

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF WATER QUALITY**

**FORM RF**

**GENERAL SAMPLING AND REPORTING GUIDANCE  
FOR PAS AND ADI FORM**

**This document provides general sampling, analysis, and reporting instructions and guidance for NJPDES individual permit applications for discharge of industrial stormwater to surface water. This general instructions and guidance applies to both the "Pollutant Analysis Summary" (PAS) in Items 11A and 11B of Form RF, and to the "Alternative Discharge Information Form" (ADI Form). You must also follow the specific instructions for the PAS or the ADI Form (depending on whether you complete the PAS or the ADI Form).**

**SAMPLING**

**Qualified Personnel**

As with all other information reported in Form RF, the discharge information reported in the PAS or the ADI Form must be properly gathered and evaluated by qualified personnel. The collection of the samples for the reported analyses should be supervised by a person experienced in performing sampling of industrial stormwater or other industrial discharges.

**Stormwater Discharges With Substantially Identical Quality**

If two or more of your stormwater outfalls or drainage areas not served by stormwater outfalls (DANS) have stormwater discharges with substantially identical quality, the Department will allow you (for purposes of Form RF) to sample only one stormwater outfall (or only one DANS), and report that the quantitative data from testing that stormwater outfall or DANS also applies to the other stormwater outfall(s) or DANS that have stormwater discharges with substantially identical quality. (For example, quantitative data from testing one stormwater outfall can be applied to another stormwater outfall or to a DANS, and quantitative data from testing one DANS can be applied to a stormwater outfall or to another DANS.)

If you conclude that two or more stormwater discharges have substantially identical quality, attach an explanation for this conclusion. This conclusion must be based on consideration of the kinds and quantities of materials that are exposed to those stormwater discharges, on the potential of those materials to contribute pollutants to stormwater, and on the estimated effects of stormwater treatment systems, if any. For example, you may conclude that stormwater discharges have substantially identical quality if they are exposed to similar kinds and quantities of materials (and if they are discharged from similar stormwater treatment systems, if any). The Department provides applicants considerable latitude in regard to what constitutes "substantially identical quality" for purposes of Form RF.

**When to Sample**

The time when you sample should be representative, to the extent feasible, of your normal operation. In particular, the stormwater that is sampled should be exposed to kinds and quantities of materials that are

normally exposed to stormwater at your facility (and your stormwater treatment system, if any, should be operating properly, with no system upsets). You should never conduct stormwater sampling during unsafe weather conditions (e.g., lightning storms, high winds, etc.).

Data from samples taken in the past may be used, provided that all data requirements are met, and all data are representative of the present discharge. Among the factors that would cause the data to be unrepresentative are significant changes in the kinds and quantities of materials that are exposed to stormwater, and significant changes in stormwater treatment.

### **Where to Sample**

Sampling must be performed for all stormwater outfalls and DANS listed in Item 4 of Form RF, unless there are stormwater discharges with substantially identical quality as described above. Sampling locations should be accessible by foot and not cause unsafe sampling conditions. Ideally, sampling locations should be on your property or on a public easement with public access. (For other potential offsite sampling locations, you should obtain permission from the property owner or manager.)

If a planned sampling location is submerged by the flood of a stream or other surface water body, sample a different storm event or at a different sampling location (for example, an unflooded location further uphill in the drainage area). If a planned sampling location is periodically submerged by tidal surface waters, sample at low tide. Do not collect samples that include water from a stream or other surface water body.

For an existing stormwater outfall, the ideal sampling location (if logistical problems are not considered) would be the stormwater outfall location identified under Item 4 of Form RF and mapped under Item 3A of Form RF. Due to logistical problems, however, it may be necessary at some facilities to instead use a sampling location that is uphill from that stormwater outfall, but where the sample would still include stormwater exposed to one or more of your facility's principal sources of pollutants in that stormwater outfall's drainage area (or if available, a downhill, offsite sampling location where the sample would include stormwater discharged from that stormwater outfall).

For a DANS, a preferred sampling location (if logistical problems are not considered) would be:

- A location in that DANS that receives all (or nearly all) of the stormwater discharge from that DANS (unless a device or drainage system that would artificially direct stormwater to that location for sampling purposes would substantially impair sample integrity for pollutants to be analyzed); or
- A location in that DANS where you believe that stormwater quality is typical of the average quality of the stormwater discharge from that DANS.

Again, however, due to logistical problems, it may be necessary at some facilities to instead use a sampling location in or downhill from that DANS where the sample would include stormwater exposed to one or more of your facility's principal sources of pollutants in that DANS (or if available, a downhill, offsite sampling location where you believe that stormwater quality is typical of the average quality of stormwater discharged from that DANS).

