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GREAT LAKES INITIATIVE

EPA and States Have Made Progress, but Much Remains to Be Done If Water Quality Goals Are to Be Achieved

Statement of David Maurer
Acting Director, Natural Resources and Environment



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Highlights

Highlights of [GAO-08-312T](#), a testimony before the Subcommittee on Water Resources and Environment, Committee on Transportation and Infrastructure, House of Representatives

Why GAO Did This Study

Millions of people in the United States and Canada depend on the Great Lakes for drinking water, recreation, and economic livelihood. During the 1970s, it became apparent that pollutants discharged into the Great Lakes Basin from point sources, such as industrial and municipal facilities, or from nonpoint sources, such as air emissions from power plants, were harming the Great Lakes. Some of these pollutants, known as bioaccumulative chemicals of concern (BCC), pose risks to fish and other species as well as to the humans and wildlife that consume them. In 1995, the Environmental Protection Agency (EPA) issued the Great Lakes Initiative (GLI). The GLI established water quality criteria to be used by states to establish pollutant discharge limits for some BCCs and other pollutants that are discharged by point sources. The GLI also allows states to include flexible permit implementation procedures (flexibilities) that allow facilities' discharges to exceed GLI criteria.

This testimony is based on GAO's July 2005 report, *Great Lakes Initiative: EPA Needs to Better Ensure the Complete and Consistent Implementation of Water Quality Standards* (GAO-05-829) and updated information from EPA and the Great Lakes states. This statement addresses (1) the status of EPA's efforts to develop and approve methods to measure pollutants at the GLI water quality criteria levels, (2) the use of permit flexibilities, and (3) EPA's actions to implement GAO's 2005 recommendations.

To view the full product, including the scope and methodology, click on [GAO-08-312T](#). For more information, contact David Maurer at (202) 512-3841 or maurerd@gao.gov.

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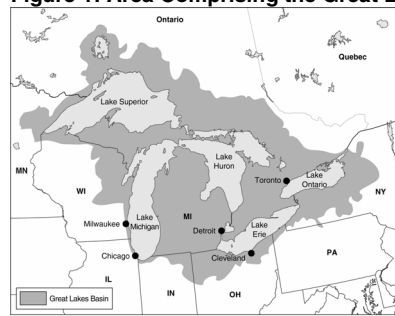
What GAO Found

As GAO reported in 2005, developing the sensitive analytical methods needed to measure pollutants at the GLI water quality criteria level is a significant challenge to achieving GLI's goals. Of the nine BCCs for which criteria have been established, only two—mercury and lindane—have EPA-approved methods that will measure below those criteria levels. Measurement methods for the other BCCs are either not yet approved or cannot reliably measure to GLI criteria. Without such measurement, it is difficult for states to determine whether a facility is exceeding the criteria and if discharge limits are required in the facility's permit. As methods become available, states are able to include enforceable discharge limits in facilities' permits. For example, since EPA approved a more sensitive method for mercury in 1999, the number of permits with mercury limits has increased from 185 in May 2005 to 292 in November 2007. EPA and state officials expect this trend to continue. Similar increases may occur as more sensitive analytical methods are developed and approved for other BCCs.

Flexibilities included in permits allow facilities' discharges to exceed GLI water quality criteria. For example, one type of flexibility—variances—will allow facilities to exceed the GLI criteria for a pollutant specified in their permits. Moreover, the GLI allows the repeated use of some of these permit flexibilities, and does not set a time frame for facilities to meet the GLI water quality criteria. As a result, EPA and state officials do not know when the GLI criteria will be met.

In the 2005 report, GAO made a number of recommendations to EPA to help ensure full and consistent implementation of the GLI and to improve measures for monitoring progress toward achieving GLI's goals. EPA has taken some actions to implement the recommendations. For example, EPA has begun to review the efforts and progress made by one category of facilities—municipal wastewater treatment plants—to reduce their mercury discharges into the basin. However, until EPA gathers more information on the implementation of GLI and the impact it has had on reducing pollutant discharges from point sources, as we recommended, it will not be able to fully assess progress toward GLI goals.

