Greenfield	727-7790
Bickford, Walter E.	D, Berlin	727-2023
Blanchette, Kevin P.	D, Lawrence	727-7035
Bohigian, Robert J.	D, Worcester	727-2380
Bolling, Royal L., Jr.	D, Boston	727-0824
Bourque, George J.	D, Fitchburg	727-2400
Brownell, Thomas F.	D, Quincy	727-4646
Buglione, Nicholas J.	D, Methuen	727-8206
Bunte, Doris	D, Boston	727-8564
Businger, John A.	D, Brookline	727-8215
Cahir, Jeremiah F.	D, Bourne	727-5374
Cahoon, Howard C., Jr.	R, Chatham	727-2396
Canavan, Ellen M.	R, Needham	727-8215
Card, Andrew H., Jr.	R, Holbrook	727-2375
Carey, William A.	D, Easthampton	727-4900

Cataldo, Angelo R.	D, Revere	727-4646
Cellucci, Argeo P.	R, Hudson	727-2400
Cerasoli, Robert A.	D, Quincy	727-2380
Chiocca, Allan R.	D, Bridgewater	727-1250
Chmura, Rudy	D, Springfield	727-2560
Ciccarelli, Salvatore	D, Watertown	727-0290
Clark, Forrester A., Jr.	R, Hamilton	727-7676
Cochran, Deborah R.	R, Dedham	727-8215
Cohen, David B.	D, Newton	727-8206
Cohen, Gerald M.	D, Andover	727-4646
Collaro, Andrew	D, Worcester	727-7780
Collins, James G.	D, Amherst	727-2584
Connelly, Edward W.	R, Agawan	727-2375
Corazzini, Leo R.	D, Shrewsbury	727-2380
Correia, Robert	D, Fall River	727-5424
Costello, Nicholas J.	D, Amesbury	727-2023
Craven, James J., Jr.	D, Boston	727-2380
Creedon, Michael C.	D, Brockton	727-0290
Cusack, John F.	D, Arlington	727-7035
Decas, Charles N.	R, Wareham	727-7660
DeFilippi, Water A.	R, West Springfield	727-2560
DeNucci, A. Joseph	D, Newton	727-5460
DiMasi, Salvatore F.	D, Boston	727-2396
Doran, Stephen W.	D, Lexington	727-7790
Doyle, Charles Robert	D, Boston	727-2351
Driscoll, John R.	R, Northbridge	727-3177
Duffin, Dennis J.	D, Lenox	727-2380

Emilio, Frank A.	D, Haverhill	727-4900
Fallon, Thomas F.	D, Clinton	727-2380
Finnegan, John J.	D, Boston	727-2380
Finneran, Thomas M.	D, Boston	727-7502
Fitzgerald, Kevin W.	D, Boston	727-2560
Flaherty, Charles F., Jr.	D, Cambridge	727-7790
Flaherty, Michael F.	D, Boston	727-2396
Flood, John H.	D, Canton	727-1250
Flynn, William J., Jr.	D, Hanover	727-2351
Forman, Peter	R, Plymouth	727-8206
Freeman, Bruce N.	R, Chelmsford	727-2560
Gallagher, Thomas M.	D, Boston	727-2584
Galvin, William F.	D, Boston	727-7660
Gibson, Mary Jane	D, Belmont	727-5374
Glodis, William J., Jr.	D, Worcester	727-5136
Goyette, Roger R.	D, New Bedford	727-0330
Graham, Saundra	D, Cambridge	727-7035
Gray, Barbara E.	R, Framingham	727-2380
Gray, John	R, Groveland	727-5374
Greenhalgh, Haden G.	R, Harwich	727-2400
Grenier, Henry R.	D, Spencer	727-2400
Harrington, James T.	R, Holden	727-4595
Healy, Jonathan L.	R, Charlemont	727-7790
Hermann, Joseph N.	D, North Andover	727-4646
Hicks, Lucile P.	R, Wayland	727-2023
Holland, Iris K.	R, Longmeadow	727-2375
Howarth, Robert L.	R, Springfield	727-5871

Howe, Marie E.	D, Somerville	727-2351
Johnston, Philip W.	D, Marshfield	727-5460
Jordan, Raymond A., Jr.	D, Springfield	727-2380
Karol, Stephen J.	D, Attleboro	727-8137
Keating, William R.	D, Sharon	727-8215
Keverian, George	D, Everett	727-6270
King, Melvin H.	D, Boston	727-2584
Kollios, Paul	D, Millbury	727-5460
LaFontaine, Raymond M.	D, Gardner	727-4900
Lambros, Nickolas	D, Dracut	727-2023
Lawrence, Denis	D, New Bedford	727-2560
Lawton, Mark E.	D, Brockton	727-0290
LeLacheur, Edward A.	D, Lowell	727-2560
Lemanski, Kenneth M.	D, Chicopee	727-7676
Lombardi, Leon J.	R, Easton	727-5886
Lombardi, Michael J.	D, Cambridge	727-7790
Loring, John H.	R, Acton	727-4646
Lussier, Thomas R.	D, Pittsfield	727-8206
Lynch, Thomas K.	D, Barnstable	727-8137
Mann, Charles W.	R, Hanson	727-2380
Manning, M. Joseph	D, Milton	727-2380
Marotta, Angelo	D, Medford	727-5886
Matrango, Frank J.	D, North Adams	727-2584
McGee, Thomas W.	D, Lynn	727-2500
McGlynn, Michael J.	D, Medford	727-2380
McKenna, Arthur J.	D, Springfield	727-2380
McNally, Charles F.	D, Franklin	727-1250

McNeil, John C.	D, Malden	727-2351
McNeil, Robert D.	D, Leicester	727-7502
Menard, Joan M.	D, Somerset	727-2548
Metayer, Elizabeth N.	D, Braintree	727-5374
Miceli, James R.	D, Wilmington	727-0330
Minahan, Alfred A., Jr.	D, Wakefield	727-2351
Monahan, F. John	D, Beverly	727-2355
Moore, Richard T.	D, Uxbridge	727-4646
Moriarty, William E.	D, Ware	727-5871
Morrissey, Michael W.	D, Quincy	727-7035
Mullins, William D.	D, Ludlow	727-2584
Murphy, John E., Jr.	D, Peabody	727-0220
Murray, Mary Jeanette	R, Cohasset	727-2400
Nagle, William P., Jr.	D, Northampton	727-2023
Natsios, Andrew S.	R, Holliston	727-2380
Navin, Joseph M.	D, Marlborough	727-2380
Nelson, David R.	D, New Bedford	727-2380
Nickinello, Louis R.	D, Natick	727-5374
Norton, Thomas C.	D, Fall River	727-1250
Paleologos, Nicholas A.	D, Woburn	727-2584
Parente, Marie J.	I, Milford	727-7676
Picucci, Angelo	D, Leominster	727-5871
Pierce, Steven D.	R, Westfield	727-2396
Piro, Vincent J.	D, Somerville	727-0280
Poirier, Kevin	R, North Attleborough	727-5871
Pokaski, Daniel F.	D, Boston	727-0330
Rea, Michael J., Jr.	D, Billerica	727-2560

Robinson, William G.	R, Melrose	727-2375
Rogers, Andrew J., Jr.	D, Framingham	727-8137
Rohan, Robert J.	D, Holyoke	727-2380
Rourke, Timothy M.	D, Lowell	727-4186
Ruane, J. Michael	D, Salem	727-2380
Saggese, Alfred E., Jr.	D, Winthrop	727-2396
Saltmarsh, Sherman W., Jr.	R, Winchester	727-5374
Scaccia, Angelo M.	D, Boston	727-2380
Scelsi, Joseph S.	D, Pittsfield	727-2400
Schur, Susan D.	D, Newton	727-1250
Scibelli, Anthony M.	D, Springfield	727-2380
Serra, Emanuel G.	D, Boston	727-8215
Silva, Richard R.	R, Gloucester	727-2023
Silveira, Walter, Jr.	D, Fairhaven	727-8137
Silvia, Charles E.	D, Fall River	727-2400
Speliotis, Theodore C.	D, Danvers	727-2560
Sullivan, Gregory William	D, Norwood	727-5460
Switzler, Royall H.	R, Wellesley	727-2380
Tougas, Roger L.	D, Dartmouth	727-7502
Trombley, Peter G.	D, Waltham	727-4595
Vallely, Thomas J.	D, Boston	727-1250
Vigneau, Robert A.	D, Burlington	727-2400
Voke, Richard A.	D, Chelsea	727-4900
Walsh, Richard L.	D, Boston	727-7660
Wetherbee, Bruce E.	D, Pepperell	727-8206
White, Thomas B.	D, Worcester	727-5871
White, W. Paul	D, Boston	727-2396

Whitney, A. James	D, Dudley	727-8137
Woodward, Francis H.	D, Walpole	727-4900

RELEVANT JOINT COMMITTEES

Energy

Chairmen

Sen. Michael LoPresti, Jr.	(D, Boston)
Rep. Thomas C. Norton	(D, Fall River)

Senators

John W. Olver	(D, Amherst)
Sharon M. Pollard	(D, Methuen)
John P. Burke	(D, Holyoke)
Louis P. Bertonazzi	(D, Milford)
Paul D. Harold	(D, Quincy)

Representatives

Angelo R. Cataldo	(D, Revere)
James G. Collins	(D, Amherst)
Charles F. McNally	(D, Franklin)
Timothy M. Rourke	(D, Lowell)
John H. Flood	(D, Canton)
Steven Angelo	(D, Saugus)
Allan R. Chiocca	(D, Bridgewater)
Susan D. Schor	(D, Newton)
Bruce N. Freeman	(R, Chelmsford)
Walter A. DeFilippi	(R, West Springfield)

Health Care

Chairmen

Sen. Edward L. Burke	(D, Framingham)
Rep. Theodore J. Aleixo, Jr.	(D, Taunton)

Senators

Louis P. Bertonazzi	(D, Milford)
Samuel Rotondi	(D, Winchester)
John G. King	(D, Danvers)
Philip L. Shea	(D, Lowell)
Peter C. Webber	(R, Great Barrington)

Representatives

Andrew J. Rogers, Jr.	(D, Framingham)
Elizabeth N. Metayer	(D, Braintree)
James A. Whitney	(D, Dudley)
Thomas K. Lynch	(D, Barnstable)
Stephen J. Karol	(D, Attleboro)
John M. Menard	(D, Somerset)

Representative (Cont.)

Walter D. Silveira	(D, Fairhaven)
Thomas J. Vallely	(D, Boston)
Argeo P. Cellucci	(R, Hudson)
James T. Harrington	(R, Holden)

Natural Resources and Agriculture

Chairmen

Sen. Carol C. Amick	(D, Bedford)
Rep. William P. Nagle, Jr.	(D, Northampton)

Senators

Edward L. Burke	(D, Framingham)
Robert D. Wetmore	(D, Barre)
Philip L. Shea	(D, Lowell)
Francis D. Doris	(D, Revere)
Peter C. Webber	(R, Great Barrington)

Representatives

Joseph S. Scelsi	(D, Pittsfield)
Nickolas Lambros	(D, Dracut)
Henry R. Grenier	(D, Spencer)
Melvin H. King	(D, Boston)
Roger R. Goyette	(D, New Bedford)
Walter E. Bickford	(D, Berlin)
Nicholas J. Costello	(D, Amesbury)
Thomas K. Lynch	(D, Barnstable)
Richard R. Silva	(R, Gloucester)
Lucile P. Hicks	(R, Wayland)

Public Safety

Chairmen

Sen. John P. Burke	(D, Holyoke)
Rep. Thomas P. White	(D, Worcester)

Senators

John A. Brennan, Jr.	(D, Malden)
William Q. MacLean, Jr.	(D, Fairhaven)
Martin T. Reilly	(D, Springfield)
Edward P. Kirby	(R, Whitman)
George Bachrach	(I, Watertown)

Representatives

George J. Bourque	(D, Fitchburg)
Angelo Picucci	(D, Leominster)

Representatives (Cont.)

Nickolas Lambros	(D, Dracut)
William A. Carey	(D, Easthampton)
Roger R. Goyette	(D, New Bedford)
Roger L. Tougas	(D, Darmouth)
William E. Moriarty	(D, Ware)
Stephen W. Doran	(D, Lexington)
Kevin Poirier	(R, North Attleborough)
Robert L. Howarth	(R, Springfield)

Transportation

Chairmen

Sen. John B. Walsh	(D, Boston)
Rep. Louis R. Nickinello	(D, Natick)

Senators

John W. Olver	(D, Amherst)
Samuel Rotondi	(D, Winchester)
Carol C. Amick	(D, Bedford)
Robert C. Buell	(R, Bosford)
Paul D. Harold	(D, Quincy)

Representatives

Jeremiah F. Cahir	(D, Bourne)
Paul W. White	(D, Boston)
Elizabeth N. Metayer	(D, Braintree)
Mary Jane Gibson	(D, Belmont)
George J. Bourque	(D, Fitchburg)
Alfred A. Minahan, Jr.	(D, Wakefield)
David B. Cohen	(D, Newton)
Sherman W. Saltmarsh, Jr.	(R, Winchester)
John Gray	(R, Groveland)

CONTENTS OF APPENDIX

The Appendix to this handbook contains the complete text of all statutes, regulations, and pending legislation cited in this handbook. The contents of the Appendix, in the order contained, are:

HOUSE . . . . . No. 655

By Mr. Serra of Boston, petition of Emanuel G. Serra for legislation to prohibit the establishment of low-level radioactive waste repositories in the Commonwealth. Natural Resources and Agriculture.

The Commonwealth of Massachusetts

In the Year One Thousand Nine Hundred and Eighty-One.

AN ACT PROHIBITING THE ESTABLISHMENT OF LOW-LEVEL RADIOACTIVE WASTE REPOSITORIES IN THE COMMONWEALTH.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

Chapter 16 of the General Laws is hereby amended by adding the following section: —

Section 25. No person, corporation or other association shall engage in any exploration, testing, drilling or investigation related to the siting or potential siting of low-level radioactive waste repositories in the Commonwealth. No person, corporation or other association shall be allowed to construct or otherwise create a repository for low-level radioactive waste in the Commonwealth with the exception of hospitals and other medical facilities who may create such repository only after certification by both the Department of Environmental Quality Engineering and the Department of Public Health that creation of said repository would not serve to endanger the public health, natural resources (including water supplies) nor pose in any way a hazard to the health, safety and well-being of the citizens of the Commonwealth.

HOUSE . . . . . No. 1002

By Mr. Serra of Boston, petition of Emanuel G. Serra relative to the transportation of radioactive materials. Public Safety.

The Commonwealth of Massachusetts

In the Year One Thousand Nine Hundred and Eighty-One.

