

State of Michigan's Environment 2008: First Triennial Report December 2008 Part II: Programmatic Measures

**Michigan Department of Environmental Quality
Michigan Department of Natural Resources**

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Prepared by KGH Environmental PLC

State of Michigan's Environment

Legislative Charge (1999 Public Act 195):

- Prepare a report that assesses the status of and trends related to the overall state of the natural environment in Michigan.
- The report shall be based upon environmental indicators identified by the departments of environmental quality and natural resources (DEQ and DNR) and upon data obtained through sound scientific methodologies and processes.

State of Michigan's Environment

Governor's January 28, 2000 Charge to the Michigan Environmental Science Board (MESB):

Review the list of DEQ and DNR proposed environmental indicators and evaluate each of the proposed indicators based on the following criteria:

- **Scientific basis for the use of the indicator as a measure of the quality of the environment** (i.e., does the proposed indicator describe a measure of the natural environment); and
- **Utility of the indicator** (i.e., what would it mean in terms of the quality of the environment if there is a change in the value of the indicator from one reporting period to the next).

MESB July 2001 Report Recommendations

*Recommended Environmental Indicators Program
for the State of Michigan*

(A Science Report to Governor John Engler)

*Prepared by
Michigan Environmental Science Board
Environmental Indicators Investigation Panel*

MICHIGAN ENVIRONMENTAL SCIENCE BOARD
KNAPPS CENTRE, SUITE 340
300 SOUTH WASHINGTON SQUARE
P.O. BOX 30680
LANSING, MICHIGAN 48909-8180

JULY 2001

Of the indicators proposed by the DNR and DEQ, the MESB recommended that 21 be included in the biennial report on the state's environment.

The MESB also recommended that the state begin to develop a monitoring protocol referred to as Master Stations in order to begin to systematically and consistently collect information on the state's environment.

Working Definitions

- **Environmental Indicators** are scientific, broadly based measures designed to detect and track changes in the quality of the state's ambient environment from one reporting period to the next.
- **Programmatic Measurements** are measures that, while in and of themselves may ultimately detect a change in the overall quality of the environment, are designed more to assess how well a given regulatory program is functioning to correct or control more short-term or localized environmental problems.
- **Emerging Contaminants of Concern** are newly recognized environmental chemicals and/or materials that are characterized by a perceived, potential, or real threat to human health or the environment or a lack of published health standards.

Biennial Report Measurements

- **Environmental Measures [22]***
 - Ecological Indicators (11)
 - Physical/Chemical Indicators (11)

- **Programmatic Measures [20]**
 - Air Measures (4)
 - Water Measures (7)
 - Land Measures (9)

- **Emergent Contaminants [14]****

* Fulfills the requirements of 1999 Public Act 195 and 2005 Public Act 313

** Fourteen contaminants of concern are identified

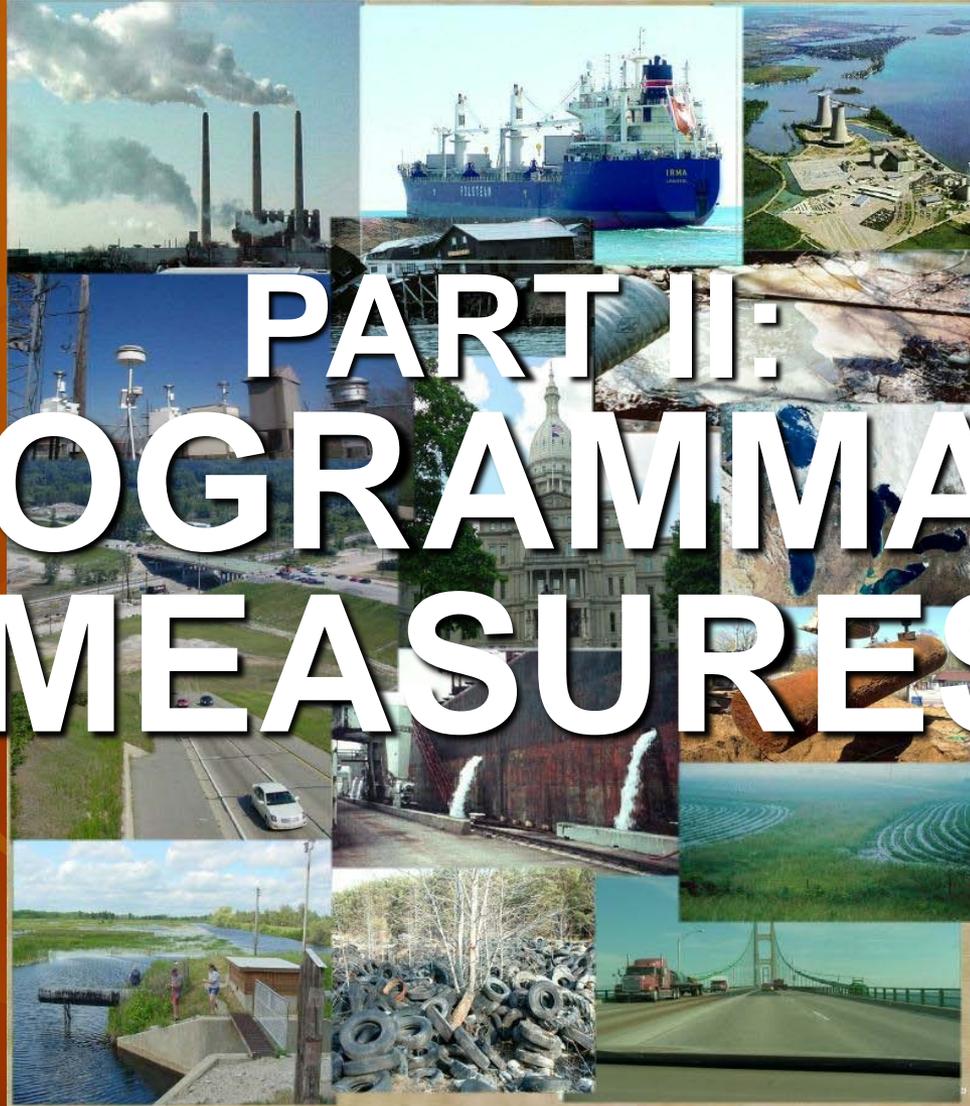
State of Michigan's Environment 2008: First Triennial Report



Submitted to the
Governor and
Legislature
December 2008

In addition to being widely distributed, the report was made available to every high school science teacher in the state to be used as teaching resource.

State of Michigan's Environment 2008: First Triennial Report



PART II: PROGRAMMATIC MEASURES

Programmatic Measures – Air Measures

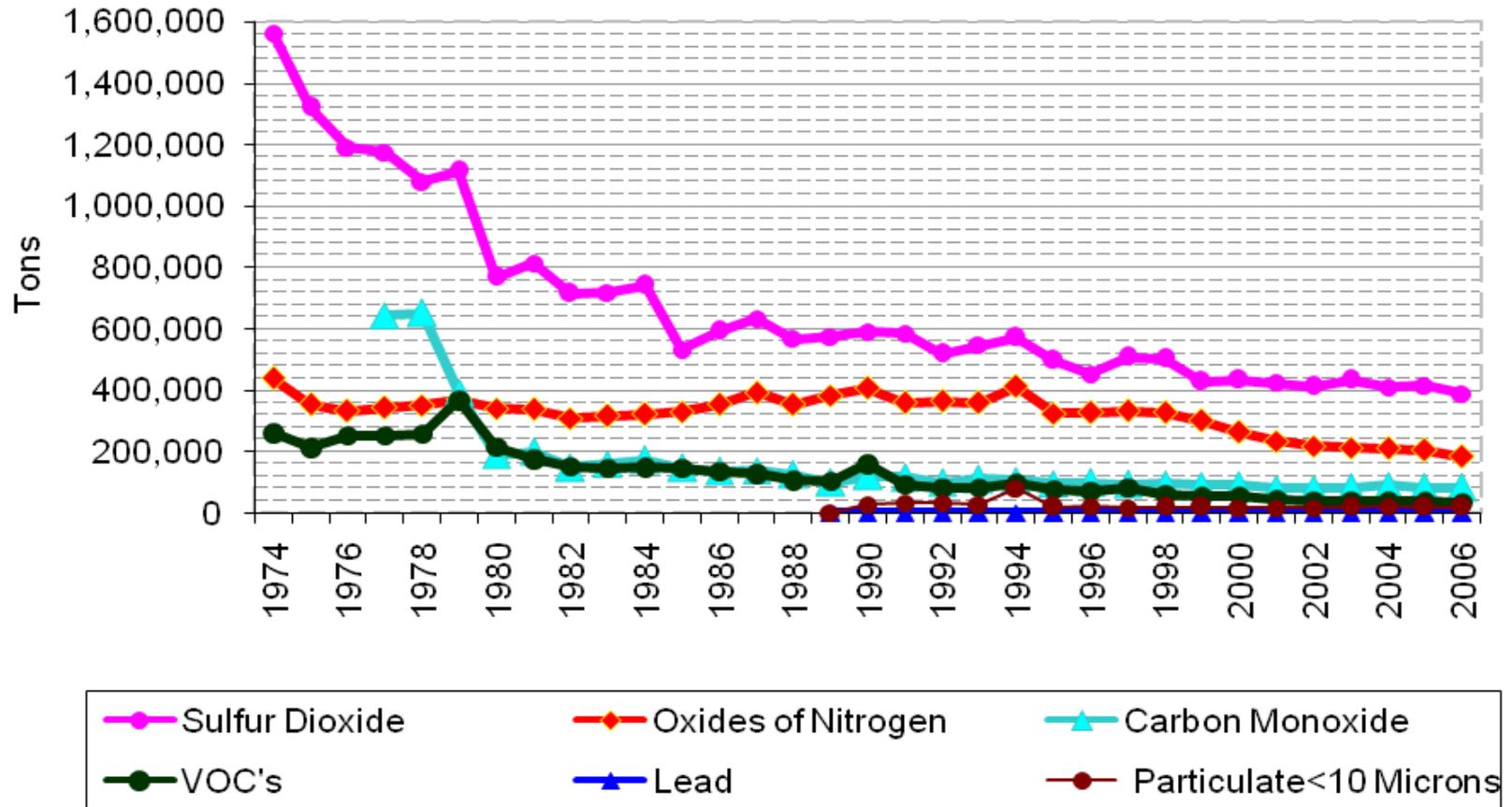
Air Emissions Estimates



- Federal Clean Air Act requires states to maintain emission inventories.
- Michigan compiles information from over 1,800 facilities.
- Air pollutant emission sources are categorized as mobile sources, large facility point sources and area sources (small industries, boats, farm equipment, etc).

