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SURFACE WASTE IMPOUNDMENTS IN MASSACHUSETTS
A BRIEF SURVEY REPORT

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SURFACE WASTE IMPOUNDMENTS IN MASSACHUSETTS - 1980

A SURVEY REPORT

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MASSACHUSETTS SURFACE IMPOUNDMENTS ASSESSMENT

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
Office of Planning and Program Management

This Report is accompanied and illustrated by USGS Water Resources Investigations, Open File Report 80-431: Distribution of Aquifers, Liquid-waste Impoundments, and Municipal Water Supply Sources, Massachusetts, by David F. Delaney and Anthony Maevsky. Impoundment locations and water supply information on that map were furnished by Massachusetts Surface Impoundments Assessment staff, in cooperation with other DEQE personnel.

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Surface Waste Impoundments - What Are They?

A surface waste impoundment is a pond, basin, excavation, or pit, intended or used to store, process, and/or dispose of some form of liquid or semi-liquid material. It may be lined or not. It is wider than it is deep. Its bottom is in contact with the soil or bedrock. Most seem to be settling basins designed to remove solid materials suspended in liquids. Liquids are either decanted off through a pipe into some stream or water way (in which case they need an NPDES permit), or into a septic system and leach field, or into the ground. Also included in the survey in Massachusetts are rapid sand filters, through which sewage effluent is discharged into the ground, and sludge drying beds. Excluded were concrete-lined municipal wastewater treatment plant lagoons and basins, and concrete and steel tanks.

Why Be Concerned About Them?

Surface waste impoundments are typically unlined, unmonitored, and situated over porous sand and gravel soils. They are usually designed to leak, to dispose of a variety of fluids. Frequently, the soils into which they seep are either water supply aquifers or recharge areas for such aquifers. Contamination of groundwater is slow, is not usually noticed until a drinking water supply well is contaminated and is slow or impossible to clean once contaminated.

Background and Funding

In the early 1970s, the U.S. Environmental Protection Agency (USEPA) became concerned about the quality of groundwater in this country. They employed the firm of Geraghty and Miller to review groundwater quality in the United States. Geraghty and Miller reported that surface waste impoundments seemed, nationwide, to be one of the major problems. A subsequent G & M study, Surface Impoundments and Their Effects On Groundwater Quality in the United States - Preliminary Survey (1978), provided a more refined estimate. The USEPA then funded a nationwide study, of which this report is part, as 100% Federal grants under Section 1442(b)(3)(c) of the Safe Drinking Water Act. Every State and Territory was included. The State reports will be reviewed by USEPA, and a synoptic National Report will be produced, in the winter of 1980-1981.

Methodology

In Massachusetts, the Department of Environmental Quality Engineering's Planning Office received the Surface Impoundment Assessment (SIA) grant in August 1978. Our primary task was to locate surface waste impoundment sites in the Commonwealth, to typify them according to a group of categories supplied by USEPA, and to identify owners and operators of the sites. A secondary task was to provide additional information on a number of randomly selected sites. In particular, USEPA wanted sites evaluated by the LeGrand System of

groundwater pollution potential evaluation. Having agreed to evaluate 55 such sites, Massachusetts eventually assessed all sites located.

Sites were located initially using aerial photographs already in existence. Eighty-nine percent of the State was examined by EPA's Environmental Photo Interpretation Complex, using a 1969-1978 data base from which the most recent available photography was selected. Eleven percent was examined by SIA project staff, using 1979 USGS mapping photographs, and DPW and Coastal Zone Management photographs. Possible impoundments and possible landfills were located, transferred to 7½' USGS quadrangle maps and overlays, and checked with DEQE Regional Staff. Additional sites and tentative operators were added. A questionnaire was prepared and sent, with a copy of the pertinent map information, to local water supply superintendents. Sixty-seven percent of these were returned. Geological consultants Dr. A. N. Genes and Dr. T. Brewer reviewed the materials, elicited telephone replies from some of the non-respondents, and then field-checked 290 of the sites. Additional sites were field-checked by David Delaney of the USGS. Some were discarded, as not suitable for inclusion as impoundment sites under assessment criteria. All 316 remaining sites were evaluated by the LeGrand System.

The LeGrand System is presented in detail in Silka & Swearingen, 1978, A Manual for Evaluating Contamination Potential of Surface Impoundments, EPA 570/9-78-003. We briefly review it here. Using a set of matrix tables, the system assigns numbers and letters as follows: Step 1 (9 points) describes the unsaturated zone in terms of porosity and depth to water table; step 2 (6 points) evaluates transmissivity and thickness of the water table aquifer; step 3 (5 points) notes the quality (in terms of Total Dissolved Solids, TDS); step 4 (9 points) rates the potential groundwater contamination hazard from the known or estimated most critical waste processed in the facility; step 5 (29 possible points) adds together the ratings of the first four steps to produce a "total groundwater contamination potential" score; step 6 rates distance from the waste impoundment to water supply wells or surface waters; step 7 assigns a "degree of confidence rating" to each of the first four steps; and step 8 refers to local conditions (such as karst topography, etc.) of special significance to groundwater conditions.

It is important to stress that this study is intended to locate waste impoundments and to identify potential problem sites. It provides what EPA has repeatedly called "first-cut data", to ascertain the nature of groundwater problems related to waste impoundments. The LeGrand System is useful for establishing a priority list of sites to examine in further detail, using in particular step 5 ratings and "distance to water supply" step 6 numbers. For example, the highest step 5 rating possible is 29. It was the consensus of the Advisory Board that sites ranging from 25 to 29 would receive the highest priority for further investigation, and that nearness to water supply and type of materials impounded would serve as secondary characters to further prioritize this step 5 group of sites. DEQE's recent discovery of widespread groundwater contamination has emphasized the urgency of providing some such "quick review" numbers. DEQE is currently engaged in the examination of high priority sites.