AN ACT RELATIVE TO THE TRANSPORTATION OF NUCLEAR MATERIALS.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

Chapter 164 of the General Laws is hereby amended by inserting after section 69S the following section:—

Section 69T. No person shall transport any radioactive material through any city or town until: (*a*) the legislative body of the municipality has approved such action, (*b*) the department of public health has certified that safety standards and procedures relating to the transportation of radioactive material have been met, (*c*) said department has been notified of any proposal to transport radioactive material, and has the option to order route changes or time and date of travel in order to avoid traffic congestion, highway construction, populated areas, weather conditions, fire, riot, civil unrest and the like. The department of public utilities shall assess reasonable taxes or user charges against the operators of nuclear power installations and radioactive material processing facilities. Such funds shall be used to detray the costs of additional state and local functions necessitated by the requirement of adequate measures to protect the health and safety of the public.

Levied taxes or user charges shall be borne by the utility company or radioactive material processing facility, and shall be prohibited from inclusion in the cost of service, operating expenses or any consumer-sponsored charges whatsoever.

HOUSE . . . . . No. 2294

By Mr. Flaherty of Cambridge, petition of Charles F. Flaherty, Jr., that the General Court be notified before any investigation for potential sites for radioactive waste storage repositories are conducted within the Commonwealth. Energy.

The Commonwealth of Massachusetts

In the Year One Thousand Nine Hundred and Eighty-One.

AN ACT REQUIRING THAT THE GENERAL COURT BE NOTIFIED BEFORE ANY INVESTIGATION OF POTENTIAL SITES FOR RADIOACTIVE WASTE STORAGE REPOSITORIES IS CONDUCTED WITHIN THE COMMONWEALTH.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

The General Court must be notified before any exploration, testing, drilling or investigation related to the siting or potential siting of radioactive waste storage repositories is conducted. Notification must be given not less than thirty (30) days before the investigation begins, and must include a description of the sites involved and the nature of the investigation.

Failure to comply with this statute is punishable by a fine of not more than ten thousand dollars.

THE COMMONWEALTH OF MASSACHUSETTS

Advance Copy 1980 Acts and Resolves

MICHAEL JOSEPH CONNOLLY, State Secretary

Chap. 474. RELATING TO THE REGISTRATION OF SOURCES OF NONIONIZING RADIATION.

Be it enacted, etc., as follows:

Chapter 111 of the General Laws is hereby amended by striking out section 5B, as most recently amended by section 15 of chapter 443 of the acts of 1970, and inserting in place thereof the following section:-

Section 5B. The department may require registration of sources of ionizing and nonionizing radiation and shall, from time to time, after a public hearing, prescribe and establish rules and regulations to control the radiation hazards of radioactive materials and of machines which emit ionizing and nonionizing radiation for the purpose of protecting the general public and individuals against hazards associated with the use, transportation, storage, packaging, sale, distribution, production and disposal thereof. Such rules and regulations shall not limit the kind and amount of radiation that may be intentionally administered by a person licensed to so administer radiation under the laws of the commonwealth. Such rules and regulations shall be filed with the state secretary at least thirty days prior to their effective date and shall become effective thirty days thereafter unless a later effective date is specified by the department. Whoever violates any such rule or regulation shall be punished by a fine of not less than ten nor more than fifty dollars. Whoever, after due notice, continues to violate any such rule or regulation shall be punished by a fine of not less than one hundred dollars nor more than five hundred dollars to the use of the commonwealth for each offense. Each day of such violation after such notice shall constitute a separate offense. The supreme judicial court or superior court, upon application of the department, or upon application of any party interested, with the approval of the department, may enforce such rules and regulations, and restrain the use or occupation of premises or such portion thereof as the department may specifiy until such rules and regulations have been complied with.

Nothing in this section shall prevent the department of labor and industries from establishing rules and regulations for the protection of the health and safety of employees against ionizing radiation in any place of employment as defined in section one of chapter one hundred and forty-nine. Said department of labor and industries shall consult with the department of public health at least thirty days prior to the adoption or modification of any rules or regulations insofar as they pertain to the health aspects of ionizing and nonionizing radiation.

The department of public health shall establish rules and regulations of the commonwealth insofar as they pertain to the health aspects of ionizing and nonionizing radiation. Such rules and regulations shall apply exclusively throughout the commonwealth.

Approved July 11, 1980

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC HEALTH

RULES AND REGULATIONS
TO
CONTROL THE RADIATION HAZARDS OF RADIOACTIVE MATERIALS AND OF MACHINES WHICH EMIT IONIZING RADIATION

SECTION 5B, CHAPTER 111, GENERAL LAWS

ADOPTED BY THE MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH ON FEBRUARY 13, 1962, IN ACCORDANCE WITH THE PROVISIONS OF SECTION 5B OF CHAPTER 111 OF THE GENERAL LAWS AS INSERTED BY CHAPTER 633 OF THE ACTS OF 1960, IN ACCORDANCE WITH THE PROCEDURE REQUIRED BY CHAPTER 30A OF THE GENERAL LAWS, AND AFTER A PUBLIC HEARING HELD ON DECEMBER 6, 1961.

FILED WITH THE SECRETARY OF STATE AND EFFECTIVE AUGUST 1, 1962.

TABLE OF CONTENTS

A. Purpose

A.1 These rules and regulations are established for the protection of the general public and individuals against radiation hazards associated with the use, transportation, storage, packaging, sale, distribution, production, and disposal of radioactive materials and with the use of machines which emit ionizing radiation. It is the intent and purpose of these regulations to minimize the subjection of individuals to ionizing radiation and, where controllable, to maintain absorbed doses of ionizing radiation received by individuals as far below the doses specified by the Radiation Protection Guides (RPG) of these regulations (Section F) as is reasonable and practicable.

B. Scope and Application

B.1 These regulations apply to all persons who receive, possess, use or transfer radioactive materials or machines which emit or may emit ionizing radiation in the Commonwealth except as exempted by the provisions of Section D of these regulations.

B.2 These rules and regulations are in addition and supplementary to any other legal rules and regulations adopted by the Department or other legally empowered agency or political subdivision of the Commonwealth.

B.3 In the course of its inspections relative to and enforcement of these regulations, it is the intention of the Department to cooperate with and coordinate its activities with those of the Department of Labor and Industries of the Commonwealth and to concern itself, in the area of employee protection, primarily with those users registered with it under the provisions of Section E of these regulations.

B.4 Nothing in these regulations shall limit the kind and amount of ionizing radiation that may be intentionally administered to an individual for diagnostic, therapeutic, or medical research purposes by or under the direction of a physician, dentist, or chiropodist (podiatrist).

C. Definitions

Because the precise meaning given to one or more critical terms frequently determines the interpretation of a statement, the following definitions are given for certain words and phrases as they are used in these regulations or as they may be interpreted by the Department relative to radiological health matters. The list is not intended to be a complete glossary of radiation terminology.

ABSORBED DOSE means the amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest (a unit of absorbed dose is the rad). In these regulations the absorbed dose in rem is the RBE dose.

--Internal absorbed dose means an absorbed dose resulting from radioactive substances within the body.

--External absorbed dose means an absorbed dose resulting from a source(s) of ionizing radiation located external to the body.

ACCIDENT means an unforeseeable event or occurrence.

ADDED FILTER means the filter added to the inherent filtration.

AIRBORNE RADIOACTIVE MATERIAL means any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors or gasses.

AIRBORNE RADIOACTIVITY AREA means:

a. any room, enclosure, or operating area in which airborne radioactive material exist in concentrations in excess of the Radioactivity Concentration Guide (RCG); or,

b. any room, enclosure, or operating area in which airborne radioactive material exists in concentrations which, averaged over the number of hours in any week during which individuals are in the area, exceed 25 percent of the RCG.

ALUMINUM EQUIVALENT means the thickness of aluminum affording the same attenuation, under specified conditions, as the material in question.

ATMOSPHERE means the gaseous fluid surrounding the earth; the air.

ATTENUATION means the process by which a beam of ionizing radiation is reduced in intensity when passing through material.

BARRIER -- See PROTECTIVE BARRIER.

BEAM means the unidirectional or approximately unidirectional flow of ionizing radiation.

CALENDAR QUARTER means:

a. a period of time not less than 12 consecutive calendar weeks and not greater than 14 consecutive calendar weeks; or,

b. a period of time of 3 consecutive calendar months.

CONSTANT POTENTIAL (cp) means, in radiological practice, a unidirectional potential (or voltage) which has little or no periodic variation.

CONTROLLED AREA means a defined area access to which is controlled for the purpose of radiation protection.

CURIE — See RADIOACTIVITY.

DEAD-MAN SWITCH means a switch so constructed that a circuit-closing contact can only be maintained through continuous pressure exerted by the operator.

DEPARTMENT means the Department of Public Health of the Commonwealth of Massachusetts.

DIAGNOSTIC-TYPE PROTECTIVE TUBE HOUSING means an x-ray tube housing so constructed that the leakage radiation at a distance of 1 meter from the target cannot exceed 100 milliroentgens in 1 hour when the tube is being operated at any of its specific ratings.

ENVIRONMENT means all portions of man's earthly surroundings (including the atmosphere) frequentable and/or utilized directly or indirectly by man.

EXPOSURE DOSE means the dose potential to deliver an absorbed dose at a specific place or location.

FILM BADGE means a packet of appropriately sensitized material and filters used to determine amounts of ionizing radiation.

FILTER means a device which when placed in a beam of ionizing radiation will absorb preferentially the less penetrating ionizing radiations.

HALF-VALUE LAYER (hvl) means the thickness of an absorber required to reduce a beam of ionizing radiation to one-half its incident intensity.

HIGH RADIATION AREA means any area, accessible to and visitable by individuals, in which there exists ionizing radiation at such levels that a major portion of the body could receive in any one hour an absorbed dose in excess of 100 millirem.

INCIDENT means a foreseeable event or occurrence.

INDIVIDUAL means any human being.

INHERENT FILTRATION means filtration in the usable beam caused by the window of the x-ray tube and any permanent tube enclosure or components thereof.

INSTALLATION means a source(s), with its associated equipment and the space in which it is located and/or used.

INTERNAL ABSORBED DOSE — See ABSORBED DOSE.

IONIZING RADIATION means any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter.

KILOVOLTS PEAK (kvp) means 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.

LEAD EQUIVALENT means the thickness of lead affording the same attenuation, under specified conditions, as the material in question.

LEAKAGE RADIATION means all ionizing radiation coming from within the tube housing except the usable beam.

MAXIMUM PERMISSIBLE ACCUMULATED DOSE (MPAD) means the absorbed dose which, if accumulated during the lifetime of an individual and on the basis of present knowledge, is acceptable to the Department.

MILLIROENTGEN (mr) means one-thousanth of a roentgen.

MINOR means any human being who has not reached the eighteenth anniversary of his or her birth date.

MONITORING means the determination of the amount of ionizing radiation or radioactive contamination present in an area or of the exposure dose received by an individual.

OCCUPANCY FACTOR means the factor which, for purposes of evaluating the hazards from ionizing radiation, may be used when making allowances for the percentage of time an individual occupies a specified area.

OCCUPATIONAL DOSE means the absorbed dose received by an individual whose duties of employment directly or indirectly may result in exposure to ionizing radiation in the course of said employment.

OPERATOR'S CONTROL STATION means an area provided with protective barriers, including a patient-viewing device and a means of communicating audibly and clearly with the patient, to permit operation without causing the operator occupationally involved with ionizing radiation to receive an absorbed dose in excess of the RPG of these regulations.

PERSON means an individual, partnership, association, syndicate, company, firm, trust, corporation, department, bureau, agency, organization, institution, political subdivision, or any other entity recognized by law as the subject of rights and duties.

PERSONNEL MONITORING EQUIPMENT means devices designed to be worn or used for the purpose of evaluating the exposure dose of individuals (e.g., film badges, pocket chambers, pocket dosimeters, and film rings).

PROTECTIVE BARRIER means a barrier of attentuating materials used to reduce radiation exposure.

---Primary protective barrier means a barrier sufficient to attenuate the usable beam to the required degree.

---Secondary protective barrier means a barrier sufficient to attenuate stray radiation to the required degree.

QUALIFIED EXPERT means an individual having the knowledge and training necessary to measure ionizing radiation and to advise regarding ionizing radiation and decontamination.

RAD means "radiation absorbed dose" and is a measure of the energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. "One rad is the measure corresponding to the absorption of 100 ergs per gram of matter; one millirad (mrad) = 0.001 rad."

RADIATION --See IONIZING RADIATION.

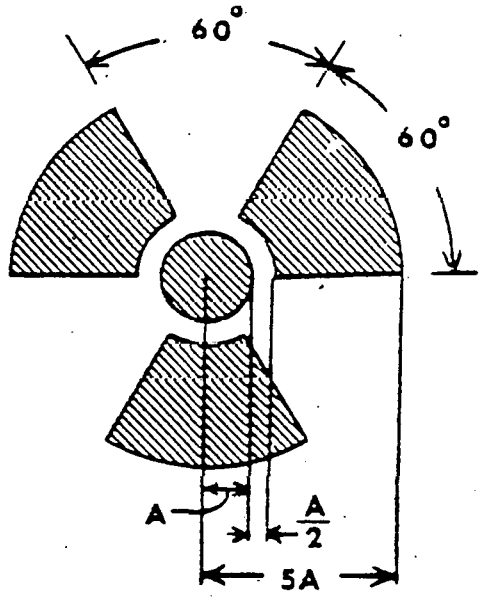
RADIATION AREA means any area accessible to individuals in which there exists ionizing radiation at such levels that a major portion of the body of such individuals could receive an absorbed dose in excess of:

a. 5 millirem in any one hour; or,

b. 100 millirem in any five consecutive days.

RADIATION CAUTION SYMBOL means the conventional three-bladed design shown below with dimension ratios and colors employed as here specified:

a. Design:



b. Colors employed: the cross-hatched area of the symbol and required lettering shall be colored magenta or purple and the background of the label or sign upon which it appears shall be colored yellow.

RADIATION MACHINE means any device capable of producing ionizing radiation when operated.

RADIATION PROTECTION GUIDE (RPG) means the absorbed dose which shall not be exceeded intentionally without approval of the Department and only after careful consideration of the reasons for doing so. Every effort and precaution should be taken to keep the absorbed dose as far below this guide as is practicable.

RADIATION SURVEY means the evaluation of the ionizing radiation hazards in and around an installation. It customarily includes a physical survey of the arrangement and use of the source(s) and measurements of the exposure rates under expected operating conditions.

RADIOACTIVE MATERIAL means any material (solid, liquid, or gaseous) which spontaneously emits ionizing radiation.

RADIOACTIVITY is the distinguishing physical characteristic of radioactive materials which shall be measured in terms of disintegrations per unit time or in curies. One curie (c) = 3.7×10^{10} disintegrations per second (dps) = 2.2×10^{12} disintegrations per minute (dpm). A commonly used sub-multiple of the curie is the microcurie (μc). One μc = 10^{-6}c = 3.7×10^{4}dps = 2.2×10^{6} dpm.

RADIOACTIVITY CONCENTRATION means the amount of radioactivity due to a radionuclide or radionuclides quantitatively and qualitatively present in a specified unit volume or weight of matter.

