2. BACKGROUND FOR STORM WATER SAMPLING

This chapter presents background information, definitions, and a description of the fundamentals of sampling. Specifically, it covers the following areas:

- The benefits of sampling
- A summary of storm water application regulations
- Who must sample
- When sampling is required
- Where to sample
- Staffing considerations

In response to the 1987 Water Quality Act amendments to the CWA, EPA published the storm water final rule on November 16, 1990. In this rule, EPA established the initial scope of the storm water program by defining the phrase "storm water discharge associated with industrial activity" in terms of 11 categories of industrial activity and the phrase "large and medium municipal separate storm sewer systems" to include municipal systems serving a population greater than 100,000. These terms are discussed in greater detail in Section 2.6, "Who Must Sample."

In addition to defining the initial scope of the storm water program, the final rule established permit application requirements, including requirements for storm water sampling. Sampling data gathered for the application will be used to characterize storm water discharges, and will serve as a basis for establishing requirements in NPDES storm water permits. It is important to note that the applicant must report data that are representative of the storm water discharge, and that the intentional misrepresentation of discharge characteristics is unlawful.

2.1 BENEFITS OF SAMPLING

Data that characterize storm water discharges are valuable to permitting authorities and permittees for several reasons. First, storm water sampling provides a means for evaluating the environmental risk of the storm water discharge by identifying the types and amounts of pollutants present. Evaluating these data helps to determine the relative potential for the storm water discharge to contribute to water quality impacts or water quality standard violations. And, storm water sampling data can be used to identify potential

sources of pollutants. These sources can then be either eliminated or controlled more specifically by the permit.

2.2 INDUSTRIAL FACILITY APPLICATION REQUIREMENTS

The storm water permit application regulations provide operators of facilities (including those owned by the government) that have storm water discharges associated with industrial activity with three application options: (1) submit an individual application; (2) participate in a group application (a two-part application); or (3) submit a Notice of Intent (NOI) to be covered by a general permit where general permits are available. This guidance focuses on sampling requirements for individual applications and Part 2 of group applications. Sampling data generally will not be required for an NOI, however, the general permit may require sampling during the term of the permit. State permitting authorities may also require sampling information for an NOI at their discretion, and should, therefore, be consulted prior to submittal.

Industrial facilities submitting individual applications must submit sampling data on a completed application Form 2F (entitled "Application for Permit to Discharge Storm Water Discharges Associated with Industrial Activity"). Facilities selected to be part of the sampling subgroup for a group application must submit sampling data with Part 2 of the application. Members of the sampling subgroup must complete only the quantitative data portions of Form 2F, including Sections VII, VIII, IX, and the certification in Section X. Exhibit 2-1 details the types of information required for each section of Form 2F. Exhibit 2-2 describes what sampling information must be provided in Part 2 of the group application. It should be noted that States may require the use of different forms and submittal of additional documentation.

EXHIBIT 2-1. FORM 2F APPLICATION REQUIREMENTS

Section	Requirement
2F-I	Outfall location(s), including longitude and latitude and receiving water(s)
2F-II	Facility improvements which may affect the discharges described in the application
2F-III	Site drainage map
2F-IVA	Estimates of impervious area within each outfall drainage area
2F-IVB	A narrative description of pollutant sources (i.e., onsite materials which may come in contact with storm water runoff)
2F-IVC	Location and description of existing structural and nonstructural pollutant control measures
2F-VA	Certification that outfalls have been tested or evaluated for non-storm water discharges
2F-VB	Description of method used for testing/evaluating presence of non-storm water discharges
2F-VI	History of significant leaks or spills of toxic or hazardous pollutants at the facility within the last 3 years
2F-VII	Discharge characterization for all required pollutants
2F-VIII	Statement of whether biological testing for acute or chronic toxicity was performed and list of pollutants it was performed for
2F-IX	Information on contract laboratories or consulting firms
2F-X	Certification that information supplied is accurate and complete

Note: See Form 2F and the instructions for more detail on application requirements.

EXHIBIT 2-2. PART 2 GROUP APPLICATION SAMPLING REQUIREMENTS

Quantitative Testing Data

- For groups with 4 to 20 members, 50 percent of the facilities must submit data; for groups with 21 to 99 members, a minimum of 10 dischargers must submit quantitative data; for groups with 100 to 1,000 members, a minimum of 10 percent of the facilities must submit data; for groups with greater than 1,000 members, no more than 100 facilities must submit data; there must be 2 dischargers from each precipitation zone in which 10 or more members of the group are located, or 1 discharger from each precipitation zone in which 9 or fewer members are located.

- Sampling and analysis requirements are described in 40 Code of Federal Regulations (CFR) 122.26(c)(1)(i)(E) and 40 CFR 122.21(g)(7). Pollutants to be analyzed depend on the type(s) of industries applying as a group.

- Sampling subgroup must provide all quantitative discharge information required in Form 2F Sections VII-IX plus the certification in Section X.

- The group application sampling subgroup must collect grab samples during the first 30 minutes of the storm event and flow-weighted composite samples as required in 40 CFR 122.21(g)(7).

Form 1 must also be submitted with Form 2F by applicants submitting individual permit applications. General information about the facility is provided on Form 1 (i.e., addresses, operators, etc.); it does not request sampling data. Forms 1 and 2F are reproduced in Technical Appendix A.

Facilities with unpermitted combined discharges of storm water and process or nonprocess wastewater must submit Form 2C or 2E, respectively, in addition to Forms 1 and 2F. Facilities with storm water discharges combined with new sources or new discharges of process wastewater must submit Form 2D as well as Forms 1 and 2F.

2.3 MUNICIPALITIES' APPLICATION REQUIREMENTS

Operators of large and medium municipal separate storm sewer systems are required to submit a two-part application. Both parts contain sampling requirements: Part 1 requires information characterizing discharges from the separate storm sewer system, including field screening sample data for identifying illicit/illegal connections; Part 2 requires sampling at representative locations and estimates of pollutant loadings for those sites. These sampling data are to be used to design a long-term storm water monitoring plan that will be implemented during the term of the permit. The sampling data that must be submitted in

EXHIBIT 2-3. MUNICIPAL APPLICATION SAMPLING REQUIREMENTS

Part 1

- Monthly mean rainfall and snowfall estimates
- Existing quantitative data on the depth and quality of storm water discharges
- A list of receiving water bodies and existing information concerning known water quality impacts
- Field screening analysis for illicit connections and illegal dumping
- Identification of representative outfalls for further sampling in Part 2

Part 2

- Quantitative data from 5 to 10 representative locations in approved sampling plans
- Estimates of the annual pollutant load and event mean concentration (EMC) of system discharges
- Proposed schedule to provide estimates of seasonal pollutant loads and the EMC for certain detected constituents in a representative storm event during the term of the permit
- Proposed monitoring program for representative data collection during the term of the permit

Parts 1 and 2 of municipal applications are listed in Exhibit 2-3. There is no standard application form for municipalities.

