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December 30, 2014

Hope Smythe
Santa Ana Regional Water Quality Control Board
3737 Main Street Suite 500
Riverside CA 92501

Re: Final Report for R8-2012-0049 Supplemental Environmental Project
Evaluation of Control Measures at Scrap Metal Facilities

Dear Ms. Smythe,

Orange County Coastkeeper (Coastkeeper) is pleased to submit the final report for the Evaluation of Control Measures at Scrap Metal Facilities Supplemental Environmental Project (SEP) funded by the Elsinore Valley Municipal Water District under Regional Board Order R8-2012-0049. Coastkeper has completed the tasks detailed in the SEP agreement to the extent possible and have included the signed Supplemental Environmental Project Certificate of Completion.

The SEP project was designed as a one year project to collect representative data on the concentration and load reductions of target pollutants that can be achieved through the implementation of Best Management Practices (BMPs) followed by advanced filtration. The SEP funding along with additional funding obtained by Coastkeper was intended to fund the project through the 2012-2013 wet season with the goal of collecting samples from four storm events. Due to a lack of rain events, samples were collected from two storms in 2013. In the fall of 2013 Coastkeeper requested and received an extension the SEP time period though the 2013-2014 wet season. Due to the extreme drought in during the 2013-2014 wet season only one additional storm event could be monitored. So a total of three of the four monitoring events anticipated for the SEP project could be completed. In spite of the difficulties we were able to collect good quality data and complete the project on time and within our budget.

The project report includes a review of the project activities, a data summary and analysis, the project training manual, presentation, and Quality Assurance Project Plan and chain of custody forms. Other than a lack of rain there were no significant difficulties in completing the project. All of the project partners participated through the entire SEP project period and have indicated their desire to continue with the project through the 2014-2015 wet season.

While the SEP funded project was a standalone project with a duration of two years Coastkeeper views it as phase one of a larger effort to collect a set of data that will support a statistical analysis to develop region specific performance standards for Scrap Metal Recycling Facilities. Coastkeeper is looking forward to continuing our work with the Regional Board, the project participants, and the Scrap Metal Recycling industry to collect the additional data needed for statistical analysis. Coastkeeper believes that the data developed by this project will have benefits far beyond its local application and that the project and associated sector specific industrial permit will serve as a model that can be applied throughout the state.

Thanks,

Raymond Hiemstra
Associate Director
Orange County Coastkeeper

Evaluation of Control Measures at Scrap Metal Facilities

Final Report

Submitted 9/1/2014

Revised December 2014

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Acknowledgements

We would like to thank all of the participants in the project for their cooperation and help in making it a success. This includes SA Recycling, American Metals Recycling, Ruby Metals and Central Metals for volunteering the use of their facilities and staff, Dr. Rich Horner and out Technical Advisory Team for their assistance in the project design and Michael Adackapara of the Santa Ana Regional Board for his assistance with the final report. We would also like to acknowledge the hard work of the monitors that collected the samples during rain events often under adverse conditions.

Executive summary

Metal Recycling yards in the Santa Ana Watershed commonly contain pollutants such as oil and grease, metals and suspended solids in their stormwater runoff. The Santa Ana River watershed is located in southern California and includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County, and a small portion of Los Angeles County.

This project was designed to collect data on the reductions in concentrations and loads of target pollutants that can be obtained through the implementation of Best Management Practices (BMPs) followed by advanced filtration using four proprietary stormwater systems at representative scrap metal recycling facilities. The project was not designed and does not attempt to document the performance of individual stormwater treatment systems. A total of 36 sample sets were collected during three rain events, two in 2013 and one in 2014. We had planned to collect samples from four rain events in 2013, but a lack of rain in 2013 and 2014 forced an extension of the project period and a reduction in rain events monitored.

