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**REPORT TO THE GOVERNOR
AND THE LEGISLATURE ON
THE PETROLEUM TANK RELEASE
CLEAN-UP PROGRAM
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EXECUTIVE SUMMARY

In 1987, the Minnesota State Legislature passed the Petroleum Tank Release Clean-up Act, Minnesota Statutes chapter 115C, establishing the Petroleum Tank Release Compensation Fund (Petrofund) and a five member Petrofund Board. The purpose of the program is to encourage rapid and thorough clean-up of a petroleum release by providing for partial reimbursement to persons for costs incurred in that clean-up, in order to prevent or alleviate groundwater contamination from petroleum products.

The Minnesota Petrofund reimbursement program is widely considered to be one of the most successful in the United States. Nonetheless, as the program grows, so does the potential for problems. This report will first present background information on the role of the Commerce Department and the Minnesota Pollution Control Agency (MPCA), and will then set forth problem areas as well as recommendations for program changes which will provide remedies. Specific recommendations in this report include:

- Improving cost and fraud control by providing the Commerce Department's Petrofund staff and the Minnesota Pollution Control Agency with stronger authority and resources to audit financial records.
- Improving fraud control by having the Commerce Department, the Minnesota Pollution Control Agency and the Attorney General's Office conduct more site inspections, to deter attempted fraud, and lead to conviction or suspension of consultants, contractors or tank-owners who commit fraud.
- Improving cost control by implementing newly adopted rules requiring competitive bidding.
- Resolving the Petrofund account deficit in order to prevent substantial delays in the payment of Petrofund reimbursement checks.
- Considering a change in the membership of the Petrofund Board, to include a local government representative.

PART I COMMERCE DEPARTMENT: PETROFUND APPLICATIONS

Minnesota Statutes chapter 115C and Minnesota Rules chapter 2890 set forth the procedure by which a person who has conducted a petroleum clean-up may apply for reimbursement from the Petrofund program. The reimbursement program is administered by the Minnesota Department of Commerce, which provides the support staff for the Petrofund Board. The Commerce Petrofund staff reviews reimbursement applications for compliance with the Petrofund statutes and rules, and makes reimbursement recommendations to the Petrofund Board. The requirements for applying for Petrofund reimbursement are set forth in Part I of this report.

PART II MPCA: CLEAN-UP REQUIREMENTS

The clean-up of petroleum contaminated sites is governed by the statutes and rules of the MPCA. A tank-owner must receive approval of a Corrective Action Plan from the MPCA before an application for Petrofund reimbursement may be submitted to the Commerce Petrofund staff for consideration by the Petrofund Board. Since 1987, MPCA procedures governing clean-ups have changed significantly, resulting in expedited approvals and clean-ups. The success of the new procedures is set forth in Part II of this report. Attachments 2 and 3 contain a more detailed analysis of these new procedures.

PART III LEGISLATIVE MANDATE TO ENSURE REASONABLE COSTS

In 1991, the legislature directed the Petrofund Board to adopt rules which would ensure reasonable costs. Pursuant to that mandate, the Petrofund Board has adopted emergency rules requiring that tank-owners obtain competitive bids for all contracts entered into for the clean-up of a petroleum release. Further, the Petrofund Board is in the process of adopting permanent rules regarding reasonable costs, which are discussed in Part III, and are set forth in Attachment 1. Additional methods of cost control are proposed in Part IV.

PART IV COST CONTROL - FRAUD AND CLAIM INVESTIGATION

Commerce Petrofund and the MPCA in collaboration with the Office of the Attorney General, found that (1) Minnesota Statutes chapter 115C requires amendment to address the potential for fraudulent and unreasonable claims, and (2) the current staff of the MPCA and Commerce Petrofund is not adequate to accomplish the detection and investigation of such false claims. Failure to do so is estimated to cost the Petrofund \$5,000,000 per year, or 10% of total annual reimbursements. Part IV of this report sets forth recommendations concerning the detection and investigation of unreasonable, false and fraudulent claims.

PART V PETROFUND ACCOUNT DEFICIT

The penny-per-gallon Petrofund fee is imposed only when the account falls below a certain level, and has been imposed sporadically as needed between 1988 and 1991. However, since July 1991, the fee has been continuously imposed, and the current level of applications (150 to 200 per Board meeting, with reimbursements of approximately \$5 million per meeting) is expected to continue until 1998 when most petroleum tanks are in compliance with EPA regulations. Despite the continuous imposition of the one cent fee, the Petrofund account is in a constant deficit status, expected to be \$-10 million by June 1992 and \$-45 million by June 1993, with the result that many tank-owners will be required to wait up to 18 months for a check after the Petrofund Board has approved payment. Annual reimbursements for fiscal year 1992 are estimated at approximately \$65 million, and reimbursement amounts are expected to plateau at annual figures between \$50 million to \$60 million until 1998, at which time most tanks will be in compliance with new regulations, making petroleum releases a much rarer occurrence. Part V of this report discusses the funding mechanism in detail, and presents a recommendation which would address the deficit.

PART VI PETROFUND BOARD

Part VII of this report makes a recommendation to alter the membership on the Petrofund Board to include representation from a local government unit to provide greater diversity and perspective.

I. APPLICATION FOR PETROFUND REIMBURSEMENT

A. Eligibility: An applicant must be a "Responsible Person" or a "Volunteer" in order to receive partial reimbursement from the Petrofund; however, certain persons who are neither a "Responsible Person" nor a "Volunteer" may receive full reimbursement in very limited circumstances.

Responsible Person: "Responsible Person" is defined in Minn. Stat. §115C.021 as an owner or operator of a tank at any time during or after a petroleum release. "Person" is further defined in Minn. Stat. §115C.02 as including individuals, partnerships, associations, public or private corporations, or other legal entities, including the United States Government, an interstate commission or other body, the state, or any agency, board, bureau, office, department, or political subdivision of this state. "Owner" is defined as a person who holds title to, controls, or possesses an interest in a tank. This does not include the holder of a security interest in a tank except where the holder has taken possession of the tank through foreclosure or other such action. "Operator" is defined as a person in control of or having responsibility for the daily operation of a tank.

As the owner or operator of the tank, the Responsible Person is the person against whom the MPCA may exercise the enforcement provisions of the Petrofund Act.

Volunteer: The requirements for "Volunteer" eligibility are set forth in Minn. Stat. §115C.09, Subd. 3b. A "Volunteer" is one who currently holds legal or equitable title to the property where a release has occurred, but who does not fall within the definition of "Responsible Person", generally because the tank was removed prior to the property transfer. It is important to note that a person does not avoid the status of a "Responsible Person" merely by being a post-release purchaser, except where the purchaser did not know or have reason to know of the existence of the tank at the time time of acquiring right, title or interest in the tank.

Non-Responsible Person: A further distinction is made in Minn. Stat. §115C, Subd. 3a for a person who is not a "Responsible Person" or a "Volunteer", but who incurs clean-up costs for action taken at the request or order of the MPCA. For example, a tank owner is ordered by the MPCA to perform soil boring tests on his property where contamination has been discovered but the source of the contamination is not clear. It is thereafter determined by the MPCA that this tank is not a source of the release. Thus, this tank owner does not

fall within the definition of a "Responsible Person", and the expenses he incurred are eligible for 100% reimbursement.

B. Application: (1) An application for reimbursement may be submitted at various times throughout the clean-up process:

(a) When the applicant has completed the initial investigation and has received a Soil Corrective Action Plan (SCAP) approval from MPCA, the applicant may apply for reimbursement of investigation and soil treatment costs incurred.

(b) If additional investigation and remediation are needed, including groundwater treatment, the applicant may apply for such costs incurred when the applicant has received a Comprehensive Corrective Action Plan (CCAP) approval from MPCA. As the CCAP is implemented, the applicant may continue to submit applications for costs as they are incurred (up to four per year).

(c) The applicant may apply for all costs incurred if a closure letter issued by the MPCA commissioner has been issued.

(2) The Petrofund staff reviews all applications for completeness, the eligibility of costs incurred, and the reasonableness of such costs. In connection with each application, the Petrofund staff also reviews the "MPCA Commissioner's Site Report to the Petroleum Tank Release Compensation Board".

Complete Application: Minn. Stat. §115C.09, Subd. 2, requires the Board to consider a complete application for reimbursement within 60 days of its submission to the Board. Upon receipt and review of an application, the Commerce Petrofund staff will promptly notify the applicant of any deficiencies and will request any additional information which may be required. Until such deficiencies are remedied, the application will not be considered complete.

Eligible Costs: In order to be considered eligible for reimbursement, clean-up costs must meet several requirements:

(a) The clean-up costs must have been incurred after June 4, 1987 if the applicant is a "Responsible Person", or after May 23, 1989 if the applicant is a "Volunteer".

(b) The costs incurred may only be for "corrective action", which is defined in Minn. Stat. §115C.02, Subd. 4 as action taken to minimize, eliminate, or clean-up a "release" to

protect the public health and welfare or environment. "Release" is defined in Subdivision 12 as a spilling, leaking, emitting, discharging, escaping, leaching, or disposing of petroleum from a "tank" into the environment. "Tank" is defined in Subdivision 14 to exclude mobile transports. Further, releases from tanks located at petroleum refineries or at facilities with more than one million gallons of storage capacity are not eligible for reimbursement pursuant to Minn. Stat. §115C.09, Subd. 3c.

Minnesota Rule 2890.0070, Subp. 1 provides the following specific list of eligible costs:

- i) Emergency response and initial site hazard mitigation. Costs may include, but are not limited to, those necessary to abate acute risks to human health, safety, and the environment.
 - ii) Temporary site hazard control measures. Costs may include, but are not limited to, temporary provision of drinking water and housing, initial abatement of vapors, and removal of free product.
 - iii) Investigation and source identification including, but not limited to, collecting and analyzing soil samples, testing the groundwater, testing adjacent drinking water supplies, tank integrity testing, and engineering services.
 - iv) Development of a corrective action plan in accordance with the MPCA's requirements.
 - v) Clean-up of releases including, but not limited to, removal, treatment, or disposal of surface and subsurface contamination and provision of a permanent alternative water supply. Clean-up must be performed in accordance with a corrective action plan approved by the MPCA.
- (c) Costs that the applicant is legally obligated to pay as damages to third parties for bodily injury or property damage caused by a release are reimbursable if they have been established by a court order or a consent decree. However, such third party costs are payable only after all eligible clean-up costs have been reimbursed.
- (d) All costs associated with actions that do not minimize, eliminate or clean-up a release to protect the public health and welfare are ineligible costs. Minn. Rule 2890.0080 provides that such ineligible costs include, but are not limited to:

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- i) the permanent repair or replacement of a tank;
- ii) upgrading tanks;
- iii) loss of income;
- iv) attorney's fees;
- v) permanent relocation of residents;
- vi) decreased property values;
- vii) reimbursement for the applicant's own time spent in planning and administration of a corrective action plan;
- viii) aesthetic improvements;
- ix) any work performed that is not in compliance with safety codes including but not limited to Occupational Safety and Health Administration requirements, well codes and fire codes; or
- x) costs which are covered by insurance.

(3) **Reasonableness of Eligible Costs:** The Commerce Petrofund staff reviews all eligible costs to determine reasonableness and may request documentation of the reasonableness of any eligible costs by requiring:

- (1) evidence of competitive bids,
- (2) evidence that the cost is substantially equivalent to that charged for comparable services in the same geographical area,
- (3) evidence that only one person was available to perform the service, or
- (4) evidence that only one person was qualified to perform the service.

The Board is currently proposing permanent rules which will require documentation of competitive bids or proposals in all cases, unless an exemption is granted (see Part III of this report and Attachment 1).

(4) **MPCA Commissioner's Site Report:** The MPCA Site Report which is submitted to the Petrofund Board pursuant to Minn. Rule 2890.0090, Subp. 6, provides a written report on

the applicant's compliance or non-compliance with Minn. Stat. §115C.09, Subd. 3(d), which provides that the amount of reimbursement will be reduced if non-compliance with the following requirements is found:

- (i) at the time of the release the tank was in substantial compliance with state and federal rules and regulations applicable to the tank, including rules or regulations relating to financial responsibility;
- (ii) the MPCA was given notice of the release as required by Minn. Stat. §115.061;
- (iii) the applicant, to the extent possible, fully cooperated with the MPCA in responding to the release; and
- (iv) if the responsible person is an operator, the person exercised due care with regard to operation of the tank, including maintaining inventory control procedures.

The Board's determination of the amount of the reimbursement reduction will be based on a consideration of the likely environmental impact of the non-compliance; whether the non-compliance was negligent, knowing or willful; the reduction recommended by the MPCA; and the deterrent effect on others.

Minn. Rule 2890.0065 provides for standard reductions, from 5% to 50%, for failure to comply with the requirements of Minn. Stat. §115C.09, Subd. 3(d).

(5) Maximum Reimbursement: Minn. Stat. §115C.09, Subd. 3 provides that the maximum reimbursement allowable to a Responsible Person or a Volunteer is 90% of total reimbursable costs up to a maximum of \$1,000,000. No more than \$1,000,000 may be reimbursed for costs associated with a single release, regardless of the number of persons eligible for reimbursement, and no more than \$2,000,000 may be reimbursed for costs associated with a single tank facility, regardless of the number of separate releases at the facility.

Minn. Stat. §115C.09, Subd. 3(a) provides for 100% reimbursement to one who is not a Responsible Person but took corrective action in response to a request or order of the MPCA.

C. Petrofund Board Determination: After reviewing the application for eligibility and reasonableness of costs and applying reimbursement reductions based on the MPCA Site

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Report, the Petrofund staff makes a reimbursement recommendation to the Petrofund Board. The complete application and the MPCA Site Report constitute the written record upon which the staff's recommendation is made.

The Petrofund Board makes the final determination on the amount of reimbursement, based on the written record. The Board may allow supplemental information to be presented orally at a Board meeting, but may reasonably limit such presentations. An applicant will be notified if the Board rejects any portion of the request for reimbursement, and the reasons for the rejection. Once the Board has made its reimbursement determination, a check is sent to the applicant as soon as funds are available in the Petrofund account.

II. MPCA MANAGEMENT OF THE CLEAN-UP OF PETROLEUM RELEASES

When a petroleum release is detected, it must be immediately reported to MPCA. MPCA then sends guidance documents to the tank-owner directing that the extent of the release be investigated, and an appropriate Corrective Action Plan be prepared and proposed to MPCA. Petroleum release cleanup generally involves three major activities: investigation to determine the extent and magnitude of contamination and possible impact on public health and the environment, assessment and selection of cost-effective cleanup approaches, and installation and operation of the cleanup.

Minnesota's petroleum releases have ranged in severity from explosions with fatalities to minor soil contamination requiring no clean-up treatment. Releases which contaminate the groundwater, nearly 2,000 at this point, are the most expensive to clean-up. Since 1987 MPCA has expended Petrofund and federal funds at 78 sites where the Responsible Persons were unknown or unwilling to perform the clean-up. The majority of these sites presented immediate threats to public health due to explosive vapors or contaminated drinking water.

Since the beginning of the Petrofund reimbursement program, approximately 4,500 petroleum tank releases have been reported to MPCA, increasing annually as shown in the table below:

<u>Calendar Year</u>	<u>Release Reports</u>
1987	248
1988	535
1989	1,208
1990	1,452
1991	1,122

Regulated storage tanks are generally located at gas stations and other commercial sites. However, the definition of petroleum also includes fuel oil; thus, petroleum releases which are eligible for Petrofund reimbursement can occur at other locations such as schools, private residences, hospitals, and churches. The ten major types of facilities at which petroleum storage tanks are located are as follows:

<u>Facility</u>	<u>% of all tanks</u>
Service Stations	19.5%
Industry	12.8%
Government	11.0%
Schools	9.8%
Convenience Stores	7.7%

Utilities	2.9%
Auto Dealers	2.8%
Auto Care	2.7%
Churches	2.1%
Agriculture	2.1%

MPCA projects a total of 11,500 release sites over the expected life of the Petrofund reimbursement program. State and federal requirements should result in the removal of obsolete tank systems and the addition of release detection and prevention equipment by 1998 for nearly all tanks subject to the regulations. Thereafter, Petrofund reimbursement is expected to be needed generally only in cases where the tank-owner is unwilling or unable to perform the clean-up, or where new tank systems were improperly installed or operated.

Of its 1991 Petrofund appropriation of \$1,509,044, MPCA budgeted \$350,000 for clean-up activities, and applied to the Petrofund Board and expended an additional \$381,638 for clean-ups. Most of MPCA's clean-up money is expended on sites where MPCA has determined that it is necessary to immediately eliminate the threat to public health or the environment. Thereafter, once MPCA determines who the tank-owner is, the vast majority of tank-owners cooperate with MPCA to complete the clean-up. MPCA's clean-up money is also used to clean up sites where the contamination is extensive, the clean-up is costly, and the tank-owner is unable or unwilling to undertake responsibility for the clean-up. Federal funds which were available for such clean-up until federal fiscal year 1992 are not currently available; thus MPCA will be depending more on Petrofund money for clean-ups. Where MPCA conducts a clean-up, it attempts to recover the money it has expended from the tank-owner.

As discussed in Attachment 3, the increasing number of petroleum sites has presented a heavy workload for MPCA, and large increases in staff size, up to 180 people, were projected to be required to manage them. However, because of the implementation of Total Quality Management (TQM) methods beginning in October 1989, MPCA has found that existing MPCA staff are able to handle the thousands of release sites. Nearly all of these staff positions are federally funded.

MPCA's use of TQM has been extensively studied by EPA. The results of the study and the success of TQM are reported in Attachments 2 and 3. Following are some highlights from the EPA study which are indications of the improvements in MPCA's program.

A. The time required to complete various stages of a clean-up has been significantly reduced between 1988 and 1991:

- The time from the date that a release is reported until MPCA issues its letter directing investigation and clean-up has been reduced from 44 days in 1988 and 1989, to 13 days in 1990, to only six days in 1991. Thus, tank-owners are now receiving instructions and guidance documents within a week.
- The time from the date that a release is reported until the tank-owner reports to MPCA that his contaminated soil has been treated has been reduced from 10 months in 1988 to 52 days in 1990. The time has been reduced measurably because MPCA staff is now able to focus its attention much more quickly on approving soil treatment applications.
- The time from the date that the release is reported until MPCA issues an approval of a Comprehensive Corrective Action Design (CCAD) has been reduced from 18 months in 1988, to 13 months in 1989, to 6 months in 1990.

B. The number of completed clean-ups since 1987 is approximately 1500. Each year has shown a significant increase in the completed clean-up numbers, from 9 in 1987, to 42 in 1988, to 177 in 1989, to 523 in 1990, to an estimated 846 in 1991. The improvement in these numbers is significant because they reflect progress in environmental and public health protection.

By working with tank-owners, contractors, EPA, local governments, and the legislature to identify problems, other improvements in MPCA's program have been accomplished:

1. MPCA has developed an extensive array of standard guidance documents designed to clearly communicate MPCA's expectations for investigation and remediation to tank-owners and their consultants.
2. Administrative and technical training is routinely provided to MPCA staff, and annual training seminars are conducted for contractors and consultants, from whom MPCA solicits recommendations for program improvement.
3. MPCA's administrative process has been streamlined to avoid unnecessary procedures and requirements which waste valuable resources, and program performance is continuously assessed to identify administrative, technical, and service improvement opportunities.

4. The Petrofund Act was amended in 1991 to enable tank-owners to obtain MPCA approvals at various stages of their clean-up, which permits them to apply for Petrofund reimbursement much earlier than had been previously permitted. This allows tank-owners with limited financial resources to finance clean-up costs.

III. CURRENT COST CONTROL METHODS

Pursuant to the directive by the legislature in 1991 Minnesota Laws, chapter 175, section 3, the Petrofund Board is in the process of adopting permanent rules governing reasonable costs. The text of the rules is set forth in Attachment 1.

These rules were required by the legislature to include the solicitation of competitive bids, except where unfeasible, as a means of ensuring that the lowest cost for a clean-up is obtained, due to concern that the costs submitted to the Petrofund Board for reimbursement were increasing at a high rate and were not limited by market pressure. For example, the reasonableness of costs associated with drilling of soil borings and monitoring wells have been questioned and, indeed, some soil borings and monitoring wells were unnecessarily installed in the past. However, in May 1991 the MPCA improved several training documents to make it clear to MPCA staff, contractors, and the regulated community that these investigatory methods are only necessary under specific site conditions. The MPCA has not received any complaints about unnecessary borings or wells since the 1991 training documents were distributed. The Commerce Petrofund staff and MPCA have also investigated the possibility that unit costs associated with borings and wells may have increased over the years. Upward trends in costs were noted, but the data did not clearly reflect whether the increases were unreasonable. The amendment to the rules to require competitive bids on services such as soil borings and monitoring wells, especially when combined with clear documents from MPCA indicating when such services are required, should help to ensure that such costs stay within reasonable limits.

The proposed permanent rules require:

- (1) that tank-owners obtain at least two competitive unit cost bids for contractor services, such as soil borings, excavation of soil, trucking, and soil treatment, and that the lowest unit cost be considered the reasonable cost;
- (2) that tank-owners obtain at least two proposals for consultant services, such as investigation services or report preparation, and that the cost of the proposal selected be justified as reasonable;
- (3) that if bids or proposals are not obtained, the tank-owner must qualify for exemption from the requirement by:

- a) showing that only one contractor or consultant was available,
 - b) showing that an emergency existed, or
 - c) showing that a standing contract was entered into which resulted in lower costs than would be obtained by bidding each service;
- (4) that when services which were the subject of unit cost bids or proposals are subsequently performed, the total cost of such services must be reasonable (for example, the cost of unnecessary soil testing would not be considered reasonable, even if the unit costs were low).