RADIOACTIVITY CONCENTRATION GUIDE (RCG) means that concentration of a radionuclide or radionuclides in the air, water, or foodstuffs of man's environment averaged over a period of 13 consecutive weeks which would result in an exposure dose equal to the absorbed dose of the Radiation Protection Guides (RPG) for portions of the human body of concern. Where and when more than one radionuclide is present in the concentration the gross effect of the mixture shall be considered.

RBE DOSE means the "relative biological effectiveness" dose due to different types of ionizing radiation. It is numerically equal to the product of the dose in rads and an agreed conventional (RBE) factor acceptable to the Department with respect to a particular form of ionizing radiation.

RCG --- See RADIOACTIVITY CONCENTRATION GUIDE.

REM means a unit of the RBE dose.

ROENTGEN (r) is the unit of exposure dose of x- or gamma radiation. One roentgen is an exposure dose of x- or gamma radiation such that the associated corpuscular emission per 0.001293 gram of air produces, in air, ions carrying 1 electrostatic unit of quantity of electricity of either sign.

RPG --- See RADIATION PROTECTION GUIDE.

SCATTERED RADIATION means ionizing radiation that, during passage through matter, has been deviated in direction. It may also have been modified by a decrease in energy.

SEALED SOURCE means any radioactive material and the permanent container encasing it in a manner intended to prevent leakage of the radioactive material which is intended for use in its entirety as a source.

SECONDARY RADIATION means ionizing radiation emitted by an irradiated material.

SEMI-PERMANENTLY ATTACHED means devices attached by simple mechanical means (spring clips, etc.) which are removable but not likely to become detached during ordinary usage.

SHALL denotes that the ensuing recommendation is necessary or essential to meet the currently accepted standards of protection.

SHOULD, or IS RECOMMENDED, indicates advisory recommendations that are to be applied when practicable.

SHUTTER means a device, generally of lead, attached to an x-ray tube housing to intercept the usable beam.

SOURCE means radioactive material or a radiation machine.

STRAY RADIATION means ionizing radiation not serving any purposeful use. It includes leakage and secondary radiation.

THERAPEUTIC-TYPE PROTECTIVE TUBE HOUSING means an x-ray tube housing so constructed that the leakage radiation at a distance of 1 meter from the target cannot exceed 1 roentgen in 1 hour and at a distance of 5 cm. from any point on the surface of the housing accessible to the patient cannot exceed 30 roentgens in 1 hour when the tube is being operated at any of its specified ratings.

TOTAL FILTER means the sum of the inherent and added filters.

USABLE BEAM means the ionizing radiation which passes through the window, aperture, cone, or other collimating device of the source.

USE FACTOR means the fraction of the workload during which the usable beam is pointed in the direction under consideration.

USER means a person having administrative and/or responsible control over one or more installations.

WORKLOAD is a measure of the radiation output of a radiation machine expressed in milliampere minutes per week or roentgens per week at 1 meter from the source.

X-RAY APPARATUS means any radiation machine designed to produce x-rays.

D. Exemptions and Exceptions.

D.1 The following materials, machines, and conditions are exempt from these regulations:

a. Radioactive materials of an equivalent specific radioactivity not exceeding that of natural potassium (10^{-9}c per gm.)

b. Quantities of radioactive materials not exceeding the amounts set forth in Table 1, provided the user does not possess more than 10 such quantities and also provided the dose rate to the whole body, gonads, active blood-forming organs, head and trunk, or lens of eye at the point of nearest approach to such sources does not exceed 0.5 rem per year. The manufacture of sealed sources shall not be exempt.

c. Radioactive material or materials in combination or not with non-radioactive material having a radioactivity concentration not exceeding the RCG.

d. Domestic television receivers (except during production testing and servicing with the shield removed), provided the dose rate at 5 cm. from any outer surface is less than 0.5 mrem per hour.

e. Electrical equipment that produces ionizing radiation incidental to its operation for other purposes, provided the dose rate to the whole body, gonads, active blood-forming organs, head and trunk, or lens of eye (under conditions of use) at the point of nearest approach to such equipment does not exceed 0.5 rem per year. The production testing or factory servicing of such equipment shall not be exempt.

f. Radiation machines in a state or condition such as to render them not capable of being used to produce ionizing radiation. (For example, x-ray machines in transport or electrical equipment in storage.)

g. Any radioactive material being transported intrastate or in intrastate transport in conformance with regulations of any governmental agency having a jurisdiction over safety during interstate transportation, provided that regulations of said agency meet the ionizing radiation protection requirements of these regulations.

h. Time pieces, instruments, novelties, or devices containing self-luminous materials in amounts not greater than those set forth in Column 1 of Table 1, except during manufacture or repair of the self-luminous components themselves.

TABLE 1.

EXEMPT QUANTITIES OF RADIONUCLIDES

	Column 1 Unsealed Sources (μc)	Column 2 Sealed Sources (μc)		Column 1 Unsealed Sources (μc)	Column 2 Sealed Sources (μc)
Actinium 227	0.1	1	Iron 55	10	100
Americium 241	0.1	1	59	1	10
Antimony 124	1	10	Krypton 85	1000	10,000
Arsenic 73	10	100	Lanthanum 140	10	100
74	10	100	Lead 203	10	100
76	10	100	210 + dtrs	0.1	1
77	10	100	Lutecium 177	10	100
Astatine 211	0.1	1	Manganese 52	10	100
Barium-			54	10	100
lanthanum 140	1	10	56	10	100
Beryllium 7	100	1000	Molybdenum 99	10	100
Bromine 82	10	100	Nickel 59	10	100
Cadmium-			63	10	100
silver 109	10	100	Niobium 95	10	100
Calcium 45	1	10	Palladium-		
Carbon 14	1000	10,000	rhodium 103	10	100
Cerium-prasco			Palladium		
dymium 144	1	10	silver 109	10	100
Cesium-			Phosphorus 32	10	100
barium 137	10	100	Platinum 191	10	100
Chlorine 36	10	100	193	10	100
Chromium 51	100	1000	Plutonium 239	0.1	1
Cobalt 58	10	100	Polonium 210	0.1	1
60	10	100	Potassium 42	10	100
Copper 64	10	100	Praseodymium 143	10	100
Curium 242	0.1	1	Promethium 147	10	100
Europium 154	1	10	Radium 226	0.1	1
Fluorine 18	100	1000	Rhenium 183	10	100
Gallium 72	10	100	186	10	100
Germanium 71	100	1000	Rhodium 105	10	100
Gold 196	10	100	Rubidium 86	10	100
198	10	100	Ruthenium 103	10	100
199	10	100	Ruthenium-		
Holmium 166	10	100	rhodium 106	1	10
Hydrogen			Samarium 151	1	10
(Tritium) 3	1000	10,000	153	10	100
Indium 114	1	10	Scandium 46	10	100
Iodine 131	1	10	47	10	100
132	10	100	48	10	100
Iridium 190	10	100	Silver 105	10	100
192	10	100	110	10	100
			111	10	100

	Column 1 Unsealed Sources (μc)	Column 2 Sealed Sources (μc)		Column 1 Unsealed Sources (μc)	Column 2 Sealed Sources (μc)
Sodium 22	10	100	Thorium nat.	100	1000
24	10	100	Thorium-protactinium 234	1	10
Strontium 89	1	10	Thulium-ytterbium 170	1	10
Strontium-yttrium 90	0.1	1.0	Tin 113	10	100
Sulfur 35	10	100	Tungsten 181	10	100
Tantalum 182	10	100	185	10	100
Technetium 96	1	10	Uraninum 233	0.1	1
99	1	10	natural	1000	10,000
Tellurium 127	10	100	Vanadium 48	10	100
129	10	100	Ytterium 91	1	10
Thallium 200	10	100	Zinc 65	10	100
201	100	1000	Zirconium-niobium 95	10	100
202	10	100			
204	10	100			

D.2 In conformance with Section B.3, such portions of these regulations as pertain to records and reports on employees do not apply to users of sources specifically registered with the Department of Labor and Industries of the Commonwealth, if the user complies with pertinent and compatible provisions of Industrial Bulletin No. 5 of said Department of Labor and Industries.

D.3 The Department may, upon request of any person or upon its own initiative, make such exemptions and/or exceptions to these regulations as it may deem appropriate.

E. Registration.

E.1 Any existing user, other than one required to be registered with the Department of Labor and Industries of the Commonwealth of Massachusetts, shall register his installation with the Department on or before August 1, 1962, and after August 1, 1962, any proposed installation shall be registered by the user thereof prior to receipt of the source. The application for registration shall be submitted on a form provided by the Department.

E.2 Dental radiographic installations under the control of a dentist registered under the provisions of Chapter 112 of the General Laws as amended shall be deemed to be registered under the provisions of this section.

E.3 Installation(s) in hospitals licensed by the Department under the provisions of Section 71 of Chapter 111 of the General Laws as amended shall be deemed to be registered under the provisions of this section.

E.4 The user shall notify the Department in writing within 30 days after any changes with respect to his registered installation which may increase its potential as a source of ionizing radiation.

E.5 Acknowledgment of registration shall not imply the Department's approval of the conditions described in the registration.

F. Radiation Protection Guides (RPG) and Radioactivity Concentration Guides (RCG) and Application Thereof.

F.1 Each user shall control all sources of ionizing radiation for which he is responsible in such a way as to provide reasonable assurance that no individual shall receive an absorbed dose in excess of the RPG set forth in this section. All absorbed doses of ionizing radiation that individuals are allowed to receive and amounts of radioactive materials released to the environment shall be kept to reasonable minimums in conformance with the purpose of these regulations.

F.2 The RPG values set forth in this section are in addition to those received by the individual from all sources of ionizing radiation naturally present in the environment and from that intentionally administered for diagnostic and therapeutic purposes.

F.3 Radiation Protection Guides (RPG) -- Occupational

F.3.1 The RPG's for individuals occupationally involved with ionizing radiation are set forth in Table 2.

F.3.2 The RPG's for any minor, whether or not occupationally involved directly with ionizing radiation, are set forth in Table 3.

F.4 Radiation Protection Guides (RPG) -- Non-Occupational and Minors.

F.4.1 The RPG's for individuals not occupationally involved with ionizing radiation are set forth in Table 3.

F.4.2 The RPG's for any minor, whether or not occupationally involved directly with ionizing radiation, are set forth in Table 3.

TABLE 2.

RADIATION PROTECTION GUIDES (RPG) — OCCUPATIONAL-ADULT

ABSORBED DOSES TO ADULT INDIVIDUALS

OCCUPATIONALLY INVOLVED WITH IONIZING RADIATION

Portion of the Body of Individuals Occupationally Involved with Ionizing Radiation	RPG for Total Dose Resulting from both External and Internal Exposure		RPG Limitations on that Portion of the Total Dose Resulting from Internal Exposure	
	Absorbed Dose Rems/year	Maximum Rate of Accumulation Rems in 13 weeks	Absorbed Dose from Air Breathed Rem/13 weeks	Absorbed Dose from Water or Foodstuffs Consumed Rem/13 weeks
Whole Body	5*	3	1.25	0.125
Gonads	5*	3	1.25	0.125
Active Blood-Forming Organs	5*	3	1.25	0.125
Head and Trunk	5*	3	1.25	0.125
Lens of Eye	5*	3	1.25	0.125
Skin of Whole Body	30	10	7.5	0.75
Thyroid	30	10	7.5	0.75
Hands and Forearms	75	25		
Feet and Ankles	75	25		
Other Organs	15	5	3.75	0.375
Bone	28**	7**	7**	0.7

*Formula: This RPG limit of 5 rem may be exceeded provided that:

(*a*) the user has determined the individual's previously accumulated occupational dose, and

(*b*) the dose, when added to the previously accumulated occupational dose, does not exceed the maximum permissible accumulated dose (MPAD) calculated according to the formula:
MPAD = 5 (N-18) rems, where N is the individual's age in full years; and,

(*c*) during any period of 13 consecutive weeks, the maximum dose of 3 rems is not exceeded.

**28 rem/year, corresponding to an average absorbed dose rate of 0.56 rem per week, which is the dose expected to result from a body den of 0.1 μgm of Ra^{226} plus 30% of its daughter products or their biological equivalent

TABLE 3.

RADIATION PROTECTION GUIDES (RPG) — NON-OCCUPATIONAL AND MINORS

ABSORBED DOSES TO INDIVIDUALS NOT OCCUPATIONALLY INVOLVED WITH IONIZING RADIATION AND MINORS

Aspect of the General Environment in and/or from Which an Individual Might Be Exposed to Ionizing Radiation	RPG Absorbed Dose to Indicated Portions of the Body of a "Standard Man"					
	External Exposure Dose Only To Whole Body	Total Dose Resulting from Both External and Internal Exposures* to				
		Whole Body Gonads Act. Bl.-Form. Organs Head and Trunk Lens of Eye	Skin of Wh. Body Thyroid	Hands and Forearms Feet and Ankles	Other Organs	Bone
Ambient Air Space (External Exposure)	0.5 rem/yr.					
Air Breathed and Water and Foodstuffs Consumed (Internal Exposure)		Not more than 0.125 rem in 13 consec. wks.	Not more than 0.75 rem in 13 consec. wks.	Not more than 1.875 rem in 13 wks.	Not more than 0.375 rem in 13 wks.	Not more than 0.7 rem in 13 wks.

*Not more than 0.5 rem/yr. of the indicated total yearly doses shall result from external exposure.

F.5 Radioactivity Concentration Guides (RCG).

F.5.1 The RCG referred to in these regulations is that concentration of a radionuclide or mixture of radionuclides in the air, water, or food portions of man's environment which, calculated on the basis of most recent scientific knowledge and assumptions acceptable to the Department, would cause an absorbed dose or doses of ionizing radiation equal to the occupational or non-occupational RPG (whichever is of indicated concern) of these regulations. Such recommendations of recognized authorities, such as the National Committee on Radiation Protection and Measurements, as may, from time to time, be acceptable to the Department may be used in the calculation or determination of the applicable RCG, but said recommendations are not to be construed as part of these regulations. In the application of the RCG, the user shall take cognizance of all sources from which any individual may, or is likely to, receive an absorbed dose, and the total absorbed dose from all such sources shall not exceed the RPG.

F.6 Application of Radiation Protection Guides (RPG) and Radioactivity Concentration Guides (RCG).

F.6.1 When radioactive materials are released to the environment and may cause an internal absorbed dose, the radioactivity concentration in that portion of the environment from which the radioactive material may be absorbed by the body shall be controlled by limiting the amounts and rates at which such materials are released to the environment. In the application of this section, the radioactivity concentration in the air, water, or foodstuffs taken into the body, averaged over any period of 13 consecutive weeks, shall not exceed the RCG.

F.6.2 When the external absorbed dose to the tissues of the body results from radioactivity concentrations in the atmosphere, the radioactivity concentration shall be controlled by limiting the amounts and rates at which such materials are released to the atmosphere and such concentrations shall not exceed the RPG.

F.6.3 When the external absorbed dose to the tissues of the body results from ionizing radiation from sources located in controlled areas, the absorbed dose to the individual shall be controlled through utilization and application of exposure, occupancy, and shielding factors and shall not exceed the RPG.