Water samples were collected at the inlet and outlet of the four proprietary advanced filtration units at scrap metal recyclers located in Bloomington, Fontana, Pomona, Santa Ana and Vernon. The samples were tested for concentrations of Oil and Grease , Total Suspended Solids, Total Hardness, Chemical Oxygen Demand , total: Iron, Aluminum, Copper, Lead, Zinc, and Dissolved: Copper, Lead and Zinc . These tests were run by Test America Lab in Irvine. pH and Conductivity measured at the sample site by Orange County Coastkeeper staff using meters. Flow was also measured on site using flow meters mounted to the units were available, and by the timed volume “bucket test” were meters were not operational.

Samples were collected on 02/20/2013, 03/08/2013 and 02/28/2014 due to site conditions samples were not collected at all sites during each rain event. The majority of samples 18 of 36 met the project quality control guidelines and were used for the data analysis in this report. The rest of the sample data is included in the report, but is flagged for further consideration by data users. For our data analysis we aggregated our metals concentration data to provide a overall look at the efficiency of advanced treatment systems in removing common industrial pollutants. Our results showed that advanced treatment systems are effective in reducing pollutant concentrations. For example, Total metals reductions ranged from 36.13% to 96.11%, and dissolved metals reductions ranged from 20.03% to 97.11%. These results varied not only from site to site but from storm to storm at the individual sites. While this data is promising, much more data need to be collected to develop a statistically valid dataset.

Project Objective

The objectives of the Supplemental Environment Project (SEP) funding is to document water quality improvements that can be achieved at scrap metal recycling yards through the use of advanced treatment systems. The goal was to document the pollutant concentration and load reductions achieved by four advanced treatment systems: Storminator, Stormwater RX, Stormwater Systems, and American Stormwater Filtration at six representative scrap metal recycling facilities through influent and effluent measurements. The data developed by this project will provide critical information on the effectiveness of advanced treatment systems for scrap metal facilities. The goal was to collect 48 sample sets, including six quality control samples, from four storms of varying intensity.

Background

The Evaluation of Control Measures at Scrap Metal Facilities project was made possible through a combination of (SEP) funds from the Elsinore Valley Water District and private funds. The project was designed as a standalone one year project but is envisioned as part of a larger three year project. The SEP project collected representative data on the concentrations selected metals, oil and grease, TSS, COD, pH and conductivity that can be achieved through the implementation of Best Management Practices (BMPs) followed by advanced filtration using four proprietary stormwater water systems. The constituents selected for analysis are considered priority pollutants for scrap metal recycling facilities and are common pollutants at industrial sites in general. The objectives of the 2012-2013 wet season were the collection of samples from four storm events. Due to a lack of rain events, samples were only able to be collected from two storms in 2013. In the fall of 2013 Coastkeeper requested and received an extension for the SEP time period though the 2013-2014 wet season. Due to the extreme drought during the 2013-2014 wet season samples could only be collected from one additional storm event. In total, three of the four samples anticipated for the SEP time period could be collected. In spite of the difficulties we were able to collect reliable data and complete the project within the time allotted.

Metal Recycling yards and other industrial sites in the Santa Ana Watershed commonly contain pollutants such as oil and grease, metals, and suspended solids in their stormwater runoff. These pollutants can affect beneficial uses and pose a threat to receiving waters, so they must be dealt with on site to protect water quality downstream. There are a number of Best Management Practices (BMPs) that are implemented to reduce these pollutants including roofing, paving, and permeable landscape coverage. This project is designed to collect water quality data on the concentration and load reductions and of target pollutants that can be obtained through the implementation of water volume and pollutant reduction BMPs followed by advanced filtration using four proprietary stormwater water systems. The data collected may be used to determine new performance standards for metal recycling yards in the Santa Ana River Watershed. The creation of new performance standards is necessary to provide metal recycling yards with goals that are achievable and cost effective while also protecting water quality and beneficial uses in receiving waters.

The four proprietary advanced filtration units to be monitored are: American Storm Water Filtration, Storm Water Systems (Formally known as H2O Storm Water System), Storminator and StormwateRx. All four technologies were selected as they are commercially available units in current use at metal recycling facilities. These four systems have undergone extensive manufacturer based testing and monitoring. This will be the first comprehensive third party monitoring for these systems in an operating metal recycling yard setting.

