Michigan Department of Environmental Quality
Waste and Hazardous Materials Division

Report on Waste Inspections at Michigan Landfills

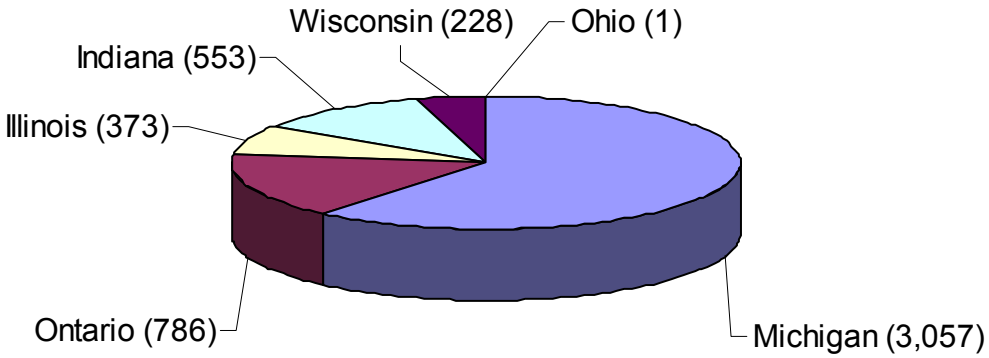
September 22, 2003

INTRODUCTION

From mid-March 2003 to mid-June 2003, Department of Environmental Quality (DEQ) staff, in cooperation with the Wayne County Department of Environment (WCDOE), inspected eight different municipal solid waste (MSW) landfills in Michigan on a weekly basis to survey incoming waste (hereafter "Waste Inspections"). The goals of this program were: (1) to determine the extent to which waste prohibited by law from an MSW landfill (Prohibited Waste) is being disposed of; (2) to determine the extent to which recyclable materials, including beverage containers (Recyclable Material), are being landfilled in lieu of recycling; and (3) to determine the extent to which Prohibited Waste and Recyclable Material is present in out-of-state waste. A list of Prohibited Waste is contained in Attachment 1. Most wastes listed are prohibited for health and safety reasons. However, yard clippings are prohibited to save landfill capacity and promote composting as an alternative to landfill disposal for those wastes.

Landfills chosen for inspection included small, medium, and large landfills geographically distributed across Michigan and operated by several different corporations or municipal governments. As shown in Attachment 2, sites chosen were located in southeast Michigan, southwest Michigan, northern Michigan, and the Upper Peninsula. A total of 85 Waste Inspections were conducted between March 2003 and June 2003, with each inspection lasting about four hours or more. Attachment 3 lists the locations and dates of each inspection. During these inspections, approximately 5,000 loads were inspected, representing approximately 264,000 cubic yards of waste. Figure 1 shows the apparent source of these waste loads by state or Canadian province, as determined by the license plate and/or truck markings.

Figure 1: Number of Loads Inspected by State/Province



In addition to visual observation of incoming trucks, DEQ staff conducted more thorough reviews at each site for asbestos waste, radioactive material, and hazardous waste.

SUMMARY OF WASTE INSPECTION RESULTS

General Summary of Results

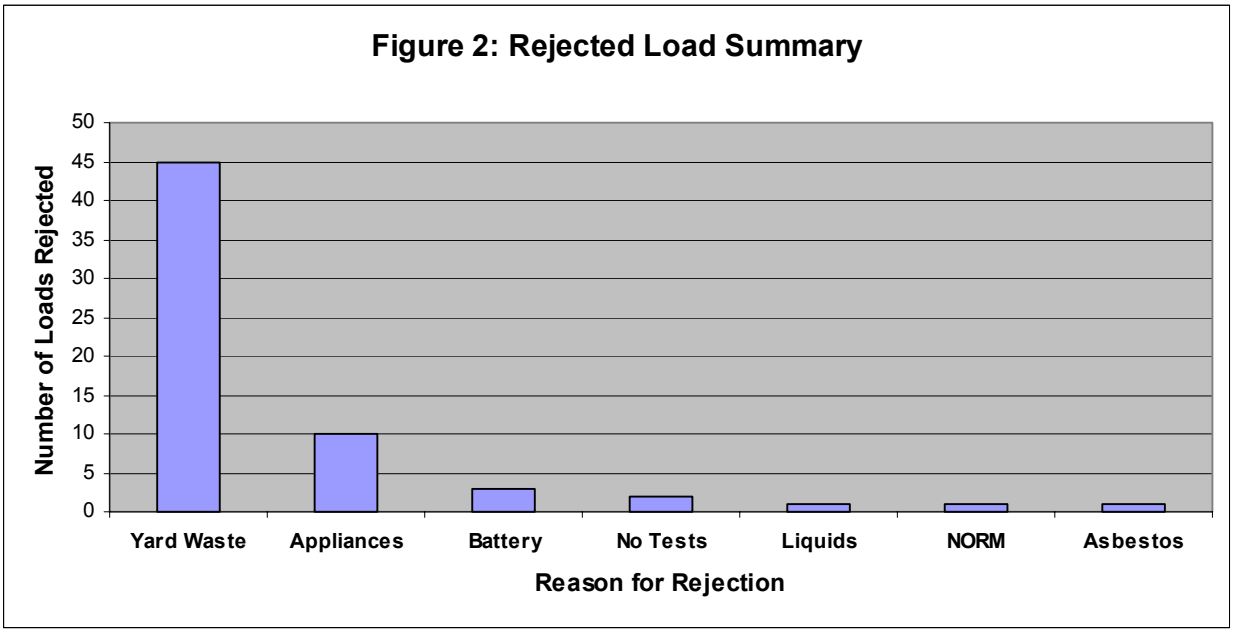
As a result of the Waste Inspections, DEQ and WCDOE staff found a significant amount of Prohibited Waste entering Michigan landfills. In total, yard waste was found in approximately ten percent of all incoming loads.