Review of Results

We located 1,962 waste impoundments at 316 sites by the conclusion of the review period discussed here. Numbers of sites and impoundments are presented by category in the Tables following this summary. General characteristics are discussed below.

Mean step 5 (total contamination potential) rating of all impoundments is 23. Mean step 4 rating (waste hazard) is 5. Seventy-six percent of impoundments for which data are available have no liner. Ninety-two percent of these impoundments have no provision for monitoring potential groundwater contamination. Six percent are upgradient and within 200 metres of a drinking water supply well; 20 percent are within 1600 metres, and upgradient of wells. Forty-five percent are upgradient of and within 200 metres of a watercourse; 62 percent are within 1600 metres. Forty-five percent of the sites are at facilities with NPDES permits. Mean age of these sites is 22.3 years, based upon sites for which age data were available. Mean area per site is 3.64 acres, based on available data. Certain Massachusetts waste impoundment statistics are compared with preliminary statistics for New England in Table Two.

All 316 sites have been assessed by the LeGrand System. Eleven sites were reported as showing groundwater contamination. This figure is misleading, because only 25 of the 316 sites have monitoring wells, and 8 of those 25 showed contamination. Projection of the percentage of sites showing contamination per site having monitoring wells suggests a possible 101 sites which may show contamination of groundwater, due to waste impoundments. Such projection based upon rudimentary data available through a study such as the SIA is of course problematical. It is indicative, not definitive, of the possible true situation.

Massachusetts has groundwater of high quality, particularly when compared with groundwater nationwide. It moves primarily through narrow, shallow glaciofluvial and ice-contact deposits of sand and gravel, as depicted upon the accompanying map, and is replenished by the abundant local precipitation. These shallow aquifers can be easily contaminated, as evidenced by numerous recent closings of municipal and private wells. Most impoundments are located above such shallow aquifers, as shown on the map, and pose the potential threat of aquifer and recharge area contamination.

During the course of the SIA, it became evident that there is considerable potential in Massachusetts for groundwater to become contaminated. We looked at waste impoundments (as a class, systematically), for perhaps the first time, during a period when numerous public water wells were discovered to be contaminated. Twenty-one of these were summarized in the Special Legislative Commission's report, Chemical Contamination. Five of the twenty-one are directly linked to impoundments. We found five additional instances of reported contamination of wells. Seven sites rated 25 or above in step 5 are within 200 metres of a water supply well and upgradient of it; seven more rated between 22 and 25 are in the same category. These sites have been or are being examined in detail by this Department. The real groundwater contamination problem due to waste impoundments is unknown because (as shown in Table Two) ninety-two percent of the impoundment sites

do not have monitoring wells. This is true for Massachusetts and New England in general.

It is the consensus of the SIA Advisory Board that a coordinated groundwater policy be developed in the Commonwealth. Each of the agencies represented on the advisory board has sustained or is initiating groundwater reconnaisance or protection programs, but nowhere has there been in a single agency or interagency board, an overall systematic scheme for groundwater protection. It must be added that the same situation has existed at the Federal level. That issue is addressed in our 1981 "State/EPA Agreement". The SIA, in addition to its overt functions, has served as a mechanism to focus attention on this general question of groundwater significance. This has already resulted in the formation of an interagency Groundwater Steering Committee, under the Water Resources Commission.

There is a strong need for state regulation of impoundment sites. Leaching impoundments are sited precariously close to water supplies. There are inadequate groundwater quality monitoring systems at impoundment sites. Impoundments have breached into surface waters due to insufficient freeboard to accommodate precipitation and storm runoff. Some impoundments have been abandoned, with hazardous materials in them. Some have been inadequately fenced. Their existence has sometimes been unknown or known only locally. Some have been filled in, leveled, and built upon. Aerial photographs have shown abandoned and forgotten impoundments at known sites. Sludge from the impoundments has in many cases been "landfilled" or buried on site. This is of particular concern in some industrial settings. "clean" septage, lagooned and landfilled, may also prove more hazardous than thought because trichloroethylene and some other chemicals used as septic tank cleaners are denser than water and would tend to settle in the tank and into the septage. Reports from other states show that this may be the case.

Presently, impoundments are monitored under the NPDES system when they discharge directly to surface waters. They are regulated when they violate surface water or air quality standards, when they are sloppily maintained and in public view, or when they for some other reason come to the attention of local public health officials or DEQE Engineers, who otherwise are not presently charged with regulating them. Massachusetts currently has sufficient authority to regulate surface waste impoundments under a variety of statutes. DEQE is the chief empowered regulatory agency. At this writing, we do not have specific regulations governing most waste impoundments, but are in the process of developing them. DEQE does have permitting criteria for septage lagoons.

Regulations for waste impoundment sites are addressed under the Resource Conservation and Recovery Act, the related Massachusetts enabling legislation of DEQE's new Division of Hazardous Waste, and the Massachusetts Clean Water Act establishing DEQE's Division of Water Pollution Control. DEQE is the single agency charged with enforcement under both Title C (hazardous wastes) and D (solid wastes) of RCRA, and is currently developing related regulations. Because most impoundments are "dewatering" devices, and produce a sludge which must be disposed of, it is felt that it

would be appropriate to regulate them under RCRA through DHW. Municipal sewage treatment impoundments will be regulated under RCRA through DWPC.

