APPENDIX D
STORMWATER MONITORING PROGRAMS

Appendix D – Stormwater Monitoring Programs

SAN DIEGO
INTERNATIONAL
AIRPORT

APPENDIX D-1

DRY WEATHER ANALYTICAL MONITORING PROGRAM

1.0 INTRODUCTION

As required under San Diego Regional Water Quality Control Board (RWQCB) Order No. R9-2007-0001, National Pollutant Discharge Elimination System (NPDES) No. CAS0108758, referred to herein as the Municipal Permit, the San Diego County Regional Airport Authority (Authority) is required to develop and implement a program to detect and eliminate illicit connections and illegal discharges to the Authority's public storm drain system, also referred to as the municipal separate storm sewer system or MS4. This program is described in Chapter 9 of the Authority's Storm Water Management Plan (SWMP), entitled "Illicit Discharge Detection and Elimination Component." The SWMP represents the Authority's jurisdictional urban runoff management program (JURMP) document required by the Municipal Permit.

Non-storm water discharges, as defined by the Municipal Permit, include all discharges to and from an MS4 that do not originate from precipitation events (all discharges from an MS4 other than storm water). Non-storm water discharges include illicit discharges, non-prohibited discharges, and NPDES permitted discharges. An illicit discharge is any discharge to an MS4 that is not composed entirely of storm water, except discharges pursuant to an NPDES permit and discharges resulting from fire-fighting activities [40 CFR 122.26(b)(2)]. Illicit connections are connections to an MS4 that convey an illicit discharge.

A requirement and critical element of the Illicit Discharges Detection and Elimination Component (IDD/EC) is a Dry Weather Analytical Monitoring Program, as specified under Section D.4.c in the Municipal Permit and in the Receiving Waters Monitoring and Reporting Program of the Municipal Permit. The Dry Weather Analytical Monitoring Program is required to consist of the development of an MS4 map, field observations, field screening monitoring, and analytical monitoring at selected stations. The purpose of the program is to detect and eliminate illicit connections and illicit discharges to an MS4 using frequent, geographically-widespread dry weather discharge monitoring and follow-up investigations.

2.0 PROGRAM COMPONENTS

2.1 STORM DRAIN SYSTEM MAPPING

Pursuant to Section D.4.c and the Receiving Waters Monitoring and Reporting Program of the Municipal Permit, the Authority is required to update its MS4 Map. As defined by the Municipal Permit, an MS4 consists of all conveyances within the Authority, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, and storm drains, owned or operated by the Authority. The Authority has updated this map and it is provided in the Authority's SWMP along with a separate map showing dry weather field screening and analytical monitoring stations (Figure 3). The accuracy of the MS4 Map is confirmed during dry weather field screening and analytical monitoring, and is updated annually.

2.2 SELECTION OF DRY WEATHER FIELD SCREENING AND ANALYTICAL MONITORING STATIONS

The Municipal Permit allows dry weather monitoring stations to be selected non-randomly, provided that the coverage of the MS4 meets or exceeds that provided by the random grid system method.

After the Authority's initial dry weather monitoring event in 2003, the dry weather monitoring locations were modified to coincide with the wet weather sampling locations. Those locations were modified in 2005 and 2006 and finalized in 2007. The Authority now has ten dry weather monitoring locations within its jurisdiction based on a review of the potential pollutants, pollutant sources, and scope of operations within the drainage basins. Drainage basins 1, 2, 3, 4, 5, 6, 7, 8, 12, and 13 contain industrial activities. As a result of the volume and types of activities, illicit discharges and/or illicit connections are more likely to occur in these drainage basins. Drainage basins 9, 10, and 11 are not significantly affected by industrial activities at San Diego International Airport (SDIA) but are affected by municipal activities at SDIA. Drainage basin 10 was selected for monitoring and can be considered to be representative of drainage basins 9 and 11. Drainage basins 2, 4, and 13 are considered substantially identical. However, there were no convenient monitoring locations in any of these drainage basins, so no formal monitoring will be performed in those basins. Monitoring locations within a given drainage basin were selected as far downstream as possible to capture as many areas with industrial activities and sources of potential illicit discharges as possible. Monitoring stations selected for dry weather monitoring are listed in Table D1-1 and consist of ten primary locations.

Additionally, many of the stations are located along maintenance routes and other commonly traveled areas, therefore, informal (cursory) field observations of these stations could be as often as every week. Informal field observations typically consist of a brief visual inspection, whereas a formal field observation consists of complete documentation of the observations on a field form.

TABLE D1-1

SAMPLING LOCATIONS FOR DRY WEATHER MONITORING

Drainage Basin	Sampling Location ID	Sampling Method	Location Description
1	C-B01-1	Grab	Inlet pipe or sheet flow at storm drain inlet
3	C-B03-2	Grab	Inlet pipe or sheet flow at storm drain inlet
5	C-B05-3	Grab	Inlet pipe or sheet flow at storm drain inlet
5	C-B05-4	Grab	Inlet pipe or sheet flow at storm drain inlet
6	C-B06-5	Grab	Inlet pipe or sheet flow at storm drain inlet
7	C-B07-6	Grab	Inlet pipe in manhole west of ASIG/American OWS

Drainage Basin	Sampling Location ID	Sampling Method	Location Description
7	C-B07-7	Grab	Sheet flow at storm drain inlet at end of concrete swale
8	C-B08-8	Grab	Sheet flow from the loading area of Terminal 1
12	C-B12-9	Grab	Inlet pipe at storm drain inlet west of T2W OWS
10	C-B09-10	Grab	Sheet flow at storm drain curb inlet at S perimeter of T2 parking lot.

2.3 DRY WEATHER ANALYTICAL MONITORING PROCEDURES

2.3.1 Monitoring Frequency

The Authority is required to monitor each dry weather monitoring station at least once annually between May 1 and September 30. Field screening and analytical monitoring of dry weather monitoring stations will be scheduled to coincide with the dry weather and coastal monitoring conducted by the Port of San Diego. As a result of this coordination, the Authority will monitor each dry weather station more than once between May 1 and September 30, thereby meeting the Municipal Permit requirements.

A master Monitoring Station Checklist will be used to track the stations that have been visited for formal observations within the sampling period, and those that have not. The Authority will retain records of all monitoring information, including all calibration and maintenance records of monitoring instrumentation, for a period of at least five (5) years from the date of sample collection or measurement. This period may be extended by request of the Regional Board or the USEPA at any time and shall be extended during the course of any unresolved litigation regarding a discharge. Records of monitoring information shall include [40CFR 122.41(j)(3)]:

1. The date, exact place, and time of sampling or measurements;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used;
6. The results of such analyses.

All sampling, sample preservation, and analyses must be conducted according to test procedures approved under 40 CFR Part 136 and meet the minimum levels (MLs) in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Resolution No. 2000-030, April, 26, 2000) of the California Toxics Rule (CTR) published in 65 Fed.Reg. 31682-31719 (May 18, 2000), unless otherwise specified by the Municipal Permit.

2.3.2 Field Screening and Observations

If flow or ponded runoff is observed at a dry weather field screening and analytical monitoring station, and there has been at least seventy-two (72) hours of dry weather, the Authority will make observations and collect at least one (1) grab sample for the purpose of conducting field screening analyses.

Informal field observations typically consist of a brief visual inspection, whereas a formal field observation involves the complete documentation of the observations on a field form. The field form used by the Authority is the Dry Weather Monitoring Field Datasheet developed by the Copermittees. The monitoring data sheet consists of three parts: general information; atmospheric and runoff conditions; and field screening analytical results, analytical laboratory results, and flow measurements. The field data sheet is reviewed and updated annually by the Copermittees as a group.

The general information section provides basic, but relevant, information such as the location, date, time, weather information (time since last rain, quantity of last rain), and site description (conveyance type, dominant and secondary land uses, etc.).

The atmospheric and runoff conditions section of the form is intended to provide a general assessment of the observed dry weather flow or ponded water, including variables such as odor, water clarity, the presence of floatables, and color, together with any visible deposits or stains; the vegetation and biological characteristics of the area; and an assessment of trash in the receiving water and runoff. The assessment of trash shall provide information on the spatial extent, types, and amount of trash present. A photograph of the site can document the site conditions for the record and future reference, and should be taken when deemed appropriate by monitoring personnel.

The field screening and the analytical laboratory results sections allow space to record the appropriate test results. These sections only need to be completed if flow or ponding is observed and if a sample is collected (see Section 2.3.3 for information on how many and how often samples need to be collected and sent to the laboratory).

The flow measurements portion of the form includes width of water surface, approximate depth of water, approximate flow velocity, and flow rate measurements. This information only needs to be completed when flow is present.

At a minimum, the following constituents will be analyzed during field screening of flow or ponded water at all dry weather monitoring stations:

- Specific Conductance (estimates of TDS will be calculated from conductivity),
- Water Temperature,
- pH,
- Turbidity,
- Reactive Phosphorus (Ortho-P),
- Nitrate Nitrogen,
- Ammonia Nitrogen,
- Surfactants (MBAS).

Additional constituents may also be analyzed to aid in the field screening effort. All results of the field screening will be recorded on the monitoring datasheet.

At a minimum, 25 percent of dry weather monitoring stations where ponded or flowing water is observed must be sampled annually and the samples submitted for analytical laboratory analysis. Personnel conducting the monitoring will use their discretion as to the need to collect a grab sample at a particular site. The following factors will be considered: the results of the field screening analysis, the conditions and characteristics of the site and the runoff, the occurrence of illicit connections or illegal discharges at the location in the past, the conditions and uses in the tributary area, and other relevant factors. Once results of the analyses are available, they will be recorded on the monitoring field data sheet for that site.

Samples will be analyzed for the following constituents in a laboratory certified by the State of California Department of Health Services:

- Total hardness;
- Oil and grease;
- Diazinon and chlorpyrifos;
- Dissolved cadmium, copper, lead, and zinc;
- Enterococcus, total coliform, and fecal coliform bacteria.*

*Colilert and Enterolert may be used as alternative methods with Fecal Coliform determined by calculations.

FIELD EQUIPMENT CHECKLIST

The field equipment listed below will be used to conduct dry weather monitoring. This list will be reviewed prior to conducting monitoring to ensure that the proper materials are available.