Programmatic Measures – Air Measures

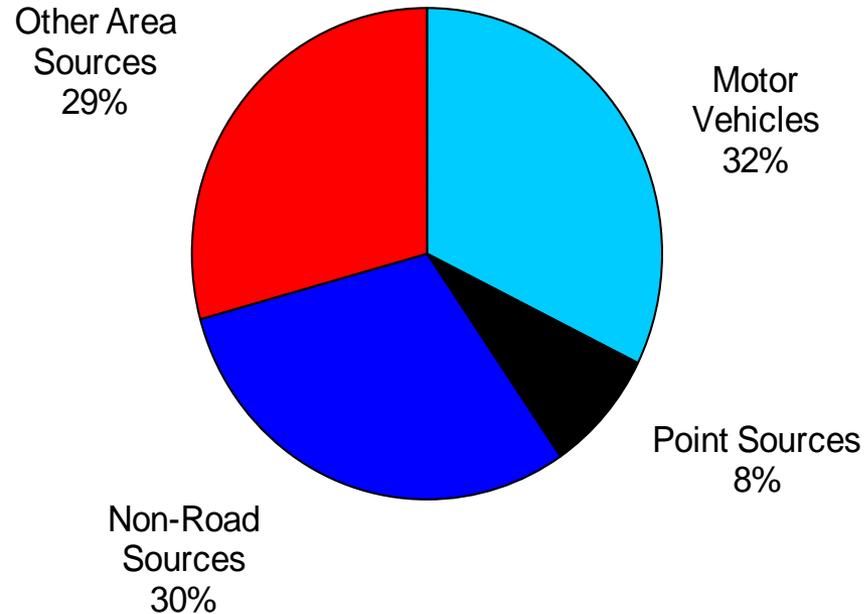
**Exhibit 64. Pollution Emission Inventory Trends
1974 - 2006**



Programmatic Measures – Air Measures

Air pollutant emission sources are categorized as mobile sources, large facility point sources, and area sources (small industries, boats, farm equipment, etc.).

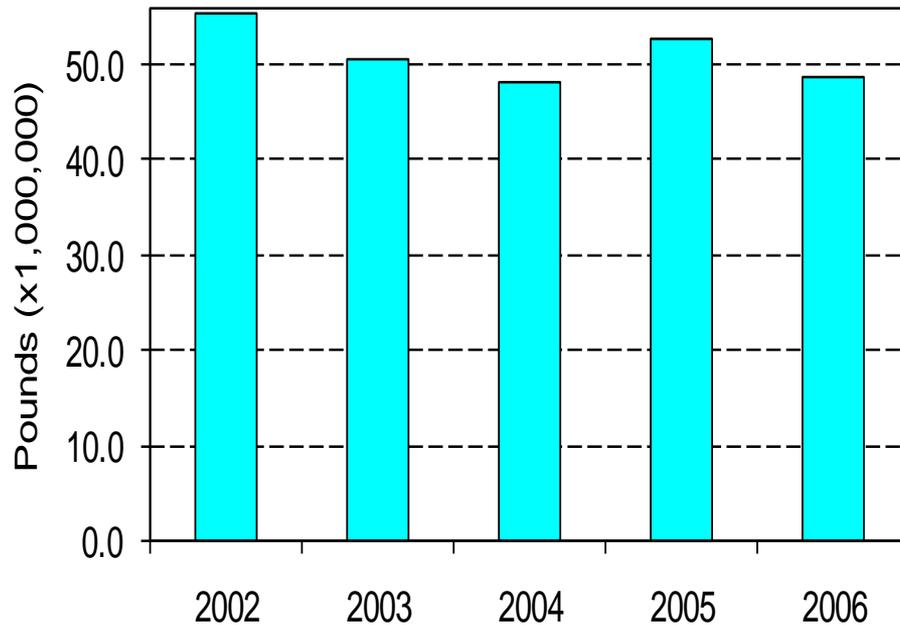
Exhibit 65. Estimated Levels of Volatile Organic Compound Emissions by Source Category



Programmatic Measures – Air Measures

Air Toxics Release Inventory

**Exhibit 69. Air Toxics Release Inventory
2002 - 2006**



- Federal Emergency Planning and Community Right-to-Know Act requires certain industrial facilities to report releases of specific toxic chemicals.
- Only facilities that exceed established thresholds are required to report.
- The reported values are estimates.

Programmatic Measures – Air Measures

Greenhouse Gas Emissions

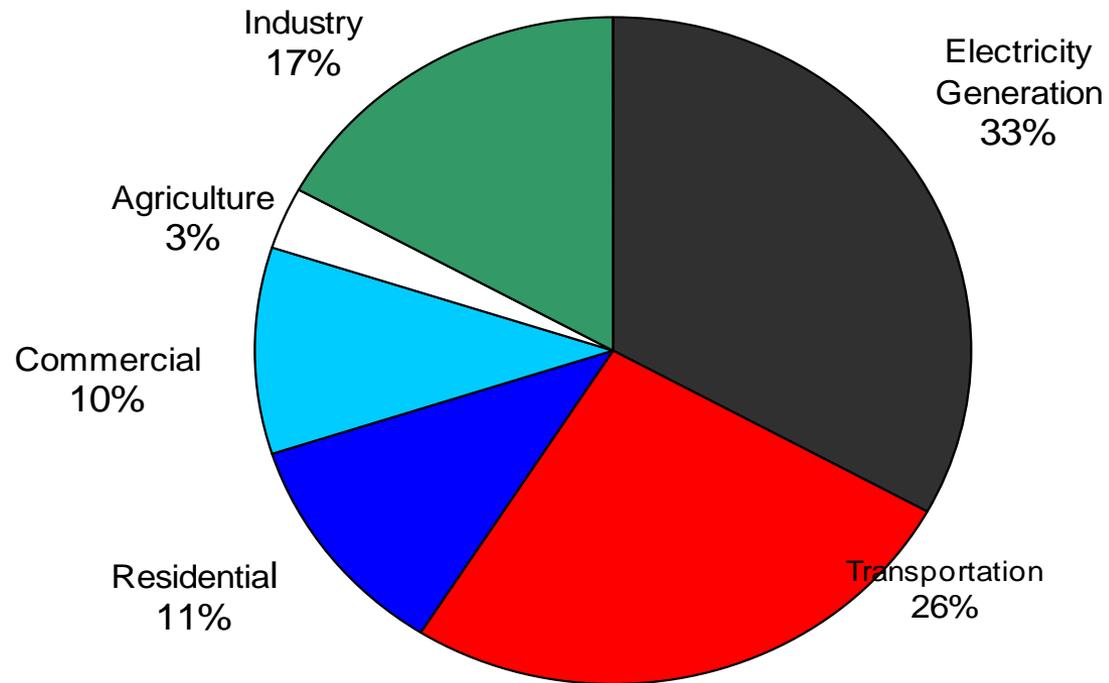
Exhibit 67. Summary of Estimated Michigan Greenhouse Gas Emissions and Sinks (Excluding Forestry) 1990 and 2002

Gas/Activity	Million Metric Tons Carbon Equivalent 1990	Million Metric Tons Carbon Equivalent 2002
Carbon Dioxide	49.58	54.15
Methane	5.16	5.18
Nitrous Oxide	2.12	2.13
Hydrofluorocarbons, Perfluorocarbons, and Sulfur Hexafluoride	0.30	1.13
Total	7.42	62.59
Net Emissions (Sources & Sinks⁽¹⁾)	57.07	62.48

1. Sinks are calculated as 0.35 and 0.11 Million Metric Ton Carbon Equivalent for 1990 and 2002, respectively, and are included in the "Net Emissions (Sources and Sinks)" values.

Programmatic Measures – Air Measures

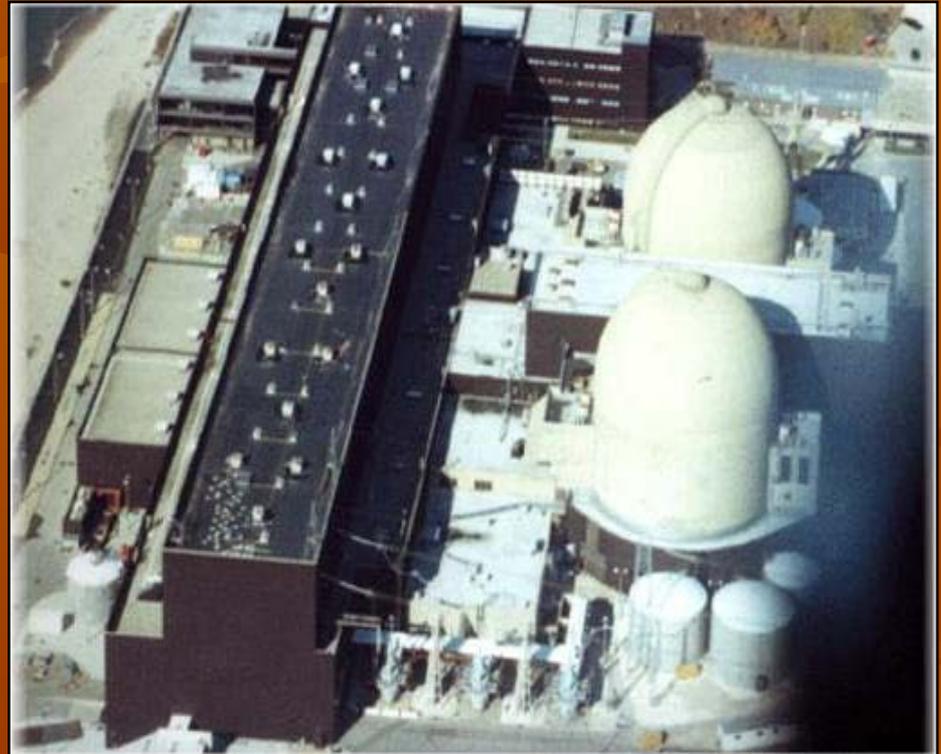
Exhibit 68. Distribution of Michigan Greenhouse Gas Emissions by Economic Sector 2002



Air Radiation Monitoring

Measurements:

- Air particulate radioactivity levels near nuclear power plants.
- Radioactivity in milk.
- Radioactivity in surface waters.