SIA work has located possible landfills as well as impoundments, both of which will become part of the open dump inventory. SIA Staff have also referred potentially hazardous sites to DHW and the Regional Engineers. We have worked on aerial interpretation of known hazardous waste sites with impoundments, for DHW and DWPC. We have, in other words, made every effort to integrate RCRA (as established in Massachusetts) and the SIA.

We are concerned about the potential impact of EPA's urging, under the new emphasis on land application, to consider rapid sand infiltration as an alternative method of wastewater disposal. Otis Air Force Base on Cape Cod has such an installation. It is one of our more extensively polluted sites. New England does not generally have unsaturated zones of sufficient depth, nor soils of the capacity, to attenuate pollution and contamination.

Recommendations

Our recommendation of the highest priority is that Massachusetts develop a coordinated and comprehensive groundwater protection program. Only through such a program can the continued purity of our groundwater reserves be adequately preserved.

Our second recommendation is that DEQE prioritize and review sites for enforcement action, taking such steps as are immediately available to secure and regulate dangerous sites. There are 83 sites in our highest priority range (7 upgradient of water supply wells). Fifty-nine in this second range are municipal, 35 industrial.

Third, it is apparent, as related above, that regulations for waste impoundments are in order. Such regulations must include criteria for technical design, siting, hydrogeological review, operation, and groundwater monitoring. The last is of major importance because otherwise our first indication of a problem is contamination of water supply wells or of surface waters through groundwater discharge. It is particularly important that the provision for adequate groundwater monitoring not be suspended for existing sites. Of course, because of time considerations and expense involved, it may be necessary to delay enforcement of this provision. In order to not create inequitable conditions in this regard, we urge that EPA encourage nationwide enactment of such a regulation.

It is suggested that sludge disposal regulations should address the question of landfilling sludge from impoundments. This is particularly important because many private impoundment installations dispose of sludge on site, because of the nature of sludges produced at such sites, and because of our shallow water tables.

Of major value to a comprehensive groundwater plan and to continued surveillance of potential contamination sites is a file of information equally accessible to both Regional Engineers and Central DEQE staff. The SIA has provided a model in the automated data processing of forms returned to EPA.

We recommend that DEQE ensure compatibility of this information to be developed, with the existing SIA file. We urge that the Commonwealth give consideration to use of the system 2000 base for filing this new information. We recommend that EPA consider supporting such a centralized file for these projects as it has for the SIA. We recommend that EPA act to ensure compatibility between air program and water program data.

Funding of groundwater quality monitoring programs is essential to the success of any groundwater protection program. This involves considerable expense. We urge that EPA develop some means of assisting states and industry pay the cost of this monitoring - in terms of helping support testing facilities and personnel, as well as in the initial installation of necessary wells.

Abandoned sites pose a major potential problem in terms of contents, knowledge of operations, and liability for cleanup. It has also been increasingly apparent that one of the more "cost-effective" ways for unscrupulous operators of hazardous waste facilities or the only recourse for operators of financially marginal sites when faced with the additional cost of adequate safeguards, is bankruptcy. This absolves the owner of financial obligation, and requires that the State pay for cleaning and securing the facilities to eliminate threats to Public Health. This is a problem which transgresses state and national boundaries. We therefore urge that EPA investigate the possibility of sponsoring a "Public Health and Safety" amendment to the federal bankruptcy statutes, to make the State prime creditor of the bankrupt hazardous waste facility.

Recommendations and Conclusions: Summary

At the State Level:

* Develop a comprehensive and coordinated Massachusetts groundwater protection strategy.

* Investigate high priority sites and promote enforcement action where warranted.

* Promulgate regulations for impoundments, including:

  (a) technical design criteria
  (b) siting criteria
  (c) hydrogeological review criteria
  (d) operating criteria
  (e) monitoring criteria, including wells in addition to surface effluent monitoring

(f) permit only interim "grandfathering" of existing sites

* Develop enforcement structures, including:

(a) assignment of appropriate personnel
(b) acquisition of sufficient funds for testing necessary to verify monitoring

(1) for staff
(2) for equipment and supplies

(c) train all appropriate personnel in impoundments regulations and criteria

* Develop a central file of technical information on known impoundments in the Commonwealth (as well as all other sites which might contaminate groundwater) available to all DEQE Regions and Divisions.

* If it is decided to develop computer capability for adequate. accurate, and accessible information storage and retrieval of such data, we recommend "system 2000" or a system capable of interfacing with it. System 2000 has been designated as the federal interagency storage base for all water-related data.

At the Federal level: existing legislation appears adequate to regulate surface waste impoundments, provided that:

* Impoundments are regulated under RCRA.

* EPA supports funding for State measurement and testing of groundwater reserves.

* EPA establishes a nationwide program for securing abandoned sites.

* EPA encourages states to adopt uniform regulations when possible, to prevent "industrial flight" to more lenient states, where certain economical but hazardous activities may be continued.

* EPA investigates the possibility of supporting a "Public Health and Safety" amendment to Federal Bankruptcy statutes, to make the State the prime creditor of the bankrupt hazardous waste facility when operations at his facilities have imperiled or will inevitably have imperiled (given the slow movement of groundwater, it may prove useful to include this foregoing qualifier) public health.