Figure 1: Area Comprising the Great Lakes Basin



Madam Chairwoman and Members of the Subcommittee:

I am pleased to be here today to discuss our work on the Great Lakes Initiative (GLI), and its impact on water quality in the Great Lakes Basin.¹ As you know, millions of people in the United States and Canada depend on the Great Lakes—the largest system of freshwater in the world—as a source of drinking water, recreation, and economic livelihood. During the 1970s, it became apparent that pollutants discharged into the basin from point sources, such as industrial and municipal facilities, or from nonpoint sources, such as air emissions from power plants and agricultural runoff, were harming the Great Lakes. Because less than 1 percent of the Great Lakes' water recycles or turns over each year, on average, many of these pollutants stay in place, settling in sediments or bio-accumulating in fish and other aquatic species. As a result, some of these pollutants, such as mercury and dioxin, known as bioaccumulative chemicals of concern (BCC), pose risks to those species as well as to the humans and wildlife that consume them.

In 1990, following a series of binational agreements aimed at improving environmental conditions in the Great Lakes Basin, the Congress passed the Great Lakes Critical Programs Act. This act, which amended the Clean Water Act, required the Environmental Protection Agency (EPA) to publish water quality guidance on minimum water quality standards and antidegradation policies for protecting existing water quality. In response, in 1995, EPA published the *Final Water Quality Guidance for the Great Lakes System*, otherwise known as the GLI, to control over 100 toxic pollutants and protect aquatic life, wildlife, and human health. Through the GLI, EPA established stringent water quality criteria—numeric values to be used by states to set pollutant discharge limits for point sources—for 9 BCCs and 20 other pollutants found in the basin. In addition, the GLI established methodologies that the states are to use in developing criteria for the remaining pollutants. Meeting the criteria established by GLI requires sensitive analytical methods that allow measurement of pollutant concentrations at or below the level established by GLI water quality criteria. These methods allow states to determine if a facility is exceeding the criteria and if a discharge limit is required in the facility's permit as well as to assess the facility's compliance. The Great Lakes Critical

¹The Great Lakes Basin includes the five Great Lakes—Superior, Michigan, Huron, Ontario, and Erie—and a large land area that extends beyond the lakes, including their watersheds, tributaries and connecting channels.

Programs Act required that the eight Great Lakes states—Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin—adopt provisions consistent with GLI into their environmental regulations and point source permit programs within 2 years of issuance of GLI guidance.

As you requested, my testimony today focuses on (1) the status of EPA's efforts to develop and approve methods needed to measure pollutants at the GLI water quality criteria level, (2) the use of permit flexibilities, and (3) the actions EPA has taken to implement the recommendations we made in our 2005 report on the GLI to better ensure full and consistent implementation of GLI and monitor progress in meeting GLI goals.² My testimony is based on the 2005 report and additional information we have obtained from EPA and the Great Lakes states. Our testimony primarily focuses on the nine BCCs for which EPA has developed GLI water quality criteria. Most of these BCCs are responsible for fish consumption advisories in the Great Lakes.

We conducted this performance audit from October 2007 through January 18, 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We determined that the data provided were sufficiently reliable for purposes of this testimony.

In summary:

- As we reported in 2005, developing the sensitive analytical methods needed to determine whether GLI water quality criteria are being met is a significant challenge to fully achieving GLI's goals. At the time of our report, a method that allowed measurement of the pollutant at or below the GLI criteria had been developed and approved for only two of the nine BCCs—mercury and lindane. Mercury and lindane remain the only BCCs for which an approved method is available that measures pollutant concentrations below the GLI criterion. Once EPA approves an analytical method, Great Lakes states are able to issue

²GAO, *Great Lakes Initiative: EPA Needs to Better Ensure the Complete and Consistent Implementation of Water Quality Standards*, [GAO-05-829](#) (Washington, D.C.: July 27, 2005).

point source permits that require facilities to use that method unless an alternative procedure has been approved by the EPA region. Methods have been developed for the remaining seven BCCs, but these methods either have not yet been approved or only allow for measurement above the GLI criteria. For example, because chlordane has a water quality criterion of 0.25 nanograms per liter but can only be measured down to a level of 14 nanograms per liter, it cannot always be determined if the pollutant is exceeding the criterion. When methods are developed that can measure pollutant concentrations at or below the level established by GLI water quality criteria, a more pervasive problem of high pollutant levels in the Great Lakes Basin waterbodies than previously recognized may be revealed and could result in additional permits with discharge limits. For example, the number of permits with mercury limits increased from 185 in May 2005 to 292 in November 2007. EPA officials attribute this increase to the development of a more sensitive method for mercury in 1999 and EPA and state officials expect this trend to continue. Similar increases may occur as more sensitive analytical methods are developed and approved for other BCCs.