While the rule amendments requiring competitive bids are valuable as an initial cost control method, they will not be successful in detecting whether unnecessary services are being performed, whether false reports are submitted to MPCA, or whether fraudulent claims are being submitted to the Petrofund Board for reimbursement. The recommendations in Part IV will address these serious problems.

IV. COST CONTROL RECOMMENDATIONS CONCERNING UNREASONABLE, FALSE AND FRAUDULENT CLAIMS

The Petrofund has been averaging 210 claims each meeting over the past six months and paying out an average of \$5 million per meeting. Petrofund Board meetings are held every six weeks. This extremely heavy workload has made it difficult for the MPCA and the Commerce Petrofund staff to establish and carry out effective programs to detect unreasonable, false and fraudulent claims.

As a result, the Petrofund is increasingly vulnerable to unreasonable, false and fraudulent claims. The MPCA and Commerce Petrofund have worked closely with the Office of the Attorney General to develop recommendations on ways to increase the protection of the Petrofund from unreasonable, false and fraudulent claims based on experience derived from other governmental programs such as Medicaid.

Minnesota Statutes chapter 115C and Minnesota's criminal code appear to provide an adequate range of civil and criminal penalties for submitting unreasonable, false or fraudulent claims to the Petrofund. These penalties include:

- Partial or total disqualification for reimbursement under 115C.09, subd. 3(b);
- Partial or complete return of reimbursement under 115C.09, subd. 5(a)(1);
- The imposition of administrative or civil judicial penalties under 115C.05;
- Reimbursement, civil penalties and criminal liability for fraudulent claims by consultants and contractors under 115C.09, subd. 6; and
- Traditional criminal liability such as theft by deception under 609.52.

Therefore, in reviewing the Petrofund program, the principle issue is facilitating the MPCA and Commerce Petrofund staffs' ability to investigate and detect cases involving unreasonable, false or fraudulent claims.

RECOMMENDATIONS

This section presents several ideas for increasing the protection of the Petrofund by strengthening the ability of the MPCA and the Commerce Petrofund staff to detect inappropriate claims. Some of the mechanisms require additional staffing while others can be instituted without any increased funding. **Those recommendations that require additional staffing should result in a net savings to the Petrofund through the reduction of unreasonable, false or fraudulent claims.** Some of the recommendations will require legislative changes while others can be implemented through agency rules.

1. **Certifications:** The current reimbursement application form submitted to the Petrofund Board requires a certification by the applicant (the tank-owner or operator) that the claims made by the applicant are true and accurate. While this certification would be helpful if the applicant submits false or fraudulent bills, it does not address the issue of unreasonable, false or fraudulent charges by consultants and contractors. **To address this issue more effectively, the Petrofund Board should require the reimbursement application to include certifications by the consultant and the contractor that the work performed at the site was necessary to remedy the release and the costs are reasonable based on industry standards.** A false certification could then form the basis of an enforcement action against a consultant or contractor under Minn. Stat. §115C.05 or 115C.09, subd. 6.

2. **Advance Notice and On-Site Audits:** The MPCA is charged with overseeing clean-up work at sites where a release has occurred. To help ensure that clean-up work at a release site is necessary, the MPCA must conduct at least some on-site audits of clean-up activities. Lack of personnel available to be assigned to on-site audits and inadequate advance notice requirements currently limit MPCA's ability to carry out this oversight function.

Minnesota Statutes, section 115.061 requires an applicant to notify the MPCA "immediately" after a release occurs. **Consultants and contractors should be required to call the MPCA as soon as a release is detected.** This would allow the MPCA to conduct site audits of clean-up activities. Even random site audits would establish an enforcement presence that should help to limit any unnecessary clean-up work. In order to do so, MPCA staff should be increased, because current MPCA staffing is not sufficient to conduct a reasonable number of inspections.

Tank-owners are also required to provide notice to the MPCA "at least 10 days before beginning permanent closure". This notice is required under Minnesota Rules, part 7150.0410, subp. 2. The purpose of this notice is to allow MPCA inspectors to conduct on-site audits at the time of tank removal. A literal interpretation of this rule allows the removal to take place at any time after the 10 day minimum notice. When the removal is delayed beyond the 10 days, a second confirmation notice is not required. The result is that MPCA inspectors are unable to conduct on-site audits to ensure compliance with removal standards and MPCA guidance for soil and/or groundwater clean-up.

Minnesota Rules, part 7150.0410 does not specify what information is required of a tank-owner at the time a tank removal notice is taken. Therefore, inaccurate information is often given by tank-owners and the contractors performing the tank work. This usually hinders inspection efforts, and in some cases prevents MPCA inspectors from conducting on-site audits in a timely efficient manner.

To remedy these problems, the MPCA rules should be amended to require the tank-owner or contractor to (1) update the removal notice if removal of a tank will be delayed more than two calendar days from the original date of removal; and (2) to specify the information required for a valid 10 day notice. This information should include the following:

- a) accurate site address, including site name, street address, and city;
- b) tank-owner name and phone number;
- c) contractor name;
- d) tank sizes, numbers and products (or best estimate); and
- e) an accurate date of removal.

The problems addressed in this paragraph are not limited to the notice of tank removal. They also apply to Minnesota Rules, part 7150.0120, subp. 1, "Notice of underground storage tank installation". Ideally, the notification requirements for removal and installation of tanks would be consistent with each other. The MPCA inspects installations as well as removals. The proposed changes in this paragraph would work equally well for both installations and removals.

3. **Financial Records:** Under the Medicaid program, a detailed list of financial records related to government payments must be retained by the claimants for a period of five years. The Medicaid program rules also provide a clear right of access to these records for purposes of claim audits. While section 115C.09, subd. 7 sets out a duty to provide information related to claims on the Petrofund, there are not specific record retention requirements and there is not specific authorization for state access to claims records. **The applicant, and any consultant and contractor working for the applicant, should be required to retain a specific list of financial records for a period of five years after submitting a claim to the Petrofund. Further, the state should have clearer authority for access to the records. The changes would facilitate auditing of claims to protect against false claims and fraud.**

4. **Anti-Kickback Provision:** Chapter 115C currently requires the applicant to pay 10 percent of the cost of clean-ups. This 10 percent match is designed to give the applicant a stake in the clean-up to, among other things, help control the costs of clean-up. **Consultants, contractors and applicants should not be permitted to enter into oral or written agreements under which the consultant or contractor agrees to not charge the applicant the 10 percent share. This practice would inflate the clean-up charge made to the Petrofund and defeats the purpose of the matching share. Kickback arrangements should be specifically prohibited, making such arrangements a violation of 115C and the basis for partial or total disqualification for reimbursement.**

5. **Reasonableness Reviews:** Chapter 115C only permits reimbursement of reasonable costs. Review of the reasonableness of costs is conducted by the Commerce Petrofund staff. Given the large number of claims being submitted to the Petrofund Board, most of the review of claims is focused on whether costs are eligible for reimbursement; the analysis of reasonableness is currently at a primitive stage.

There are two steps that could be taken to provide more in-depth review of the reasonableness of claims. **An exception reporting process should be developed that would identify claims that contain abnormally high costs. The Petrofund Board has a significant amount of data on contractor costs from claims submitted over the past few years that should provide a good data base which could be used to identify claims with exceptionally high contractor costs. Additional staff time is needed to create a computerized data base that could assist in identifying contractor claims that deserve closer review because they are outside of the normal range of**

claims. The Medicaid program utilizes such a management information system to monitor claims made under that program.

The data for consultant fees is currently not detailed enough to create a data base that could be used to identify consultant claims that should be given more scrutiny.

The Commerce Petrofund staff should be increased to allow careful review of all potentially excessive claims. The Commerce Petrofund's current staffing level is not sufficient to review all claims that are potentially excessive.

6. Post Claim Auditing: The Commerce Petrofund staff and the MPCA should have the ability to conduct some post-claim audits to help assure that claims are not false or fraudulent. This practice is common in the Medicaid program and, of course, is a standard practice in tax programs. To successfully conduct post-claim audits to help maintain an honest claims process, additional MPCA and Commerce Petrofund staff, capable of conducting investigations and undertaking detailed financial analysis, is needed.

7. Consultant/Contractor Disqualification: The Medicaid program can suspend or terminate participants who submit false or fraudulent claims. Under several federal environmental laws, companies can be barred from government contracts for some violations of the laws. A similar process under the Petrofund could help deter false or fraudulent claims.

The state should be authorized to bar consultants or contractors who are convicted of providing false or fraudulent billings to an applicant for reimbursement from participating in the Petrofund program for a specific period of time. In addition, an administrative process should be created for suspending consultants or contractors from participation in the program where the state is able to establish a pattern of unreasonable claims or submission of false or fraudulent claims to the Petrofund. A list of disqualified consultants and contractors should be published periodically by the state.

V. FUNDING MECHANISM FOR PETROFUND

The Petrofund Act originally required an applicant to pay a deductible of the first \$10,000 in costs, and thereafter, 75% of additional costs were reimbursable up to a maximum of \$100,000. The Act was then amended to require no deductible and to permit reimbursement of 90% of eligible costs up to a maximum of \$250,000, in an effort to encourage greater reporting of releases.

In 1990, the Act was amended to permit reimbursement of 90% of eligible costs up to a maximum of \$1,000,000. This amendment was necessary not because costs for clean-up were increasing; indeed, costs have remained steady at an average of approximately \$40,000 per site. Rather, this amendment was made necessary because tank-owners were required by EPA to be able to show that they had sufficient "financial responsibility" to pay for the cost of any clean-up; for most small tank owners, the amount required was \$1,000,000. While it was originally anticipated that tank-owners would be able to obtain private insurance to establish "financial responsibility", private insurance for petroleum contamination became prohibitively expensive and eventually was no longer offered in Minnesota. Thus, while it would appear to be a cost control measure to reduce the maximum amount reimbursable, the effect of such a reduction would be to cause many small tank-owners to be unable to meet the EPA "financial responsibility" requirements, and would have little or no effect on the total annual reimbursements paid by the Petrofund.

Petrofund revenue is obtained through the imposition of a penny-per-gallon fee on the use of tanks which are subject to inspection fees, which are generally wholesale distributor tanks. Minn. Stat. §115C.08 requires the Petrofund Board to impose the fee for up to four months whenever the balance in the Petrofund account falls below \$2,000,000. The Department of Revenue, which administers the Petrofund fee, has indicated that approximately \$2.5 million is raised in one month, or a maximum of \$30 million in any fiscal year.

Petrofund revenues are expended for (1) administration of the Petrofund reimbursement program, which includes the cost of Commerce Petrofund staff as appropriated by the legislature, as well as the reimbursement awards as approved by the Petrofund Board; and for (2) MPCA costs of administration, investigation, and clean-up as appropriated by the legislature. In fiscal year 1989, the legislature appropriated \$747,500 to MPCA for its costs of which \$603,933 was spent; for Petrofund support staff, \$55,400 was

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appropriated to the Commerce Department. Also in 1989, reimbursement awards totalling \$818,576 were granted by the Petrofund Board. Thus, the total amount of Petrofund revenue spent in fiscal year 1989 was approximately \$1,477,909.

By contrast, in fiscal year 1991, the legislature appropriated \$1,509,044 for MPCA costs, and MPCA applied to the Petrofund Board and was granted an additional \$562,460 for clean-up costs pursuant to Minn. Stat. §115C.10, of which \$381,638 was spent. The legislature appropriated \$60,799 to the Commerce Department for Petrofund support staff in 1991. Reimbursement awards totalling \$15,620,900 were granted by the Petrofund Board. Thus, in fiscal year 1991, the total amount of Petrofund revenue spent increased substantially to approximately \$17,567,466.

It is anticipated that a total of approximately \$52,000,000 in Petrofund revenues will be expended in fiscal year 1992: \$1,563,000 appropriated by the legislature to MPCA plus \$583,382 in additional funds for clean-up requested by MPCA and granted by the Petrofund Board; \$220,000 appropriated by the legislature to the Commerce Department for Petrofund staff; and an estimated \$50,000,000 in reimbursement awards granted by the Petrofund Board. This substantial increase, from approximately 18 million in 1991 to over 50 million in 1992, is due to (1) the increased number of reported releases in 1989 and 1990, (2) more efficient MPCA procedures which permit tank-owners to apply for reimbursement sooner, and (3) the statutory requirement that reimbursement applications be processed within 60 to 120 days of submission.

The Petrofund Board has approved reimbursements exceeding \$2 million at each of its meetings since July 1991:

<u>Board meeting date</u>	<u>Total reimbursements</u>
July 1991	\$ 2,583,625
August 1991	6,568,535
October 1991	6,458,410
November 1991	5,471,873
December 1991	3,846,643

This level of reimbursement is expected to continue until 1998; after that date most tanks will be in compliance with EPA regulations requiring obsolete tanks to be removed and new tanks to have leak detection and prevention equipment, and thereafter reimbursement amounts should fall.

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The anticipated expenditures from the Petrofund account until 1998 will substantially exceed the amount which can be raised by the current penny-per-gallon fee. For example:

<u>Fiscal year</u>	<u>Estimated expenditure</u>	<u>1 cent annual fee</u>	<u>Estimated fund balance</u>
1992 Jan. -June	\$25,000,000	\$15,000,000	\$-10,000,000
1993	65,000,000	30,000,000	-45,000,000

If the fee were raised to two cent-per-gallon, the following fund balance is estimated:

<u>Fiscal year</u>	<u>Estimated expenditure</u>	<u>2 cent annual fee</u>	<u>Estimated fund balance</u>
1992 Jan. -June	\$25,000,000	\$30,000,000	\$5,000,000
1993	65,000,000	60,000,000	0

From 1992 until 1998 it is anticipated that reimbursements will plateau at \$5 million per meeting, or approximately \$50 million annually; thus, a two cent-per-gallon fee which is capable of raising \$60 million annually should be sufficient to meet reimbursement requirements during that period.

RECOMMENDATION

The penny-per-gallon Petrofund fee which raises \$30 million annually is not sufficient to allow Petrofund reimbursement to be promptly paid to applicants, when annual reimbursements are anticipated to remain at approximately \$50 million until 1998. Further, with reimbursements averaging \$5 million per meeting, the Petrofund Board is currently unable to trigger the fee in a timely fashion, because the fee can be imposed only when the Petrofund account falls below \$2 million.

Therefore, it is recommended that the Petrofund fee mechanism be amended to provide increased funding at a level which would resolve the deficit in the Petrofund account. It is clear that without an increase, Petrofund applicants will become increasingly frustrated as they face longer and longer delays in the receipt of their reimbursement checks.

VI. THE PETROFUND BOARD

The Petrofund Board consists of five members, pursuant to Minn. Stat. §115C.07: two representatives from the petroleum industry and one representative from the insurance industry who are appointed by the Governor; the Commissioner of Commerce; and the Commissioner of the MPCA.

Many aspects of the clean-up of petroleum contamination are governed by local government units. For example, permits are granted and fees are set by townships and counties for the disposal of contaminated soil on land within their boundaries. Such local governments are acutely aware of the impact of petroleum contamination and clean-up.

RECOMMENDATION

The Petrofund Board would benefit from a more diverse membership. A representative from a local government such as a township or a county board would add the potential of greater geographical diversity, and more importantly, a unique perspective which would add depth to the Board. **It may be valuable to consider changing the representation on the Petrofund Board to include a member who represents a local government unit.**

VII. CONCLUSION

The Petrofund reimbursement program has gone through many changes since 1987, and more changes may be required to ensure the proper administration of the program.

This report has discussed changes that have improved the program in the past:

- (1) The Petrofund statutes and rules have been amended:
 - a. to permit application for reimbursement at an earlier phase of clean-up than had perviously been permitted,
 - b. to require that MPCA approve or disapprove Corrective Action Plans within 60 to 120 days of submission,
 - c. to require that the Petrofund Board consider an application for reimbursement within 60 to 120 days of submission, and
 - d. to require tank-owners to obtain competitive bids or proposals for all clean-up work to be performed.
- (2) MPCA has created standard guidance documents which are sent to tank-owners when a release is reported and which clearly explain the procedures to be followed in the investigation and clean-up of petroleum contamination.

This report has recommended changes to improve the program in the future:

- (1) Because there is concern that the Petrofund is vulnerable to unreasonable, false and fraudulent claims, this report has proposed several recommendations:
 - a. Requirement that tank-owners, contractors and consultants maintain detailed financial records of clean-up activities.
 - b. Random on-site audits of contaminated sites and authority for post-claim audits of financial records, with the staff increases for MPCA and Commerce Petrofund.
 - c. Creation of a computer data base of industry standards for contractor costs which would facilitate the review of the reasonableness of reimbursement requests.

d. Certification by contractors or consultants who perform clean-up services that their charges are reasonable based on industry standards.

e. Prohibition against kickback agreements between tank-owners and contractors or consultants.

f. Suspension of contractors or consultants from performing Petrofund clean-up services for submitting false or fraudulent claims or where a pattern of unreasonable claims has been established.

(2) Amendment of the Petrofund Act to increase funding of the Petrofund account to alleviate the deficit and avoid delays in payments.

(3) Change in the representation on the Petrofund Board to increase its diversity.

Implementation of these recommendations would serve the citizens of Minnesota by making the Petrofund reimbursement program more responsive to participants, and would save money by making the program less susceptible to unreasonable and fraudulent claims.

PROPOSED PERMANENT RULE

1. **2890.0075. DOCUMENTATION OF REASONABLENESS.**

2. **Subpart 1. Generally.** The applicant shall prove the
3. reasonableness of all incurred eligible costs. Effective for
4. any contract entered into or commenced on or after the
5. effective date of this part, the applicant shall solicit a
6. minimum of two written competitive bids for each contractor
7. service, and two written proposals for consultant services.
8. The board shall pay only those costs it determines to be
9. reasonable.

10. **Subpart 2. Contractor services; bids.** The applicant or
11. its agent shall solicit, publicly or privately, a minimum of
12. two written competitive bids in a form prescribed by the board
13. based upon comparable unit costs for each contractor service
14. performed in connection with corrective action from
15. contractors considered by the applicant or its agent to be
16. qualified and who shall have all necessary licenses and
17. government approvals for the work to be performed.

18. Copies of the written bids shall be submitted to the
19. board with the application for reimbursement. Unit costs in
20. excess of those in the bid of the lowest qualified bidder may
21. be considered prima facie unreasonable by the board.

22. **Subpart 3. Consultant services; proposals.** The applicant
23. shall solicit a minimum of two written proposals for

24. consultant services from consultants considered by the
25. applicant to be qualified in a form prescribed by the board
26. setting forth the qualifications of the consultant and
27. estimates of costs for consulting services. The applicant
28. must make a good faith effort to assure that the costs in the
29. proposal selected are reasonable considering the qualifica-
30. tions of the consultant and the services to be performed.

31. Copies of the written proposals shall be submitted to the
32. board with the application for reimbursement. The board may
33. require the applicant to justify the reasonableness of the
34. costs in the proposal selected.

35. The applicant may present evidence of reasonableness by
36. a showing that the lowest cost proposal was selected, or that
37. the services to be performed or the selected consultant's
38. qualifications, including but not limited to, education,
39. experience, certifications and registrations, health and
40. safety training, insurance, availability and references,
41. justified the selection of a higher cost proposal.

42. Subpart 4. Exemptions. The applicant may be granted an
43. exemption from the requirement that a minimum of two bids be
44. obtained for each contractor service or a minimum of two
45. proposals be obtained for consultant services:

46. A. if the board determines that the applicant has
47. provided satisfactory evidence:

48. (1) that only one contractor or consultant was

Proposed Permanent Rule - Documentation of Reasonableness

49. reasonably available to perform the necessary service and that
50. costs are not substantially in excess of costs charged for
51. similar services by a comparable contractor or consultant in
52. the same geographical area; or

53. (2) that the necessary services were required by an
54. emergency, including the abatement of free product, for which
55. there was not sufficient time to obtain bids or proposals; or

56. B. if the board makes an annual determination that
57. the applicant has established that a standing contract which
58. was entered into via a bidding or evaluation process will
59. result in reasonable corrective action costs by providing to
60. the board:

61. (1) (a) documentation of the bidding process which
62. led to the standing contract for contractor services; or

63. (b) written explanation of the evaluation
64. process which led to the standing contract for consultant
65. services; and

66. (2) a written explanation of why the standing
67. contract results in lower corrective action costs than
68. obtaining bids or proposals on a per job basis.

69. Subpart 5. Reasonableness of incurred costs.

70. Notwithstanding the preceding provisions of this part, the
71. board may consider all invoice costs submitted for
72. reimbursement to determine whether the costs
73. incurred are reasonable.

PROPOSED PERMANENT RULE

2890.0010 DEFINITIONS

[For text of subps. 1 to 7, see M.R.]

Subpart 8. Contractor services. "Contractor services" means products and services within a scope of work which can be defined by typical written plans and specifications including, but not limited to, excavation, treatment of contaminated soil and groundwater, soil borings and well installations, laboratory analysis, surveying, electrical, plumbing, carpentry, and equipment.

Subpart 9. Consultant services. "Consultant services" means professional consulting, investigation or design services.

Subpart 10. Board. "Board" means the petroleum tank release compensation board.

2890.0070 ELIGIBLE COSTS

[For text of subp. 1, see M.R.]

Subpart 2. [delete]

2890.0060 REIMBURSEMENT OF COSTS

[For text of subps. 1 to 4, see M.R.]