Results:

All measurements have remained below background levels since the early 1980s.

Programmatic Measures – Water Measures

Surface Water

The state operates several extensive surface water-related monitoring programs. Two of the larger programs are the state's:

- Combined, Sanitary, and Storm Water Sewer Systems Program, and
- Surface Water and Beach Monitoring Program.



Programmatic Measures – Water Measures

Combined, Sanitary, and Storm Water Sewer Systems

- Discharges of raw or inadequately treated sewage from sewer systems constitute a serious environmental and public health threat and are illegal.
- In 2000, the DEQ announced a statewide strategy to identify and correct the discharge of untreated and inadequately treated sanitary sewage.
- The primary tools of the strategy are the use of corrective action grants and public disclosure.
- A web page has been set up to keep the public informed of problem areas.

Programmatic Measures – Water Measures

Beach Monitoring

In 2007, the DEQ awarded grants totaling \$212,766 to support bacteriological monitoring at 205 Great Lakes public beaches and \$100,000 to support monitoring at 269 inland lake public beaches.



Conservation Reserve Enhancement Program

The federal-state-local program is designed to reduce sediment, phosphorus, nitrogen, pesticide, and pathogen inputs to surface waters through the use of filter strips, riparian buffer strips, field windbreaks, and wetland restorations.

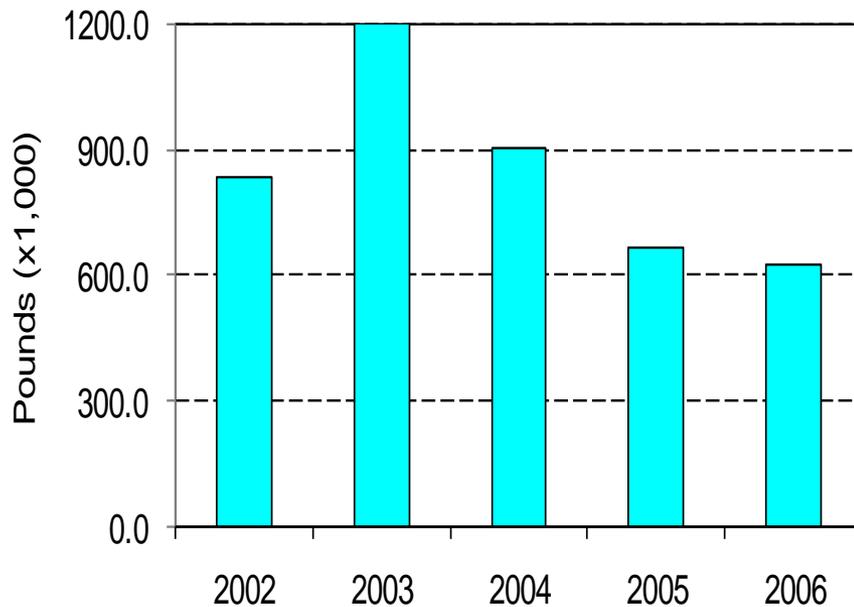


There are currently 65,750 acres of such conservation practices that are either under contract or pending in Michigan.

Programmatic Measures – Water Measures

Water Toxics Release Inventory

**Exhibit 73. Water Toxics Release Inventory
2002 - 2006**



- Federal Emergency Planning and Community Right-to-Know Act requires certain industrial facilities to report releases of specific toxic chemicals.
- Only facilities that exceed established thresholds are required to report.
- The reported values are estimates.

Programmatic Measures – Water Measures

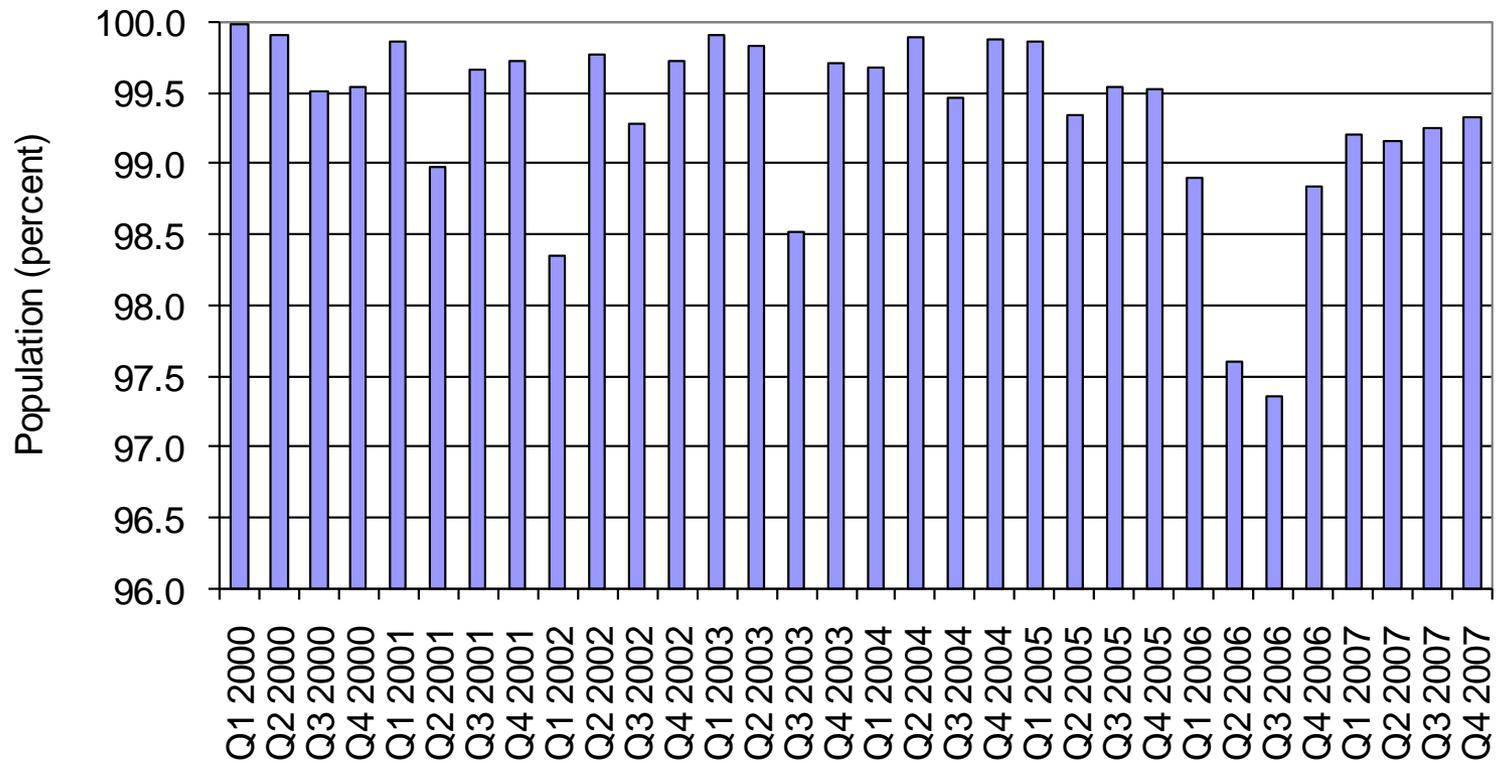
Drinking Water

- The DEQ maintains information on the quality of drinking water on 1,465 community water supplies.
- The DEQ also tracks the levels of lead in drinking water since lead-contaminated drinking water can contribute to the total body burden and aggravate problems for children with lead exposure from other sources.



Programmatic Measures – Water Measures

Exhibit 75. Percentage of Population Receiving Drinking Water Meeting Michigan Standards (Community Water Supplies) 2000 - 2007