- Although permits may include BCC discharge limits, the GLI authorizes states to use flexibilities that allow facilities' discharges to exceed GLI water quality criteria. For example, one type of flexibility—variances—will allow facilities to exceed the GLI criteria for a particular pollutant specified in their permits. Furthermore, the GLI allows the repeated use of some of these flexibilities and does not set a time frame for facilities to meet the GLI water quality criteria. As a result, EPA and state officials could not tell us when the use of these flexibilities will be discontinued or when the GLI criteria will be met.
- EPA has taken some actions to implement the recommendations we made in our 2005 report to help ensure the full and consistent implementation of the GLI and to improve measures for monitoring progress toward achieving GLI's goals. First, EPA implemented our recommendation to fully develop the GLI Clearinghouse and make it available to the Great Lakes states. Second, as we recommended, EPA is beginning to gather and track information to assess the progress of GLI implementation although the information collected is limited to municipal wastewater treatment plants. Third, to ensure the equitable and timely implementation of GLI among all the Great Lakes states, EPA has increased its efforts to resolve disagreements with the state of Wisconsin on the adoption and implementation of GLI provisions. Finally, although EPA disagreed with our recommendation to issue a permitting strategy for mercury to ensure a more consistent approach

for controlling mercury by the states, it has continued to support state implementation efforts by assessing which approaches are most effective in reducing mercury discharges by point sources.

Progress Made in Developing Analytical Methods Will Ultimately Result in More Permits with BCC Discharge Limits

The ability to accurately and reliably measure pollutant concentrations is vital to successfully implementing GLI water quality criteria. Without this ability, it is difficult for states to determine if a facility's discharge is exceeding GLI water quality criteria and if a discharge limits are required. For example, because chlordane has a water quality criterion of 0.25 nanograms per liter but can only be measured down to a level of 14 nanograms per liter, it cannot always be determined if the pollutant is exceeding the criterion. As we reported in 2005, developing the analytical methods needed to measure pollutants at the GLI water quality criteria level is a significant challenge to fully achieving GLI goals. Although methods have been developed for the nine BCCs for which GLI water quality criteria have been established, EPA has only approved the methods to measure mercury and lindane below GLI's stringent criteria levels. Analytical methods for the other BCCs either have not received EPA approval or cannot be used to reliably measure to GLI criteria levels. Once EPA approves an analytical method, Great Lakes states are able to issue point source permits that require facilities to use that method unless the EPA region has approved an alternative procedure. According to EPA officials, specific time frames for developing and approving methods that measure to GLI criteria have not yet been established. EPA officials explained that developing EPA-approved methods can be a time-consuming and costly process. Table 1 shows the status of the methods for the nine BCCs.

Table 1: Status of BCC Analytical Methods

BCC	Status of method to measure GLI water quality criteria
Chlordane	Measures above the GLI criterion
Dieldrin	Measures above the GLI criterion
DDT	Measures at the GLI criterion but not yet approved by EPA ^a
Hexachlorobenzene	Measures above the GLI criterion
Lindane	Measures below the GLI criterion and approved by EPA
Mercury	Measures below the GLI criterion and approved by EPA
PCBs	Measures above the GLI criterion
2,3,7,8-TCDD	Measures above the GLI criterion
Toxaphene	Measures above the GLI criterion

Source: GAO analysis of EPA information.

^aAn analytical method exists for DDT; however, this method does not measure this pollutant at the GLI criterion level. A more sensitive method has been developed but it is in draft and EPA has not yet approved it.

As we reported in 2005, if pollutant concentrations can be measured at or below the level established by GLI water quality criteria, enforceable permit limits can be established on the basis of these criteria. The Great Lakes states' experience with mercury illustrates the impact of sufficiently sensitive measurement methods on identifying pollutant discharges from point sources. Methods for measuring mercury at low levels were generally not available until EPA issued a new analytical method in 1999 to measure mercury concentrations below the GLI water quality criterion of 1.3 nanograms per liter of water. This more sensitive method disclosed a more pervasive problem of high mercury levels in the Great Lakes Basin than previously recognized and showed, for the first time, that many facilities had mercury levels in their discharges that were exceeding water quality criteria. Since this method was approved, the number of permits with discharge limits for mercury rose from 185 in May 2005 to 292 in November 2007. Moreover, EPA and state officials are expecting this trend to continue. As EPA officials explained, it may take up to two permit cycles—permits are generally issued for 5-year periods—to collect the monitoring data needed to support the inclusion of discharge limits in permits. EPA officials are expecting a similar rise in permits with discharge limits for polychlorinated biphenyls (PCBs) when detection methods are approved.