We found the Surface Impoundments Assessment to be a productive endeavour. We believe that the data gained will prove useful in preventing groundwater contamination from impoundments, and in beginning to locate existing cases of contamination. It has helped further the cause of groundwater protection in Massachusetts.

Epilogue:

The basic work for this report was completed and submitted for review on March 31, 1980. Of the recommendations made at that time, most have been, or are in the process of being, implemented. These include:

* DEQE full examination of the sites of highest priority is in process.

* DEQE and DEM promotion of an integrated and comprehensive groundwater management and protection program is underway.

* DEQE development of waste impoundment regulations has begun.

A Request:

A study such as the Surface Impoundments Assessment, working primarily through aerial photographic data over a relatively short time could not possibly locate all surface waste impoundments in the Commonwealth. Information was particularly difficult to obtain for two categories of impoundments: 1) those abandoned (and perhaps filled) before the dates of our photographs; and 2) those new impoundments constructed since the date of our photographs (for most of Massachusetts, about 1974). If after examination of the accompanying map you observe sites not included, please advise the author of this report. Your assistance is greatly appreciated.

THE TABLES AND FIGURES

Category Designations Under Which SIA Data is Aggregated and Discussed in This Report.

Mun - Municipal Sewage Treatment Plants, <u>including</u> facilities with open-bottomed impoundments, sand filters (underdrained or not), rapid sandfilters/groundwater recharge basins, unlined settling lagoons, aeration and anaerobic lagoons, septage lagoons and pits (including those at landfills), and landfill leachate ponds; but <u>excluding</u> concrete-lined structures, and steel tanks.

IND - Industrial Facilities with waste impoundments, lined or unlined, including such features as oil separators, but excluding steel tanks.

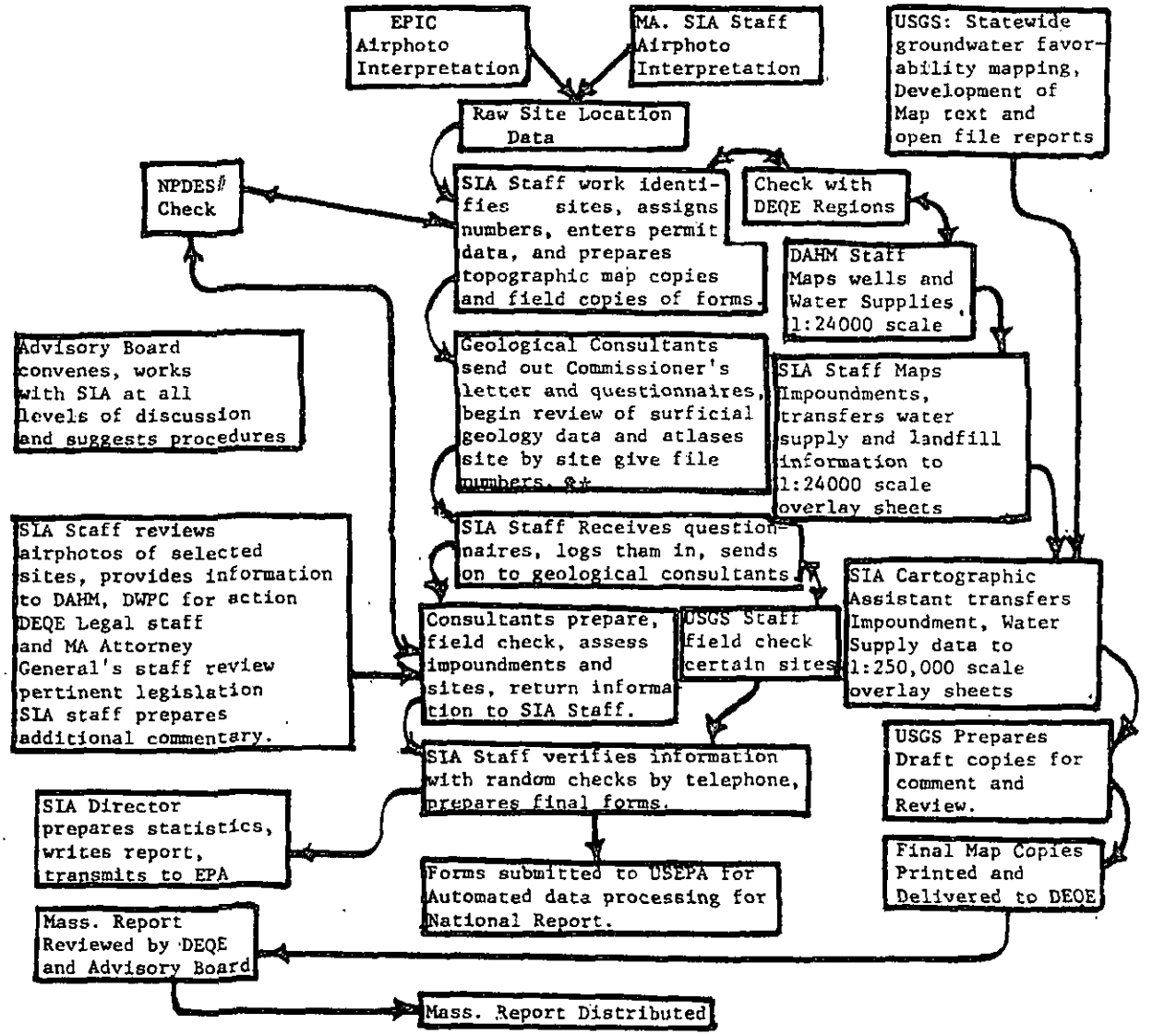
AGR - Manure pits and ponds, and some polishing ponds related to agricultural/commercial operations, such as cider mills, etc.

