

Municipality/Organization: CITY OF GARDNER

5/7/10

EPA NPDES Permit Number: MA041109

MaDEP Transmittal Number: W-035868

**Annual Report Number
& Reporting Period:** No. 7: April 09-March 10

NPDES PII Small MS4 General Permit Annual Report

Part I. General Information

Contact Person: Robert B. Hankinson

Title: City Engineer

Telephone #: 978-630-4010

Email: rhankinson@gardner-ma.gov

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:



Printed Name: Mark P. Hawke

Title: Mayor, City of Gardner

Date: April 29, 2010

Part II. Self-Assessment

The City of Gardner submits the following report of our progress for the reporting period: May 1, 2009 –April 30, 2010

GENERAL:

The City continues to work toward meeting proposed goals commensurate with staff and financial limitations. A Finding of Violation and Order for Compliance was filed against the City on August 14, 2009, subsequently the schedule for compliance was modified; our attention since that time has been focused on meeting the required deadlines contained within the Order.

SPECIFIC:

The following list represents the submissions required as part of the order:

By November 1, 2009

- Screening results for four downtown outfalls

By January 1, 2010

- Written criteria for deciding whether outfalls require further investigation.

By May 1, 2010

- Map of outfalls (not manholes or catch basins).

By May 1, 2010, and yearly thereafter

- List if IDDE investigations and results.
- List of illicit discharges removed.

By July 1, 2010

- Summary list of outfalls screened and dates of screening, identifying all outfalls with dry-weather flows.

By November 1, 2010 (and following years until sampling is complete)

- Dry-and wet-weather sampling results from the last year.
- List of outfalls requiring further investigation (due to screening or sampling results) and schedules for the investigations.

Conditions of the modified Administrative Order requiring submittals have been met through May 1, 2010. Specifically, by letter dated October 29, 2009, the City submitted a printed and electronic copy of a plan showing city wide mapping of the stormwater system. Additionally the forms for eight outfalls screened prior to November 1, 2009 were included. These forms showed that of the eight outfalls, four had sustained flow, three had no flow and one was buried beneath trap rock at the edge of the Otter River. In compliance with the January 1, 2010 deadline, IDDE criteria for additional investigation of outfalls with flow were included.

Part III. Discussion of Minimum Control Measures:

1. Public Education and Outreach

During the reporting period the City has continued existing public education and outreach measures as reported in the last annual report. No new education or outreach measures were undertaken during the last year.

2. Public Involvement and Participation

The City once again sponsored and volunteers participated in an earth day cleanup day throughout the City; this has become an annual event with support from local public service organizations.

No sponsors have been found for catch basin stenciling. We will continue looking to implement this measure.

3. Illicit Discharge Detection and Elimination

Work continues to implement a sustainable IDDE program. Our outfall mapping has been completed in compliance with EPA's Administrative Order. Work will continue concurrently to complete catch basin identification, piping location and outfall sample testing.

A stronger illicit discharge ordinance has been written and is moving toward acceptance by City Council. This ordinance will make enforcement of illicit connections easier to police.

4. Construction Site Stormwater Runoff Control

Construction site runoff is controlled by an existing subdivision control ordinance and EPA site construction regulations are also monitored. Development has essentially stopped within the City over the past year. Plans are under development for an ordinance for non-subdivision construction activities.

No activities have begun on an education program for runoff and erosion control issues.

5. Post-Construction Stormwater Management in New Development and Redevelopment

This item has been completed; monitoring is done by Conservation, Building and Engineering Departments.

6. Pollution Prevention and Good Housekeeping in Municipal Operations

All BMP's in this item have continued throughout the reporting year. New for this reporting period; two DPW foremen have received off-site training on dealing with hazardous waste in the public works environment with emphasis on recognition and cleanup in stormwater systems.

7. BMPs for Meeting TMDL

Investigation of stream impairment has not taken place over the reporting period. Available resources have been used to complete other tasks; however no local water bodies are on the impaired waters list.

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Illicit Discharge and Connection Stormwater Ordinance

SECTION 1. PURPOSE/INTENT.