F.6.4 In meeting the requirements for the protection of individuals against hazards associated with sources of ionizing radiation subject to responsible control and/or radioactive material escaping controlled areas or being discharged to the environment, the user may make reasonable allowances for exposure and occupancy factors and man-made or natural environmental phenomena.

F.6.5 Recommendations of the National Committee on Radiation Protection and Measurements may be used as guides or as bases for calculating to obtain or maintain adequate protection for the general public and individuals against hazards associated with sources of ionizing radiation within the meaning of these regulations, but said recommendations shall not be considered, in whole or in part, as a portion of these regulations.

G. Responsibility.

G.1 The user shall be responsible for and shall establish operating rules and procedures which will provide reasonable assurance that the other provisions of these regulations will be carried out, and the user should keep himself informed on procedures and methods based upon current developments and recommendations of knowledgable authorities such as the National Committee on Radiation Protection and Measurements.

G.2 Where necessary to assure compliance with the other provisions of these regulations, the user shall provide, or have readily available at his disposal, properly maintained and calibrated instruments adequate for the detection and measurement of ionizing radiation.

G.3 The user shall provide and require use of safety devices and equipment, for protection against the hazards of ionizing radiation, to and by every individual (including visitors) admitted to his installation and shall enforce all ionizing radiation safety rules that concern or affect said individual's conduct and shall provide, or cause to be provided, any necessary instruction concerning the attendant ionizing radiation hazards.

G.4 The user shall make an evaluation of his installation's nuclear incident potential, take appropriate steps to guard against such an occurrence, and establish an emergency plan, as may be indicated, to minimize the hazard from ionizing radiation to his employees and the general public and damage to private and public property that may result from such an incident. The user shall inform the Department of his emergency plan and, in the event of such an incident, shall notify the Department and institute such portions of his plan as may be deemed reasonable and advisable. Such action as the user may take in conformance with such a plan submitted to and approved by the Department shall not be deemed in violation of these regulations.

G.5 In the event of an accident that may result in a nuclear occurrence, the user shall appraise the situation and take such reasonable and appropriate steps as may be indicated on the basis of information available, to minimize the hazard from ionizing radiation and danger to his employees and the general public. Such reasonable action as may be taken under this section shall not be considered a violation of these regulations.

H. Surveys and Monitoring.

H.1 The user shall provide for adequate surveys and monitoring of areas both inside and outside the area under his control, sufficient to assure compliance with other sections of these regulations, and shall maintain records thereof.

H.2 The user shall provide for personnel monitoring of all occupationally exposed individuals within a controlled area. However, such monitoring shall not be required if:

a. the dose to which any said individual is exposed can be demonstrated to be predictable and, for adults, less than 25 per cent of the RPG (Table 2) and, for minors, less than 50 per cent of the RPG (Table 3); and,

b. reasonable assurance can be given that an accident causing exposure in excess of the RPG will not occur.

I. Records and Reports.

I.1 The user shall keep exposure records such as may be required in Section H and shall preserve these records on each individual whose name is on the user's employee roster for a period of time of 5 years after termination of employment unless extended by the Department. When an individual's employment is permanently terminated, the user, upon request of the Department or said individual, shall provide the Department and the former employee with a summary of the records for each calendar year of employment. These records shall include the individual's Social Security number.

I.2 The user shall record the details of any circumstances wherein any individual receives an absorbed dose, as a result of sources under his control, in excess of the RPG. This regulation shall not apply to absorbed doses resulting from ionizing radiation administered to an individual for diagnostic or therapeutic medical purposes by a physician, dentist, or chiropodist (podiatrist).

I.3 The user shall keep records showing the date, amount, and kind of radioactive materials received at his premises from other users and an inventory of such radioactive materials at his installation.

I.4 The user whose installation contains or employs facilities capable of producing radioactive materials (as in the case of a reactor or particle accelerator) shall keep a record of the kinds and amounts of radioactive products intentionally produced.

I.5 The user shall keep records showing the date, amount, and kind of radioactive materials shipped from his installation.

I.6 The user shall keep sufficient records of the kinds and amounts of radioactive materials released from his installation to the environs to demonstrate compliance with other sections of these regulations.

I.7 When it is known or believed that an individual(s) may have received an absorbed dose in excess of the applicable RPG, the user shall report to the Department by letter, within 7 days of the discovery, all of the facts relevant to the incident or accident and shall place a copy of the report in that individual's personnel file if he be an employee. Absorbed doses in excess of 5 times the annual allowable RPG shall be reported immediately. This regulation shall not apply to absorbed doses resulting from ionizing radiation administered to an individual for diagnostic or therapeutic medical purposes by a physician, dentist, or chiropodist (podiatrist).

I.8 Except as approved by the Department, the user shall report to the Department within 24 hours (said report to be confirmed by letter) any release of radioactive material to the environs of:

a. a concentration which, when averaged over 24 hours, exceeds 500 times the RCG; or,

b. a total quantity, in any 24-hour period, which exceeds 100 times the amount set forth in Column 1 of Table 1 of these regulations.

I.9 The loss or theft of or damage by fire, explosion, natural phenomena, or accident to any source shall be reported by telephone to the Department within 24 hours, and said report shall be confirmed by letter.

I.10 All records referred to in Sections H and I shall be made available to the Department upon request.

J. Storage of Radioactive Materials.

J.1 Radioactive materials shall be kept or stored in a manner that will provide reasonable assurance that no individual will receive an absorbed dose in excess of the RPG. In this regard, precautions to minimize exposure to ionizing radiation of any individual in the event of fire, earthquake, flood, windstorm, explosion, or other emergency should be taken, and the storage facilities should be suitably designed with respect thereto.

J.2 Any radioactive material in storage shall be secured against unauthorized removal from the place of storage.

J.3 The user shall notify the local fire department of the presence on his premises of any radioactive material that may present special fire-fighting problems or require special precautionary measures in case of fire or other natural catastrophe, and he shall establish effective liaison with the fire department in regard to this matter.

K. Radioactive Contamination Control and Removal.

K.1 All work with radioactive materials shall be carried out under such conditions as to minimize the possibility of any contamination that would result in any individual receiving an absorbed dose in excess of the RPG.

K.2 Every person using radioactive material other than a sealed source shall have on hand or immediately available an instrument(s), properly calibrated and maintained, suitable for the detection and measurement of contamination in accordance with the requirements of this section. The Department may require the same or similar instrumentation for users of sealed sources.

TABLE 4.

CAUTION SIGN AND SIGNAL DEVICE REQUIREMENTS

(Where Required and Description Thereof)

Area of Concern	Required		
	Caution Signs Containing		
	Radiation Caution Symbol	Cautioning Words	Additional Requirement
a) Radiation Areas	Yes	Caution (or Danger) Radiation Area	None
b) High Radiation Area	Yes	Caution (or Danger) High Radiation Area	See Sect. L-2
c) Airborne Radioactivity Area	Yes	Caution (or Danger) Airborne Radioactivity Area	See Sect. L-2 if area is also a High Radiation Area
d) Entrance to areas or rooms in which radioactive material is used or stored in an amount exceeding 10 times the amount of radioactive material exempted by Table 1.	Yes	Caution (or Danger) Radioactive Material(s) (and, where practical, describe the quantities and kinds of radioactive materials involved)	None
e) Radiation Machine*	Yes	Caution (or Danger) Radiation	Label placed on the control panel
*In the case of x-ray machines only	Yes	Caution (or Danger) X-ray Area	

K.3 The Department may require a suitable pattern of work rules applicable to individual users, as may be indicated.

L. Use of Caution Signs, Labels, and Signals.

L.1 The user shall indicate the presence of ionizing radiation in certain areas by posting conspicuous signs or labels which bear the radiation caution symbol and appropriate wording (as set forth in Table 4) to explain the nature and indicate the existence of the hazard. The use of such signs for other than this express purpose is prohibited, and the user shall remove all such signs and labels when no longer required by the provisions of these regulations. This regulation shall not apply to areas used for medical, dental, chiropodal, and veterinary x-ray diagnosis or therapy.

L.2 Each high radiation area shall be equipped with an internal control circuit which shall either cause the level of ionizing radiation to be reduced below that at which an individual might receive an absorbed dose of 100 mrem in any one hour when in the area or shall energize a conspicuous visible or audible alarm signal or a barricade suitably labeled in such a manner that the individual, when entering the area, and the responsible person in charge are made aware of the individual's entry into said area. If an area is a high radiation area for a period of time of 30 consecutive days or less, a control circuit is not required provided that a barricade (such as a fence or rope) is erected, the required caution signs are posted, and the area is kept under surveillance by the user or his designated representative.

L.3 All machines and devices capable of emitting ionizing radiation and all containers, source holders, manufactured products, or other things containing a quantity of radioactive material in an amount greater than the quantities set forth in Table 1 shall be provided with and bear a durable, clearly visible label on which are imprinted the radiation caution symbol and suitable and descriptive words of caution.

L.4 In addition to providing the standard radiation-hazard symbol, each container of radioactive material shall be labeled in such a manner that the kind and quantity of material, date of measurement, and the name of the person designated responsible for the material can be easily and quickly determined.

L.5 Exemptions from Posting and Labeling Requirements.

L.5.1 Rooms or other areas in hospitals are not required to be posted with caution signs because of the presence of patients containing radioactive material(s) provided that attendant personnel are adequately instructed as to the precautions necessary to prevent the exposure of any individual to ionizing radiation or airborne radioactive materials in excess of the limits established by these regulations.

L.5.2 Caution signs are not required to be posted at rooms and areas containing radioactive material(s) for periods of less than 8 hours, provided that such material(s) are so attended during such periods that there is no chance that any individual could enter the area or room without knowing that a hazard exists.

L.5.3 The labeling requirement provisions set forth in Section L.3 do not apply if:

a. the radioactivity concentration does not exceed the RCG; and

b. the absorbed dose to an individual will not exceed the RPG (Non-Occupational and Minors) set forth in Table 3; and

c. the quantity of the radioactive material involved does not exceed such quantities of radioactive materials as are exempt under the provisions of these regulations; or

d. in the case of laboratory containers (e.g, beakers, flasks, and test tubes, used transiently in laboratory procedures), the user is present; or

e. the source is a radiation machine in a controlled area of a medical, dental, chiropodal, or veterinary installation.

M. Disposal or Radioactive Materials and Wastes.

M.1 No user shall release radioactive material(s) into the air or water or dispose of such material(s) by burial in such a manner that it may result in any individual receiving an absorbed dose

of ionizing radiation in excess of the RPG. In the application of and the conforming with the provisions of this regulation, the user shall investigate the possibility of the discharge(s) of radioactive wastes to the same environs by another user(s) and, upon becoming cognizant of such common use of the environs, shall cooperate with said other user(s) in establishing and adhering to mutually agreeable pro-rata limitations upon their respective releases and file with the Department a statement setting forth the terms of such an agreement. If such an agreement is not executed within a reasonable time, the Department may arbitrarily assign quantitative limits and/or conditions of such releases to the users severally.

M.2 Each user shall control the release or discharge of radioactive materials to the atmosphere, inland or tidal waters, sewerage systems, etc., on the following basis:

The average radioactivity concentration of the airborne or waterborne radionuclide(s) at points of release from control of the user shall not exceed the RCG. However, with the approval of the Department, the user may exceed the RCG after demonstrating to the satisfaction of the Department the necessity therefor and the appropriateness of making reasonable use of and allowances for occupancy, dilution, dispersion, and the environmental and other factors, provided (1) the radioactive material being discharged to inland or tidal waters or to a sewer system is soluble in water, (2) the average radioactivity concentration of the radionuclide(s) created in the environment (or portions thereof) at points frequented or used by individuals does not exceed the RCG, and (3) the total quantities of the radionuclide(s) released in any period of 24 consecutive hours shall not exceed 100 times the quantities listed in Table 1, Column 1.

M.3 No radioactive material in an amount in excess of that contained in Table 1 shall be disposed of by burial in the ground or in or on a land dump or stored (contained or uncontained) in or on unenclosed ground without the approval thereof by the Department.

M.4 The user shall keep records of all sales, transfers, and/or disposal or any source(s).

M.5 Nothing in these regulations shall be construed as permitting the release or disposal of materials in a manner which would be unlawful for other reasons.

N. General Requirements.

N.1 A user should require an employee or potential employee to submit to an appropriate medical examination prior to the employee's assignment to an operation where he may receive, or is likely to receive, an absorbed dose in any calendar quarter in excess of 25 per cent of the RPG, or said employee will be, or is likely to be, exposed to airborne radioactive material(s) in an average concentration in excess of 10 per cent of the RCG and thereafter as may be required by the user, and shall provide the employee with a copy of the report of said medical examination upon the employee's request.

N.2 No food, including candy and beverages, should be brought into, and smoking should be prohibited in, any area where unsealed source(s) of radioactive material are being used, handled, processed, or transferred, or stored in a manner which does not prevent leakage of the radioactive material(s). Specific notice to this effect should be posted conspicuously in such areas.

N.3 After establishment of specific periods of time to be employed by a user as a calendar quarter, the user should make appropriate notation in his pertinent records of any change therein.

N.4 The user should formulate suitable emergency plans as may be indicated to protect his employees and the public against potential hazards due to his specific source(s), and should make known the details and existence of such plans to the Department and such other public agencies having a concern, such as boards of health, fire departments, and police departments.

X. Severability

Insofar as the Department may provide, each section or part thereof of these regulations shall be construed as separate, to the end that, if any section, sentence, clause, or phrase shall be held invalid for any reason, the remainder of these regulations shall continue in full force.

CHAPTER 663*

An Act Authorizing the Department of Public Health to Control the Hazards of Ionizing Radiation.

Be it enacted, etc., as follows:

Chapter 111 of the General Laws is hereby amended by striking out Section 5B, inserted by Chapter 335 of the Acts of 1955, and inserting in place thereof the following section:--

Section 5B. The department may require registration of sources of ionizing radiation and shall, from time to time, after a public hearing, prescribe and establish rules and regulations to control the radiation hazards of radioactive materials and of machines which emit ionizing radiation for the purpose of protecting the general public and individuals against hazards associated with the use, transportation, storage, packaging, sale, distribution, production, and disposal thereof. Such rules and regulations shall not limit the kind and amount of radiation that may be intentionally administered to a person or animal for diagnostic, therapeutic or experimental purposes by or under the direction of a physician, dentist, chiropodist (podiatrist), veterinarian or other person licensed to so administer radiation under the laws of the commonwealth. Such rules and regulations shall be filed with the Massachusetts commission on atomic energy at least thirty days prior to their effective date and shall become effective upon filing with the state secretary, unless a later effective date is specified by the department. Whoever violates any such rule or regulation shall be punished by a fine of not less than ten nor more than fifty dollars. Whoever, after due notice, continues to violate any such rule or regulation shall be punished by a fine of not less than one hundred dollars nor more than five hundred dollars to the use of the Commonwealth for each offense. Each day of such violation after such notice shall constitute a separate offense. The supreme judicial court or superior court upon application of the department, or upon application of any party interested, with the approval of the department, may enforce such rules and regulations, and restrain the use or occupation of premises or such portion thereof as the department may specify until such rules and regulations have been complied with.