1. Field Notebook consisting of:
    - Monitoring station checklist,
    - Site map,
    - Monitoring data sheets,
    - Point of Contact (POC) list,
    - Health and Safety Plan,
    - Photographs of monitoring stations.
2. Field Kit including:
    - Sample collection equipment;
    - Clipboard;
    - Pens and/or pencils;
    - Permanent felt tip pen;
    - Digital camera;
    - Nitrile gloves;
    - Protective eyeglasses or goggles;
    - Rubber boots/waders;
    - Paper towels;

- Tape;
- Small, clear container for visual observations;
- Crate for carrying supplies and equipment;
- Portable Field Test Kits, colorimeters or spectrophotometer, and reagents for meters;
- Multi-parameter or individual probes to measure temperature, electrical conductivity, pH, and turbidity;
- De-ionized water in squeeze bottles;
- Thermometer;
- Extra batteries for all meters;
- Waste disposal bottles;
- Polypropylene bucket with rope, or a sampling rod;
- Sample bottles with preservatives;
- Coolers with bagged ice and bubble wrap;
- Pick or manhole puller;
- Flow measurement equipment (required equipment will depend on method used):
  - Measuring tape for measuring stream width,
  - Folding scale for measuring stream depth,
  - Flow meter or wristwatch;
- Extra sample containers;
- Safety harness or flotation device.

2.3.3 Alternate Stations

If a station is dry (no flowing or ponded runoff), the Authority will make and record applicable observations and select another station for monitoring if alternate stations are available.

2.3.4 Investigation Action Criteria

The Authority will rely on the latest action criteria developed by the Copermittee dry weather monitoring workgroup, listed in Tables D1-2 and D1-3, to determine if a follow-up investigation is required. An exceedance of these criteria will necessitate a follow-up investigation to identify and eliminate the source causing the exceedance. The action criteria will not be the sole criteria for initiating an investigation, however. Monitoring personnel will use their discretion to determine if a source investigation is necessary. The decision will be based on the site-specific characteristics. Within 48 hours of receiving dry weather field screening or analytical laboratory results that exceed an action level, the Authority will either conduct an investigation to identify the source of the discharge or provide the rationale for why the discharge does not pose a threat to water quality and does not need further investigation. Obvious illicit discharges (e.g., color, odor, or exceedance of an action level) will be investigated immediately. Dry weather screening and analytical monitoring stations identified to exceed dry weather monitoring criteria for any constituent will continue to be screened in subsequent years.

TABLE D1-2

ACTION CRITERIA FOR ANALYTES – FIELD SCREENING

Analytes	Action Levels[1]	Source/Notes
pH	<6.5 or >9.0	Basin Plan, with allowance for elevated pH due to excessive photosynthesis. Elevated pH is especially problematic in combination with high ammonia.
Orthophosphate-P (mg/L)	2.0	USEPA Multi-sector General Permit
Nitrate-N (mg/L)	10.0	Basin Plan and drinking water standards
Ammonia-N (mg/L)	1.0	Based on Workgroup experience. May also consider unionized ammonia fraction.
Turbidity (NTU)	Best Professional Judgment	WQOs relevant to inland surface waters are not available. Base judgment on channel type and bottom, time since last rain, background levels, and, most importantly, visual observation (e.g., unusual colors and lack of clarity) and unusual odors.
Temperature (F or C)	Best Professional Judgment	Base judgment on season, air temperature, channel type, shading, etc.
Conductivity (mS/cm)	Best Professional Judgment	Values > 5 mS/cm may indicate IC/ID; however, EC may be elevated in some regions due to high TDS from groundwater exfiltration to surface water, mineral dissolution, drought, and seawater intrusion. Normal source ID and discharge elimination work is not effective in these situations. Knowledge of area background conditions is important. Values < 0.75mS/cm may indicate excessive potable water discharge or flushing.
MBAS (mg/L)	1.0	Basin Plan, with allowance based on Workgroup field experience and possible field reagent interferences.

[1] The referenced action level will not be the sole criteria for initiating a source identification. Dry weather monitoring data will be interpreted using the various available information, including best professional judgment, and within- and between-site sample variability.

TALE D1-3

ACTION CRITERIA FOR ANALYTES – ANALYTICAL MONITORING

Analytes	Action Levels[1]	Source/Notes
Oil and Grease (mg/L)	15	USEPA Multi-sector General Permit. If a petroleum sheen is observed, the sample will be collected from the water surface. Visual observations may justify immediate investigation.
Diazinon (μg/L)	0.5	Response to diazinon and chlorpyrifos levels above 0.5 μg/L will focus on education and outreach to potential dischargers in the target drainage basin. High levels will be investigated aggressively, as with other potential IC/IDs.
Chlorpyrifos (μg/L)	0.5	
Dissolved Cadmium (μg/L)	California Toxics Rule	Use California Toxics Rule Table 1-hour criteria to determine the appropriate action level for individual samples. Table provides benchmarks based on hardness and dissolved metal concentrations. For example, at 300 mg/L hardness the following action levels apply: Cd – 14 μg/L, Pb – 209 μg/L, and Zn – 297 μg/L.
Dissolved Copper (μg/L)	California Toxics Rule	
Dissolved Lead (μg/L)	California Toxics Rule	
Dissolved Zinc (μg/L)	California Toxics Rule	
Total Coliform (MPN/100mL)	50,000	Action levels are based on upper 90% confidence level of Copermittees 2002 dry weather analytical monitoring data.
Fecal Coliform (MPN/100mL)	20,000	
Enterococcus (MPN/100mL)	10,000	

[1] The referenced action level will not be the sole criteria for initiating a source identification. Dry weather monitoring data will be interpreted using the various available information, including best professional judgment, and within- and between-site sample variability.

2.3.5 Investigations and Elimination of Discharges and Connections

Follow-up source investigations and procedures for the elimination of illicit discharges and connections will be conducted as described below. Source investigations will typically be conducted by the Environmental Affairs monitoring personnel. Source investigations are initiated when observations, field screening results, laboratory analytical results, or a reported complaint suggest a reasonable potential for the existence of an illicit discharge. The Municipal Permit requires the Authority to conduct an investigation to identify the source or rationale for why the discharge does not pose a threat to water quality within two business days of receiving dry weather field screening or laboratory results that exceed action levels.

STEP 1 – LOCATION OF OBSERVATION

Source investigations begin at the location where the observations that initiated the investigation were made. If the observations were made by someone other than the person or persons conducting the investigation (the investigators), or if they were made more than several hours prior to the initiation of the source investigation, the source investigation should begin with a thorough visual inspection of the location. If flows exist, samples should be collected for field screening and laboratory analysis as deemed appropriate by the investigators. If the illicit discharge is still occurring and is deemed to pose a substantial threat to resources and humans downstream, if feasible, actions should be take immediately by the Authority to prevent or retard the discharge from flowing further downstream.

STEP 2 – SOURCE TRACKING DETERMINATION

While at the observation location, the investigator should consult various resources such as MS4 and land use maps to determine the characteristics of the tributary areas and upstream communities. In some circumstances, the investigator may be able to identify probable sources of the illicit discharge based on the expected activities of certain upstream sites or the results of previous investigations. In these circumstances, the investigator may choose to go directly to these potential sources to investigate. If inspections of these potential sources do not reveal the source of the illicit discharge, or if potential sources are too numerous, then the investigator should track the discharge upstream.

If the discharge has ceased it may be impossible to track the source. In these circumstances, the investigator should document that the discharge has ceased and cannot be tracked. A brief drive or walkthrough survey of the tributary area should be conducted and documented to verify that there is no obvious source. In some cases, the sources may still be identified by evidence at the site or further upstream. For example, if a sediment laden discharge was reported, an upstream site may reveal signs of sediment discharge such as deposits along curbs or in inlets, signs of eroded slopes, or exposed soils lacking required BMPs.

STEP 3 – SOURCE TRACKING

When source tracking, the investigator should use MS4 maps and other resources to aid in the investigation. Any traceable characteristic of the illicit discharge (color, constituents, odor, quantity, etc.) should be noted, as these will aid the investigator in tracking and identifying sources. The Authority's strategy to source tracking is to track the discharge upstream, thereby reducing the tributary area and potential sources. While working upstream along the MS4, the investigator may encounter tributary pipes or inlets and each should be evaluated for their potential to be the conveyor of the discharge. If a pipe or inlet is dry, it can automatically be eliminated if the illicit discharge is still occurring. If a pipe or inlet is the source of the flow in the main portion of the MS4, then the tracking should continue along that pipe or inlet. If the main portion of the MS4 and the tributary pipe or inlet both contain flow, more detailed observations must be made. The investigator may be able to rule out a conveyance based on visual observations, characteristics of the illicit discharge, or field screening to identify constituents.

Once the set of possible sources has been reduced to a manageable set, the investigator may choose to end the source tracking and continue the investigation by inspecting the various potential sources. However, if none of these potential sources can be identified as the source of the discharge, or if the investigator cannot identify any potential sources, the source tracking may continue all the way to the source.

Tracking along underground MS4 conveyances is more difficult because observations can only be made at the locations of manholes, outlets, and inlets. The MS4 map will be useful for these investigations. When the map indicates the confluence of two MS4 conveyances, or if an unmapped confluence is suspected, if possible, the investigator should make observations at the point of confluence. Otherwise, the investigator should make observations at the nearest access point upstream along each conveyance. When tracking along underground conveyances, the investigator should be aware that the source of discharge may be an illicit connection or unmapped confluence existing between observation points. The investigator should check surrounding inlets, the surrounding area, and appropriate Authority personnel or records for evidence of infrastructure construction or other activities that might have resulted in an illicit connection. In the case of chronic illicit discharges for which a source cannot be identified, the Authority may choose to conduct dye testing, smoke testing, video monitoring, underground visual inspections, and/or continued water monitoring at the suspected source(s).

STEP 4 – DISCHARGE ELIMINATION

Once the source of a discharge has been identified, if the discharge is still occurring, it must be eliminated. The investigators should contact appropriate Authority personnel who will issue the necessary enforcement mechanism to the discharger to ensure that alterations are implemented to terminate the discharge and clean up the discharge. In cases where the responsible party is present at the source, or the discharge poses a substantial threat to humans or the environment, the investigator may choose to confront the responsible party before appropriate Authority personnel arrive in order to terminate the discharge as quickly as possible. The actions required of the responsible party to eliminate the illicit discharge will vary depending on type of illicit discharge. Clean up or remediation actions may also be required of the responsible party depending on the type and impact of the illicit discharge.

STEP 5 – DAMAGE ASSESSMENT

After the discharge has been terminated, the inspector or other Authority personnel should travel downstream from the discharge to assess the impacts that the discharge caused to downstream resources. Additional remediation may be required of the responsible party if downstream impacts are detected and monitoring may also be necessary to ensure recovery of downstream areas. Authority personnel may also want to consider the level of downstream impact caused by the illicit discharge prior to deciding on which level of enforcement action is appropriate for the case.

STEP 6 - REPORTING

Based on the type of discharge and the damage assessment, the Authority may be required to immediately report the discharge to the RWQCB. The Authority submits the Annual Report to the RWQCB that includes a description of investigations and follow-up actions for illicit discharges and connections, reports the number of illicit discharges and connections identified, and the number eliminated for the previous fiscal year.