Waste Inspections by DEQ and WCDOE staff found a significant amount of Recyclable Material, including beverage containers, in some loads observed during the Waste Inspections. Cardboard was found in the greatest amount, followed by paper, and then wood. Metal and recyclable plastic were also found in significant, but lesser, quantities.

Rejected Load Summary

When possible, DEQ staff had yard waste removed from incoming loads for composting. However, in most cases, small amounts of yard waste were mixed with large volumes of household waste and could not be removed before disposal, especially at large southeast Michigan landfills. With the exception of yard waste that could not be easily removed, Prohibited Waste was rejected by landfill personnel, when found. Rejected yard waste was often routed to on-site composting areas, while other rejected waste was sent back with the transporter for proper handling and disposal elsewhere. Figure 2 shows the number of loads where at least part of a load was rejected and the reason for rejection.

Figure 2: Rejected Load Summary



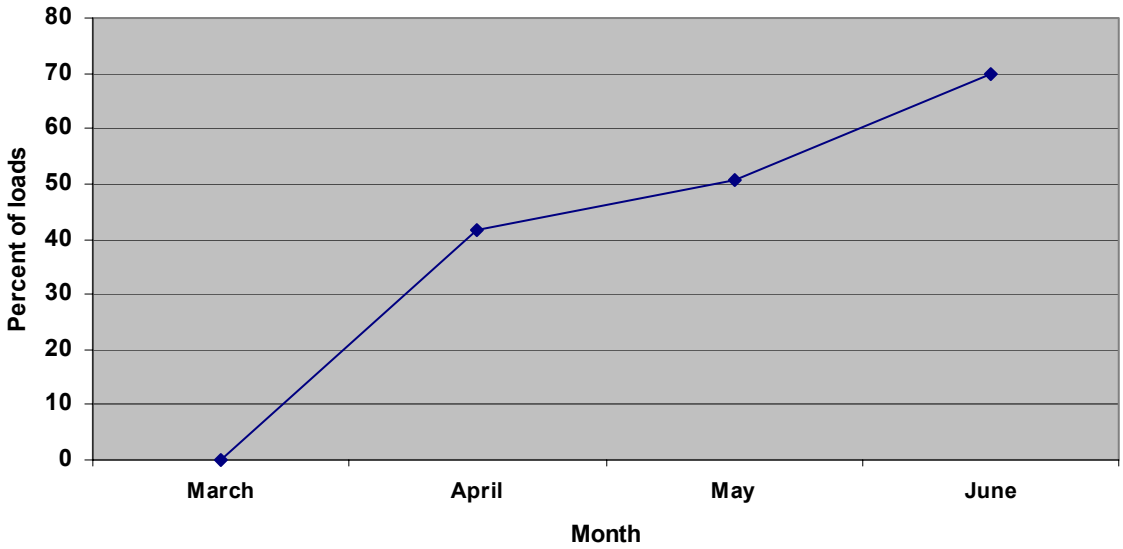
As shown in Figure 2, the most common wastes rejected, besides yard waste, were appliances still containing the refrigerant (such as refrigerators, freezers, and air conditioners) and lead acid batteries. In addition to appliances and lead acid batteries,

DEQ staff documented landfill operators rejecting wastes, such as contaminated soil for which no testing had been conducted, liquid paint, naturally occurring radioactive material (NORM), and asbestos waste that was not properly contained. However, in thousands of loads inspected, each of these materials was found on only one occasion. No hazardous waste was found during the inspections.

Yard Waste Results

Yard waste was found in approximately 10 percent of all incoming loads surveyed during the three-month period from mid-March to mid-June. However, as might be expected, the amount of yard waste observed varied with the season. Figure 3 shows the amount of yard waste observed in household waste loads at one southeast Michigan landfill, by month.

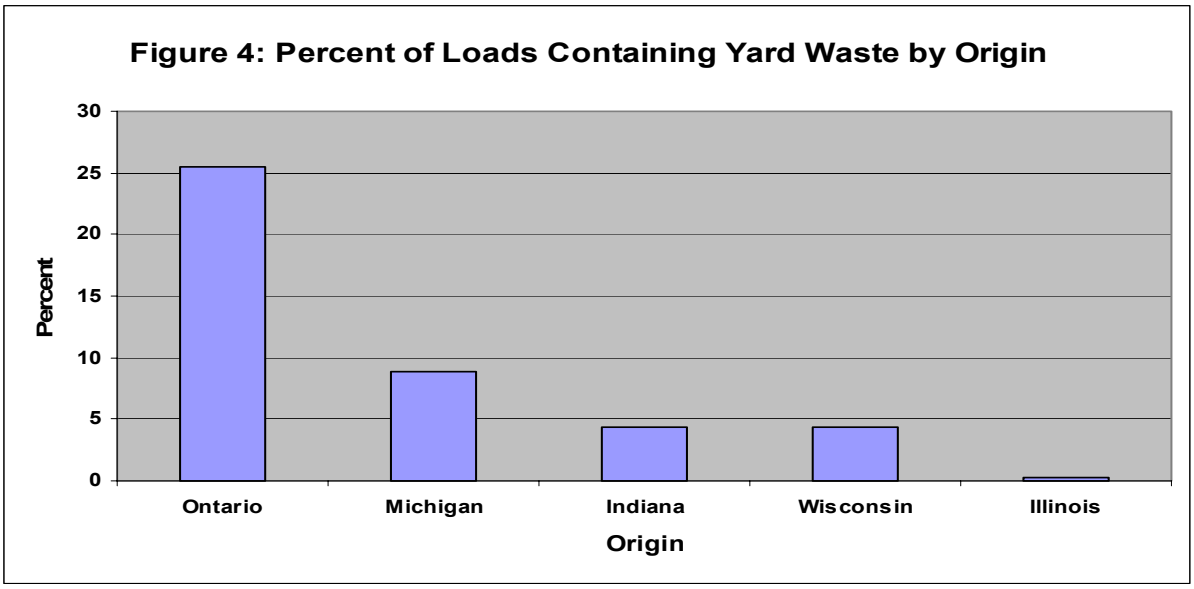
Figure 3: Percent of Household Waste Loads Containing Yard Waste by Month at One Southeast Michigan Landfill