The parameters to be monitored include oil and grease (HEM), total suspended solids (TSS), COD, total hardness, pH, conductivity as well as total: Iron, Aluminum, Copper, Lead, Zinc, and Dissolved: Copper, Lead, and Zinc along with pH and Conductivity. Initially a planned fifty four water samples (including QC samples) were to be collected from four representative storms at the inlet and outlet of the advanced filtration unit at each of the six project site during storm events over the 2012-2013 and the 2013-2014 wet seasons. Due to weather constraints only three storm events were monitored in 2012-2013, and one storm event monitored in 2013-2014 the result was 39 sample sets collected including four quality control samples.

The samples for lab analysis were placed on ice and transported to Test America Laboratory in Irvine Ca. within 48 hours of collection. At the lab the composite sample were filtered and divided as required for analysis by lab personnel.

The samples collected at the inlet are not be considered representative of the water quality that can be achieved by BMPs by metal recycling yards in the Santa Ana Watershed. The sample from the outlet of the filtration system is be considered representative of the water quality that metal recycling yards can achieve through the use of advanced filtration. The effectiveness of advanced treatment is dependent on the composition of the influent and pretreatment BMPs, which varies at each site. The project was not designed to evaluate the individual performance of the four treatment systems operated in this project and that evaluation is not included as part of this report.

Treatment System Description

The four propriety advanced filtration units to be monitored are: Storminator, StormwaterRX, American Storm Water Filtration and Storm Water Systems.

- The Storminator is an above ground, self-contained unit using a combination of pumps and filters filled with site specific media. The system requires backwashing the pressure vessels.
- The StormwaterRx Advance Media Filtration is a passive filtration system installed on grade with one pump station. Storm water is pumped through a series of settling and media containers.
- American Storm Water Filtrations system has automatic /manual 150 gpm pump. An Inline Pre-filter which removes unwanted leaves and larger debris at the front end of the filtration process, a series of media vessels and an Inline water metering device which helps keep accurate measurement of filtered water.
- Storm Water Systems– Alameda Treatment System
  Central Metals treatment system consists of a sump collection pit with pumps to transfer the water to the first settling tank. Flocculent is injected to improve the removal of solids and metals. After the first settling tank, the water transfers gravitationally to a second settling tank for additional solids removal. Water is withdrawn from the second settling by a centrifugal pump which pushes the water through the remaining treatment units to the final discharge point. The pressurized portion of the treatment system consists of three stages of sequentially finer mechanical filtration; followed by two stages of media polishing to remove oils, greases, and metals.

Training

All samples were collected by specifically trained Coastkeeper personnel. All of the staff participating in the project went through a two-step training program before collecting any stormwater samples. The first step involved a classroom session at the Coastkeeper office in Costa Mesa where consultants from AMEC and/or Project Director Ray Hiemstra introduced the project and conducted project specific training on USEPA approved sample collection methods, including a review of the project Quality Assurance Project Plan (QAPP). Safety training for sampling and working at scrap metal recycling facilities was also provided. Classroom training included a mock sample collection session where the trainees set up all equipment and then practiced using USEPA approved sample collection techniques including clean hands/dirty hands. All monitors were given a copy of the training manual developed by Dr. Richard Horner of the University of Washington and the QAPP to keep for review and reference. Copies of the QAPP and training materials presented in this report are the most recent, updated versions. All monitors were trained using these or earlier versions of these documents.

For phase two of the training the monitors were grouped into three person teams (two monitors and an alternate) and assigned to specific monitoring sites. All of the monitors (including alternates) were then taken to their specific monitoring site by their Coastkeeper site supervisor for an onsite visit and orientation to become familiar with the site setup and staff before arriving to conduct rain event monitoring.