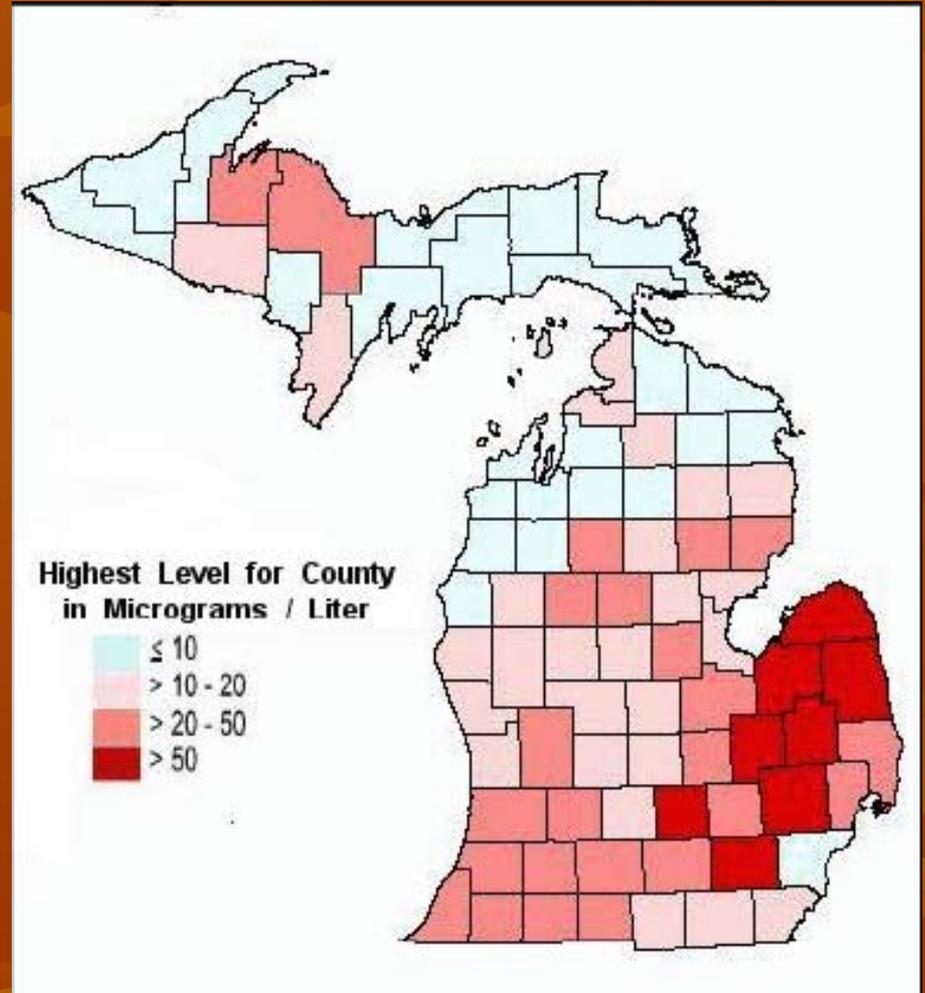


Programmatic Measures – Water Measures

Arsenic in Ground Water

The most common form of human exposure to arsenic is from ground water used for drinking and cooking.

The USEPA adopted a new drinking water standard for public water systems of 10 $\mu\text{g}/\text{L}$. The new standard went into effect on January 23, 2006.

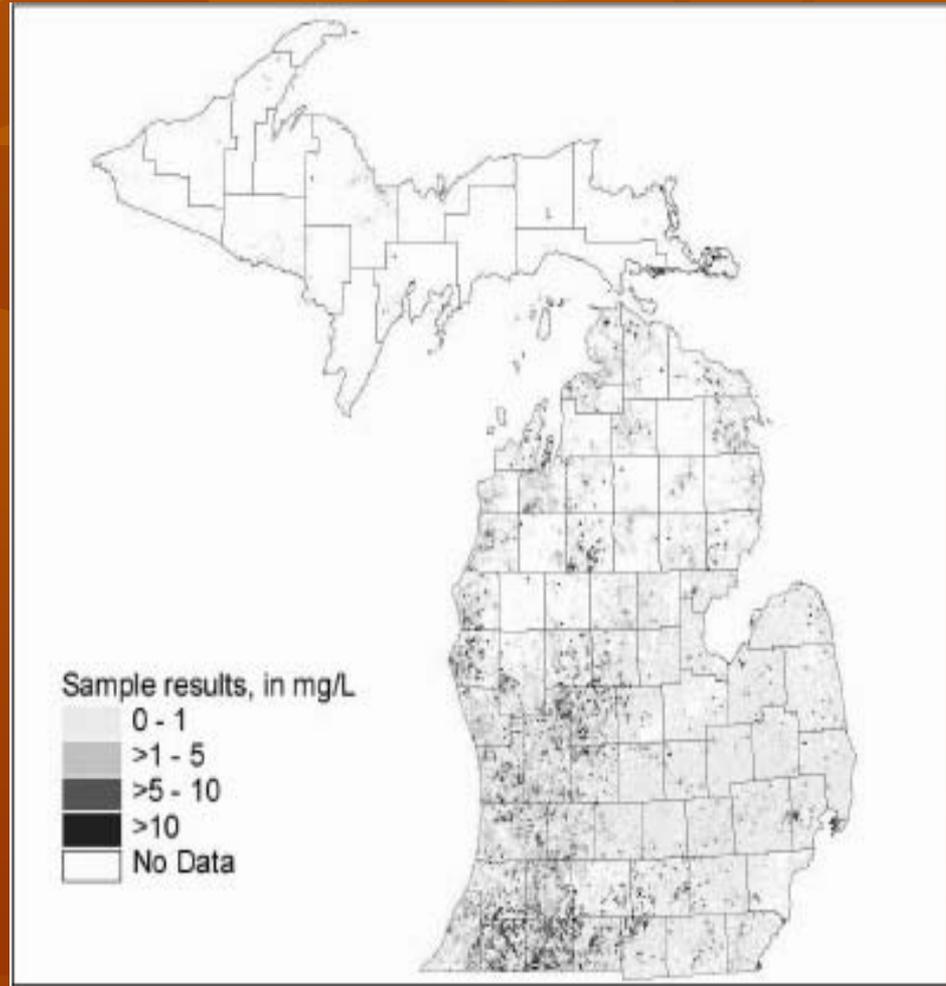


Programmatic Measures – Water Measures

Nitrates in Ground Water

Nitrate can get into water if a well is improperly constructed or located near contamination sources. Typical sources of contamination include:

1. Wastes from livestock operations;
2. Septic tank/drainfield effluent; and
3. Crop and lawn fertilizers.



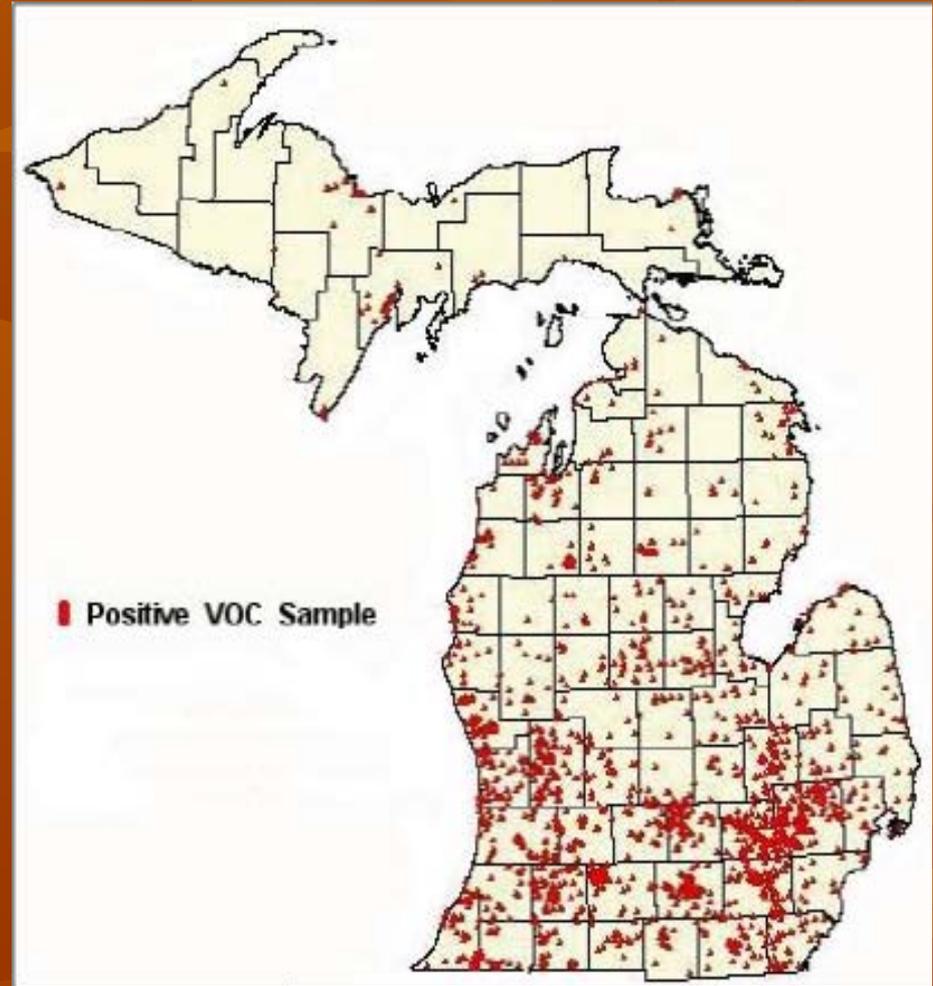
Programmatic Measures – Water Measures

VOCs in Ground Water

VOCs do not generally occur naturally in ground water.

Sources typically include:

1. industrial solvent release,
2. landfill leachate,
3. chemical transportation spill,
4. a fuel spill or leak, or
5. illegal waste disposal.