OTR - Institutional and commercial facilities of a wide variety, from State Hospitals and Prisons to restaurants and laundries. Where sanitary waste only was contained therein, strictures under MUN, above, were applied. Otherwise, "worst-case" possibilities were assumed, and waste hazard ratings typical for products used/produced at the facility were used, and concrete-lined facilities were included.

Other categories were those for abandoned sites corresponding, respectively, to the four given above, i.e.: AMU, AIN, AAG, and AOT.

FIGURE 1.

Massachusetts SIA Work Flow Chart



** Initial location information and draft maps were reviewed by local Water Supply Superintendents or Selectmen.

TABLE 1

Numbers and percentages of total numbers of sites and impoundments.

Category	Symbol	# of Sites	% of Total	# of Imps.	% of Total #
(Active)					
Municipal	MUN	113	36%	894	46%
Industrial	IND	101	32%	315	16%
Agricultural	AGR	6	2%	15	0.8%
Commercial/ Institutional	OTR	59	19%	508	26%
(Abandoned)					
Municipal	AMU	18	7%	151	8%
Industrial	AIN	9	3%	31	2%
Agricultural	AAG	1	0.3%	6	0.3%
Commercial/ Institutional	AOT	9	3%	42	2%
TOTALS		316		1,962	

Categories not encountered in Massachusetts (e.g., mining, MIN) are, of course, not discussed in this report. If an EPA-designated category is absent, it was not encountered in the Commonwealth.

88% of the sites and of the impoundments are currently operating; 12% have been abandoned.

TABLE 2

Comparison of certain Massachusetts SIA data with preliminary information from all of New England

	Massachusetts	New England	% of N.E. in MA.
Sites Located	316	1,321	24%
Impoundments Located	1,962	4,340	45%
Impoundments Not Lined	76%	86%	
Unmonitored Sites	92%	91%	
Sites Within 200 Metres of a Water Supply Well	6%	9%	
Sites Within 200 Metres of a Surface Body of Water	45%	48%	

* From: Chow, Silka, and Brasier. 1980. Surface Impoundments Assessment in the New England States. Delivered by Clara Chow at the Conference: Geotechnology in Massachusetts, March 21, 1980.

TABLE 3

Count of Sites and Impoundments
by Category and by Priority Rating Range

Sites:

Category	Priority Rating Ranges 25+	22-24	18-21	Below 18	TOTAL
MUN	18	59	25	11	113
IND	45	35	17	4	101
AGR	0	4	1	1	6
OTR	9	36	8	6	59
AMU	5	11	2	0	18
AIN	4	2	3	0	9
AAG	0	1	0	0	1
AOT	2	5	2	0	9
	83	153	58	22	316 Sites

Impoundments:

Category	Priority Rating Ranges 25+	22-24	18-21	Below 18	TOTAL
MUN	172	582	62	78	894
IND	134	130	43	8	315
AGR	0	13	1	1	15
OTR	76	337	49	46	508
AMU	27	66	58	0	151
AIN	22	4	5	0	31
AAG	0	6	0	0	6
AOT	2	8	32	0	42
	433	1,146	250	133	1,962 Imps.