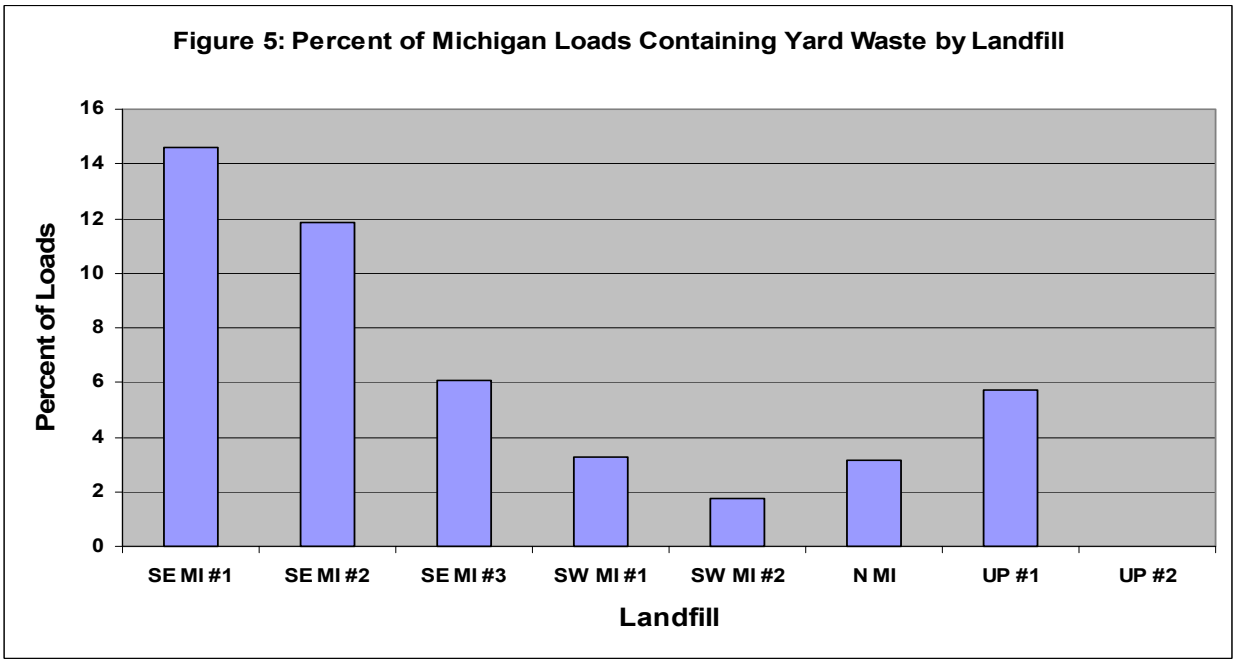
As shown in Figure 3, the percentage of household loads containing yard waste varied from no loads in mid-March to 70 percent of the loads in mid-June. It should be noted that although yard waste was present in a large percentage of incoming loads, the majority of these loads contained less than five percent yard clippings, by volume.

The amount of yard waste found in incoming loads also varied by state or Canadian province. Waste originating in Ontario had the highest percentage of loads containing yard waste, while Illinois had the lowest. Figure 4 shows the percentage of household waste loads containing yard waste by state or Canadian province. It should be noted that Illinois has banned what they call “landscape waste” from landfills since 1990. According to the report entitled “Nonhazardous Solid Waste Management and Landfill Capacity in Illinois,” dated November 2002, 334,000 tons of landscape waste was

composted at 43 different Illinois composting facilities in 2001. Although the city of Toronto has a comprehensive composting program for yard waste and other compostable material, neither Ontario nor Indiana bans yard waste from landfills.



Even when not considering waste from Ontario, southeast Michigan landfills received a higher percentage of yard waste in incoming loads than landfills located elsewhere in Michigan. Figure 5 shows the percentage of Michigan loads containing yard waste by landfill.



In addition to yard waste, DEQ staff noted a variety of yard waste-like material in incoming loads. These included shrubs and plants from greenhouses, flowers and

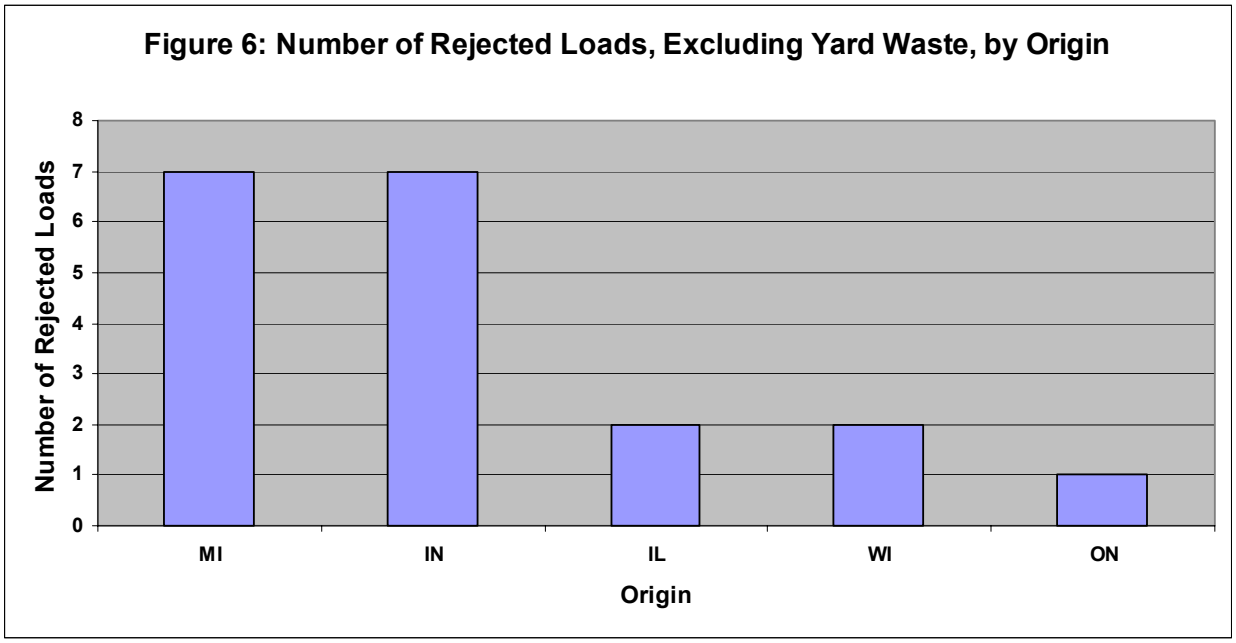
wreaths from cemeteries, palm fronds (apparently from church services), and hay (apparently from agricultural activity). DEQ staff did not consider these to meet the definition of "yard clippings" banned from disposal in landfills and did not require that they be rejected.

