USAEHA

WATER QUALITY INFORMATION PAPER NO. 37

National Pollutant Discharge Elimination System Sampling Protocol for Storm Water Permit Application

U.S. Army Environmental Hygiene Agency
Aberdeen Proving Ground, Maryland 21010-5422

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DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO ATTENTION OF

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM SAMPLING PROTOCOL FOR STORM WATER PERMIT APPLICATION

1. BACKGROUND.

a. On 16 November 1990, the U.S. Environmental Protection Agency (EPA) promulgated final rules establishing requirements for the storm water application process for "industrial" facilities and established preliminary permitting strategies for industrial activities. The rules will be codified under Title 40, Code of Federal Regulations (CFR), Parts 122, 123, and 124 [The National Pollutant Discharge Elimination System (NPDES)]. These rules were discussed in detail in Water Quality Information Paper No. 36.

b. This protocol is designed to assist U.S. Army Environmental Hygiene Agency (USAEHA) project officers in completing the monitoring and sampling requirements of the new rules and in completing the application forms. The sampling methods described are written around available equipment here at USAEHA and assumes some familiarity with their use. Effective 1 February 1992, the deadline for individual applications is 1 October 1992.

2. PRELIMINARY PREPARATIONS.

a. Develop a tentative list of industrial facilities on post. Appendix A provides guidance for determining and selecting industrial facilities. Some better sources of information include the following.

(1) USAEHA Environmental Program Reviews.

(2) Waste Disposal Engineering Division (WDED) Solid Waste Management Unit (SWMU) Evaluations and Hazardous Waste Management Surveys.

(3) Hazardous Waste Minimization Studies.

(4) U.S. Army Toxic and Hazardous Materials Agency (THAMA) Efforts: Installation Assessments (WDED has copies) and various Health Risk Assessment publications.

(5) Various WDED, Air Pollution Engineering Division (APED), Water Quality Engineering Division (WQED), and USAEHA-W,S,N reports.

(6) Storm water and other site maps in the WQED map room.

b. Determine outfall locations for each facility if possible. Use installation maps, U.S. Geological Survey (USGS) maps, storm water drainage maps, and site maps if available.

c. Develop an analytical parameter list for each facility. There is a basic parameter list to be analyzed for at every site.[1] Two samples are to be collected from each site: a grab sample of runoff during the first 30 minutes (or as soon as possible) of the event, and a flow-weighted composite over the entire event (or first 3 hours). Other parameters will depend on what is (or has been) stored (used) at each location. See the Form 2F and the referenced information paper for further guidance.

d. Call the installation point of contact.

(1) Set up 2 weeks for your sampling period.

(2) Verify sites and add sites, if necessary.

(3) Ask for other information to fill in gaps (such as maps and permits).

(4) Check to see if they are monitoring or have monitored any of the sites in question.

(5) Discuss installation support requirements (a typical list is shown in Appendix B).

(6) Obtain additional information/data from the installation to help you fill out necessary application forms (see Appendix B).

e. Send a notification letter in followup to phone call. Complete travel requests which should include $200 in miscellaneous expenses and two bags of excess baggage for each

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[1] Oil and grease, BOD, TSS, Nitrate/Nitrite-N, Phosphorous, COD, TKN, pH.

person. A team of four works best. Two will leave after setting up equipment at all points. Plan that these two will work a Monday through Friday schedule.

f. Finalize facility and parameter list. Make a list of sample points and include dummy sample points in case you discover some other points while onsite. Contact appropriate labs and the Analytical Quality Assurance Division (AQAD) at least 30 days in advance to coordinate analytical work. If possible, have AQAD send containers and preservatives to the installation.

g. Schedule a short preliminary visit if necessary.

h. Discuss your equipment needs with the technician(s) at least 4 weeks prior to the study. A typical equipment list is provided as Appendix C. You can ship most of the equipment using Federal Express Economy Service (you will need a Building No. and street address of the installation for FEDEX to deliver to). You can, of course, drive to the installation in the WQED truck (or rented vehicles) if the location is relatively close. Driving allows some extra flexibility in the amount of materials you can bring. If the installation cannot supply wood for you, then you will need to purchase this offpost at a lumber yard. Get a cargo van onsite (or two minivans). In some cases, the installation may be able to let you sign out a medium sized truck.

3. ONSITE - LOGISTICAL DETAILS.

a. During the first day the project team should handle administrative details: entrance brief with your point of contact (POC), arrange night and weekend access to sites, unpack, get wood, batteries, etc.

b. The second day is usually spent visiting each site to determine where to sample and the type of equipment to use at each site. The team can then begin setting up at the various sites as soon as possible - generally the third day. Ask your POC if any installation personnel might be interested in helping. Often they are interested in learning sampling techniques and may be a good source of manpower. It will take 2-3 days to setup equipment at 10-15 sampling locations. You will generally find that many sites have no apparent runoff outfall or observable drainage pattern. Some sites are flat, some are located [some landfills and open burning/open detonation (OB/OD) grounds] where rain percolates into the ground, and other sites are too small to generate runoff (many battery acid neutralization facilities, for example). At these sites, you may be able to obtain grab samples at areas where puddling occurs, but composites may be unobtainable.

Experience has shown about one quarter of your original sites have no discernable runoff to surface ditches/streams; thus, you will not be able to use automated sampling techniques.

c. As soon as all equipment is setup, the additional team members can return, leaving the project officer (PO) and his assistant onsite.

d. The PO and assistant cannot stay at the installation indefinitely waiting for a rain event and should not stay any longer than 12 days (Monday through the following Friday). Sometime during the second week a decision should be made whether to stay or not. Of course this will depend on the weather forecast. If rain is not predicted soon, then someone onpost should be trained on how to use the sampling equipment - changing settings and so forth. This should not be too difficult, but the problem of grab sampling during the initial phases of the rain event might be troublesome since it may occur after normal working hours. Make a checklist for the samplers. Following the rain event, you can return to the installation to break down samples and ship them back. You may also train someone onsite to do this.

e. Allow 2-3 days to complete site inspections, which involve sketching a detailed map showing existing physical features of the site including drainage patterns. You will need to obtain background information such as what has been stored/ used at each site over the past 3 years, pesticide/herbicide applications, spill data, as well as the site sketch of the current site layout (to include locations of material storage areas).

4. FLOW MEASUREMENT. The storm water rules require runoff flow to be measured, or estimated, at each site. Also, all composite samples must be flow composite types. Many facilities will have several outfalls. Actual flow measurements at all outfalls from each facility would be infeasible. In the approach recommended below, we select one representative outfall at each facility and measure flow using a flow meter/recorder. The flow record at measured outfalls will be used to estimate flow at other outfalls. A typical setup consists of a V-notch weir across a ditch or channel and a flow meter. Other methods may be used to estimate flow, but their accuracy is variable. These include the Manning equation and a number of hydrological formulas (such as the Rational Method) which require measuring only the rainfall. Any of these may be acceptable but are not recommended to give good estimates.

a. Location. On most installations, storm water conveyance systems will be a combination of culverts and ditches. Some installations may have an underground system. If a site has more than one outfall, choose the one that (1) probably has the highest flow and/or (2) will probably have the highest concentration of pollutants. The location should be as close to the facility as possible to avoid dilution effects. Additionally, place at least one rain gauge at each or most of the sites. You may encounter several storm water collection systems:

(1) Underground, Manhole Access. For these, you can generally use a pipe insert (Palmer-Bowlus) which are typically easy to install. Another alternative is to place a V-notch weir across the channel. This takes longer to install and may be subject to leaks if not installed properly.

(2) Aboveground, Ditches. This is the most common system, and in nearly all cases you will have to install a weir to obtain flow measurements. A weir can be placed in a ditch or at the entrance (or exit) side of a culvert pipe. Placing one at the exit requires additional bracing, but may be the best choice if the inlet is on the inside of a fenced compound.

(3) Free Falling Pipe. In some instances, you will encounter a pipe which free falls within a manhole or on a hillside. In this case, you may use a pipe insert (metal V-notch) as your primary device.

b. Weirs. If a weir is used, then use either a V-notch or a rectangular with end contractions. We have precut, metal, V-notch weirs in the warehouse (30°, 45°, and 60°). Each has a maximum head of 9 inches (effective head of about 8 inches), although you can extend this head with a proper wood cut. We have no precut rectangular weirs, although you can obtain them through a metal shop.

c. Weir Placement Guidance. The following provides general requirements for placing a weir in an open channel.

(1) The weir should consist of a thin plate 1/8- to 1/4-inch thick with a straight edge. Our metal V-notch weir plates are 1/4-inch thick.

(2) The upstream face of the weir should be smooth and perpendicular to the axis of the channel in both horizontal and vertical directions. The crest of the weir should also be level to ensure a uniform depth of flow.

(3) The connection of the weir to the channel should not leak.

(4) The height of the weir from the bottom of the channel to the crest should be at least two times the maximum head of liquid (expected) above the crest. This is a control on channel velocities. For storm water runoff, however, you must consider the upstream backup caused by the weir. Also, many ditches will be shallow. We suggest a channel bottom-to-weir distance of about 3-4 inches. If channel velocities are going to be a problem, you can place wooden baffles upstream.

(5) The approach section should be straight for a distance of at least 20 times the maximum expected head of liquid above the crest, upstream from the weir. The slope should be small.

(6) The crest must be set higher than the maximum downstream elevation to prevent water from backing up over the weir and submerging it.

(7) The weir size should be selected only after preliminary estimates of expected flow rates.

(8) The cross-sectional area of the approach channel should be at least eight times that of the nape at the crest for a distance upstream of 15 to 20 times the head on the crest (to minimize approach velocities).

(9) For V-notch weirs: the minimum distance from the side of the V to the channel banks should be twice the expected head.

(10) For rectangular weirs with end contractions: the minimum distance from the side of the weir to the channel banks should be twice the expected head.

(11) Equations for flow over weirs:

60° V: $Q=1.443H^{2.5}$

45° V: $Q=1.035H^{2.5}$

30° V: $Q=0.676H^{2.5}$

Rectangular weir
with end contractions: $Q=3.33(L-0.2H)H^{1.5}$

Q is flow rate in cubic feet per second, H is the head over the weir (in feet), and L is the length of the rectangular weir (in feet).

d. Weir Construction and Placement. The following are general steps for placing a V-notch weir into a channel.

(1) Use a 4 foot X 8 foot piece of plywood (3/4 inch). Shorten the piece (using a circular saw) to fit the channel and extend 6-9 inches into the channel walls. This will help reduce erosion and subsequent leaks. Cut a V into the plywood slightly larger than the metal V. The V should be centered across the length of the weir.

(2) Attach the metal V to the plywood with screws (use self tapping ones with a drill) and silicon adhesive. Try to keep the V level (you will level the entire weir later) and ensure that at least 1 inch of overlap occurs between the metal and wood (for nape to form).