*This Section 5B of Chapter 111, as provided by Chapter 633 of the Acts of 1960, supersedes Section 5B of Chapter 111 as placed in the General Laws by Chapter 335 of the Acts of 1955, as amended by Chapter 495 of the Acts of 1966.

Nothing in this section shall prevent the department of labor and industries from establishing rules and regulations for the protection of the health and safety of employees against ionizing radiation in any place of employment as defined in section one of chapter one hundred and forty-nine. Said department of labor and industries shall consult with the department of public health at least thirty days prior to the adoption or modification of any rules or regulations insofar as they pertain to the health aspects of ionizing radiation. The department of public health shall approve, modify, or disapprove all proposed rules and regulations of political subdivisions of the commonwealth insofar as they pertain to the health aspects of ionizing radiation and no such rules and regulations which do not have the approval of the department shall be adopted.

Approved August 30, 1960.

The Commonwealth of Massachusetts

Secretary of State

REGULATION FILING AND PUBLICATION

1. REGULATION CHAPTER NUMBER AND HEADING: 315 CMR 2.00 HAZARDOUS WASTE REGULATIONS

2. NAME OF AGENCY: HAZARDOUS WASTE BOARD

3. READABLE LANGUAGE SUMMARY: State the general purposes and requirements of this regulation as well as the persons, organizations and businesses affected.

315 CMR 1.00 Reserved

2.00 HAZARDOUS WASTE REGULATIONS

UNDER THE PROVISIONS OF MASSACHUSETTS GENERAL LAWS CHAPTER 30A, SECTION 6 AND CHAPTER 233, SECTION 75 THIS DOCUMENT MAY BE USED AS EVIDENCE OF THE ORIGINAL DOCUMENTS ON FILE WITH THE STATE SECRETARY .

A TRUE COPY. ATTEST:

Michael Joseph Connolly

MICHAEL JOSEPH CONNOLLY

SECRETARY OF STATE

#30

IN EFFECT 6/30/80

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NON-TEXT PAGE

(315 CMR 1.00: RESERVED)

315 CMR 2.00: HAZARDOUS WASTE REGULATIONS

Section

2.01: Purpose

The purposes of these regulations are to define wastes generated within the Commonwealth that are considered hazardous and that require further control, to specify the manner in which said substances may be handled and to establish controls on disposal sites and disposal methods for such wastes. In all instances, the recovery or recycling of such wastes to useful products with minimum production of by-product wastes is preferred.

These regulations are established under the provisions of Sections 27(8), 52, 57, and 58 of Chapter 21 of the General Laws, as amended by Chapter 692 of the Acts of 1970. These regulations shall not amend, modify or alter existing laws, rules and regulations concerning water pollution abatement or control, except as specifically set forth below.

The scope of these regulations is intended to cover handling and disposal methods involving conveyance of hazardous wastes by truck, rail or vessel from a point or origin to an "off-site" disposal area on land or in water. Permits for "on-site" accumulation of hazardous wates by originators of such wastes (such as service stations, industrial companies, etc.) are not required under these regulations. However, subsequent disposal of such hazardous wastes by any person, including the originator, shall be subject to licensing under these regulations and to the penalties provided under the General Laws (ref. 315 CMR 2.07).

Low-level residual quantities of hazardous substances from the following sources are exempt from these regulations:

(1) Discharges from an appropriate and properly operating waste treatment facility, pretreatment facility or other facility complying with a State or Federal discharge permit or license or numerical effluent standard.

(2) Discharges to sanitary sewer systems which comply with sewer use ordinances or regulations and which do not contribute to a condition in contravention or water quality standards.

(3) Quantities resulting from normal household use.

Numerical limits, in terms of concentration or amount per unit time, may be established by the Division for specific sources, on the basis of individual applications.

The scope of these regulations specifically excludes transportation and disposal of dredged spoil material, which is subject to U.S. Army Corps of Engineers' permit after certification by the Division of Water Pollution Control. The scope also specifically excludes transportation

2.01: continued

and disposal of municipal refuse, sewage sludge and demolition materials which are subject to regulation under separate authority within the General Laws.

Collection and disposal of waste oil within the Commonwealth is deemed to be within the provisions of these reguations. Section 6.00 and 8.02 of the Rules for the Prevention and Control of Oil Pollution in the Waters of the Commonwealth, as adopted by the Division, and as filed with the Secretary of State on June 10, 1969 are hereby repealed and included within these regulations.

2.02: Definitions

(1) Hazardous Wastes. Waste substances which because of their chemical, radioactive, flammable, explosive or other characteristics, constitute or may reasonably be expected to constitute a danger to the public health, safety or welfare or to the environment.

(2) Originator. Any person engaged in a business which results or reasonably may result in generation of hazardous wastes.

(3) Waters of the Commonwealth. All waters within the marine and territorial boundaries of the Commonwealth.

(4) Person. Any agency, subdivison or institution of the Commonwealth, any municipality, political subdivision, or other quasi-governmental body, individual, partnerships, association, public or private corporation, or other entity and including any officer or governing or managing body of a municipality, political subdivision or public or private corporation or any other association engaged in the handling, transportation, storage or disposal of hazardous wastes.

(5) Division. Massachusetts Water Resources Commission, Division of Water Pollution Control.

(6) Board. Hazardous Wastes Board -- Members of the Water Resources Commission and the Commissioner of the Department of Public Safety.

(7) Oil. Insoluble or partially soluble oils of any kind or origin or in any form including, but not limited to, crude or fuel oils, lube oil or sludge, asphalt, insoluble or partially insoluble derivatives of mineral, animal or vegetable oils.

2.03: Handling of Hazardous Wastes

(1) Except as provided in 315 CMR 2.01, no person shall engage in the collection, conveyance or disposal of hazardous wastes classified within the scope of these reguations from any site to a disposal site off the premises without having obtained a license from the Division of Water Pollution Control, issued in accordance with these regulations, for the appropriate class(es) of hazardous wastes as determined by the Board.

(2) Except as provided in 315 CMR 2.01 no person shall operate a waste disposal facility, landfill site, or storage facility for hazardous wastes classified within the scope of these regulations without having obtained a license from the Division of Water Pollution Control, issued in accordance with these regulations, for the appropriate class(es) of hazardous wastes as determined by the Board.

(3) No person shall dispose of hazardous wastes at a land site in the Commonwealth unless the site has been approved by the Division of Water Pollution Control for disposal of that class of wastes. Any land

2.03: continued

disposal site will also be subject to current Regulations for the Disposal of Solid Wastes by Sanitary Land-fill, as adopted by the Division of Environmental Health, Massachusetts Department of Public Health.

(4) No person shall transport hazardous wastes through waters of the Commonwealth for the purpose of off-shore disposal nor dispose of hazardous wastes in waters of the Commonwealth unless off-shore disposal of that class of waste has been approved by the Division of Water Pollution Control and disposal is accomplished in a dumping ground designated by the Division. In no case shall the following be dumped in any of the waters of the Commonwealth:

(a) Mercury and mercury compounds.
(b) Beryllium and beryllium compounds.
(c) Cadmium and cadmium compounds.
(d) Arsenic, lead, and thallium and compounds thereof.
(e) Organohalogen compounds and compounds which may form such matters in the marine enviroment, including but not limited to Aldrin, Lindane, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Polyhalogenated Biphenyls, (PCB), and Toxaphene.
(f) Waste oils taken on board for the purpose of dumping.
(g) Radioactive wastes.
(h) Military (nerve) gases and other biological and chemical warfare agents.
(i) Materials in the highest health hazard category (#4) in the National Fire Protection Association identification system.

(5) Wastes shall be strictly segregated by classes by the originators and the persons involved in collection, conveyance and disposal of the wastes. All hazardous wastes shall be stored and maintained in such a manner that the contents of a ruptured container or other source of spillage, whether accidental or otherwise, will not cause or contribute to a condition in contravention of the Water Quality Standards.

2.04: Classification of Hazardous Wastes

The following classes of materials are identified as hazardous wastes within the scope of these regulations. Materials may be added to or removed from each category or additional categories established by action of the Hazardous Wastes Board.

(1) Waste Oils. Materials which are classified as waste oils include those oils having flash points at or above 100°F which are no longer usable for the services for which they were manufactured, due to the presence of impurities or loss of certain compounds. These include, but are not limited to, crude oil, fuel oils, lubricating oils, kerosene, diesel fuels, cutting oil emulsions, hydraulic oils and other non-chlorinated industrial oils that are discarded as waste or are recovered from oil separators, oil spills, tank bottoms or other sources.

(2) Solvents and Chlorinated Oils. Materials classified under this heading include insoluble or partially soluble organic chemicals and petroleum derivatives which require special disposal precautions because of flammability (i.e., flash points below 100°F), toxicity or composition (i.e., contain elements such as chlorine or sulphur in concentrations which prohibit conventional incineration). These include, but are not limited to, chlorinated solvents, and oils, gasoline, aromatics, organic pesticides, polychlorinated biphenyls, and low-boiling insoluble ketones, alcohols and ethers.

(3) Toxic Metals, Etchants, Pickling and Plating Wastes. Materials which are classified under this heading are aqueous solutions and sludges containing cyanides or toxic metals which include, but are not

2.04: continued

limited to, mercury, beryllium, cadmium, chromium, nickel, copper, lead, zinc, arsenic, thallium and antimony.

(4) Explosives, Reactive Metals and Compounds. Materials which are classified under this heading are explosives and materials which are highly reactive either by themselves or on contact with water to form ions or compounds normally present in sea water. These include, but are not limited to, lithium, sodium, magnesium, aluminum, potassium and titanium metals and their highly reactive inorganic compounds.

(5) Hazardous, Chemical, Biological and Radioactive Wastes. Materials included under this heading include military (nerve) gases, other biological and chemical warfare agents, radioactive wastes and compounds assigned a moderate or serious hazard category (#2 or greater) in the National Fire Protection Association identification system and not otherwise classified above, or equipment containing or contaminated by such hazardous materials.

2.05: Disposal Methods and Locations

Disposal methods and locations for the hazardous wastes classified within the scope of these regulations shall only be permitted, according to the class of material, as provided herein. Where the permitted disposal methods are not "feasible or practical," alternative disposal methods will be considered by the division of Water Pollution Control on the basis of individual applications. A person licensed to collect or dispose of such wastes shall make written application to use alternate disposal methods to the Board by filing said application with the Division of Water Pollution Control, which application shall set forth the type and quantity of waste, proposed disposal method and site, and alternative methods and sites considered. The Division will investigate improved methods for disposal and advise licensed persons as to appropriate disposal techniques.

(1) Waste Oils. Insofar as feasible or practical, waste oils shall be reprocessed for use, or used directly, in original or secondary markets where such use meets all applicable environmental standards. Alternative disposal methods such as incineration or land spreading will be permitted only if it is shown by the applicant that reprocessing or direct use is not feasible or practical and if such methods meet all applicable environmental standards. Collection of waste oil intended for disposal outside of the Commonwealth of Massachusetts is prohibited unless the proposed ultimate disposal location or facility is approved by the U.S. Environmental Protection Agency or the appropriate State pollution control agency of the State in which said disposal facilities are located.

(2) Solvents and Chlorinated Oils. Insofar as feasible or practical, wastes solvents and chlorinated oils shall be reprocessed for use in original or secondary markets. If it can be shown that reprocessing is not feasible or practical, incineration of the material, with exhaust gases complying with Air Quality Standards, may be permitted. Alternative disposal methods will not be permitted unless it can be shown that technology for recovery or incineration of the material does not exist.

(3) Toxic Metals, Etchants, Pickling and Plating Wastes. Metal sludges from this class of wastes must be concentrated and disposed of in a disposal site which must meet the requirements under 315 CMR 2.03(3). All cyanides must be destoyed insofar as feasible or practical. Concentrated solutions should be regenerated for reuse or treated to render them suitable for disposal or returned to the supplier for reprocessing. All wastewaters containing heavy metals must be treated to remove the heavy metals to the solubility of their respective oxide or

2.05: continued

hydroxide. Alternative disposal methods will not be permitted unless it can be shown that regeneration or treatment is not feasible or practical.

(4) Explosives, Reactive Metals and Compounds. Materials in this category shall be consolidated for recovery insofar as feasible or practical. Where recovery or other disposal methods may tend to contribute to increased hazard due to fire or explosion, disposal may be permitted in a landsite licensed by the Division or at an off-shore site designed by the Division.

(5) Hazardous Chemical, Biological and Radioactive Wastes. Insofar as feasible or practical, such wastes shall be consolidated for recovery or shall be detoxified or otherwise pretreated to render them suitable for conventional waste treatment. Where this is not technically feasible, alternate disposal methods will be considered by the Division of Water Pollution Control. Where recovery or other disposal methods may tend to contribute to increased hazard, disposal may be permitted in a landsite licensed by the Division or at an off-shore site designated by the Division. However, in no case shall off-shore disposal be permitted for wastes listed in 315 CMR 2.03(4).

2.06: Licensing

(1) Within 90 days of the effective date of these regulations, any person engaged or desiring to engage in handling or disposal of hazardous wastes as defined in these regulations shall make application to the Division for a license therefor.

(2) All licenses issued under these regulations shall expire on January first of each year and may be renewed annually. The fee for such annual license shall be fifty ($50) dollars and the fee for a renewal of such license shall be ten ($10) dollars.

(3) Each applicant shall submit a written application to the Division of Water Pollution Control which shall include the following and other relevant information as the Division may require (see 315 CMR 2.09(1)):

(a) Name and place(s) of business;
(b) Class(es) of wastes and approximate quantities usually handled or disposed of in the usual course of business;
(c) Description of disposal methods presently used or intended to be used;
(d) Location and plan of specific disposal sites to be utilized for hazardous wastes;
(e) Signature and authorization of applicant's agent.

(4) Licenses will be issued by the Division for conveyance of hazardous wastes and for operation of specified disposal sites and facilities. Approval will be based on feasiblity of alternate disposal methods and consideration of the methods posing the least potential hazard to the public or its environment.

(5) Licenses are non-transferable. Continuation of operation by a new owner, without prior notification to the Division, and approval by the Division, shall be in violation of this regulation and a basis for cancellation, revocation or suspension of said license.

All licenses may contain new or additional restrictions, conditions and terms reasonably imposed by the Division. The Division shall allow each licensee a reasonable time, as determined by the Division, to conform to such new or additional conditions.

2.06: continued

(6) Representatives of the Division may enter upon a licensed person's premises at reasonable times and on reasonable notice to inspect the facilities, inventory, records and to take samples of any hazardous wastes or of other evidence.

(7) The Division may revoke for cause any license, subject to a hearing under the provisions of Chapters 21 and 30A of the General Laws, as amended.

Notification of revocation shall be in writing and shall state the effective date of such revocation.

An appeal from a ruling of the Division shall be taken in accordance with the Administrative Rules of the Division.