The purpose of this ordinance is to provide for the health, safety, and general welfare of the citizens of the City of Gardner through the regulation of non-storm water discharges to the storm drainage system to the maximum extent practicable as required by federal and state law. This ordinance establishes methods for controlling the introduction of pollutants into the municipal separate storm sewer system (MS4) in order to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process. The objectives of this ordinance are:

- (1) To regulate the contribution of pollutants to the municipal separate storm sewer system (MS4) by stormwater discharges by any user
- (2) To prohibit Illicit Connections and Discharges to the municipal separate storm sewer system
- (3) To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this ordinance

SECTION 2. DEFINITIONS.

For the purposes of this ordinance, the following shall mean:

Authorized Enforcement Agency: employees or designees of the director of the municipal agency designated to enforce this ordinance.

Best Management Practices (BMPs): schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act: The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

Hazardous Materials: Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Discharge: Any direct or indirect non-storm water discharge to the storm drain system, except as exempted by this ordinance.

Illicit Connections: An illicit connection is defined as either of the following:

Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the storm drain system including but not limited to any conveyances which allow any non-storm water discharge including sewage, process wastewater, and wash water to enter the storm drain system and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency or,

Any drain or conveyance connected from a commercial or industrial land use to the storm drain system which has not been documented in plans, maps, or equivalent records and approved by an

authorized enforcement agency.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in 40 CFR, Section 122.26 (b)(14).

National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit: A permit issued by EPA (or by a State under authority delegated pursuant to 33 USC § 1342(b)) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Non-Storm Water Discharge: Any discharge to the storm drain system that is not composed entirely of storm water.

Pollutant: Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, ordinances, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Storm Drainage System: Publicly-owned facilities by which storm water is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

Storm Water: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation and resulting from such precipitation.

Wastewater: Any water or other liquid, other than uncontaminated storm water, discharged from a facility.

SECTION 3. APPLICABILITY.

This ordinance shall apply to all water entering the storm drain system generated on any developed and undeveloped lands unless explicitly exempted by an authorized enforcement agency.

SECTION 4. RESPONSIBILITY FOR ADMINISTRATION.

The Engineering Department shall administer, implement, and enforce the provisions of this ordinance. Any powers granted or duties imposed upon the authorized enforcement agency may be delegated in writing by the Director of the authorized enforcement agency to persons or entities acting in the beneficial interest of or in the employ of the agency.

SECTION 5. SEVERABILITY.

The provisions of this ordinance are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this Ordinance or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this Ordinance.

SECTION 6. ULTIMATE RESPONSIBILITY.

The standards set forth herein and promulgated pursuant to this ordinance are minimum standards; therefore this ordinance does not intend nor imply that compliance by any person will ensure that there will be no contamination, pollution, nor unauthorized discharge of pollutants.

SECTION 7. DISCHARGE PROHIBITIONS.

Prohibition of Illegal Discharges.

No person shall discharge or cause to be discharged into the municipal storm drain system or watercourses any materials, including but not limited to pollutants or waters containing any pollutants that cause or contribute to a violation of applicable water quality standards, other than storm water.

The commencement, conduct or continuance of any illegal discharge to the storm drain system is prohibited except as described as follows:

- (a) Discharges specified in writing by the authorized enforcement agency as being necessary to protect public health and safety.
- (b) Dye testing is an allowable discharge, but requires a verbal notification to the authorized enforcement agency
- (c) The prohibition shall not apply to any non-storm water discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

Prohibition of Illicit Connections.

- (a) The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited.
- (b) This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.
- (c) A person is considered to be in violation of this ordinance if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

SECTION 8. SUSPENSION OF MS4 ACCESS.

Suspension due to Illicit Discharges in Emergency Situations

The Engineering Department may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, or to the health or welfare of persons, or to the MS4 or Waters of the United States. If the violator fails to comply with a suspension order issued in an emergency, the authorized enforcement agency may take such steps as deemed necessary to prevent or minimize damage to the MS4 or Waters of the United States, or to minimize danger to persons.