(3) Dig a narrow trench with a pick across the channel. Cut the bottom to the depth necessary to maintain the minimum height to the bottom of the V. The minimum recommended height (two times expected head) may be infeasible to establish in practice for a number of reasons: backup problems upstream, increased pressure on the weir, and a higher potential for weir washout. Also, if the weir elevation is too high, then water may simply backup behind it and not overflow; this may happen if the rain event is short. We recommend that the bottom of the V be placed between 3 and 5 inches above the channel bottom. This has been sufficient in all studies performed to date. Allow a couple extra inches for pounding in the weir. Sometimes you may have to put a weir into a channel with water already flowing in it. In this case, you may be able to use sandbags to backup or divert the flow while you work.

(4) Insert the plywood/weir into the trench and pound the weir in a couple inches. We have dry clay which can be used to pack the weir (wet clay before putting against weir). Make sure the metal weir is on the upstream side of the wood. Pack excavated soil back in.

(5) Brace the downstream side with two-by-fours or stakes, if necessary. This step is very important. If you have to place the weir against the exit side of a culvert, water pressure behind the weir will be significant during a heavy rain. In these cases, brace the weir as follows: cut the ends of two, 6-foot two-by-fours to make pointed ended stakes; pound the stakes into the ground 5-6 feet away from the weir and spaced so

that a brace can be placed between the stakes and against the weir board; measure the distance between the stakes and weir and cut a two-by-four to this length plus a couple inches; pound the two-by-four braces so that they fit tight against both the weir board and stake (the brace should be touching the ground at the stake and should be snug against the weir at about one third up the weir); nail the brace to both the stake and the weir.

(6) Use a bubble level to ensure that the weir is level. Use a hammer to level plywood, if necessary.

(7) Reseal the weir with copious amounts of clay or cement. Revisit the setup several hours later to check tightness.

The same steps can be followed for rectangular weir setup. The installation metal shop will have to cut the weir to your specifications. Also, remember your safety precautions such as wearing gloves when handling the wood and using goggles or safety glasses when using the power tools.

e. Weir In A Manhole. The steps are similar to those above, except that you will be working in a confined area.

(1) The wood must be cut to allow the height of the plywood weir to fit in through the manhole opening. The width must be cut to fit across the width of the hole inside. If the manhole floor has a channel running through it, then you should cut the wood to fit as snugly as possible (use a sabre saw).

(2) Attach the metal V as discussed above.

(3) Seal up both sides of the weir against the interior manhole walls with cement or clay.

(4) If you setup in a round manhole, you will need to brace the weir on the downstream side to prevent it from toppling over when water strikes it and pushes on it. In a square manhole (some are vault type), you many be able to use the corners to brace the weir.

f. Flow Meter Setup. The ISCO bubbler flow meter models work best for storm water setups. We also have ultrasonic types and float types, if necessary. Follow the instructions of the meter for calibration and installation. A few points regarding setup of a bubbler model follow.

(1) Make sure that the bubble tube line is below the bottom of the weir. Usually 1/2 inch is good.

(2) Although instructions may say to install the bubble line (or monitoring point) a specified distance upstream of the weir (to eliminate turbulence and drawdown effects), you can simplify installation by attaching the tubing to the upstream side of the weir. Any error will not be significant in most cases. Remember, the rules require only an estimation of flow, which this method easily provides.

(3) The bubbler must be calibrated to zero in water. This can be done by filling in the area behind the weir with water or by using a beaker (or other suitable container). We suggest the latter method for convenience. In either case, draw a straight line across the plywood 1/2 inch below the weir. Fill the beaker with water and draw a line on the beaker 1/2 inch below the water level. Slide the beaker under the tube until the tube is at the mark. Calibrate the flow meter to zero. Secure the tubing at the 1/2-inch mark. Alternatively, place a piece of tape around the tubing at a distance of 9 1/2 inches above the bottom of the tubing. Align the bottom of the tape with the top of the metal weir plate, which is 9 inches above the bottom of the V.

(4) During the rain event, you can use a staff gauge to check the calibration of the flow meter and adjust it, if necessary, and if you have the time.

(5) If an ultrasonic or float flow meter is used, then follow the installation instructions given by the meter. In these cases, some sort of bracket will have to be built to support the transducer or float. This is why the bubbler is so much easier to use.

(6) It should be noted that a flow meter is not a necessity. The level flowing across the weir can be manually checked and recorded throughout the rain event. Flows can then be calculated using one of the flow equations in paragraph 4c(11) above. This is, of course, very time and manpower intensive, but it is an option.

g. Pipes and Culverts. We have a variety of pipe inserts which may be used for measuring flow in pipes or culverts. Most culverts are too wide for our inserts. However, inserts may be ideal for underground systems since weir construction in a manhole is very time consuming. An insert is simply placed within the pipe and sealed. For the Palmer-Bowlus inserts, a seal is formed by blowing up an annular inner tube. For V-inserts, you seal them using silicon or cement. Currently, the maximum sized insert is about 15 inches.

h. Other Outfalls. If you do not monitor all sources, you will have to estimate total flow and peak flow rates at the unmonitored sources.

(1) Sites With More Than One Outfall. Use the flow record from the outfall where you did monitor. Estimate the drainage area running off into the monitored outfall. Multiply the area by the amount of rainfall and convert to gallons to estimate the maximum total runoff. Divide the actual amount measured by the estimated maximum total runoff. This fraction is the runoff coefficient for the area. If the rest of the site is similar, you can use this coefficient to estimate runoff from the other areas. Simply multiply the runoff area by the amount of rainfall by the runoff coefficient. The maximum flow rate can be similarly derived from the flow chart. Alternately, you can use a runoff coefficient from a standard hydrological text (see Table) rather than a calculated one.

(2) Sites Not Monitored. Use a runoff coefficient based on your knowledge of the site to obtain a total runoff amount. For the maximum flow rate from the site, assume that the flow pattern (trace of chart) is similar to the closest site where you did monitor flow. Find the average flow for the monitoring period (total flow divided by hours runoff occurred). Divide the maximum flow rate by the average flow rate. For the unmonitored site, divide the estimated total runoff by the runoff period to get the average flow rate for the unmonitored site. Multiply this by the maximum to average ratio found at the monitored site. This number is the estimated maximum flow rate at the unmonitored site.

5. SAMPLING - GENERAL CONSIDERATIONS. The storm water rules require two different sets of samples be collected at each site to satisfy application requirements. The first is a grab sample collected within the first 30 minutes (or as soon as possible) of the runoff event. The second is a flow-weighted composite collected either for the duration of the runoff event or over the first 3 hours of the event. Also, a minimum of 0.1 inch of rain must have fallen. Further, the time elapsed since the previous rainfall must be at least 72 hours.

6. AUTOMATIC COMPOSITE SAMPLING. The beginning of the compositing period should coincide with the beginning of the runoff. Also, the rules require that samples be collected at least every 20 minutes. At most installations, facilities will be spread out over a wide area and rain may begin falling during early morning hours, so you probably will not be able to start all the samplers manually. Thus, the sampler must be somehow automatically triggered to collect samples at the beginning of

TABLE. TYPICAL RUNOFF COEFFICIENTS

Description of Area	Runoff Coefficient
Business	
Downtown areas	0.70-0.95
Neighborhood areas	0.50-0.70
Residential	
Single-family areas	0.30-0.50
Multiunits, detached	0.40-0.60
Multiunits, attached	0.60-0.75
Apartment dwelling areas	0.50-0.70
Industrial	
Light areas	0.50-0.80
Heavy areas	0.60-0.90
Parks, cemeteries	0.10-0.25
Playgrounds	0.20-0.35
Railroad yard areas	0.20-0.40
Unimproved areas	0.10-0.30
Streets	
Asphaltic	0.70-0.95
Concrete	0.80-0.95
Brick	0.70-0.85
Drives and walks	0.75-0.85
Roofs	0.75-0.95
Lawns, sandy soil	
Flat, 2%	0.05-0.10
Average, 2-7%	0.10-0.15
Steep, 7%	0.15-0.20
Lawns, heavy soil	
Flat, 2%	0.13-0.17
Average, 2-7%	0.18-0.22
Steep, 7%	0.25-0.35

the runoff event. We suggest the use of ISCO 2700 samplers which can be set up to fill discrete (24) individual 1,000 mL bottles on a time interval basis. Also, the samplers can be started automatically by using a flow actuator device. The actuator (ISCO Model 1640) is simply a conductivity probe which, when wetted, initiates the preprogrammed sampler. The use of discrete bottles requires time sequential sampling. A flow weighted sample is then manually composited using flow records, a time consuming but straight forward procedure. The use of a 5-gallon flow proportioned composite would be less time consuming to collect, but you would need a very accurate estimate of the amount/duration/rate of flow during the rain event.[2] An additional advantage of using sequential sampling: you can use the first six or seven bottles as your first 30 minute grabs, if necessary. One final note: you must obtain enough samples to satisfy analytical volume requirements. You will obtain between 10 and 12 liters of sample after manually compositing.

a. Placement of Sampler Collection Tubing. If a strainer is used, it should be kept off the bottom of the channel so it does not get covered with sediment. The strainer will not pull sample unless it is submerged. A better method is not to use a strainer but to attach the sampler tubing to the upstream side of the weir or to a stick (or rod) so that the bottom of the tubing is just below the bottom elevation of the weir notch. In some cases, runoff in ditches may carry a high sediment load which may bury the end of the tubing under silt. If it appears that this is a possibility, then place a barrier of rocks around the tubing to filter some of the sediment. You can also construct a screen around the tubing using window screening purchased at a local hardware store. Be creative.

b. Automatic Sampler. A number of different modes may be employed when using an automatic sampler, depending on model and make of sampler and available flow meter connection. A number of different possibilities are discussed below.

(1) Initiation with Actuator and Grab with Sampler. The ISCO makes a sampler actuator (Model 1640) which will automatically turn on the sampler when runoff touches the

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[2] This is virtually impossible, given the unpredictability of rainfalls. You will get too much sample in too little time or not enough sample if the rainfall/runoff is short of your expectation. This method is too unreliable for satisfying both duration requirements and laboratory requirements. Therefore, we recommend the use of time sequential sampling and manually compositing these into a flow-weighted composite.

actuator. The actuator is a metal probe you mount on a stick or bar (or on the weir) which sends a signal to the sampler when the water level rises to touch the probe. Read the directions for use.

(a) Mount actuator sensor a couple inches off the bottom of the channel upstream of the weir. This will help ensure that a sample will be taken as the water level is rising to the weir.

(b) Connect to sampler per instructions (it connects where the flow meter is normally connected).

(c) Sampler settings: (model 2700).

nonuniform time mode

bottles 1-6[3], key in 0 minutes
bottle 7, 15 minutes
bottle 8, 0 minutes
bottle 9, 15 minutes
bottle 10, 0 minutes
bottle 11, 15 minutes
bottle 12, 0 minutes
bottle 13, 15 minutes
bottle 14, 0 minutes
bottle 15, 15 minutes
bottle 16, 0 minutes
bottle 17, 15 minutes
bottle 18, 0 minutes
bottle 19, 15 minutes
bottle 20, 0 minutes
bottle 21, 15 minutes
bottle 22, 0 minutes
bottle 23, 15 minutes
bottle 24, 0 minutes

1,000 mL sample volume

(d) After keying these in, put the sampler in standby (flashing -01-). Push the enter button five times, then enter "3". Make sure the actuator toggle switch is in the reset position. Push the "reset distributor/start program" button.