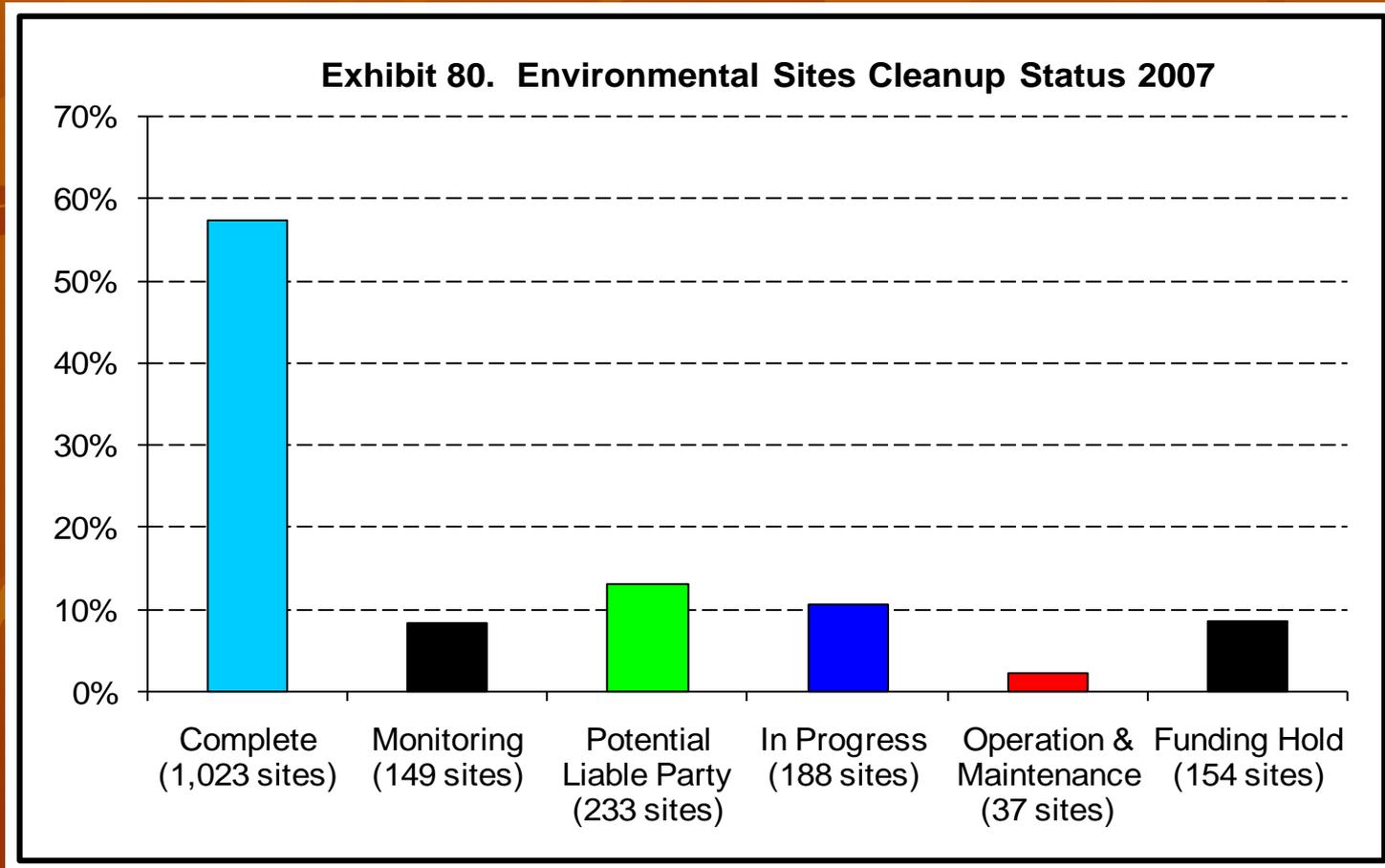
Water Diversions and Consumptive Use

The Compact Agreement signed into federal law in 2008 includes the following points:

- Sustainable use and responsible management of Great Lakes Basin waters;
- Banning (with some limited exceptions) of new diversions of water from the Great Lakes Basin;
- Use of a consistent standard to review proposed uses of Great Lakes Basin water;
- Development of regional goals and objectives among the Compact members for water conservation and efficiency; and
- Improved collection and sharing of technical data among the Compact members.

Programmatic Measures – Land Measures

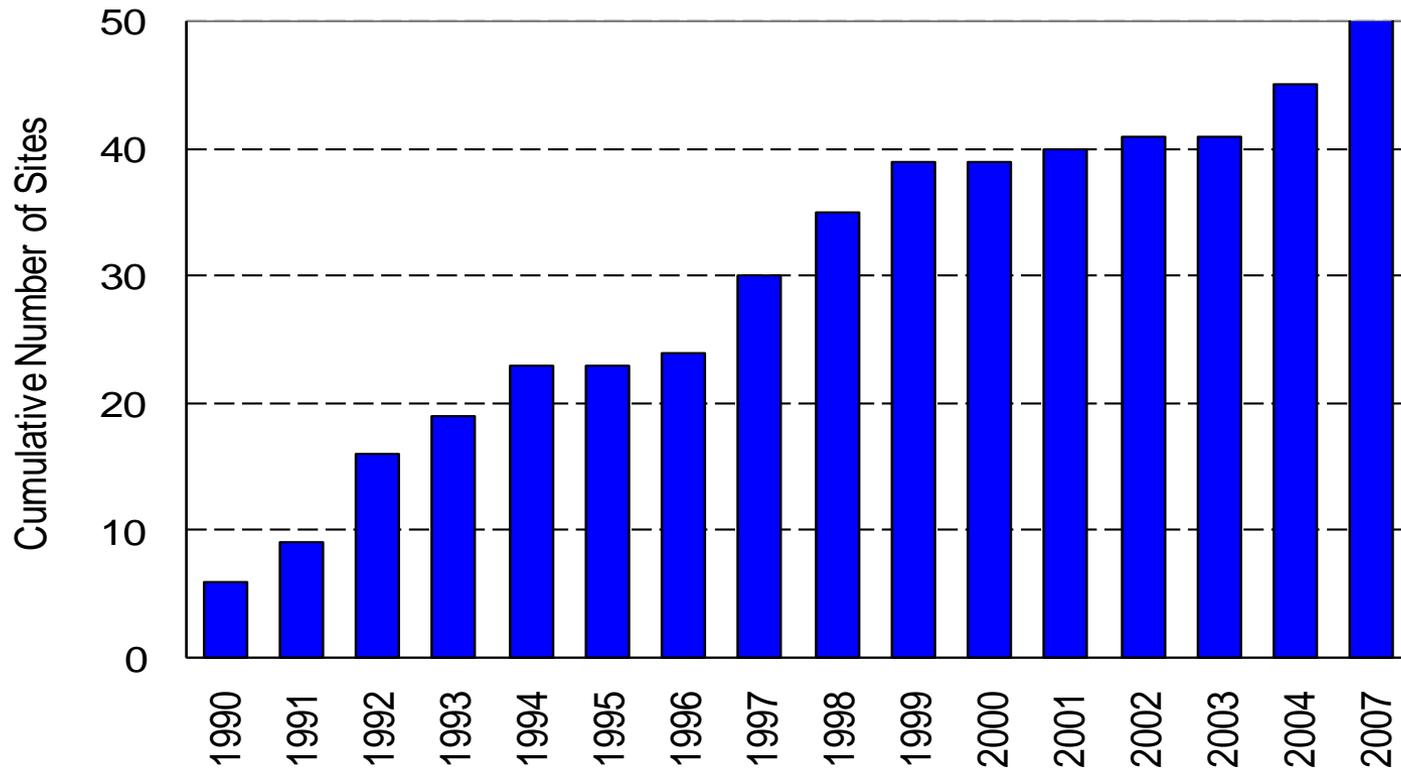
Environmental Cleanups



Cleanup Status for 1,784 Sites

Programmatic Measures – Land Measures

**Exhibit 83. Ground Water Contaminated Solid Waste Landfills Returned to Compliance
1990 - 2007**



Programmatic Measures – Land Measures

Brownfield Redevelopment



Before Redevelopment



After Redevelopment

Redevelopment of previously contaminated land.

Degree of cleanup required is based on level of risk that proposed use of redeveloped property will pose.

Programmatic Measures – Land Measures

Brownfield Redevelopment

Exhibit 81. Investment in Brownfield Properties
1998 - 2007

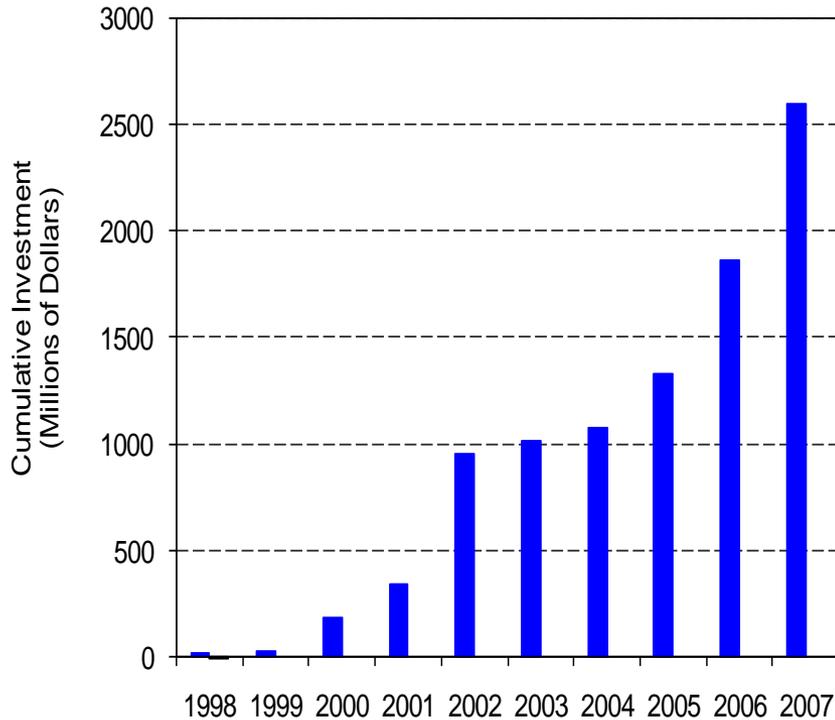
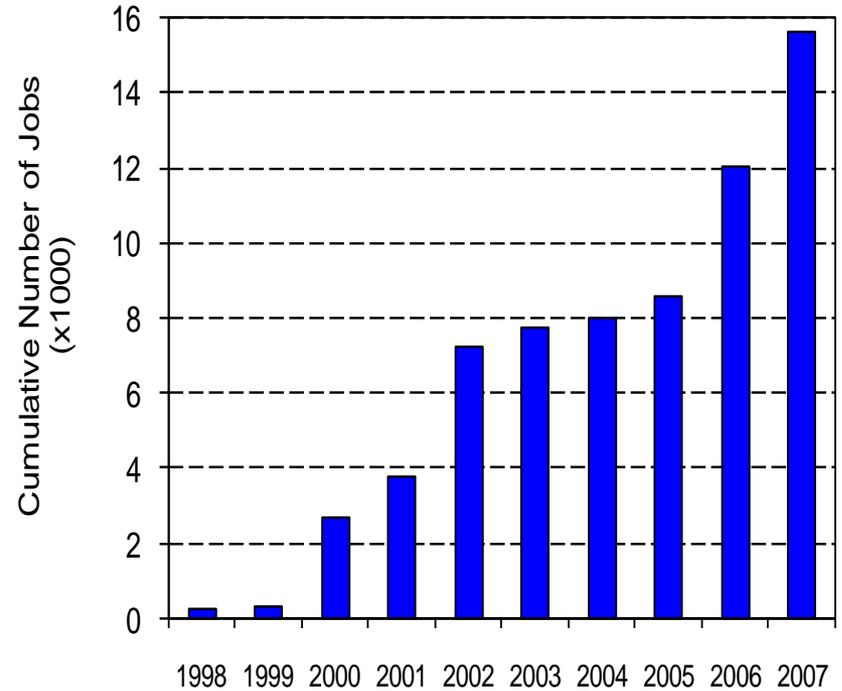