3.0 SAMPLING PROCEDURES

Dry weather monitoring involves the collection of grab samples only. The following procedures will be followed:

- Put on clean, nitrile gloves and prepare sample collection devices, if necessary.
- Remove the required pre-labeled sample containers from the cooler (see Tables D1-4 and D1-5 for appropriate containers to use) and fill out the remaining information on the label with a waterproof pen: date, time, and sampler's initials.
- If samples are not collected directly into the sample container (for instance, when a bucket is used to collect the sample), rinse the sample collection device three times with water discharging from the sample location before collecting the sample. Disposable sampling equipment (e.g., bucket liners) will be used at each sample location. Also, rinse sample containers that DO NOT contain a preservative three times prior to sample collection.
- Collect representative samples at a point below the surface of the flow (at about half of the water's depth) and midway across the flow as close as possible. Avoid stagnant pools near the edge of flowing water unless the purpose is to sample a stagnant pool.
- If entering the water is necessary for sampling, enter the flow downstream of the sampling location disturbing as little of the bottom material as possible. Always collect the sample upstream of your position so that the sample will not be contaminated by you or materials on the bottom of the channel that you may have disturbed.
- Measure water quality parameters, listed in Section 2.3.2, at the time of field screening using the appropriate portable meters, field test kits, and the clear, plastic container used for making observations. Estimate the flow rate (see Dry Weather Monitoring Field Datasheet). Record all observations and field screening results on the field datasheet, and describe any unusual or noteworthy conditions or results in detail on the bottom of the field data sheet.
- Fill sample containers to be sent to the laboratory to the shoulder unless directed otherwise by the laboratory.*
- Cap each container tightly and place it into a cooler. The cooler will have a sufficient amount of ice to maintain a temperature of $4 \pm 2\ ^{o}C$ during transport. If samples need to be stored for an extended period prior to delivery to the laboratory, it may be necessary to renew the ice every 24 hours.
- Dispose of all spent reagents, reacted samples, and rinse solutions in the appropriate waste containers. Upon return to the office, wastes should be decanted into the sewer system.

* Some of the sample containers may contain a small amount of acid as a preservative. To prevent any possible harm to sampling personnel, open the containers with the opening facing away from the face and do not inhale the vapors. When filling the containers, be careful not to spill any acid. If some of the acid does get on the skin, rinse it off thoroughly.

4.0 QUALITY CONTROL/QUALITY ASSURANCE (QC/QA)

The following sections address Quality Assurance and Quality Control (QA/QC) activities associated with both field sampling and laboratory analyses. These general procedures focus on sample collection at SDIA. Field QC samples are collected and used to evaluate potential contamination and sampling error introduced into a sample prior to its submittal to the analytical laboratory. Laboratory QC activities provide information needed to assess potential laboratory contamination and analytical precision and accuracy. Field and Laboratory Data Quality Objectives (DQOs) are summarized in Tables D1-4 and D1-5.

4.1 Field Quality Assurance/Quality Control

Field QA/QC will consist of sample tracking and handling, and the collection of field blanks and field duplicates. Equipment blanks are not required because new, disposable equipment will be used for all sampling locations. Trip blanks are not required because samples will not be analyzed for volatile organic compounds (VOCs).

4.1.1 Sampling Tracking and Handling

Samples will be kept properly chilled and will be transferred to the analytical laboratory within the holding times specified in Table D1-5. To provide for proper tracking and handling of the samples, chain-of-custody procedures and documentation will accompany the samples from initial collection to final extraction and analysis.

To assure quality data results, it is imperative that the analytical laboratory provide confirmation of each analytical test to be conducted, respective reporting limits, analytical methods, and costs before analyses are allowed to be conducted.

4.1.2 Field Blanks

Field blanks are used to determine if contamination is introduced during field sampling activities. They will be prepared by pouring blank water into sampling containers in the field during the sampling period. Blank water is supplied by the laboratory and certified to be free of contaminants. For grab samples, identical equipment used to collect the grab samples will be rinsed with blank water before the blank water is poured into the sample containers. One field blank will be collected for every ten field samples collected per event.

4.1.3 Field Duplicates

Field duplicates are used to assess variability attributable to sample collection, handling, shipment, and storage, and/or laboratory handling and analysis. Procedures for collecting the additional sample volume required for the duplicate field samples will simulate the normal sampling protocols. Twice as much sample volume is required to be collected for duplicates samples. Duplicate grab samples will be collected by filling two grab samples bottles at the same time (simultaneously) or in rapid sequence. Duplicate samples will be labeled separately and will be submitted "blind" to the laboratory. As with field blanks, one field duplicate will be collected for every ten field samples.

TABLE D1-4
DATA QUALITY OBJECTIVES – FIELD SCREENING

Analyte	Container	Analytical Method	Reporting Limits	Accuracy
Specific Conductance	Plastic	Field Meter	0.01	±2%
pH	Plastic	Field Meter	1-14	± 0.01 units
Temperature	Plastic	Field Meter	0.01	±0.3
Turbidity	Plastic	Field Meter	0.05	±2%
MBAS (surfactants)	Plastic	Field Kit	0.5 mg/L	±0.125
Nitrate NO_3-N	Plastic	Field Kit	1.35 mg/L	±0.1
Reactive Phosphorous PO_4-P	Plastic	Field Kit	0.07 mg/L	±0.05
Ammonia NH_3-N	Plastic	Field Kit	0.05 mg/L	±0.05
Copper (Dissolved)	Plastic	Field Kit	5 µg/L	±0.05

TABLE D1-5
DATA QUALITY OBJECTIVES – ANALYTICAL MONITORING

Analyte	Container[1]	Preservative[2]	Holding Time	Analytical Method	Reporting Limits	Accuracy	Precision	
							Matrix Spike	RPD
Oil and Grease (O&G)	Glass	4°C, H_2SO_4 to pH<2	28 days	EPA 1664	5 mg/L	40-140%	±25%	±25%
Hardness	Plastic	4°C, H_2SO_4 to pH<2	6 months	SM 2340C	0.40 mg/L	15%	±25%	±25%
Enterococcus (bacteria)	Sterile plastic	4°C, $Na_2S_2O_2$	6 hours	SM 9230	2 MPN/100mL	--	--	--
Total Coliform (bacteria)	Sterile plastic	4°C, $Na_2S_2O_2$	6 hours	SM 9221 B, E	2 MPN/100mL	--	--	--
Fecal Coliform (bacteria)	Sterile plastic	4°C, $Na_2S_2O_2$	6 hours	SM 9221 B, E	2 MPN/100mL	--	--	--
Diazinon & Chlorpyrifos	Glass	4°C	7 days	EPA 8141B	0.05 μg/L	60-130%	±25%	±25%
Metals (Dissolved)[3]	Teflon, plastic, borosilicate glass	4°C, HNO_3 to pH<2	Filter for dissolved fraction and then preserve with acid, within 48 hours; 6 months to analyze					
Cadmium (Cd)				EPA 200.8	5 μg/L	80-120%	±20%	±20%
Copper (Cu)				EPA 200.8	5 μg/L	80-120%	±20%	±20%
Lead (Pb)				EPA 200.8	5 μg/L	80-120%	±20%	±20%
Zinc (Zn)				EPA 200.8	20 μg/L	80-120%	±20%	±20%

Notes:
MPN = Most Probable Number
RPD = Relative Percent Difference
[1] Container volume size will be determined by the laboratory.
[2] Some analytes with the same preservative can be combined into a single container, if the same laboratory is performing the analyses. Samples volumes and combined analytes will be determined by the laboratory.
[3] Samples to be analyzed for dissolved metals will be filtered in the laboratory prior to preservation by acidification.

4.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

Laboratory quality assurance/quality control includes the following:

- Employing analytical chemists trained in the procedures to be followed;
- Adherence to documented procedures, USEPA methods, written Standard Operating Procedures (SOP), and other approved methods (e.g., Standard Methods for the Examination of Water and Wastewater);
- Laboratory Check Samples;
- Complete documentation of sample tracking, analysis, and reporting.

4.2.1 Laboratory Check Samples

Laboratory check samples will include the use of laboratory duplicates, Method Blanks (MBs), Matrix Spike and Matrix Spike Duplicates (MS/MSDs), and Laboratory Control Spikes (LCS). These laboratory QA/QC activities are discussed below and their applicability to each analyte is summarized in Table D1-5.

LABORATORY DUPLICATES

Laboratory duplicate samples will be generated by the laboratory. Duplicate analyses results will be evaluated by calculating the Relative Percent Difference (RPD) between the two sets of results and will serve as a measure of the reproducibility (precision) of the measured results.

METHOD BLANKS

Method blanks will be run by the laboratory to determine the level of contamination associated with laboratory reagents and equipment. An MB is a sample of a known matrix that has been subjected to the same complete analytical procedure as the field samples to determine if contamination has been introduced into the samples during processing. The results of the MB will be checked against reporting limits for analytes. Method blank results should be less than the reporting limits for each analyte.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATES

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) samples are analyzed for their analytes and then are spiked with a known amount of analyte(s). The results of the analysis of the spiked sample are compared to the unspiked sample results and the "percent recovery" of each spiked analyte is calculated. The MS/MSD results and the calculated RPD allow evaluation of the accuracy and precision of the laboratory analytical method and matrix interferences.

LABORATORY CONTROL SPIKES

The LCS contains a known (spiked) amount of the analyte(s) of interest in a clean matrix and assesses the matrix effects on spike recoveries. High or low recoveries of the analytes in an MS may be caused by interferences from the sample. The LCS assesses these possible matrix effects because the known (clean) matrix is free from matrix interference.

CORRECTIVE ACTION

Corrective action is taken when an analytical result is considered to be anomalous. Reasons include exceeding RPD ranges and/or problems with spike recoveries or blanks. The corrective action varies somewhat from analysis to analysis, but typically involves the following:

- A check of procedures;
- A review of documents and calculations to identify possible errors;
- Correction of errors;
- Similar calculations to improve accuracy;
- A re-analysis of the sample extract, if sufficient volume is available, to determine if results can be improved;
- A complete reprocessing and re-analysis of additional sample material, if available and if the holding time has not been exceeded.