EXHIBIT 2-4. PERMIT APPLICATION SUBMISSION DEADLINES

	Date	Sampling Requirement
Industrial		
Individual	October 1, 1992	Sampling data due
Group		
• Part 1	September 30, 1991	Sampling subgroup identified
• Part 2	October 1, 1992	Sampling data due
Municipal		
Large Municipalities		
• Part 1	November 18, 1991	Illicit connection screening due and identification of sampling points
• Part 2	November 16, 1992	Effluent characterization due Monitoring management program identified
Medium Municipalities		
• Part 1	May 18, 1992	Illicit connection screening due and identification of sampling points
• Part 2	May 17, 1993	Effluent characterization due Monitoring management program identified

*NOI under a general permit is due on October 1, 1992 or the date specified in the permit, whichever comes first.

2.4 APPLICATION SUBMITTAL DEADLINES

Deadlines for submitting permit applications and associated sampling requirements are presented in Exhibit 2-4 for individual and group industrial applications and for municipal applications.

2.5 WHERE TO SUBMIT APPLICATIONS

Storm water discharge permit applications are generally submitted directly to the permit-issuing authority. The appropriate authority is the State, where the State has been granted the authority to issue NPDES permits, or the EPA Regional office, where the State does not have NPDES authorization. Exhibit 2-5

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact	State	Permitting Authority	Contact
Alabama	yes	Aubrey White Water Division 1751 Dickinson Dr. Montgomery, AL 36130 (205) 271-7811	Alaska	no	Steve Bubnick U.S. EPA Region 10 1200 6th Ave. WD-134 Seattle, WA 98101 (206) 553-8399
Arizona	no	Eugene Bromley U.S. EPA Region 9 75 Hawthorne St. W-5-1 San Francisco, CA 94105 (415) 744-1906	Arkansas	yes	Marysia Jastrzebski 8001 National Dr. P.O. Box 8913 Little Rock, AR 72219-8913 (501) 562-7444
California	yes	Archie Matthews Storm Water Research Control Board Water Quality 901 P St. Sacramento, CA 95814 (916) 657-1110	Colorado	yes	Patricia Nelson Dept. of Health Water Quality Control 4210 E. 11th Ave. Denver, CO 80220 (303) 331-4590
Connecticut	yes	Dick Mason Dept. of Environmental Protection Water Management Bureau Water Discharge Management 165 Capitol Ave. Hartford, CT 06106 (203) 566-7167	Delaware	yes	Sarah Cooksey Dept. of Natural Resources Surface Water Management 89 Kings Highway P.O. Box 1401 Dover, DE 19903 (302) 739-5731
Florida	no	Chris Thomas U.S. EPA Region 4 345 Courtland St. N.E. 4WM-FP Atlanta, GA 30365 (404) 347-3633	Georgia	yes	Mike Creason Dept. of Natural Resources Environmental Protection 205 Butler St. S.E. Room 1070 Atlanta, GA 30334 (404) 656-4887
Hawaii	yes	Steve Chang Dept. of Health Clean Water Branch Five Water Front Plaza #500 Ala-Moana Blvd. Honolulu, HI 96813 (808) 586-4309	Idaho	no	Steve Bubnick U.S. EPA Region 10 1200 6th Ave. WD-134 Seattle, WA 98101 (206) 553-8399
Illinois	yes	Tim Kluge EPA Water Pollution Control 2200 Churchill Rd. P.O. Box 19276 Springfield, IL 62794-9276 (217) 782-0610	Indiana	yes	Lonnie Brumfield Dept. of Environmental Management NPDES Permits Group 105 S. Meridian St. P.O. Box 6015 Indianapolis, IN 46206 (317) 232-8705
Iowa	yes	Monica Wnuk Department of Natural Resources Wallace State Building 900 E. Grand St. Des Moines, IA 50319-0034 (515) 281-7017	Kansas	yes	Don Carlson Dept. of Environment Water Bureau Forbes Field, Building 740 Topeka, KS 66620 (913) 296-5555

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact
Kentucky	yes	Douglas Allgeier Dept. of Environmental Protection Water Division 18 Reilly Road Frankfort, KY 40601 (502) 564-3410
Maine	no	Shelley Puleo U.S. EPA Region 1 U.S. EPA/JFK Building/WCP Boston, MA 02203 (617) 565-3525
Massachusetts	no	Shelley Puleo U.S. EPA Region 1 U.S. EPA/JFK Building/WCP Boston, MA 02203 (617) 565-3525
Minnesota	yes	Scott Thompson Pollution Control Agency 520 Lafayette Rd. St. Paul, MN 55155-3898 (612) 296-7203
Missouri	yes	Bob Hentges Dept. of Natural Resources Water Pollution Control Program 205 Jefferson St. P.O. Box 176 Jefferson City, MO 65102 (314) 751-6825
Nebraska	yes	Clark Smith Environmental Control Water Quality Division P.O. Box 98922 Lincoln, NE 68509 (402) 471-4239
New Hampshire	no	Shelley Puleo U.S. EPA Region 1 U.S. EPA/JFK Building/WCP Boston, MA 02203 (617) 565-3525
New Mexico	no	Brent Larson U.S. EPA Region 6 1445 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Louisiana	no	Brent Larson U.S. EPA Region 6 1455 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Maryland	yes	Edward Gertler MD Dept. of Environment Industrial Discharge Program 2500 Broening Highway Baltimore, MD 21224 (410) 631-3323
Michigan	yes	Gary Boersen Dept. of Natural Resources Surface Water Division P.O. Box 30028 Lansing, MI 48909 (517) 373-1982
Mississippi	yes	Jerry Cain Dept. of Environmental Quality Office of Pollution Control Industrial Waste Water Branch P.O. Box 10385 Jackson, MS 39289-0385 (601) 961-5171
Montana	yes	Fred Shewman Water Quality Bureau Cogswell Building Helena, MT 59620 (406) 444-2406
Nevada	yes	Rob Saunders Conservation and Natural Resources Environmental Protection 123 W. Nye Lane Carson City, NV 89710 (702) 687-4670
New Jersey	yes	Sandra Cohen NJ DEPE Office of Regulatory Policy CN029 Trenton, NJ 08625-0029 NJ Hotline: (609) 633-7021
New York	yes	Ken Stevens Wastewater Facilities Design NY State DEC 50 Wolf Road Albany, NY 12233 (518) 457-1157