Summary of Results for Other Prohibited Wastes

With the exception of yard waste, other Prohibited Waste was not found in significant amounts during the Waste Inspections, and such wastes were rejected by landfill personnel, when found. Out of over 4,600 loads inspected, only 18 were found to contain Prohibited Waste, or less than one-half of one percent. Most of these (ten) were appliances still containing the refrigerant. Although not specifically banned from landfills by Michigan law, such appliances are prohibited from disposal by Section 608 of the federal Clean Air Act. After appliances, the next most frequent Prohibited Waste found in incoming loads was lead acid batteries, which was noted on three occasions.

Although over 50 percent of inspected loads were from Michigan, more Prohibited Waste was found in loads originating from out of state. Figure 6 shows the source of rejected loads, other than yard waste, by state or Canadian province. As shown, the highest number of loads rejected from any state, besides Michigan, originated in Indiana. Six of the seven loads rejected from Indiana were appliances containing the refrigerant, while the other was a pickup truck containing a used lead acid battery. It should be noted that Indiana does not ban the disposal of lead acid batteries or appliances in solid waste landfills.

Figure 6: Number of Rejected Loads, Excluding Yard Waste, by Origin



Although only one load was rejected for improperly contained asbestos waste, DEQ staff took special efforts to review incoming waste to ensure it complied with asbestos waste requirements of Title 40 of the Code of Federal Regulations, Part 61. During one

inspection at each landfill, specially-trained staff of the DEQ's Air Quality Division conducted thorough inspections to determine compliance with these requirements. With the exception of the one rejected load, no violations were documented during these inspections.

DEQ staff also screened incoming loads for radioactive material. The DEQ's Waste and Hazardous Materials Division, Radioactive Material and Standards Unit (RMSU), conducted one survey at each of the eight landfills, inspecting 445 individual loads. Using sensitive detection equipment, these inspections found one driver and three waste loads with elevated radiation readings. The driver recently had a nuclear medicine study, and elevated readings in the three waste loads were also caused by radioactive material used in nuclear medicine procedures. These included a load of general refuse, a load of incinerator ash from a Michigan wastewater treatment plant, and a load of sludge from an Ontario wastewater treatment plant. It is not uncommon to find detectable, but not harmful, amounts of short-lived radioactive contamination from nuclear medicine in solid waste, incinerator ash, or wastewater treatment sludge. In all three instances, RMSU staff recommended that the loads be buried in the landfill due to the very short half-lives of these radionuclides.

As noted in Figure 2, one landfill (i.e., City Environmental Services of Waters) did detect and reject a load containing NORM during the inspection period using its own radiation monitoring equipment. This landfill is the only one in Michigan using such equipment, and as RMSU staff was not present during this inspection, the landfill's findings could not be verified independently. NORM is typically a byproduct from oil and gas production in northern Michigan.

DEQ staff randomly checked records of industrial waste and contaminated soil to ensure that prohibited hazardous waste was not entering Michigan landfills. On two occasions, landfill staff rejected incoming loads for lack of testing. On another occasion, DEQ staff tested a suspicious industrial load from Indiana for hazardous characteristics. However, tests found the waste to be nonhazardous.

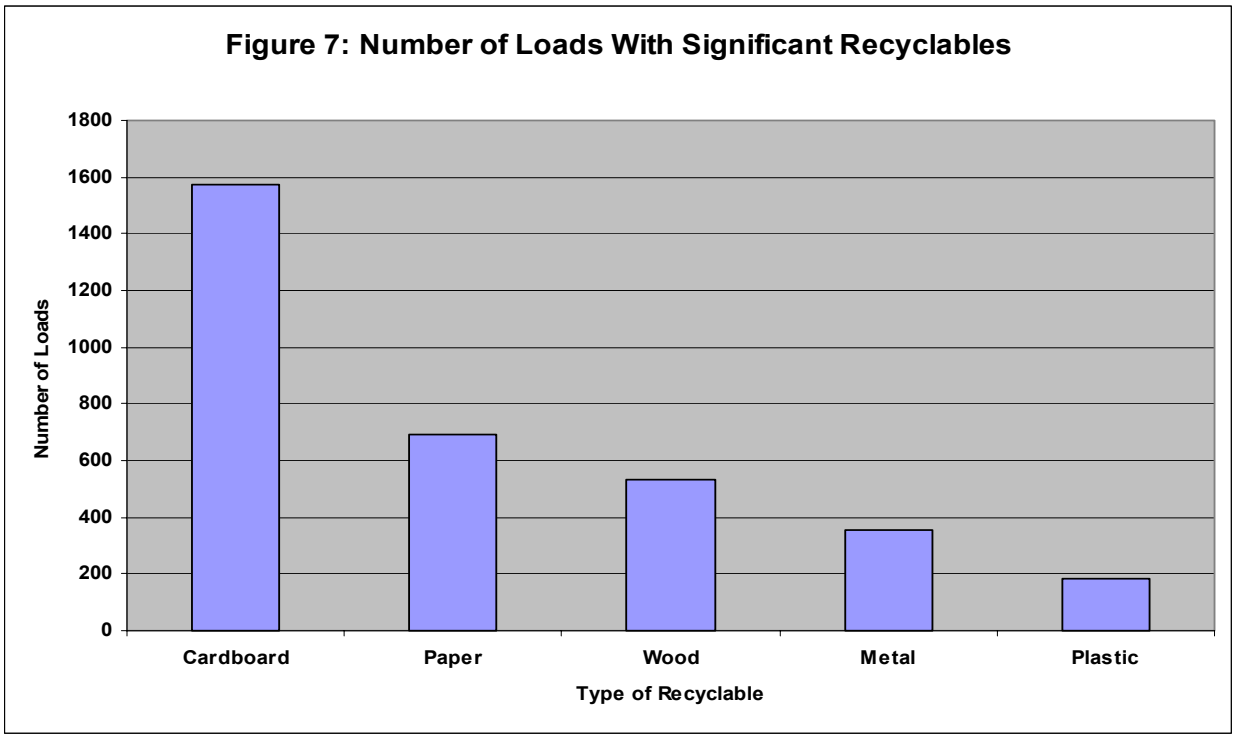
It should be noted that the number of loads inspected for hazardous waste, asbestos waste, and radioactive material was limited, as these inspections require extensive testing or the use of specially-trained staff. It should also be noted that hazardous waste or asbestos waste, if mixed with large quantities of refuse, is difficult to identify.