Permit Flexibilities Allowing Discharges in Excess of GLI Water Quality Standards Delay Achievement of GLI Goals

Permit flexibilities often allow facilities' discharges to exceed GLI water quality criteria. These flexibilities can take several forms, including the following:

- *Variance*. Allows dischargers to exceed the GLI discharge limit for a particular pollutant specified in their permit.
- *Compliance schedule*. Allows dischargers a grace period of up to 5 years in complying with a permitted discharge limit.
- *Pollutant Minimization Program (PMP)*. Sets forth a series of actions by the discharger to improve water quality when the pollutant concentration cannot be measured down to the water quality criterion. A PMP is often used in conjunction with a variance.
- *Mixing Zone*. Allows dischargers to use the areas around a facility's discharge pipe where pollutants are mixed with cleaner receiving waters to dilute pollutant concentrations. Within the mixing zone, concentrations of pollutants are generally allowed to exceed water quality criteria as long as standards are met at the boundary of the

mixing zone. This flexibility expires in November 2010 with some limited exceptions.

These flexibilities are generally only available to permit holders that operated before March 23, 1997, and are in effect for 5 years or the length of the permit.³ GLI allows states to grant such permit flexibilities under certain circumstances, such as when the imposition of water quality standards would result in substantial and widespread economic and social impacts. Table 2 shows the number and type of BCC permit flexibilities being used as of November 2007 in the Great Lakes Basin for mercury, PCBs, and dioxin, as well as BCC discharge limits contained in permits.

Table 2: Number and Type of BCC Permit Flexibilities Used and BCC Discharge Limits in Great Lakes Basin Permits

	IL	IN	MI	MN	NY	OH	PA	WI	Total as of Nov. 2007
Mercury									
Variance	0	2	136	0	0	15	0	2	155
PMP	0	2 ^a	136 ^a	3 ^b	^c	25 ^d	0	31 ^e	197
Compliance Schedule	0	12	0	3	^c	48	0	0	63
Mixing Zone	0	0	0	0	^c	20	0	^f	20
Mercury discharge limits contained in permits	0	16	136	4	49	83	0	4	292
PCBs									
Variance	0	0	0	0	0	0	0	0	0
PMP	0	0	0	1	^c	0	0	0	1
Compliance Schedule	0	0	0	1	^c	0	0	0	1
Mixing Zone	0	0	0	0	^c	1	0	0	1
PCB discharge limits contained in permits	0	2	7	1	39	1	0	0	50
2,3,7,8-TCDD;Dioxin									
Variance	0	0	0	0	0	0	0	0	0
PMP	0	0	0	1	^c	0	0	0	1
Compliance Schedule	0	0	0	1	^c	0	0	0	1
Mixing Zone	0	0	0	0	^c	0	0	0	0
Dioxin discharge limits contained in permits	0	0	2	1	0	0	0	0	3
Total Flexibilities Used ^a	0	16	272	10	^c	109	0	33	440

³Mixing zones are available for facilities that were discharging the pollutant or facilities that were under construction on the date that the GLI took effect in that state.

	IL	IN	MI	MN	NY	OH	PA	WI	Total as of Nov. 2007
BCC discharge limits for mercury, PCBs, and dioxin contained in permits	0	18	145	6	88	84	0	4	345

Source: GAO analysis of state permit data.

^aThese PMPs are used as a condition of a variance in a permit.

^bThese PMPs are associated with compliance schedules.

^cCurrently, no variances have been granted by the New York State Department of Environmental Conservation (NYSDEC). However, the department was unable to determine the number of permitted facilities that had other flexibilities, and the number of flexibilities used. According to NYSDEC, 51 facilities could use these permit flexibilities.

^dThese 25 PMPs are used as both a condition of a variance (15) and associated with compliance schedules (10).

^eTwo of these PMPs are used as a condition of a variance in a permit. In general, Wisconsin officials are using PMPs in lieu of discharge limits to address mercury.

^fWisconsin officials were unable to provide data on the number mixing zones used for mercury.

According to EPA and state officials, in many cases, facilities cannot meet GLI water quality criteria for a number of reasons, such as technology limitations, and the flexibilities are intended to give the facility time to make progress toward meeting the GLI criteria. With the exception of compliance schedules, the GLI allows for the repeated use of these permit flexibilities.⁴ As a result, EPA and state officials could not tell us when the GLI criteria will be met.