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact
North Carolina	yes	Coleen Sullins Environmental Management Water Quality Planning P.O. Box 29535 Raleigh, NC 27626-0535 (919) 733-5083
Ohio	yes	Bob Phelps OEPA Water Pollution Control P.O. Box 1049 1800 Watermark Columbus, OH 43266 (614) 644-2034
Oregon	yes	Ranei Nomura DEQ-Water Quality 811 SW 6th St. Portland, OR 97204 (503) 229-5256
Puerto Rico	no	José Rivera U.S. EPA Region 2 Water Permits & Compliance Branch 26 Federal Plaza, Room 845 New York, NY 10278 (212) 264-2911
South Carolina	yes	Birgot McDade Dept. of Health & Env. Ctrl. Industry and Agriculture Waste Water Division 2600 Bull St. Columbia, SC 29201 (803) 734-5241
Tennessee	yes	Robert Haley Dept. of Environment Water Pollution Control 150 9th Ave. N., 4th Floor Nashville, TN 37243-1534 (615) 741-2275
Utah	yes	Harry Campbell Dept. of Environmental Quality P.O. Box 16690 Salt Lake City, UT 84116 (801) 538-6146
North Dakota	yes	Sheila McClenathan Dept. of Health Water Quality Division 1200 Missouri Ave. P.O. Box 5520 Bismarck, ND 58502-5520 (701) 221-5210
Oklahoma	no	Brent Larson U.S. EPA Region 6 1445 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Pennsylvania	yes	R.B. Patel Environmental Resources Water Quality Management P.O. Box 2063 Harrisburg, PA 17120 (717) 787-8184
Rhode Island	yes	Angela Liberti Division of Water Resources 291 Promenade St. Providence, RI 02908 (401) 277-6519
South Dakota	no	Vern Berry U.S. EPA Region 8 999 18th St. 8-WM-C Denver, CO 80202-2466 (303) 293-1630
Texas	no	Brent Larson U.S. EPA Region 6 1445 Ross Ave. 6W-PM Dallas, TX 75202 (214) 655-7175
Vermont	yes	Brian Koiker Environmental Conservation Permits and Compliance 103 S. Main St. Annex Building Waterbury, VT 05671-0405 (802) 244-5674

EXHIBIT 2-5. NPDES STORM WATER PROGRAM PERMITTING AUTHORITIES (Continued)

State	Permitting Authority	Contact
Virgin Islands	yes	Marc Pacifico Dept. of Planning & Natural Resources 1118 Watergut Project Christiansted St. Croix, VI 00820-5065 (809) 773-0565
Washington	yes	Gary Kruger Dept. of Ecology Water Quality Division P.O. Box 47600 Olympia, WA 98504-7600 (206) 438-7529
West Virginia	yes	Jerry Ray Division of Water Resources 1201 Greenbriar St. Charleston, WV 25311 (304) 348-0375
Wyoming	yes	John Wagner Dept. of Environmental Quality Herschler Building, 4th Floor Cheyenne, WY 82002 (307) 777-7082
Virginia	yes	Burton Tuxford Water Control Board Permits Section P.O. Box 11143 Richmond, VA 23230-1143 (804) 527-5083
Washington D.C.	no	Kevin Magerr U.S. EPA Region 3 841 Chestnut Bldg. 3WM53 Philadelphia, PA 19107 (215) 597-1651
Wisconsin	yes	Anne Mauel Dept. of Natural Resources Wastewater Management P.O. Box 7921 Madison, WI 53707 (608) 267-7364

indicates which States have approved NPDES permitting programs. It also provides contact names and addresses where applications should be submitted for each State or EPA Regional Office (depending on who the permitting authority is in each case). It should be noted, however, that both parts of a group application must instead be submitted to EPA Headquarters. Group applications must be sent to: Director, Office of Wastewater Enforcement and Compliance, Attention Mr. William Swietlik, U.S. EPA, EN-336, 401 M Street, SW, Washington, DC 20640.

Applications submitted by industrial facilities must be certified by a responsible corporate officer as described in 40 CFR 122.22 (e.g., president, secretary, treasurer, vice president of the corporation in charge of a principal business function). Applications submitted by municipalities must be certified by a principal executive officer or ranking elected official as described in 40 CFR 122.22.

2.6 WHO MUST SAMPLE

Operators of facilities that have storm water discharges associated with industrial activity and operators of large and medium municipalities are required to conduct storm water sampling as part of their NPDES

permit applications. Specifically, the following types of industries and municipalities must sample storm water discharges:

- Storm Water Discharges Associated With Industrial Activities - Under Phase I, the storm water permit application regulations identify, by Standard Industrial Classification (SIC) code and narrative description, 11 categories of facilities considered to be "engaging in industrial activity" for the purposes of storm water permit application requirements. Those facilities included in 40 CFR 122.26(b)(14)(i) through (xi) of the storm water permit application regulations with storm water point source discharges to waters of the U.S. or separate storm sewers and those designated under Section 402(p)(2)(E) of the CWA are required to apply for storm water permit coverage by October 1, 1992. Industrial facilities include those that are Federally, State, or municipally owned or operated. Exhibit 2-6