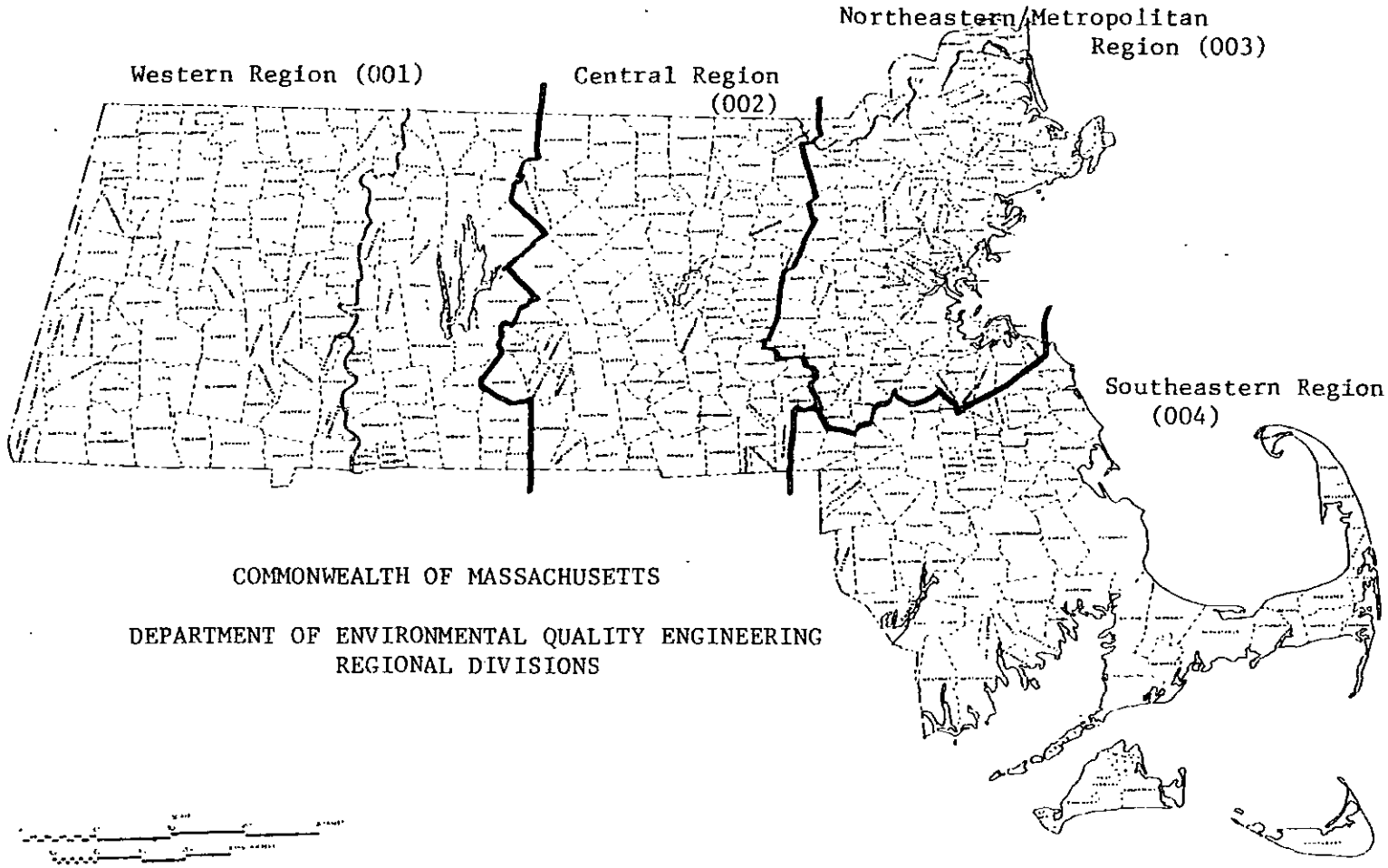

Northeastern/Metropolitan
Region (003)
Western Region (001)
Central Region
(002)
Southeastern Region
(004)
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
REGIONAL DIVISIONS

FIGURE 2.

TABLE 4

Count of Sites and Impoundments
by DEQE Region and by Priority Rating Range

Sites:

Priority Rating	DEQE Region Western	Central	Northeastern	Southeastern	TOTAL
25+	9	20	19	35	83
22-24	16	52	43	42	153
18-21	18	21	6	13	58
Below 18	2	11	3	6	22
	45	104	71	96	316 Sites

Impoundments:

Priority Rating	DEQE Region Western	Central	Northeastern	Southeastern	TOTAL
25+	49	142	66	176	433
22-24	117	487	258	284	1,146
18-21	44	133	40	33	250
Below 18	3	60	38	32	133
	213	822	402	525	1,962 Impoundments

Mean number of impoundments per site= 6.21; all categories included

TABLE 5

Impoundments Upgradient of, and Within 200 Metres of a Water Supply Well (Municipal, Public, or Private) or a Watercourse, by Category and by Priority Rating Range. (These are the sites in the "9 A" category of "Step 6", as cited in the Division of Hazardous Waste's Suspect Sites list.)

Wells

	MUN	IND	AGR	OTR	AMU	AIN	AAG	AOT	TOTAL
25+	2	5	0	0	0	0	0	0	7
22-25	3	0	1	2	0	1	0	0	7
18-21	1	2	0	1	0	0	0	0	4
Below 18	0	1	0	0	0	0	0	0	1
Total	6	8	1	3	0	1	0	0	19

Watercourses

	MUN	IND	AGR	OTR	AMU	AIN	AAG	AOT	TOTAL
25+	6	23	0	1	2	2	0	0	34
22-24	26	18	2	16	4	1	0	0	67
18-21	15	8	0	3	0	1	0	0	27
Below 18	10	1	0	2	0	0	0	0	13
	57	50	2	22	6	4	0	0	141

Those impoundment sites reported to be within 200 metres of water supply wells are identified on the next page.

TABLE 5 (Continued)

Identification, by priority rating and category number, of those sites reported to be within 200 metres of municipal, industrial, public, or private water supply wells.

PRIORITY RATING 25 AND ABOVE

MUN 00016	ID 0151	Wilbraham - Town of Wilbraham - well type not reported (N.R.)
MUN 00103	ID 0414	Mashpee - Town of Mashpee - private wells.
IND 00006	ID 0483	Belchertown - Belchertown Bulk Carriers - private.
IND 00008	ID 0033	Barre - Barre Wool Combings Ltd. - municipal well.
IND 00027	ID 0210	Acton - W.R. Grace Co. - company wells.
IND 00057	ID 0246	Tyngsboro - Charles George Landfill Trust - N.R..
IND 00060	ID 0313	Attleboro - Teknor Apex Co. - unused municipal test well.

PRIORITY RATING 22-24

MUN 00086	ID 0292	Weymouth - Town of Weymouth - municipal well.
MUN 00108	ID 0430	Tisbury - Town of Tisbury - municipal well.
MUN 00128	*ID 0388*	*Lakeville - Town of Lakeville - N.R.*
AIN 00002	ID 0018	Groton - Nielsen Molding Co. - N.R.
AGR 00002	ID 0012	Sterling - Pine Crest Duckfarm Trust - N.R.
OTR 00007	ID 0020	Shirley - MCI Shirley - municipal well.
OTR 00032	ID 0247	North Reading - J.T. Berry Rehabilitation Centre - municipal well.

PRIORITY RATING 18-21

MUN 00078	ID 0412	Eastham, Town of Eastham - N.S.
IND 00089	ID 0449	Lee - Westfield River Paper Co. - private well.
IND 00001	ID 0017	Groton - Hollingsworth & Vose Co. - N.S.
OTR 00056	ID 0441	Mt. Washington - Bridgeport, CT, YMCA camp - N.S.