EPA Has Taken Some Actions to Ensure Consistent Implementation of the GLI as Recommended in Our 2005 Report

In our 2005 report, we described several factors that were undermining EPA's ability to ensure progress toward achieving consistent implementation of GLI water quality standards. To help ensure full and consistent implementation of the GLI and to improve measures for monitoring progress toward achieving GLI's goals, we made a number of recommendations to the EPA Administrator. EPA has taken some actions to implement the recommendations contained in our 2005 report, as the following indicates:

- *Ensure the GLI Clearinghouse is fully developed.* We noted that EPA's delayed development of the GLI Clearinghouse—a database intended

⁴The GLI does not provide a sunset date for permit flexibilities other than mixing zones, which are set to expire in 2010 with limited exceptions. Individual compliance schedules cannot be used for more than the 5-year period they establish; however, after the schedules expire, facilities may use other permit flexibilities such as variances.

to assist the states in developing consistent water quality criteria for toxic pollutants—was preventing the states from using this resource. To assist Great Lakes states in developing water quality criteria for GLI pollutants, we recommended that EPA ensure that the GLI Clearinghouse was fully developed, maintained, and made available to Great Lakes states. EPA launched the GLI Clearinghouse on its Web site in May 2006 and in February 2007, EPA Region 5 provided clearinghouse training to states. The clearinghouse currently contains criteria or toxicity information for 395 chemicals. EPA officials told us that the clearinghouse is now available to the states so they can independently calculate water quality criteria for GLI pollutants. EPA officials told us that some states, including Ohio, Wisconsin, and Illinois, plan on updating their water quality standards in the near future and believe that the clearinghouse will benefit them as well as other states as they update their standards.

- *Gather and track information to assess the progress of GLI implementation.* In 2005, we reported that EPA's efforts to assess progress in implementing the GLI and its impact on reducing point source discharges have been hampered by lack of information on these discharges. To improve EPA's ability to measure progress, we recommended that EPA gather and track information on dischargers' efforts to reduce pollutant loadings in the basin. EPA has begun to review the efforts and progress made by one category of facilities—municipal wastewater treatment facilities—to reduce their mercury discharges into the basin. However, until EPA develops additional sources of information, it will not have the information needed to adequately assess progress toward meeting GLI goals.
- *Increase efforts to resolve disagreements with Wisconsin.* Although we found that the states had largely completed adoption of GLI standards, EPA had not resolved long-standing issues with Wisconsin regarding adoption and implementation of GLI provisions. To ensure the equitable and timely implementation of GLI by all the Great Lakes states, we recommended that the EPA Administrator direct EPA Region 5, which is responsible for Wisconsin, to increase efforts to resolve disagreements with the state over inconsistencies between the state's and the GLI's provisions. Wisconsin officials believe the GLI provisions are not explicitly supported by Wisconsin law. Subsequently, EPA and Wisconsin officials have held discussions on this matter, and neither Wisconsin nor EPA officials believe that these disagreements are significantly affecting GLI implementation. However, they have been unable to completely resolve these issues. We found that similar issues have also surfaced with New York.

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- *Issue a permitting strategy for mercury.* Because we found that Great Lakes' states had developed inconsistent approaches for meeting the GLI mercury criterion, including differences in the use of variances, we recommended that EPA issue a permitting strategy to ensure a more consistent approach. EPA disagreed with this recommendation, asserting that a permitting strategy would not improve consistency. Instead, the agency continued to support state implementation efforts by developing guidance for PMPs, evaluating and determining compliance, and assessing what approaches are most effective in reducing mercury discharges by point sources. One such effort is EPA Region 5's review of mercury PMP language in state-issued permits for wastewater treatment facilities. This review resulted in recommendations to the states in May 2007 to improve the enforceability and effectiveness of PMP provisions. However, additional efforts will be needed to ensure consistency at other types of facilities, such as industrial sites, across the Great Lakes states.

In closing, Madam Chairwoman and Members of the Subcommittee, although progress has been made with mercury detection and increased knowledge of wastewater treatment facilities' pollutant discharges to the Great Lakes, information is still lacking on the full extent of the problem that BCCs pose in the Great Lakes. As methods are developed to determine whether facilities' discharges for other BCCs meet GLI criteria and EPA approves them, and as more permits include discharge limits, more information will be available on pollutant discharges in the basin. Even with these advances, however, extensive use of permit flexibilities could continue to undercut reductions in pollution levels and the ultimate achievement of GLI's goals.

This concludes my prepared statement. I would be happy to respond to any questions that you or Members of the Subcommittee may have at this time.

GAO Contacts

Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. For further information about this testimony, please contact David Maurer at (202) 512-3841 or maurerd@gao.gov. Key contributors to this testimony were Greg Carroll, Katheryn Summers Hubbell, Sherry L. McDonald, and Carol Herrnsstadt Shulman. Other contributors included Jeanette Soares and Michele Fejfar.

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