4.2.2 Laboratory Data Package Deliverables

The laboratory deliverable package will include a hard copy and an Electronic Data Deliverable (EDD). The hard copy will include standard narratives identifying any analytical or QA/QC problems and corrective actions. A summary of the following QA/QC elements will be in the data package: sample extract and analysis dates; results of MBs, MSs, and MSDs; summary of analytical accuracy; summary of analytical precision; and reporting limits. The electronic data files will contain all information found in the hard copy reports submitted by the laboratory

4.3 DATA MANAGEMENT AND REPORTING PROCEDURES

The Authority will be responsible for tracking the analytical process to make sure that the laboratories are meeting holding times and are providing a complete deliverable package. The Authority will receive the original hard copy from the laboratory, verify its completeness, and log the date of receipt. Upon receipt from the laboratory, each analytical report will be thoroughly reviewed and the data evaluated to determine if its data meets the project objectives. The data will be screened for the following major items:

- A check between electronic data and the hard copy reports provided by the laboratory;
- Conformity check between the Chain-of-Custody Forms, compositing protocol, and laboratory reports;
- A check for laboratory data report completeness;
- A check for typographical errors in the laboratory reports;
- A check for suspect values.

Following the initial screening, a more complete QA/QC review process will be performed. It will include an evaluation of holding times, method blank contamination, and analytical accuracy and precision from LCSs, MSs, and MSDs. If blank contamination is present, the data will be evaluated and qualified according to USEPA guidelines for organic and inorganic data review. Accuracy will be evaluated by reviewing MS/MSD and LCS recoveries. Depending on the analytical method, precision will be evaluated by reviewing field duplicate, MSD, and laboratory duplicate sample RPDs. Control limits for spike recoveries (accuracy) and RPDs (precision) are defined by the project DQOs listed in Table D1-5.

4.4 ELECTRONIC DATA TRANSFER

The laboratory will provide data in both hard copy and electronic formats. The required form of electronic submittals will be provided to the laboratory to make sure the files can be imported directly into the software. Laboratory data will be maintained and managed with either Microsoft® Excel or Microsoft® Access.

5.0 HEALTH AND SAFETY

Dry weather water sampling sometimes may be necessary when the sampling location and/or the discharge create hazardous conditions. Safety precautions will be used at all times when conducting dry weather monitoring.

SAFETY GUIDELINES

- Keep a first aid kit with field equipment.
- Watch out for traffic along the access road when sampling or making observations.
- Do NOT remain in open areas or stand under trees or tall structures if lightning is occurring in the vicinity.
- Watch your step; the ground may be wet and slippery, steep, or unstable. Do not attempt to climb down unsafe slopes.
- Always wear clean, nitrile rubber gloves when sampling.
- Protect eyes and skin against contact with acids and other preservatives.
- Use common sense when deciding whether to sample during adverse weather conditions. This program is intended to assess dry weather conditions. Do not sample during dangerous conditions, such as high winds.
- Do not enter confined spaces.
- Be familiar with Material Safety Data Sheets (MSDSs) for all chemicals used in the field and when calibrating instruments. Know the health hazards and emergency medical treatments, and follow proper disposal instructions.

SAFETY EQUIPMENT

The following safety equipment is to be readily available for use during dry weather sampling:

- First Aid Kit
- Safety Glasses
- Nitrile Gloves
- Work Boots/Rubber Boots
- Safety Rope
- Cellular Phone
- Safety Vest
- Hard Hat

Appendix D – Monitoring Programs

SAN DIEGO
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AIRPORT

APPENDIX D-2

WET WEATHER MONITORING PROGRAM

Section II.B of the Receiving Waters and Urban Runoff Monitoring and Reporting Program for San Diego Regional Water Quality Control Board Order No. R9-2001-0001, the Municipal Permit, and Section B of the General Industrial Permit require wet weather monitoring. The requirements of both permits have been combined under one sampling program described in this Appendix. The Authority has assumed responsibility for conducting the wet weather monitoring required by the General Industrial Permit. The Authority's monitoring program is structured around compliance with the General Industrial Storm Water Permit, but also includes the Municipal Permit's source identification monitoring requirements.

The General Industrial Permit (Section B.2) objectives and requirements for the storm water monitoring program are included in Section 9 of the SWMP.

The Municipal Permit (Section I of the Receiving Waters and Urban Runoff Monitoring and Reporting Program) lists the following objectives for the overall monitoring program:

a. Assess compliance with the Municipal Permit;

b. Measure and improve the effectiveness of the Copermittees' urban runoff management programs;

c. Assess the chemical, physical, and biological impacts to receiving waters resulting from urban runoff discharges;

d. Characterize urban runoff discharges;

e. Identify sources of specific pollutants;

f. Prioritize drainage and sub-drainage areas that need management actions;

g. Detect and eliminate illicit discharges and illicit connections to the MS4;

h. Assess the overall health of receiving waters.

In addition, this Receiving Waters and Urban Runoff Monitoring and Reporting Program is designed to answer the following core management questions:

a. Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?

b. What is the extent and magnitude of the current or potential receiving water problems?

c. What is the relative urban runoff contribution to the receiving water problem(s)?

d. What are the sources of urban runoff that contribute to receiving water problem(s)?

e. Are conditions in receiving waters getting better or worse?

Specific monitoring requirements of the Municipal Permit as they pertain to the Authority are discussed in Section 5.0 of this Appendix.

1.0 GENERAL INDUSTRIAL STORM WATER PERMIT MONITORING REQUIREMENTS

The General Industrial Storm Water Permit requirements are discussed in Sections 7 and 9 of the SWMP.

2.0 VISUAL OBSERVATIONS

For descriptions of the storm water and non-storm water visual observations performed at SDIA to comply with the General Industrial Permit, see Section 7 of the SWMP. Also, see Sections 3 and 9 and Appendix D1 for descriptions of the non-storm water discharge program at SDIA for compliance with the Municipal Permit.

3.0 SAMPLING AND ANALYSIS

The 2005 Site Audit at SDIA identified pollutants of concern (POCs) based on comparisons of historical storm water quality data to the selected benchmark values outlined in that report. There were 12 analytes that exceeded the benchmark values, namely (in order of descending benchmark exceedance frequency): copper (total and dissolved), total zinc, total aluminum, total iron, biological oxygen demand, chemical oxygen demand, total suspended solids (TSS), oil and grease (O&G), specific conductance, total lead, ethylene glycol, and pH. The General Industrial Permit outlines the analyses that must be performed, i.e., pH, total suspended solids (TSS), total organic carbon (TOC) (oil and grease may be substituted for TOC), specific conductance (SC), toxic chemicals, and other pollutants that are likely to be present in storm water discharges in significant quantities. Analysis is also required for those parameters listed in Table D of the Industrial Storm Water Permit. Applicable parameters for SDIA listed in Table D are biological oxygen demand (BOD), chemical oxygen demand (COD), ammonium (NH_3), and pH. Therefore, the analyses for industrial monitoring sites additional to General Industrial Permit requirements to cover the POCs likely to be present in storm water discharges from SDIA are: copper (total and dissolved), zinc (total and dissolved), total aluminum, total iron, total lead, total petroleum hydrocarbons (TPH), methylene blue active substances (MBAS) and ethylene glycol. MBAS, an indicator of surfactants, was selected because of the aircraft and vehicle washing activities that occur at SDIA. TPH, an indicator of petroleum hydrocarbons, was selected because of the fueling and maintenance operations that occur at SDIA. Hence, samples from the industrial sampling locations will be analyzed for the following analytes:

- O&G
- pH
- SC
- TSS
- Total metals (aluminum, copper, iron, lead, and zinc)
- Dissolved metals (copper and zinc)
- MBAS
- TPH
- BOD
- COD
- NH_3
- Ethylene glycol

If pollutants that are likely to be present in storm water discharges in significant quantities are not detected in significant quantities after two consecutive sampling events and are not specifically required to be analyzed for, the facility operator may eliminate the pollutant from future sample analysis until the pollutant is likely to be present again.

The Authority is not required to analyze a parameter listed in Table D when the parameter is not already required to be analyzed pursuant to Sections B.5.c.i. and ii., or B.6, of the General Industrial Storm Water

Permit, and either of the two following conditions are met: 1) the parameter has not been detected in significant quantities from the last two consecutive sampling events, or 2) the parameter is not likely to be present in storm water discharges and authorized non-storm water discharges in significant quantities based upon the an evaluation of the facilities industrial activities, potential pollutant sources, and the SWMP. If applicable Table D parameters are not analyzed for, the Authority must certify in the Annual Report that the above conditions have been satisfied.

The sampler shall visually observe and collect samples of storm water discharges from all drainage areas that represent the quality and quantity of the facility's storm water discharges from the storm event. Ten sampling locations have been identified for SDIA pursuant to the General Industrial Storm Water Permit and are shown on the SWMP site map (Figure 3), and in Table 1 below.

As described in Table 1, drainage basins 1, 2, 3, 4, 5, 6, 7, 8, 12, and 13 contain industrial activities. Drainage basins 9, 10, and 11 are all parking lot areas and are not significantly affected by industrial activities, but are affected by municipal activities at SDIA. Drainage basin 10 was selected for compliance sampling and can be considered to be representative of drainage basins 9 and 11.

Sampling locations selected for industrial monitoring are described in Table 1 and consist of ten primary locations. Based on a review of the potential pollutants and pollutant sources, and the scope of operations within the drainage basins, drainage basins 2, 4, and 13 are considered substantially identical. All three of the drainage basins had similar RPRs. Drainage basin 13 had the highest RPR; however, there were no convenient sampling locations in drainage basin 13, and similarly, there were no convenient sampling locations in drainage basins 2 or 4, so no sampling will be performed in those basins.

TABLE 1

SAMPLING LOCATIONS FOR COMPLIANCE MONITORING

Drainage Basin	Sampling Location ID	Sampling Method	Location Description
1	C-B01-1	Grab[1]	Sheet flow at storm drain inlet
3	C-B03-2	Grab[1]	Sheet flow at storm drain inlet
5	C-B05-3 (same location as S-B05-5)	Grab[2]	Inlet pipe in storm drain inlet
5	C-B05-4	Grab[1]	Sheet flow at storm drain inlet
6	C-B06-5	Grab[1]	Sheet flow at storm drain inlet
7	C-B07-6	Grab[4]	Inlet pipe in manhole west of OWS
7	C-B07-7	Grab[1]	Sheet flow at storm drain inlet at end of concrete swale
8	C-B08-8 (same	Composite[3]	Sheet flow from the loading area of Terminal 1

Drainage Basin	Sampling Location ID	Sampling Method	Location Description
	location as S-B08-14)		
12	C-B12-9	Grab[4]	Inlet pipe at storm drain inlet 12-05-I
9	C-B09-10 (same location as S-B09-3	Grab[4]	Sheet flow at storm drain curb inlet at SE corner of T2 parking lot/road into parking lot

Notes:
[1] Grab sample collected using a Vortox sampler.
[2] Grab sample collected using automated equipment.
[3] Composite sample collected using automated sampling equipment. Grab samples in this location were not possible because of the high level of aircraft traffic in this area.
[4] Grab sample collected manually.