Methodology

For this study there were six metal recycling yards: SA (SAS) in Santa Ana, American Metals Recyclers (AMRF) and SA (SAF) in Fontana, Ruby Metals (RMB) in Bloomington, SA (SAP) in Pomona, and Central Metals (CMV) in Vernon, selected to represent scrap metal facilities located in the Santa Ana watershed. (CMV is located in the Los Angeles Watershed, but is representative of Scrap Recycling facilities in the Santa Ana River Watershed)

The Pomona and Santa Ana yards are both small collector yards were metal is collected, sorted and stored before it is shipped to an offsite processing facility. The SA Fontana yard is a large processing facility. All of the SA metal scrap yards collect both ferrous and nonferrous metals. The SA metal scrap yards have installed Storminator systems at their three facilities. Ruby Metals, Inc. located in Bloomington is both a collecting and processing facility and has installed the Stormwater RX filtration system. American Metal Recycling located in Fontana is a collecting facility and the developer of the American Filtration system. Central Metals located in Vernon (Los Angeles County) is a collecting facility and has the H2O Storm Water Systems installed.

Since the Scrap recycling facilities are not open 24 hours/seven days a week samples had to be collected during business hours. Since storms do not conform to business hours, the stormwater is typically stored and then treated and released during business hours. Each site has a different storage scenario ranging from storage tanks to below grade detention areas. The facilities generally store water from small storms to re-use for dust control; this reduces treatment costs and potable water usage. The excess water generated by medium and large storms is run through an advance treatment system during or immediately after a storm event as necessary to prevent flooding before being discharge into the storm drains.

All samples were collected by trained Coastkeeper personnel assigned to a specific project site. A site crew consists of two main members and an alternate. The crew met with the site operator and toured their assigned site prior to any sampling events. They acquainted themselves with the site layout and the advance filtration system making notes of the flow meter, the inlet and out. All Coastkeeper crew were available for monitoring at all hours and were on-call 24/7.

The procedure for a monitoring event was for the project manager to call the site operator three days ahead of any potential storm event and confirm a monitoring event for the upcoming storm. The project manager then notified the Coastkeeper crew three days in advance of the potential storm event with the time and date. The site operator was to notify Coastkeeper if they had begun running the advance filtration system the night of the storm event or prior to business hours. When the crew arrived on site the first thing they did was to coordinate with the advance treatment system operator to get an estimate on the run time to filter the accumulated stormwater. The crew would set up for sample collection and determine the sample collection interval based on the run time estimate from the operator. The water samples and the associated flow rate were collected and recorded on a regular interval until the minimum 75% of the hydrograph were monitored. This run time estimated by the treatment system operator was considered to represent the full hydrograph, so the monitoring crew had to collect samples from at least 75% of the run time to meet the hydrograph QC goals for the project.

A liter of inlet and outlet water was collected at the beginning as oil and grease sample. A 100mL of sample was then collected at the inlet and outlet at the specified interval with the goal of collecting 20 discreet samples (12 at a minimum) to create the composite sample. The composite sample was kept in a cooler on ice. After the composite sample was completed, 100mL was poured out from both the inlet and the outlet composite sample for pH and conductivity measurements. After the sample was completed the Coastkeeper monitors called the project manager to arrange the pick up the paperwork and samples. The project manager than delivered the samples to the contract lab within 24 hours for processing.

Water samples were collected by placing an acid washed bottle under the sample collection nozzle and filling it to the 100mL mark then transferring it to an acid cleaned four liter composite amber glass bottle. The 100mL bottles were rinsed with site water three times before each sample was taken. The oil and grease samples were collected directly into a 1L amber glass bottle with HCL. Bottles were provided to Orange County Coastkeeper by the contract lab.

Samples used for analysis were collected using the techniques detailed in the project Training Manual. All sampling were collected using “Clean Hands/Dirty Hands” technique. For composite samples a minimum of twelve discreet 100mL samples representing at least 75% of the hydrograph were collected and poured into the 4 liter amber glass bottle to create a composite sample. Composite samples were placed on ice and delivered to Test America Laboratory within 48 hours. The staff at Test America filtered and divided the composite sample as necessary for the requested analysis. Oil and Grease samples (HEM) were preserved with HCl.