EXHIBIT 2-6. INDUSTRIAL FACILITIES WHICH MUST SUBMIT APPLICATIONS FOR STORM WATER PERMITS

40 CFR 122.26(b)(14) Subpart	Description
(i)	Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutants effluent standards under 40 CFR, Subchapter N [except facilities which are exempt under category (xi)].
(ii)	Facilities classified as: SIC 24 (except 2434) . . . . Lumber and Wood Products SIC 26 (except 265 and 267) . . Paper and Allied Products SIC 28 (except 283 and 285) . . Chemicals and Allied Products SIC 29 . . . . Petroleum and Coal Products SIC 311 . . . . Leather Tanning and Finishing SIC 32 (except 323) . . . . Stone, Clay and Glass Products SIC 33 . . . . Primary Metal Industries SIC 3441 . . . . Fabricated Structural Metal SIC 373 . . . . Ship and Boat Building and Repairing
(iii)	Facilities classified as SIC 10 through 14, including active or inactive mining operations and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with, or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts, or waste products located on the site of such operations. SIC 10 . . . . Metal Mining SIC 11 . . . . Anthracite Mining SIC 12 . . . . Coal Mining SIC 13 . . . . Oil and Gas Extraction SIC 14 . . . . Nonmetallic Minerals, except Fuels
(iv)	Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of the Resource Conservation and Recovery Act (RCRA).
(v)	Landfills, land application sites, and open dumps that receive or have received any industrial wastes including those that are subject to regulation under subtitle D or RCRA.
(vi)	Facilities involved in the recycling of material, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as: SIC 5015 . . . . Motor Vehicle Parts, Used SIC 5093 . . . . Scrap and Waste Materials
(vii)	Steam electric power generating facilities, including coal handling sites.
(viii)	Transportation facilities which have vehicle maintenance shops, equipment cleaning operations, or airport de-icing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fuelling, and lubrication), equipment cleaning operations, or airport de-icing operations, or which are otherwise listed in another category, are included.

EXHIBIT 2-6. INDUSTRIAL FACILITIES WHICH MUST SUBMIT APPLICATIONS FOR STORM WATER PERMITS (Continued)

40 CFR 122.26(b)(14) Subpart	Description
(ix)	Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including lands dedicated to the disposal of the sewage sludge that are located within the confines of the facility, with a design flow of 1.0 million gallons per day or more, or required to have an approved pretreatment program under 40 CFR Part 403. Not included are farm lands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with Section 405 of the CWA.
(x)	Construction activity including clearing, grading, and excavation activities except operations that result in the disturbance of less than 5 acres of total land area and those that are not part of a larger common plan of development or sale.*
(xi)	Facilities under the following SICs [which are not otherwise included in categories (ii)-(x)], including only storm water discharges where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, byproducts, or industrial machinery are exposed to storm water.* SIC 20 . . . . . Food and Kindred Products SIC 21 . . . . . Tobacco Products SIC 22 . . . . . Textile Mill Products SIC 23 . . . . . Apparel and Other Textile Products SIC 2434 . . . . . Wood Kitchen Cabinets SIC 25 . . . . . Furniture and Fixtures SIC 265 . . . . . Paperboard Containers and Boxes SIC 267 . . . . . Converted Paper and Paper Board Products (except containers and boxes) SIC 27 . . . . . Printing and Publishing SIC 283 . . . . . Drugs SIC 285 . . . . . Paints, Varnishes, Lacquer, Enamels SIC 30 . . . . . Rubber and Misc. Plastics Products SIC 31 (except 311) . . . . . Leather and Leather Products SIC 323 . . . . . Products of Purchased Glass SIC 34 (except 3441) . . . . . Fabricated Metal Products SIC 35 . . . . . Industrial Machinery and Equipment, except Electrical SIC 36 . . . . . Electronic and Other Electric Equipment SIC 37 (except 373) . . . . . Transportation Equipment SIC 38 . . . . . Instruments and Related Products SIC 39 . . . . . Miscellaneous Manufacturing Industries SIC 4221 . . . . . Farm Products Warehousing and Storage SIC 4222 . . . . . Refrigerated Warehousing and Storage SIC 4225 . . . . . General Warehousing and Storage

Source: Federal Register, Vol. 55, No. 222, p. 48065, November 16, 1990.
*On June 11, 1992, the U.S. Court of Appeals for the Ninth Circuit remanded the exemption for construction sites of less than five acres in category (x) and for manufacturing facilities in category (xi) which do not have materials or activities exposed to storm water to the EPA for further rulemaking. (Nos. 90-70671 & 91-70200).

lists these industrial facilities. The Transportation Act of 1991 provides an exemption from storm water permitting requirements for certain industrial activities owned or operated by municipalities with a population of less than 100,000. Such municipalities must submit storm water discharge permit applications for only airports, power plants, and uncontrolled sanitary landfills that they own or operate, unless a permit is otherwise required by the permitting authority.

- Municipal Separate Storm Sewer Systems - Under Phase I, those municipalities with separate storm sewer systems serving 100,000 people or more are required to submit an application for discharges from the system. (Only the part of the population served by municipal separate storm sewers is to be included in the 100,000 count, not the part served by combined sewers.) Regulated municipalities are listed in Appendices F through I in the November 16, 1990, final rule or have been designated by their permitting authority.

2.7 WHEN SAMPLING IS REQUIRED

Industrial individual and group applicants must include sampling data from at least one representative storm event. Operators of large or medium municipal separate storm sewer systems must submit sampling data from three different representative storm events. How to determine "representativeness" and other considerations for when to sample are presented below.

2.7.1 STORM EVENT CRITERIA

Storm water discharge permit application requirements establish specific criteria for the type of storm event that must be sampled:

- The depth of the storm must be greater than 0.1 inch accumulation
- The storm must be preceded by at least 72 hours of dry weather
- Where feasible, the depth of rain and duration of the event should not vary by more than 50 percent from the average depth and duration.

These criteria were established to: (1) ensure that adequate flow would be discharged; (2) allow some build-up of pollutants during the dry weather intervals; and (3) ensure that the storm would be "representative," (i.e., typical for the area in terms of intensity, depth, and duration).

Collection of samples during a storm event meeting these criteria ensures that the resulting data will accurately portray the most common conditions for each site. However, the permitting authority is authorized to approve modifications of this definition (especially for applicants in arid areas where there are few representative events). Section 5.1 of Chapter 5 discusses general protocol for requesting modifications to application requirements, including the definition of "representative storm."

In determining whether a storm is representative, there are two important steps to take. First, data on local weather patterns should be collected and analyzed to determine the range of representative storms for a particular area. Second, these results should be compared to measurements of duration, intensity, and depth to ensure that the storm to be sampled fits the representativeness criteria.