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[3] The first six bottles will be used for your first 30-minute grabs. If more (or less) than 6,000 mL are needed for your grabs, use more (or less) bottles.

(e) In this setup, the sampler will collect six samples in separate bottles when water touches the actuator probe (which is protected from rain by a hood). Then 2,000 mL will be collected every 15 minutes thereafter, over a 2-hour, 15-minute period. You can make several changes during the rain event.

(f) If you can get to the site within the first 30 minutes, collect your grab manually into a 5-gallon cubitainer (oil and grease and volatiles separately). Put sampler in standby. Pull and pour out the first six bottles (into the grab container if you like). Other sets (7-8, 9-10, etc.) will likely be full also, depending on the time you reach the sampler. Move up full container sets (two each) and replace poured out containers into the empty positions. Unhook actuator from sampler. Reset sampler settings: time sequential, 15 minutes between each sample, two bottles per sample. Use manual distributor arm button to move distributor to first empty bottle position. This now extends your sample period to 3 hours. Making these changes in the field may sound complicated, but it does not take more than a couple of minutes to make the changes. Remember to hit "resume program" after making the changes. Pushing the "start program/reset distributor" will reset the arm at bottle 1, which contains sample (unless you reached the site before 10 minutes passed). Also, collect grabs for grease and oil and volatiles separately.

(2) Initiation with Actuator and Collect Grabs Manually. If you have only a few sites and believe you can collect all the grabs manually, set up the sampler/actuator as follows:

time sequential mode
0 minutes delay
15 minutes between samples
2 bottles per sample
1,000 mL per sample

Samples will be collected over a 3-hour period.

(3) Initiation with Flow Meter. If an actuator is not available, the next best method would be to trigger the sampler using a flow meter connected to it. In this case, as flow begins to pass over the weir, the flow meter will send a pulse to the sampler after a predetermined number of gallons passes over. However, the problem is that initially the sampler has to be setup in a flow sequential mode for initiation purposes. A very small amount of flow must be keyed in for initiation purposes; however, this small amount also becomes the flow sequential

interval. You want to collect a first sample and then sample every 15-20 minutes thereafter. Fortunately, we can overcome this somewhat using the following method.

Sampler settings: flow sequential
bottles per sample 2
flow initiation: 50 gal (small site)
200 gal (large site)
sample pull: 1,000 mL

A small site might be a Defense Reutilization and Marketing Office (DRMO) yard. A large site might be an airfield. This will trigger the sampler near the beginning of the runoff period. When it starts to rain, get to the site(s) and collect grabs into 5-gallon cubitainers (oil and grease and volatiles separate). Look at your flow recording. An ISCO flow meter places a line across the flow chart every time a sample is collected. Dump out all containers in the sampler, except those corresponding to your selected time interval (15-30-45). Move up the others and reset the sampler to time sequential and move the distributor arm to the first empty bottle. If the sampler is full when you reach the site, note when the last sample was taken, dump out bottle sets to leave a selected (15 minute) sequence, move remaining bottles up, and reset the sampler to time sequential as above. If the last sample was collected more than 15 minutes ago, immediately collect a sample and note the difference.

(4) Sampler Initiation When No Actuator or Flow Meter Available. If all you have is a sampler available for runoff sampling (and possibly a float type flow meter), setup the sampler as follows:

Volume of pull: 1,000 mL
Time sequential
2 bottles per sample
Time interval between samples: 15 minutes

At this point, there are two options.

(a) Option 1. Set the delay to collect the first sample during the time period the rain event is likely to begin. The sampler will attempt to draw samples over a 3-hour period beginning with your initiation time. If it does rain during this period, get to the site as soon as possible. Then, move full bottle sets up in the sampler base, replacing empty ones. For example, assume that rain/runoff is expected (best guess) at 1600 hours. Set the sampler to start at this time. The rainfall/runoff actually begins at 1700 hours. You reach the sampler at 1730 hours. Bottles 1-8 are empty, bottles 9-12 are full, the

next bottle is 13. Move bottles 9-12 to positions 1-4 and reset the distributor arm to the first empty bottle (5) and resume the program at this point. If it does not rain at all, then you will have to reprogram a new delay (or turn it off). Check the battery voltage if you need to reprogram. This option gives you some leeway in getting to the site and still have the first samples collected when runoff begins.

(b) Option 2. Set the sampler up as above, then put the sampler in standby. When it rains you will have to get to the site and start the sampler yourself. This is OK if there are few sites or the sites are clustered.

c. Manual Sampling. The rules allow you to collect samples manually instead of using an automatic sampler. The grabs must be collected at least every 20 minutes and then flow composited. This is, of course, very time consuming, and would require many containers, but it is an option.

7. FLOW COMPOSITING THE DISCRETE SAMPLES. When the sampler is full, you will have between 16 and 24 bottles (about 1,000 mL each) with which you need to manually flow composite. Cap the bottles and move the sampler to your breakdown area. Pull the flow chart also and note the rainfall amount in the rain gauge. The procedure for manually compositing follows:

a. Use a Compositing Container. A 5-gallon cubitainer is recommended.

b. Analyze the Flow Record. Find the period(s) with the highest flow rate. This will be the 100 percent rate. As an example, assume the maximum hourly rate is 300 gpm and corresponds to bottles 11 and 12 (collected at the 90-minute mark). Pour all of the sample collected (2,000 mL) during these time periods into the composite container.

c. For All Other Times. Find the fraction of the peak flow. For example, say the flow at 60 minutes (bottles 6 and 7) was 200 gpm. The fraction is 200/300 or 0.67.

d. Transfer. Multiply the fraction for each period by the maximum amount collected (2,000 mL). This is the amount of sample to be transferred to the compositing container. For the above period, 2,000 * 0.67 = 1,340 mL would be transferred to the compositing container from bottles 7 and 8.

e. Repeat. Repeat for the rest of the sample point sets.

8. GRAB SAMPLING. The rules require both a grab sample and a composite sample for most parameters. The grab sample must be collected during the first 30 minutes of the discharge, or as soon as possible afterwards. Certain parameters, such as pH, fecal coliforms, and oil and grease must be grabs (not composited), although only one sample is needed for these (see rules or information paper). Also, if sampling from a pond with an average detention time of 24 hours or more, then a composite is not required - only a grab. The purpose of the grab sampling in the first 30 minutes is to get the "first flush" of pollutants in the runoff. Onsite conditions will dictate how the grabs are collected. Generally, one person will collect the grabs while the other is resetting or checking the flow meter/sampler setups. Grabs can either be collected in the individual parameter containers or in a larger container which can be brought back to a central location for breakdown.

9. COMPLETING NPDES FORMS 1 AND 2F. Refer to Information Paper No. 36 for details. Basically, the forms are straight-forward. A brief overview with notes is provided here. Form 1 has already been completed if the installation has an NPDES permit in place. It is primarily background information. See examples of the forms in Appendix D.

a. Section I. Use your own outfall numbering system.

b. Section II. Check with the installation's environmental office for information on this section. This is to be completed only if the installation is under an implementation schedule. Other construction or planned construction (wastewater or storm water related) descriptions may be attached, but the information is not required.

c. Section III. A site drainage map must be provided and connotated as described. Photocopy a section of a storm water runoff print for each site. Also, a hand or computer-generated sketch to show site specific details is required. More than one map may be attached.

d. Sections IV, V, and VI. Use a separate sheet for each outfall. Computer-generated substitute sheets are acceptable.

e. Section IV. Part A is self-explanatory. For Part B, you will need to check historical records and talk to either site personnel or some knowledgeable person in the environmental office. Entomology shop personnel should have records on pesticide and herbicide application for the sites. Note that

only a narrative description is necessary (that is, amounts and specific compounds are not required) and that the data should go back 3 years. Part C is also self-explanatory.

f. Section V. The rules contain no guidance as to who is to certify. We suggest the project officer certify here. The testing for nonstorm-water sources can be some type of field test (such as smoke testing or camera surveillance), though simple observations during dry periods coupled with schematics review are acceptable. Any nonstorm-water discharges from these outfalls must be identified in Form 2E and/or Form 2C.

g. Section VI. Check installation records.

h. Section VII. Follow instructions in the form.

(1) Part A. The rules require you to report data in both concentration and mass loading form. The space provided in Form 2F does not permit this, so you will need two sheets. If two or more samples are collected to characterize the site runoff, then fill out both maximum and average sections. Otherwise, only fill in under the maximum value columns. To determine the mass of pollutant, multiply the concentration (mg/L) by the amount of runoff (gallons) and convert to pounds or kilograms.

(2) Part B. Same as Part A above.

(3) Part C. It may be helpful to setup a spreadsheet with parameters already listed. This would save time and is acceptable. Note that a short description about where the pollutants may be coming from is needed under the last column.

(4) Part D. This section may require interpolation of data since flow was probably not measured at each location and maybe not at all outfalls from a single location.

(5) Part E. Self explanatory.

i. Section VIII. Normally check no.

j. Section IX. There are no instructions for this section. Fill in with the USAEHA or contractor (or both) laboratory address.

k. Section X. Upon completion of all other sections, send the form(s) to the installation Environmental Office for review. Some sections may be amended and some information may have to be filled in by installation personnel (for example, you may not be

able to obtain 3 years worth of storage data for a particular site during your site visit). If acceptable, a "principal executive officer" should sign this section. This should be left up to the installation, but it would normally be the post commander. The installation can then send the completed forms to the appropriate final destination - regulatory agency, back to USAEHA, or elsewhere.

10. POTENTIAL STUDY ANNOYANCES. Because no piece of equipment works all the time and because rainfall events are unpredictable, problems are destined to develop. Below are some of the more common problems.

a. Actuator Does Not Actuate. Occasionally, the actuator will not turn on the sampler, even if its operation was checked using clean water during setup. We believe that the conductivity of runoff is sometimes too low to initiate the actuator. Deionized water will not trigger the actuator. Also, angling actuator towards flow is suggested to prevent air bubbles from forming in hood. Do not assume they will work - always visit your sites during the rain event.

b. Sediment Buries Actuator and Collection Tubing. In some earthen ditches, dirt erodes off and settles out around the actuator and tubing, rendering both useless. Sometimes the sampler will draw dirt into its tubing, partially clogging it and causing a vacuum in the tubing. The tubing invariably pops out of its connection with the sampler. If sedimentation appears to be a possibility, then place a rock or screen barricade around the tubing and actuator.

c. Weir Washout. This phenomenon is common in earthen ditches during heavy rains. Carry a shovel with you during your site checks to plug leaks in leaking weirs. Note approximate percent of flow lost in washout areas.

d. Weir Leak. Again, weir leaks are common in earthen ditches and are also likely anywhere you have caulked or cemented weirs in place. Plug the weirs as well as you can during the rain event and note the approximate amount of leakage. Check cemented connections regularly during dry periods. As cement dries, it has a tendency to contract and pull away from the contacting surface.