The monitoring team also measured flow by recording the reading on the flow meter (if working) during each composite sample subset collection. If the flow meter was not working the team measured flow using the bucket test method. This method consists of filling a bucket or vessel of known volume and documenting the fill time with a stopwatch. This is done three times for each measurement. The three fill times are then averaged to determine the flow rate for that measurement event.

Sampling was to occur at six metal recycling yards for four rain event during the 2012-2013and 2013-2014 rain season Due to lack of rain samples were not collected at some of the metal recycling yards during the rain events that were monitored. On 02/20/2013 monitoring occurred at SA Fontana, Ruby Metals, American Metal Recyclers and SA Pomona. On 03/08/2013 monitoring occurred at SA Fontana, Ruby Metals, American Metal Recycler and Central Metals. Monitoring did not occur at Central metals on 2/20/13 or at SA Santa Ana on 02/20/201, or 03/08/2013 due to lack of rain. On 02/28/2014 monitoring occurred at SA Fontana, Ruby Metals, American Metal Recycler and SA Pomona, SA Santa Ana, and Central Metals. Due to a lack of significant rain fall, only one rain event was monitored for the season.

Narrative of individual site activities

2/20/13 Central Metals – Vernon, CA (CMV)

We did not monitor at Central Metals on this date. When monitors arrived at the site they were informed that there was not enough of rainfall to run the H2O Stormwater system. A duplicate sample was scheduled for this site, but could not be attained as well.

2/20/13 SA-Santa Ana, CA (SASA)

We did not monitor at SA in this date. When monitors arrived at the site they were informed that there was not enough of rainfall to run the Storminator system.

2/20/13 Ruby Metals- Bloomington, CA (RMB)[1]

Water Monitors arrived at Ruby Metals at 7:00am to sample. The rain event started at 2/19/2013 10 pm and ended at 2/20/2013 4 am. Speaking with the Scrapyard operator and the representative from StormwateRx the estimated run time was 3.5 hours. The sampling interval was decided to be at every 6 minutes. Setup started at 7:30 am, the StormwateRx was turned on at 7:35 am and ran for 15 minutes before the first composite sample was taken. The inlet oil and grease sample was taken at 7:35 am and the outlet oil and grease sample at 7:50 am. The first of the composite sample was taken at 7:50 am. It started sprinkling at 8:45 am and stopped at 8:55 am. The Monitors called the Project Supervisor informing that 20 sub-samples have been collected and there was an estimated 3 hrs. of water left to sample. The Project Supervisor advised them to change the sampling frequency to every 12 minutes. Sampling lasted until 10:08 am with a sampling window of 2 hrs. and 18 minutes. 200 ml were extracted from the composite outlet and 100 ml were extracted from the composite inlet for pH and conductivity. The pH results were 8.02 for inlet and 7.13 for outlet and conductivity results were 400 Us for inlet and 320 Us for outlet. Monitors had mistaken the totalizer on the flow meter for the flow so flow data is not available for this sample set. While we collected the necessary samples to obtain composite samples, the composite does not represent 75% of the hydrograph.

[1] Did not meet QAPP requirements for 75% of the hydrograph.

2/20/13 SA-Fontana, CA (SAF)[2]