Subpart 5. [delete]

1 2890.0090 APPLICATION PROCESS

2 Subpart 1. Applications. A person who requests
3 compensation from the fund shall complete, sign, and submit
4 to the board a written application. The application shall
5 be made on a form prescribed by the board and shall contain
6 at least the following:

7 A. the name of the person making the application;

8 B. a description of the site of the release;

9 C. ~~a copy of the corrective action plan and the~~

10 ~~commissioner's approval of the plan;~~

11 (1) for costs associated with corrective action related
12 to soil contamination, a copy of the commissioner's
13 approval of a soil corrective action plan, or
14 evidence that a proposed soil corrective action plan
15 has been submitted to the commissioner; or

16 (2) for costs associated with corrective action that
17 will address the entire release, including
18 groundwater if necessary, a copy of the
19 commissioner's approval of a comprehensive
20 corrective action plan, or evidence that a proposed
21 comprehensive corrective action plan has been
22 submitted to the commissioner; or

23 (3) a closure letter issued by the commissioner.

24 D. an itemized list of all corrective actions taken, the

25 eligible costs associated with the actions, and name of the
26 engineer, contractor, or subcontractor who performed the
27 action; and

28 E. documentation of solicitation of competitive bids or
29 the unfeasibility of soliciting competitive bids proposals or
30 qualification for exemption as required by part 2890.0090,
31 subpart 5 0075.

32 (For text of subps. 2 to 6, see M.R.)

THE MINNESOTA STORY:

ONE STATE'S COMMONSENSE ATTACK ON A BACKLOG OF LEAKING USTs

In the world of petroleum underground storage tanks, state regulatory agencies share a common problem: more UST sites report leaks than environmental staff can handle. The Minnesota Pollution Control Agency (MPCA) has faced this problem head on over the past few years, and they appear to be winning the battle.

Historically, MPCA faced many of the seemingly insurmountable problems most states are facing now: not enough staff, huge numbers of leak sites, external pressures from responsible parties and their consultants, unrealistic report review expectations, and demands from responsible parties for reimbursement from various state funds.

The story below relates the basic history of the MPCA Tanks and Spills Section's battle: how they identified problems and took practical steps to overcome them.

MPCA's experience suggests that a LUST cleanup program can be more effective when:

- ❖ Good, sound, *quick* decisions are made by cleanup staff;
- ❖ Frontline staff are empowered to make decisions;
- ❖ Frontline staff (the experts) are sought out for advice on policy;
- ❖ Micro-management of sites (through reviews of work plans) is eliminated;

- ❖ Consultants and the regulated community are informed and educated regarding the specific agency requirements;
- ❖ A priority system is established and followed; and
- ❖ Cleanup goals are communicated to the regulated community.

A Loudly Ticking Time Bomb

By mid-1989, MPCA was attempting to handle a caseload that in one year had tripled in size to over 2,000 leaking UST sites. A limited number of staff found it increasingly difficult to respond to the demands being made on them. Some sites took from 12 to 24 months to get an UST corrective action started, and many sites had not taken any corrective action. To make matters worse, the caseload backlog was constantly growing larger. MPCA also knew that significant additional state and federal resources could not be counted on to attack this problem.

The effect of the backlog was apparent even in MPCA's initial response reaction. It generally took about two months simply to get out the routine response letters sent to UST owners and operators who had reported releases. The long time it took to inform owners and operators about proper corrective action steps only reinforced the owner and operator's level of frustration and created confusion regarding the appropriate course of cleanup actions to limit

environmental damage. In fact, information occasionally arrived after inappropriate corrective work or only partial cleanup work had been completed and the site owner thought the cleanup was completed.

Compounding the response time was a confusion by consultants and some newer MPCA staff regarding the mechanisms, requirements, and ultimate cleanup goals acceptable to MPCA. The absence of readily available and prepackaged guidance made it difficult to inform UST owners and operators, as well as their consultants who actually conducted cleanups, what they were expected to do. Thus, information was often delayed and did not clearly convey MPCA's expectations about the type and quality of work needing to be performed.

MPCA knew this situation needed correction. It was becoming increasingly difficult for the public to understand MPCA's policies and procedures. These problems were also not good for the morale of their environmentally-oriented staff, who wanted to do their work more efficiently.

By October 1989, it became apparent to everyone that something had to be done. If not, the tension building among staff and management over their inability to perform efficiently would lead to staff turnover and a loss of focus on their mission.

Confronting the Problem at a Retreat

The creation of a Retreat Planning Committee signaled the beginning of a resolution to the problems confronting them. The retreat planners, who included both frontline management and staff, had decided that a one-day "gripe" session held on a regular work day at a location outside the office would provide the

best forum for getting at what was wrong and how to correct the problems.

The retreat was set up quickly and very simply: everyone gathered at the home of one Committee member; pizza was ordered; and participants brought beverages, extra chairs, flip charts, and lots of ideas on how to improve the situation. Before the retreat, committees had been conceptualized to focus on specific problem areas, such as responding to release reports and work specifications for soil excavation. Their basic agenda is typical of the commonsense approach MPCA took in solving problems:

- ◆ Discuss how the program presently works and where the system seems to break down;
- ◆ Discuss options for streamlining those problem areas identified in the program overview discussion;
- ◆ Discuss staffing and resource constraints that affect the selection of solutions; and
- ◆ Discuss alternatives for program changes.

Later, the Retreat Committee summarized the suggested changes in a document that retreat participants then reviewed. The goal for this document was to provide multiple options and recommend preferred alternatives to the section's chief manager. Before this point, the chief had agreed to avoid participation to make sure a free flow of ideas would come from his staff and other managers.

An Empowered Staff Gets Down to Work

In the winter months following the retreat, staff gladly responded to the clear message they had received from their chief: develop

ways to do our job more efficiently and effectively. Thus empowered, they plunged into committee work focused on problem areas identified at the retreat for improving the system.

They were told that their first priority at work was to improve the system. Although this meant that the growing backlog would receive secondary attention for a few months, it was the only practical approach to find improved ways of responding faster and providing useful cleanup guidance. In fact, nearly 50 percent of staff time was directed at systems improvement during this busy winter of planning activity. The immediate beneficial effect of this staff empowerment and involvement in improvement work was that morale significantly improved.

Because some of the staff and most of management had come from MPCA's Superfund program, they shared some important basic assumptions that had served them well in Superfund work. In Superfund, they had been accustomed to accomplishing cleanups that involved hard, practical decisions. They knew it wasn't always possible to get 100-percent cleanup at all sites. If cleanup responses were delayed by an impractical search for only 100-percent solutions, nothing would get done. Instead, the point was to act decisively and get done what could be practically done. In fact, their previous inability to act in this manner had been a major factor in their shared unhappiness with their slow progress in responding to UST cleanups and protecting the environment.

Nevertheless, building a consensus among all staff and management on these matters was not an easy task, and a few people decided to leave. Those who remained had to search for effective solutions in several problem areas, including clarifying and simplifying the

procedural and substantive requirements for corrective action, streamlining internal operations, and working with corrective action service providers to ensure higher quality work. Highlights of the improvements MPCA made in these areas are discussed briefly below.

Standardized Informational Materials

A major challenge was to reach consensus on technical guidance and informational materials for UST owners and operators and their consultants to follow as they engaged in cleanup activities. By May 1990, MPCA had produced an impressive series of new or revised work sheets, guidances, and other informational materials that clarified and simplified policies, technical work specifications, and reporting procedures. The level and intensity of the staff work undertaken demonstrated how serious the need was for clearer work standards and field guidance regarding corrective action. The broad range of topics covered is indicated by the following titles of documents in the series:

- ◆ Petroleum tank release reports;
- ◆ Six steps to a petroleum tank release cleanup;
- ◆ Selecting an environmental consultant for petroleum cleanup (including a list of consultants:);
- ◆ Petroleum vapor risk assessment and survey;
- ◆ Excavation of petroleum contaminated soil;
- ◆ Excavation report for petroleum release sites;
- ◆ Soil boring and monitoring well installation;
- ◆ Jar headspace analytical screening procedure;

- ❖ Land application of petroleum contaminated soil: single application sites;
- ❖ Application for thermal treatment of petroleum contaminated soil;
- ❖ Soil and groundwater analysis at petroleum release sites;
- ❖ Groundwater receptor survey;
- ❖ Hydrogeologic setting and groundwater contamination characterization of petroleum release sites;
- ❖ Corrective action design for groundwater remediation to recommended allowable limits; and
- ❖ Sampling requirements during tank closure.

The production of this series was arduous. Reaching consensus on tough issues, such as the characterization of groundwater contamination, was accomplished only by a long winter's hard work of staff coordination and compromise. Repeatedly, they kept analyzing their procedures and policies to find the best way to reach two goals: make requirements clear and consistent; and streamline each MPCA process to its essential constituents. A critical tool in this work was to flow chart existing assembly line processes and use available data to identify bottlenecks and other problem spots.

Each document in the series reflects their desire to produce user-friendly materials that would simply and clearly answer most corrective action questions and that would guide the user step-by-step through the requirements for each process. With this portfolio of standardized guidance materials now available, they can avoid the general confusion that resulted from incomplete, unclear earlier guidance or differences of opinion concerning MPCA requirements.

Eliminating a Wasteful Assembly Line Step

Development of this guidance material also meant they could eliminate a step that had been identified in their flow charting as a major bottleneck: the step in which they reviewed and approved a site investigation work plan.

Before the new clear and simple guidance, they had tried to inspect quality into contractor work plans. However, with the development of the guidance package, they no longer needed to review initial site investigation work plans, which had been the focus of significant staff resources as well as the source of a significant delay for the start of cleanup activities. MPCA now relies on the ability of corrective action consultants to follow the directions supplied to them by the new standardized materials.

Through "Consultants Days" and mass mailings of guidance documents, corrective action consultants were made aware that all field work initiated and reports submitted after July 1, 1990 would be held to the standards explained in the new standardized documents, and that work not meeting the new requirements would be rejected. MPCA also made clear their ready availability by phone to help consultants solve problems encountered in the field while trying to implement the new guidance documents.

MPCA's review of this work now comes later in the process, when the UST owner or operator has completed the initial site investigation and either reports that no additional corrective action is necessary or submits a formal Corrective Action Design. The end result is that MPCA staff need to make fewer inspections for each site and that more leaking UST sites receive action sooner.

Reducing Response Time to Information Requests

Another product of the winter's work was a streamlined internal operations system for responding to UST owners and operators reporting leaks. The previous delay of up to two months before information was sent out resulted from data entry backlogs and unnecessary handling of the files by others before the site manager became involved. A newly created release report team (four staff positions) dedicated to receiving reports now responds immediately to first calls by placing the new site in a databank and sending out a standard package of informational materials. Owners and operators with leaking USTs now have complete information on what needs to be done within a few days of their first call to MPCA.

The standard package of information they receive is worth taking a close look at. An overview of the Minnesota UST program, including the state's UST statutes, provides general background. Next, a summary of petroleum release reporting requirements walks the user through all the steps and forms necessary to go from the first report of a leak to completed cleanup and reimbursement from the state's Petrofund. The summary is "user-friendly" and includes a "questions and answers" section. Many of the guidance tools developed during the winter are also included, as is a checklist and order form for the full range of UST-related materials made available by MPCA. Completing the package are standard EPA publications, such as "Musts for USTs" and "Dollars and Sense."

Speed memos are also being used to reduce the time it takes to respond to other requests from consultants and UST owners and operators; responses can now be mailed within 24 hours. If guidance materials have not suffi-

ciently answered questions, UST owners and operators can get help fast, often over the phone.

Streamlining Internal Operations

A major problem identified at the retreat focused on the optimum use of technical staff time. Flow charting internal processes again helped them reach some solutions. To ensure that staff would have regular blocks of time each week in which their work would not be interrupted by phone calls, "quiet time" was built in. Each site management team member has 8 hours a week, usually in blocks of 2 to 4 hours, during which support staff handle calls and take detailed messages. Also, support staff, who include student workers, have been expanded in number and their responsibilities increased to allow technical staff to concentrate on site management. These staffing changes and allocations of resources have proved especially effective for staff morale and productivity.

Implementing options such as "quiet time" reflects management's commitment to staff and their belief in the "pride of ownership" resulting from assigning each new site to one staff member. Having one person, as a site project manager, see a site through from start to finish also ensures consistency of review and allows more efficient use of other staff resources. For example, project managers now review all release reports first to highlight important sections. Because too much time was previously spent reviewing obviously inadequate release reports, a basic checklist for completeness was developed. Also, reports without groundwater contamination are no longer sent to hydrologists, and soil treatment can be directed by the project manager. In addition, by clearly prioritizing

sites as high, medium, or low (based on criteria arrived at by consensus), project managers can direct their resources most intelligently.

Working With Consultants to Improve the Quality of Corrective Action Work

MPCA realized that a key strategy to making their program work was to be able to rely on the quality of work performed by the consultants who actually performed corrective action. Consultants needed to be acknowledged as partners who required clear, consistent work specifications. MPCA approached this task in three ways.

The first way is described above as the provision of reliable, standardized guidance materials. These materials will be further refined based on feedback from the consultants who use them to guide their corrective action activities in the field.

The second way is by hosting periodic "Consultants Days" at which representatives from the corrective action providers have an opportunity to be briefed by MPCA staff and to ask questions. This is a primary forum for making sure consultants understand the requirements of the new guidance documents. In addition to covering an agenda of topics (ranging from "program improvement overview" to "recent changes in the Petrofund"), the most recent Consultants Day provided an extended question-and-answer session. In keeping with MPCA's commonsense tone, a promotional letter for the event urged consultants not to miss "this opportunity to get your answers straight from the source."

The third way is to make sure there is ample follow-up to the first two approaches. Con-

sultants are not left to figure things out alone. For example, in guidance documents and at Consultants Days, specific MPCA staff are clearly identified who can be called upon directly to answer questions as they arise during corrective action in the field. In addition, a quarterly newsletter, "The Tank Monitor," keeps consultants and UST owners and operators abreast of developments in the UST program.

In these three ways, MPCA works to build up trust and confidence in the consultants. The more consultants can be aided in doing a good job, the less work MPCA must do in overseeing each site, which in turn allows them to respond to a greater number of sites.

The Future of MPCA's UST Program

Although this history has focused only on cleanup response, MPCA has a broad UST program, which includes such projects as a tank installer training and certification program. They are understandably pleased with the progress they have made since the retreat meeting in October 1989. But they know much still needs to be done. The report of recommended improvements that grew out of the retreat identified a number of suggestions not yet acted upon, such as more ways to optimize staff time and to improve data handling systems. They will continue to implement improvements incrementally this year.

However, a major reorientation of the program has been accomplished and the work this winter (and in the future) can return to the primary task of significantly reducing the backlog of leaking UST sites. A goal that can now be achieved thanks to the commonsense tools and process changes resulting from one winter's demanding challenge.

Some "before-and-after" highlights of MPCA'S process improvements:

BEFORE: Delay of 2 months for written response to an initial release report

AFTER: Delay reduced to a few days using standard guidance packet information

BEFORE: State review and approval of remedial investigation work plans before work can begin

AFTER: Standard reporting format replaces state review; state review comes later in process, such as reviewing corrective action design proposals

BEFORE: Review of remedial investigations took 5 months; results of review showed incomplete and inadequate work on most sites

AFTER: Review of remedial investigations takes 2 months, despite dramatic increase in number of sites; results of reviews show complete work following MPCA's technical documents

BEFORE: 189 site closures from beginning of program through September 1989

AFTER: 460 additional site closures from October 1989 to October 1990

BEFORE: Approval process for treatment of excavated contaminated soil slow and inefficient

AFTER: Written approvals for soil treatment given within one week of request

BEFORE: Stress level high and staff morale low

AFTER: Stress level lowered due to clearer goals and procedures; staff morale much improved

MEMORANDUM

30 December 1991

TO: Walter Walsh, OPA
FROM: Bob Black, Brian Morrison, IEc
SUBJECT: Rapid Response in Minnesota's UST Program

INTRODUCTION

In its oversight of state underground storage tank (UST) cleanup programs, EPA's Office of Underground Storage Tanks (OUST) has encouraged the development of procedural and technological innovations that improve program performance. An area of particular interest to OUST is encouraging states to change their site cleanup procedures to facilitate rapid response. OUST's interest in rapid response is motivated by the belief that taking immediate action to remediate a leak is likely to reduce the areal extent of contamination, thereby reducing the cost and complexity of cleanup and the health risk potential at the site. Thus, by expediting cleanups, states can not only reduce their project backlog but also can improve the cost-effectiveness of UST response actions.

Although some states have begun to alter the procedures governing cleanups to encourage rapid response, no systematic review of such actions has been performed. As part of an effort to perform such a review, this memorandum describes steps that the state of Minnesota has taken to streamline the corrective action process for leaking USTs, and evaluates these changes with respect to their benefits and costs. Unless otherwise noted, the information presented here was obtained in meetings or phone conversations with staff at the Minnesota Pollution Control Agency (MPCA) Tanks and Spills Section.¹

¹ Dave Richfield of Tanks and Spills served as the primary contact at MPCA. Other MPCA staff providing information included Jim Lundy, Mike Bares, Dave Fawcett, Jim Doe, Jayne Stilwell-Lamb, and Natalie Paulsen.

Summary of Major Findings

This memo examines a number of innovations introduced to streamline MPCA's management of leaking USTs. MPCA frequently conducts internal performance reviews to identify shortcomings in UST cleanup procedures, and uses this review system to develop administrative changes designed to encourage the participation of the regulated community and move leak sites through the corrective action process more quickly. This memo will consider four specific changes that have been implemented since 1989:

- (1) The introduction of a release report team to respond to incoming leak notifications;
- (2) The establishment of streamlined procedures for permitting surface water discharges and air emissions from soil and ground water remediation;
- (3) The development of practical requirements and standardized materials to guide contractors in sampling, testing, monitoring, and cleanup procedures; and
- (4) The introduction of a reimbursement system to provide strong economic incentives for prompt reporting and cleanup.

Our evaluation of the measures is as follows:

- ▶ The system of changes introduced by MPCA has been effective in encouraging prompt initiation of cleanup and in helping the program reduce the backlog of UST sites; while not readily measurable, site-level benefits such as reduced cleanup costs and reduced health risk are believed to result from this increased administrative efficiency.
- ▶ The administrative changes discussed here have potential drawbacks that may complicate corrective action; however, these problems cannot be verified and, to the extent they do exist, are likely to arise only at the minority of leak sites. Therefore, they do not appear to outweigh the program performance and site-level benefits of rapid response.

These conclusions are discussed in detail below.

Organization

This memo is divided into four major sections:

- ▶ The first section briefly reviews Minnesota's approach to managing leaking USTs.
- ▶ The second section identifies four different measures that MPCA has taken to expedite the UST corrective action process, discussing how each was developed and implemented.
- ▶ The third section reviews the benefits of rapid response, presenting data that illustrate the effect that rapid response measures have had on the pace and efficiency of the corrective action process.
- ▶ The fourth section considers several factors that represent potential drawbacks of the administrative changes made in Minnesota.

The final section of the memo summarizes the discussion and presents conclusions on the effectiveness of rapid response in Minnesota.

LEAKING UST CORRECTIVE ACTION PROCESS IN MINNESOTA

The MPCA's Tanks and Spills Section has primary responsibility for managing UST cleanups. The following discussion briefly reviews the basic UST cleanup process followed by Tanks and Spills; the purpose is to describe the procedural context into which rapid response measures have been introduced.

Exhibit 1 summarizes the major components of Minnesota's current Subtitle I process, beginning with release detection and ending with closure following corrective action.² As the exhibit shows, initial corrective actions are generally completed within three days of detecting a release. Within 24 hours after the release is detected, the owner/operator is required to report the release to MPCA, mitigate any fire or safety hazards posed by the leak, and initiate free product recovery. Immediately thereafter, the owner/operator usually removes the tank and excavates the surrounding soil.³ Tank removal and soil excavation are not required at this point, but typically occur since many leaks are discovered in the process of replacing old or sub-standard tanks. For sites where tanks are not being replaced, soil excavation generally is done within a month of the initial discovery. The cleanup goals governing initial soil cleanup are 10 ppm total petroleum hydrocarbons (TPH) using a PID, 30 ppm TPH using an FID, and 50 ppm TPH using a laboratory or polyethylene bag

² The information in this flowchart is based on discussions with MPCA staff.

³ For simplicity, this memo frequently uses the term "owner/operator" to denote either the owner/operator or an environmental consultant working under contract to the owner/operator.

sample analysis. At this time, other soil samples are collected and used later to determine if a remedial investigation is appropriate.

Following the initial response, the owner/operator generally applies to have the excavated soil treated using one of the two methods currently used in Minnesota:

- ▶ **Thermal treatment** is conducted at plants authorized exclusively to process soil contaminated with distillate fuels (non-hazardous waste only). Currently there are eight such plants in Minnesota.⁴
- ▶ **Land application** (or landfarming), is a method of bioremediation whereby soil is spread and incorporated into the top six to eight inches of native soil; hydrocarbons are removed through bioremediation (although volatilization does occur during initial incorporation of soil).

Applications for thermal treatment are reviewed and approved by the thermal treatment facility, while approval for land application is provided by the MPCA.⁵ The contaminated soil is then treated at the relevant facility. Once the soil treatment method is approved, the owner/operator has the option of applying for reimbursement for the initial response actions and the initial soil treatment. The owner/operator must submit a Corrective Action Worksheet (CAW) that is reviewed and approved by MPCA in order to be eligible for reimbursement at this intermediate point. The CAW simply verifies what actions have been taken.