2.7.2 OBTAINING RAINFALL DATA

Several sources provide accurate local weather information for both: (1) determining what a representative storm event is for a particular area; and (2) assessing expected storm events to determine whether a predicted rainfall will be "representative," and thus, meet the requirements for storm water sampling. The National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center's (NCDC's) Climate Services Branch is responsible for collecting precipitation data. Data on hourly, daily, and monthly precipitation for each measuring station (with latitude and longitude) are available to the public on computer diskette, microfiche, or hard copy. Orders can be placed by calling **(704) 259-0682**, by fax at **(704) 259-0876**, or by writing to NCDC, Climate Services Branch, The Federal Building, Asheville, North Carolina 28071-2733.

The National Weather Service (NWS) of NOAA can also provide information on historic, current, and future weather conditions. Local NWS telephone numbers can be obtained from the NWS Public Affairs Office at **(301) 713-0622**. Telephone numbers are also usually in local phone directory listings under "National Weather Service" or "Weather." In addition, NOAA runs the NOAA NWS Weather Radio, which provides continuous broadcasts of the most current weather information. This broadcast can be accessed with a radio that has a weather band feature. Approximately 90 percent of the United States

population is within listening range of the 380 NWS stations. Technical Appendix B presents additional information on NOAA Weather Radio, including radio frequencies for specific locations and a listing of weather band radio manufacturers. Telephone recordings of weather conditions are also provided by most NWS offices.

Cable TV weather stations and local airports can also provide weather information. Weather information provided by the local newspaper or TV stations should be used only if more accurate data (as described above) are unavailable, since weather forecasts can change drastically within several hours.

Someone should be designated at the facility to follow current weather conditions by listening to NOAA Weather Radio, calling the local NWS offices, and watching cable TV weather news. Exhibit 2-7

EXHIBIT 2-7. DECISION CHART FOR STORM WATER SAMPLING

presents a storm water sampling decision chart for mobilizing field personnel for a probable storm event.

Annual rainfall statistics can also be used to evaluate representativeness of storm events. For example, Exhibit 2-8

EXHIBIT 2-8. RAIN ZONES OF THE UNITED STATES

RAIN ZONE	Annual Statistics: No. of Storms Avg	No. of Storms COV	Precip. Avg	Precip. COV	Independent Storm Event Statistics: Duration Avg	Duration COV	Intensity Avg	Intensity COV	Volume Avg	Volume COV	DELTA Avg	DELTA COV
			(in)		(hr)		(in/hr)		(in)		(hr)	
NORTH EAST	70	0.13	34.6	0.18	11.2	0.81	0.067	1.23	0.50	0.95	126	0.94
NORTH EAST—COASTAL	63	0.12	41.4	0.21	11.7	0.77	0.071	1.05	0.66	1.03	140	0.87
MIDATLANTIC	62	0.13	39.5	0.18	10.1	0.84	0.092	1.20	0.64	1.01	143	0.97
CENTRAL	68	0.14	41.9	0.19	9.2	0.85	0.097	1.09	0.62	1.00	133	0.99
NORTH CENTRAL	55	0.16	29.8	0.22	9.5	0.83	0.087	1.20	0.55	1.01	167	1.17
SOUTHEAST	65	0.15	49.0	0.20	8.7	0.92	0.122	1.09	0.75	1.10	136	1.03
EAST GULF	68	0.17	53.7	0.23	6.4	1.05	0.178	1.03	0.80	1.19	130	1.25
EAST TEXAS	41	0.22	31.2	0.29	8.0	0.97	0.137	1.08	0.76	1.18	213	1.28
WEST TEXAS	30	0.27	17.3	0.33	7.4	0.98	0.121	1.13	0.57	1.07	302	1.53
SOUTHWEST	20	0.30	7.4	0.37	7.8	0.88	0.079	1.16	0.37	0.88	473	1.46
WEST INLAND	14	0.38	4.9	0.43	9.4	0.75	0.055	1.06	0.36	0.87	786	1.54
PACIFIC SOUTH	19	0.36	10.2	0.42	11.6	0.78	0.054	0.76	0.54	0.98	476	2.09
NORTHWEST INLAND	31	0.23	11.5	0.29	10.4	0.82	0.057	1.20	0.37	0.93	304	1.43
PACIFIC CENTRAL	32	0.25	18.4	0.33	13.7	0.80	0.048	0.85	0.58	1.05	265	2.00
PACIFIC NORTHWEST	71	0.15	35.7	0.19	15.9	0.80	0.035	0.73	0.50	1.09	123	1.50

COV = Coefficient of Variation = Standard Deviation/Mean
DELTA = Interval Between Storm Midpoints
o = Rain Gauge Stations

Source: Urban Targeting and BMP Selection, U.S. EPA Region 5, November 1990.

presents fifteen rain zones in the United States and related storm event statistics. (These rain zones are not those shown in 40 CFR Part 122 Appendix E.) To determine typical values of annual storm events for a particular facility, identify the zone in which the facility is located. The tabulated information lists the annual average number of storms and precipitation as well as the average duration, intensity, and depth of independent storm events for each zone. Care must be taken, however, in using annual rainfall statistics for determining representativeness of storm events, since the annual rainfall statistic may not be representative of seasonal rainfall events. If rainfall data is available at or close to a particular facility, it is preferable to use this data for determining average storm event statistics.

Rainfall data tabulated from NOAA precipitation data indicate for Alaska (not shown in Exhibit 2-8) that average storm events last from 14 to 24 hours in duration and are 0.6 to 1.05 inches in depth. Average storm event data for Hawaii are 9 to 11 hours in duration and from 0.6 to 1.6 inches in depth.

The NWS should be consulted for proper procedures for collecting and interpolating rainfall data if the applicant elects to collect the data rather than use existing data.

2.7.3 DETERMINING REPRESENTATIVENESS

An example of how to determine whether a rainfall event varies by more than 50 percent (i.e., is not representative) is shown in Exhibit 2-9.

EXHIBIT 2-9. EXAMPLE OF 50 PERCENT VARIANCE FROM AVERAGE RAINFALL

Event Type	Duration (hrs.)	Depth (in.)
Average event	5.2	0.43
50 percent average event	2.6	0.22
150 percent average event	7.8	0.65

Once the information on an average duration and depth storm event is obtained for a specific location, multiply these numbers by 0.5 to get the 50 percent average event numbers and multiply by 1.5 to get the 150 percent average event numbers.

A representative storm in both duration and depth for a specific area will fall between the shaded numbers above (i.e., between 2.6 and 7.8 hours in duration and 0.22 and 0.65 inches in depth).