Summary of Recyclable Material Results

In addition to observing incoming waste loads for Prohibited Waste, DEQ staff noted the number of loads with a significant amount of Recyclable Material, such as cardboard, paper, wood, metal, and plastic. One inspector in southeast Michigan went further and attempted to break down the percentage of recyclables in each load. Figure 7 shows the percentage of loads observed statewide with a significant amount of Recyclable Material.

As shown in Figure 7, the most common Recyclable Material found being landfilled in large amounts was cardboard. Large amounts of paper and wood were also found in a significant number of loads, while metal and recyclable plastic were found less frequently in large quantities. Glass was seldom found in significant amounts and is not included in Figure 7. Since what each inspector viewed as "significant" varied with the inspector, the results shown in Figure 7 should be considered "qualitative" rather than "quantitative."

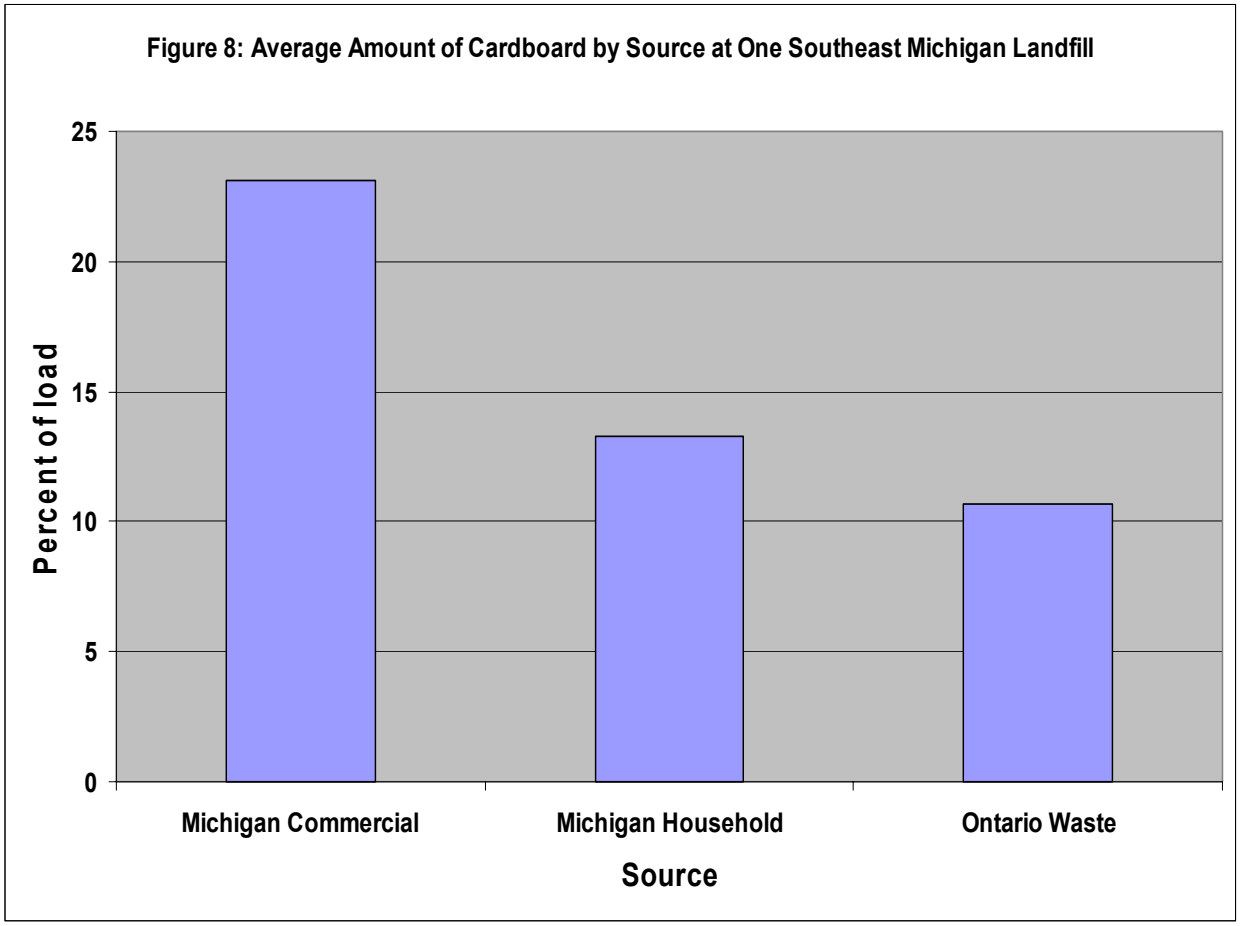
Figure 7: Number of Loads With Significant Recyclables



One southeast Michigan inspector estimated that an average Michigan load of household waste contained between 10 to 20 percent of cardboard, 5 to 15 percent of paper, approximately 5 percent of metal, and something less than 5 percent of recyclable plastic, by volume.