Soil samples collected after the initial soil excavation (sidewall and bottom samples) are used to determine if a full remedial investigation is needed at the leak site. Generally, if the chemical analysis of soil samples shows total petroleum hydrocarbon (TPH) concentrations greater than 50 ppm, a remedial investigation is conducted. If the site involves only soil contamination, a remedial investigation is conducted to determine the areal extent of contamination and the potential migration routes. The corrective action design (CAD) is then prepared by the consultant and submitted to MPCA. The MPCA may reject the CAD if further remedial investigation is required to fully characterize the extent of contamination. Otherwise, MPCA will make changes to the submitted CAD and approve the plan. The CAD is then implemented; soils generally must be remediated to a level of 50 ppm TPH or less.⁶ A closure report (including the soil excavation

⁴ "Thermal Treatment of Petroleum Contaminated Soil," guidance document prepared by MPCA Tanks and Spills Section, May 1991. Formerly, thermal treatment also was commonly conducted at asphalt plants. Confronted with new emissions control requirements, however, many asphalt plants chose to discontinue thermal treatment of petroleum-contaminated soil.

⁵ In addition to off-site thermal treatment and land application, other soil remediation technologies (e.g., on-site thermal treatment, soil venting) have been applied at leaking UST sites. Use of these technologies is limited, but is expected to become more common in the future. MPCA actively encourages new treatment technologies.

⁶ Note that this final soil remediation goal is a TPH soil concentration and differs from the vapor headspace level that can be used for the initial cleanup operations.

report) is filed, and final closure is obtained from the MPCA.

When ground water contamination is suspected at the site, the procedure is only slightly different.⁷ After the remedial investigation phase, MPCA staff develop ground water cleanup goals that govern the corrective action. Although no formal classification system exists, these ground water cleanup goals are typically based on site specific conditions, including site hydrogeology, soil characteristics, and the designated use of the ground water in question (i.e., whether it is currently used for drinking water, could be used for drinking water, or is not suitable for consumption).⁸ Because of its mobility and potential human health impacts, benzene has been assigned the lowest Recommended Allowable Limit (RAL), and therefore is often the constraining contaminant in the ground water cleanup process. The RAL for benzene is 10 ppb, and is applied in cases where the ground water is currently used for drinking water. Higher criteria than the RAL may be applied on a site specific basis for other designated uses of ground water.

Once MPCA designates the ground water cleanup levels, the corrective action process proceeds in a manner similar to the soil-only case. The CAD is prepared and approved, and the remediation is performed.⁹ Most of the ground water remediation in Minnesota to date has been performed using pump and treat methods. In most cases, ground water is pumped to the surface and volatile compounds are removed using air stripping systems, with carbon filtration also being required on some air strippers.¹⁰ Emissions from air stripping are regulated by the MPCA Division of Air Quality. The treated water is then discharged to surface water or to a sanitary sewer; these discharges require a National Pollutant Discharge Elimination System (NPDES) permit or a sewer discharge permit (respectively).

REVIEW OF RAPID RESPONSE MEASURES

In our discussions with MPCA staff, we identified several measures that MPCA has recently taken to streamline the UST corrective action process. This section describes these measures and discusses the development and implementation of each.

⁷ The consultant on the project generally uses professional judgment to determine if ground water impacts are likely but not immediately apparent.

⁸ The goal of the Minnesota UST program is to restore contaminated ground water to its natural quality. The use of site specific information allows MPCA to establish cleanup goals that are achievable and balance the need for corrective action with the effects of natural attenuation.

⁹ If floating free product is found, a recovery system may be installed before the RI or CAD is completed.

¹⁰ MPCA staff indicate that other ground water remediation methods (e.g., in-situ bioremediation) are encouraged and are likely to be more widely used in the future. Where pump and treat methods are employed, the MPCA recommends the simultaneous use of soil venting, air sparging, or other corrective action technologies capable of removing additional contaminant mass.

Although other rapid response measures have been taken, the following four changes generally have had the greatest impact on MPCA's ability to respond to reports of UST leaks and initiate prompt cleanup:

- ▶ **Introduction of Release Report Team:** MPCA eliminated a decentralized and time-consuming system of responding to initial release reports and replaced it with a system that immediately issues guidance for proceeding with remediation.
- ▶ **Streamlined Permitting:** MPCA simplified permitting of surface water discharges from pump and treat units by creating a general permit and using emergency permitting procedures. MPCA also streamlined permitting of on-site air emissions by replacing individual site permitting with standardized guidance on allowed emissions.
- ▶ **Reduced Remediation Oversight:** MPCA reduced the need for individual management of site cleanups by issuing standardized guidance materials for contractors performing remediations.
- ▶ **Economic Incentives:** MPCA provides a strong economic incentive for reporting and cleanup through the system of remediation cost reimbursement.

These rapid response-facilitating actions are discussed in the following subsections.

Introduction of Release Report Team¹¹

The primary objective of rapid response to UST leaks is to eliminate delays between the time a leak is discovered and the point at which remediation begins. Alleviating such delays at the outset of remediation is instrumental in limiting the migration of contamination and the ultimate cost of cleanup (see benefits discussion below).

Recognizing the importance of prompt initial response, MPCA revised its system of receiving and processing release report phone calls from owner/operators. Below, we describe the former system and contrast it to the current system; we then briefly discuss how the change was developed and implemented.

¹¹ In addition to interviews with MPCA staff, some of the discussion in this section is based on information in "The Minnesota Story: One State's Commonsense Attack on a Backlog of Leaking USTs", a 1990 document prepared for EPA Region 5 by Jay Evans, a private consultant.

Description of Release Report Team Approach

Under the original system of responding to release reports, the initial phone call from the owner/operator was forwarded to the "Spills Line", a phone line primarily devoted to handling petroleum spills from trucks and tankers. Typically, information on the leaking UST would be forwarded to a data manager in Tanks and Spills who would add the release report to the computer system. The release report would then be forwarded to one of the site managers in Tanks and Spills who would review the general conditions of the release and issue a "standard letter" to the owner/operator, instructing him on what measures to take to begin or continue remediation.

Two factors suggested the need for a procedural change. First, staff noted that it was taking one to two months to complete initial processing of the release report and to issue the standard letter to the owner/operator. This delay was attributable to the increasing frequency of UST leaks and the resulting backlog of sites, as well as to the inefficiency of interdepartmental communication. Second, the decentralized system for responding to release reports meant that the "standard" letter was not, in fact, uniform in its content. Instead, each site manager was issuing somewhat different guidance, resulting in a lack of consistency in the types of instructions given to owner/operators and consultants.

The revised system for responding to release reports is based on the formation of a release response team specifically devoted to handling calls on leaking USTs. Unlike the individuals monitoring the Spills Line, the release response team consists of UST site managers whose only assignment and specific expertise is in the cleanup of leaking USTs. This allows MPCA to begin responding to the release report at the moment a phone call is received. For instance, the response team member may recommend initial emergency procedures and containment measures over the phone. Following the initial phone call, the site is entered in the database of UST leaksites, and a standard package of materials is issued simultaneously to the owner/operator. As we discuss below, this standard package was explicitly developed to be sent to all sites, and contains step-by-step information on how the owner/operator should proceed with cleanup. MPCA staff estimate that the time between initial notification of a release and issuance of the standard guidance has been reduced from one or two months to just a few days.

Development and Implementation of Release Report Team Approach

The development of both the release report team and the first set of standardized guidance materials (see below) took place in the winter of 1989-1990. The initial step was to convene the leaking UST program staff (roughly 45 individuals) in an informal retreat designed to identify elements of the site management process that were in need of improvement and to elicit suggestions on how the problems might be addressed. Work teams were established to refine the suggestions made at this retreat; the plans were then reviewed and finalized in a full meeting of the UST staff.

Two important aspects of the development and implementation process deserve attention. First, consistent with a "total quality management" (TQM) approach, the development of the release report team (and standardized guidance materials) was based on input from a diverse subset of staff at Tanks and Spills. Individuals from all levels of the organization and with diverse areas of expertise (e.g., management, pollution control specialists, and hydrogeologists) participated in the process. This type of pluralistic participation has proven to be beneficial to the development of

policies and procedures in complex organizations.¹²

A second important aspect of the development and implementation process relates to how staff were allowed sufficient time to concentrate their effort on design issues. The release report team and the standardized guidance approaches were developed at a time when the Minnesota UST program was facing a growing backlog of leak sites. The work teams responsible for developing the procedural innovations were primarily site managers who would normally have been assigned to overseeing a set of UST cleanups. While it may have seemed counter-productive to reassign staff to internal design tasks, this constituted only a temporary diversion, one which ultimately resulted in a more efficient system that delivered long-term benefits. This theme was noted frequently by Tanks and Spills staff, i.e., the need to allow individuals to step back from routine roles and focus on "big picture" issues that affect the entire organization.

Streamlined Permitting

A second rapid response-facilitating measure highlighted by MPCA staff concerns the permitting of air emissions and water discharges associated with remediation of soil and ground water. As in the previous section, we first describe the procedural changes that were made, and then review the process by which the measures were designed and implemented.

Description of Streamlined Permitting System

As a way of streamlining the corrective action process, MPCA has revised the procedure associated with two types of permits: (1) permits allowing discharge to surface water during pump and treat operations; and (2) permits governing emissions from air strippers (ground water treatment) and soil venting (soil treatment). Each of these is discussed below.

If a site remediation calls for pump and treat operations involving discharge of treated ground water to surface water, a permit must be issued under the National Pollutant Discharge Elimination System (NPDES).¹³ Under the former system, the owner/operator would apply for a permit with the Water Quality Division of MPCA. Each of these permit requests was developed separately, with specific discharge limits and an individual public hearing. As the number of leaking UST reports grew in the late 1980s, a large backlog of permit requests developed. The result was that it took between four and ten months to finalize the permit and begin ground water treatment.

¹² "Total Quality Management in the Site Assessment Program," prepared by Joseph Kruger and Penelope Hansen, Office of Emergency and Remedial Response, U.S. EPA, published in Hazard Ranking Systems, pp. 66-70.

¹³ Not all pump and treat requires a NPDES permit. For instance, water can be discharged to a sanitary sewer, but this procedure must be cleared with the local POTW through an indirect discharge permit and is more costly than surface water discharge. In addition, re-infiltration, a process by which ground water is treated and returned to the ground, is being used more frequently.

To alleviate this delay, MPCA recently introduced a "general permit" to govern discharges to surface water from pump and treat operations. The full text of the general permit is provided in Appendix A of this memo. The purpose of the permit is to eliminate the need to individually approve surface water discharges from each site, and thereby reduce the time before pump and treat can be initiated. The approach is possible because of the similarity in the contaminants and other conditions present at leaking UST sites. The focus of the permitting requirements is a set of effluent limitations, i.e., limits on the allowed concentrations of various contaminants in the discharged water (see Part I, Subpart B). The contaminants specified are those typically found in petroleum products held in USTs. Several other components of the permit limit the universe of applicable treatment units (see Part I, Subpart A) and thereby ensure that damages to surface water will not result. Other conditions of the permit specify that:

- ▶ The discharge may only consist of contaminated ground water being treated for petroleum-related contaminants;
- ▶ The discharge rate of treated ground water must be less than or equal to 50 gallons per minute;
- ▶ The owner/operator may not discharge contaminated ground water to certain high-value water bodies; and
- ▶ The owner/operator is not allowed to discharge any ground water containing a contaminant not specifically covered in the effluent limitations of the general permit.

Pump and treat operations not meeting these specifications must apply for a standard NPDES permit. Other sections of the general permit address monitoring and reporting, management requirements (e.g., bypasses, upsets), and the legal responsibilities of the permittee.

The general permit is administered by the MPCA Water Quality Division. The permit was introduced on May 22 of this year, and Water Quality staff estimate that roughly 40 permits have been issued; this compares to only ten individual permits that were issued in the entire year prior to the general permit. Overall, staff estimate that completion of testing and final issuance of the general permit takes about one month, compared to the four to ten months required for the individual permit.

In addition to the general permit, MPCA also issues temporary discharge approvals. The full text of the notification letter is presented in Appendix B of this memo. This emergency approval to pump and treat ground water is issued by Tanks and Spills when conditions at the UST site pose an immediate threat to the surrounding population because of the presence of free product, vapor impacts, or downgradient drinking water wells. Pump and treat operations must adhere to discharge limits very similar to those specified in the general permit, and must also meet air emission limits specified by the Air Quality division (see below). The owner/operator is required to submit an application for a general permit or an individual NPDES permit within 45 days of receiving the temporary discharge approval.

The objective of a temporary discharge approval is to mitigate any immediate hazard that may result from a leaking UST. MPCA staff estimate that it takes only three to four days to extend such approval once a request is made, thereby helping to avert acute hazards such as explosions, severe drinking water contamination, or inhalation exposures.

In addition to water permits, certain remedial operations formerly required a permit limiting the release of volatile contaminants to the air. Contaminated ground water is often treated using an air stripper, a device which removes volatile compounds from the extracted ground water and emits them to the air. Soil venting, whereby vapors are extracted from in situ soil and released to the air, is also becoming a more common soil treatment method. Under the former system, owner/operators who intended to use either of these technologies applied for a permit with the MPCA Air Quality Division. As in the case of NPDES permits, the growing number of UST sites reported in the late 1980s proved burdensome for the permit system then employed by the Air Quality Division. The resulting backlog in permit requests meant that approval was delayed for as much as several months.¹⁴ This, in turn, delayed the initiation of soil and ground water treatment.

To alleviate this backlog, MPCA recently developed a set of standardized guidelines to govern the use of air stripping and soil venting. This material, included in Appendix C of this memo, is provided to contractors as part of a larger guidance package (see discussion below). The purpose is to eliminate the need for individual permitting of strippers and soil venting systems, in much the same way that the general permit eliminates the need for individual NPDES permitting. The focus of the material is the specification of "significant emission rates" (SERs) that limit the rate at which contaminants can be released to the air. Contractors are given step-by-step instructions on how to calculate emissions from the air stripper or soil venting system using data from initial sampling, as well as other information; they are also supplied with simple tables that allow them to compare the estimated emissions with SERs. If calculations indicate that any SERs will be exceeded during operation, the air stripper or venting system must be equipped with an emission control device. The guidance also specifies monitoring requirements that must be met while the system is in operation.

By replacing individual permitting with standard guidance, the administrative delay associated with initiating air stripping or soil venting is essentially eliminated. The contractor in charge of implementing cleanup can begin work immediately as part of initial sampling procedures. Then, as soon as preliminary estimation of emissions has been completed and the system has been equipped with any necessary controls, treatment can be completed. MPCA staff believe that this brand of reduced oversight of contractors is a key element in expediting the corrective action process.

Development and Implementation of Streamlined Permitting

Development of the streamlined permitting systems for treatment operations releasing residual contaminants to water and/or air required coordination between different divisions within MPCA. In the case of the general permit for surface water discharges, the Water Quality Division initiated the development process by first proposing the idea of a general permit. A workgroup was formed which consisted of three Water Quality representatives and two Tanks and Spills

¹⁴ No precise data were available on the length of time required to obtain an air permit.

representatives. Each participant was asked to develop a different section of the general permit. The draft version was distributed for review by staff in both Tanks and Spills and Water Quality; the final version was introduced in May 1991.

The standard guidance for air emissions was developed through a similar cooperative process. The Air Quality Division initiated the process by developing the significant emission rates (SERs) using toxicologic information on the relevant contaminants as well as typical design characteristics for air strippers and soil venting systems (e.g., stack height). Staff from Tanks and Spills then incorporated the SERs into the formal guidance materials and added the documents to the standard contractor guidance package beginning in May 1991.

Reduced Remediation Oversight

Consistent with the sections above, we first describe how MPCA has instituted reduced oversight of UST cleanup contractors, then briefly describe the development and implementation process.

Description of Reduced Oversight

Closely related to the permitting arrangements discussed above is the more general concept of reducing the level of involvement that MPCA has in the day-to-day implementation of the corrective action process. The basic principle governing MPCA's approach to managing UST sites is that an amicable, cooperative working relationship between owner/operators, contractors, and MPCA will result in faster and less costly site remediation. Over the life of the UST corrective action program, the move has been toward reduced oversight of contractors; this approach reduces time-consuming checkpoints and instead relies on the expertise of contractors to make sound decisions and to comply with MPCA requirements. While this approach has potential drawbacks (see discussion later in this memo), the general feeling among MPCA staff is that it has successfully allowed more efficient remediation of leaking USTs.

Two practices have allowed MPCA to transfer site management responsibilities to contractors and have helped foster a more constructive working relationship between MPCA and private remediation firms:

- ▶ Development of standardized guidance materials governing a variety of sampling, testing, and remediation procedures; and
- ▶ Conducting periodic information sessions for consultants, contractors, and tank operators to train them in proper procedures and to allow open communication among all parties.

These are discussed below.

Standardized Guidance

As part of the administrative revisions outlined during the Winter of 1989 and 1990, MPCA decided to transfer increased site management responsibilities to environmental contractors by developing standardized materials that would guide various stages of the UST corrective action process. This type of information limits the need for frequent interaction between the MPCA site manager and the consultant, eliminating unnecessary delays in the investigation and cleanup process. Furthermore, the guidance guarantees consistent analysis and reporting by consultants, making it easier for MPCA to interpret the information and oversee the site.

Among other materials, the following documents are included in the package of guidance materials:

- ▶ A document explaining how temporary approval can be obtained if site conditions require immediate pumpout of contaminated ground water (see earlier discussion);
- ▶ A document containing information on a variety of topics related to soil management, including instructions on soil excavation, soil vapor analysis, soil sampling, contaminated soil storage, and soil treatment;
- ▶ A document that leads the reader through a series of questions on hydrogeologic conditions and the extent of contamination; the answers to these questions can then be used by MPCA to set ground water cleanup goals prior to the development of the corrective action design;
- ▶ A document that provides suggestions on how to enhance pump and treat ground water remediation to meet difficult cleanup goals;
- ▶ A document presenting minimum requirements for soil borings and monitoring well installation;
- ▶ A document which reviews reports required by MPCA and provides format guidelines;
- ▶ A document reviewing procedures for land treatment of petroleum-contaminated soils at one-time-only application sites; and
- ▶ Materials explaining how to secure reimbursement for remediation expenditures.

The availability of standardized guidance material streamlines the UST remediation process by eliminating the need for certain procedures. For instance, MPCA formerly reviewed a site investigation work plan in which contractors would specify how they intended to investigate contamination at the site (e.g., placement of monitoring wells, number of soil samples, etc.). This was problematic because the staff time needed to review these plans resulted in a larger backlog of UST sites and consequently delayed remediation. The standardized guidance material made this step unnecessary because sampling and monitoring requirements are made explicit before work

begins.

Contractor, Consultant, and Owner/Operator Days

In addition to the standardized guidance materials, "contractor days", "consultant days", and "owner/operator days" are held to allow direct interaction between MPCA and the parties performing site remediations. Introduced in April 1989, these conferences are still held periodically. The primary objective of these meetings is to briefly review the standardized guidance materials and then allow all parties to raise questions. A secondary motivation for the meetings is to establish free communication between MPCA and those performing the cleanups, avoiding the adversarial relationship that frequently develops between the parties in other states. While this latter objective is somewhat less tangible, MPCA staff often note that it is essential to the operation of their UST program.

Development and Implementation of Reduced Oversight Approach

The general concept of transferring responsibility to UST remediation contractors and reducing MPCA oversight was the product of the winter 1989-1990 retreat and follow-up meetings discussed above in association with the release report team approach. Specific guidance materials were developed by individual staff members within Tanks and Spills, drawing on each member's particular area of expertise.

Providing Economic Incentives Through the Petrofund Reimbursement System

A final aspect of Minnesota's UST remediation system that encourages rapid response is the system by which owner/operators are reimbursed for cleanup expenses. As we will discuss below, the reimbursement system contributes to rapid response by encouraging owner/operators to come forward when a leak is detected rather than to delay reporting the leak. Reimbursements are financed through the Minnesota Petrofund. The Petrofund raises money through a periodic one cent per gallon fee on wholesale gasoline; the fee is active only when the Petrofund balance is low and requires replenishment.

While most states have a reimbursement system, Minnesota is somewhat unique in the specific amount awarded to owner/operators.¹⁵ As the table below illustrates, the system has evolved from awarding a relatively modest percent of costs with a significant deductible, to awarding virtually complete reimbursement.

¹⁵ For example, other states in Region 5 charge a deductible and then award 100 percent of all cleanup costs incurred. Wisconsin has a \$5,000 deductible, Illinois and Michigan a \$10,000 deductible, Indiana a \$25,000 to \$35,000 deductible, and Ohio a \$50,000 deductible.

CHANGES IN PETROFUND REIMBURSEMENT SYSTEM OVER TIME			
Date	Percent Refunded	Deductible	Ceiling
1987	75 %	\$10,000	\$90,000
1989	90 %	none	\$250,000
1990	90 %	none	\$1,000,000

As shown, the system currently awards up to 90 percent of the costs incurred during cleanup, has no deductible, and has an award ceiling of \$1 million per release, an amount unlikely to be experienced in all but the most complex cleanups.