Snowmelt creates runoff which may result in point source discharges very similar to that from other storm events. Pollutants accumulate in snow, and when a thaw occurs, the pollutants will be discharged to receiving waters much like during a rain storm event. Snowmelt may be sampled as long as the applicant works closely with the permitting authority to determine the proper sampling strategy, i.e., sampling procedures, techniques, and pollutant analyses.

For snowmelt, the sampling strategy should be developed depending on the drainage area being monitored for storm flow. The strategy should consider (1) snow removal or clearing practices, e.g., direct dumping into water bodies, plowing, and the creation of snow mounds (whether in a line along a roadway or in piles on parking lots, etc.), and (2) the melting process.

It is also important to consider what happens to snowmounds as they melt and evaporate, which can alter the pollutant concentration in the resulting runoff. In addition, pollutants from the surrounding air and pavement can build up on snow mound surfaces in a crust or cake-like manner eventually leaving a residue

(including previously dissolved solids that become a remaining solids residue) which is later left to be washed off by rainfall, manual flushing or other mechanisms.

The sampling of snow mounds, undisturbed snow itself, and hard pack requires a carefully thought out strategy. Given the complexities associated with snowmelt sampling, applicants should have proposed sampling strategies reviewed by the permitting authority before attempting to conduct sampling.

2.7.4 LOGISTICAL PROBLEMS WITH WHEN TO SAMPLE

Applicants may encounter weather conditions that may not meet minimum "representative" storm criteria; these conditions may prevent adequate collection of storm water samples prior to application submission deadlines. For instance, sampling may be problematic in parts of the country that experience drought or near-drought conditions or areas that are under adverse weather conditions such as freezing and flooding. Events with false starts and events with stop/start rains can also cause problems. Solutions for sampling under these circumstances are discussed below.

Where the timing of storm event sampling poses a problem, it may be appropriate for the applicant to petition the permitting authority for a sampling protocol/procedure modification either prior to sampling or after sampling is conducted (if the storm event is not acceptable). When the applicant requests a sampling protocol/procedure modification, a narrative justification should be attached. This justification should be certified by a corporate official (for industrial facilities) or the principle executive officer or ranking official (for municipalities), as per 40 CFR 122.22. Section 5.1 of Chapter 5 discusses protocol/procedure modifications.

Arid Areas

For arid or drought-stricken areas where a storm event does not occur prior to the time the applicant must sample and submit data with the application form, the applicant should submit the application, complete to the extent possible, with a detailed explanation of why sampling data are not provided and an appraisal of when sampling will be conducted. This explanation must be certified by the appropriate party (as described above). The applicant should also contact the permitting authority for further direction. Where the applicant can anticipate such problems, approval for an extension to submit sampling data should be acquired prior to the deadline.

Adverse Weather Conditions

The applicant should never conduct storm water sampling during unsafe conditions. It is likely that, in areas that experience flooding, lightening storms, high winds, etc., another representative storm event will occur for which sampling conditions will be much safer. (For further information on safety issues, see Chapter 6.) If no other storm event occurs, the applicant should submit a justification as to why the event was not sampled. This information should be certified by the appropriate official.

False Starts and Stop/Start Rains

False start and stop/start rains can also cause problems. False starts may occur when weather conditions are unpredictable and it appears that a storm event may be representative, collection begins, and then the rain stops before an adequate sample volume is obtained. (Necessary sample volumes are discussed in Section 3.6.) Some latitude may be given for the 0.1-inch rainfall requirement as long as the sample volume is adequate; the permitting authority may accept the results with applicant justification and certification. Again, see Chapter 5 for information on requesting protocol/procedure modifications to storm water sampling requirements.

During stop/start rains (those in which rainfall is intermittent), samples should be taken until an adequate sample volume is obtained. Exhibit 2-10 summarizes logistical problems of storm water sampling and presents solutions to the problems identified.

2.7.5 WHEN INDUSTRIAL FACILITIES MUST SAMPLE

EXHIBIT 2-10. LOGISTICAL PROBLEMS OF STORM WATER SAMPLING	
Problem:	Arid/drought areas
Solution:	Submit a petition requesting a modification to the protocol if problems are anticipated and, if it is approved, submit the application without sampling data by the application due date with a certified explanation. Provide sampling data to the permitting authority as soon as possible.
Problem:	Adverse weather conditions such as freezing, flooding, winds, tornadoes, electrical storms, and gully washes
Solution:	Sample another, less hazardous event or submit a certified justification of why the event was not sampled. Provide sampling data to the permitting authority as soon as possible.
Problem:	False starts
Solution:	Discard the sample if the volume is inadequate. If the volume is adequate, submit the sampling data with a certified explanation that the sample is from a non-representative event. Continue to monitor weather conditions and attempt to resample as soon as possible.
Problem:	Stop/start rains
Solution:	Continue to sample in case the storm event turns out to be representative and adequate sample volumes are obtained. If sample volumes are inadequate, continue to monitor weather conditions and attempt to resample as soon as possible.

Industrial applicants must generally collect two types of storm water samples: (1) grab samples collected during the first 30 minutes of discharge; and (2) flow-weighted composite samples collected during the first 3 hours of discharge (or the entire discharge, if it is less than 3 hours). Information from both types of samples is critical to fully evaluate the types and concentrations of pollutants present in the storm water discharge.

The grab samples taken during the first 30 minutes of a storm event will generally contain higher concentrations of pollutants, since they pick up pollutants that have accumulated on drainage surfaces since the last storm event.

Composite samples characterize the average quality of the entire storm water discharge. Flow-weighted composite samples provide for the most accurate determination of mass load. The flow-weighted composite sample must be taken for either the first 3 hours or for the entire discharge (if the event is less than 3 hours long). Additional information on how to collect grab and composite samples is presented in Sections 3.3 and 3.4, respectively.

Industrial applicants are required at a minimum to sample only one storm event. However, if samples from more than one storm are analyzed and the results are representative of the discharge, the data representing each event must be reported. The facility must provide a description of each storm event tested. The average of all values within the last year must be determined and the concentration, mass, and total number of storm events sampled must be reported on Form 2F. Furthermore, sampling should be conducted during normal operating procedures (day or night), and, not when the facility has been closed for a period of time.