Sampling locations were selected as far downstream as possible to capture as many areas with industrial activities as possible within a given drainage basin. Where sampling locations are tidal or access is restricted (e.g., when they are over the zipper line), sheet flow runoff will be collected. For drainage basins 5 and 7, however, a single sampling location could not capture all industrial areas. In these drainage basins, multiple sampling locations were selected.

If the Authority determines that the industrial activities and BMPs within two or more drainage areas are substantially identical, it may either 1) collect samples from a reduced number of substantially identical drainage areas, or 2) collect samples from each substantially identical drainage area and analyze a combined sample from each substantially identical drainage area. The Authority must document such a determination in the annual report.

4.0 Sample Collection and Analysis Guidelines

All sampling and sample preservation shall be in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a facility operator's own field instruments for measuring pH and Electro Conductivity) shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. All laboratory analyses must be conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified by the Regional Water Board. With the exception of analysis conducted by facility operators, all laboratory analyses shall be conducted at a laboratory certified for such analyses by the State Department of Health Services. Facility operators may conduct their own sample analyses if the facility operator has sufficient capability (qualified employees, laboratory equipment, etc.) to adequately perform the test procedures. Table 2 shows the data quality objectives, including the analytical methods and corresponding method detection limits used to detect pollutants in storm water discharges. All reporting limits specified in the monitoring program are below (often well below) USEPA Multi-Sector General Permit benchmarks, so that any exceedances of those benchmarks can be identified in the results.

TABLE 2
DATA QUALITY OBJECTIVES

Analyte	Container(1)	Preservative(2)	Holding Time	Analytical Method	Reporting Limits	Accuracy	Precision	
							Matrix Spike	RPD
Specific Conductance	Glass or PE	4°C, Filter if hold time >24 hours	28 days	EPA 120.1	0.5 µmhos/cm	--	--	--
pH	Glass or PE	None	15 minutes	EPA 150.1	± 0.01 units	--	--	--
Temperature	Glass or PE	None	15 minutes	Field Meter	± 0.1°C	--	--	--
Total Suspended Solids (TSS)	Glass or PE	4°C	7 days	EPA 160.2	4 mg/L	75-125%	±20%	±20%
Ethylene glycol	Glass or PE	4°C, HCl to pH<2	7 days extract, 14 days analyze	EPA 8015.1	1 mg/L	75-125%	±25%	±25%
Biological Oxygen Demand (BOD)	Glass or PE	4°C	48 hours	EPA 405.1	2 mg/L	--	--	--
Chemical Oxygen Demand (COD)	Glass or PE	4°C	28 days	EPA 410.4	10 mg/L	65-135%	±20%	±20%
Oil and Grease (O&G)	Glass or PE	4°C, H_2SO_4 to pH<2	28 days	EPA 1664	5 mg/L	40-140%	±25%	±25%
Total Petroleum Hydrocarbons (TPH)	Wide-mouth glass (jet fuel, diesel, and motor oil)	4°C	Extract-7 days, analyze-40 days (diesel, jet fuel, and motor oil)					
- Jet Fuel				EPA 8015B	0.5 mg/L	45-130%	±20%	±20%
- Diesel				EPA 8015B	0.5 mg/L	45-130%	±20%	±20%
- Motor Oil				EPA 8015B	0.5 mg/L	45-130%	±20%	±20%

TABLE 2 (continued)

DATA QUALITY OBJECTIVES

Analyte	Container[1]	Preservative[2]	Holding Time	Analytical Method	Reporting Limits	Accuracy	Precision	
							Matrix Spike	RPD
Metals (Total and Dissolved)[3] Aluminum (Al) Copper (Cu) Iron (Fe) Lead (Pb) Zinc (Zn)	Teflon, PE, borosilicate glass	4°C, HNO_3 to pH<2	Filter for dissolved fraction and preserve within 48 hours; 6 months to analyze	 EPA 200.8 EPA 200.8 EPA 200.8 EPA 200.8 EPA 200.8	 50 µg/L 2 µg/L 50 µg/L 2 µg/L 2 µg/L	 80-120% 80-120% 80-120% 80-120% 80-120%	 ±20% ±20% ±20% ±20% ±20%	 ±20% ±20% ±20% ±20% ±20%
MBAS	PE/Glass	4°C	48 hours	EPA 425.1	0.05 mg/L	80-120%	±20%	±20%
Ammonia-N (NH_3-N)	Glass or PE	4°C, H_2SO_4 to pH<2	28 days	EPA 350.3	0.1 mg/L	80-120%	±20%	±20%
Particle Size Distribution	Glass w/TFE	4°C Analyze at room temp.	As soon as possible	SM 2560D	0.1 µm	80-120%	NA	5% of Sample

Notes:

PE = Polyethylene
RPD = Relative Percent Difference
Completeness objective for all analytes is 95%.
(1) Container volume size to be determined by the laboratory.
(2) Analytes with the same preservative can be combined into a single container, if the same laboratory is performing the analyses. Samples volumes to be determined by laboratory.
(3) Dissolved analytes will be filtered in the laboratory prior to acidification.

5.0 MUNICIPAL PERMIT URBAN RUNOFF MONITORING REQUIREMENTS

Under Section II.B.2 of the Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2001-0001 of the Municipal Permit, source identification monitoring within each watershed is required beginning no later than the 2008-2009 monitoring year. The Municipal Permit requires copermittees to collaborate in developing and implementing a monitoring program to identify sources of discharges of pollutants causing the priority water quality problems within each watershed. As a first step towards that, and to meet some of the objectives of the Authority's Sampling Plan i.e., 1) to identify and rate sources of POCs at SDIA in terms of annual mass loading in storm water, the potential for reduction through BMP implementation, and the best combination of sources to address through BMP implementation to achieve pollutant load reduction objectives, and 2) to monitor the performance and effectiveness of BMPs, the Authority conducted source identification and BMP effectiveness monitoring during the 2006-2007 monitoring season. The BMP effectiveness program is a multiple year program and will continue into the 2007-2008 monitoring season and beyond. These parts of the monitoring program are part of the program effectiveness assessment, which is described in Section 13.

6.0 SAMPLING AND ANALYSIS

POCs at SDIA were identified as described in Section 3.0, above. Copper and zinc were identified as the priority POCs because they exceeded the benchmark values more than 50 percent of the time, i.e., they had the highest exceedance frequencies airport-wide and for most of the outfalls and drainage basins. The other analytes that exceeded benchmark values are considered, for the purposes of the source identification and BMP effectiveness sampling, secondary POCs. The source identification objectives focus on the primary POCs. However, the secondary POCs are also anticipated to benefit from the implementation of BMPs designed to address the primary POCs.

The Authority has set long term (10-year) pollutant load reduction objectives of 65 pounds per year for copper and 35 pounds per year for zinc. Short term (5-year) objectives are 33 pounds per year of copper, and 17 pounds per year of zinc, following production of a BMP Recommendations Report by MACTEC in 2005. Since source control BMPs will be implemented to meet short-term pollutant load reduction objectives, source identification sampling will help to prioritize the implementation of treatment control BMPs to meet the long-term pollutant load reduction objectives. Measuring BMP effectiveness is included for both discrete treatment control BMPs and BMP systems. BMP systems are considered combinations of source and treatment controls implemented throughout a watershed or basin that together can provide a reduction in pollutants. For both treatment control BMPs and BMP systems, objectives are to assess whether the BMPs are reducing pollutant concentrations (for both primary and secondary POCs) below benchmark values and whether BMPs are achieving the short-term and long-term pollutant load reduction objectives for the primary POCs (i.e., copper and zinc).

6.1 SOURCE IDENTIFICATION SAMPLING

The objective of source identification is to identify and rate sources of pollutants of concern (POCs) at SDIA in terms of annual mass loading in storm water, the potential for reduction through BMP implementation, and the best combination of sources to address through BMP implementation to achieve pollutant load reduction objectives. The number of samples required to characterize the probable sources of copper and zinc are based on the power analyses conducted during the development of the Authority's Sampling Plan. For airport operations related sources (i.e., runways, roofs, and aircraft loading/unloading areas), 14 samples must be collected for copper and 111 samples collected for zinc to assess (at a power of 80) whether mean concentrations are above benchmark values. For ground transportation-related sources (i.e., parking lots), 17 samples must be collected for copper and 205 samples collected for zinc to assess (at a power of 80) whether mean concentrations are above benchmark values, assuming certain mean concentrations are achieved. The number of samples required for copper is considered a feasible number of samples to collect and analyze. The number of samples required for zinc, however, is not considered feasible. For the purposes of this sampling program, the number of samples required to estimate mean copper and zinc concentrations will be based on the number of samples required for copper. In summary, the number of samples required to characterize each possible source of the POCs is 14 for airport operations related sources and 17 for ground transportation related sources.

The minimum number of sampling locations was selected to meet the source identification objectives and achieve the required number of samples (based on the power analysis) within a one-year period. A one-year period was selected so that baseline source characterization data could be gathered prior to the implementation of enhanced source control BMPs identified in the BMP Recommendations Report. As such, fourteen sampling locations have been selected to characterize the quality of non-industrial storm water runoff associated with vehicle and aircraft use and emissions, atmospheric deposition, and galvanized metal structures, particularly metal roofs.

Sampling locations are described in Table 3. Sampling locations were selected to capture runoff from parking lots, runways, roofs, and aircraft loading/unloading areas. Samples of runoff from parking lots will help evaluate the concentration of POCs in storm water runoff from vehicle emissions and use and atmospheric deposition. Samples of runoff from runways and airport operations will help evaluate the concentration of POCs in storm water runoff from aircraft emissions and use and atmospheric deposition. Samples of runoff from roofs will help evaluate the concentration of POCs in storm water runoff from metal roofs and atmospheric deposition. Several of these locations are also used for BMP effectiveness evaluation.

Note that this sampling program will not quantify the specific contribution of POCs from atmospheric deposition. Both atmospheric deposition and vehicle and aircraft use and emissions may deposit POCs on a surface (for example, a parking lot). However, because BMPs would not necessarily depend on whether the POC originates from vehicle use or atmospheric deposition, the sampling program is not designed to differentiate these specific sources.