(8) Any licensee authorized by the Division to use an off-shore disposal site shall be required to have a State inspector designated by the Division on board the vessel while transporting and disposing of hazardous wastes. The licensee shall reimburse the Commonwealth of Massachusetts per diem costs of fifty dollars ($50) for each day or portion thereof that an inspector is required on board said vessel.

The only off-shore disposal site that may be used for chemical disposal, when authorized by the Division, is the area shown on Coast and Geodetic Survey Chart No. 1207 as "FOUL AREA -- EXPLOSIVES" a distance of 9 1/2 nautical miles NE of the Boston Lightship.

(9) Vessels, tank tucks, rack trucks, or other vehicles used for transportation of hazardous wastes to a storage or disposal facility shall carry prominent markings to identify the vehicle and its owner and operator and any other markings properly required by law or regulation. The operator of each such vessel, truck or other vehicle shall maintain records of hazardous materials handled, origin, quantity and destination of such materials. Such records shall be retained for at least one calendar year and be available for inspection by Division representatives. A monthly report shall be submitted to the Division, to be received not later than the end of the following month, providing a summary of the total quantities of each class of hazardous waste, or appropriate subdivisions thereof, handled, received and disposed of. This summary of proprietary information shall not be a public record. Failure to maintain detailed logs or to submit monthly summaries to the Division shall be grounds for license revocation. A recommended format for the monthly summary is shown in 315 CMR 2.09(2).

2.07: Penalties

(1) Penalty for violation of rules and regulations of the Division of Water Pollution Control (G. L., c. 21, s. 27(8)): "Except as otherwise provided in this Chapter, any person violating any rule or regulation issued under the authority of sections twenty-six to fifty-three, inclusive, shall be punished by a fine of not more than one thousand dollars."

(2) Penalty for violation of rules and regulations of the Hazardous Waste Board (G. L., c. 21, s. 58): "A violation of this section or of section 57 or any regulation adopted thereunder shall be punished by a fine of not more than five thousand dollars, or by imprisonment in a jail or house of correction for not more than six months, or both."

2.08: General

(1) In the event any section, paragraph, sentence, clause, phase or word of these regulations shall be invalid or declared invalid for any reason whatsoever, that decision shall not effect the validity of any

2.08: continued

other part of these regulations which shall remain in full force and effect, and to this end the provisions of these regulations are hereby declared severable.

(2) The provisions of these regulations shall become effective upon filing with the Secretary of the Commonwealth of Massachusetts.

2.09: Attachments

(1) License Application.

COMMONWEALTH OF MASSACHUSETTS
HAZARDOUS WASTE BOARD
DIVISION OF WATER POLLUTION CONTROL
100 CAMBRIDGE STREET
BOSTON, MASSACHUSETTS 02202

FY_____
Permit No._____
Expires _____

License Application - Hazardous Waste Collection and Disposal (G. L., c. 21, s. 57-58) (Submit application in duplicate and signed by owner or authorized official.)

1. Name of Firm _____
2. Address of Firm _____
3. Person to Contact in Emergencies _____ Tel._____
4. Type of Hazardous Waste Operation (Check applicable spaces)

   _____ Conveyance of Hazardous Wastes
   _____ Operation of Storage Facility
   _____ Operation of Disposal Facility

5. Classes of Hazardous Wastes Handled (Check applicable spaces)

   _____ Waste Oils
   _____ Solvents & Chlor. Oils
   _____ Hazardous, Chemical, Biological and Radioactive Wastes
   _____ Toxic Metal & Plating Wastes
   _____ Explosives, Reactive Metals

6. Attach a tabulation of the class(es) of wastes and approximate annual quantities handled or disposed of in the usual course of your business.
7. Attach a description of the disposal method(s) being used or to be used for each class of waste.
8. State the location and capacity of all storage and/or disposal facilities owned, operated or controlled by your firm. State the location of specific disposal sites proposed to be utilized. (attach sheets as required)
9. Attach a list of trucks, vessels or other vehicles owned, operated or controlled by your firm for the handling and conveyance of hazardous wastes. (description/license or ident. no.)

_____ _____
Type Name of Applicant Signature & Title of Applicant

_____
_____
Address of Applicant

_____
(For Issuing Office Use Only)

Approved subject to current rules and regulations and to conditions listed below.
Conditions:

_____
Director, Division of Water
Pollution Control

REGULATORY AUTHORITY

315 CMR 2.00: M. G. L. c. 21, s. 57, 27(8), 52, and 58.

LOW LEVEL RADIOACTIVE WASTE MANAGEMENT IN MASSACHUSETTS

Report to the Governor of Massachusetts

by the

Massachusetts Advisory Council on Radiation Protection

November, 1980

LOW LEVEL RADIOACTIVE WASTE MANAGEMENT IN MASSACHUSETTS

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SUMMARY

Low Level Waste (LLW), i.e. waste containing small amounts of radioactivity, is generated in the Commonwealth of Massachusetts from medicine and medical research, university and industrial research, and industry including nuclear power generation. In the very near future, this waste, now shipped at great expense, to three distant, but reluctant states, will have to be disposed of either regionally or within the Commonwealth. The amount of radioactivity is low and the volume is far smaller than the volume of other hazardous waste and of solid waste. The management of LLW, therefore, can be much simpler and less costly than the management of other waste forms. In addition, the management of LLW can be conducted in an economical and proper manner that protects the environment and the health and safety of the public.

To continue the benefits that accrue to the Commonwealth (employment and taxes, advances in medicine and research) it is necessary to be able to continue the disposal of LLW. Because the volume of LLW generated in Massachusetts is the eighth largest in the nation and represents 40 - 50% of all that is generated in New England, it is recommended that a LLW management program be initiated immediately within the Commonwealth. Eight additional recommendations are given in this report to set forth the conditions for implementing the program and to assure a satisfactory LLW management program. In particular, it is recommended that an education program be instituted to give everyone the opportunity to understand the LLW problem and the proper management of LLW and, hence, to support, constructively, the implementation of this necessary program.

This report consists of a short account of the problem and the set of recommendations. Details of the technical considerations in LLW management are contained in six appendices.

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MEMBERSHIP

ADVISORY COUNCIL ON RADIATION PROTECTION

Constantine J. Maletskos, Chairman
Gloucester, Massachusetts

Frank Archibald
Department of Labor and Industries

Manson Benedict
Massachusetts Institute of Technology

Paul Cahill
Civil Defense Agency

Edward Hanley
Executive Office of Administration
and Finance

John Marchant
Division of Personnel Administration

James R. Nichols
Nichols and Pratt

Gerald S. Parker
Department of Public Health

Laurence Robbins*
Massachusetts General Hospital

Patric Scavotto
West Roxbury, Massachusetts

Carlisle Smith
Department of Public Safety

Shields Warren*
New England Deaconess Hospital

---

* Deceased, 1980

MEMBERSHIP

Ad hoc Committee on Low Level Waste
Advisory Council on Radiation Protection

Constantine J. Maletskos, Chairman
Gloucester, Massachusetts

Murray M. Bolton, Jr.
Massachusetts Institute of Technology

Robert M. Hallisey
Department of Public Health

Charles B. Killian
New England Nuclear Corporation

Peter S. Littlefield
Yankee Atomic Electric Company

Francis X. Massé
F. X. Massé Associates, Inc.

Gerald S. Parker
Department of Public Health

Jacob Shapiro
Harvard University

Janis D. Stelluto
Executive Office of Environmental Affairs

1. INTRODUCTION

Extensive use of radioactive materials in the Commonwealth over the past 35 years has provided employment and taxes and has led to advances in medicine and research. Currently, an estimated 5000 persons, employed in hospitals, universities and industry, are directly involved with the use of radionuclides.

As an example, in order for a hospital to be accredited it must have a formal nuclear medicine program. At least 30 percent of the people who enter hospitals benefit directly from a wide variety of radiopharmaceuticals or devices using radionuclides for diagnosis or treatment. Nearly all patients benefit indirectly from basic medical research in which radionuclides play an important role.

Similarly, radionuclides are used in many fields of research in universities and in industrial research centers providing a variety of benefits to society. As examples, these benefits include studies on the absorption of food in the nutrition field, on the flow of waters in the civil enginnering field, on the function of cells in the biology field, on the reduction of friction in the mechanical engineering field, and on improved components in the electrical engineering field.

In the normal life processes, all societies produce waste, from the production and use of food, transportation, energy, and other goods and services. Waste includes human waste (sewerage), solid waste (municipal and industrial), and hazardous waste (toxic chemicals and metals). The magnitude of the waste disposal problem is indicated by the volumes generated in the last two classes. In Massachusetts, an estimated 500,000,000 cubic feet of solid waste and 5,000,000 cubic feet of hazardous waste are generated each year.

In similar fashion, all uses of radionuclides, including the production of electricity with nuclear power, lead to some waste that must be disposed of in a safe manner. The radioactive waste discussed in this report contains small amounts of radioactivity and is called low level waste (LLW). The volume of LLW currently generated in Massachusetts is estimated to be 170,000 cubic feet per year, about 3% of the volume of hazardous waste, 0.03% of solid waste. Procedures for transporting and disposing of this LLW safely are well known.

These procedures can be implemented within the Commonwealth without subjecting the general public, including those nearest the disposal operations, to radiation of any significance compared with natural radiation to which we are all exposed.

This report describes and discusses the LLW problem facing Massachusetts. The report also presents the actions that the Commonwealth must take to assure the proper handling of LLW within its borders and, hence, to assure the continued benefits that derive from the use of radionuclides. The next section addresses the nature of the problem and the need for action, while the third section sets forth the recommendations to initiate and institute a LLW program.

This short report is followed by a series of appendices that describe, in detail, the technical aspects of LLW management. These appendices include information on waste classification; the magnitude and handling of the waste; criteria for packaging, transport and processing; recycling and reclamation; and siting considerations for waste disposal facilities. The last appendix, of special importance, discusses the need for an education program to describe the nature of the problem, and to give a perspective to all interested parties on such issues as the radioactivity involved, the considerations for siting a facility, and the health and other benefits obtained from the use of radionuclides. With this background, everyone can play a constructive role in the implementation of a LLW management program in the Commonwealth as soon as possible.

2. STATEMENT OF THE PROBLEM

The temporary closings of the LLW disposal sites recently in the states of South Carolina, Nevada and Washington have dramatically pointed out the serious consequences that can affect the continued use of radionuclides in medicine, research, and industry. The reopenings of these sites, under considerably more stringent requirements and controls, emphasizes the probability that these three states will no longer continue to act as the sole receivers of LLW for the United States. It is quite clear now, as it has not been before, that all the states, individually or regionally, must participate in and contribute to the solution of LLW disposal.

LLW is in many respects similar to municipal wastes - consisting largely of paper, glassware, scrap materials and some solvents - except that it is contaminated with small amounts of radioactivity. Because the volume is small by comparison and the concentration of radioactivity is low (on average, not much different from radioactivity concentrations occurring naturally, including those in the human body) the difficulty associated with the disposal of LLW is not much greater than that of the proper handling and disposal of municipal wastes.

The disposal of LLW has always been under regulatory control. Regulations developed by the U. S. Atomic Energy Commission have been continued and improved by its successor agencies, the Energy Research and Development Agency, the Department of Energy, and the Nuclear Regulatory Commission as well as by the Environmental Protection Agency and the Massachusetts Department of Public Health. These regulations require that all users of radioactive materials be trained to follow prescribed rules for disposal of LLW. Adherence to these rules is monitored by the Nuclear Regulatory Commission and the Department of Transportation and by the states with LLW burial sites. These regulations, with proper inspection and enforcement, should ensure the safe operation of LLW disposal facilities and burial sites.

It is important to consider the economic impact of the development of local or regional disposal sites. The cost of the disposal of LLW is currently absorbed as part of normal operations involving radioactive material. This cost is increasing

rapidly primarily because of the spiraling costs of fuel and the long distances required for transportation and because of unreasonably escalating burial fees. Thus, the cost of disposal would be significantly reduced with shorter shipping distances, and the savings could be applied to the establishment of local or regional disposal facilities. In addition to maintaining manageable disposal costs, funds and fees and the accompanying creation of jobs would accrue to the host community as important economic benefits.

Waste management is the process by which waste is handled from its generation to its final disposal. The several steps involved in this process are: (1) appropriate choice of production or laboratory operations to produce less waste volume, (2) recycling, if possible, (3) radioactive decay where practical, until waste material is no longer radioactive, (4) mechanical volume reduction, and (5) further volume reduction by physical or chemical means, and finally, (6) proper disposal of residues by burial requiring technically sound procedures that involve waste forms compatible with the characteristics of the chosen site. Criteria for choosing sites, in turn, must consider geological, geographical, environmental, demographic, and economic factors.

The solution to the problem, therefore, is to improve LLW management and to establish and operate processing facilities with land burial capacity for disposal nearby. The 47 remaining states have a limited grace period to demonstrate that they will not expect the present three states to be the only sites for LLW disposal, and that, in fact, they are ready to assume responsibility for their own wastes or share in a regional program. Thus, the real solution to this problem must include a definite and enlightened understanding by all concerned, the public as well as the administrators and the lawmakers, that we must take care of the wastes generated in the Commonwealth by properly managing and disposing of them within our own geographical area.

The Advisory Council on Radiation Protection has deemed the subject of LLW disposal to be of primary concern for the Commonwealth of Massachusetts, eighth in the nation in LLW volume production. The Council has prepared this report to provide the background on and recommendations for policy and and technical solutions that the Commonwealth, through the Governor and the Legislature, might use to develop and implement a plan for LLW management. For the normal continuation of all those operations that use radioactive materials, it is imperative that the State address this issue immediately and effectively.

3. RECOMMENDATIONS

The Advisory Council believes that the LLW problem is solvable and that it is important for the Commonwealth of Massachusetts to start on the solution immediately.

There may well be advantages for regional participation in which several states share costs, facilities and sites. However advantageous, the legal considerations are complex and Congressional action will be required for the states to enter into contracts that protect each others rights. Because resolution of the legal problems and enactment of Congressional legislation will take a few years, immediate action by Massachusetts to solve its own problem is the best course to follow. Should regional legislation be enacted, Massachusetts can enter into appropriate regional agreements in an advantageous and strong bargaining position.

The LLW problem of Massachusetts is well-defined: the generators are known by license; the nature, volume, and radioactivity of the waste are known; the techniques for safely processing and disposing the waste are known; and the regulations are on record. The hazardous waste problem, on the other hand, is just beginning to be addressed in Massachusetts with the passage of the hazardous waste legislation. Eventually, it may be advantageous to combine the two waste forms. However, at this time, it would be a disservice to the citizens of the Commonwealth to tie the two types of waste together and, hence, delay action on LLW disposal.

When possible, the Commonwealth should take advantage of financial and technical assistance offered by several federal agencies.

The specific recommendations of the Council to the Commonwealth are as follows:

1. Encourage the immediate initiation of a program for low level waste management within the state.
2. Require that site selection and facility development and operations be conducted in a thorough manner to protect the health and safety of the public and to protect the environment, in accord with applicable regulations.