Industrial applicants must certify, as a separate requirement, that all outfalls have been tested or evaluated to determine whether non-storm water discharges are present (e.g., process wastewater, sanitary wastes, cooling water, or rinse water) or whether illegal/illicit connections are occurring in the system. This testing should be conducted during dry weather to avoid any flows of storm water through the conveyance.

A checklist that can be used to conduct dry weather evaluations is provided in Exhibit 2-11. A

EXHIBIT 2-11. CHECKLIST FOR CONDUCTING DRY WEATHER EVALUATIONS

1. Date of inspection:_____ 2. Facility name and address:_____

3. Date of last rain event:_____ _____

4. Inspector name:_____ _____

5. Type of outfall

☐ Concrete ☐ Pipe ☐ Grassed ☐ Rock ☐ Other _____

_____

6. Is there visible flow from the pipe? ☐ Yes ☐ No
If yes, check all that apply. If no, go to number 7.

☐ Colored water (describe)_____ ☐ Oily sheen

☐ Odor* (describe)_____ ☐ Sludge present

☐ Murky ☐ Clear water

☐ Floating objects (describe)_____ ☐ Stains on conveyance

☐ Absence of plant life surrounding conveyance ☐ Notable difference in plant life surrounding conveyance

☐ Scum ☐ Suds ☐ Other:_____

*e.g., rotten eggs, earthy, chemical, chlorine, soap, putrescence, gasoline, musty, etc.

Estimate the flow either visually or by describing the width, height, and shape of the conveyance and the approximate percentage of the conveyance where flow is present or the approximate depth of the flow. Describe your estimate.

7. Is there standing water present? ☐ Yes ☐ No
If yes, check all that apply. If no, go to number 8.

☐ Colored water (describe)_____ ☐ Oily sheen

☐ Odor* (describe)_____ ☐ Sludge present

☐ Murky ☐ Clear water

☐ Floating objects (describe)_____ ☐ Stains on conveyance

☐ Absence of plant life surrounding conveyance ☐ Notable difference in plant life surrounding conveyance

☐ Suds ☐ Scum ☐ Other:_____

☐ Absence of plant life surrounding conveyance

*e.g., rotten eggs, earthy, chemical, chlorine, soap, putrescence, gasoline, musty, etc.

8. From the inspection locations, can you see any unusual piping or ditches that drain to the storm water conveyance? ☐ Yes ☐ No

9. Is there any overland flow visible from the discharge location? ☐ Yes ☐ No

10. Are there dead animals present? ☐ Yes ☐ No

narrative description of the method used to conduct dry weather evaluations and the date and the drainage points must be included in Section V.A of Form 2F. This statement must be certified by the appropriate party as described in Section 2.7.4.

A dry weather visual inspection is the simplest way to screen for illicit discharges. If one or more of the items on the checklist in Exhibit 2-11 are answered affirmatively, or if there are other reasons to believe that illicit connections exist, more detailed investigations (such as dye tests, smoke tests, evaluation of piping designs, and TV line monitoring) may be necessary. Dye testing involves releasing fluorescent, nontoxic dye into the suspected source of non-storm water, (e.g., a drain, sink, toilet, or pipe) and checking to see whether the dye shows up in the storm water outfall. Smoke testing involves pumping smoke into a storm sewer and viewing the facility to see if smoke escapes through unknown openings or storm sewer inlets. The presence of smoke indicates that storm water may enter the sewer through these openings or inlets. However, smoke testing may prove ineffective at finding non-storm water discharges to separate storm sewers. Smoke passage may be blocked due to line traps that are intended to block sewer gas.

TV line monitoring is a technique whereby a small video camera is placed in the storm sewer and a video image of the sewer is viewed on a monitor at the surface to identify illicit connections. The camera can be moved through the sewer by remote control. For more information on smoke and dye testing and TV line monitoring, consult EPA's Guidance Manual for the Preparation of NPDES

Permit Applications for Storm Water Discharges Associated with Industrial Activity (EPA-505/8-91-002, April 1991).

A problem with the dry weather evaluation process is that the presence of a dry weather/non-storm water discharge may be caused by infiltration of ground or surface waters through cracks in the storm water drainage system. In this situation, all other possible sources of the non-storm water discharge should be examined and ruled out. If no sources are found, the physical structure of the conveyance system should be inspected for deterioration.

The applicant should make every attempt to halt non-storm water discharges to the storm sewer system unless the discharge is covered by an NPDES permit. If it is not feasible to halt the discharge of non-storm water to the storm sewer system, and the discharge is not authorized by a process wastewater or storm water permit, the applicant must submit either Form 2C (for a process water discharge) or Form 2E (for a nonprocess water discharge), and check with state officials to see if alternate forms are required.

2.7.6 WHEN MUNICIPAL FACILITIES MUST SAMPLE

Municipal applicants are required to conduct sampling for both Parts 1 and 2 of their applications. In Part 1, municipalities must conduct a field screening analysis to detect illicit connections and illegal dumping into their storm sewer system. Where flow is observed during dry weather, two grab samples must be collected during a 24-hour period with a minimum of 4 hours between samples. These samples must be analyzed for pH, total chlorine, total copper, total phenol, and detergents (surfactants). Note that these are dry weather samples, rather than storm water samples. EPA's Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems presents a description of conducting field screening sampling and provides a data sheet.

For Part 2 of the application, municipalities must submit grab (for certain pollutants) and flow-weighted sampling data from selected sites (5 to 10 outfalls) for 3 representative storm events at least 1 month apart. The flow-weighted composite sample must be taken for either the entire discharge or the first 3 hours (if the event lasts longer than 3 hours). Municipal facilities are not required to collect grab samples within the first 30 minutes of a storm event.

In addition to submitting quantitative data for the application, municipalities must also develop programs for future sampling activities that specify sampling locations, frequency, pollutants to be analyzed, and

sampling equipment. Where necessary (as determined by the municipality or if required by the permitting authority), responsibilities may also include monitoring industries connected to the municipality's storm sewers for compliance with their facility-specific NPDES permits. Refer to EPA's Guidance Manual for the Preparation of Part 1 of the NPDES Permit Applications for Discharges from Municipal Separate Storm Sewer Systems for information on how to develop municipal sampling programs.

2.7.7 USE OF HISTORICAL DATA

Data from storm water samples analyzed in the past can be submitted with applications in lieu of new sampling data if:

- All data requirements in Form 2F are met
- Sampling was performed no longer than 3 years prior to submission of the permit application
- All water quality data are representative of the present discharge.