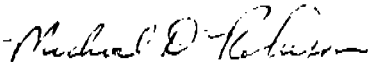
e. Weir Overflow. Heavy rainfall may cause runoff to overtop your weir. The recorder will continue to track the level in most cases, but the flow equation will not be correct. Note

approximately when the overtopping began and the approximate level above the weir. You will have to estimate the additional flow using a rectangular weir approximation.

f. Stolen Equipment. This has not yet been a problem. In high traffic areas, place orange traffic cones around the equipment with warning tape and a phone number to call for information. Put your batteries inside a plastic bag. Also, notify the Military Police about your sites. They will normally provide regular surveillance.

g. Stuck Distributor Arm. If you inadvertently program more than 1,000 mL into individual bottles, the overflow will pool in the base of the sampler. This may cause the empty containers to float slightly, subsequently causing the distributor arm to get hung up on the bottle. Make sure that the inside tie-downs are secure.

11. TECHNICAL ASSISTANCE. This protocol is provided as a guide for project officers in completing storm water application and sampling requirements. The methods and approaches provided are recommendations only, based on experiences with storm water sampling. Questions or comments concerning this protocol should be addressed to Michael D. Robison or William F. Fifty, Water Quality Engineering Division, DSN 584-3289/3554 (Commercial 410-671-3289/3554).



MICHAEL D. ROBISON, P.E.
Environmental Engineer
Water Quality Engineering Division

APPENDIX A

INDUSTRIAL FACILITIES

This appendix provides help for determining and selecting "industrial" facilities. The categories are listed as they appear in the new rules.

For categories I, II(a), II(b), II(d), III, IV, V, VI, and VII, storm water runoff areas covered include: industrial plant yards, immediate access roads/rails traveled by material (raw through finished) carriers, material handling sites, refuse sites, wastewater/waste treatment/disposal sites, shipping and receiving, storage areas (including tank farms) for raw materials, and areas where industrial activity has taken place in the past and significant materials remain. In these categories, it does not matter if materials are exposed to storm water (in a building, for example).

For category II(c), only those areas where materials are exposed to storm water are covered. That is, if materials are stored within a building, then this is not a site. Therefore, even if an installation has an industry in this category it does not necessarily mean that it is an industrial site for storm water application purposes.

Category I. Facility listed in Subpart N of 40 CFR (Parts 405-471), subject to new source performance standards or toxic pollutant effluent standards.

The following is a complete list of industrial categories listed under Subpart N of 40 CFR that have New Source Performance Standards or Toxic Pollutant Effluent Standards; all others are not covered under the storm water rules. Categories in which Army installations may fall are shown in bold. Subparts of categories are shown only if of Army interest. Form 2F requires that industries analyze for any parameter listed under their respective new source performance standards (40 CFR 403 through 471) that is not one of the conventional pollutants listed in Table 2F-2 of Form 2F. In the list below, the additional parameters are shown to the right of the subpart (parameters in categories not normally applicable to any Army base are not provided). If a subcategory is shown without parameters, it means that no additional parameters are listed in the CFR. Always check with the latest revision of the CFR.

CATEGORY/SUBPART/ADDITIONAL PARAMETERS

405 Dairy Products
406 Grain Mills
407 Canned and preserved fruits and vegetables processing
408 Canned and preserved seafood processing
409 Sugar processing
410 Textile mills
411 Cement manufacturing
412 Feedlots
413 Electroplating, metals, cyanide, total toxic organics (TTO)
414 Organic chemicals, plastics, and synthetic fibers
- F - Commodity Organic Chemicals, and
- G - Bulk Organic Chemicals: Pb, Zn, CN, TTO
- I - Direct Dischargers using Biological Treatment, and
- J - Direct Dischargers not using Biological Treatment: Cr, Cu, CN, Pb, Ni, Zn, TTO

415 Inorganic chemicals
- **F - Chlor-alkali: Hg, Cu, Pb, Ni**
- **H - Hydrofluoric Acid: Fl, Ni, Zn**
- **I - Hydrogen Peroxide: CN, TOC (BPT only)**
- **Q - Sodium Dichromate and Sodium Sulfate: Cr (VI), Ni, Cr (T)**
- **T - Sodium Sulfite: Cr, Zn**
- **V - Titanium Dioxide: Cr, Ni**

417 Soap and detergent manufacturing

418 **Fertilizer manufacturing**
A - Phosphate
B - Ammonia
D - Ammonium Nitrate
E - Nitric Acid
F - Ammonium Sulfate
419 Petroleum refining
420 Iron and steel manufacturing
421 Nonferrous metals manufacturing
422 Phosphate manufacturing
423 Steam electric power generating: Cu, Fe, and any substance used in cooling tower.
424 Ferroalloy manufacturing
425 Leather tanning and finishing
426 Glass Manufacturing
427 Asbestos Manufacturing
428 Rubber Manufacturing
429 Timber Products Processing
430 Pulp, Paper and Board Mills
431 Builders paper and Board Mills
432 Meat products
433 **Metal Finishing**
A - Metal finishing: Cd, Cr, Cu, Pb, Ni, Ag, Zn, CN, TTO
434 Coal Mining
439 Pharmaceutical manufacturing
440 **Ore mining and dressing:** depends on ore
443 Paving and Roof Materials
446 Paint formulating
447 Ink formulating
458 Carbon Black manufacturing
461 Battery manufacturing
463 Plastics Molding
464 Metals molding and casting
A - Aluminum casting,
B - Copper casting,
C - Ferrous casting, and
D - Zinc casting: Cu, Pb, Zn, and phenols
465 Coil coating
466 Porcelain enameling
467 **Aluminum forming:** Cr, CN, Zn, Al
468 **Copper forming:** Cr, Cu, Pb, Zn, Ni
469 **Electrical and electronics components**
A - Semiconductor: TTO, Fl
471 Nonferrous metals forming and metal powders
C - Nickel-cobalt: Cu, Ni, Fl
D - Precious Metals: Cu, Cd, Fl, Ag, CN
E - Refractory Metals: Cu, Ni, Fl, Mb
F - Titanium Forming: CN, Pb, Zn, Fl
H - Zinc Forming: Cr, Cu, CN, Zn

Category II(a). Facility classified under the following standard industrial classification (SIC) codes:

24 (except 2434), 26 (except 265 and 267), 28 (except 283), 29, 311, 32 (except 323), 33, 3441, and 373.

24 LUMBER AND WOOD PRODUCTS, EXCEPT FURNITURE
(2434 WOOD KITCHEN CABINETS)
26 PAPER AND ALLIED PRODUCTS
(265 PAPERBOARD CONTAINERS AND BOXES)
(267 CONVERTED PAPER PRODUCTS, EXCEPT CONTAINERS AND BOXES)
28 CHEMICALS AND ALLIED PRODUCTS
281 INDUSTRIAL INORGANIC CHEMICALS
(283 DRUGS)
286 INDUSTRIAL ORGANIC CHEMICALS
289 MISCELLANEOUS CHEMICAL PRODUCTS
2892 EXPLOSIVES
2899 CHEMICALS AND CHEMICAL PREPARATIONS, NOT ELSEWHERE CLASSIFIED
29 PETROLEUM REFINING AND RELATED INDUSTRIES
311 LEATHER TANNING AND FINISHING
32 STONE, CLAY AND CONCRETE PRODUCTS
(323 GLASS PRODUCTS, MADE OF PURCHASED GLASS)
33 PRIMARY METAL INDUSTRIES
331 STEEL WORKS, BLAST FURNACES, ROLLING AND FINISHING MILLS
332 IRON AND STEEL FOUNDRIES
333 PRIMARY SMELTING AND REFINING OF NONFERROUS METALS
334 SECONDARY SMELTING AND REFINING OF NONFERROUS METALS
335 ROLLING, DRAWING, AND EXTRUDING OF NONFERROUS METALS
336 NONFERROUS FOUNDRIES (CASTINGS)
339 MISCELLANEOUS PRIMARY METAL PRODUCTS
3441 FABRICATED STRUCTURAL METAL
373 SHIP AND BOAT BUILDING AND REPAIRING

Notes: It should be noted that the SIC Codes mostly deal with manufacturing industries. For example, lumber yards would not fall under SIC Code 24, because these are generally storage areas. However, a sawmill operated on post would fall under the category.

Category II(b). Facility classified under the following standard industrial classification (SIC) codes:

10, 12, 13, and 14.

10 METAL MINING

- 101 IRON ORES
- 102 COPPER ORES
- 103 LEAD AND ZINC
- 104 GOLD AND SILVER ORES
- 106 FERROALLOY ORES, EXCEPT VANADIUM
- 109 MISCELLANEOUS METAL ORES

12 COAL MINING

13 OIL AND GAS EXTRACTION

14 MINING AND QUARRYING OF NONMETALLIC MINERALS, EXCEPT FUELS

- 141 DIMENSION STONE
- 144 SAND GRAVEL
- 145 CLAY, CERAMIC, AND REFRACTORY MINERALS
- 147 CHEMICAL AND FERTILIZER MINERAL MINING
- 148 NONMETALLIC MINERALS SERVICES, EXCEPT FUELS
- 149 MISCELLANEOUS NONMETALLIC MINERALS, EXCEPT FUELS

Category II(c). Facility classified under the following standard industrial classification (SIC) codes:

20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, and 4221 through 4225.

- 20 FOOD AND KINDRED PRODUCTS
- 21 TOBACCO PRODUCTS
- 22 TEXTILE MILL PRODUCTS
- 23 APPAREL AND OTHER FINISHED PRODUCTS MADE FROM FABRICS AND SIMILAR MATERIALS
- 2434 WOOD KITCHEN CABINETS
- 25 FURNITURE AND FIXTURES
- 265 PAPERBOARD CONTAINERS AND BOXES
- 267 CONVERTED PAPER AND PAPERBOARD PRODUCTS, EXCEPT CONTAINERS AND BOXES
- 27 PRINTING, PUBLISHING, AND ALLIED INDUSTRIES
- 283 DRUGS
- 285 PAINTS, VARNISHES, LACQUERS, ENAMELS, AND ALLIED PRODUCTS
- 30 RUBBER AND MISCELLANEOUS PLASTICS PRODUCTS
- 31 LEATHER AND LEATHER PRODUCTS
  (311 LEATHER TANNING AND FINISHING)
- 323 GLASS PRODUCTS, MADE OF PURCHASED GLASS
- 34 FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND TRANSPORTATION EQUIPMENT
  - 346 METAL FORGING AND STAMPING
  - 347 COATING, ENGRAVING, AND ALLIED SERVICES
  - 348 ORDNANCE AND ACCESSORIES, EXCEPT VEHICLES AND GUIDED MISSILES
  - 3482 SMALL ARMS AMMUNITION
  - 3483 AMMUNITION, EXCEPT FOR SMALL ARMS
  - 3484 SMALL ARMS
  - 3489 ORDNANCE AND ACCESSORIES, NOT ELSEWHERE CLASSIFIED (3441 FABRICATED STRUCTURAL METAL)
- 35 INDUSTRIAL AND COMMERCIAL MACHINERY AND COMPUTER EQUIPMENT
- 36 ELECTRONIC AND OTHER ELECTRICAL EQUIPMENT AND COMPONENTS, EXCEPT COMPUTER EQUIPMENT
- 37 TRANSPORTATION EQUIPMENT
  - 371 MOTOR VEHICLES AND MOTOR VEHICLE EQUIPMENT
  - 372 AIRCRAFT AND PARTS
  - 379 MISCELLANEOUS TRANSPORTATION EQUIPMENT
    - 3795 TANKS AND TANK COMPONENTS (373 SHIP BOAT BUILDING AND REPAIRING)

38 MEASURING, ANALYZING, AND CONTROLLING INSTRUMENTS; PHOTOGRAPHIC, MEDICAL AND OPTICAL GOODS; WATCHES AND CLOCKS
381 SEARCH, DETECTION, NAVIGATION, GUIDANCE AERONAUTICAL AND NAUTICAL SYSTEMS, INSTRUMENTS AND EQUIPMENT
39 MISCELLANEOUS MANUFACTURING INDUSTRIES
4221 FARM PRODUCT WAREHOUSING AND STORAGE
4222 REFRIGERATED WAREHOUSING AND STORAGE
4225 GENERAL WAREHOUSING AND STORAGE

Category II(d). Facility classified under the following standard industrial classification (SIC) codes: Transportation facilities classified as SIC 40, 41, 42 (except 4221-4225), 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations.