3. Institute an education program, to give perspective to the public on the contributions to society of the services and products that produce LLW, and on the practical and safe means of LLW disposal.
4. Encourage and support the management of LLW disposal by organizations qualified from the standpoints of expertise, economics, and long term stability, and require financial responsibility for current operations in LLW management.
5. Set up a mechanism for an escrow fund, to be supported by the income of operation, for potential post-closure contingencies.
6. Require that generators be financially responsible for problems arising from improper packaging and accidents.
7. Encourage volume reduction techniques.
8. Set up a review body, consisting of qualified experts and of members of the public, to audit the operation of the LLW disposal program and to review proposals on new techniques for handling LLW.
9. Consider making appropriate state land available for use as a LLW disposal operations site.

As a final comment, the development of a program of LLW disposal will have to include the public, allowing it to play an integral role in the planning and implementation. To be effective in this regard, the public must be informed about the benefits from the use of radioactive materials, the need for proper disposal, the safety of proper disposal and the consequences of having no proper disposal available. In addition, the public should understand that the location of geologically suitable sites is not a matter of individual choice, but of geological evolution, that at least one site must be chosen, and that support for the necessary zoning changes will be needed. In short, the role of the public should be constructive and supportive in finding an acceptable solution for LLW disposal.

APPENDICES

APPENDIX A. WASTE CLASSIFICATION

For purposes of disposal, radioactive material is normally classified as Low Level Waste(LLW), Transuranic Waste (TRU) and High Level Waste (HLW).

All radioactive waste that does not fit into either the TRU or HLW categories is classified as LLW. Essentially all of the radioactive waste now generated in Massachusetts or in the New England region is LLW. This waste includes material from academic institutions, hospitals, radiopharmaceutical manufacturers, industry and nuclear power stations (excepting reactor spent fuel).

The Nuclear Regulatory Commission (NRC) has recently proposed (NRC,1979b) further classification limits, within the LLW category, that would define waste acceptable for shallow land burial. This classification system is based on concentration limits that are related to the potential hazard of critical radionuclides. Waste not acceptable for shallow land burial would have to be disposed of by intermediate depth burial or some other method providing an equivalent degree of isolation.

Waste material containing quantities of radionuclides with atomic number greater than 92 (i.e., plutonium, americium, etc.) in excess of 0.001 microcuries[1] per gram is presently classified as transuranic waste. This TRU waste is currently stored in retrievable storage facilities pending ultimate disposal. The new classification system described above will include TRU waste and thus define the method of disposal to be used. Waste containing concentrations of transuranics or other radionuclides unacceptably high for shallow land burial results from spent reactor fuel reprocessing or weapons production. High level waste consists of either the liquid or solid waste generated by the reprocessing of this fuel. The HLW program is being addressed by the federal government.

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[1] A curie is a unit of radioactivity equal to 37,000,000,000 nuclear transformations per second. A microcurie is 1/1,000,000 of a curie and is equal to 37,000 nuclear transformations per second.

APPENDIX B. MAGNITUDE AND HANDLING OF LOW LWVEL WASTE

B1. Volume and Radioactivity

The volume and radioactivity of LLW and the distribution of users is given in Table 1. The information presented in this table is taken from the licensed user reports (NRC, 1979a) supplied to regulatory agencies in the eighteen-month period from January, 1978 through June, 1979. The data have been normalized for an effective 1979 year to show the impact of a full year. There are approximately 410 U. S. Nuclear Regulatory licensees registered in the Commonwealth of Massachusetts. Information was obtained on 202 of those registered. The processors are divided into the following categories: commercial power, industrial, academic and hospital. LLW from university research reactors is included in the academic waste category. There are also a few government facilities conducting research with radioactive materials and these have been included in the industrial category. The remaining 200 licensees, whose information was not available for this report, are considered small producers of LLW and their contribution would change the data very little.

LLW from all producers consists of paper trash, clothing, glassware, equipment, chemicals, filters, solidified waste, scintillation vials, animal carcasses and other contaminated materials. A single container can have radioactive materials ranging from a millionth of a curie to hundreds of curies of some radionuclides. A full 55-gallon (7.3 cubic feet) steel container can weigh anywhere from 50 to 800 pounds.

Transportation of LLW is limited to 40,000 pounds per vehicle due to requirements of various states. Current unit cost of disposal of LLW ranges between $150 and $250 per 55-gallon drum, for a total of several million dollars per year for Massachusetts generators. Other charges are added on when weight, quantity of radioactivity and radiation levels exceed specified limits.

Records of the 202 producers indicate that 35 different radionuclides are used routinely, eleven of these predominating in medical and research use.

One of the two major industrial producers contributes 24,300 cubic feet of LLW containing 83,000 curies (mostly hydrogen-3). The second produces 39,400 cubic feet containing 60 curies of depleted uranium.

Table 1. Low Level Radioactive Waste Shipped from Massachusetts[a]

Category	Power	Industrial	Academic	Hospital	TOTAL
Licenses Reviewed	2	77	24	99	202
Licenses above That Report No Waste is Produced	___	37	11	48	96
Large Volume[b]					
- Producers	2	2	___	___	4
- Cubic Feet	50,000	84,000	___	___	134,000
- Curies[c]	1,000[d]	83,000	___	___	84,000
Small Volume					
- Producers	___	38	13	51	102
- Cubic Feet	___	7,400	8,100	19,000	34,500
- Curies	___	81	44	18	143

GRAND TOTAL

Volume: 168,500 cubic feet; radioactivity: 84,143 curies

[a] Data have been adjusted for operations over one year.

[b] This category includes those who produce more than 5000 cubic feet/year and 50 curies/year.

[c] A curie is a unit of radioactivity equal to 37,000,000,000 nuclear transformations per second.

[d] Quantity depends on shutdowns and core changes.

About 50% of the producers report that no LLW is sent to burial sites. These producers hold their radionuclides for 10 to 15 half lives[2] and dispose the decayed products through conventional commercial methods.

The size of the New England LLW disposal problem (and that including New York)is indicated by the reported volumes of waste shipped from the neighboring states. Table 2 indicates that the Massachusetts LLW volume is between 20 - 50% of the regional volume and 40 - 50% of the New England volume. These percentages should be sufficient incentive for Massachusetts to take a leadership role in seeking a solution to LLW disposal.

B2. Criteria For Packaging

All low-level waste accepted for disposal by land burial is packaged in DOT approved containers and complies with all applicable regulations of the U. S. Nuclear Regulatory Commission (NRC) and Department of Transportation (DOT) and of the Commonwealth of Massachusetts through the Department of Public Health.

The waste form must be packaged to prevent fires through friction, absorption of moisture or spontaneous chemical changes, and, if by some chance ignited, must not burn so vigorously and persistently as to create a hazard during handling, storage, and disposal. In addition, LLW containing pathogenic, infectious or other biological material must be treated, prior to packaging, to minimize the potential hazard of this material.

The following classes of LLW are identified under the criteria of the existing burial sites: 1. dry solids, 2. absorbed liquids, 3. liquid scintillation vials, 4. animal carcasses, 5. gasses, and 6. resins. For each class there are specific packaging requirements.

Some changes in packaging criteria would be advisable if volume reduction by incineration were adopted as part of a local disposal operation. One of the primary considerations would be to minimize the handling of waste to be

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[2] A half life is the time required for the activity of a radionuclide to decay to one half the initial value.

Table 2. Low Level Waste Volumes Shipped from Massachusetts and from States Neighboring Massachusetts[a]

State	Volume (cubic feet)
Connecticut	114,000
Maine	30,000
Massachusetts	119,000[b]
New Hampshire	12,000
New York	239,000
Rhode Island	6,000
Vermont	11,000
TOTAL	531,000
New England TOTAL	292,000

[a] Data are taken from EGG, 1980, and are for the year 1979.

[b] Note that the volume for Massachusetts obtained in the present review (Table 1) is larger than the above value which has been obtained from the preliminary EGG report.

incinerated so as to minimize both the radiation exposure to operating personnel and the potential for radioactive contamination. It would be desirable, therefore, to package combustible LLW in combustible packaging, sized suitably for direct injection into the incinerator. Present DOT regulations allow the shipment of radioactive materials in combustible packaging; in fact, most radionuclides as initially purchased are shipped in combustible packaging.

APPENDIX C. TRANSPORT AND PROCESSING OF LOW LEVEL WASTE

C1. Transport

Packaged low-level radioactive waste is transported from the Massachusetts "generator" to one of the three remaining LLW repositories in the U. S., where it is buried under the full control of a permanent curator. Such transportation is by truck, usually in full "exclusive-use" trailer loads. The majority of LLW generated in Massachusetts is currently shipped to the Hanford site in Richland, Washington, or to Barnwell, South Carolina. Low-volume generators of LLW usually contract with a middle-man or "broker", who collects the packaged waste from several such generators, warehousing as necessary until full trailer-loads are accumulated. A significant factor in the recent cost escalation in this entire process is associated with the distant locations for burial. Those involved in this business over the past few years recall shipping to West Valley, New York; to Sheffield, Illinois; to Morehead, Kentucky; to Barnwell, South Carolina; to Beatty, Nevada; and now to Richland, Washington.

The location of an appropriate site for operation of a facility and for burial in Massachusetts should take into consideration the transport routes that would be involved in getting the LLW to the site. While the transportation of LLW does not pose a significant hazard, proper routing, including the use of all of the Commonwealth's major highways, should minimize unnecessary transport through communities.

C2. Processing

The bulk of the material included in the LLW volume is suitable for incineration in terms of both its combustible nature and of its radioactivity content. The cost of initiating an appropriate incineration program would be high for the individual generator, when the requirements of the federal, state and local air pollution control laws are factored into the equipment design. The technology is available, however, to incinerate this material safely and properly on a large scale, if the combustible LLW from many generators could be efficiently pooled for this purpose. In fact, proven incineration techniques are available that result in a 5-10% residue bound in impervious materials such as glass or iron slag, yielding not only greatly

reduced volumes, but much less leachable disposal forms. Compared with the current cost of LLW disposal, a cooperative central facility or commercial operation with these volume reduction capabilities would be economically feasible in this state.

Such a facility could operate in one of several ways. (1) It could process (incinerate, compact) all waste from various generators, to reduce volumes as much as possible for ultimate burial at one of the existing sites. (2) It could receive only combustible LLW from various generators to incinerate and, thereby, to reduce volumes for ultimate burial elsewhere. (3) It could receive all waste as in No. 1 above, and process and bury it on site after obtaining appropriate licenses and clearances. (4) It could operate in combined fashion, whereby an incinerator with capacity and capability to handle combustible LLW waste could also handle toxic chemical wastes that can be suitably treated by incineration, with the ultimate burial of the residue to be arranged elsewhere or on site. (5) It could be primarily an incineration site, designed large enough to handle all combustible LLW and all toxic chemical waste as well as all municipal waste from the community or region in which it is located, with arrangements for the ultimate burial of the radioactive and toxic residues elsewhere or on site, if the site meets the appropriate requirements.

The fifth mode would be the ideal and most effective approach to take. However, for practical reasons involving time, effort and money, this mode would not solve the LLW problem for Massachusetts in time to satisfy the demands for early relief by the three states now accepting waste.

The most practical solution, therefore, is the third mode, processing and burial on the same site. Since sites geologically satisfactory for hazardous waste disposal have been found in Massachusetts, these sites or similar ones might be adequate for LLW disposal. Licensing for LLW incineration is a relatively short term (6 months - 1 year) effort so that incineration could proceed soon. While pursuing licensing for burial, a 1-to 3-year process, the incinerator residue could be transported for burial to the existing out-of-state sites. Such a solution demonstrates to these states that Massachusetts is taking appropriate action and, at the same time, is transporting and requesting burial for smaller volumes of much less leachable waste.

APPENDIX D. RECYCLING AND RECLAMATION FOR VOLUME REDUCTION

This section is included in this report to show that there are other potential means for reducing the quantity of LLW for disposal.

One alternate method includes recycling, i.e., the recovery and reprocessing for reuse of both the radioactive and non-radioactive components, or either one, of a radioactive material normally be scheduled for disposal. However, the separation of radionuclides from solutions, from complex compounds, or from fabrications that fail to meet quality assurance standards, is in an early stage of development. The incentive to investigate such separation processes is governed by economics, manpower, and new technology, none of which appear promising at this time.

The ability to remove radionuclides from materials varies according to the specific nuclide to be isolated, to its incorporation in particular compounds or materials, and to the quantity of the non-radioactive atoms of the same element present in the compound or material that will compete in the process because both the radioactive and non-radioactive atoms of an element behave chemically in the same manner. Current experience in chemical separation processes, such as distillation, evaporation, and column techniques, has resulted in up to 90 percent separation of the radioactive component. The degree of acceptance of the separated products depends on the purity and concentration of the radionuclide and on the degree of residual radioactive contamination of the component that is normally non-radioactive.

Radionuclides can also be reclaimed from devices that contain them. For this purpose, the requirements of the process include dedicated space and equipment that might not be considered cost effective for a single or a few recovery operations. For example, to reclaim a quantity of cesium-137 from an obsolete sealed source requires the additional facilities of an enclosure with filtered exhaust ventilation ports to prevent release of radioactivity to the environment, remote tools to minimize radiation exposure of the workers, and chemicals to bring the radiocesium back to an acceptable raw-material state. In the process of isolating a large fraction of the radiocesium, however, it is possible that the volume of contaminated waste to be disposed of could become larger than the small volume of the original waste source.

Recycling and reclamation processes ought to be investigated further with increased effort and ingenious methods. For the most effective volume reduction, such processes should be considered for incorporation in the original production processes.

APPENDIX E. SITING CONSIDERATIONS FOR PROCESSING AND BURIAL

The siting of a LLW disposal facility encompasses all steps from the development of site criteria to the licensing of the proposed facility. It includes the survey of prospective sites and their evaluations, leading to the selection of an acceptable location for the proposed facility. This section briefly describes the major considerations that must be addressed during this process.

The size of the site required for a low-level waste burial facility will depend on the volume of LLW in the state or in the region to be served, the desired length of time the facility will be operational and the desired exclusion area surrounding the active site. Typical sites may range from less than a hundred acres to several hundred acres, depending on how much land is already available for a buffer zone. The space requirements for a waste volume reduction/solidification facility would be much less, and the licensing effort for this type of processing plant would be significantly less than that for a burial site whether on the same site or elsewhere. For this reason most of the discussion below pertains to the siting of waste burial facilities.

Until the present time, private industry has taken the initiative in seeking, selecting, licensing, and operating new commercial low-level waste disposal sites. The land on which these disposal facilities are located has been deeded to the Federal or State government. The private company, or operator, is then responsible for assuring safety during use of the facility and the appropriate government agency is responsible for long-term care. The Interagency Review Group, however, has recently recommended (IRG,1979) that the"Department of Energy (DOE) assume responsibility for developing and coordinating the needed national plan for LLW..." This IRG Report further states that future sites could be developed and operated by individual states or the the federal Government. If the facility is sited on state-owned land, title could be transferred to the Federal Government upon termination of the facility license. Responsibility for siting a new waste facility may therefore reside with either a private company or a government agency. The siting process itself however, will be relatively independent of whoever assumes this responsibility.