TABLE 3

SAMPLING LOCATIONS FOR SOURCE IDENTIFICATION

Source	Drainage Basin	Sampling Location ID	Location Description	Sampling Method	Samples per Season	Number of Seasons to Sample
Parking Lot	8	S-B08-1	Sheet flow at storm drain curb inlet 08-45-I. Combine with S-B08-2	Composite[2]	6	1
	8		Sheet flow at storm drain curb inlet on S end of T1 parking lot entry road. Combine with S-B08-1			
	9	S-B09-3 (same location as C-B09-10)	Sheet flow at storm drain curb inlet at SE corner of T2 parking lot/road into parking lot. Combine with S-B11-4	Composite[2]	6	1
	11	S-B11-4	Sheet flow at Manhole 11-10-M. Combine with S-B09-3			
	5	S-B05-5 (same location as C-B05-3)	Inlet pipe in storm drain inlet	Composite[2]	6	1
Roof Runoff	7	S-B07-6	Flow from downspout on SDCRAA employee office building	Grab[3]	5	1
	12	S-B12-7	Flow from downspout on Terminal 2 Building	Grab[3]	5	1

TABLE 3 (continued)

SAMPLING LOCATIONS FOR SOURCE IDENTIFICATION

Source	Drainage Basin	Sampling Location ID	Location Description	Sampling Method	Samples per Season	Number of Seasons to Sample
Roof Runoff (continued)	8	S-B08-8	Flow from downspout on Terminal 1 Building	Grab[3]	5	1
Runway	8	S-B08-9	Sheet flow from runway at storm drain inlet	Grab [1]	5	1
	3	S-B03-10	Sheet flow from runway at storm drain inlet	Grab[1]	5	1
	6	S-B06-11	Sheet flow from runway at storm drain inlet	Grab[1]	5	1
Airport Operations	6	S-B06-12	Inlet pipe in trench drain	Composite[2]	5	1
Aircraft Loading/Unloading	12	S-B12-13	Sheet flow from the loading area of Terminal 2	Composite[2]	5	1
	8	S-B08-14 (same location as C-B08-8)	Sheet flow from the loading area of Terminal 1	Composite[2]	5	1

<u>Notes:</u>
[1] Grab sample will be collected using a Vortox sampler.
[2] Composite sample will be collected using automated sampling equipment.
[3] Grab sample will be collected manually.

Sampling Locations S-B08-1 and S-B08-2 are sheet flow locations from the Terminal 1 parking lot. These samples should be combined into one sample to provide a more representative sample of the entire parking lot. Similarly, Sampling Locations S-B09-3 and S-B11-4, and sheet flow from the Terminal 2 parking lot, should be combined. Sampling Location S-B05-5 was selected to characterize runoff from the large rental car storage lot in drainage basin 5.

To characterize runoff from the roofs of buildings at SDIA, Sampling Locations S-B07-6, S-B12-7, and S-B08-8 were assigned to downspouts representative of various roofing materials and ages at SDIA. Both terminals have multi-ply, built-up, shingle asphalt roofs with lead and galvanized steel flashing. Sampling Locations S-B08-9, S-B03-10, and S-B06-11 were chosen to characterize runoff from the runway, and Sampling Locations S-B12-13 and S-B08-14 were chosen to characterize runoff from aircraft loading/unloading areas. Sampling Location S-B06-12 was chosen to be a composite sample representing runoff from Drainage Basin 6, which has the highest RPR of all the drainage basins. This drainage basin is comprised of primarily airport operations and industrial land uses and contains a variety of both structural and non-structural BMPs.

Samples from the source identification sampling locations will be analyzed for the primary POCs (total and dissolved copper and zinc). Additionally, to help assess the treatability of storm water runoff at SDIA, particle size distribution analysis will be performed at Sampling Location S-B06-12. This sampling location is considered to be representative of other drainage basins in terms of particle size distribution. Source identification samples should be collected over one wet season. Depending on success, this schedule will provide approximately 15 data sets for each airport operations related source and 18 data sets for each ground transportation related source (i.e., parking lots). This meets the goals of 14 samples for airport operations and 17 samples for ground transportation.

6.2 BMP Effectiveness Sampling

The objectives of BMP Effectiveness sampling are to monitor the performance and effectiveness of BMPs. Although this is also stated as a requirement and objective of the General Industrial Permit, this objective is identified separately to allow more flexibility in monitoring the performance of BMPs beyond the requirements identified in the General Permit. Structural and non-structural BMP performance will be evaluated at locations that receive runoff from both industrial and non-industrial drainage basins to assess whether the BMPs are reducing pollutant concentrations (for both primary and secondary POCs) below benchmark values and whether BMPs are achieving the short-term and long-term pollutant load reduction objectives for the primary POCs (i.e., copper and zinc). The number of samples required to evaluate the effectiveness of treatment control BMPs and BMP systems is based on the power analyses conducted. Based on the power analysis, copper requires a reasonable number of samples to produce meaningful data when comparing to benchmark values, assessing potential changes in mean concentrations over time, and detecting differences between influent and effluent concentrations.

Based on the power analyses, 14 samples are required to compare mean concentrations to benchmark values. A total of 14 samples is also required to detect an 80 percent reduction in influent concentrations, either through treatment at a discrete treatment control BMP, or through treatment by a BMP system.

Sampling locations for treatment control BMP monitoring and BMP system monitoring are discussed below. The effectiveness of BMP systems (i.e., combinations of structural and non-structural BMPs) will be evaluated by conducting a paired watershed study and collecting flow-weighted composite samples from a representative drainage basin and tracking trends as BMPs become fully implemented over time.

Treatment Control BMP Monitoring

The locations for treatment control BMPs will depend on the specific BMPs constructed. As outlined in the BMP Recommendations Report, these may include one or more of the following:

- Sand filters,
- Detention basins,
- Biofiltration strips and swales,
- Bioretention.

For the treatment control BMPs being considered for implementation, monitoring locations would consist of an influent location and an effluent location at the BMP. If multiple BMPs of one type are implemented, then influent and effluent monitoring will be conducted at one BMP representative of the BMP type implemented. Differences in the design and/or construction of a BMP type may dictate the monitoring of more than one of the same type of BMP.

PAIRED WATERSHED MONITORING

A paired watershed study will be conducted to evaluate BMP system effectiveness. In a paired watershed study, one watershed is considered the control. Within the control watershed, BMPs are neither added nor removed. The other watershed is the treatment or test watershed where new BMPs are implemented.

Two periods of monitoring are required: calibration and treatment. During the calibration period, the two watersheds are treated identically and a relationship between the control and treatment watersheds is established. Two such studies are recommended in this program. The first consists of the parking lots for Terminal 1 and Terminal 2. The second study is between the drainage basins for Outfalls 8 and 12.

Table 4 presents the sampling locations for these two studies. These locations were selected from the source identification sampling locations to minimize additional sampling locations.

TABLE 4

SAMPLING LOCATIONS FOR BMP EFFECTIVENESS

Drainage Basin	Sampling Location ID	Samples per Season	Number of Seasons to Sample	Description
Paired Watershed Monitoring				
8	S-B08-1 and S-B08-2	6	3 (calibration period) + 3 (treatment period)	Control watershed representing parking lots
9, 11	S-B09-3 and S-B11-4	6	3 (calibration period) + 3 (treatment period)	Test watershed representing parking lots
12	S-B12-13	5	3 (calibration period) + 3 (treatment period)	Control watershed representing airport operations
8	S-B08-14	5	3 (calibration period) + 3 (treatment period)	Test watershed representing airport operations
Trend Analysis Monitoring				
6	S-B06-12	5	10	Priority target for BMPs (highest RPR) to determine reduction over time.

The parking lot study will compare lots that are used primarily for short-term, civilian parking. Sample Locations S-B08-1 and S-B08-2 will be combined to form one sample representing the parking lot for Terminal 1. Assuming this lot is designated the control sample, no BMPs will be added to or removed from this lot, and the BMPs currently in place will be maintained at their current level. Sample Locations S-B09-3 and S-B11-4 will be combined to form one sample representing the parking lot for Terminal 2. BMPs currently in place within the parking lot drainage area for Terminal 2 should be maintained at their current level during the calibration period. After the calibration period is over, BMPs can then be added and/or modified.

The second study will compare runoff water quality from drainage basins 8 and 12. These basins are mostly comprised of industrial and airport operations land uses. Sampling Location S-B08-14, which also represents Sampling Location C-B08-8, will represent runoff from the airport operations use of drainage basin 8. Sampling Location S-B12-13 will represent runoff from drainage basin 12. Drainage basin 12 is the recommended control watershed because it had a lower RPR in 2005. Based on the RPRs, adding to and/or modifying the BMPs in drainage basin 8 are anticipated to be more effective at reducing the overall pollution load at SDIA than adding to and/or modifying BMPs in drainage basin 12.

The calibration period for these studies is expected to be three years. 14 samples are required for copper. Three years will provide 15 samples. The data should be tested using the t-test each year that samples are collected. If the data has a low variability then statistically meaningful calculations may be performed on less than 14 samples. On the other hand, the data may indicate that more samples must be collected. More samples may also be required to perform meaningful calculations for analytes other than copper.

When a sufficient number of results have been collected to derive regression relationships between the control and treatment watersheds, the treatment period may begin. For planning purposes, it is assumed that the treatment period will last for three years. However, data from the calibration period will be used to calculate the number of samples required for the treatment period. A power analysis will be performed to determine the number of samples necessary to detect the predicted change in the treatment watershed. As discussed above, the goal is to detect a reduction in the copper concentration of 83 percent, which is equivalent to 0.011 mg/L.

TREND ANALYSIS MONITORING

Samples will be collected for BMP effectiveness monitoring at Sampling Location S-B06-12. Drainage basin 6 had the highest RPR in 2005 and is, therefore, a priority target for BMP implementation. Trend analysis will be performed on data from these samples from this location. The goal is to obtain enough data to confidently establish a downward trend. The data must be carefully checked to meet all assumptions of the analysis before conclusions are drawn. The lack of an obvious downward trend does not necessarily mean BMPs are not effective. This location should be sampled for a minimum of ten years, or until all planned BMPs have been fully implemented.

All BMP effectiveness samples will be analyzed for the primary POCs (total and dissolved copper and zinc) and secondary POCs. Secondary POCs are (in order of descending benchmark exceedance frequency): total aluminum, total iron, biological oxygen demand, chemical oxygen demand, total suspended solids (TSS), oil and grease, specific conductance, total lead, ethylene glycol, and pH. The required samples can be collected in 3 years if 5 samples are successfully sampled per year for airport operations and 6 samples are successfully sampled per year for ground transportation.

7.0 RECORDS

For details on record keeping requirements for wet weather monitoring under the General Industrial Permit, see Sections 7 and 9 in the SWMP.

8.0 ANNUAL REPORTS

The Authority is subject to two annual reporting requirements, detailed below.

8.1 GENERAL INDUSTRIAL STORM WATER PERMIT REQUIREMENTS

For reporting requirements under the General Industrial Storm Water Permit, see Sections 7 and 9 of the SWMP.