40 RAILROAD TRANSPORTATION
401 RAILROADS
41 LOCAL AND SUBURBAN TRANSIT AND INTERURBAN HIGHWAY PASSENGER TRANSPORTATION
42 MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING
421 TRUCKING AND COURIER SERVICES, EXCEPT AIR
422 PUBLIC WAREHOUSING AND STORAGE
(4221 FARM PRODUCT WAREHOUSING AND STORAGE)
(4222 REFRIGERATED WAREHOUSING AND STORAGE)
(4225 GENERAL WAREHOUSING AND STORAGE)
423 TERMINAL AND JOINT TERMINAL MAINTENANCE FACILITIES FOR MOTOR FREIGHT TRANSPORTATION
43 UNITED STATES POSTAL SERVICE
44 WATER TRANSPORTATION
4493 MARINAS
45 TRANSPORTATION BY AIR
458 AIRPORTS, FLYING FIELDS, AND TERMINAL SERVICES
51 WHOLESALE TRADE NONDURABLE GOODS
517 PETROLEUM AND PETROLEUM PRODUCTS
5171 PETROLEUM BULK STATIONS AND TERMINALS

Notes: (1) Only those portions of the facilities that are either involved in vehicle maintenance (rehab, repair, fueling, lubrication), equipment cleaning, airport deicing, or otherwise associated with industrial activity. Some examples of areas not covered: airport landing strips, vehicle parking areas in transportation motor pools, and offices.

(2) The SIC's specified do not cover unit sized motor pools. Motor pools would be part of Major Group 75 - Automotive Repair, Services, and Parking, which is not subject to the new rule. Group 75 is specifically discussed in the EPA preamble (page 48014) to the rules, and the group is specifically

excluded[1]. The term "transportation facility" may be misleading in this case without knowing which SIC code is involved. If you believe, however, that a motor pool may be significantly impacting the receiving stream, then you should sample at this site (but under category IX [see below]).

Category III. Hazardous waste (HW) treatment, storage, or disposal (TSD) facility, including those that are operating under interim status or a permit under Subtitle C of the Resource Conservation and Recovery Act (RCRA). Most Army bases have some type of HW facility. According to the rule's preamble, solid waste management units or SWMU's are also supposed to be covered under this category but a great deal of confusion exists here. For example: several oil drums stored outside a building represent a SWMU. However, this site would not be a HW TSD facility because no hazardous wastes are involved. The site may represent a threat to contaminate storm water if the drums leaked, but is still not a HW site and thus should not be covered under this category. The EPA's hotline could not give a clear answer on this. It is obviously not feasible to sample every one of these, nor does it appear to be the EPA's intention for that either. So our guidance when dealing with SWMU's (active or inactive): put one on your list only if HW's are involved (past or present) and if significant contamination remains. This is greater coverage than the verbatim wording. For example, include a closed landfill which had accepted hazardous waste at one time, but do not include one that records indicate accepted only domestic waste.

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[1]Here is an extract from the preamble: "The 7 December 1988 proposal also requested comments on including the following other categories of discharges in the definition of industrial activities: (xii) Automotive repair shops classified as SIC 751 or 753; (xiii) Gasoline service stations classified under SIC 5541....The proposal reflected EPA's intent not to require permits for these facilities, but rather to address these facilities in the two studies required by CWA section 402(p)(5) and (6). After reviewing these comments, EPA believes that these facilities should be addressed under these sections of the CWA...It should be noted that although the EPA is not requiring the facilities ... to apply for a permit application under this rulemaking, such facilities may be designated under section 402(p)(2)(E) of the CWA."

Category IV. Landfills, land application sites, and open dumps that receive or have received any industrial wastes from any activity listed as being "industrial."
This includes those which are subject to regulation under Subtitle D of RCRA. Many Army installations have landfills, some of which do receive (or have received) industrial waste. Sewage treatment plant sludges (from STP's with a design capacity greater that 1 MGD) are classified as industrial wastes under this rule. However, permit applications will not be required for lands where sludge is beneficially reused such as farm lands or home gardens, or where sludge is applied to offsite lands.

Category V. Facility involved in the recycling of materials, including metal scrapyards, battery reclaimers, salvage yards, and automobile junkyards. There is no mention of minimum facility size, nor is there any reference specifying types of materials recycled. Consequently, any size site involved in any way with the above is considered an industrial activity. Army bases may have a number of places where recycling (Defense Reutilization and Marketing Office yards) is performed or where metal scrapyards exist.

Category VI. Steam electric power generating facility including coal handling sites.
This does not include transformer facilities which are regulated under the Toxics Substance Control Act (TSCA). It does include oil, nuclear, and coal-fired facilities. A number of these facilities exist in the Army. Steam plants generating only steam are not included.

Category VII. Treatment works treating domestic sewage, with a design flow of 1.0 MGD or more.
This includes land treatment systems for sludge or wastewaters within the facility boundary. As discussed above, permit applications will not be required to address land where sludge is beneficially reused such as farm lands or home gardens, or where sludge is applied to offsite lands. In this case, the interpretation is that a permit would be required for land disposal if the sole purpose is to provide a means of ultimate disposal of the sludge or wastewater and is thus tied to the operation of the treatment plant. The exclusions are meant for incidental disposal and thus unconnected with the facility generating the waste. However, the rules are not completely clear on this point and some additional interpretations may be necessary. Contact the EPA (see hotline number at end of this paper) if in doubt. This category will affect a large number of Army installations.

Category VIII. Construction activity including clearing, grading and excavation activities for operations that are planned to cover 5 or more acres of total land area.
Areas of less than 5 acres may still be in this category if the land is part of a larger common plan of development. Permit application requirements are much different for this category than for other categories. Information required: location (including map), total area, proposed measures to control pollutants in storm water discharges during construction, proposed measures to control pollutants in storm water discharges after construction, an estimate of the runoff coefficient before and after construction, and the name of the receiving water. No sampling is required. Nearly all Army installations have some construction, either existing or planned.

Category IX. Designated Discharges.
Facilities which do not fit into any of the above categories may still be required to submit individual applications if the EPA or state determines that a facility's storm water discharge may be contributing to a violation of a particular receiving water's water quality criteria or is a significant contributor of pollutants to the receiving water [40 CFR 122.26(a)(1)(v)]. If a site appears to fit into this category, include it.

APPENDIX B

INSTALLATION SUPPORT REQUIREMENTS

1. PHYSICAL.

a. 12-Volt Batteries (borrow to run equipment). Number will depend on number of samplers, etc. This is an essential support item.

b. A ladder for entering manholes.

c. Traffic cones to mark sampling locations.

d. Earth digging tools (shovels, picks, sledgehammers).

e. Plywood, if available.

f. A source of deionized water for sampling blanks.

g. Portable generator to power weir fabricating tools.

2. ADMINISTRATIVE.

a. Access to all sample locations 24 hours a day. This may involve signing out a key, getting badges, and/or having the environmental office write memos to the activities involved. Access during nonduty hours may be essential. For the most part, sample points will be outside fenced compounds, although this is not always the case.

b. Notifying all industrial sites that you will be in and around their areas for the duration. Provide a list (tentative or final) of the sites in the notification letter.

c. Notifying the MP's and SP's of our activities. Some sample points will be out in the open, along and inside fence lines, and you may be working at night. Coordination with them will reduce potential problems.

d. Access to a room or building with a sink and place to store equipment.

e. A source of ice for sample and sampler preservation.

3. INFORMATION NEEDS. The following information or documents will be used to fill in Form 2F sections and also help determine sample point locations.

a. A list of hazardous materials, wastes, and petroleum products stored at each of the identified sites. The material list must date back 3 years.

b. A copy of installation spill plans, HW Management Plan, and HW Minimization Plan.

c. A listing of construction sites for a 180-day period from the beginning of the study (only sites greater than 5 acres in size).

d. Spill history records for the last 3 years.

e. Storm water collection system and runoff maps.

f. For each site, the location, manner and frequency in which pesticides, herbicides, soil augmenters, and fertilizers were applied. Entomology shop records will be needed.

g. Copies of surface water sampling data, if available.

h. Information on the installation's Solid Waste Management Units.

APPENDIX C
EQUIPMENT LIST, TYPICAL

Insect Repellent[2]
Tape
Assorted Nails and self tapping screws[2]
Claw Hammer
Tape measure
5-gallon cubitainers
Yellow caution tape
Manhole cover lifter
Screwdrivers
1,000 mL graduated cylinder
Angle staff gauge
Hand pump
V-notch weir plates
Pipe inserts
Shovel[1]
Pick[1]
Silicone[2]
Flumes
Leather gloves
Rain suits
Long rubber gloves
Surgeons gloves
Drill and bits
Saber saw
Circular saw
Rubber boots and hip waders
Hand saw[1]
Plastic buckets
Quick Set Cement[2]
Flashlights
Indelible Markers
pH meter and standards
Large plastic bags
Flow Meters (ISCO 1870) and accessories (connectors, tubing, etc.)
Samplers (ISCO 2700) and accessories (connectors, tubing, etc.)
Actuators (ISCO 1640)
Rope
First Aid Kit
Funnels
Footlockers and ice chests
Gas Can

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1 - should be provided by installation
2 - can be purchased onsite

Generator[1]
Ladder[1]
Stakes[2]
Plywood[2]
Assorted Lumber[2]
Rain gauges

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1 - should be provided by installation
2 - can be purchased onsite

APPENDIX D

ENVIRONMENTAL PROTECTION AGENCY FORM 2F

Please print or type in the unshaded areas only

EPA ID Number *(copy from Item I of Form 1)*

Form Approved. OMB No. 2040-0086
Approval expires 5-31-92

Form 2F NPDES

United States Environmental Protection Agency
Washington, DC 20460

Application for Permit To Discharge Stormwater Discharges Associated with Industrial Activity

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 28.6 hours per application, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate, any other aspect of this collection of information, or suggestions for improving this form, including suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M St., SW, Washington, DC 20460, or Director, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

I. Outfall Location

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. Outfall Number *(list)*	B. Latitude			C. Longitude			D. Receiving Water *(name)*

II. Improvements

A. Are you now required by any Federal, State, or local authority to meet any implementation schedule for the construction, upgrading or operation of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

1. Identification of Conditions, Agreements, Etc.	2. Affected Outfalls		3. Brief Description of Project	4. Final Compliance Date	
	number	source of discharge		a. req.	b. proj.