PRIORITY RATING BELOW 18

IND 00100	ID 0376	Bellingham - New England Rug Co. - N.S.

TABLE 6

Numbers of sites reported as having groundwater contamination as shown in monitoring wells, test pits, and drinking water wells

Category of the sites	Monitoring wells or test pits	Drinking water wells	Total Number of Contaminated sites
MUN	1	2	3
IND	7	4	8
AGR	0	0	0
OTR	1	1	1
AMU	0	0	0
AIN	4	1	4
AAG	0	0	0
AOT	0	0	0
Total for all sites.	13	8	15

Note that occasionally categories of "Monitoring wells" and "Drinking water wells" above, overlap - that is, the same site may have contaminated wells of both types; hence, the last column of figures describes the total number of contaminated sites in each category, but is not the sum of the figures in the previous columns. Twenty-nine sites were reported as having monitoring wells. 13 sites, or 44 percent of the sites with monitoring wells were reported as having contaminated groundwater.

TABLE 7

Sites reported by SIA field investigators as having groundwater contamination related to surface waste impoundments.

Category Number	Brief Description	SIC Code	Step 4 Rating	Step 5 Rating
MUN 00047	Septage Lagoons	4953	8	28
MUN 00077	Sewage Treatment Plant, infiltration	4952	5	24
MUN 00103	Septage Pits at Landfill	4953	5	25
IND 00006	Truck Washing Co.	2869	8	27
IND 00027	Chemical Co.	2869	9	26
IND 00037	Chemical Co.	2822	9	28
IND 00038	Chemical Co.	2899	9	29
IND 00055	Power Company	4910	7	24
IND 00057	Landfill	4953	9	28
IND 00095	Chemical Co.	2819	8	25
AIN 00004	Reprocessing Co.	2899	9	21
AIN 00013	Gas Manufacturer	4924	8	26
AIN 00008	Abandoned Chemical Co.	2899	9	28
AIN	Illegal Disposal		9	28
OTR 00020	Military Airport STP	9711	8	27

These sites are discussed further in the following three pages.

Contamination Incidents.

The following are brief case histories related to groundwater contamination in Massachusetts. Several have been reported in other places, as well as here. We have designated these other sources by letters in parentheses: (E) = Eckhardt list of hazardous waste sites; (S) = Special Legislative Commission on Water Supply as reported above; (C) = consultant case studies; (U) = USGS Water Resources Division investigation; (EPA) = USEPA, Region I Surveilance and Enforcement section; (N) denotes extensive commentary on the site by newspapers, and provides some indication of public awareness of and interest in the case. These are brief case histories, intended to typify the relationship of surface impoundments to groundwater contamination. As legal action is underway or contemplated in several instances, we have elected to present minimal data here. All of these sites have been referred to the DEQE's Division of Hazardous Waste.

FRAMINGHAM - Commonwealth Gas Company AIN 00013

AIN. Gasification plant. SIC 4924. 10 impoundments, unlined; now mostly leveled and filled. Adjacent to aboveground portion of aqueduct. Division of Water Resources' Groundwater and Groundwater Law in Massachusetts says "At least 25 acres at the site are ... impregnated with oil and tar to a depth of at least ten feet, which is below water table". Phenols have been detected in the brook flowing from the site. High sulfur content of waste on the site produces a pH of 2 to 3 in surface runoff. Site has recently been cleaned of tanks and structures and offered for sale. Control efforts specified by DWPC seem to have been unsuccessful. Step 4 hazard rating = 8; step 5 = 26. (C)

EVERETT - Monsanto Chemical Company IND 00095

IND. Chemical plant, SIC 2819. One impoundment, unlined. Monitoring wells. Plasticizers made here 10+ years ago have been reported in the groundwater at the site. Adjacent to an estuary. Step 4 rating = 8; step 5 = 25. (E).

CAMBRIDGE - W.R. Grace Company IND 00037

IND. Chemical plant, SIC 2822. At least seven impoundments, some abandoned. According to airphoto history, virtually all the site has been covered at one time or another by impoundments. Part of site was wetland, and appears to have been filled by landfilling of dewatered sludge on site. Sludge extremely acid. Adjacent to a water supply and a recreational area. Groundwater movement in area is being studied by (C). On (E) list, and discussed in (S) and (N). Monitoring wells on site, more being installed. Step 4 rating = 9; step 5 = 28.

WILMINGTON - Stepan Chemical Company IND 00027

IND. Chemical plant, SIC 2869. Seven impoundments, four of them abandoned. Old impoundments unlined; new impoundments plastic membrane lined - membrane has ruptured. Sludge disposal on site. (C) study for DWPC showed high chromate, ammonia, sulfate, other dissolved solids, and low pH. Extensive ground and surface water contamination. (C) study did not pick up one of the abandoned and filled impoundments. Old airphotos show a large part of this site to have been marsh and wooded swamp before this plant was constructed. Recent EPIC airphotos reveal considerable vegetation damage of the sort indicative of the type attributable to groundwater contamination. Step 4 rating = 9; step 5 = 28.

ACTON - W.R. Grace Company IND 00038

IND. Chemical plant. SIC 2899. Nine impoundments, unlined. More than 50 monitoring wells installed by (C) reveal extensive contamination of groundwater, at all depths, to bedrock. Company landfill on site may be a source of additional contamination. Two downgradient municipal wells closed by DEQE, due to chemical contamination. Relationship of plant and impoundments to wells under study by (C). Discussed in (S). Step 4 rating = 9; step 5 = 29.