8.2 San Diego Municipal Permit Requirements

The Authority's Annual Report for the San Diego Municipal Permit shall be a documentation of the activities conducted by the Authority during the past annual reporting period to meet all requirements of section D. The reporting period for these annual reports shall be the previous fiscal year. For example, the report submitted September 30, 2008 shall cover the reporting period July 1, 2007 to June 30, 2008. It shall, at a minimum, contain the following:

- Comprehensive descriptions of all activities conducted by the Authority to meet all requirements of each component of the JURMP Sections of the permit.
  - D.1: Development Planning Component
  - D.2: Construction Component
  - D.3: Existing Development Component (Including Municipal, Industrial, Commercial, Residential)
  - D.4: Illicit Discharge Detection and Elimination Component
  - D.5: Education Component
  - D.6: Public Participation Component
  - Fiscal Analysis
  - I.1: Program Effectiveness Assessment
- An accounting of all:
  - Reports of illicit discharges (i.e., complaints) and how each was resolved (indicating referral source);
  - Inspections conducted;
  - Enforcement actions taken;
  - Education efforts conducted.
- Public participation mechanisms utilized during the SWMP implementation process;
- Proposed revisions to the SWMP;
- A summary of all urban runoff related data not included in the annual Copermittee monitoring report (e.g., special investigations);
- Budget for upcoming year;
- Identification of management measures proven to be ineffective in reducing urban runoff pollutants and flow;
- Identification of water quality improvements or degradation.

The report shall also include an executive summary, introduction, conclusion, recommendations, and signed certified statement.

SAN DIEGO INTERNATIONAL AIRPORT

ATTACHMENT D1-A
TRASH ASSESSMENT PROGRAM

Final
Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds

Prepared For:

The County of San Diego

August 30, 2007

FINAL

Monitoring Workplan for the Assessment of Trash in San Diego County Watersheds

Prepared For:

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August 30, 2007

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1.0 INTRODUCTION

In accordance with the Receiving Waters and Urban Runoff Monitoring and Reporting Program No. R9-2007-0001 permit requirements (Permit), the San Diego Municipal Copermittees (Copermittees) are required to assess the presence of trash in receiving waters and urban runoff at each dry weather field screening site, mass loading station (MLS), and temporary watershed assessment station (TWAS) in the San Diego Watersheds. This trash assessment program is designed to provide information on the spatial extent and relative amount of trash present, as well at the nature of the trash present. Permit Section II A. 1. k. (Receiving Waters Monitoring Program) states: *"The Copermittees shall collaborate to develop and implement a program to assess the presence of trash (anthropogenic litter) in receiving waters. The program shall collect and evaluate trash data in conjunction with collection and evaluation of analytical data."* Additionally, Section II. B.3.c. (7) (Dry Weather field Screening and Analytical) requires the Copermittees to: *"Assess the presence of trash in receiving waters and urban runoff at each dry weather field screening or analytical monitoring station."*

1.1 Background

Trash is not only an aesthetic concern, but one which can adversely affect water quality, fish and wildlife, and the beneficial uses of water bodies. It can affect beneficial uses such as recreation in water bodies (fishing and swimming) and degrade aquatic habitat. Trash may become marine debris and has the potential to harm fish and wildlife as it travels through streams and rivers and reaches the ocean. Most water quality concerns from trash are related to wildlife in the form of entanglement and ingestion. In addition to wildlife, the human health effects from poor water quality are sometimes a result of discarded medical waste, human or pet waste, and broken glass. Trash "hotspots" such as illegal dumping, littering, and/or accumulation of trash are also of concern from a management perspective. Trash in the form of leaf litter or other organic materials (such as from intentional dumping) can be of concern and cause nutrient and ecosystem imbalance in streams and rivers. During storms, trash may block drainage areas and result in flooding that erodes soils by undercutting stream banks. Excess suspended solids (including trash) are detrimental to aquatic organisms and may scour stream beds and damage habitats.

The San Francisco Bay Region implemented a rapid trash assessment from 2002 through 2005 in order to support Clean Water Act Section 303(d) listing decisions and, in conjunction with the SWAMP program, produced a document called "A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams." The Trash Assessment Program for San Diego Watersheds will parallel the approach outlined in this document. Other work in the San Diego area has been conducted by the City of San Diego Storm Water Division, which currently assesses trash at various locations in Chollas Creek. The monitoring is done once a year at dry weather sites and employs a simplified version of the ranking system developed by the San Francisco Bay Region. A similar assessment is being conducted in Forrester Creek by the City of El Cajon. In an attempt to expand upon these studies and accurately represent the range of conditions found in San Diego Watersheds, the Dry-Weather Monitoring Sub-Workgroup has developed a trash assessment form (Attachment 1) which provides five categories to describe the abundance of trash.

1.2 Monitoring Objectives and Assessment Questions

The overall monitoring objective is to assess the relative amounts of trash within the San Diego Watersheds. Until now, the nature of trash within most watersheds has been unknown and, although problem areas have been identified, it is unclear how much trash can be attributed to urban runoff. The primary objective of this program is to develop a qualitative assessment of trash in San Diego Watersheds by providing information on the spatial extent and relative amount of trash present, as well as the nature of the types of trash present. This program will also evaluate the spatial and temporal variability in trash distribution and assist the Copermittees in setting watershed priorities.

Section II.A.9 of the Permit Fact Sheet states that *"Since a monitoring program for trash is new, the Copermittees are provided significant leeway in the development and implementation of the program. The Copermittees can utilize the flexibility incorporated into the MRP (Monitoring and Reporting Program) to develop a program that is workable for them while providing the necessary information."*

In order to assess the presence of trash for use in this program, the following questions are asked:

Q1. Where is trash being detected in San Diego Watersheds?

By performing trash assessments at each of the MLS and TWAS during wet and dry weather events and at the dry weather monitoring locations during dry events using a standardized trash monitoring form (Attachment 1), the Copermittees will assess approximately 1,000 sites per year, which will determine where trash is being detected. This spatial information on trash will assist the Copermittees with identifying problem areas that will in turn be considered to develop regional and watershed priorities.

Q2. How many sites are identified as submarginal or poor?

At sites identified as submarginal or poor, the spatial extent, relative amounts, and nature of trash present will also be evaluated through the use of the standardized trash monitoring form mentioned in Q1 above (Attachment 1). These results will help the Copermittees identify the nature of problem areas and aid Copermittees in prioritizing sites. Sites can also be reviewed over time to evaluate any trends (positive or negative) on a jurisdictional, watershed and regional level. Sites will be assessed during the initial monitoring period (i.e. first reporting cycle). Recommendations for program refinements will be made based on the data gathered over the first year of program implementation. An overall evaluation of trash levels and potential sources within individual watersheds will be conducted as part of the Annual Regional Monitoring Report.

Q3. In locations identified as submarginal or poor, what is the nature of the types of trash present?

The nature of the types of trash identified at submarginal, and poor sites will help the Copermittees determine the potential sources and routes of trash which can then guide management actions. The potential implementation of management actions such as outreach efforts to specific groups may be directed based on the information collected on the nature of trash.

2.0 MONITORING DESIGN

2.1 Trash Assessment

2.1.1 Locations

Trash assessments will be performed as part of the Regional Monitoring Program on a rotational basis during wet and dry weather monitoring at the locations discussed below.

<u>Mass Loading Stations (MLS) and Temporary Watershed Assessment Locations (TWAS)</u>
Trash assessment will be performed at MLS and TWAS monitoring sites during both dry ambient monitoring and storm event monitoring. These sites will provide information on the relative amounts of trash present in receiving waters. The minimum number of annual monitoring events required for each location is provided in Table 1. This schedule corresponds to that specifically outlined in the Permit.

Table 1. Trash Monitoring Locations and Number of Annual Monitoring Events.

Watershed	Permit Year 2007-2008		Permit Year 2008-2009*		Permit Year 2009-2010		Permit Year 2010-2011		Permit Year 2011-2012	
	MLS	TWAS	MLS	TWAS	MLS	TWAS	MLS	TWAS**	MLS	TWAS**
Santa Margarita River	4		1				4			
San Luis Rey River	4	4	1				4	4		
Loma Alta Creek		4						4		
Buena Vista Creek		4						4		
Agua Hedionda Creek	4	4	1				4	4		
Escondido Creek	4	4	1				4	4		
San Dieguito River	4	8	1				4	8		
Los Peñasquitos Creek	4	8	1				4	8		
Rose Creek						4				4
Tecolote Creek			1		4	4			4	4
San Diego River			1		4	12			4	12
Chollas Creek	4		1		4		4		4	
Sweetwater River			1		4	4			4	4
Otay River						4				4
Tijuana River			1		4	8			4	8

*Bight '08 Monitoring Year
** TWAS Locations may change based on information gathered during the first rotation

Dry Weather Monitoring Stations

Trash assessment will be conducted at established dry weather field screening locations. Stations within each Copermittee's jurisdiction will be identified in the Jurisdictional Urban Runoff Management Plans to be submitted in January 2008.

2.1.2 Frequency

The Trash Assessment Form will be completed at each location during each monitoring event. MLS and TWAS locations will be monitored on a rotational basis between the northern and southern watersheds during two wet weather and two dry weather (ambient) monitoring events per year. Each of the selected dry weather monitoring locations will be assessed for trash at least once between May 1st and September 30th of each year (or as often as the Copermittees determine is necessary to comply with permit requirements).

2.1.3 Trash Assessment Procedures

Prior to a site visit, it is important to identify personnel who are familiar with the site and have some local knowledge of the general area. There should also be a general consensus among the monitoring team as to the extent of the area to be assessed. When a site is first established, the length of the site being assessed should be determined as a channel or shore length. When possible, distinctive site characteristics, such as a large boulder or tree, should be used as starting/finishing length landmarks. The upper boundary of each bank should be used for the width of the monitoring site. This can be determined visibly by either a debris or water line. When determining site boundaries, it is important to remember that the intent of the trash assessment is to determine the trash which has been mobilized or has the potential to be mobilized by water at the defined locations.

Upon arrival at a designated site, a qualitative estimate of the presence of trash should be determined and documented in the top portion of the Trash Assessment Form (Attachment 1). This is a qualitative assessment which should reflect a first impression of the site. There are five categories to describe the amount and extent of trash at each site:

- *Optimal:* On first glance, no trash is visible. Little or no trash (<10 pieces) is evident when the evaluated area is closely examined for litter and debris.
- *Suboptimal:* On first glance, little or no trash is visible. After close inspection, small levels of trash (~10-50 pieces) are evident in the evaluated area.
- *Marginal:* Trash is evident in low to medium levels (~51-100 pieces) on first glance. Evaluated area contains litter and debris. Evidence of site being used by people: scattered cans, bottles, food wrappers, blankets, or clothing are present.
- *Submarginal:* Trash distracts the eye on first glance. Evaluated area contains substantial levels of litter and debris (>100-400 pieces). Evidence of site being used frequently by people: many cans, bottles, food wrappers, blankets, or clothing are present.
- *Poor:* Site is significantly impacted by trash. Evidence of trash accumulation behind a constriction point or evidence of excessive dumping. Evaluated area contains substantial levels of litter and debris (>400 pieces).