The historical data may be unacceptable if there have been significant changes since the time of that storm event in production level, raw materials, processes, or final products. Significant changes which may also impact storm water runoff include construction or installation of treatment or sedimentation/erosion control devices, buildings, roadways, or parking lots. Applicants should assess any such changes to determine whether they altered storm water runoff since the time of the storm event chosen for use in the permit application. Historical data can be used only in applications. Historical data cannot be used for fulfilling permit requirements.

2.8 WHERE TO SAMPLE STORM WATER DISCHARGES

Storm water samples should be taken at a storm water point source. A "point source" is defined as any discernible, confined, and discrete conveyance, including (but not limited to) any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft from which pollutants are or may be discharged (as per 40 CFR 122.2). Included in the definition of storm water "point sources" is storm water from an industrial facility that enters, and is discharged through, a municipal separate storm sewer. In short, most storm water discharges can be defined as "point source" discharges, since they ultimately flow into some kind of conveyance (e.g., a channel or swale).

2.8.1 INDUSTRIAL FACILITIES

Industrial applicants submitting individual applications must collect and analyze a grab sample taken within the first 30 minutes of the storm event and flow-weighted composite samples from each of the industrial storm water "point source" outfalls identified on the site drainage map submitted for Section III of Form 2F. Applicants submitting quantitative data for Part 2 of the group application must also collect samples for each outfall discharging storm water associated with industrial activity. All outfalls should be sampled during the same representative storm event if possible. If this is not feasible, outfalls may be sampled during different representative storm events upon approval by the permitting authority. Descriptions of each storm event and which outfalls were sampled during each event must be included in the application. Storm water runoff from employee parking lots, administration buildings, and landscaped areas that is not mixed with storm water associated with industrial activity, or storm water discharges to municipal sanitary sewers, do not need to be sampled.

Outfalls With Substantially Identical Effluents—Industrial Facilities

If an applicant has two or more outfalls with "substantially identical effluents," the facility may petition the permitting authority to sample and analyze only one of the identical outfalls and submit the results as representative of the other. "Substantially identical effluents" are defined as discharges from drainage areas undergoing similar activities where the discharges are expected to be of similar quantity and quality, and indistinguishable in expected composition. Chapter 5 presents an example of a petition for substantially identical effluents and discusses this process in more detail.

2.8.2 MUNICIPALITIES

Large and medium municipalities are required to sample storm water discharges from 5 to 10 outfalls or field screening points that were proposed in Part 1 of the application. The final decision on the number and location of sampling points will be determined by the permitting authority and will depend on site-specific conditions such as land use or drainage area and results of data collected during the field screening analysis process for Part 1 of the application.

2.8.3 LOGISTICS OF WHERE TO SAMPLE

The ideal sampling location would be the lowest point in the drainage area where a conveyance discharges storm water to waters of the U.S. or to a municipal separate storm sewer system. A sample point also should be easily accessible on foot in a location that will not cause hazardous sampling conditions. Ideally,

the sampling site should be on the applicant's property or within the municipality's easement; if not, the field personnel should obtain permission from the owner of the property where the discharge outfall is located. Typical sampling locations may include the discharge at the end of a pipe, a ditch, or a channel.

However, logistical problems with sample locations may arise (e.g., nonpoint discharges, inaccessibility of discharge point, etc.). Logistical problems with sample locations and suggested solutions are described in Exhibit 2-12. In many cases, it may be necessary to locate a sampling point further upstream of the discharge point (e.g., in a manhole or inlet). If the storm water at a selected location is not representative of a facility's total runoff, the facility may have to sample at several locations to best characterize the total runoff from the site. In situations where discharge points are difficult to sample for various reasons, the applicant should take the best sample possible and explain the conditions in the application. A discussion on sampling at retention ponds appears in Section 3.1.2.

EXHIBIT 2-12. SOLUTIONS TO SAMPLE LOCATION PROBLEMS

Problem:	Sampling where storm water commingles with process or non-process water
Solution:	Attempt to sample the storm water discharge before it mixes with the non-storm water discharge. If this is impossible, sample the discharge both during dry and wet weather and present both sets of data to the permitting authority. This will provide an indication of the contribution of pollutants from each source.
Problem:	Numerous small point discharges
Solution:	Impound channel or join together flow by building a weir or digging a ditch to collect discharge at a low point for sampling purposes. This artificial collection point should be lined with plastic to prevent infiltration and/or high levels of sediment. Or, sample at several locations to represent total site runoff.
Problem:	Inaccessible discharge point [examples include underwater discharges or unreachable discharges (e.g., out of a cliff)]
Solution:	Go up the pipe to sample (i.e., to the nearest manhole or inspection point). If these are not available, tap into the pipe or sample at several locations to best represent total site runoff.
Problem:	Managing multiple sampling sites to collect grab samples during the first 30 minutes (industrial facilities only)
Solution:	Have a sampling crew ready for mobilization when forecasts indicate that a representative storm will occur or sample several different representative events. Also, for most parameters, automatic samplers may be used to collect samples within the first 30 minutes triggered by the amount of rainfall, the depth of flow, flow volume or time.
Problem:	Commingling of parking lot runoff with discharge associated with industrial activity
Solution:	The combined runoff must be sampled at the discharge point as near as possible to the receiving water or the parking lot drain inlet if there is one.
Problem:	Sampling in manholes
Solution:	Sample in manholes only when necessary. See Chapter 6 for safety information. Sampling in manholes requires training on confined space entry.
Problem:	Runon from other property
Solution:	If possible, estimate the volume of offsite runon contributions and offsite runon sources of pollutants to perform a mass balance calculation. Include this information in the permit application. If this estimation is not possible, provide a narrative discussion of the upstream site (e.g., is it developed, if so the type of facility, the types of pollutants that may be present on the site, etc.).

2.9 STAFFING CONSIDERATIONS

Staffing needs for sampling must be determined by the applicant. Factors in making the determination include the number of sample locations, the size of the area to be sampled, how far apart the locations are, the type of sampling required, the technique to be used, the number of samples to be taken (depending on how many parameters must be analyzed), and safety considerations.

Training sampling personnel is important to the success of storm water discharge characterization. Training can be done using this manual. Sampling conducted by untrained personnel may result in data that is unrepresentative of the facility's storm water discharge. This data might be rejected by the permitting authority, who would then require another sampling effort.