Minnesota's system of reimbursement facilitates rapid response because it encourages owner/operators to report leaks promptly and to aggressively pursue cleanup. Owner/operators have three incentives which make the cleanup system effective. First, they have an incentive to voluntarily report leaks because they know that the cleanup will not impose extreme financial burden on them. Second, owner/operators have an incentive to report promptly because they are still responsible for at least ten percent of all expenses; this ten percent can be significant if the leak is neglected and contamination is allowed to migrate, necessitating a more complex cleanup (e.g., one which involves ground water remediation). This latter incentive is absent under reimbursement systems which impose a deductible and then award 100 percent of the costs incurred in cleanup. Finally, to be eligible for the full 90 percent reimbursement, the owner/operator must comply with all MPCA requirements or else face progressive reductions in the percentage of expenses refunded. For instance, if the owner/operator neglects to report a leak promptly, he may be awarded only 80 percent of all expenses; similar penalties apply if leaks are discovered at unregistered tanks, or if due care is not practiced in the investigation and remediation process. MPCA staff believe that this incentive is effective; penalties are relatively uncommon, and most owner/operators receive the full 90 percent reimbursement.

MEASURING THE BENEFITS OF RAPID RESPONSE IN MINNESOTA

To the extent that rapid response-facilitating changes in Minnesota's UST remediation process are effective, program data should reflect this improved performance. The purpose of this section is to review information on the positive effects of rapid response. The discussion is divided into two subsections -- program performance benefits and site-level benefits. In the discussion of program performance benefits we examine how the administrative changes discussed above have decreased the time required for various components of the corrective action process, and how the changes have allowed MPCA to reduce the backlog of leaking UST sites. These benefits are, however, only a means toward achieving the more fundamental site-level benefits of rapid response. In the discussion of site-level benefits, we identify the site-level advantages of achieving rapid response, including the potential cost and risk reduction benefits. The latter discussion is qualitative and is included to emphasize the fact that the benefits of rapid response go well beyond enhancing the program's administrative performance.

Program Performance Benefits

The most direct and readily measurable impact that rapid response has is reflected in the performance of the UST program itself. Below, we consider several measures of the efficiency of the Minnesota UST corrective action system; specifically, we examine:

- ▶ the median number of days required for various components of the corrective action process;
- ▶ the gap between the annual number of reported leaks and the number of cleanups completed (site backlog);
- ▶ the backlog of corrective action designs awaiting approval;
- ▶ the percentage of all tanks reporting leaks, which serves as a proxy indicator of prompt reporting of leaks; and
- ▶ the percentage of sites requiring legal action because of recalcitrant or absent responsible parties (RPs).

In the following discussion we occasionally associate a performance measure with a particular rapid response action; in most cases, however, no direct connection can be made. It is the combination of the administrative changes that contributes to the overall efficiency of the system, not any particular change. This fact has important implications for the entire analysis of rapid response. The various rapid response actions reviewed above cannot be viewed simply as a menu from which states can choose modifications to their programs. The administrative innovations have a synergistic quality that makes isolating and analyzing a single rapid response measure difficult. Gerry Phillips, the UST program manager for EPA Region 5 noted, for example, that having a generous reimbursement system will not elicit more cooperation from owner/operators if it is not combined with a reasonable set of clean up requirements.¹⁶ If an owner/operator anticipates that the remediation process will be long and time-consuming, even a 100 percent reimbursement system will not encourage him to pursue clean up. This type of complementary relationship between rapid response options means that, in most cases, we will discuss program performance indicators as the result of the comprehensive procedural approach in Minnesota.

It is also important to note that the trends indicated by performance data may be the product of many factors beyond the rapid response measures examined in this memo. To some extent, improvements in program performance are to be expected as the organization becomes more experienced and efficient. Also, improvement may result from internal factors such as increased funding of the program.¹⁷ Furthermore, exogenous factors such as the availability of qualified contractors may

¹⁶ Personal communication, August 15, 1991.

¹⁷ We investigated the possibility that the performance improvements discussed may be the result of increased staff; this does not appear to be the case since the staff directly managing cleanups has actually shrunk, from 46 members in June of 1989 to 45 members in May of 1991.

influence how efficiently leaking USTs are addressed.

Time Required to Complete Various Stages of the Corrective Action Process

One indicator of the effect of rapid response-facilitating actions is simply the amount of time it takes to complete different segments of the corrective action process. Exhibits 2 and 3 illustrate how refinement of MPCA's UST program has expedited various phases of the cleanup process. These exhibits show the median number of days from the initial release report to the completion of different steps in the corrective action process.¹⁸ In all cases, the data show a steady downward trend in the amount of time it takes to complete the various tasks. For example, the time needed to issue guidance material to the owner/operator has declined from a median of 43 days in 1988 to only six days in the first half of 1991. This change is probably attributable to the introduction of the release response team discussed above.

MPCA has also significantly reduced the time required to begin soil and ground water remediation. The period prior to the initiation of soil treatment has been reduced from 313 days in 1988 to 52 days in 1990. Similarly, the period prior to the initiation of pump and treat operations has been reduced from 321 days in 1988 to 96 days in 1990. While this increased efficiency is the product of many factors, improvements in the permitting system (e.g., general permits) account for much of the change, particularly with respect to ground water treatment. As we discuss below, expediting the onset of remediation provides important site-level benefits, reducing both health risks and cleanup costs.

Exhibits 2 and 3 also show that the median time for approval of corrective action designs (CADs) has been reduced from 546 days in 1988 to 197 days in 1990, and that the total time for site remediation, from release report until final site closure, has been reduced from 534 days in 1988 to 205 days in 1990.¹⁹ Data for sites achieving closure in 1991 show an even shorter time frame (77 days); this figure may be inaccurate, however, since the spring season tends to include many soil-only cleanups.

¹⁸ The data for these exhibits were drawn from MPCA's "Leak sites" data base; MPCA staff suggest caution in interpreting the figures since data entry is inconsistent and subject to limited quality control. MPCA is in the process of revising its UST data base to improve recordkeeping accuracy and supplement current information with more detailed data on site conditions (e.g., volume of soil removed, etc.).

¹⁹ Note that the 1988 and 1989 medians show a shorter time frame for complete remediation than for approval of the CAD. This is probably attributable to the fact that the sites reaching final closure are primarily soil-only sites, while the CAD-approval data include soil-only as well as more complex ground water sites.

Site Backlog

Expediting the corrective action process has allowed Minnesota's UST program to complete a greater number of cleanups and begin addressing the backlog of sites that typically is experienced by state UST programs. In this section we review data that suggest that administrative streamlining in Minnesota has allowed the UST program to address a greater number of sites relative to other states in EPA Region 5. We should emphasize that the relative difference between states may be attributable to factors beyond those discussed above. For example, the cleanup standards required by the different states may affect the pace of corrective action; furthermore, funding and staff levels may play an important role in the relative efficiency of the UST programs. However, the efficiency of the Minnesota program is at least partially related to the administrative procedures that have been established.

Exhibit 4 illustrates how Minnesota is making progress on addressing the backlog of leaking UST sites. The graph shows the number of releases reported and the number of cleanups completed in each of four years (the figures are not cumulative). As shown, between 1988 and 1989, the number of sites grew more rapidly than did the number of cleanups completed. In contrast, between 1989 and 1990, the number of cleanups grew at a faster rate than did the number of leaks reported. As a result, the gap between the number of releases and the number of completed cleanups was smaller in 1990 than in 1989. This suggests that while the backlog of sites continued to grow, it was growing at a slower rate than previously, indicating that the MPCA UST program may have "turned the corner" in remediating sites.

Exhibit 5 also reflects the progress that Minnesota has made in addressing the backlog of leaking USTs. Based on cumulative numbers of releases reported and cleanups completed in the seven quarters for which data were available, the graph shows the percentage of UST releases that have been remediated in each of the states in Region 5. As shown, Minnesota has been more successful than the other states in addressing incoming leak reports. As of June 1991, the percentages of all releases that had been remediated were as follows:

PERCENT OF RELEASES WITH CLEANUPS COMPLETED AS OF JUNE 1991					
Minnesota	Other Area States				
27%	13%	10%	18%	7%	16%

With a ratio of cleanups to releases of 19 percent, Minnesota appears to be significantly more successful than other Region 5 states in keeping pace with the number of releases reported.²⁰

Corrective Action Design Backlog

²⁰ When the Region 5 states report data to EPA, the number of confirmed releases includes both federal and non-federal USTs, while the number of cleanups completed includes only federal tanks (personal communication with Vera Conwell, EPA Region 5, November 12, 1991). In Minnesota, about 70 percent of all leaks involve federal tanks. This percentage was applied to the confirmed release figures to obtain the number of federal tank releases in each state; this figure was used to determine the percentage of leaks with cleanups completed.

Because all aspects of the corrective action process are interrelated, streamlining one step may free resources to expedite completion of other steps. One example of this interrelationship can be seen by considering the backlog of corrective action designs (CADs) under review by Tanks and Spills. The backlog has been shrinking because:

- (1) The use of standardized guidance materials has made certain oversight functions unnecessary (e.g., the review of site investigation workplans), and has allowed staff to devote more time to reviewing CADs.
- (2) The 1991 Minnesota Legislature, at the request of the regulated community, required MPCA to reduce review of CADs for ground water sites to under four months, thereby making the time frame for cleanup and reimbursement more predictable.

The following table illustrates how the backlog of CADs has been reduced over the brief period from March of 1991 through June of 1991 (the only period for which data were available). Prepared in response to the legislative requirements, these data apply only to sites involving ground water contamination (the more complex CADs).

BACKLOG OF GROUND WATER CADs AWAITING REVIEW						
Date	Site Backlog	Months Since CAD Filed				
		> 4 mos.	4 mos.	3 mos.	2 mos.	1 mo.
3/91	163	52	17	48	36	10
4/91	123	23	22	22	28	30
5/91	113	17	16	22	32	26
6/91	111	2	16	34	30	29

These figures demonstrate how, in a brief period of time, Tanks and Spills has been able to expedite its review of ground water CADs. The number of CADs that spend more than four months under review has been reduced from 52 to two; in June of 1991, roughly 84 percent of all CADs were reviewed and approved within three months. As a result of this expedited review process, the total number of CADs awaiting review has been reduced from 163 to 111. While this improvement has been motivated partly by legislative mandate, the prompt response to the mandate has been possible because of efficiency established in other aspects of the cleanup management process.

More Active Reporting of Leaks

Above we discussed how the presence of a zero-deductible reimbursement system may contribute to the efficiency of the UST corrective action process by encouraging owner/operators to report leaks promptly and pursue cleanup aggressively. One rough indicator of the extent to which leaks are actively being reported is simply the percentage of all tanks that have reported a leak, the assumption being that a generous reimbursement system elicits cooperation from owner/operators while a limited reimbursement system may lead owner/operators to delay reporting. The table below compares the states in Region 5 on this basis.

COMPARISON OF REIMBURSEMENT SYSTEM AND LEAK/TANK RATIO						
	Minnesota	Wisconsin	Illinois	Michigan	Indiana	Ohio
Deductible	\$0	\$5,000	\$10,000	\$10,000	\$25,000- \$35,000	\$50,000
Leak/Tank Ratio	.095	.087	.089	.076	.042	.044

Two observations can be made based on these data. First, Minnesota has the highest leak/tank ratio and also has the lowest deductible. Second, the states with significantly higher deductibles -- Indiana and Ohio -- have significantly lower leak/tank ratios. This suggests that higher deductibles may discourage reporting of leaks. There may be physical factors that affect the leak/tank ratios in the various states (e.g., the age of tank stock), but it appears that the prospect of large cost burdens may initially discourage reporting of tank leaks. This is highly detrimental to the objectives of UST cleanup programs, since delays in reporting allow the leaked product to migrate, making remediation more complex.

Reduced Litigation

A final program performance indicator that suggests that Minnesota's UST program facilitates rapid response relates to the degree of legal action that is required in the corrective action process. MPCA staff highlighted the fact that their program has required limited enforcement actions to identify responsible parties and to recover cleanup costs for those sites that were initially financed by the state using state or federal funds (fund-financed sites). Avoidance of these types of situations is beneficial to rapid response since the sites typically progress through the corrective action system much more slowly than normal RP-financed sites.

MPCA staff feel that the limited need for litigation and enforcement action is partially attributable to the economic incentives provided by the Petrofund system. As of June, 1991, Minnesota had 30 fund-financed leaksites and 50 other sites for which cost recovery efforts were underway.²¹ However, no reliable data are available to compare Minnesota to other states in this regard.

²¹ Nearly all of the fund-financed sites started as emergencies for which no responsible party was known. Most of these sites will be cleaned up by responsible parties once they are identified.

Site-Level Benefits of Rapid Response

The data discussed above address the internal performance of the Minnesota UST program. Available information suggests that MPCA is able to respond quickly to reports of leaks, and to move sites successfully through the corrective action process. This efficient management, however, is only a means to the more important objectives of rapid response – control of cleanup costs and reduction of human health risks. No data exist to demonstrate that these benefits have been realized; therefore, the following discussion is largely qualitative, focusing on the way in which rapid response is likely to provide benefits at the site level.

Control of Cleanup Costs

One direct benefit of responding quickly to leaking USTs is that the cost of cleanup is likely to be lower. In Minnesota, the benefit of reduced costs extends beyond owner/operators who must incur a portion of cleanup costs; owner/operators, petroleum wholesalers, and the general public all incur the cost of the fee placed on wholesale petroleum to finance the Petrofund.²² Therefore, to the extent that cleanup costs can be controlled, all parties benefit from rapid response.

Rapid response helps control cleanup costs by limiting the migration of contaminants released. For example, given the widespread use of ex-situ treatment (land application, thermal treatment) in Minnesota, the cost of soil cleanup depends largely on the overall volume of soil that is contaminated beyond the 50 ppm total petroleum hydrocarbon cleanup standard. Since the cost of soil treatment at commercial facilities generally is computed on a per-cubic yard basis, there is a direct link between site cleanup costs and the volume of contaminated soil. Other costs related to soil cleanup also are based on the volume of soil, including excavation costs, transport costs, and the cost of replacement soil. Based on a draft study of UST remediation costs in Minnesota, the total cost of managing UST contaminated soil is roughly \$35 to \$85 per cubic yard.²³ Typically, soil remediation costs constitute about 60 to 75 percent of total costs at a soil-only cleanup site. Overall, these data imply that even limited migration of contamination at an UST site can add significantly to cleanup costs, making rapid response beneficial.

Ground water cleanup costs can also be limited through rapid response. Perhaps most importantly, prompt reporting and remediation of leaks can preclude the need for ground water remediation altogether. MPCA staff acknowledged that if leaks are detected and soil promptly excavated, ground water contamination can be avoided at some sites. If procedures are such that unnecessary delays exist prior to cleanup, the result may be more sites that require ground water remediation. This can add considerably to the total funds spent on UST remediations in a given state, since purchase and operation of typical pump and treat systems costs between \$200,000 and \$500,000, an amount far greater than the cost of remediating soil-only sites. Once ground water is contaminated, cleanup costs are dependent on the extent of contamination. Larger volumes of contaminated ground water and higher concentrations

²² The distribution of this burden will depend on elasticities of supply and demand between the parties involved.

²³ "Effects of Removing the TC Deferral for Petroleum-Contaminated Media from Leaking USTs: Minnesota Case Study," draft memo prepared for EPA's Office of Policy Analysis, prepared by Industrial Economics, Incorporated, July 1991.

of contamination -- both potential outcomes of delaying remediation -- mean that pump and treat systems must operate for longer periods of time, driving up operating costs.²⁴

Reduction of Human Health Risk

The most significant benefit of rapid response to UST leaks is the reduction of human health risk. Closely related to the cost advantages discussed above, prompt reporting and remediation can limit the frequency and extent of ground water contamination, and thereby limit contamination of drinking water. Innovations such as MPCA's temporary discharge approval system can be used to immediately address more acute risks such as vapor inhalation or fire/explosion hazard.²⁵

POTENTIAL DRAWBACKS OF MINNESOTA RAPID RESPONSE MEASURES

This section examines potential drawbacks of the rapid response measures reviewed earlier in this memo. Some of the discussion below is based on conversations with contractors in Minnesota who were asked to comment on MPCA's administrative procedures. Much of the discussion, however, is hypothetical and is based solely on the nature of the administrative changes that have been made; no reliable evidence exists to verify that these potential drawbacks have any actual impact. We review all potential drawbacks to emphasize that the procedural innovations analyzed in this memo generally have offsetting "costs" in addition to the benefits identified in the previous section. Five disadvantages are examined:

- ▶ The possibility that owner/operators may undertake excessive remedial actions because the reimbursement system provides no incentives for limiting costs;
- ▶ The tendency for owner/operators to remain uninvolved in the remedial action process because of limited financial incentives;
- ▶ The potential for the reimbursement system to lead to cost escalation among contractors;
- ▶ The potential for standardized guidance to be inflexible in the face of unique site circumstances; and
- ▶ The potential for contractors to violate criteria presented in standard guidelines and general permits.

²⁴ One way to determine if administrative changes have effectively decreased per-site costs would be to compare average costs in 1988 and 1991 using Petrofund reimbursement invoices. This would be misleading, however, because of rapid cost escalation in the market for contractor services as well as other factors (see "Drawbacks" discussion below).

²⁵ Quantitative assessment of the risk reduction benefits of rapid response is beyond the scope of this case study. To the extent that data are available in the literature, this issue will be addressed in more detail in the overview of rapid response to be developed following completion of the state case studies.

Potential for Excessive Remedial Actions

As we discussed, owner/operators in Minnesota generally pay only ten percent of the total cost of UST site investigation and remediation. One disadvantage of this system acknowledged by both MPCA and environmental contractors is the weak incentive owner/operators have to control costs. Owner/operators typically encourage contractors to excavate soil and remove the contamination from the premises as quickly as possible. In many cases, this is a positive incentive since it prevents the spread of contamination. In some cases, however, it may potentially mean foregoing more cost-effective but slower-working approaches to cleaning up the site. For instance, a large leak site may be conducive to a soil venting remedial approach, but the owner/operator may request soil excavation and off-site thermal treatment since the latter more quickly removes the problem from his property. This choice may be made regardless of the final cost. Similarly, at sites with soil excavation, owner/operators may request that a much larger area be excavated than is actually necessary, simply to be certain that no residual contamination remains.

To the extent that actions such as those noted above occur, there is unnecessary spending of Petrofund dollars to finance the projects. It should be noted, however, that supplementary MPCA rules leave little room for these potential abuses. For example, consultants must meet with MPCA staff to discuss corrective action at larger sites where soil venting may be more cost effective. Furthermore, the Petrofund does not reimburse excavation of soils below action levels.

Limited Participation of Owner/Operators

In contrast to the incentive problem noted above, the limited financial liability created by the reimbursement system may lead some owner/operators to disassociate themselves entirely from the planning of remedial action; i.e., they may feel that their financial responsibility is so limited that the cleanup process does not warrant their attention.²⁶ This can result in a variety of practical coordination problems between owner/operators and contractors. For instance, the contractor may install ground water monitoring wells in an area that the owner/operator normally uses to store equipment. Such a lack of communication has the potential to create animosity between contractors and owner/operators, limiting the cooperative foundation of the cleanup system in Minnesota, and perhaps slowing the progress of the corrective action process.

²⁶ This problem was noted by a representative of Terracon, August 26, 1991.

Potential for Cost Escalation

A final incentive problem related to the relatively generous reimbursement system in Minnesota concerns how contractors price their services. To the extent that owner/operators must pay their own remediation bill, they have an incentive to seek out lower-priced contractors; however, since owner/operators are paying only a limited share of total costs, they may accept less competitive prices. Furthermore, competition in Minnesota is also limited by the shortage of contractor capacity; if owner/operators cannot receive multiple bids on a project, they may accept the first bid offered to them, regardless of the cost.²⁷ Without normal market inducement, contractors have less incentive to establish competitive rates. The result may be a generally higher set of rates state-wide, increasing the burden on the Petrofund. In light of this concern, the Petrofund Board is developing rules which require competitive bidding among contractors.

Inflexibility of Standard Guidance

The use of standardized guidance materials to direct UST site remediation has a potential drawback in that the guidelines may be overly rigid in the face of unique site circumstances, leading to inefficient choices in the site characterization and remediation process. For example, contamination from a leaking tank may affect only a small, shallow area of ground water directly beneath the tank, and site characterization may show that the hydrogeology of the site renders the contamination immobile. Nevertheless, the standardized guidance requires installation of monitoring wells in instances of ground water contamination, without consideration of whether off-site transport is possible.²⁸ Like the incentive for excessive remediation noted above, installation of these wells may add unnecessarily to the final amount that must be reimbursed.²⁹

Violation of Guidance Criteria

A final potential drawback associated with both the general permit approach and the use of standardized guidance for other remedial operations is the potential for contractors to abuse the system. As we mentioned, many aspects of MPCA's move toward decreased oversight rely on contractors to follow the established guidelines. Thus, for example, a contractor could easily allow contaminants from an air stripper to be emitted at a rate beyond that called for in the guidance material. While data on air stripper emission rates are initially reviewed by MPCA staff to counteract such abuses, nothing guarantees that the submitted data will not be falsified. We should emphasize that MPCA staff have seen no evidence suggesting that contractors are not complying with all requirements.

²⁷ Personal communication with a representative of DPRA, August 27, 1991.

²⁸ Personal communication with a representative of Terracon, August 26, 1991.

²⁹ To counteract this potential problem, the MPCA encourages contractors to discuss alternatives to the standardized guidance as site specific circumstances warrant.