Your Item 3A site map must identify each sampling location. Samples should be collected from the center of the flow channel, where turbulence is at a maximum, at a site specified in your present NJPDES-DSW permit, or at any location adequate for the collection of representative samples. Because of logistical problems often encountered in stormwater sampling, the limited amount of sampling that Form RF requires for each stormwater discharge, and the large variability of stormwater characteristics within a storm event and from storm event to storm event, the Department provides applicants considerable latitude in regard to what constitutes a "representative sample" for purposes of Form RF.

In situations where stormwater discharges are difficult to sample for various reasons, you should take the best sample you feasibly can, and explain the conditions in the application. If feasible, the sample must include stormwater exposed to one or more of what you believe to be your facility's principal sources of pollutants in the drainage area, and sample integrity must not be substantially impaired for what you believe to be the principal pollutants from those sources.

### **Sampling of Shallow Flow or Other Difficult Flow Conditions**

Shallow flow is a logistical problem encountered in sampling some stormwater outfalls, and in sampling DANS. At some facilities, inspection during a storm event will identify existing locations where stormwater is somewhat deeper or otherwise easier to sample (for example, where paved areas meet grass, along a curb, in a small pool within a swale, or where runoff abruptly drops from one elevation to another). If feasible, and consistent with the other sampling guidance provided above, sample at locations where stormwater can be collected directly into the sample bottle without use of other sampling equipment, and without modifying existing drainage features (except for modifications that create very little or no risk of impairing the sample's integrity). If such locations do not exist, use additional sampling equipment and/or modify existing drainage features as necessary for sampling, and minimize to the extent feasible the risk of substantially impairing sample integrity.

One type of sampling equipment that has been used to capture shallow stormwater flows (including sheetflows less than 1 cm deep) is a peristaltic, hand-operated vacuum pump that creates a small vacuum in the sample bottle, which then gently draws the sample directly into the sample bottle through a polytetrafluoroethylene (PFTE, e.g., Teflon<sup>®</sup>) tube. To avoid sucking particles, such as sediment, into the sample bottle that are not flowing with the water, a sampling location should be chosen that is free of debris that could be artificially introduced into the sample, and the sampling rate should be slow. For pervious areas, a small clean plate (preferably glass) placed on the ground to allow the water to flow onto it for sampling reduces this contamination risk (Pitt et al., 1995, 1996).

Sheetflow on paved and grass surfaces has also been sampled using sampling equipment that holds the sample bottle below the ground surface so that stormwater enters the sample bottle by gravity. In some instances, barrier devices or pipes cut with slits were used to intercept sheetflow and divert it to the sample bottle in such equipment (see Bannerman et al., 1993 for some details).

Also, your options are not limited to the specific sampling procedures mentioned in the two preceding paragraphs. For example, one general approach to the shallow flow problem is to create a small pool of stormwater sufficiently deep for one or more kinds of sampling equipment by such drainage feature modifications as:

- Installing a weir or excavating a small basin in an existing stormwater conveyance such as a pipe, ditch, gully, swale, or gutter.
- Installing a stormwater collection basin at or near the bottom of a slope at the facility (either by installing a barrier device that extends above the existing ground surface, or by excavating a small basin), and installing troughs, gutters, pipes cut with slits, ditches, or berms or other barrier devices on that slope which intercept sheetflow and direct it into that basin by gravity.

Various elements of this approach have been suggested by USEPA (1992), or have been used to sample agricultural or other surface runoff.

Other stormwater flow problems sometimes encountered in stormwater sampling include deep, stratified flow or stormwater discharges with low discharge rates. Line et al. (1997) and USEPA (1992) indicate that these problems can be minimized or eliminated by methods such as using appropriate sampling

equipment, temporary channel alterations (e.g., to decrease flow depth or increase turbulence), or drainage area modifications that join small flows together, or join a small flow with a larger flow.

As noted below, you should minimize impairment of sample integrity resulting from sampling equipment and drainage feature modifications.

### **Difficult Access**

Difficult access is another logistical problem that can be addressed by special sampling equipment, using another sampling location(s), or physical modification of drainage structures. For example, at some locations where it is not feasible to place sample bottles or other sampling equipment directly in the stormwater by hand (for example, at the end of some pipes or in some ditches or channels), a “pond sampler” may be used for sampling stormwater. The “pond sampler” consists of a telescopic pole, similar to that used in swimming pool maintenance, with a sampling beaker clamped at the end. The sample should be taken in the center of the stormwater flow, and directly transferred into the sample bottle with as little disturbance as possible.