Generally, the percentage of cardboard and other recyclables in household waste was not significantly different between states. However, inspectors in southeast Michigan did find that Ontario loads contained significantly less cardboard than Michigan loads, especially commercial loads from within Michigan. These commercial loads were routinely "roll-off" boxes servicing a business or industry and were distinguishable from household refuse.

A chart showing the average percentage of cardboard in Michigan household and commercial loads compared to Ontario loads, based on data from one southeast Michigan landfill, is shown in Figure 8.



Corrugated cardboard is usually easy to recycle, and it appears that a large recycle market at commercial businesses disposing of such packaging is being missed.

The ability to reclaim other Recyclable Material noted by inspectors is difficult to assess because Recyclable Material may be difficult to separate from other waste. Such may be the case with metal and wood mixed with other material in demolition waste. However, inspectors did notice a large number of wood pallets being landfilled, which could easily be separated if a sufficient market existed for these.

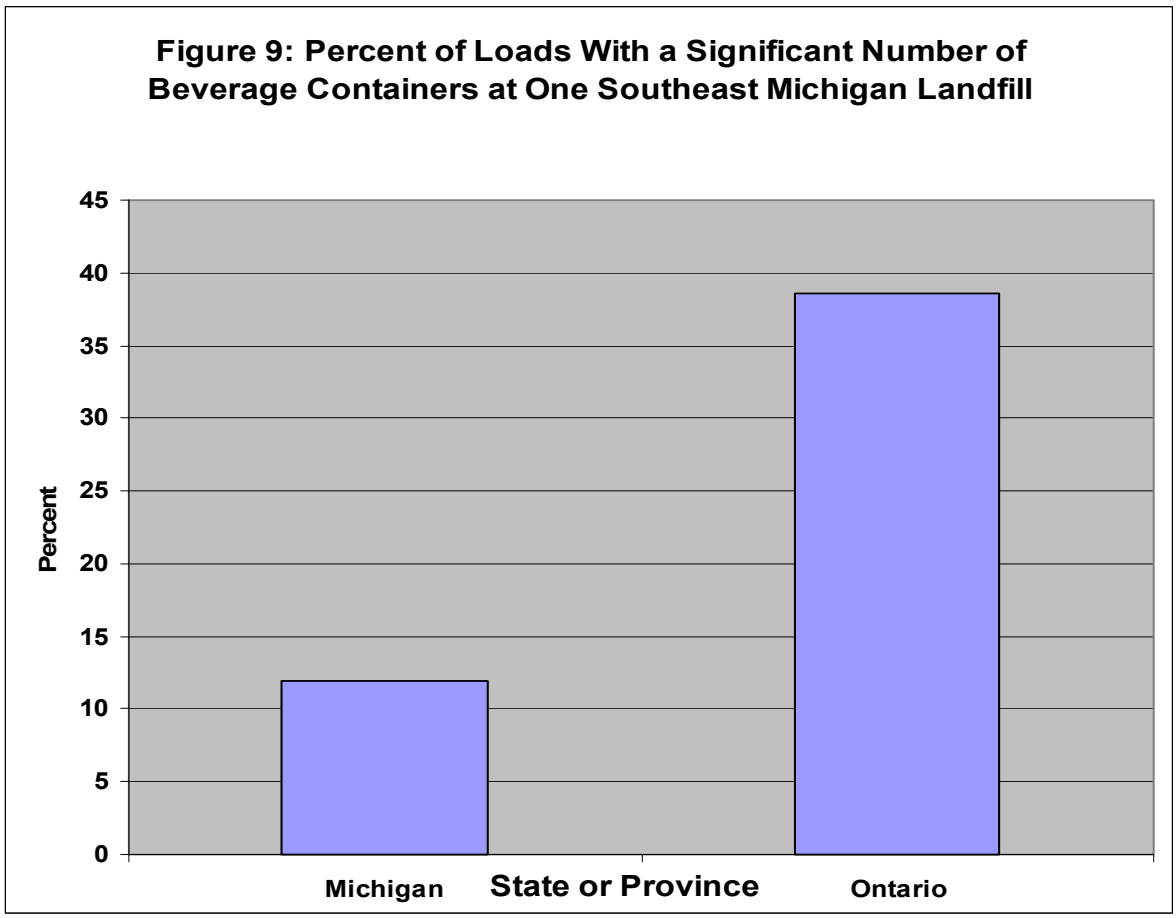
On several occasions, inspectors noted loads with over 50 percent of recyclables, such as ground plastic (from Illinois) and beverage containers (from Wisconsin), apparently from recycle facilities. These observations support the DEQ view that viable markets for Recyclable Materials must be established in order for Michigan's recycling efforts to succeed and improve.

Beverage Container Survey

Michigan's Bottle Bill defines a "beverage container" as "an airtight metal, glass, paper, or plastic container, or a container composed of a combination of these materials, which, at the time of sale, contains 1 gallon or less of a beverage." Inspectors in southeast Michigan made a close count of the presence of beverage containers in

incoming loads to distinguish the difference Michigan's Bottle Bill may have on Michigan waste compared to out-of-state waste.

Figure 9 shows the percentage of incoming household waste loads that contained a significant number of beverage containers by source. In this case, loads containing over five percent beverage containers, by volume, were considered to contain a significant number.



As shown in Figure 9, inspection results found that a higher percentage of Canadian loads contained a significant number of beverage containers compared to Michigan loads. This data would seem to confirm that Michigan's Bottle Bill does an effective job at removing at least some bottles from disposal. However, it should also be noted that the Bottle Bill does not remove all bottles and cans from Michigan waste and that some are still thrown away by Michigan residents, despite the ten-cent deposit.