Water Monitors arrived at SA-Fontana at 7:00 am for sampling. The rain event started at 2/19/2013 10 pm and ended at 2/20/2013 4 am. Speaking with the Scrapyard operator, the estimated runtime was 5 hours. The monitors were not able to sample immediately, the water stored on the site needed to be pumped into the settling tank. With a late start time the sampling intervals was decided to be at every 15 minutes. Monitoring started at 10:00 am but sample collection lagged due to mechanical malfunction. The outlet valve and flow meter were non-operational. Monitors ended up taking outflow samples and flow measurements (using the bucket test) from the 4"discharge pipe. The oil and grease sample was taken at 10:25 am. The Back flush started at 11:05 am and ended at 11:20 am. The first composite sample was taken at 11:30 am. The Storminator was shut down at 1:05 pm for five minutes in attempt to fix the outflow valve; the valve was unable to be fixed at that time. A total of 12 sub-samples from 11:30 am to 2:15 pm were taken for the composite sample. The flow rate from the bucket test was a steady 43 gpm. Samples were extracted from the composite bottle for pH and conductivity measurement. The pH results were 7.77 for inlet and 7.81 for outlet and the conductivity results were 190 us for inlet and 200 us for outlet. While we collected the necessary samples to obtain composite samples, the composite does not represent 75% of the hydrograph.

2/20/13 American Metal Recycling- Fontana, CA (AMRF)

Water Monitors arrived at AMR at 7:30 am and started to setup. The rain event started at 2/19/2013 10 pm and ended at 2/20/2013 4 am. The site operator informed the monitors that the estimated run time is 7.65 hours. It was determine that the sampling interval would be at every 20 minutes. The pump was turned on at 8:00 am and sampling started at 8:40 am and continuously went until 2:00 pm where the flow rate dropped to 14.8 gpm from 36.84 gpm from the previous sample. The flow ranged from 46.5 gpm to 14.8 gpm. The pump ran from 8:00 am to 2:00 pm for a total of a 6 hour run time. Samples were extracted from the composite bottle for pH and conductivity measurement. The pH results were 7.45 for inlet and 7.85 for outlet and the conductivity results were 100 us for inlet and 110 us for outlet.

2/20/13 SA- Pomona, CA (SAP)

Water Monitors arrived at SA-Pomona at 7:00 am. When monitors arrived, the site operator informed the monitors that the filtration system will be running intermittently so he can store the discharge water to hose down the Scrapyard. The monitors immediately called the monitoring project supervisor who worked with the Environmental Director at SA's headquarters to resolve the issue. The sampling did not start until 10:00 am because the operator needed to wait for the crewman that hoses down the yard. The sampling interval was decided to be at 10 minutes. The pump started pumping at 9:54 am with the first sample being taken at 10:20 am. The procedure for sampling was as follow:

1. turn off pump

[2] Did not meet QAPP requirements for75% of the hydrograph.

2. switch lever from flow to filtration system to inflow nozzle for pre filtration sample
3. turn on pump
4. take pre filtration sample
5. turn off pump
6. switch lever back to run through filtration system
7. turn on pump
8. take sample of post filtration
9. turn off pump
10. unhook outflow hose
11. turn on pump
12. perform bucket test for flow measurement
13. turn off pump
14. re-hook outflow hose to truck
15. turn on pump

These steps were repeated every time when a sample was taken. The pump was stopped at 10:40 am, 11:45 am and 12:47 pm when the water truck filled up. The crewmen would hose down the yard, after finishing he would reattach the outflow hose to the truck and the filtration system would start again. A total of 18 sub-samples were collected from 10:20 am to 2:00 pm. The flow rate ranged from 42 gpm to 60 gpm. Samples were extracted from the composite bottle for pH and conductivity measurement. The pH results were 8.46 for inlet and 8.33 for outlet and the conductivity results were 510 us for inlet and 590 us for outlet.

3/08/13 SA- Santa Ana

No measurements were taken on this day due to lack of water to test.

3/08/13- SA-Pomona

No measurements were taken on this day due to lack of water to test.

3/08/13 Central Metals – Vernon, CA (CMV)[3]

Water Monitors arrived on site at 7:30am. It previously rained from 23:00 03/07 to 03:00 03/08. A duplicate sample was taken at this site. The monitors were informed by an engineer with Storm Water Systems that there were enough of storm water to run the filtration system but we had to wait for the holding tanks to be filled. The Oil and Grease sample was taken at 11:30. The Storm Water Systems is automated; the pump is controlled by a floating device in the holding tank. The pump would automatically stop when water levels in the tank roughly drops a third.