As another example, at some facilities there is no existing access point for a storm sewer pipe at the corresponding stormwater outfall location mapped in Item 3A of Form RF. In such instances, the sampling location for that outfall may be the nearest existing manhole, storm sewer inlet, or other access point to that pipe, or may be downhill at the end of that pipe. (Such a sampling location should be used only if you believe that stormwater quality at that sampling location is similar to stormwater quality at the stormwater outfall location, and if you obtain permission from the downhill property owner or manager, if applicable.) You may also tap into the pipe (preferably at the stormwater outfall location, or at a location with similar stormwater quality), or use sampling locations at two or more existing uphill access points to that pipe.

### **Sample Integrity**

Because of logistical problems often encountered in stormwater sampling, the degree of sample integrity that is feasible in some instances for stormwater sampling is less in some respects than the degree of sample integrity that is generally feasible for traditional wastewater sampling. Moreover, due to the limited amount of sampling that Form RF requires for each stormwater discharge, and the large variability of stormwater characteristics often encountered within a storm event and from storm event to storm event, the exact pollutant levels reported in Form RF are less significant than they often are for traditional wastewater sampling. The Department takes these factors into consideration, and does not require for Form RF a degree of sample integrity that is unreasonably high given the practical realities of stormwater sampling and stormwater variability. However, you must still avoid substantial impairment of sample integrity to the extent feasible.

All sample bottles must be precleaned before arriving on site, and should remain wrapped and sealed until use. All sample bottles used for taking grab samples, except for prepreserved bottles, must be rinsed with the stormwater to be sampled at least twice before being filled, unless the sample is to be analyzed for oil and grease, petroleum hydrocarbons, bacteria, metals, volatile organics, pesticides, PCBs, PBBs, or dissolved oxygen.

All other readily portable field sampling equipment, if any (for example, beakers, buckets, pumps, syringes, tubes, clamps, sleeves, fasteners), that will come into contact with the stormwater sample should be decontaminated before arriving at each sampling location, and should not be unwrapped until needed. Before a sample is taken, the parts of such equipment that will come into contact with the stormwater sample should be rinsed at least twice with the stormwater to be sampled (unless the sample is to be analyzed for oil and grease, petroleum hydrocarbons, bacteria, metals, volatile organics, pesticides, PCBs, PBBs, or dissolved oxygen). Samples can be taken manually or with an automatic

sampler, except that automatic samplers cannot be used for collection of volatile organic compound (VOC) samples. In addition, some pollutants may not be amenable to collection by an automatic sampler because of very short holding times contained in the applicable analytical methods, or the need for special tubing or container material. Sample preservation shall be performed immediately after each sample is collected. For composite chemical samples, each aliquot shall be preserved at the time of collection, unless use of an automatic sampler makes it impossible to preserve each aliquot. In that case, chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

Pipes, troughs, gutters, ditches, depressions, dikes, berms, or other barriers, weirs, or other devices or drainage systems may be installed or excavated in the ground to divert stormwater to, or impound stormwater at, a location where stormwater can be transferred (directly or with portable field sampling equipment) into sample bottles. Such devices or systems are either not portable, or are not readily portable because of the time required for field installation or removal. Such devices or systems should be designed to minimize impairment of sample integrity for the pollutants to be analyzed (especially the pollutants that you believe to be the principal pollutants in the stormwater discharge). For example, where feasible, pipes or other components of such devices or systems should be decontaminated before arriving on site, and should not be unwrapped until just before installation. Machinery or hand tools used for installation or excavation should also be decontaminated before use. Ground disturbed during installation or excavation of such devices or systems should be lined or stabilized to prevent or minimize addition of sediment or ground water to the stormwater sample.

Instructions on fabricating “pond samplers” and some other kinds of sampling equipment, and procedures for decontaminating and using sampling equipment, are contained in the Department’s “[NJDEPE Field Sampling Procedures Manual](#)”. A copy of this manual is available to the public at the Department’s Information Resource Center. The Information Resource Center may be contacted at (609) 984-2249. Copies of this manual may be purchased through the Department’s Maps and Publications Sales Office at (609) 777-1038.

Any specific requirements contained in the applicable analytical methods should be followed for sample containers, sample preservation, holding times, the collection of duplicate samples, etc. You may contact the Office of Quality Assurance at (609) 292-3950 for detailed guidance on those methods and for answers to specific questions about those methods. (Also see, however, the discussion of “site-specific sampling procedures or requirements” in the Instructions for the ADI Form, and the special protocol that is available for pH under the Instructions for Table 11B-1 in the PAS.)

## **References**

Bannerman, R.T. et al. (1993). Sources of pollutants in Wisconsin stormwater. *Water Sci. Technol.* (G.B.), **28**, 241.