Suspension due to the Detection of Illicit Discharge

Any person discharging to the MS4 in violation of this ordinance may have their MS4 access terminated if such termination would abate or reduce an illicit discharge. The authorized enforcement agency will notify a violator of the proposed termination of its MS4 access. The violator may petition the authorized enforcement agency for a reconsideration and hearing.

A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this Section, without the prior approval of the authorized enforcement agency.

SECTION 9. INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES.

Any person subject to an industrial or construction activity NPDES storm water discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Engineering Department prior to the allowing of discharges to the MS4.

SECTION 10. MONITORING OF DISCHARGES

A. Applicability.

This section applies to all facilities that have storm water discharges associated with industrial activity, including construction activity.

B. Access to Facilities.

- (a) The Engineering Department shall be permitted to enter and inspect facilities subject to regulation under this ordinance as often as may be necessary to determine compliance with this ordinance. The facility owner/operator shall make the necessary arrangements to allow access to representatives of the authorized enforcement agency.
- (b) Facility operators shall allow the Engineering Department ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records that must be kept under the conditions of an NPDES permit to discharge storm water, and the performance of any additional duties as defined by state and federal law.
- (c) The Engineering Department shall have the right to set up on any permitted facility such devices as are necessary in the opinion of the authorized enforcement agency to conduct monitoring and/or sampling of the facility's storm water discharge.
- (d) The Engineering Department has the right to require the discharger to install monitoring equipment as necessary. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.
- (e) Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the operator at the written or oral request of the Engineering Department and shall not be replaced. The costs of clearing such access shall be borne by the operator.
- (f) Unreasonable delays in allowing the Engineering Department access to a permitted facility is a violation of a storm water discharge permit and of this ordinance. A person who is the operator of a facility with a NPDES permit to discharge storm water associated with industrial activity commits an offense if the person denies the authorized enforcement agency reasonable access to the permitted facility for the purpose of conducting any activity authorized or required by this ordinance.

- (g) If the Engineering Department has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this ordinance, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this ordinance or any order issued hereunder, or to protect the overall public health, safety, and welfare of the community, then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction.

SECTION 11. REQUIREMENT TO PREVENT, CONTROL, AND REDUCE STORM WATER POLLUTANTS BY THE USE OF BEST MANAGEMENT PRACTICES.

The Engineering Department will adopt requirements identifying Best Management Practices for any activity, operation, or facility which may cause or contribute to pollution or contamination of storm water, the storm drain system, or waters of the U.S. The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the municipal storm drain system or watercourses through the use of these structural and non-structural BMPs. Further, any person responsible for a property or premise, which is, or may be, the source of an illicit discharge, may be required to implement, at said person's expense, additional structural and non-structural BMPs to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the discharge of storm water associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section. These BMPs shall be part of a stormwater pollution prevention plan (SWPP) as necessary for compliance with requirements of the NPDES permit.

SECTION 12. WATERCOURSE PROTECTION.

Every person owning property through which a watercourse passes, or such person's lessee, shall keep and maintain that part of the watercourse within the property free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or significantly retard the flow of water through the watercourse. In addition, the owner or lessee shall maintain existing privately owned structures within or adjacent to a watercourse, so that such structures will not become a hazard to the use, function, or physical integrity of the watercourse.

SECTION 13. NOTIFICATION OF SPILLS.

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into storm water, the storm drain system, or water of the U.S. said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the authorized enforcement agency in person or by phone or facsimile no later than the next business day. Notifications in person or by phone shall be

confirmed by written notice addressed and mailed to the Engineering Department of the City of Gardner within three business days of the phone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

SECTION 14. ENFORCEMENT.

A. Notice of Violation.

Whenever the Engineering Department finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, the authorized enforcement agency may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

- (a) The performance of monitoring, analyses, and reporting;
- (b) The elimination of illicit connections or discharges;
- (c) That violating discharges, practices, or operations shall cease and desist;
- (d) The abatement or remediation of storm water pollution or contamination hazards and the restoration of any affected property; and
- (e) Payment of a fine to cover administrative and remediation costs; and
- (f) The implementation of source control or treatment BMPs.