The water in the yard was being pump from around the yard into the sunk which was then pumped into the holding tanks. The pump in the yard was much smaller than that of the filtration pump, the water going in was not equal to the water going out which cause frequent stoppage during the

[3] Did not meet QAPP requirements by achieving minimum sub-samples.

monitoring. The filtration system would run for 2-3 minutes then shuts off for roughly 20 minutes before the tank is filled and the pump starts to run again. The first composite sample was taken at 13:30.

In order to for the monitors to get their 12 sub-discreet samples the monitors had the Stormwater systems engineer manually turn the pump on starting at 15:00. The pump was switch on for roughly 2-3 minutes than off for roughly 15 minutes in order for the tank to be filled. This occurred 3 times before there was no more water to be pumped into the holding tank. There was a constant flow rate of 100 gallons per minute, while the pump was on. It is important to note that the pump turns on and off at this site. The total flow from this site is unknown. The monitors were unable to achieve the minimum discreet samples as outlined in the QAPP. Only 9 discreet sub- samples were taken, due to no more water in the holding tank

100mL were poured out of sample A and B for pH and conductivity readings. The pH for {A inlet: 7.59 and A outlet: 7.8} and {B inlet: 7.57 and B outlet 7.85}. For conductivity {A inlet: 570 µs and A outlet: 590} µs and {B inlet: 570 µs and B outlet: 590 µs}.

3/08/13 Ruby Metals –Bloomington, CA (RMB)

Water Monitors arrived at Ruby Metals at 730 to sample. A duplicate sample was taken at this site, samples were labeled A and B. Speaking with the Scrapyard operator the estimated run time was 4 hours. The pump was turned on at 07:50; the sampling interval was decided to be at every 20 minutes. The Oil and Grease sample was taken at 08:50 and the first composite was taken at 0825. It was raining when the monitors arrived and rained off and on throughout the day. Sampling went smoothly, the last sample was taken at 12:45 and the flow of water stopped at 1305. A total of 14 discreet sub- samples were taken. The Flow ranged 40.7 gpm to 44.4 gpm.

100mL were poured out of sample A and B for pH and conductivity readings. The pH for {A inlet: 7.64 and A outlet: 7.35} and {B inlet: 7.71 and B outlet 7.37}. For conductivity {A inlet: 300 µs and A outlet: 300} Us and {B inlet: 300 µs and B outlet: 300 Us}.

3/08/13 American Metals Recycler- Fontana, CA (AMR)

Water Monitors arrived at AMR at 7:30 am and started to setup. The rain event started at 3/07/2013 03:00 and ended at 3/08/2013 08:00. The site operator informed the monitors that the estimated run time is 8 hours. The pump was turned on at 07:40; both the oil and grease and the first composite sample was taken at 08:00. The total monitoring time was 6 hours and 20 minutes. No problems were reported at this site by the monitors. The flow rate ranged from 36.6 gpm to 39.8 gpm. The pH results were 8.35 at the inlet and 8.14 at the outlet and the conductivity results were 40 µs at the inlet and 70 µs at the outlet.

3/08/13 SA-Fontana, CA (SAF)[4]

[4] Does not meet QAPP requirements due to not representing 75% of the hydrograph.

Water Monitors arrived at SA-Fontana at 08:30. The rain event was recorded to have started at 03:00 and lasted until 08:00. The rain gauge onsite read ¾" of rain. Speaking with the site operator the monitors were informed that the estimated run time would be 25 hours. Same as the previous monitoring session the bucket test was used to measure the flow rate. The first composite and Oil & Grease sample was taken at 09:05. The sampling went well with the bucket test necessary to obtain the flow rate. A total of 18 sub-samples were taken with the flow rate ranging from 30 gpm to 43 gpm. The total sampling time was 7 hours. The pH results were 8.08 at the inlet and 8.4 at the outlet and the conductivity results were 220 Us at the inlet and 240 Us at the outlet. While we collected the necessary samples to obtain composite samples, the composite does not represent 75% of the hydrograph.