CONCLUSIONS

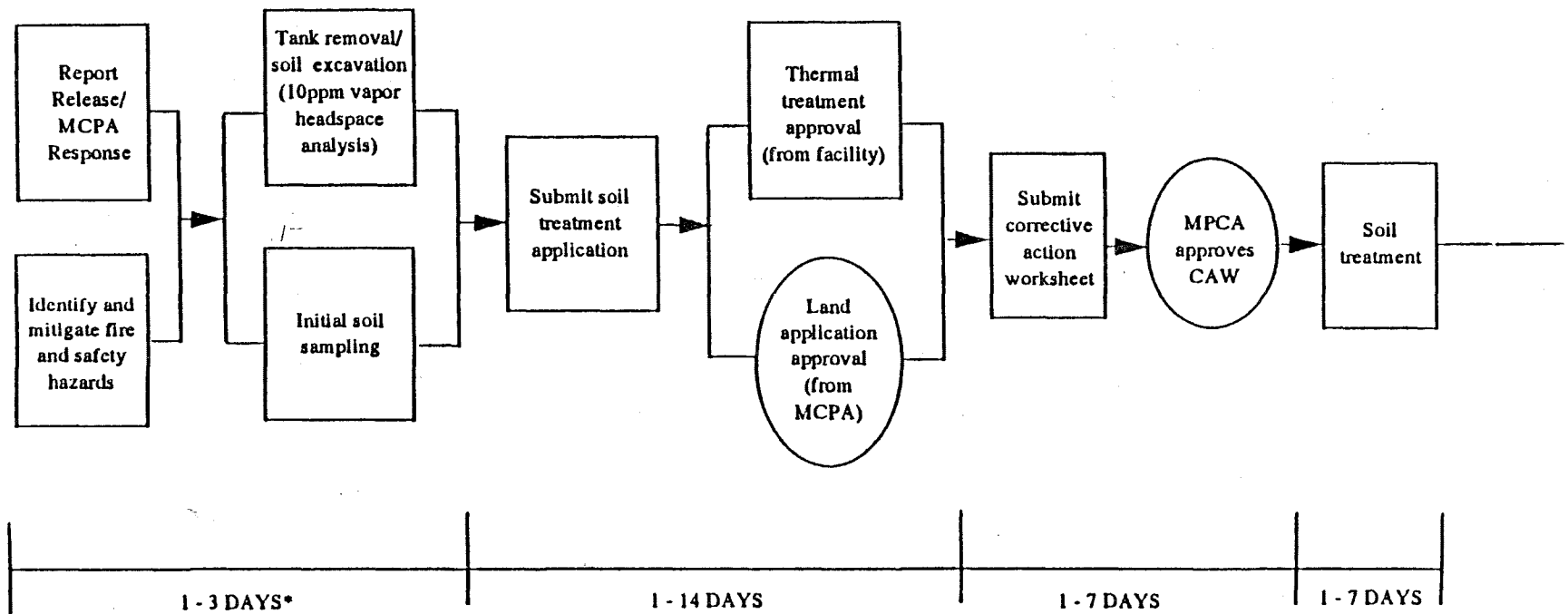
This memo has examined the advantages and disadvantages of a variety of administrative changes that Minnesota has made to streamline its system of managing leaking USTs. The primary findings are as follows:

- ▶ In the last three years MPCA has introduced a variety of administrative changes designed to elicit the cooperation of the regulated community and help move leak sites through the corrective action process more quickly.
- ▶ The focus of many of the administrative changes has been to transfer increased responsibility to remediation contractors, limiting the degree of oversight that MPCA must perform.
- ▶ While it is difficult to isolate the effect of individual administrative actions, available data show that the changes have been effective in encouraging prompt initiation of cleanup and in reducing the backlog of leaking UST sites; data are not available to assess the site-level benefits of rapid response (reduced remediation cost, reduced health risk), but MPCA staff believe that the positive impact is significant.
- ▶ The administrative changes have potential drawbacks that may complicate the corrective action process; however, these are only potential problems, and cannot be verified based on current evidence. To the extent that they do exist, these potential problems represent exceptions to an otherwise effective system, and do not appear to outweigh the program performance and site-level benefits of rapid response.

Overall, the success of Minnesota's innovations suggests that other state UST programs may wish to consider similar changes. As we discussed above, however, the changes reviewed here should not be interpreted as a menu from which individual selections can be made. The changes are complementary and should be thought of as a comprehensive system. For instance, reducing oversight and shifting to a system of standardized guidance could be unsuccessful if not combined with institutionalized means of communication between the UST agency and the contractors (e.g., contractor days). Developing and maintaining an effective UST corrective action program requires a comprehensive approach, not marginal adjustments to a faulty system.

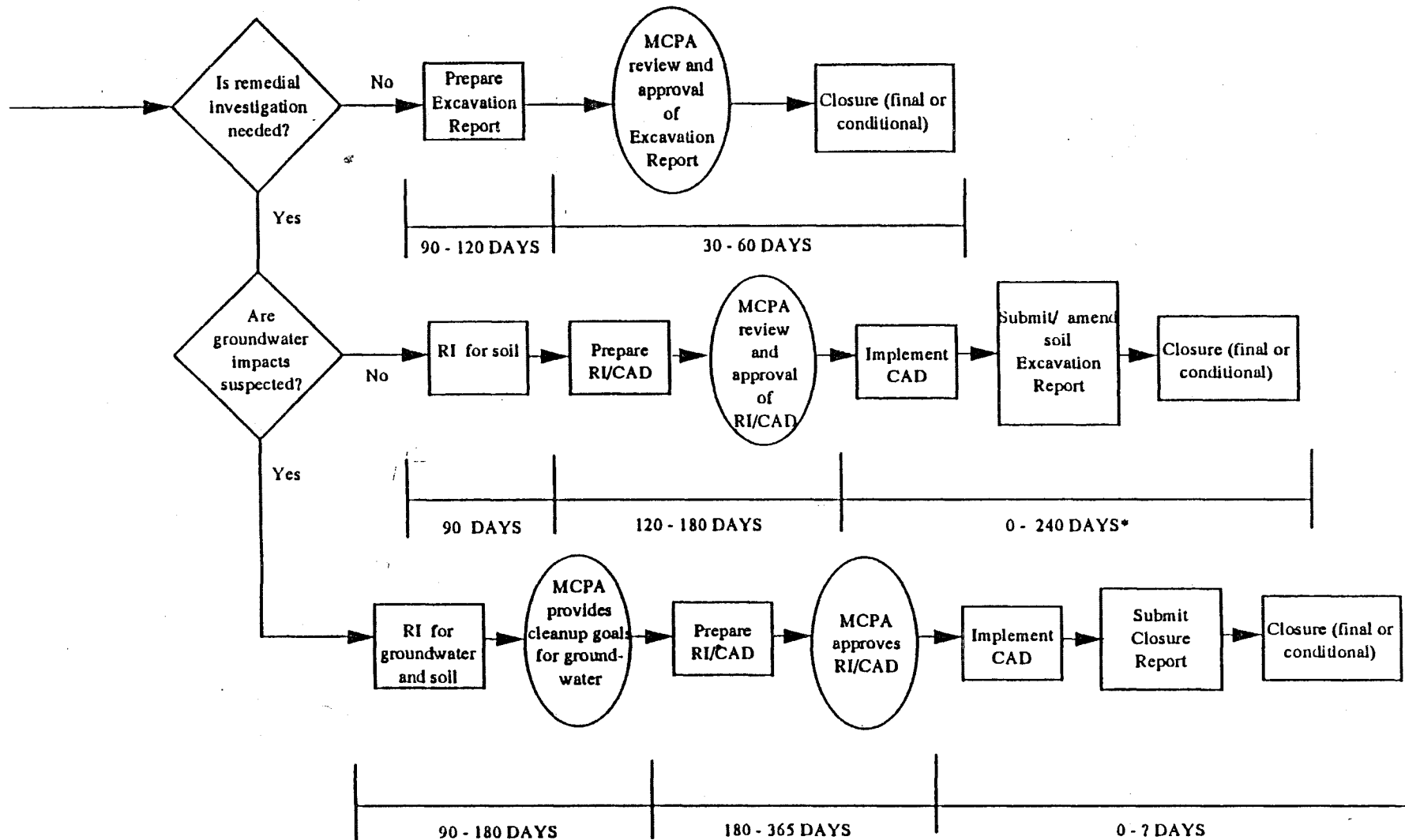
Exhibit 1

MINNESOTA SUBTITLE I PROCEDURES



* Estimated time elapse applies to each stage of the process; see text for estimates of cumulative time elapse.

Exhibit 1
MINNESOTA SOLID WASTE I PROCEDURES
 (continued)



* This estimate does not include the time required for soil venting sites, which may take about two years to close.

Exhibit 2

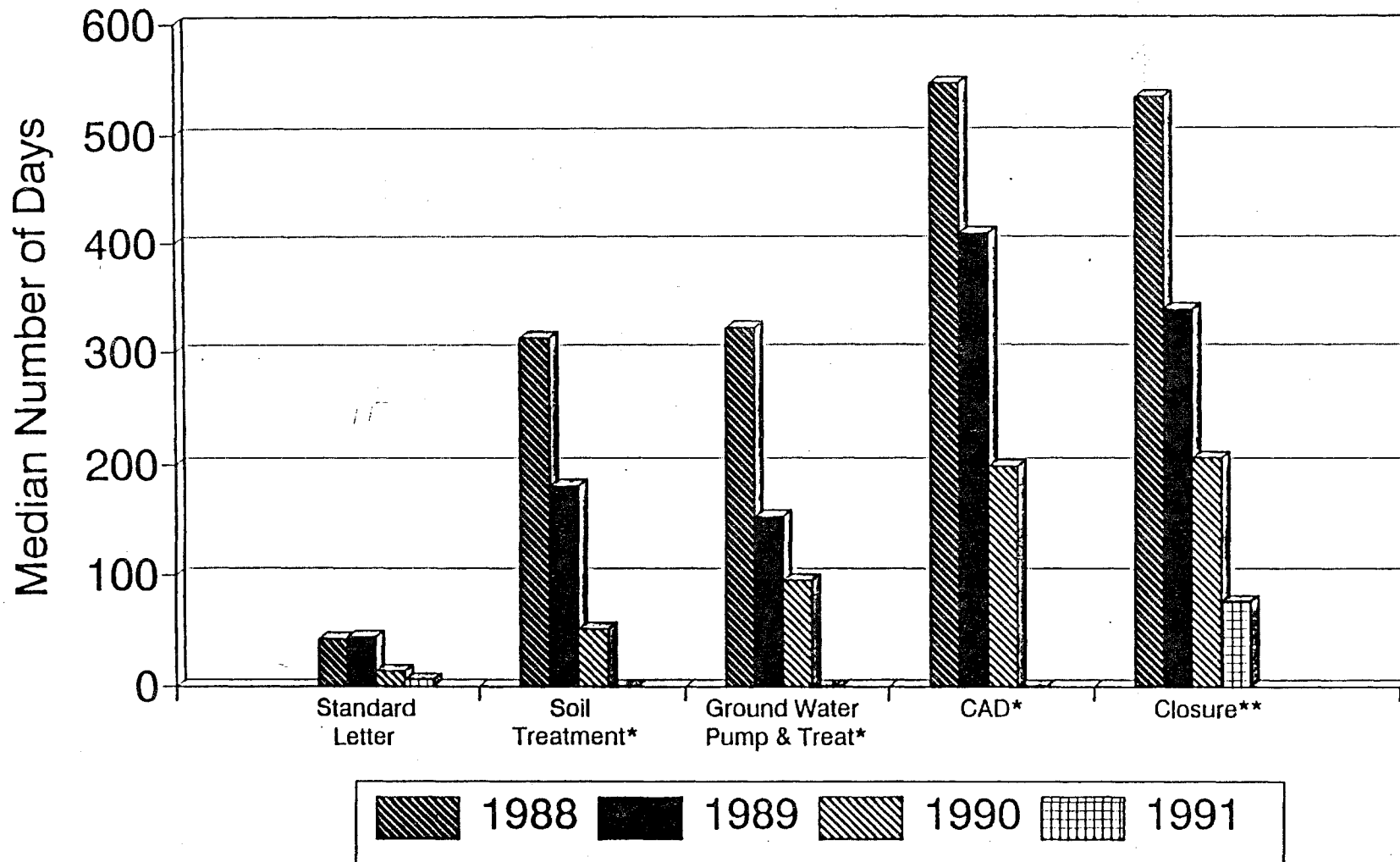
Time Required to Complete Various Stages of Minnesota's UST Corrective Action Process

Period	Year	Sample Size	Median Number of Days
Initial Leak Report to Issuance of Standard Letter	1988	117	43
	1989	528	44
	1990	1031	13
	1991	200	6
Initial Leak Report to Soil Treatment	1988	16	313
	1989	23	180
	1990	31	52
	1991	1	*
Initial Leak Report to Ground Water Pump and Treat	1988	27	321
	1989	25	153
	1990	16	96
	1991	2	*
Initial Leak Report to Corrective Action Design Approval	1988	121	546
	1989	226	408
	1990	169	197
	1991	3	*
Initial Leak Report to Final Site Closure	1988	169	534
	1989	515	338
	1990	392	205
	1991	23	77**

* Insufficient sample size to determine duration in 1991.

** Low 1991 median partially attributable to high percentage of soil-only sites.

Time Required to Complete Various Stages of Minnesota's UST Corrective Action Process



* Insufficient sample size to determine median duration in 1991.

** Low 1991 median partially attributable to high percentage of soil-only sites.

Backlog of UST Sites in Minnesota

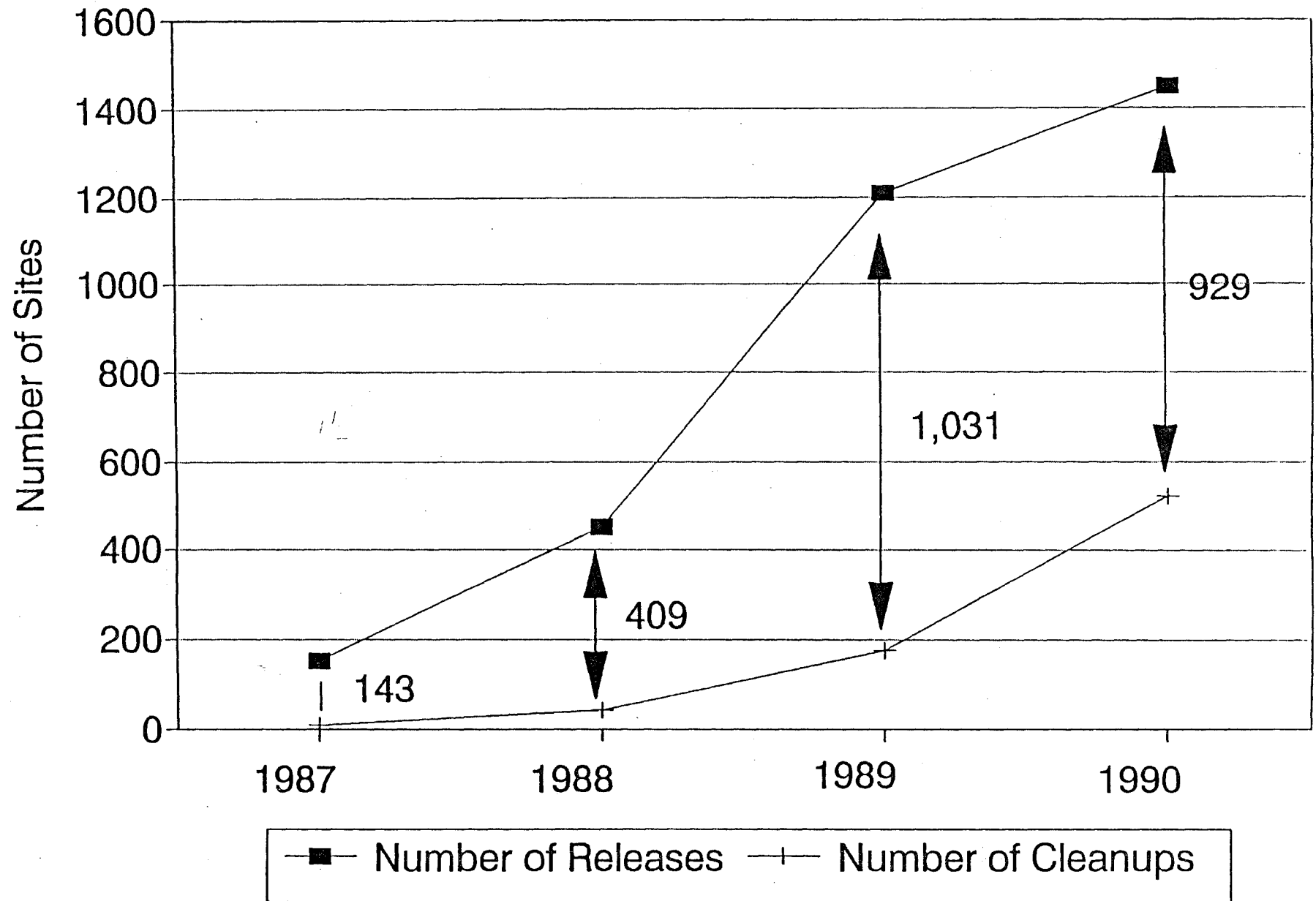
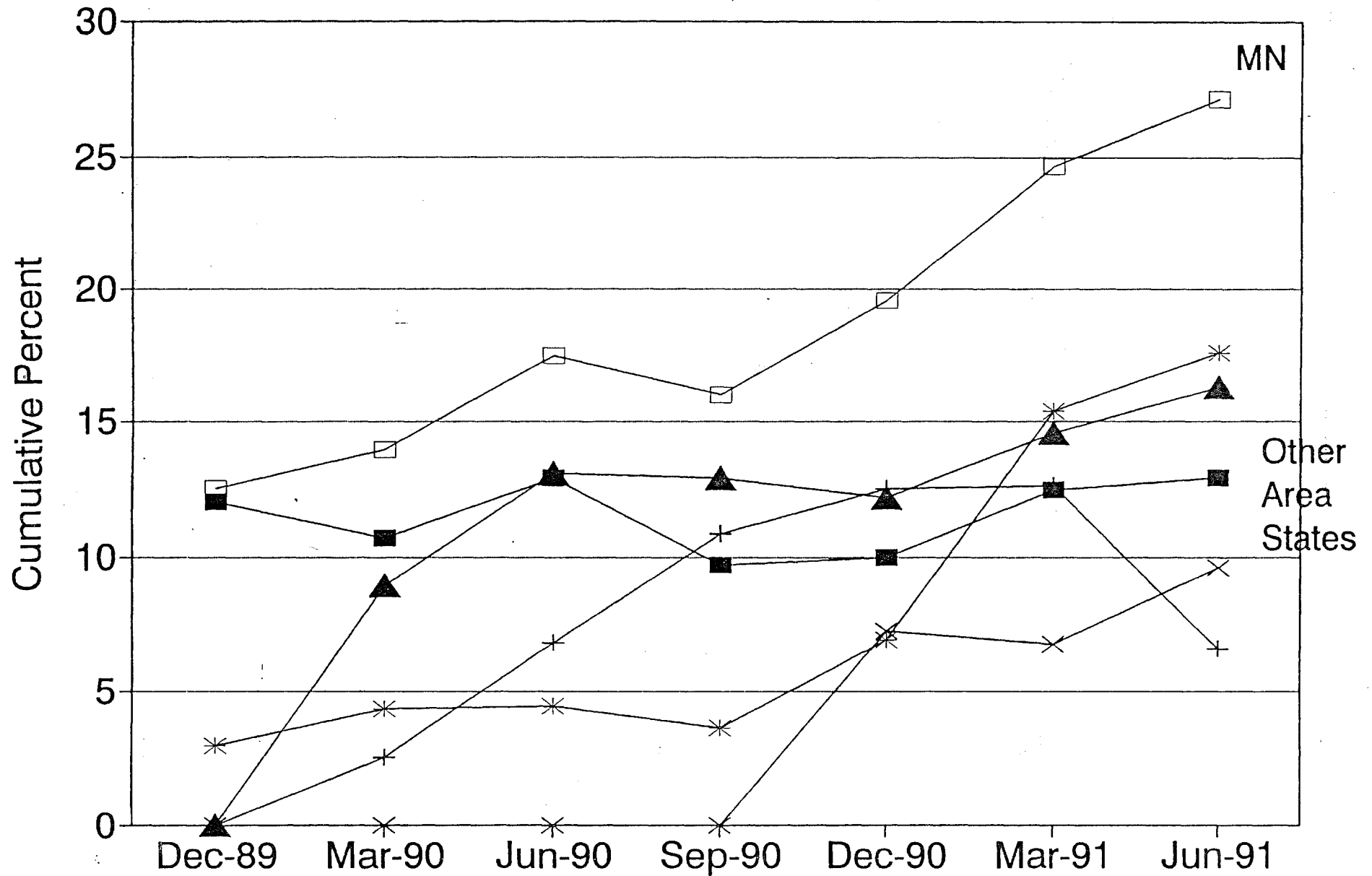


Exhibit 5

Percent of Releases with Cleanup Completed



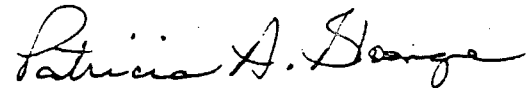
**APPENDIX A:
MPCA's SURFACE WATER DISCHARGE
GENERAL PERMIT**

GENERAL PERMIT AUTHORIZATION TO DISCHARGE AND TO CONSTRUCT WASTEWATER
TREATMENT FACILITIES UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM AND STATE DISPOSAL SYSTEM PERMIT PROGRAM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1241 et seq; hereinafter the "Act"), Minnesota Statutes Chapters 115 and 116 as amended, and Minnesota Rules pt. 7001.0210 and the effluent limitations, monitoring requirements and other conditions contained in this permit, any discharger of contaminated ground water located in the State of Minnesota meeting the applicability criteria, effluent limitations, monitoring requirements and other conditions of this permit, is permitted to discharge these wastewaters directly to surface waters of the state and/or indirectly to ground waters of the State.