If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

SECTION 15. APPEAL OF NOTICE OF VIOLATION

Any person receiving a Notice of Violation may appeal the determination of the authorized enforcement agency. The notice of appeal must be received within 15 days from the date of the Notice of Violation. Hearing on the appeal before the appropriate authority or his/her designee shall take place within 15 days from the date of receipt of the notice of appeal. The decision of the municipal authority or their designee shall be final.

SECTION 16. ENFORCEMENT MEASURES AFTER APPEAL

If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or, in the event of an appeal, within 15 days of the decision of the municipal authority upholding the decision of the authorized enforcement agency, then representatives of the authorized enforcement agency shall enter upon the subject private property and are authorized to take any and all measures necessary to abate the violation and/or restore the property. It shall be unlawful for any person, owner, agent or person in possession of any premises to refuse to allow the government agency or designated contractor to enter upon the premises for the purposes set forth above.

SECTION 17. COST OF ABATEMENT OF THE VIOLATION

Within 30 days after abatement of the violation, the owner of the property will be notified of the cost of abatement, including administrative costs. The property owner may file a written protest objecting to the amount of the assessment within 15 days. If the amount due is not paid within a timely manner as determined by the decision of the municipal authority or by the expiration of the time in which to file an appeal, the charges shall become a special assessment against the property and shall constitute a lien on the property for the amount of the assessment.

SECTION 18. INJUNCTIVE RELIEF

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this Ordinance. If a person has violated or continues to violate the provisions of this ordinance, the authorized enforcement agency may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

SECTION 19. COMPENSATORY ACTION

In lieu of enforcement proceedings, penalties, and remedies authorized by this Ordinance, the authorized enforcement agency may impose upon a violator alternative compensatory action/s, such as storm drain stenciling, attendance at compliance workshops, stream cleanup, etc.

SECTION 20. VIOLATIONS DEEMED A PUBLIC NUISANCE

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this Ordinance is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

SECTION 21. CRIMINAL PROSECUTION

Any person that has violated or continues to violate this ordinance shall be liable to criminal prosecution to the fullest extent of the law, and shall be subject to a criminal penalty of \$100.00 dollars per violation per day.

The authorized enforcement agency may recover all attorney's fees court costs and other expenses associated with enforcement of this ordinance, including sampling and monitoring expenses.

SECTION 22. REMEDIES NOT EXCLUSIVE

The remedies listed in this ordinance are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the authorized enforcement agency to seek cumulative remedies.

SECTION 23. ADOPTION OF ORDINANCE

This ordinance shall be in full force and effect 14 days after its final passage and adoption. All prior ordinances and parts of ordinances in conflict with this ordinance are hereby repealed.

Gardner, Massachusetts Illicit Discharge Detection & Elimination (IDDE) Protocol

Purpose

This document provides a common framework for EPA New England ("EPA-NE") communities to develop and implement a comprehensive plan to identify and eliminate dry and wet weather illicit discharges to their separate storm sewer systems.

Adopted from BWSC (2004), Pitt (2004), and based upon fieldwork conducted and data collected by EPA-NE, the protocol relies primarily on visual observations and the use of field test kits and portable instrumentation during dry weather to complete a thorough inspection of the communities' storm sewers in a prioritized manner. The protocol is applicable to most typical storm sewer systems, however modifications to materials and methods may be required to address situations such as open channels, systems impacted by sanitary sewer overflows or sanitary sewer system under drains, or situations where groundwater or backwater conditions preclude adequate inspection. The primary focus of the protocol is sanitary waste, however, toxic and nuisance discharges may also be identified. EPA has established the protocol as the expected standard of practice for EPA-NE communities.

Implementation of the protocol will assist in compliance with the Illicit Discharge Detection and Elimination ("IDDE") provisions of the NPDES Small MS4 General Permit.