TYNGSBORO - Charles George Landfill Trust IND 00057

IND. Landfill with a large leachate lagoon. SIC 4953. Was a licensed hazardous waste landfill. Reports and corrective action by (C) currently in progress. Site was lined with 4 feet of clay. but has leachate problems nonetheless. (S) reports "some" groundwater contamination. Discussed in (N). Step 4 rating = 9; step 5 = 28.

MASHPEE - Town Landfill MUN 00103

MUN. Septage pits at municipal landfill. SIC 4953. Nearby residents allege that pollution of their drinking water wells is due to the septage pits. Site is reported upgrade of an abandoned municipal well. Step 4 rating = 5; step 5 = 25.

BOURNE / FALMOUTH - Otis Air Force Base OTR 00020

OTR. Military airport sewage treatment plant. SIC 9711. Fifty-two infiltration beds. Upgradient of municipal water supply well, which has been closed by DEQE due to contamination. More than 50 monitoring wells. Long-term study by (U) reveals leachate plume of more than 9000 feet, with a core of ammonia, and elevated levels of specific conductance, detergents, boron, and other dissolved solids. Phosphorous appears to have been sorbed close to the beds; other substances sppear to attenuate over distance. Step 4 rating = 8; step 5 = 27.

LUNENBURG - Illegal Disposal AIN

IND. Contractor disposed of industrial waste liquids in pit in his own property. Unlined pit appears to have received more than 70,000 gallons of wastes. Public water supply wells downgradient are being monitored, as well as wells closer to site. Recovery operations are underway, impeded somewhat by local fire control laws which limit the amount of flammable materials which may be stored in tanks on site. Owner very cooperative in cleanup. Step 4 rating = 9; step 5 = 28.

SOMERSET - New England Power Company IND 00055

IND. Electrical power generator, SIC 4910. Eight impoundments for high-vanadium content fly ash disposal. Recently studied by (C) and rebuilt. Old impoundments not lined; new impoundments lined, with clay and membrane and underdrained. 2 monitoring wells. Step 4 rating = 7; step 5 = 24.

AUBURN / LEICESTER - Liquid Waste Specialists, Inc. AIN 00004

AIN. Recycling firm, SIC 2899. Two unlined impoundments on leased property in a gravel pit. Studies conducted by Commonwealth and by (EPA) revealed groundwater contamination. Original investigations occured when heavy rains broached the impoundments, as liquid contained therein exceeded the freeboard. Materials flowed into nearby wooded swamp. Surface water pollution control measures were instituted. Impoundments were abandoned. Some wells in the area have been reported contaminated; test pits on site

show presence of oils. Understanding of the hydrogeology of the area is confused by the presence of similar substances in the leachate of a nearby municipal landfill. Streams from the area are eventually tributary to a public water supply reservoir. Step 4 rating = 9; step 5 = 21.

BELCHERTOWN - Belchertown Bulk Carriers, Inc. IND 00006

IND. Truck washing firm, SIC 2869. Two lagoons, one abandoned and filled. Existing lagoon lined with powdered stone. 3 monitoring wells on site. Over 150 organic compounds present in sampled material in lagoon. Owners of private wells in the area have been advised not to drink their water. Attribution of responsibility for contamination is problematical; there are 2 dry wells on site, and septic tanks with leaching beds. Discussed in (S). Extensive (N) commentary. Considerable DEQE involvement. Step 4 rating = 8; step 5 = 27.

FALMOUTH - Town Landfill MUN 00027

MUN. Landfill with septage lagoons. SIC 4953. 8 unlined impoundments. Thirteen monitoring wells. leachate present in groundwater. Not certain as to whether it is due to impoundments, landfill, or both. Town is monitoring in conjunction with DEQE. Step 4 rating = 8; step 5 = 28.

WOBURN - Industriplex 128. (Formerly Stauffer Chemical) AIN 00008

AIN. Chemical plant, SIC 2899. Now being developed as an industrial park. At least ten abandoned lagoons, some obliterated and filled. They include a sewage treatment lagoon, an insecticide manufacturing (lead arsenate) lagoon, a sedimentation lagoon containing high amounts of chrome, and an indeterminate number of offal pits. All major lagoons appear to have been built on wetlands. All lagoons and pits were unlined. Piles of assorted chemicals are dispersed about the site. SIA staff has done considerable interpretation of aerial photography for and mapping of this site and relayed information to the DEQE personnel concerned. EPA,, DEQE, US Army Corps of Engineers, developer, town officials, and the state Attorney General's office have been involved; a consent decree for development has been negotiated. Studies are underway by all of above, and by USEPA Washington, as well as USEPA Region I, Hazardous Waste section. DEQE's Division of Hazardous Waste is coordinating work at the state level. (C) is engaged in "scoping" the problem. Streams flow through site; town wells below site have been closed by DEQE due to organic chemical contamination. Issue is complicated by the upgradient presence of other chemical companies and users of chemicals, by a sewer trunkline which may exfiltrate in the area, and by the complicated history of the site itself. Commentary in (N). Step 4 rating = 9; step 5 = 28.

BARNSTABLE - Municipal Sewage Treatment Plant MUN 00077

MUN. Sewage treatment plant, infiltration beds. SIC 4952. Plant disposes of effluent by infiltration into the ground through sand "polishing filters". Soil in the area is sand and gravel. Nearby residents allege that contamination of private water supply wells is due to this treatment plant. (C) study is underway at site. Step 4 rating = 5; step 5 rating = 24.