CONCLUSIONS

Based on Waste Inspections conducted from March to June 2003, the following conclusions can be drawn regarding the nature of waste entering Michigan landfills from Michigan and out-of-state:

1. *A large number of waste loads entering Michigan landfills during summer months contain some amount of yard waste, despite Michigan's prohibition on the disposal of such waste in landfills.* Generally, however, the amount of yard waste found during Waste Inspections was less than five percent of the volume of the total load.

2. *Yard waste is found in a much greater percentage of Ontario loads than in Michigan loads or loads from any other state.* Approximately 25 percent of Ontario-inspected loads contained some yard waste, while less than ten percent of Michigan inspection loads did.

3. *The amount of Prohibited Waste, other than yard waste entering Michigan landfills, appears to be small and is generally well policed by landfill operators.* The potential always exists for hazardous waste mixed with general refuse to be disposed of illegally in Michigan landfills. No effective screening tool exists to totally eliminate this threat.

4. *A significant amount of cardboard is being landfilled in lieu of being recycled, especially in loads from commercial facilities.* Other recyclables, such as wood pallets and paper, are also being landfilled in a large quantity when a recycle market may exist for these.

5. *Ontario waste contains more beverage containers than does Michigan waste.* A survey of incoming loads at one landfill found that Ontario loads were three times as likely as Michigan loads to contain a significant percentage (five percent) of beverage containers.

Attachment 1
Municipal Solid Waste Landfill Disposal Prohibitions

Items "banned" or otherwise prohibited from disposal in Type II **Municipal Solid Waste (MSW) Landfills** per Michigan or federal law:

(1) Yard clippings (Section 11521 of Part 115, Solid Waste Management, of the NREPA; Rule 430)

"Yard clippings" means leaves, grass clippings, vegetable or other garden debris, shrubbery, or brush or tree trimmings, less than four feet in length and two inches in diameter, that can be converted to compost humus. Yard clippings do not include stumps, agricultural wastes, animal waste, roots, sewage sludge, or garbage.

NOTE: Operational Memorandum GEN-13 provides for the use of compost produced from yard clippings as daily cover in an MSW landfill. The DEQ has stated that ban does not apply to Christmas trees and wreaths.

(2) Lead acid batteries (Rule 430 and Part 171, Battery Disposal, of the NREPA)

"Lead acid battery" means a storage battery, that is used to start an internal combustion engine or as the principal electrical power source for a vehicle, in which the electrodes are grids of lead containing lead oxides that change in composition during charging and discharging, and the electrolyte is dilute sulfuric acid.

NOTE: Prohibition applies regardless of source (household or otherwise).

(3) Liquid waste (Rule 430)

"Liquid waste" means bulk or noncontainerized liquid waste or waste that contains free liquids and containers that hold liquid waste (other than containers normally found in household waste).

(4) Hazardous waste (Rule 430)

"Hazardous waste" means regulated hazardous waste under Part 111, Hazardous Waste Management, of the NREPA. This does not include household hazardous waste or hazardous waste generated by conditionally exempt small quantity generators.

(5) Sewage (Rule 430)

"Sewage" is not defined under Part 115. However, rules under Part 31, Water Resources Protection, of the NREPA define "sanitary sewage" as treated or untreated wastes that contain only human metabolic wastes or wastes generated and discharged as a result of domestic or restaurant activities.

(6) PCBs and PCB items (40 CFR §761.3 and Rule 430)

"PCB Items" are defined in 40 CFR §761.3 as any PCB article, PCB article container, PCB equipment, or anything that deliberately or unintentionally contains or has as a part of it any PCB or PCBs. This definition has been considered to include only PCB waste that is subject to the disposal requirements of 40 CFR, Part 761, Subpart D, and does not include household PCB waste, certain small capacitors, etc.

(7) Materials that would adversely affect the liner or leachate system (Rule 430)

Materials that would adversely affect the liner are most commonly wastes that could puncture the liner during initial fill activities, such as certain kinds of demolition waste. These could also be chemical wastes incompatible with liner materials.

(8) Asbestos waste, unless the landfill complies with 40 CFR §61.154 (Rule 430)

"Asbestos waste" means mill tailings or any waste that contains commercial asbestos and is generated by a source subject to 40 CFR, Part 61. This includes filters from control devices, friable asbestos waste material, and bags or similar packing contaminated with commercial asbestos.

(9) Empty drums, unless crushed to eliminate voids (Rule 430)

Part 115 and its rules do not define "empty." Any drum accepted should be crushed to eliminate voids.

(10) Used oil (Section 16704 of NREPA)

"Used Oil" is defined in Part 167, Used Oil Recycling, of the NREPA as petroleum based oil, which through use, storage, or handling has become unsuitable for its original purpose due to the presence of impurities or loss of original properties. Part 167 provides no exemptions for oil generated from households.

(11) Medical wastes, unless disposal complies with the Medical Waste Regulatory Act (333.13801 to 333.13831 of the Michigan Compiled Laws)

"Medical waste" is defined by the Medical Waste Regulatory Act (MWRA) as certain waste not generated from a household, farm operation, home for the aged, or home health care agency. These include cultures of infectious agents, liquid human and animal waste, pathological waste, sharps, and infectious waste from animals. The MWRA prohibits these from a landfill in liquid form and requires that sharps be placed in rigid, puncture resistant, and appropriately labeled containers.