This permit shall become effective on the date of issuance and shall expire on February 29, 1996. The Permittee is not authorized to discharge after the above date of expiration.

Date: May 22, 1991



Timothy K. Scherkenbach
Director
Water Quality Division

For Charles W. Williams
Commissioner
Minnesota Pollution Control Agency

General Permit:

PART I

A. APPLICABILITY CRITERIA

Persons wishing to discharge wastewater from any facility under this General Permit shall submit an individual NPDES/SDS permit application and meet all applicability criteria listed below. Facilities which do not meet all of these applicability requirements will be evaluated for issuance of individual NPDES/SDS permits under Minnesota Rules Chapter 7001.

1. The discharge consists of contaminated ground water which contains and is being treated for only petroleum related contaminants.
2. The discharge is less than or equal to 50 gallons (190 liters) per minute.
3. No discharge is allowed under this permit to Outstanding Resource Value Waters or designated trout waters.
4. The discharge of treated ground water to surface water or to ground water indirectly through seepage will not have a significant impact on water quality.
5. No discharge is allowed under this permit in cases where the discharge contains a contaminant not specifically limited in this permit or where the discharge would violate water quality standards in Minn. Rules ch. 7050, or air emissions of toxic pollutants Minn. Stat. § 116.081, subd 4.A.

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting until February 29, 1996 the Permittee is authorized to discharge from the remediation facility specified in the attached cover letter. There shall be no discharge of any contaminant other than those specifically limited in this permit.

Such discharges shall be limited and monitored by the Permittee as specified below:

EFFLUENT LIMITATIONS

Parameter	To Class 2Bd surface waters, or to unsaturated zone	To Class 2B, 2C or 7 surface waters	Sample Type
	Daily Maximum	Daily Maximum	
Flow	50 gpm (190 lpm)	50 gpm (190 lpm)	continuous monitoring
Total Hydrocarbons	500 ug/l	500 ug/l	grab
Benzene	6 ug/l	114 ug/l	grab
Toluene	253 ug/l	253 ug/l	grab
Xylenes	166 ug/l	166 ug/l	grab
Lead	(7)	(7)	grab
Total PAHs, carcinogenic	.028 ug/l	.07 ug/l	grab
Total PAHs, noncarcinogenic	.28 ug/l	--	grab
Acenaphthene	--	12 ug/l	grab
Anthracene	--	.029 ug/l	grab
Fluoranthene	--	4.6 ug/l	grab
Phenanthrene	--	2.1 ug/l	grab
Naphthalene	--	50 ug/l	grab

1) Monitoring

- a) Monitoring shall be conducted on the effluent monthly for the first three months of operation. After three months, the Commissioner may authorize quarterly monitoring. Reduced monitoring will be allowed only if pollutant levels in the discharge are well below permit limits.
- b) Monitoring for lead is required when contamination results from leaded gasoline, or when lead is present in the ground water. After one year, the Commissioner may authorize annual monitoring.
- c) Monitoring for PAHs is required when initial effluent or ground water analyses indicate they are present. If required, monitoring shall be conducted quarterly for the first year of operation. After one year, the Commissioner may authorize annual monitoring. Reduced monitoring will be allowed only if levels are well below permit limits.

- 2) The pH shall not be less than 6.0 nor greater than 9.0 and shall be monitored monthly. These upper and lower limitations are not subject to averaging and shall be met at all times.
- 3) There shall be no discharge of floating solids or visible foam in other than trace amounts.
- 4) The discharge shall not contain oil or other substances in amounts sufficient to create a visible color film on the surface of the receiving waters.
- 5) Samples taken in compliance with the monitoring requirements specified above shall be taken at a point representative of the discharge from the treatment system, during a representative time of operation, and prior to mixing with receiving water or other water.
- 6) For lead analyses, the detection limit shall be 1 ug/l or less. For PAH analysis, EPA method 610 employing high performance liquid chromatography shall be used. Permit limits for total carcinogenic PAHs, total noncarcinogenic PAHs, and anthracene are below the detection limits of currently available, and approved, analytical technology. Discharges will be considered in compliance with this permit if test results show no detectable concentrations of these compounds at the detection limits of EPA method 610 as published in 40 CFR 136, Appendix A. If this test method, or other approved test methods, reduce the detection limits to below the permitted limits during the life of this permit, the permit limit will be the enforceable limit rather than the analytical detection limit.
- 7) The discharge limitation for lead at various hardness values shall be:

Hardness mg/l	Daily Max
50	1.3 ug/l
100	3.2 ug/l
200	7.7 ug/l
400	18.6 ug/l

For discharge to a seasonal wetland, lead must be non-detect at an analytical detection limit of 1 ug/l.

C. SPECIAL REQUIREMENTS

1. Pretreatment Requirements

No pollutant shall be discharged from this facility to a publicly owned treatment works except in accordance with pretreatment standards established in accordance with the Act or Minnesota Statutes or any such local standards or requirements. No pollutant shall be discharged into any publicly owned disposal system which interferes with, passes through inadequately treated or otherwise is incompatible with such disposal system. The Permittee shall not make modifications to divert any discharge of pollutants authorized by this permit to a publicly owned treatment works without having first notified and received the approval of the Commissioner.

2. Water Treatment and Chemical Additives

The Permittee shall not use nor increase the use of water treatment, biocides or chemical additives at this facility other than those additives and in the amounts reported prior to issuance of this permit and approved by the Commissioner, without the prior approval of the Commissioner. The Permittee shall request approval from the Commissioner in writing at least 30 days in advance of the proposed new use or increase in use of a water treatment or chemical additive at this facility. This written request shall include at least the following information for the proposed additive:

- a. The commercial and chemical names;
- b. Aquatic toxicity and human health or mammalian toxicity data;
- c. Environmental fate information (including, but not limited to, persistence, half-life and bioaccumulation data);
- d. Whether the chemical is a suspected carcinogen, mutagen or teratogen; and
- e. The proposed methods, and average and maximum rates and frequencies of chemical addition.

This permit may be modified to restrict the use or discharge of a water treatment or chemical additive, or to require additional monitoring.

D. MONITORING AND REPORTING

1. Monitoring

a. Representative Sampling

Samples and measurements taken for the purposes of monitoring shall be representative of the volume and nature of the monitored activity.

b. Quality Assurance

In order to insure the validity of analytical data, the Permittee shall submit an outline of the quality assurance program employed by the laboratory performing the analyses. Such outline shall be contained in the monitoring plan required by PART I, D.2.

c. Test Procedures

Test procedures for the analysis of parameters shall conform to regulations promulgated pursuant to Section 304 (h) of the Act, and Minnesota Statutes, Section 115.03, Subd. 1 (e) (7) as amended, and shall be specified in a monitoring plan subject to review and approval by the Commissioner in accordance with PART I, D.2.

The Permittee shall calibrate all field instruments in the field prior to sample collection. The Permittee also shall periodically calibrate and perform maintenance on all other monitoring and analytical instrumentation used to monitor parameters discharged under this permit, at intervals to insure accuracy of measurements. The Permittee shall maintain written records of all such calibrations and maintenance.

d. Recording of Results

For each measurement taken or sample collected pursuant to the requirements of this Permit, the Permittee shall record the following information:

- 1) The exact place, date, and time of sampling;
- 2) The dates the analyses were performed;
- 3) The person who performed the analyses; and
- 4) The results of such analyses.

e. Additional Monitoring by Permittee

If the Permittee monitors any parameter designated herein more frequently than required by this permit, or as otherwise directed by the Agency or Commissioner, the results of such monitoring shall be included in the calculation and reporting of values submitted on the Discharge Monitoring Report Form. Any increased monitoring frequency shall also be indicated on such designated form.

f. Recording and Records Retention

The Permittee shall retain for a minimum of three years all records and documents in its possession or the possession of its divisions, employees, agents, accountants, contractors or attorneys that relate to this Permit, including original recordings from any continuous monitoring instrumentation, and any calibration and maintenance records. These retention periods shall be automatically extended during the course of any legal or administrative proceedings or when so requested by the Regional Administrator, the Agency, or the Commissioner.

2. Monitoring Plan

- a. The Permittee shall submit a monitoring plan to the Commissioner for approval within 15 days after the receipt of the cover letter acknowledging coverage under the general permit.
- b. The Permittee shall submit any proposed amendments to the monitoring plan in writing to the Commissioner for approval.
- c. Monitoring plans shall include the items described in Minnesota Rules Part 7001.1080.

3. Reporting

- a. All monitoring results obtained pursuant to the provisions of this permit shall be summarized on a monthly basis and reported on the designated "Discharge Monitoring Report Form."
- b. Reports shall be submitted quarterly and received or postmarked no later than the 21st day of the month following the completed reporting period. The first report is due on the reporting date following the first reporting period where monitoring is required beginning on the date of issuance of this permit. Reports shall be due on the 21st day of April, July, October, and January. Reports shall be signed by the Permittee or the duly authorized representative of the Permittee.

Signed copies of these, and all other reports required herein, shall be submitted to the Commissioner at the following address:

Minnesota Pollution Control Agency
Water Quality Division
Industrial Section
520 Lafayette Road
St. Paul, Minnesota 55155

- c. The Permittee shall report the results of the monitoring in the units specified in this permit. The reports or written statements shall be submitted even if no discharge occurred during the reporting period. The report shall include (a) a description of any modifications in the wastewater collection, treatment, and disposal facilities; (b) any substantial changes in operational procedures; (c) any other significant activities which alter the nature or frequency of the discharge; (d) any other material factors affecting compliance with the conditions of this permit and such information as the Agency or Commissioner may reasonably require of the Permittee pursuant to Minnesota Statutes, Chapters 115 and 116 as amended, and Minnesota Rules Chapter 7001.
- d. Except for data determined to be confidential under Section 308 of the Act, and Minnesota Statutes, Section 116.075, Subd. 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Agency. Procedures for submitting such confidential material shall be pursuant to Minnesota Rules Part 7000.1300. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report, confidential or otherwise, is subject to the imposition of criminal penalties as provided for in Section 309 of the Act and Minnesota Statutes, Section 609.671 (1990).

F. DEFINITIONS

1. The "Agency" means the Minnesota Pollution Control Agency, as constituted pursuant to Minnesota Statutes, Section 115.02, Subd. 1.
2. The "Commissioner" means the Commissioner, or other Agency staff as authorized by the Commissioner, of the Minnesota Pollution Control Agency as described in Minnesota Statutes, Section 116.02 as amended.
3. The "Regional Administrator" means the Environmental Protection Agency (EPA) Region Administrator for the region in which Minnesota is located (now Region V).
4. The "Act" means the Clean Water Act, as amended 33. U.S.C. 1251, et seq.
5. "Petroleum" means:
 - (1) gasoline and fuel oil as defined in section 296.01, subdivisions 3 and 4;
 - (2) crude oil or a fraction of crude oil that is liquid at a temperature of 60 degrees Fahrenheit and pressure of 14.7 pounds per square inch absolute; or
 - (3) constituents of gasoline and fuel oil under clause (1) and crude oil under clause (2).
6. "Daily Maximum" concentration means the daily determination of concentration for any calendar day.
7. Pollutants, Toxic Pollutants, Other Wastes, Point Source, Disposal System, Waters of the State, and other terms for the purpose of this permit are defined in Section 502 of the Act and Minnesota Statutes 115.01 as amended and Minn. Rules ch. 7001.
8. "Best Available Technology" means the application to a treatment facility of the best available technology economically achievable as required by Section 301 (b)(2) of the Clean Water Act, United States Code, Title 33, Section 1311 (b)(2).
9. "Best Management Practices" means practices to prevent or reduce the pollution of the waters of the state, including schedules of activities, prohibitions of practices, and other management practice, and also includes treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge, or waste disposal or drainage from raw material storage.
10. "Grab" sample is an individual sample collected at one point in time.

PART II

A. MANAGEMENT REQUIREMENTS

1. Bypasses

A bypass is an intentional diversion of a waste stream from any portion of the treatment facility. Bypasses are prohibited except as allowed by PART II,A.1. of this Permit or as allowed by rules of the Agency.

a. Bypass not causing exceedance of permit effluent limitations.

(1) A bypass that does not result in an exceedance of applicable effluent limits is allowed only if the bypass is necessary for essential maintenance to assure efficient operation of the wastewater treatment facility.

(2) The Permittee shall notify the Agency in writing of the need for an anticipated bypass at least ten days before the date of the bypass. If the bypass was unanticipated, the Permittee shall notify the Agency as soon as possible under the circumstances, but in no event more than 24 hours after the bypass.

b. Bypass causing exceedance of permit effluent limitations. A bypass that causes an exceedance of an effluent limit, whether anticipated or unanticipated, is prohibited except under the following conditions:

(1) The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. For the purposes of this paragraph, "severe property damage" means substantial damage to property of the Permittee or of others; damage to the wastewater treatment facilities that may cause them to become inoperable; or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. "Severe property damage" does not mean economic loss as a result of a delay in production.

(2) There is no feasible alternative to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or performance of maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.

(3) In the case of an anticipated bypass, the Permittee has notified the Commissioner at least ten days in advance of the bypass or as soon as possible under the circumstances, and the Commissioner has approved the bypass. The Commissioner shall

approve the bypass if the Commissioner finds that the conditions set forth in (1) and (2) above are met. The Permittee shall provide the Commissioner such information as the Commissioner requires to make a decision on the bypass.

(4) In the case of an unanticipated bypass, the Permittee has notified the Agency within 24 hours of the bypass. The Permittee shall provide in writing the reasons for an unanticipated bypass.

- c. Water Quality Violations. In no event shall a bypass, whether anticipated or unanticipated, be permitted if it results in a violation of applicable water quality standards.
- d. Affirmative Bypass Defense. A Permittee who experiences a bypass, either anticipated or unanticipated, may raise as an affirmative defense to an alleged violation of this Permit that the bypass was authorized under PART II, A.1. of this Permit.

The Permittee has the burden to establish such affirmative defense by a preponderance of competent evidence.

- e. Health Hazards/Nuisance Conditions. If an unanticipated bypass may cause a health hazard or nuisance condition to occur, the Permittee shall notify the Agency immediately by calling the Agency's emergency response number (612) 296-8100.
- f. Written Reports. The Permittee shall include with its next Discharge Monitoring Report a written report about any bypass that caused an exceedance of permit limits. The report shall contain the following information:
 - (1) A description of the discharge, the approximate volume, and the cause of the bypass.
 - (2) The period of the bypass including exact dates and times, and, if the bypass is still occurring, the anticipated time the bypass will continue.
 - (3) A description of the steps taken to reduce, eliminate, and prevent recurrence of the bypass.

2. Upsets

An upset is an exceptional incident in which there is unintentional and temporary exceedance of permit limits due to factors beyond the control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

- a. Affirmative Upset Defense. If the Permittee exceeds permit limits due to an upset, the Permittee has an affirmative defense to an enforcement action brought by the Agency as a result of the noncompliance if the Permittee demonstrates the following by a preponderance of competent evidence:
- (1) The specific cause of the upset;
 - (2) That the upset was unintentional;
 - (3) That the upset resulted from factors beyond the control of the Permittee and did not result from operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or increases in production which are beyond the design capability of the treatment facilities;
 - (4) That at the time of the upset the facility was being properly operated;
 - (5) That the Permittee notified the Agency within 24 hours of the upset; and
 - (6) That the Permittee took all reasonable steps to minimize the adverse impacts on human health, public drinking water supplies, and the environment resulting from the upset.
- b. Written Report. The Permittee shall include with its next Discharge Monitoring Report a written report about any upset that occurred in the previous month. The report shall contain the same information required for a bypass report under paragraph II.A.1.f and in addition shall describe the steps taken to minimize the adverse impacts on human health, public drinking water supplies, and the environment resulting from the upset.
3. Permit Limit Exceedances. If, for any reason, the Permittee exceeds any effluent limitation specified in the Permit, the Permittee shall report with the next Discharge Monitoring Report, the following information:
- a. A description of the discharge, approximate volume, and the cause of the noncompliance.
 - b. The period of noncompliance including exact dates and times, the anticipated time of noncompliance if it is still continuing, and the steps taken to correct, reduce, eliminate, and prevent recurrence of the noncomplying discharge.
4. Adverse Impact
- The Permittee shall take all reasonable steps to minimize any adverse impact to waters of the State resulting from:

- a. All unauthorized discharges accidental or otherwise, of oil, toxic pollutants or other hazardous substances consistent with Minnesota Statutes Section 115.061 and 40 CFR PART 110 and 116;
- b. Effluent limitation violations;
- c. A bypass; or
- d. An upset.

The Permittee shall immediately notify the Commissioner in writing of any occurrences as described in a. through d. above. Notification for bypasses and upsets shall be consistent with the requirements of PART II, A.1.

5. Change in Discharge

- a. All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil or criminal penalties as provided for in Section 309 of the Act, Minnesota Statutes Section 115.071, and Section 609.671 (1990).
- b. Facility modifications, additions, and/or expansions that increase the plant capacity shall be reported to the Commissioner (Attn: Industrial Section, Water Quality Division) and this permit may then be modified or reissued to reflect such changes.
- c. Any anticipated change in the facility discharge, including any new or modified discharge or change in the quality of existing discharges to the treatment system that may result in a new or increased discharge of pollutants shall be reported to the Commissioner (Attn: Industrial Section, Water Quality Division). Modification to the permit may then be made to reflect any necessary change in permit conditions, including any necessary effluent limitations for any pollutant not identified and limited herein.

- d. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

6. Facilities Operation and Quality Control

All waste collection, control, treatment, and disposal facilities shall be operated in a manner consistent with the following:

- a. Maintenance of the treatment facility that results in degradation of effluent quality shall be scheduled as much as possible during non-critical water quality periods and shall be carried out in a manner approved by the Commissioner.
- b. The Commissioner may require the Permittee to submit a maintenance plan to eliminate degradation of the effluent. The Permittee shall operate the disposal system in accordance with this plan as approved by the Commissioner.
- c. The Permittee shall provide an adequate operating staff which is duly qualified under Minnesota Rule 9400 if applicable as determined by the Commissioner pursuant to Minnesota Rules Part 7001.0150, to carry out the operation, maintenance and testing functions required to insure compliance with the conditions of this permit.
- d. The Permittee shall at all times maintain in good working order and operate as efficiently as possible all facilities or systems of control installed or used to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures.
- e. Necessary in-plant control tests shall be conducted at a frequency adequate to ensure continuous efficient operation of the treatment facility.

7. Removed Substances

The Permittee shall dispose of solids, sludges, filter backwash, or other pollutants removed from or resulting from treatment or control of wastewaters in such manner as to prevent any pollutant from such materials from entering waters of the state. The Permittee in disposal of such materials shall comply with all applicable water, air, solid waste and hazardous waste statutes and regulations. When requested, the Permittee shall submit a plan for such disposal for approval by the Commissioner.

8. System Reliability

The Permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes at all times. The Permittee is responsible for insuring system reliability by means of alternate power sources, back-up systems, storage of inadequately treated effluent, or other appropriate methods of maintaining system reliability.

9. Construction

This Permit only authorizes the construction of treatment works to attain compliance with the limitations and conditions of this permit, after plans and specifications for treatment facilities have been submitted to and approved in writing by the Commissioner prior to the start of any construction.

10. Need to Halt or Reduce not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

B. RESPONSIBILITIES

1. Transfer of Ownership or Control

No permit may be assigned or transferred by the holder without the approval of the Agency. In the event of any changes in control or ownership of the facilities, a Request for Permit Transfer, signed by both parties shall be sent to the Agency (Attn: Industrial Section, Water Quality Division). Any succeeding owner or controller also shall comply with the terms and conditions of this permit.

2. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:

- a. Violation of any terms or conditions of this permit;
- b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;
- c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;
or
- d. Minnesota Rules Parts 7001.0170 and 7001.0180.

3. Toxic Pollutants

Notwithstanding PART II, B.2. above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307 (a) of the Act or Minnesota Statutes Chapters 115 and 116 as amended, for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitations for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and in accordance with applicable laws and regulations.

4. Right of Entry

The Permittee shall, pursuant to Section 308 of the Act and Minnesota Statutes 115.04, allow the Commissioner of the Agency, the Regional Administrator, and their authorized representatives upon presentation of credentials:

- a. To enter upon the Permittee's premises where a disposal system or other point source or portion thereof is located for the purpose of obtaining information, examination of records, conducting surveys or investigations;
- b. To bring such equipment upon the Permittee's premises as is necessary to conduct such surveys and investigations;

- c. To examine and copy any books, papers, records, or memoranda pertaining to the installation, maintenance, or operation of the discharge, including but not limited to, monitoring data of the disposal system or point source or records required to be kept under the terms and conditions of this permit;
- d. To inspect any monitoring equipment or monitoring procedures required in this permit; and
- e. To sample and monitor any substances or parameters at any location.

5. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the Permittee from civil or criminal penalties for non-compliance with the terms and conditions provided herein.

6. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject to under Section 311 of the Act and Minnesota Statutes, Chapters 115 and 116 as amended.

7. Liability Exemption

This permit authorizes the permittee to perform the activities described herein under the conditions set forth. In issuing this permit, the state/agency assumes no responsibility for any damage to persons, property or the environment caused by the activities of the permittee in the conduct of its actions, including those activities authorized, directed or undertaken pursuant to this permit. To the extent the state/agency may have any liability for the activities of its employees, that liability is explicitly limited to that provided in the Torts Claim Act, Minn. Stat. § 3.736.