B. You may attach additional sheets describing any additional water pollution (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

III. Site Drainage Map

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including: each of its intake and discharge structures; the drainage area of each storm water outfall; paved areas and buildings within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied; each of its hazardous waste treatment, storage or disposal units (including each area not required to have a RCRA permit which is used for accumulating hazardous waste under 40 CFR 262.34); each well where fluids from the facility are injected underground; springs, and other surface water bodies which receive storm water discharges from the facility.

Table 2F-4

Hazardous substances required to be identified by applicant if expected to be present

Toxic Pollutant

Asbestos

Hazardous Substances

Acetaldehyde	Dinitrobenzene	Napthenic acid
Allyl alcohol	Diquat	Nitrotoluene
Allyl chloride	Disulfoton	Parathion
Amyl acetate	Diuron	Phenolsulfonate
Aniline	Epichlorohydrin	Phosgene
Benzonitrile	Ethion	Propargite
Benzyl chloride	Ethylene diamine	Propylene oxide
Butyl acetate	Ethylene dibromide	Pyrethrins
Butylamine	Formaldehyde	Quinoline
Carbaryl	Furfural	Resorcinol
Carbofuran	Guthion	Stronthium
Carbon disulfide	Isoprene	Strychnine
Chlorpyrifos	Isopropanolamine	Styrene
Coumaphos	Kelthane	2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)
Cresol	Kepone	TDE (Tetrachlorodiphenyl ethane)
Crotonaldehyde	Malathion	2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Cyclohexane	Mercaptodimethur	Trichlorofan
2,4-D (2,4-Dichlorophenoxyacetic acid)	Methoxychlor	Triethylamine
Diazinon	Methyl mercaptan	Trimethylamine
Dicamba	Methyl methacrylate	Uranium
Dichlobenil	Methyl parathion	Vanadium
Dichlone	Mevinphos	Vinyl acetate
2,2-Dichloropropionic acid	Mexacarbate	Xylene
Dichlorvos	Monoethyl amine	Xylenol
Diethyl amine	Monomethyl amine	Zirconium
Dimethyl amine	Naled	

Table 2F-3

Toxic pollutants required to be identified by applicant if expected to be present

Toxic Pollutants and Total Phenol

Antimony, Total	Copper, Total	Silver, Total
Arsenic, Total	Lead, Total	Thallium, Total
Beryllium, Total	Mercury, Total	Zinc, Total
Cadmium, Total	Nickel, Total	Cyanide, Total
Chromium, Total	Selenium, Total	Phenols, Total

GC/MS Fraction Volatiles Compounds

Acrolein	Dichlorobromomethane	1,1,2,2,-Tetrachloroethane
Acrylonitrile	1,1-Dichloroethane	Tetrachloroethylene
Benzene	1,2-Dichloroethane	Toluene
Bromoform	1,1-Dichloroethylene	1,2-Trans-Dichloroethylene
Carbon Tetrachloride	1,2-Dichloropropane	1,1,1-Trichloroethane
Chlorobenzene	1,3-Dichloropropylene	1,1,2-Trichloroethane
Chlorodibromomethane	Ethylbenzene	Trichloroethylene
Chloroethane	Methyl Bromide	Vinyl Chloride
2-Chloroethylvinyl Ether	Methyl Chloride	
Chloroform	Methylene Chloride	

Acid Compounds

2-Chlorophenol	2,4-Dinitrophenol	Pentachlorophenol
2,4-Dichlorophenol	2-Nitrophenol	Phenol
2,4-Dimethylphenol	4-Nitrophenol	2,4,6-Trichlorophenol
4,6-Dinitro-O-Cresol	p-Chloro-M-Cresol	

Base/Neutral

Acenaphthene	2-Chloronaphthalene	Fluroranthene
Acenaphthylene	4-Chlorophenyl Phenyl Ether	Fluorene
Anthracene	Chrysene	Hexachlorobenzene
Benzidine	Dibenzo(a,h)anthracene	Hexachlorobutadiene
Benzo(a)anthracene	1,2-Dichlorobenzene	Hexachloroethane
Benzo(a)pyrene	1,3-Dichlorobenzene	Indeno(1,2,3-cd)pyrene
3,4-Benzofluoranthene	1,4-Dichlorobenzene	Isophorone
Benzo(ghi)perylene	3,3'-Dichlorobenzidine	Napthalene
Benzo(k)fluoranthene	Diethyl Phthalate	Nitrobenzene
Bis(2-chloroethoxy)methane	Dimethyl Phthalate	N-Nitrosodimethylamine
Bis(2-chloroethyl)ether	Di-N-Butyl Phthalate	N-Nitrosodi-N-Propylamine
Bis(2-chloroisopropyl)ether	2,4-Dinitrotoluene	N-Nitrosodiphenylamine
Bis(2-ethylyhexyl)phthalate	2,6-Dinitrotoluene	Phenanthrene
4-Bromophenyl Phenyl Ether	Di-N-Octylphthalate	Pyrene
Butylbenzyl Phthalate	1,2-Diphenylhydrazine (as Azobenzene)	1,2,4-Trichlorobenzene

Pesticides

Aldrin	Dieldrin	PCB-1254
Alpha-BHC	Alpha-Endosulfan	PCB-1221
Beta-BHC	Beta-Endosulfan	PCB-1232
Gamma-BHC	Endosulfan Sulfate	PCB-1248
Delta-BHC	Endrin	PCB-1260
Chlordane	Endrin Aldehyde	PCB-1016
4,4'-DDT	Heptachlor	Toxaphene
4,4'-DDE	Heptachlor Epoxide	
4,4'-DDD	PCB-1242	

Table 2F-2

Conventional and Nonconventional Pollutants Required To Be Tested by Existing Discharger if Expected To Be Present

Bromide
Chlorine, Total Residual
Color
Fecal Coliform
Fluoride
Nitrate-Nitrite
Nitrogen, Total Kjedahl
Oil and Grease
Phosphorus, Total Radioactivity
Sulfate
Sulfide
Sulfite
Surfactants
Aluminum, Total
Barium, Total
Boron, Total
Cobalt, Total
Iron, Total
Magnesium, Total
Molybdenum, Total
Magnesium, Total
Tin, Total
Titanium, Total

Table 2F-1
Codes for Treatment Units

	Physical Treatment Processes		
1-A	Ammonia Stripping	1-M	Grit Removal
1-B	Dialysis	1-N	Microstraining
1-C	Diatomaceous Earth Filtration	1-O	Mixing
1-D	Distillation	1-P	Moving Bed Filters
1-E	Electrodialysis	1-Q	Multimedia Filtration
1-F	Evaporation	1-R	Rapid Sand Filtration
1-G	Flocculation	1-S	Reverse Osmosis (Hyperfiltration)
1-H	Flotation	1-T	Screening
1-I	Foam Fractionation	1-U	Sedimentation (Setting)
1-J	Freezing	1-V	Slow Sand Filtration
1-K	Gas-Phase Separation	1-W	Solvent Extraction
1-L	Grinding (Comminutors)	1-X	Sorption
	Chemical Treatment Processes		
2-A	Carbon Adsorption	2-G	Disinfection (Ozone)
2-B	Chemical Oxidation	2-H	Disinfection (Other)
2-C	Chemical Precipitation	2-I	Electrochemical Treatment
2-D	Coagulation	2-J	Ion Exchange
2-E	Dechlorination	2-K	Neutralization
2-F	Disinfection (Chlorine)	2-L	Reduction
	Biological Treatment Processes		
3-A	Activated Sludge	3-E	Pre-Aeration
3-B	Aerated Lagoons	3-F	Spray Irrigation/Land Application
3-C	Anaerobic Treatment	3-G	Stabilization Ponds
3-D	Nitrification-Denitrification	3-H	Trickling Filtration
	Other Processes		
4-A	Discharge to Surface Water	4-C	Reuse/Recycle of Treated Effluent
4-B	Ocean Discharge Through Outfall	4-D	Underground Injection
	Sludge Treatment and Disposal Processes		
5-A	Aerobic Digestion	5-M	Heat Drying
5-B	Anaerobic Digestion	5-N	Heat Treatment
5-C	Belt Filtration	5-O	Incineration
5-D	Centrifugation	5-P	Land Application
5-E	Chemical Conditioning	5-Q	Landfill
5-F	Chlorine Treatment	5-R	Pressure Filtration
5-G	Composting	5-S	Pyrolysis
5-H	Drying Beds	5-T	Sludge Lagoons
5-I	Elutriation	5-U	Vacuum Filtration
5-J	Flotation Thickening	5-V	Vibration
5-K	Freezing	5-W	Wet Oxidation
5-L	Gravity Thickening		

acid (2,4,5,-T); 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5,-TP); 2-(2,4,5-trichlorophenoxy) ethyl, 2,2-dichloropropionate (Erbon); O,O-dimethyl O-(2,4,5-trichlorphenyl) phosphorothioate (Ronnel); 2,4,5-trichlorophenol (TCP); or hexachlorophene (HCP); then list TCDD. The Director may waive or modify the requirement if you demonstrate that it would be unduly burdensome to identify each toxic pollutant and the Director has adequate information to issue your permit. You may not claim this information as confidential; however, you do not have to distinguish between use or production of the pollutants or list the amounts.

Item VIII

Self explanatory. The permitting authority may ask you to provide additional details after your application is received.

Item X

The Clean Water Act provides for severe penalties for submitting false information on this application form.