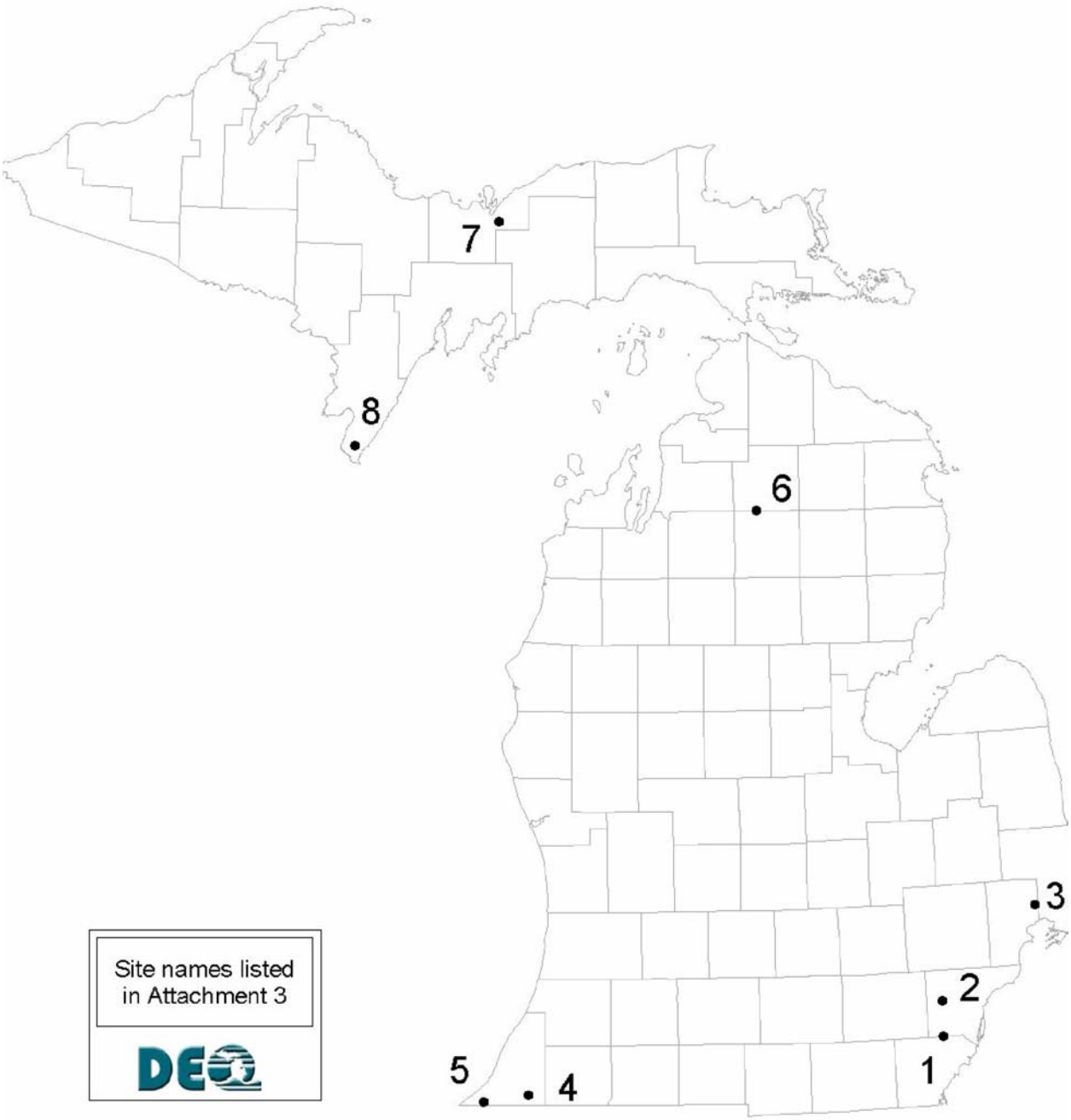
(12) Radioactive material

Radioactive waste regulated by the U.S. Nuclear Regulatory Commission (NRC) may be prohibited for disposal at an MSW landfill under 10 CFR, Part 20. Medical waste containing radioactive isotopes and naturally occurring radioactive material (NORM) waste are not regulated by the NRC. For NORM waste, the DEQ has established recommended upper limits on this material for disposal in MSW landfills.

(13) Appliances containing refrigerant

Appliances still containing a refrigerant, such as refrigerators, freezers, and air conditioners, must be evacuated to a recovery or recycling machine before disposal under Section 608 of the federal Clean Air Act.

Attachment 2
Landfill Waste Inspection Locations



Attachment 3
List of Prohibited Waste Inspections

1	2	3	4	5	6	7	8
Carleton Farms Landfill (Wayne Co.)	**Woodland Meadows - Van Buren Landfill (Wayne Co.)**	**Pine Tree Acres Landfill (Macomb Co.)**	**Southeast Berrien Landfill (Berrien Co.)**	**Forest Lawn Landfill (Berrien Co.)**	**City Envir. Services of Waters Landfill (Crawford Co.)**	**Wood Island Landfill (Alger Co.)**	**Michigan Environs Landfill (Menominee Co.)**
3/17/03	3/19/03	3/20/03	3/20/03	3/18/03	4/8/03	3/20/03	3/19/03
3/24/03	3/27/03	3/25/03	3/27/03	3/26/03	4/15/03*	3/27/03	4/1/03
4/2/03	4/1/03	4/2/03	4/2/03	3/31/03	5/5/03	4/2/03	4/9/03
4/10/03	4/9/03	4/15/03	4/11/03	4/9/03	5/7/03	4/8/03	4/23/03
4/18/03	4/14/03	4/23/03	5/2/03	4/23/03	5/15/03	5/12/03	5/7/03
4/22/03	4/30/03	5/14/03	5/8/03	4/25/03	5/21/03	5/21/03	5/20/03
4/28/03	5/8/03	5/22/03	5/13/03	5/6/03	5/28/03	5/30/03	5/29/03
5/8/03	5/19/03	5/28/03	5/29/03	5/7/03	6/3/03	6/4/03	6/3/03
5/13/03	6/10/03	6/5/03	6/2/03*	5/14/03	6/10/03	6/11/03*	6/5/03
5/30/03	6/24/03*	6/11/03	6/20/03	6/3/03	6/16/03	6/12/03	6/10/03*
6/05/03		7/1/03*		6/13/03*			
6/13/03							
6/19/03*							

*Dates of Detailed Radiation Surveys