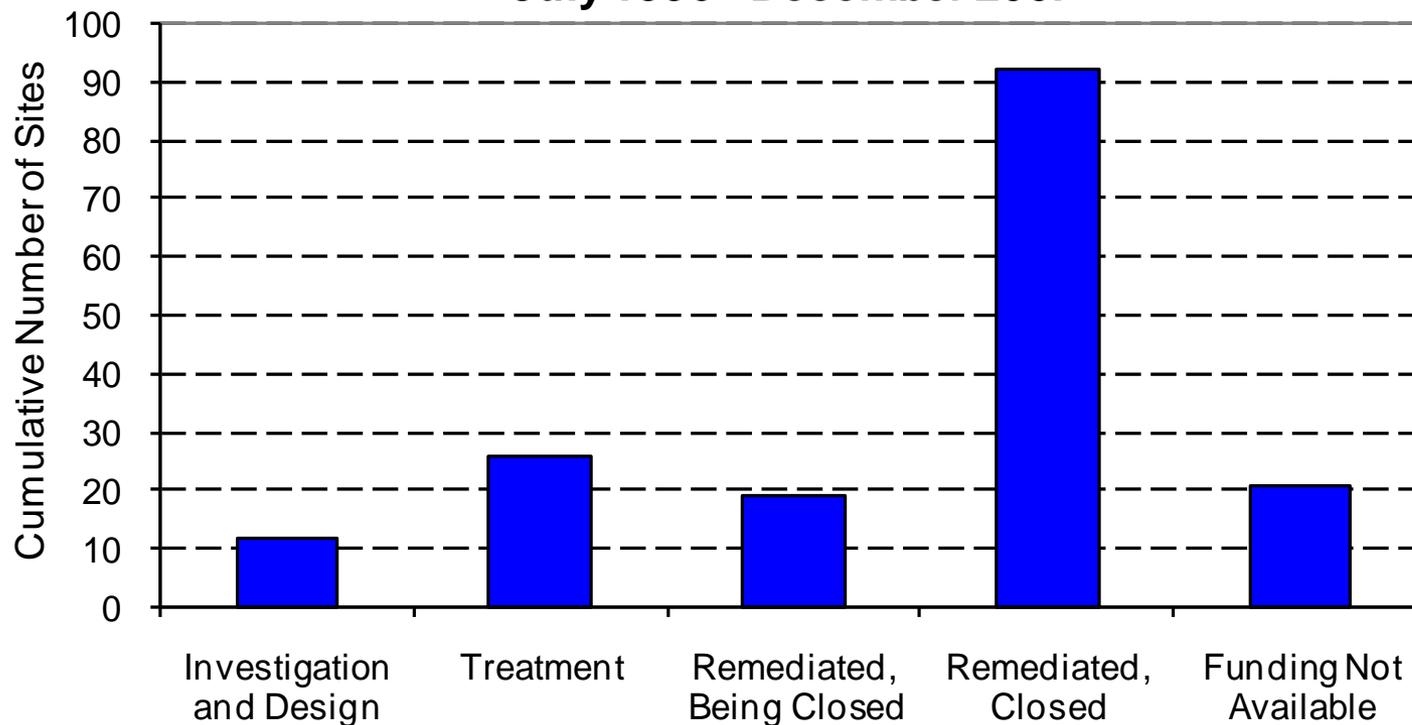
Exhibit 82. Number of Jobs Created at Brownfield
Properties 1998 - 2007



Programmatic Measures – Land Measures

State-Owned Sites Cleanups

**Exhibit 84. Status of Funded Cleanups at State-Owned/Operated Sites
July 1996 - December 2007**

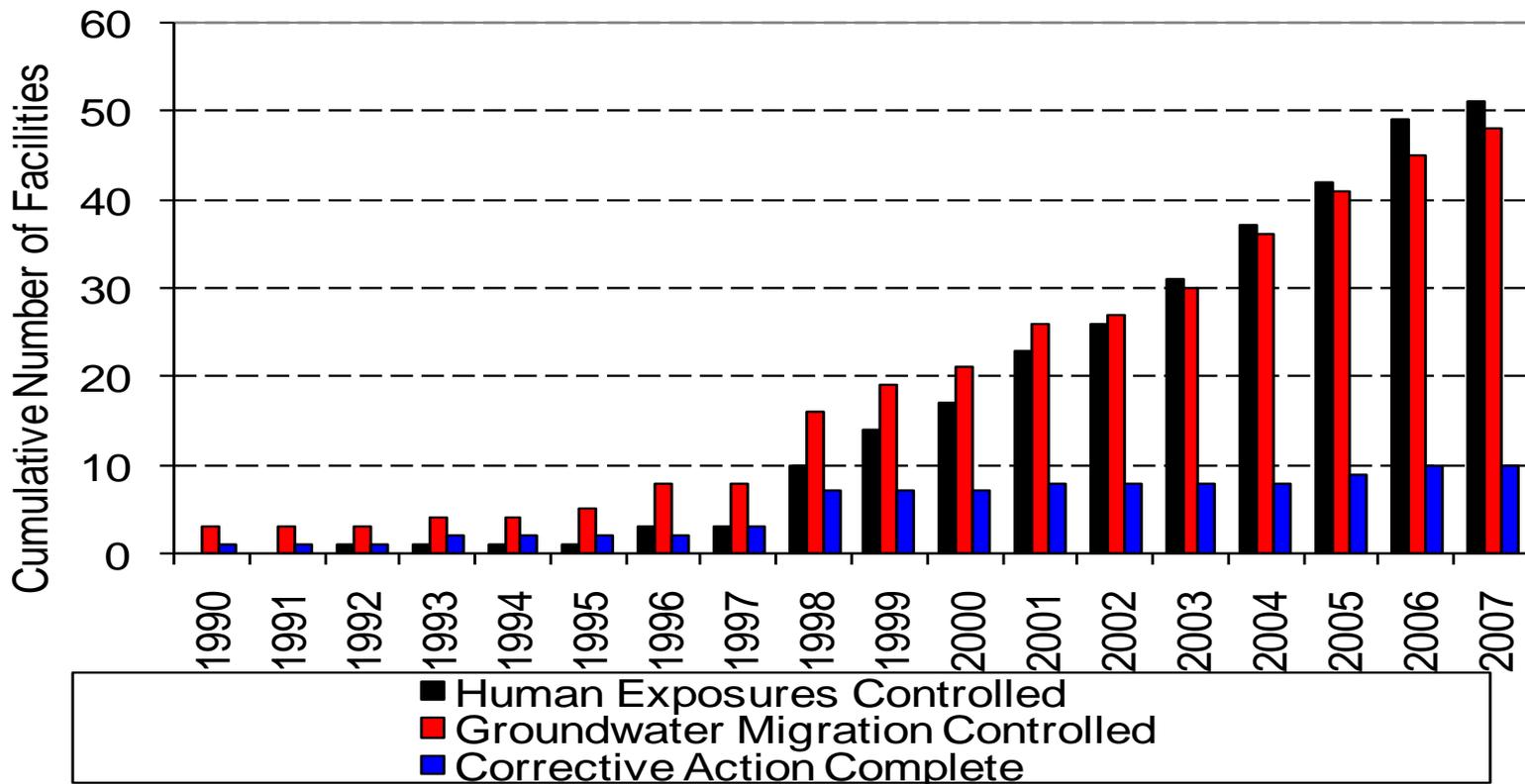


Cleanup Status for 232 Sites

Programmatic Measures – Land Measures

Hazardous Waste Treatment, Storage, and Disposal Sites

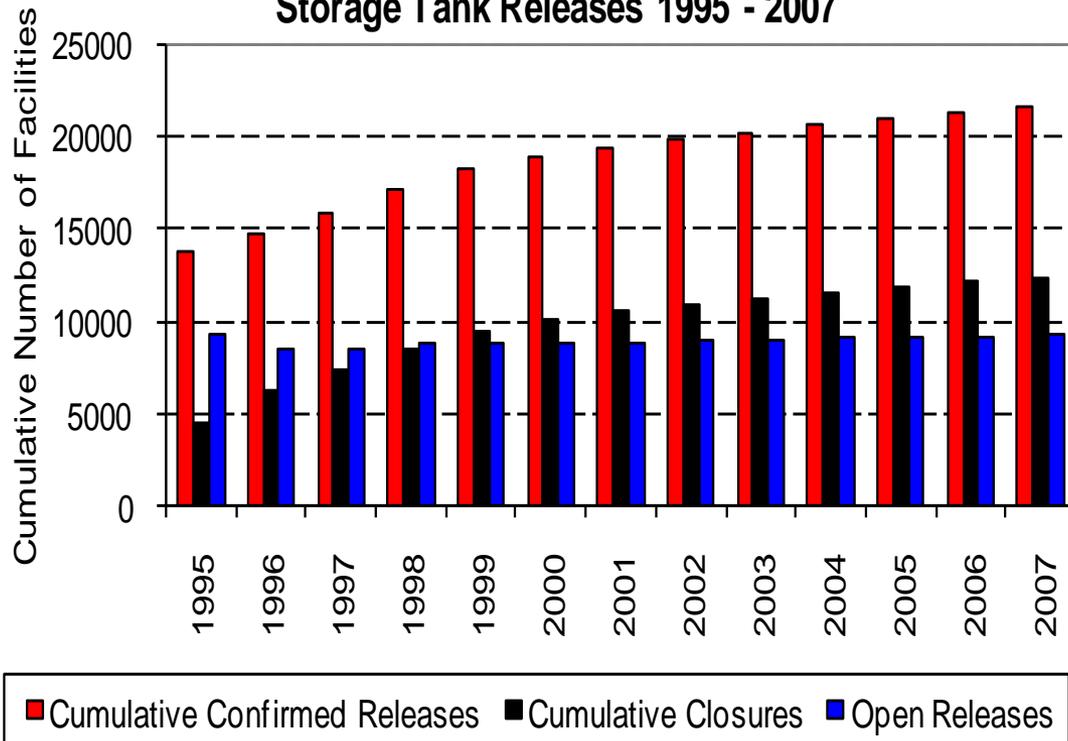
Exhibit 85. Corrective Actions Taken at High Priority Hazardous Waste Management