8. Minnesota Laws

Nothing in this permit shall be construed to preclude the institution of any legal or administrative proceedings or relieve the Permittee from any responsibilities, liabilities, or penalties for violation of effluent and water quality limitations not included in this permit.

9. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

11. NPDES/SDS Rules

The Permittee shall comply with the provisions of Minn. Rules pts. 7001.0150, subp. 3 and 7001.1090, subp. 1.

12. Other Statutes, Rules and Ordinances

The Agency's issuance of a permit does not release the Permittee from any liability, penalty or duty imposed by Minnesota or federal statutes or local ordinances, except the obligation to obtain the permit.

13. More Stringent Rules

The Agency's issuance of a permit does not prevent the future adoption by the Agency of pollution control rules, standards, or orders more stringent than those now in existence and does not prevent the enforcement of these rules, standards or orders against the Permittee.

14. Agency Obligation

The Agency's issuance of a permit does not obligate the Agency to enforce local laws, rules or plans beyond that authorized by Minnesota Statutes.

APPENDIX B:
MPCA's TEMPORARY DISCHARGE APPROVAL

TEMPORARY DISCHARGE APPROVAL LETTER
FEBRUARY 1991

>
>
>

Dear >:

RE: Request for Emergency Discharge Approval
Site:
Site ID#: LEAK0000>

The Minnesota Pollution Control Agency (MPCA) has received your request for emergency discharge approval dated <_____>. After reviewing this situation, the above-referenced site has been given emergency status by the MPCA due to [the presence of free product] [vapor impacts] [downgradient drinking water wells] [high concentrations of dissolved hydrocarbons with a high potential for migration].

This letter authorizes you to proceed with operation of the product recovery system, initiate gradient control and discharge to <_____> receiving water <_____>, a Class <_____> Water. The following effluent limitations and monitoring requirements apply until a National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit is issued:

Parameter	Class 2B, 2A Waters	Other Waters	Monitoring Frequency	Sample Type
Total Hydrocarbons	500 µg/l	500 µg/l	Monthly	Grab
Benzene	6 µg/l	114 µg/l	Monthly	Grab
Toluene	253 µg/l	253 µg/l	Monthly	Grab
Xylenes	166 µg/l	166 µg/l	Monthly	Grab
Lead:				
at 50 mg/l hardness	1.3 µg/l	1.3 µg/l	Monthly	Grab
at 100 mg/l hardness	3.2 µg/l	3.2 µg/l	Monthly	Grab
at 200 mg/l hardness	7.7 µg/l	7.7 µg/l	Monthly	Grab
at 400 mg/l hardness	18.6 µg/l	18.6 µg/l	Monthly	Grab
Total PAHs:				
Carcinogenic	.028 µg/l	.07 µg/l	Monthly	Grab
Noncarcinogenic	.280 µg/l	--	Monthly	Grab
Acenaphthene	--	12 µg/l	Monthly	Grab
Anthracene	--	.029 µg/l	Monthly	Grab
Fluoranthene		4.6 µg/l	Monthly	Grab
pH	6.0 to 9.0	6.0 to 9.0	Monthly	Grab

NOTES:

1. There shall be no discharge of floating solids, visible foams or oil films.
2. Monitoring for lead is only required when contamination results from leaded gasoline, or when lead is believed to be present in the ground water. For lead analyses the detection limit shall be a µg/l or less.

One Polynuclear Aromatic Hydrocarbons (PAH) analysis is to be performed using U.S. Environmental Protection Agency method 610 employing high performance liquid chromatography. Detection limits for carcinogenic PAHs shall be .04 µg/l or less. If PAH's are detected in the effluent, additional treatment may be required for NPDES permit issuance.

In addition, an NPDES application together with the \$60.00 application fee must be submitted to the Water Quality division within 45 days of the date of this letter and if treatment of discharge water is required and involves discharge of contaminants to the atmosphere, Air Quality standards must be met. If you have any questions, please call me at 612/643-____. Questions concerning Air Quality may be directed to the Air Quality Division at 612/296-7757 or 612/296-7951.

Analytical results from the monthly shall be submitted to Pete Sandberg, Industrial Section, Water Quality Division on an annual basis.

Sincerely,

>
>
Tanks and Spills Section
Hazardous Waste Division

____:____

: Consultant

bcc: Pete Sandberg, Industrial Section, Water Quality Division
Barb Jablonski, Tanks and Spills Section, Hazardous Waste Division

**APPENDIX C:
STANDARDIZED GUIDELINES FOR
AIR STRIPPING AND SOIL VENTING EMISSIONS**

AIR EMISSION CONTROLS: I. AIR STRIPPERS

Minnesota Pollution Control Agency
Tanks and Spills Section
May 1991

To assess the potential impacts of air emissions from air strippers used during ground water remediation, the Air Quality Division (AQ) of the Minnesota Pollution Control Agency (MPCA) has developed significant emission rates (SERs) based on toxicologic information and the characteristics of typical air stripper systems. If contaminant emission rates exceed the SERs, emission control may be necessary.

This document was developed by the Leaking Underground Storage Tank staff for use at petroleum storage tank release sites. It outlines procedures for evaluating air emissions from air strippers and diffusers and describes sampling, analyses, and control requirements.

A. INITIAL SAMPLING

1. Initial Sampling Schedule:

- a) Sampling is not required during pilot testing.
- b) Sample influent and effluent water at the end of first week of operation. The laboratory analyses should be expedited with a two week turn-around time.
- c) Resample at the end of the second week. The laboratory analyses should be expedited with a one week turn-around time.
- d) The stripper system must be shut down after the second sampling event.

2. Analytical Requirements:

- a) If Minnesota Department of Health (MDH) list 465C sampling analysis has not been run on monitoring wells samples, then 465C should be performed on the first round of air stripper influent and effluent samples.
- b) If MDH list 465C sampling analysis has been performed on adjacent monitoring wells or on influent and effluent samples, then air stripper influent and effluent samples need to be analyzed for benzene, ethyl benzene, toluene and total xylenes (BETX) and for other compounds detected during the remedial investigation.

B. EMISSION RATE CALCULATIONS

1. Ground Water Concentration (GC):

Write the influent contaminant concentrations (in micrograms per liter [$\mu\text{g/l}$]) on Form 1, Column A under "Ground Water Concentration." Contact AQ if contaminants are encountered which are not on the form.

2. Stripper Influent Flow Rate (IFR):

- a) For continuously operating systems, the water flow rate through the air stripper must be measured at the time of ground water sampling.
- b) For systems operating cyclically, the average water flow rate over a representative period must be calculated.
- c) Write the flow rate (in liters per second [l/sec]) on Form 1, column B under "Stripper Influent Flow Rate." This value will likely be the same for every entry in the column.

3. Removal Factor (RF):

- a) Compute the removal factor using the following formula:

$$RF = \frac{(\text{influent concentration} - \text{effluent concentration})}{\text{influent concentration}}$$

- b) List the removal factor for each contaminant on Form 1, column C. If the removal factor is not known, use a value 1.0.

4. Emission Rate (ER) Calculation:

- a) Compute the ER for each contaminant using the following formula:

$$ER = GC \times IFR \times RF \text{ or } \text{Column A} \times \text{Column B} \times \text{Column C}$$

- b) Write the ER (in micrograms per second [$\mu\text{g}/\text{sec}$]) on Form 1, Column D under "Emission Rate."

C. REQUIREMENTS FOR AIR TOXIC EMISSION CONTROLS

1. If the ERs all below the SERs, then the stripper system may be restarted immediately without emission control.
2. If the ER for any contaminant is above the SER for both of the initial sampling events, then emission controls are required. SERs for contaminants are given on Form 1, Column E.

If contaminants are encountered for which the SERs are not listed on Form 1 under Column E, AQ should be contacted for the appropriate SER values. Queries should be directed to Paul Gerbec (612/296-7757) or George Bollweg (612/296-7992).

The stripper system must remain shut down until emission controls have been installed.

3. If the ER for any one contaminant is above the SER for just one of the sampling events, the consultant should make a recommendation regarding future actions. The recommendation should be telephoned to the appropriate project manager at the Tanks and Spills Section of the MPCA immediately after receiving the second round of sampling results. The options might include:
 - a) Additional sampling.
 - b) Emissions control installation.

The air stripper must remain shut down until either it is determined that emission controls are not needed or until emission controls are in place.

4. Permissible Emission Control Technology:

Any air emission control device that can be shown to be effective and cost efficient may be acceptable.

D. SYSTEM MONITORING

1. Water Quality Monitoring:

Influent and effluent ground water quality must be sampled on a quarterly basis, regardless of whether air emission control devices are in place. Samples should be analyzed for BETX plus any other contaminants previously detected. The ER for all contaminants must be calculated each quarter from the water quality data. If the ER for any one contaminant is found to be above the SER, see Section C, parts 3-4 above for emissions control criteria.

2. Air Quality Monitoring if Air Emission Controls are In Place:

- a) A minimum of quarterly sampling of post-treatment air emissions is required. If carbon filters are used as the emissions control devices, the rate of consumption must be determined. Air quality samples should be collected from the vent stack at an interval frequent enough to determine when the carbon unit should be replaced.
- b) Air quality samples should be sampled and analyzed using U.S. Environmental Protection Agency method 18 or appropriate method (see Form 2, Column A). Samples should be analyzed for BETX and any other contaminant determined to be present in the ground water. Emission concentrations (ECs) should be written on Form 2, Column B in units of micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

The gas flow rate (GF) through the vent stack should be measured and written on Form 2, Column C in units of cubic meters per second (m^3/sec).

- c) $\text{ER} = \text{EC} \times \text{GF}$. Write this value (in units of $\mu\text{g}/\text{sec}$) on Form 2, Column D.
- d) If post-treatment ECs for any compound are above the SER's (Form 2, Column E), the emission controls must be upgraded.
- e) Emission controls can be removed if the stripper emission rates calculated from influent and effluent ground water samples are below the SER's for two consecutive quarters or if it can be demonstrated that the ER's are consistently below the SER's. The MPCA Tanks and Spills project manager should be notified if emission controls are removed.
- f) If carbon filtration units are used, proper disposal or recycling is required; documentation of disposal/recycling procedures should be included with the annual report.

3. Reporting:

Annual monitoring reports to Tanks and Spills staff of the MPCA are required for all air stripper systems associated with petroleum storage tank sites. The water and air quality data should be included in the annual progress report. (See MPCA Tanks and Spills document "Petroleum Tank Release Reports," May 1991.) The report should include a section discussing the effectiveness of the emission control systems and make recommendations for future site activities. More frequent monitoring reports may be required on a site specific basis.

Form I - Air Stripper Screening Evaluation

Site Name:	Responsible Party Contact	Form completed by:
Address:	Name:	
	Affiliation:	Date form completed:
MPCA Leak #:	Phone #:	

	A	B	C	D	E	
Contaminant (CAS #)	Groundwater Concentration (µg/liter)	Stripper Influent flow rate (liters/sec)	Removal Factor	Emission Rate (µg/sec)	Significant Emission Rate (µg/sec)	Is ER ≥ SER?
	GC	IFR	RF	ER	SER	(yes/no)
benzene (71-43-2)					4,600	
chloroform (67-66-3)					1,600	
dichlorodifluoromethane (75-71-8)					767,200	
1,1-dichloroethane (75-34-3)					1,918,000	
1,2-dichloroethane (107-06-2)					1,500	
1,1-dichloroethylene (75-35-4)					800	
1,2-dichloroethylene (540-59-0)					2,083,900	
dichlorofluoromethane (75-43-4)					105,300	
ethylbenzene (100-41-4)					497,700	
methylene chloride (75-09-2)					80,600	
1,1,2,2-tetrachloroethane (79-34-5)					700	
tetrachloroethylene (127-18-4)					65200	
1,1,1-trichloroethane (71-55-6)					3,835,800	
1,1,2-trichloroethane (79-00-5)					2400	
trichloroethylene (79-01-6)					22600	
trichlorofluoromethane (75-69-4)					2,685,100	
1,1,2 trichlorotrifluoroethane (76-13-1)					20,048,000	
toluene (108-88-3)					429,800	
vinyl chloride (75-01-4)					9,200	
xylene [mixed] (1330-20-7)					497,700	
Other ¹						

¹ Contact MPCA Division of Air Quality Staff (296-7757) regarding any contaminants which are not on this list

Form 2 - Offgas Screening Evaluation

Site Name:	Responsible Party Contact	Form completed by:
Address:	Name:	
	Affiliation:	Date form completed:
MPCA Leak #:	Phone #:	

A		B	C	D	E			
Contaminant (CAS #)	Test Method	Emission Concentration (µg/m³)	Gas flow rate through vent stack (m³/sec)	Emission Rate (µg/sec)	Significant Emission Rate (µg/sec)	Is ER ≥ SER		
		(EC)	X	(GF)	=	(ER)	(SER)	(yes/no)
benzene (71-43-2)	EPA Method 18					4,600		
toluene (108-88-3)	EPA Method 18					429,800		
xylene [mixed] (1330-20-7)	EPA Method 18					497,700		
ethylbenzene (100-41-4)	EPA Method 18					497,700		
chloroform (67-66-3)	see footnote 1					1,600		
dichlorodifluoromethane (75-71-8)	see footnote 1					767,200		
1,1-dichloroethane (75-34-3)	see footnote 1					1,918,000		
1,2-dichloroethane (107-06-2)	see footnote 1					1,500		
1,1-dichloroethylene (75-35-4)	see footnote 1					800		
1,2-dichloroethylene (540-59-0)	see footnote 1					2,083,900		
dichlorofluoromethane (75-43-4)	see footnote 1					105,300		
methylene chloride (75-09-2)	see footnote 1					80,600		
1,1,2,2-tetrachloroethane (79-34-5)	see footnote 1					700		
tetrachloroethylene (127-18-4)	see footnote 1					65,200		
1,1,1-trichloroethane (71-55-6)	see footnote 1					3,835,800		
1,1,2-trichloroethane (79-00-5)	see footnote 1					2,400		
trichloroethylene (79-01-6)	see footnote 1					22,600		
trichlorofluoromethane (75-69-4)	see footnote 1					2,685,100		
1,1,2-trichlorotrifluoroethane (76-13-1)	see footnote 1					20,048,000		
vinyl chloride (75-01-4)	see footnote 1					9,200		
other ¹								

¹ Contact MPCA Division of Air Quality Staff (296-7757) regarding contaminants not on this list, or for test methods other than for BTEX.

Minnesota Pollution Control Agency
Tanks and Spills Section
May 1991

To assess the potential impacts of air emissions from soil venting systems used during contaminated soil remediation, the Air Quality Division (AQ) of the Minnesota Pollution Control Agency (MPCA) has developed significant emission rates (SERs) based on toxicologic information and the characteristics of typical soil venting systems. If contaminant emission rates exceed the SERs, emission controls may be necessary.

This document was developed by the Leaking Underground Storage Tank staff for use at petroleum storage tank release sites. It outlines procedures for evaluating air emissions from soil venting systems and describes sampling, analyses, and control requirements.

A. INITIAL SAMPLING

1. Initial Sampling Schedule:

- a) Sampling is not required during pilot testing.
- b) Sample vent stack within the first 12 hours after start-up (regular laboratory turn-around time).
- c) Resample at seven days after system start-up (the laboratory analyses should be expedited with a two week turn-around time).
- d) Resample at 14 days after system start-up (the laboratory analyses should be expedited with a one week turn-around time).
- e) The soil venting system must be shut down after the third sampling event.

2. Analytical Requirements:

All air samples should be analyzed for benzene, ethyl benzene, toluene, total xylenes (BETX), and for any other compound detected during the remedial investigation. The air samples should be collected and analyzed using U.S. Environmental Protection Agency method 18 (or the appropriate method as shown on Form 2, column A).

B. EMISSION RATE CALCULATIONS

1. Air Emission Concentration (EC):

Write the contaminant concentrations (in micrograms per cubic meter [$\mu\text{g}/\text{m}^3$]) on Form 2, Column B under "Emission Concentration."

2. Gas Flow Rate (GF):

- a) The gas flow rate through the venting stack must be measured at the same time that the vent stack samples are collected.
- b) Write the flow rate (in cubic meters per second [m^3/sec]) on Form 2, Column C under "Gas Flow Rate Through Vent Stack."

3. Emission Rate (ER):

- a) Compute the ER for each contaminant using the following formula:

$$\text{ER} = \text{EC} \times \text{GF or Column B} \times \text{Column C}$$

- b) Write the ER (in micrograms per second [$\mu\text{g}/\text{sec}$]) on Form 2, Column D under "Emission Rate."

REQUIREMENTS FOR AIR TOXIC EMISSION CONTROLS

1. If the ERs for the second and third sampling events are all below the SERs, then the soil venting system may be restarted immediately without emission controls.
2. If the ER for any one contaminant is above the SER for both the second and third sampling event, then emission controls are required. SERs for contaminants are given on Form 2, Column E.

If contaminants are encountered for which the SERs are not listed on Form 2 under Column E, AQ should be contacted for the appropriate SER values. Queries should be directed to Paul Gerbec (612/296-7757) or George Bollveg (612/296-7992).

The soil venting system must remain shut down until emission controls have been installed.

3. If the ER for any one contaminant is above the SER for either the second or third sampling events, the consultant should make a recommendation regarding future actions. The recommendation should be telephoned in to the appropriate project manager at the Tanks and Spills Section of the MPCA immediately after receiving the third round of sampling results. The options might include:
 - a) Additional sampling.
 - b) Emissions control installation.

The soil venting system must remain shut down until either it is determined that emission controls are not needed or until emission controls are in place.

4. Permissible Emission Control Technology:

Any air emission control device that can be shown to be effective and cost efficient may be acceptable (contingent upon MPCA approval).

D. SYSTEM MONITORING

1. Pre-Treatment Air Quality Monitoring:

Pre-treatment soil venting system vent stack samples must be collected on a quarterly basis regardless of whether air emission control devices are necessary. Samples should be analyzed for BETX plus any other contaminants shown to have been present in previous testing. Calculate the emission rates as instructed above. If the ER for any one contaminant is found to be above the SER, see Section C, parts 3-4 for emissions control criteria.

2. Post-Treatment Air Quality Monitoring:

- a) A minimum of quarterly sampling of post-treatment air emissions is required. If carbon filters are used as the emission control devices, the rate of consumption must be determined. Air quality samples should be collected from the post-treatment portion of the vent stack at an interval frequent enough to determine when the carbon unit should be replaced.
- b) The post-treatment air quality samples should be sampled and analyzed using EPA method 18 (or appropriate method). Samples should be analyzed for BETX and for any other contaminant determined to be present. ECs should be written on Form 2 in Column B in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The gas flow rate (GF) through the vent stack GF should be measured and written on Form 2 in Column C in units of cubic meters per second (m^3/sec).
- c) $\text{ER} = \text{EC} \times \text{GF}$. Write this value (in units of $\mu\text{g}/\text{sec}$) on Form 2 in Column D.
- d) If post-treatment ECs for any compound are above the SER's (Form 2, Column E), the emission controls must be upgraded.
- e) Emission controls can be removed if the ERs for all contaminants are below the SER's for two consecutive quarters or if it can be demonstrated that the ER's are consistently below the SER's. The MPCA Tanks and Spills project manager should be notified if emission controls are removed.
- f) If carbon filtration units are used, proper disposal or recycling is required; documentation of disposal/recycling procedures should be included with the progress reports.

3. Reporting:

Annual monitoring reports to Tanks and Spills staff of the MPCA are required for all soil venting systems. The pre-air and post-air treatment data should be included in the annual progress report. (See the MPCA Tanks and Spills guidance document "Petroleum Tank Release Reports", May 1991.) The report should include a section discussing the effectiveness of the emission control system and make recommendations for future site activities. More frequent monitoring reports might be required on a site specific basis.

E. SITES WITH BOTH SOIL VENTING SYSTEMS AND AIR STRIPPER SYSTEMS

1. The need for air toxic emission controls is based upon the total amount contaminants volatilizing from the site. If the added ERs for the soil venting system and the air stripper system are above the SER's for any one contaminant, then air emissions controls are required on one or both of systems so as to reduce total emissions to below the SER's.
2. If the ground water stripper system and the soil venting system are vented through the same venting stack, the necessity for emission controls should be determined using the criteria listed in procedures above.

Form 2 - Off-gas Screening Evaluation

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Address:	Name:	
	Affiliation:	Date form completed:
MPCA Leak #:	Phone #:	

A		B	C	D	E			
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1,1-dichloroethylene (75-35-4)	see footnote 1					800		
1,2-dichloroethylene (540-69-0)	see footnote 1					2,083,900		
dichlorofluoromethane (75-43-4)	see footnote 1					105,300		
methylene chloride (75-09-2)	see footnote 1					80,600		
1,1,2,2-tetrachloroethane (79-34-5)	see footnote 1					700		
tetrachloroethylene (127-18-4)	see footnote 1					65,200		
1,1,1-trichloroethane (71-55-6)	see footnote 1					3,835,800		
1,1,2-trichloroethane (79-00-5)	see footnote 1					2,400		
trichloroethylene (79-01-6)	see footnote 1					22,600		
trichlorofluoromethane (75-69-4)	see footnote 1					2,685,100		
1,1,2-trichlorotrifluoroethane (78-13-1)	see footnote 1					20,040,000		
vinyl chloride (75-01-4)	see footnote 1					9,200		
other ¹								

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