Introduction

The protocol is structured into several phases of work that progress logically through elements of mapping, prioritization, investigation, removal, verification, and monitoring. Each community should assess their current IDDE Program and identify where it has or has not successfully satisfied the elements of the protocol. In modifying their IDDE Programs to become consistent with the protocol, communities may need to refine particular elements or phases of the protocol to accommodate their institutional constraints or preferences. Regardless, the rigor and comprehensive nature of the protocol must remain unchanged.

Step I - Mapping

The goal of the requisite mapping is the comprehensive depiction of key infrastructure and factors influencing proper system operation and the potential for inappropriate sanitary sewer discharges. The required scale, detail, and number of maps should be appropriate to facilitate a rapid understanding of the system by the municipality and regulators, serve as a planning tool for the implementation and phasing of investigations, and demonstrate the extent of completed and planned investigations and corrections, and other related capital projects. Further, municipal representatives, community members, or regulatory personnel must be able, using a publicly available version of the map, to locate and identify all stormwater outfalls in the field with reasonable effort. To ensure legible mapping, information should be grouped appropriately and represented thematically (e.g. by color) with legends or schedules where possible. Mapping should be updated as necessary to reflect newly discovered information, corrections or modifications, and progress made. The following information and features should be considered for inclusion in the mapping:

investigations (see Par 5. below), tributary area delineations should be confirmed and junction manholes should be identified during this process. Orthophotographic coverages (available from previous engineering studies and such sources as MassGIS,) will also facilitate investigations by providing building locations and land use features.

3. Infrastructure cleaning requirements

To facilitate investigations, storm drain infrastructure should be evaluated for the need to be cleaned to remove debris or blockages that could compromise investigations. Such material should be removed to the extent possible prior to investigations, however, some cleaning may occur concurrently as problems manifest themselves.

4. Dry weather criteria

In order to limit or remove the influence of stormwater generated flows on the monitoring program, antecedent dry weather criteria need to be established. An often used metric is to sample when no more than 0.1 inches of rainfall have occurred in the previous 24-hour period; however, exact language in the applicable permit should be verified.

5. Manhole inspection and flow monitoring methodology

Beginning at the uppermost junction manhole(s) within each tributary area, drainage manholes are opened and inspected for visual evidence of contamination after antecedent dry weather conditions are satisfied (e.g. after 48 hours of dry weather). Where flow is observed, and determined to be contaminated through visual observation (e.g. excrement or toilet paper present) or field monitoring (see Par 6. below), the tributary storm sewer alignment is isolated for investigation (e.g. dye testing, CCTV; see Par 7. below). No additional downstream manhole inspections are performed unless the observed flow is determined to be uncontaminated or until all upstream illicit connections are identified and removed. Where flow is not observed in a junction manhole, all inlets to the structure are partially dammed for the next 48 hours when no precipitation is forecasted. Inlets are dammed by blocking a minimal percentage (approximately 20% +/- depending on pipe slope) of the pipe diameter at the invert using sandbags, caulking, weirs/plates, or other temporary barriers. The manholes are thereafter reinspected (prior to any precipitation or snow melt) for the capture of periodic or intermittent flows behind any of the inlet dams. The same visual observations and field testing is completed on any captured flow, and where contamination is identified, abatement is completed prior to inspecting downstream manholes.

In addition to documenting investigative efforts in written and photographic form, it is recommended that information and observations regarding the construction, condition, and operation of the structures also be compiled.

6. Field Measurement/ Analysis:

Where flow is observed in the manhole and does not demonstrate obvious olfactory evidence of contamination, samples are collected and analyzed with field instruments identified in Table 1. Measured values are then compared with benchmark values in Table 1 or by using the flow chart in Figure 1 to determine the likely prominent source of the flow. This information facilitates the investigation of the upstream stormsewer alignment described in Part 7. Benchmark values may be refined over the course of investigations when compared with the actual incidences of observed flow sources. Concurrent sampling and analysis of conventional indicator organism (e.g. *E. coli* enterococcus) densities at all or a subset of the same structures will assist greatly in the identification of potentially significant sources of illicit contributions.

In those manholes where periodic or intermittent flow is captured through damming inlets, additional laboratory testing (e.g. toxicity, metals, etc.) should be considered where an industrial batch discharge is suspected for example.