Programmatic Measures – Land Measures

Leaking Underground Storage Tanks

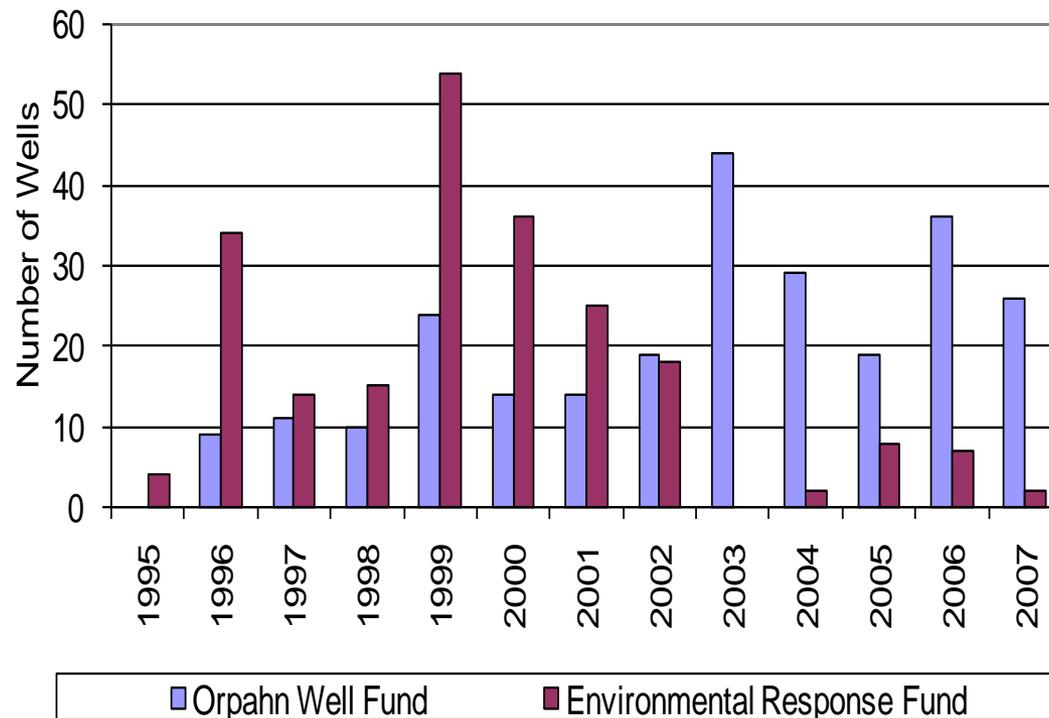
Exhibit 86. Number of Leaking Underground Storage Tank Releases 1995 - 2007



Programmatic Measures – Land Measures

Abandoned Oil and Gas Wells

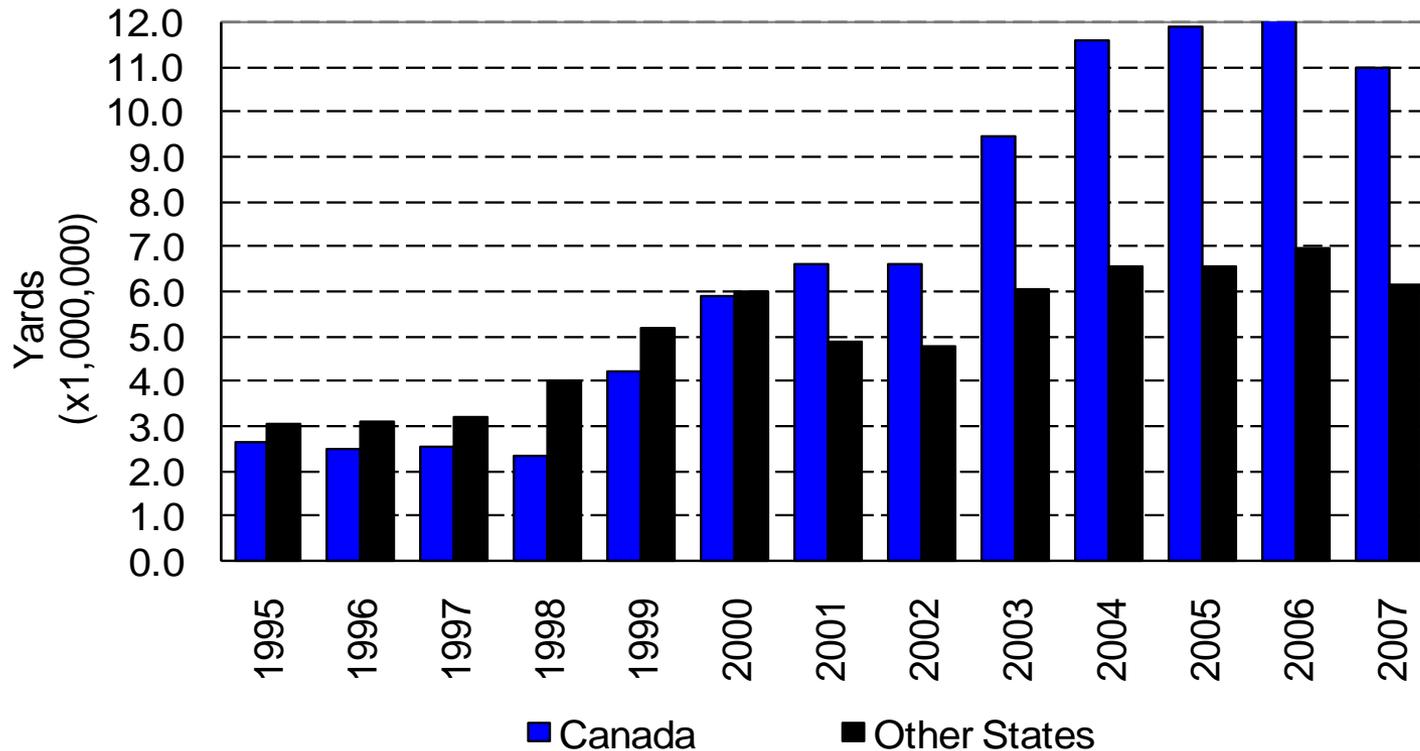
Exhibit 87. Oil and Gas Wells Plugged
1995 - 2007



Programmatic Measures – Land Measures

Solid Waste Imports

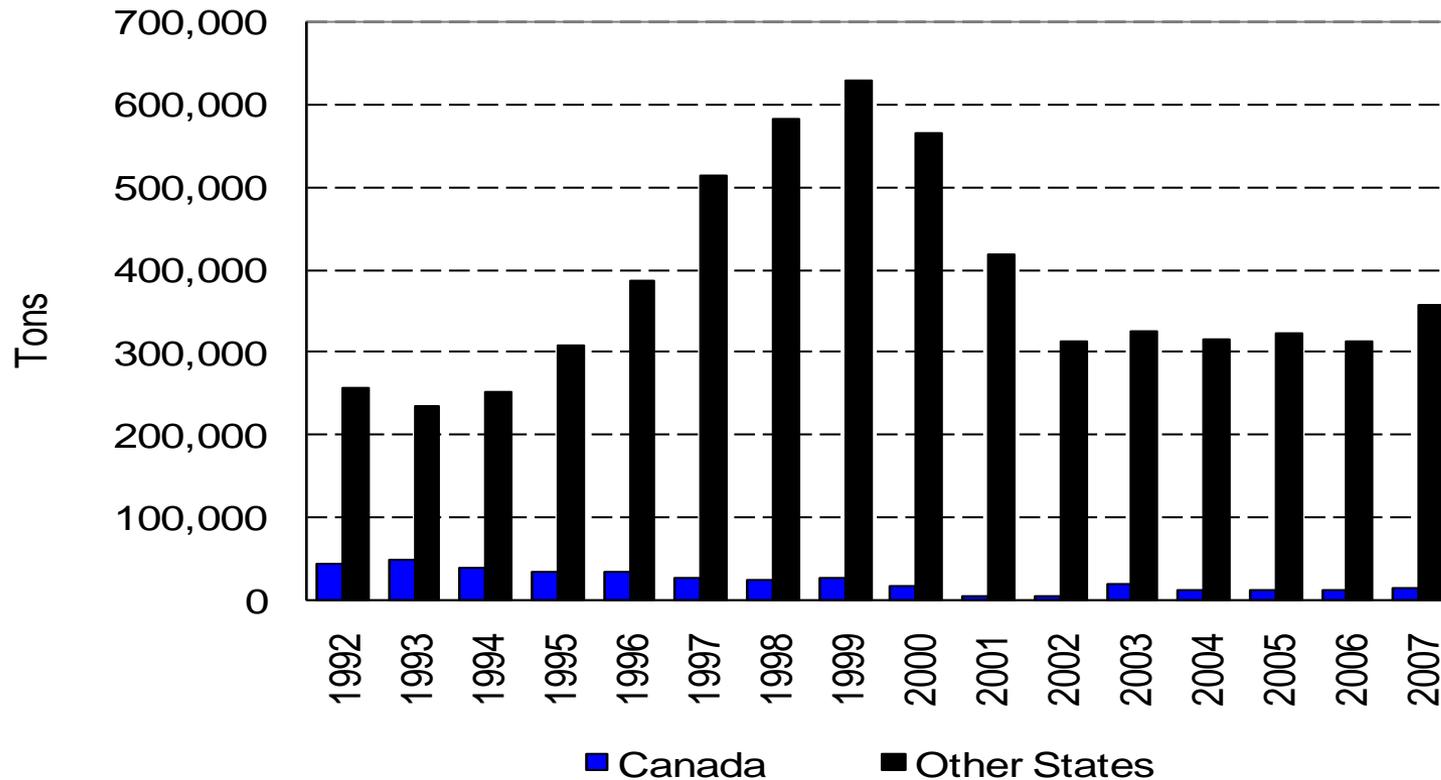
Exhibit 88. Annual Solid Waste Imports to Michigan
1995 - 2007