Sites will also be evaluated to determine the threat to human health and/or threat to aquatic health. In some cases, sites may pose a threat to both categories. The evaluation of each category is presented as follows:

- Threat to Human Health - Site poses a threat to human health via swimming, wading, or walking through the area. Trash and debris has the potential to contain chemicals that may bioaccumulate, transmit dangerous bacteria (e.g. medical waste, diapers, human waste), or has the potential for physical harm (sharps, entanglement, nails, etc…). Comments should be added at the bottom of the field sheet for clarification.

- Threat to Aquatic Health – Site poses a threat to aquatic health or other wildlife (via contact, ingestion, entanglement, etc...) from the trash and debris present. Trash and debris such as small floatable material that is persistent and can be transported long distances may resemble food and may be ingested. Wire, plastic, fishing line, and other material that has the potential for entanglement. Oil and other visible chemicals or chemical containers falls in this category. Comments should be added at the bottom of the field sheet for clarification.

If the quantity of trash falls into the submarginal, or poor category, assessments of the type(s) of trash present, the potential trash mobilization route, and the potential source will occur. Categories of trash types listed on the form include:

- Automotive
- Biohazard waste
- Business Related
- Cigarette Butts
- Construction
- Fabric/Clothing
- Food Packaging
- Food Waste
- Household
- Shopping Carts
- Toxic
- Yard Waste

The types of trash present should be ranked in order of their prevalence (from 1 to 12, where 1 is the most prevalent and 12 is the least prevalent). Next, the user should try to determine the potential mobilization route for the trash (e.g., dumping, littering, or upstream sources). If the route is unknown, then it may be described as "unable to determine." Finally, the user should check the potential sources of the trash. The form includes the following source categories:

- Household
- Construction
- Commercial
- Industrial
- School
- Transient

Again, if the source is unknown, the form includes the category "unable to determine." Prior knowledge of the surrounding area will help when making assumptions about the potential route and sources of trash present.

3.0 ASSESSMENT AND REPORTING

3.1 Trash Assessment

The regional and jurisdictional trash assessments provide Copermittees with valuable information they can use to make informed decisions on how to address problem areas. Information such as potential sources and/or types of trash may guide the Copermittees efforts on outreach to the appropriate target groups. This information may also be used to guide the selection of management actions where appropriate. In order to evaluate the nature and extent of trash accumulation, the following questions are asked as the basis for the monitoring design:

Q1. Where is trash being detected in San Diego Watersheds?

The presence of trash in receiving waters and MS4 locations will be differentiated and illustrated in tabular and graphical formats. GIS maps may also be used, when applicable, to depict the relative amounts of trash at the MLS, TWAS and dry weather monitoring locations across San Diego County.

Q2. How many sites are identified as submarginal or poor?

Summarizing information on how many sites with submarginal, or poor trash levels can provide a general overview of where problem areas occur throughout the region. The number of problem sites can be tracked annually and evaluated over time. This type of assessment can be conducted on both a regional and watershed scale, as well as jurisdictionally in the Dry Weather Monitoring reports. General information on the number of submarginal, or poor sites per watershed will be presented in tabular and graphical formats in regional and watershed assessments. Jurisdictional assessments could also track problem sites over time to determine if management efforts are working. Evaluating the effectiveness of outcomes such as behavior changes and load reductions, where applicable, may be appropriate after evaluating multiple years of data and observing improvements or declines in site conditions.

Q3. In locations identified as submarginal, or poor, what is the nature of the types of trash present?

In locations where submarginal, or poor trash levels are present, additional analysis of the nature of trash present will be performed. These analyses may differentiate between dry and wet weather monitoring events, as well as between receiving waters and MS4 monitoring locations. During the first year assessment period, general information on the number of submarginal, or poor sites per watershed along with the predominant trash types and potential sources will be presented in tabular and graphical formats in regional and watershed assessments. Additionally, the number of sites determined to be threats to human and/or aquatic health will be presented in tabular format. The information assessed may then be used to identify regional strategies to develop targeted outreach strategies, where applicable. When appropriate, these data could be used by watershed groups and/or jurisdictions to single out a predominant source and/or type of trash that commonly occurs. The data may also help guide the selection of management actions where appropriate.

3.2 Reporting

Trash assessment reporting will be presented on a jurisdictional basis in the Jurisdictional Urban Runoff Monitoring Program (JURMP) Reports and on a watershed basis in the Annual Regional Monitoring Report. The Annual Regional Monitoring Report will include summary statistics of trash assessment data within each watershed management area assessment section. Copermittees will also provide jurisdictional trash assessments in their individual dry weather reports contained in their JURMPs. These assessments will follow the Permit requirements for reporting the dry weather monitoring program. Trash monitoring data from jurisdictional dry weather monitoring and MLS/TWAS monitoring will be assessed by modifying the current Watershed Data Assessment Framework used for establishing frequency of occurrence for water quality parameters. This assessment will provide the Copermittees with information needed to make informed decisions on where to address problem areas related to trash. The diamond ranking system for determining constituent of concern (COC) frequency of occurrence rankings of "high", "medium", or "low" will be used to assess the watersheds trash data. These criteria will take into account the dry weather monitoring and MLS/TWAS sites with submarginal, or poor assessments only; and classify each COC as high, medium or low frequency of occurrence in the watershed. The classification of COC can change from year to year in response to the changes in the levels of trash being identified within the watershed.

4.0 Program Review and Modification

As stated previously in this document, Order 2007-0001 provides the Copermittees flexibility to develop a workable trash assessment program. Specifically, section II.A.9 of the Permit Fact Sheet states:

"Since a monitoring program for trash is new, the Copermittees are provided significant leeway in the development and implementation of the program. The Copermittees can utilize the flexibility incorporated into the MRP (Monitoring and Reporting Program) to develop a program that is workable for them while providing the necessary information."

The program described in this document meets the Permit criteria for a trash monitoring program. As stated previously in this program, the initial year of trash monitoring focuses on qualitative assessments of trash at sites within the region. This was determined to be the most acceptable approach because it enables Copermittees to collect a relatively consistent set of data, while making initial assessments of the overall impacts of trash within the region. To date, Copermittees cannot be certain that a high number of sites are impacted with trash. More importantly, Copermittees need to ensure that the data they collect can be directly related to making management decisions (ie site cleanups, increased BMPs, etc) and to water quality improvements.

Because the program is newly developed and has not yet been field tested, it is appropriate to assume that modifications may need to be made after an initial assessment of the data collected.

Copermittees intend to evaluate the data and determine where and how program modification will be made. Particularly important will be data collected from sub-marginal and poor sites. Where initial data suggests that the incorporation of quantitative assessments will lead to improvements in water quality, then Copermittees will modify the program to include quantitative measures.

5.0 REFERENCES

California Regional Water Quality Control Board, San Diego Region. 1994. *Water Quality Control Plan for the San Diego Basin (9).*

California Regional Water Quality Control Board, San Francisco Region. 2007. *A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams.*

ATTACHMENT 1: TRASH ASSESSMENT FORM

Draft Trash Assessment Form

SITE ID: ________________ **DATE:** __________________

LOCATION: ________________ **TIME:** ___________________

OBSERVER: ________________

PREVIOUS TRASH ASSESSMENT RATING (IF APPLICABLE):

ESTIMATED AREA OF ASSESSMENT L X W (FT):

Amount and Extent of Trash	
EVALUATION OF TRASH INCLUDES*: ☐ **MS4** ☐ **RECEIVING WATER** ☐ **BOTH**	
☐ **Optimal**	On first glance, no trash visible. Little or no trash (<10 pieces) evident when evaluated area is closely examined for litter and debris.
☐ **Suboptimal**	On first glance, little or no trash visible. After close inspection small levels of trash (~10-50 pieces) evident in evaluated area.
☐ **Marginal**	Trash is evident in low to medium levels (~51-100 pieces) on first glance. Evaluated area contains litter and debris. Evidence of site being used by people: scattered cans, bottles, food wrappers, blankets, or clothing present.
☐ **Submarginal**	Trash distracts the eye on first glance. Evaluated area contains substantial levels of litter and debris (>100- 400) . Evidence of site being used frequently by people: many cans, bottles, food wrappers, blankets, or clothing present.
☐ **Poor**	Site is significantly impacted by trash. Evidence of trash accumulation behind a constriction point or evidence of excessive dumping. Evaluated area contains substantial levels of litter and debris (>400 pieces).

* In areas where receiving water is accessible and adjacent to dry weather site, trash evaluation must include receiving water.

Site Evaluation for Threat to Human Health and/or Aquatic Health	
☐ **Threat Human Health**	Site poses a threat to human health via swimming, wading, or walking through the area. Trash and debris has the potential to contain chemicals that may bioaccumulate, transmit dangerous bacteria (e.g. medical waste, diapers, human waste), or has the potential for physical harm (sharps, entanglement, nails, etc…). Comments should be added for clarification .
☐ **Threat to Aquatic Health**	Site poses a threat to aquatic health or other wildlife (via contact, ingestion, entanglement, etc...) from the trash and debris present. Trash and debris such as small floatable material that is persistent and can be transported long distances may resemble food and may be ingested. Wire, plastic, fishing line, and other material that has the potential for entanglement. Oil and other visible chemicals or chemical containers falls in this category. Comments should be added for clarification.

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- **Complete the following section for Marginal, Submarginal, and Poor Evaluations ONLY**

TYPE	Ranking or Count by Type *	POTENTIAL ROUTE (CHECK UP TO 2)				POTENTIAL SOURCE (CHECK UP TO 2)						
		Dumping	Littering	Upstream	Unable to determine	Household	Construction	Commercial	Industrial	School	Transient	Unable to determine
Automotive												
Biohazard Waste												
Business Related												
Cigarette Butts												
Construction												
Fabric/Clothing												
Food Packaging												
Food Waste												
Household												
Shopping Carts												
Toxic												
Yard Waste												

* Only rank the types of trash PRESENT in evaluated area from 1 through 12 (1 is most prevalent – 12 is least prevalent).
DO NOT rank types of trash that are not present in evaluated area.

Comments:____

Note: This draft form may be updated by the Dry Weather Monitoring Workgroup

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Appendix D – Stormwater Monitoring Programs

SAN DIEGO INTERNATIONAL AIRPORT