Line, D.E. et al. (1997). Water quality of first flush runoff from 20 industrial sites. *Water Environ. Res.*, **69**, 305.

Pitt, R. et al. (1995) Urban stormwater toxic pollutants: assessment, sources, and treatability. *Water Environ. Res.*, **67**, 260.

Pitt, R. et al. (1996) Urban stormwater toxic pollutants: assessment, sources, and treatability — Closure. *Water Environ. Res.*, **68**, 953.

U.S. Environmental Protection Agency (1992). *NPDES Storm Water Sampling Guidance Document*. EPA 833-B-92-001. U.S. Environmental Protection Agency, Office of Water.

## ANALYSIS

A laboratory certified by the Department under N.J.A.C. 7:18 and named in Item 14 of Form RF must perform the analysis (except for group application data submitted to USEPA under 40 CFR 122.26 and submitted to the Department in accordance with the ADI Form and its Instructions). You must use test methods promulgated in 40 CFR Part 136 or N.J.A.C. 7:18; however if none have been promulgated for a particular pollutant, you may propose to use any suitable method for measuring the level of the pollutant in your discharge. You must submit a description of the proposed methodology to the Department for approval for the specific pollutant prior to initiation of sampling. Your description must include the sample holding times, preservation techniques, and the quality control measures used. Where no certification program in accordance with N.J.A.C. 7:18 is available for a specific pollutant, use a laboratory certified for a similar pollutant or analytical procedure.

## REPORTING

### Rainfall

Do not provide measurements or estimates of rainfall during the storm event(s) sampled if:

- All or part of the snow, freezing rain, or other frozen precipitation during that storm event did not melt during that storm event; or
- All or part of the stormwater flow during that storm event consisted of melted snow or ice that resulted from a previous storm event(s).

In either of those two circumstances, enter "N/A" in the column or line for rainfall data, and attach a description of the weather events (and snow or ice removal activities, if any) related to the storm event(s) sampled.

### Units, Abbreviations, and CAS Numbers

All levels must be reported with units. Use the following abbreviations where applicable:

<b>CONCENTRATION</b>		<b>LOADING (ADI FORM ONLY)</b>	
ppm	parts per million	lbs	pounds
mg/L	milligrams per liter	ton	tons (English)
ppb	parts per billion	mg	milligrams
µg/L	micrograms per liter	g	grams
col/100 mL	colonies per 100 milliliters	kg	kilograms
pCi/L	picocuries per liter	T	tons (Metric)

Provide the Chemical Abstracts Service (CAS) numbers, if available, for pollutants you list in Tables 11B-2 or 11B-3 in the PAS (or Parts B or C of the ADI Form). For some pollutants, you can copy CAS numbers provided in Appendix RF-2, RF-3, and RF-4 of the Form RF Instructions.

### Metal

All reporting of values for metal must be in terms of "total recoverable metal," unless:

- An applicable, promulgated effluent limitation or standard specifies the limitation for the metal in dissolved, valent, or total form; or

- All approved analytical methods for the metal inherently measure only its dissolved form (e.g. hexavalent chromium); or
- The Department has determined that in establishing case-by-case limitations it is necessary to express the limitations on the metal in dissolved, valent, or total form to carry out the provisions of the Federal Clean Water Act.

### **Sources of Pollutants**

When reporting "Sources of Pollutants," identify what you believe to be the primary source(s) of the listed pollutant in the stormwater discharge. In some instances, such a source may be atmospheric deposition on your facility of a pollutant released or generated outside your facility, or stormwater that flows onto your facility from areas outside your facility. You may indicate uncertainty by adding "?" after the name of the source. You may report that the source is unknown if you have insufficient information to identify the source(s) conclusively or tentatively.

### **Presence of Pollutant in Discharge**

For Table 11B-3 in the PAS (or Part C of the ADI Form), base your determination that a pollutant is present in or absent from your discharge on your knowledge of your raw materials, material management practices, maintenance chemicals, history of spills and releases, intermediate and final products and byproducts, and any previous analyses known to you of your discharge or similar discharges.

### **Sales Data for Small Business Exemption**

If you submit sales data to the Department under Table 11B-3 in the PAS (or Part C of the ADI Form), the sales data must be for the facility which is the source of the discharge. The data should not be limited to sales for the process or processes which contribute to the discharge unless those are the only processes at the facility. For sales data, in situations involving intra-corporate transfers of goods and services, the transfer price per unit should approximate market prices for those goods and services as closely as possible. Sales figures should be indexed to the second quarter of 1980 by using the gross national product price deflator (second quarter of 1980 = 100). This index is available in the National Income and Product Account of the United States (Department of Commerce Bureau of Economic Analysis).