Programmatic Measures – Land Measures

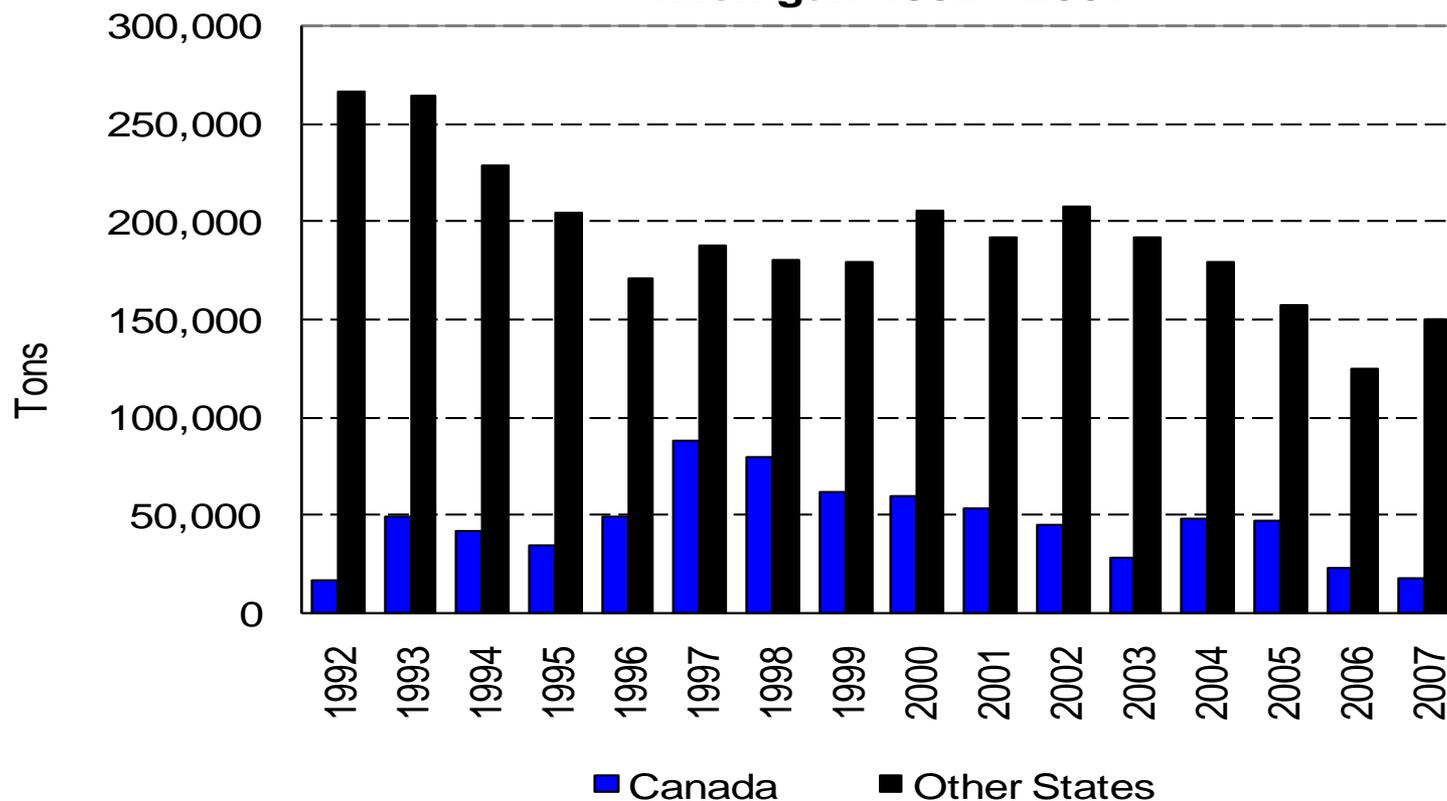
Hazardous Wastes Imports and Exports

Exhibit 89. Annual Hazardous Waste Imports to Michigan 1992 - 2007



Programmatic Measures – Land Measures

Exhibit 90. Annual Hazardous Waste Exports from Michigan 1992 - 2007



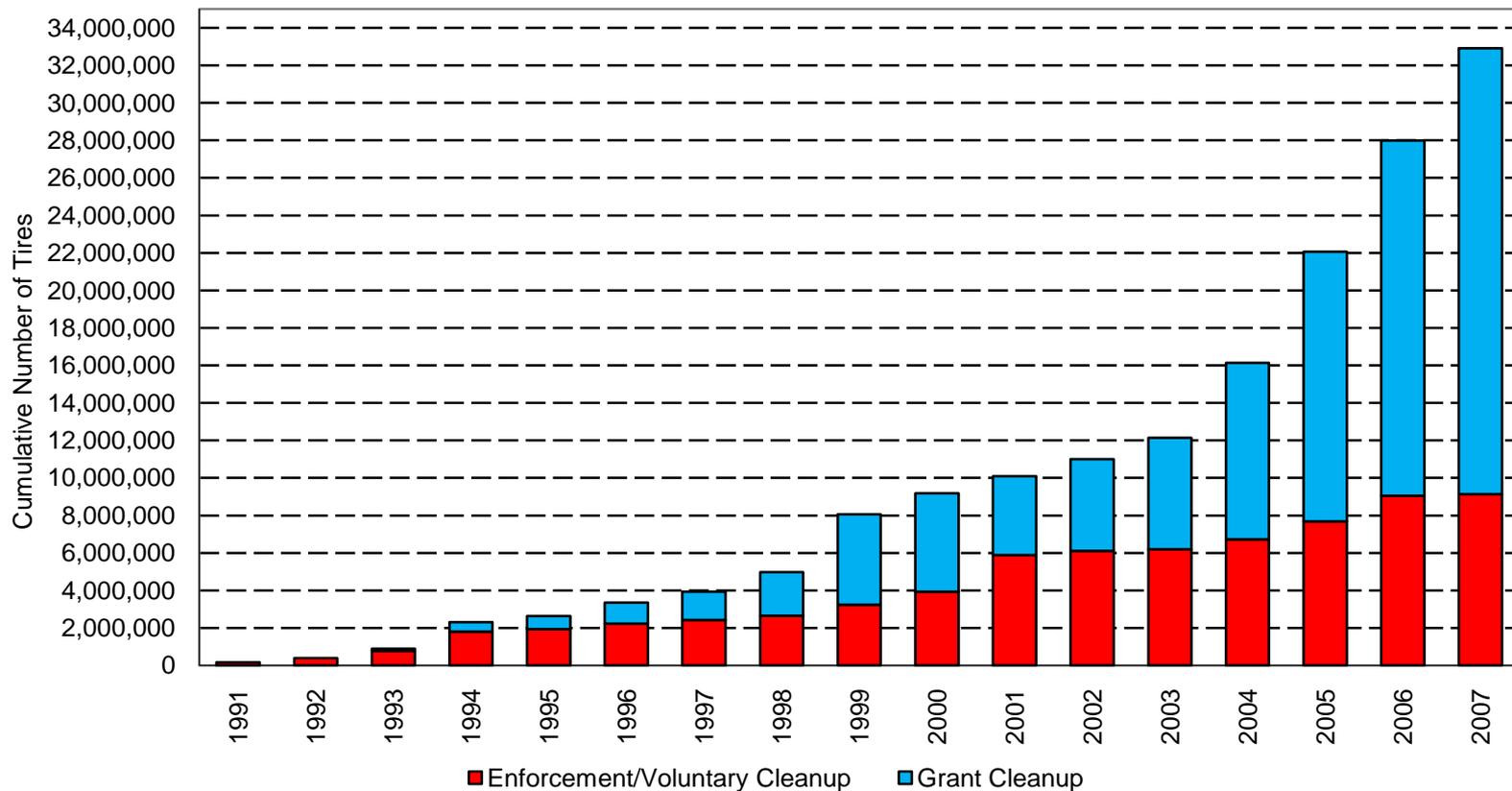
Scrap Tires

- Over 290 million scrap tires are generated each year in the United States.
- Michigan contributes over 10 million scrap tires annually to that waste stream.
- Since 1991, more than 32 million tires have been removed from the Michigan landscape through the state's compliance and enforcement efforts.



Programmatic Measures – Land Measures

**Exhibit 91. Scrap Tire Cleanup Program
1991 - 2007**



State of Michigan's Environment 2008: First Triennial Report Summary for Parts I - III

- In general, the available data clearly demonstrate that Michigan's air and water have significantly improved during the last 40 to 50 years.
- With the marked reduction of contaminants, the air has become clearer and cleaner, many of Michigan's lakes, rivers and streams have seen improvement, and many previously at risk animal species have been observed to again increase in both population and viability.

State of Michigan's Environment 2008: First Triennial Report

Summary for Parts I - III (continued)

- While, clearly, many improvements in air and water can be seen, other problems have since surfaced. Many of these “new” concerns, however, really are not new. Most of them, such as non-point source pollution, urban sprawl, loss of habitat, exotic species, were around in the 1960s also. The difference is that impacts of most of these were overshadowed by the more dramatic impacts of the other contaminants. These are the areas where the state now needs to focus its attention.
- In addition to the above, we also can point to several issues that are just now beginning to be seen as problems and where little information exists regarding adverse impacts. These emerging contaminants of concern also will need the state's attention.

Additional Information Sources:
Michigan Department of Environmental Quality
www.michigan.gov/deq

Michigan Department of Natural Resources
www.michigan.gov/dnr

Environmental Science and Services
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