Section 309(c)(4) of the Clean Water Act provides that "Any person who knowingly makes any false material statement, representation, or certification in any application, . . . shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than 2 years, or by both. If a conviction of such person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both." 40 CFR Part 122.22 requires the certification to be signed as follows:

> **(A) For a corporation:** by a responsible corporate official. For purposes of this section, a responsible corporate official means (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
>
> **Note:** EPA does not require specific assignments or delegation of authority to responsible corporate officers identified in 122.22(a)(1)(i). The Agency will presume that these responsible corporate officers have the requisite authority to sign permit applications unless the corporation has notified the Director to the contrary. Corporate procedures governing authority to sign permit applications may provide for assignment or delegation to applicable corporate position under 122.22(a)(1)(ii) rather than to specific individuals.
>
> **(B) For a partnership or sole proprietorship:** by a general partner or the proprietor, respectively; or
>
> **(C) For a municipality, State, Federal, or other public agency:** by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

in concentrations of 100 ppb or greater. For every pollutant expected to be discharged in concentrations less than 10 ppb (or 100 ppb for the four pollutants listed above), then you must either submit quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

Small Business Exemption - If you are a "small business," you are exempt from the reporting requirements for the organic toxic pollutants listed in Table 2F-3. There are two ways in which you can qualify as a "small business". If your facility is a coal mine, and if your probable total annual production is less than 100,000 tons per year, you may submit past production data or estimated future production (such as a schedule of estimated total production under 30 CFR 795.14(c)) instead of conducting analyses for the organic toxic pollutants. If your facility is not a coal mine, and if your gross total annual sales for the most recent three years average less than $100,000 per year (in second quarter 1980 dollars), you may submit sales data for those years instead of conducting analyses for the organic toxic pollutants. The production or sales data must be for the facility which is the source of the discharge. The data should not be limited to production or sales for the process or processes which contribute to the discharge, unless those are the only processes at your facility. For sales data, in situations involving intracorporate transfer of goods and services, the transfer price per unit should approximate market prices for those goods and services as closely as possible. Sales figures for years after 1980 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 National Income and Product Accounts of the United States (Department of Commerce, Bureau of Economic Analysis).

Table 2F-4: For each outfall, list any pollutant in Table 2F-4 that you know or believe to be present in the discharge and explain why you believe it to be present. No analysis is required, but if you have analytical data, you must report them. **Note:** Under 40 CFR 117.12(a)(2), certain discharges of hazardous substances (listed at 40 CFR 177.21 or 40 CFR 302.4) may be exempted from the requirements of section 311 of CWA, which establishes reporting requirements, civil penalties, and liability for cleanup costs for spills of oil and hazardous substances. A discharge of a particular substance may be exempted if the origin, source, and amount of the discharged substances are identified in the NPDES permit application or in the permit, if the permit contains a requirement for treatment of the discharge, and if the treatment is in place. To apply for an exclusion of the discharge of any hazardous substance from the requirements of section 311, attach additional sheets of paper to your form, setting forth the following information:

1. The substance and the amount of each substance which may be discharged.
2. The origin and source of the discharge of the substance.
3. The treatment which is to be provided for the discharge by:
    a. An onsite treatment system separate from any treatment system treating your normal discharge;
    b. A treatment system designed to treat your normal discharge and which is additionally capable of treating the amount of the substance identified under paragraph 1 above; or
    c. Any combination of the above.

See 40 CFR 117.12(a)(2) and (c), published on August 29, 1979, in 44 FR 50766, or contact your Regional Office (Table 1 on Form 1, Instructions), for further information on exclusions from section 311.

Part VII-D

If sampling is conducted during more than one storm event, you only need to report the information requested in Part VII-D for the storm event(s) which resulted in any maximum pollutant concentration reported in Part VII-A, VII-B, or VII-C.

Provide flow measurements or estimates of the flow rate, and the total amount of discharge for the storm event(s) sampled, the method of flow measurement, or estimation. Provide the data and duration of the storm event(s) sampled, rainfall measurements, or estimates of the storm event which generated the sampled runoff and the duration between the storm event sampled and the end of the previous measurable (greater than 0.1 inch rainfall) storm event.

Part VII-E

List any toxic pollutant listed in Tables 2F-2, 2F-3, or 2F-4 which you currently use or manufacture as an intermediate or final product or byproduct. In addition, if you know or have reason to believe that 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is discharged or if you use or manufacture 2,4,5-trichlorophenoxy acetic

If you measure more than one value for a grab sample or a flow-weighted composite sample for a given outfall and those values are representative of your discharge, you must report them. You must describe your method of testing and data analysis. You also must determine the average of all values within the last year and report the concentration mass under the "Average Values" columns, and the total number of storm events sampled under the "Number of Storm Events Sampled" columns.

C. **Analysis:** You must use test methods promulgated in 40 CFR Part 136; however, if none has been promulgated for a particular pollutant, you may use any suitable method for measuring the level of the pollutant in your discharge provided that you submit a description of the method or a reference to a published method. Your description should include the sample holding time, preservation techniques, and the quality control measures which you used. If you have two or more substantially identical outfalls, you may request permission from your permitting authority to sample and analyze only one outfall and submit the results of the analysis for other substantially identical outfalls. If your request is granted by the permitting authority, on a separate sheet attached to the application form, identify which outfall you did test, and describe why the outfalls which you did not test are substantially identical to the outfall which you did test.

Part VII-A

Part VII-A must be completed by all applicants for all outfalls who must complete Form 2F.

Analyze a grab sample collected during the first thirty minutes (or as soon thereafter as practicable) of the discharge and flow-weighted composite samples for all pollutants in this Part, and report the results except use only grab samples for pH and oil and grease. See discussion in General Instructions to Item VII for definitions of grab sample collected during the first thirty minutes of discharge and flow-weighted composite sample. The "Average Values" column is not compulsory but should be filled out if data are available.

Part VII-B

List all pollutants that are limited in an effluent guideline which the facility is subject to (see 40 CFR Subchapter N to determine which pollutants are limited in effluent guidelines) or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See discussion in General Instructions to item VII for definitions of grab sample collected during the first thirty minutes (or as soon thereafter as practicable) of discharge and flow-weighted composite sample. The "Average Values" column is not compulsory but should be filled out if data are available.

Analyze a grab sample collected during the first thirty minutes of the discharge and flow-weighted composite samples for all pollutants in this Part, and report the results, except as provided in the General Instructions.

Part VII-C

Part VII-C must be completed by all applicants for all outfalls which discharge storm water associated with industrial activity, or that EPA is evaluating for designation as a significant contributor of pollutants to waters of the United States, or as contributing to a violation of a water quality standard. Use both a grab sample and a composite sample for all pollutants you analyze for in this part except use grab samples for residual chlorine and fecal coliform. The "Average Values" column is not compulsory but should be filled out if data are available. Part C requires you to address the pollutants in Table 2F-2, 2F-3, and 2F-4 for each outfall. Pollutants in each of these Tables are addressed differently.

Table 2F-2: For each outfall, list all pollutants in Table 2F-2 that you know or have reason to believe are discharged (except pollutants previously listed in Part VII-B). If a pollutant is limited in an effluent guideline limitation which the facility is subject to (e.g., use of TSS as an indicator to control the discharge of iron and aluminum), the pollutant should be listed in Part VII-B. If a pollutant in table 2F-2 is indirectly limited by an effluent guideline limitation through an indicator, you must analyze for it and report data in Part VII-C. For other pollutants listed in Table 2F-2 (those not limited directly or indirectly by an effluent limitation guideline), that you know or have reason to believe are discharges, you must either report quantitative data or briefly describe the reasons the pollutant is expected to be discharged.

Table 2F-3: For each outfall, list all pollutants in Table 2F-3 that you know or have reason to believe are discharged. For every pollutant in Table 2F-3 expected to be discharged in concentrations of 10 ppb or greater, you must submit quantitative data. For acrolein, acrylonitrile, 2,4 dinitrophenol, and 2-methyl-4,6 dinitrophenol, you must submit quantitative data if any of these four pollutants is expected to be discharged

Grab sample: An individual sample of at least 100 milliliters collected during the first thirty minutes (or as soon thereafter as practicable) of the discharge. This sample is to be analyzed separately from the composite sample.

Flow-Weighted Composite sample: A flow-weighted composite sample may be taken with a continuous sampler that proportions the amount of sample collected with the flow rate or as a combination of a minimum of three sample aliquots taken in each hour of discharge for the entire event or for the first three hours of the event, with each aliquot being at least 100 milliliters and collected with a minimum period of fifteen minutes between aliquot collections. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. Where GC/MS Volatile Organic Analysis (VOA) is required, aliquots must be combined in the laboratory immediately before analysis. Only one analysis for the composite sample is required.

Data from samples taken in the past may be used, provided that:

All data requirements are met;

Sampling was done no more than three years before submission; and

All data are representative of the present discharge.

Among the factors which would cause the data to be unrepresentative are significant changes in production level, changes in raw materials, processes, or final products; and changes in storm water treatment. When the Agency promulgates new analytical methods in 40 CFR Part 136, EPA will provide information as to when you should use the new methods to generate data on your discharges. Of course, the Director may request additional information, including current quantitative data, if they determine it to be necessary to assess your discharges. The Director may allow or establish appropriate site-specific sampling procedures or requirements, including sampling locations, the season in which the sampling takes place, the minimum duration between the previous measurable storm event and the storm event sampled, the minimum or maximum level of precipitation required for an appropriate storm event, the form of precipitation sampled (snow melt or rainfall), protocols for collecting samples under 40 CFR Part 136, and additional time for submitting data on a case-by-case basis.

B. **Reporting:** All levels must be reported as concentration and as total mass. You may report some or all of the required data by attaching separate sheets of paper instead of filling out pages VII-1 and VII-2 if the separate sheets contain all the required information in a format which is consistent with pages VII-1 and VII-2 in spacing and in identification of pollutants and columns. Use the following abbreviations in the columns headed "Units."

Concentration		Mass	
ppm	parts per million	lbs	pounds
mg/1	milligrams per liter	ton	tons (English tons)
ppb	parts per billion	mg	milligrams
ug/1	micrograms per liter	g	grams
kg	kilograms	T	tonnes (metric tons)

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

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

(2) All approved analytical methods for the metal inherently measure only its dissolved form (e.g., hexavalent chromium); or

(3) The permitting authority 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 CWA. If you measure only one grab sample and one flow-weighted composite sample for a given outfall, complete only the "Maximum Values" columns and insert "1" into the "Number of Storm Events Sampled" column. The permitting authority may require you to conduct additional analyses to further characterize your discharges.

Item V

Provide a certification that all outfalls that should contain storm water discharges associated with industrial activity have been tested or evaluated for the presence of non-storm water discharges which are not covered by an NPDES permit. Tests for such non-storm water discharges may include smoke tests, fluorometric dye tests, analysis of accurate schematics, as well as other appropriate tests. Part B must include a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test. All non-storm water discharges must be identified in a Form 2C or Form 2E which must accompany this application (see beginning of instructions under section titled "Who Must File Form 2F" for a description of when Form 2C and Form 2E must be submitted).

Item VI

Provide a description of existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years.

Item VII-A, B, and C

These items require you to collect and report data on the pollutants discharged for each of your outfalls. Each part of this item addresses a different set of pollutants and must be completed in accordance with the specific instructions for that part. The following general instructions apply to the entire item.

General Instructions

Part A requires you to report at least one analysis for each pollutant listed. Parts B and C require you to report analytical data in two ways. For some pollutants addressed in Parts B and C, if you know or have reason to know that the pollutant is present in your discharge, you may be required to list the pollutant and test (sample and analyze) and report the levels of the pollutants in your discharge. For all other pollutants addressed in Parts B and C, you must list the pollutant if you know or have reason to know that the pollutant is present in the discharge, and either report quantitative data for the pollutant or briefly describe the reasons the pollutant is expected to be discharged. (See specific instructions on the form and below for Parts A through C.) 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 effluent or similar effluent.