Much of the groundwork in developing a methodology for siting a LLW facility has been completed by the New England Regional Commission (NERCOM,1979) for the purpose of disposing hazardous wastes. This study points out the importance of allowing the maximum number of parties to participate in the decision-making process with the underlying assumption that "some final siting decision has to be made". Massachusetts now has siting legislation for hazardous waste (COM,1980) that defines the decision-making process quite clearly with respect to community participation and the procedures to overcome a potential impasse. Many parts of this law apply to the siting considerations of LLW disposal.

The site must be selected to meet both short-term, or operational, considerations, and long-term performance objectives. The proximity of established transportation routes to facilitate the safe and economic transport of LLW, the quantity of land available, the ease of acquisition, and public acceptance must all be considered as short-term conveniences. The long-term performance objective of the disposal facility after closure is to assure that all LLW is contained within the facility for the required lifetime of that waste.

This long-term performance objective will be met by a site-specific system of barriers to LLW migration including the specified form of the buried waste, engineered barriers, natural characteristics of the site and its environs, and control over the use of the land upon which the site is located.

Sufficient funds must be made available to provide for: (1) decommissioning of the disposal facility, including dismantling surface structures on the site, (2) stabilization of the site and the buried waste to preclude ongoing active maintenance, and (3) the provision of surveillance and monitoring activities over a period long enough to show that the site conforms to expectations. The National Conference of Radiation Control Program Directors has recommended bonding and perpetual care trust funds as a means of assuring such funding (CRCPD,1976). The NRC, in their proposed regulation (NRC,1979b) concurs with this concept and discusses several financial surety arrangements, such as bonds, cash deposits, certificates of deposit and letters of credit, which would be acceptable.

The characteristics of a proposed site must be investigated in sufficient scope and detail to assure that the objectives discussed above can be met, as well as allowing a thorough evaluation of the site. These characteristics include, but are not limited to, demography, hydrology, geology and meteorology, and are discussed below:

a. For an adequately sized site, the facility should be sited in a relatively low population area and must be evaluated with respect to the present and future character and activities of the population in this area. This evaluation should also include the present and projected uses of the land, water and other natural resources of the area, and the proximity and type of transportation routes available for the shipment of LLW.

b. The site should be chosen so that the hydrogeologic environment of the area surrounding the disposal site will act to prevent or minimize the migration of waste through groundwater pathways. Site characteristics desirable in achieving this include low groundwater flow rates and soil properties which would adsorb the waste material, if it were released.

c. The facility should not be located in an area where surface geologic processes such as erosion, landsliding or weathering could significantly enhance the hydrogeological transport of LLW from the site. The site should not be located near a capable fault such that the migration of waste could increase as a result of seismic activity.

d. The local meteorology must be studied to assure that rain-water intrusion or wind erosion will not enhance the migration of waste to an unacceptable level. This study will also characterize local atmospheric dispersion to allow assessment of the off-site environmental impact from airborne releases.

The application for a LLW facility license will include a safety and environmental report to meet the requirements of the NRC and the National Environmental Policy Act (NRC,1979b). This report will contain a full evaluation of the candidate sites and the rationale for choosing the proposed site. The results of the technical and environmental studies, as described above, will be documented in this license application, along with a complete description of the proposed method of operation.

APPENDIX F. THE NEED FOR EDUCATION

Sucess of a LLW management program hinges on securing a suitable means of treatment and a site for disposal. Although waste volume reduction requires less space and less long-term monitoring than a shallow landfill operation, the task of securing an appropriate location for either operation is likely to be difficult when there is widespread fear of anything radioactive or nuclear. Any LLW management proposal should include a plan that will help change this misconception, reducing fear through better understanding of the issues. Thus, an education program must be an integral part of the overall program for waste management.

F1. Perspective on Radiation and Radioactivity

While the use of radioactive materials must be strictly controlled to prevent excessive releases to the environment, it should be borne in mind that the environment is naturally radioactive. One of the ways to assess the significance of the disposal of LLW is to compare the radioactivity of LLW with this naturally occurring radioactivity. The latter radioactivity includes radioactivity in the air as radioactive gases or particles, in the ground, in rain water and ground water, in building materials, in food, and in the human body. The amounts and concentrations of this radioactivity vary appreciably in different locations. The naturally occurring radionuclides also differ greatly in their toxicities, and include some radionuclides that rank among the most hazardous as well as others that rank among the least hazardous.

Natural radioactivity in the environment originates from a variety of sources. The most significant are the radionuclides potassium-40, uranium-238, and thorium-232, produced when the universe was created billions of years ago, and remain in significant quantities today because of their long half lives (greater than a billion years). When they decay, they are followed by additional radioactive products with shorter half lives, such as radium-226 (1600 years) radon-222 (3.8 days), polonium 214 (0.00016 seconds), and polonium 210 (138 days). Except for potassium-40, the preceding radionuclides emit alpha radiation and are considered to be highly toxic.

All of the above radionuclides except one are solids and are distributed throughout the ground, from which they are taken up by vegetation or dissolved in ground water. One radioactive decay product, radon-222, is a noble gas. While it originates from the decay of the radium in the ground, it diffuses out of the ground and reaches significant concentrations in the atmosphere, particularly when the air is still. Radon also diffuses into homes, where the concentrations depend on the ventilation. The highest concentrations occur in homes that have little air exchange with the environment, such as homes in cold climates sealed to reduce heat losses. The decay of each radon atom is followed by 6 successive decays, producing radionuclides which emit alpha, beta and gamma radiation. The decay products are found in the ground, food, and water, and form radioactive aerosols in the air which are breathed in and retained in the lungs.

Radionuclides are also generated continuously from the action of cosmic radiation on elements in the atmosphere. The most significant are carbon-14 and hydrogen-3 (tritium). Both emit very low-energy beta particles and are among the least hazardous of radioactive materials. The radiation dose to each person from carbon-14 is 0.7 mrem[3]/year and from tritium, 0.001 mrem/year.

The cosmic radiation and the gamma radiation emitted by radioactive materials in the ground are responsible for large differences in radiation doses in different places. For example, at an altitude of 1.6 km (1 mile), the annual cosmic-ray dose of 45 mrem is greater by 17 mrem/year than that at sea level. Annual radiation doses in the U. S. (including both terrestrial and cosmic radiation) range in various locations from 32 mrem to 197 mrem, a total difference of 165 mrem. Residents of the city of Denver receive a whole body dose of 125 mrem/year compared to 65 mrem/year for inhabitants of the Atlantic and Gulf coastal states and 80 mrem/year for the majority of the U. S. population. Neutrons, not included in the above dose values, contribute an additional annual 30 mrem at 1.6 km and 6 mrem at sea level.

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[3] The quantity of radiation dose that places all radiations on a common basis for assessing biological effects is called the dose equivalent. The unit of the dose equivalent is a rem. 1 mrem = 1 millirem = 1/1000 rem.

There are also large differences in radioactivity in the air, due primarily to the naturally occurring radioactive gas radon-222. Concentrations of radon-222 in outdoor air range from 20-1000 picocuries[4]/cubic meter. The corresponding average dose rates to the lungs range from 20 mrem/year to 1000 mrem/year. Variations in radium-226 content in the diet produce variations in the dose to bone of about 10 mrem/year around an average bone dose of 100 mrem/yr.

Typical levels of radioactivity in the ground and in the air are given in Table 3. These levels are quite significant, and it is important to note that these radionuclides are not encased in containers but are truly accessible to ground water, to food crops, and to the atmosphere.

Despite the large differences in radiation levels, very few people give any thought to natural radioactivity in selecting a place to work or live. There is no evidence that these variations are significant in affecting the incidence of cancer or other diseases. In any event, there is little one can do to control population exposures from these sources.

Because of the natural abundance of radioactive materials, the disposal of sufficiently small quantities of radioactive materials in the ground and via the air would not produce changes that would be considered significant in view of the variations in the existing levels. The highest radiation dose to which any member of the public would be exposed by a properly managed LLW program should not exceed 5 mrem/year.

Of course, the existence of natural levels of radioactivity does not give license to pollute indiscriminately. The potential release of low levels of radioactivity should be weighed against the benefits to society from the activities that produced this radioactivity. Finally, releases should be reviewed for compliance with the ALARA principle which requires that the discharge of pollutants to the environment be kept As Low As Reasonably Achievable and not merely in compliance with pollution regulations.

Inclusion of this discussion on natural background radiation serves as an example of the kind of information needed in an education program to improve understanding on the safe disposal of LLW.

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[4] A picocurie is 1/1,000,000,000,000 of a curie and is equal to 0.037 nuclear transformations per second.

Table 3. Radioactivity in the Environment and in People from Naturally Occurring Long-Lived Radianuclides[a]

Radionuclide	Half-life	Global Inventory	Activity in Soil to depth of 2 meters		Concentration		Activity in Body
			1 acre	1 square kilometer	Air	Water	
	years	millions of curies[b]	millicuries[c]	millicuries	picocuries[d] per cubic meter	picocuries per cubic meter	picocuries
Alpha-Particle Emitters							
Uranium-238	4.5 billion		10	2,500	0.00012		26
Thorium-232	14 billion		10	2,500	0.00003		
Radium-226	1600		10	2,500	0.00012	1,000-10,000 (well water)	120
Radon-222	3.82 days	25 (atmosphere)			70.		48
Polonium-210	138 days	20	13	3,200	0.0033	100	200
Beta-Particle Emitters							
Potassium-40	1.3 billion		80	43,000			130,000
Carbon-14	5730	300					87,000
Hydrogen-3	12.4	34 (natural) 1700 (fallout, 1980)			0.038	6,000-24,000	
Lead-210	22.3						

[a] Sources: UNSCEAR (1977); NCRP (1975)

[b] See footnote No. 1 for definition.

[c] A millicurie is 1/1000 of a curie and is equal to 37,000,000 nuclear transformations per second.

[d] See footnote No. 4 for definition.

F2. Implementation of Education Program

A single state agency should be charged with design of the education program, coordination of information and implementation of the plan. Although a consortium of users might provide educational services, the public is more likely to trust a state agency with fewer specific stakes in the outcome. Funds for the program, however, might be provided partially or wholly by a consortium of users. Responsibility for this program demands more than public relations skills; the coordinator of the effort must be included in technical and policy discussions to understand the issues and goals of the LLW management program.

F3. Audience

The education program should reach several sectors of society: the general public and state and local officials, few of whom understand the issues or the impacts of failure to act; and the LLW generators, who should be encouraged to consider a full range of treatment and disposal options.

The aim of the education of the general public should be to dispel the widely believed myths about anything labeled radioactive or nuclear and to provide a perspective on society's need to handle its wastes properly. Most believe all radioactive products to be equally threatening to public health and the environment. Many believe that the solution to radioactive waste disposal is simply to cease production of such waste, unaware that LLW is a by-product of quality-of-life maintenance and safeguards: health care, research and a number of consumer goods. The public should realize how failure to assume this responsibility would affect their lives.

Local and state officials, who will ultimately make decisions about location and operation, need to be informed about the technological soundness and the safety of processing and disposal facilities. Mechanisms that reduce risks and that offer safeguards and benefits to potential host communities should be explored by the appropriate decision-makers.

F4. Approach to Public Education

An emerging question in the public mind might well be: "Why are we concerned about LLW treatment and disposal now"? That question should be

answered truthfully: present disposal sites are thousands of miles away and closing their services to out-of-state wastes. Massachusetts has not taken responsibility for its own waste in the past, and is now forced to do so.

Unfortunately, this awareness effort comes at the same time as an awareness effort for hazardous waste, and neither can wait for the other to be resolved. Although the two might be handled technologically as one, with common issues and solutions, it may be that neither can bear the millstone of public fear of the other. Responsible officials in each area believe that management plans will be more readily implemented if the programs "go public" separately. Because the volume and variety of LLW is much less than that of hazardous chemical waste, the public might be more receptive to dealing with LLW.

The primary goals of the public education program are (1) to assuage public fears about radioactivity and (2) to explain why in-state or regional treatment and disposal are necessary. Dissemination of information for the enlightenment of the public may include several routes, as follows:

a. Talent bank and speaker's bureau of advocates who are not known advocates of other nuclear uses: hospital personnel, researchers and other users as well as people who do not have a private stake in the issue. These advocates might appear before a variety of group meetings, offering a new perspective.

b. Workshop for media people to inform writers and commentators of the spectrum of issues that surround LLW management.

c. Contact with environmental groups and trade organizations and their publications, offering information and articles about LLW generation and solutions to treatment and disposal problems.

d. Displays in public places of consumer goods and health care uses that produce LLW.

F5. Education Relative to Facility Siting

Although a public education program might successfully convince people that an in-state or regional waste managment facility is needed, it does not counter the typical "But not in my town" response. Any particular facility

proposal is likely to face local opposition as communities weigh their stakes in the issue. Any specific proposed community perceives local costs from hosting the facility (in the form of possible property value losses, public service costs, and the fear engendered by the proposal) to be greater than local benefits. Total benefits are dispersed throughout the state, benefiting all who might have suffered from improper disposal, and more directly, eliminating the cost and inconvenience of hauling long distances.

Although NRC (NRC,1979b) specifies that disposal facilities shall be sited on land owned by the federal or state government, and does not specifically require local approval, local opposition to any proposal can be expected, employing a variety of effective techniques to discourage site assignment. To effect a change in local attitude, the balance of costs and benefits to communities must be changed allowing specific benefits to accrue to the community under consideration.

Greatest costs to a specific community are in the real and perceived risks inherent in any treatment or disposal facility proposal. Historically communities have been offered little compensation for assuming these risks. The proper approach to local siting lies in reducing the risks (which cannot be reduced to zero) of hosting the facility through prescribed conditions and monitoring agreements, and also in increasing the benefits to the community to make the proposal attractive for local consideration.

A variety of mechanisms to reduce risks and to compensate communities for taking risks have been summarized in "Siting Options for Hazardous Waste Facilities" (Stelluto and O'Hare, 1980); these include: assuring proper construction and operation of the facility through regulations; technical planning assistance and expertise of state officials; mitigation techniques of over-design, monitoring and paying the cost of public service impacts; compensation through recreation facilities, employment programs, public works projects and payment in-lieu of taxes or handling fees; and insurance for health, liability and property value losses.

By using a process of negotiating for conditions agreeable to the community and the developer, the community will receive a properly controlled and supervised facility with appropriate compensation for costs incurred. In

return, the developer should not be tied up in court fighting obstructionist suits, nor forced to pay exorbitant compensation.

Negotiations for conditions and compensation should take place between the facility operator and the community involved, establishing a line of communication that may be the key to siting and to cooperation during operation. Compensation should be paid by the facility operator, who can legitimately pass costs along to the consumers of the waste generators, the consumers being beneficiaries of the host community's agreement to host the facility. The caveat to this scheme is cost containment by all parties, communities requesting only realistic compensation. LLW generators operate within given budgets and too great demands on their resources could result in reduced services, affecting the production of consumer products.

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