7. Isolation and confirmation of illicit sources

Where field monitoring has identified storm sewer alignments to be influenced by sanitary flows or washwaters, the tributary area is isolated for implementation of more detailed investigations. Additional manholes along the tributary alignment are inspected to refine the longitudinal location of potential contamination sources (e.g. individual or blocks of homes). Targeted internal plumbing inspections/dye testing or CCTV inspections are then employed to more efficiently confirm discrete flow sources.

8. Post-Removal confirmation

After completing the removal of illicit discharges from a sub-catchment area and before beginning the investigation of downstream areas, the sub-catchment area is reinspected to verify corrections. Depending on the extent and timing of corrections, verification monitoring can be done at the initial junction manhole or the closest downstream manhole to each correction. Verification is accomplished by using the same visual inspection, field monitoring, and damming techniques as described above.

Since verification of illicit discharges removals is required prior to progressing downstream through the storm sewer system, consideration must be given to providing adequate staffing and equipment resources to initiate investigations in other subareas to facilitate progress while awaiting completion of corrections.

Table 1- Freshwater Water Quality Criteria, Benchmark levels of other indicators, and available field instrumentation

Step IV - Outfall Monitoring

Upon conclusion of investigations and removal of identified illicit discharges, municipalities should measure program success and compliance with bacteriological water quality standards through initiation of a regular outfall monitoring program. In addition to supporting the confirmation of successful removal of illicit discharges identified during Phase III, ongoing monitoring can facilitate discovery of new illicit discharges as they occur as a result of redevelopment, infrastructure deterioration, or otherwise.

Municipalities should design and implement their program to monitor all stormwater outfalls on an annual basis during dry and wet weather conditions. EPA recommends analyzing grab samples for either E.coli or enterococcus as appropriate, in addition to surfactants, and ammonia. Water quality criteria for these indicators are provided in Table 1. Outfalls that exhibit substantially elevated densities of indicator organisms should be reinvestigated using the IDDE Protocol. Obviously, elevated densities of indicator organisms combined with elevated levels of ammonia or surfactants, or both, significantly increase confidence in the suspected source and greatly assist in prioritizing outfalls for further study.

Program Evaluation

The success and progress of a municipality's IDDE program can be represented by improvements in receiving water quality. Progress and success of the program can also be evaluated by tracking a variety of metrics including:

- Percentage of manholes/structures inspected
- Percentage of outfalls screened

- Percentage of home plumbing inspections/dye tests completed
- Percentage of pipe inspected by CCTV
- Number (and relative percentage) of illicit discharges identified through: visual inspections; field testing results; and temporary damming procedures
- Number of illicit discharges removed
- Cost of illicit discharge removals (total and average unit cost)
- Estimated flow or volume of illicit discharges removed
- Estimated flow or volume of inflow / infiltration removed
- Percentage of infrastructure jetting/cleaning completed
- Infrastructure defects identified or repaired
- Number and estimated flow of water main breaks identified or repaired

References Cited

Boston Water & Sewer Commission, 2004 A systematic Methodology for the Identification and Remediation of Illegal Connections. 2003 Stormwater Management Report, chap. 2.1.

Pitt, R. 2004 Methods for Detection of Inappropriate Discharge to Storm Drain Systems. Internal Project Files. Tuscaloosa, AL in The Center for Watershed Protection and Pitt, R., Illicit Discharge Detection and Elimination: A' Guidance Manual for Program Development and Technical Assessments: Cooperative Agreement X82907801- , U. S. Environmental Protection Agency, variously paged. Available at: <http://www.cwp.org>.

Instrumentation Cited (Manufacturer URLs)

MBAS Test Kit - CHEMetrics K-9400: <http://www.chemetrics.com/products/IDeterg.htm>

Portable Photometer - CHEMetrics V-2000: <http://www.chemetrics.com/lv2000.htm>

Portable Colorimeter - Hach DR/890: <http://www.hach.com/>

Portable Ion Meter: Horiba Cardy C- 131: <http://www.wq.hii.horiba.com/lc.htm>

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