A. **Sampling:** The collection of the samples for the reported analyses should be supervised by a person experienced in performing sampling of industrial wastewater or storm water discharges. You may contact EPA or your State permitting authority for detailed guidance on sampling techniques and for answers to specific questions. 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. The time when you sample should be representative, to the extent feasible, of your treatment system operating properly with no system upsets. Samples should be collected from the center of the flow channel, where turbulence is at a maximum, at a site specified in your present permit, or at any site adequate for the collection of a representative sample.

   For pH, temperature, cyanide, total phenols, residual chlorine, oil and grease, and fecal coliform, grab samples taken during the first 30 minutes (or as soon thereafter as practicable) of the discharge must be used (you are not required to analyze a flow-weighted composite for these parameters). For all other pollutants both a grab sample collected during the first 30 minutes (or as soon thereafter as practicable) of the discharge and a flow-weighted composite sample must be analyzed. However, a minimum of one grab sample may be taken for effluents from holding ponds or other impoundments with a retention period of greater than 24 hours.

   All samples shall be collected from the discharge resulting from a storm event that is greater than 0.1 inches and at least 72 hours from the previously measurable (greater than 0.1 inch rainfall) storm event. Where feasible, the variance in the duration of the event and the total rainfall of the event should not exceed 50 percent from the average or median rainfall event in that area.

   A grab sample shall be taken during the first thirty minutes of the discharge (or as soon thereafter as practicable), and a flow-weighted composite shall be taken for the entire event or for the first three hours of the event.

   Grab and composite samples are defined as follows:

Item I

You may use the map you provided for Item XI of Form 1 to determine the latitude and longitude of each of your outfalls and the name of the receiving water.

Item II-A

If you check "yes" to this question, complete all parts of the chart, or attach a copy of any previous submission you have made to EPA containing the same information.

Item II-B

You are not required to submit a description of future pollution control projects if you do not wish to or if none is planned.

Item III

Attach a site map showing topography (or indicating the outline of drainage areas served by the outfall(s) covered in the application if a topographic map is unavailable) depicting the facility including:

each of its drainage and discharge structures;

the drainage area of each storm water outfall;

paved areas and building within the drainage area of each storm water outfall, each known past or present areas used for outdoor storage or disposal of significant materials, each existing structural control measure to reduce pollutants in storm water runoff, materials loading and access areas, areas where pesticides, herbicides, soil conditioners and fertilizers are applied;

each of its hazardous waste treatment, storage or disposal facilities (including each area not required to have a RCRA permit which is used for accumulating hazardous waste for less than 90 days under 40 CFR 262.34);

each well where fluids from the facility are injected underground; and

springs, and other surface water bodies which receive storm water discharges from the facility;

Item IV-A

For each outfall, provide an estimate of the area drained by the outfall which is covered by impervious surfaces. For the purpose of this application, impervious surfaces are surfaces where storm water runs off at rates that are significantly higher than background rates (e.g., predevelopment levels) and include paved areas, building roofs, parking lots, and roadways. Include an estimate of the total area (including all impervious and pervious areas) drained by each outfall. The site map required under item III can be used to estimate the total area drained by each outfall.

Item IV-B

Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored, or disposed in a manner to allow exposure to storm water; method of treatment, storage or disposal of these materials; past and present materials management practices employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied. Significant materials should be identified by chemical name, form (e.g., powder, liquid, etc.), and type of container or treatment unit. Indicate any materials treated, stored, or disposed of together. "Significant materials" includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

Item IV-C

For each outfall, structural controls include structures which enclose material handling or storage areas, covering materials, berms, dikes, or diversion ditches around manufacturing, production, storage or treatment units, retention ponds, etc. Nonstructural controls include practices such as spill prevention plans, employee training, visual inspections, preventive maintenance, and housekeeping measures that are used to prevent or minimize the potential for releases of pollutants.

Appendix 2(e) Form 2F—Application for Permit to Discharge Storm Water Associated with Industrial Activity*

Instructions - Form 2F
Application for Permit to Discharge Storm Water Associated with Industrial Activity

Who Must File Form 2F

Form 2F must be completed by operators of facilities which discharge storm water associated with industrial activity or by operators of storm water discharges that EPA is evaluating for designation as a significant contributor of pollutants to waters of the United States, or as contributing to a violation of a water quality standard.

Operators of discharges which are composed entirely of storm water must complete Form 2F (EPA Form 3510-2F) in conjunction with Form 1 (EPA Form 3510-1).

Operators of discharges of storm water which are combined with process wastewater (process wastewater is water that comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, waste product, or wastewater) must complete and submit Form 2F, Form 1, and Form 2C (EPA Form 3510-2C).

Operators of discharges of storm water which are combined with nonprocess wastewater (nonprocess wastewater includes noncontact cooling water and sanitary wastes which are not regulated by effluent guidelines or a new source performance standard, except discharges by educational, medical, or commercial chemical laboratories) must complete Form 1, Form 2F, and Form 2E (EPA Form 3510-2E).

Operators of new sources or new discharges of storm water associated with industrial activity which will be combined with other nonstormwater new sources or new discharges must submit Form 1, Form 2F, and Form 2D (EPA Form 3510-2D).

Where to File Applications

The application forms should be sent to the EPA Regional Office which covers the State in which the facility is located. Form 2F must be used only when applying for permits in States where the NPDES permits program is administered by EPA. For facilities located in States which are approved to administer the NPDES permits program, the State environmental agency should be contacted for proper permit application forms and instructions.

Information on whether a particular program is administered by EPA or by a State agency can be obtained from your EPA Regional Office. Form 1, Table 1 of the "General Instructions" lists the addresses of EPA Regional Offices and the States within the jurisdiction of each Office.

Completeness

Your application will not be considered complete unless you answer every question on this form and on Form 1. If an item does not apply to you, enter "NA" (for not applicable) to show that you considered the question

Public Availability of Submitted Information

You may not claim as confidential any information required by this form or Form 1, whether the information is reported on the forms or in an attachment. Section 402(j) of the Clean Water Act requires that all permit applications will be available to the public. This information will be made available to the public upon request.

Any information you submit to EPA which goes beyond that required by this form, Form 1, or Form 2C you may claim as confidential, but claims for information which are effluent data will be denied.

If you do not assert a claim of confidentiality at the time of submitting the information, EPA may make the information public without further notice to you. Claims of confidentiality will be handled in accordance with EPA's business confidentiality regulations at 40 CFR Part 2.

Definitions

All significant terms used in these instructions and in the form are defined in the glossary found in the General Instructions which accompany Form 1.

EPA ID Number

Fill in your EPA Identification Number at the top of each odd-numbered page of Form 2F. You may copy this number directly from item I of Form 1.

* ***Editor's Note:*** This form has been reduced and is included as a sample only.

Continued from the Front

IV. Narrative Description of Pollutant Sources

A. For each outfall, provide an estimate of the area (include units) of impervious surfaces (including paved areas and building roofs) drained to the outfall, and an estimate of the total surface area drained by the outfall.

Outfall Number	Area of Impervious Surface *(provide units)*	Total Area Drained *(provide units)*	Outfall Number	Area of Impervious Surface *(provide units)*	Total Area Drained *(provide units)*

B. Provide a narrative description of significant materials that are currently or in the past three years have been treated, stored or disposed in a manner to allow exposure to storm water; method of treatment, storage, or disposal; past and present materials management practices employed, in the last three years, to minimize contact by these materials with storm water runoff; materials loading and access areas; and the location, manner, and frequency in which pesticides, herbicides, soil conditioners, and fertilizers are applied.

C. For each outfall, provide the location and a description of existing structural and nonstructural control measures to reduce pollutants in storm water runoff; and a description of the treatment the storm water receives, including the schedule and type of maintenance for control and treatment measures and the ultimate disposal of any solid or fluid wastes other than by discharge.

Outfall Number	Treatment	List Codes from Table 2F-1

V. Nonstormwater Discharges

A. I certify under penalty of law that the outfall(s) covered by this application have been tested or evaluated for the presence of nonstormwater discharges, and that all nonstormwater discharges from these outfall(s) are identified in either an accompanying Form 2C or Form 2E application for the outfall.

Name and Official Title *(type or print)*	Signature	Date Signed

B. Provide a description of the method used, the date of any testing, and the onsite drainage points that were directly observed during a test.

VI. Significant Leaks or Spills

Provide existing information regarding the history of significant leaks or spills of toxic or hazardous pollutants at the facility in the last three years, including the approximate date and location of the spill or leak, and the type and amount of material released.

EPA ID Number *(copy from Item I of Form 1)*

Continued from Page 2

VII. Discharge Information

A,B,C, & D: See instructions before proceeding. Complete one set of tables for each outfall. Annotate the outfall number in the space provided. Tables VII-A, VII-B, and VII-C are included on separate sheets numbered VII-1 and VII-2.

E: Potential discharges not covered by analysis - is any pollutant listed in Table 2F-2 a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes *(list all such pollutants below)* ☐ No *(go to Section IX)*

VIII. Biological Toxicity Testing Data

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ Yes *(list all such pollutants below)* ☐ No *(go to Section IX)*

IX. Contract Analysis Information

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☐ Yes *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ No *(go to Section X)*

A. Name	B. Address	C. Area Code & Phone No.	D. Pollutants Analyzed

X. 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.

A. Name & Official Title *(type or print)*	B. Area Code and Phone No.
C. Signature	D. Date Signed

EPA ID Number *(copy from Item I of Form 1)*

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VII. Discharge Information *(Continued from page 3 of Form 2F)*

Part A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		
Oil and Grease						
Biological Oxygen Demand (BOD5)						
Chemical Oxygen Demand (COD)						
Total Suspended Solids (TSS)						
Total Kjeldahl Nitrogen						
Nitrate plus Nitrite Nitrogen						
Total Phosphorus						
pH	Minimum	Maximum	Minimum	Maximum		

Part B - List each pollutant that is limited in an effluent guideline which the facility is subject to or any pollutant listed in the facility's NPDES permit for its process wastewater (if the facility is operating under an existing NPDES permit). Complete one table for each outfall. See the instructions for additional details and requirements.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		

Continued from the Front

Part C - List each pollutant shown in Tables 2F-2, 2F-3, and 2F-4 that you know or have reason to believe is present. See the instructions for additional details and requirements. Complete one table for each outfall.

Pollutant and CAS Number *(if available)*	Maximum Values *(include units)*		Average Values *(include units)*		Number of Storm Events Sampled	Sources of Pollutants
	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite	Grab Sample Taken During First 30 Minutes	Flow-weighted Composite		

Part D - Provide data for the storm event(s) which resulted in the maximum values for the flow weighted composite sample.

1. Date of Storm Event	2. Duration of Storm *(in minutes)*	3. Total rainfall during storm event *(in inches)*	4. Number of hours between beginning of storm measured and end of previous measurable rain event	5. Maximum floe rate during rain event *(gallons/minute or specify units)*	6. Total flow from rain event *(gallons or specify units)*	7. Season sample was taken	8. Form of Precipitation *(rainfall, snowmelt)*

9. Provide a description of the method of flow measurement or estimate.

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