2/28/14 Central Metals – Vernon, CA (CMV)[5]

Water Monitors arrived at Central Metals at 7:00am to sample. The rain event started on 2/28/2014 at 2:00am and ended on 2/29/2014. The Engineer from Storm Water Systems estimated the total sample collection time was 5 hours. The sampling interval was decided to be at every 19 minutes. Setup started at 7:15am, the Storm Water System was turned on at 7:30am and ran for 1 hour and 2 minutes before the inlet oil and grease sample was taken at 8:32am. While field personnel was sampling, the process pump turned off in order for the sump pumps to fill the tanks. The sump pumps are still too small compared to the process pump, which makes the process pump turn back on every 15 minutes causing delays in sampling. After taking the inlet oil and grease sample, the monitors had to wait 12 minutes to take the outlet oil and grease sample due to the pump turning off, which was at 8:44am. The first composite sample was taken at 8:50am. Heavy rain was overhead for most of the day. At 2:00pm the rain went from heavy to moderate rain fall. The monitors called the Project Supervisor informing that 35 samples have been collected. Sampling lasted until 2:00pm with a sampling window of 5 hours. 200 mL were extracted from the composite outlet and 100mL were extracted from the composite inlet for pH and conductivity. The pH results were 7.42 for inlet and 7.45 for outlet. The conductivity results were 530 us for inlet and 230 us for outlet. The Flow Meter reading was at 120 gpm when taking the oil and grease samples. The engineer then lowered the meter to have the flow rate at 100 gpm. The Flow Meter stayed at 100 gpm throughout the rest of the sampling, while the pump was on. It is important to note that the pump turns on and off at this site. The total flow from this site is unknown. The data from this sampling session was flagged due to irregularities. The outlet concentrations for metals were higher than the inlet concentrations. A lab duplicate was run for metals and showed the same results.

2/28/14 SA-Santa Ana, CA (SASA)[6]

Water monitors arrived at SA- Santa Ana at 8:00am to sample. The rain event started at 2/28/2014 2:00am and ended 2/29/2014. The Scrapyard operator estimated the total sample collection time at 4 hours. Setup started at 8:00am and ran for 50 minutes before the first composite sample was taken. No times were recorded for the taking of the oil and grease samples. Expected pump shutoff time was at 8:30pm. Sampling lasted until 12:57pm, with a sampling window of 4 hours. The sampling interval was

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[5] Data from sampling session was flagged due to irregularities of the influent and effluent data.
[6] Data from sampling session was flagged due to irregularities of the influent and effluent data.

decided to be at every 11 minutes, from the 1st to the 15th sample, and then every 7 minutes from the 16th to the 20th sample. The sampling interval of the 15th sample was interrupted due to a filter change that occurred at 11:48 am. The outlet sample was not taken until after the filter change at 12:19pm. There was also one more filter change after 2:40pm due to a cylinder busting. The pH and conductivity tests were not sampled on site (due to erroneousness), but rather in the Orange County Coastkeeper lab later in the day. While this was not according to procedure we do not think it affected the results. The data has been flagged as a precaution. The results for pH inlet was 7.93 and for outlet 8.00. The conductivity results for inlet was 360 Us and for outlet 450 Us. The duplicate test for pH for inlet was 7.66 and for outlet 7.67. The duplicate tests for conductivity were 350 us for inlet and 370 us for outlet. The bucket test had to be administered for this site to obtain the flow rate reading. Only three bucket tests were recorded for this site on this day. The flow test taken did not conform to SOP (Standard Operating Procedure), due to monitor error, so there is no flow data for this site. The data from this sampling session was flagged due to irregularities. The outlet concentrations for metals were higher than the inlet concentrations.

2/28/14 Ruby Metals- Bloomington, CA (RMB)

Water Monitors arrived at Ruby Metals at 8:00am to sample. The rain event started at 2/28/2014 at 2:00am and ended on 2/29/2014. The Scrapyard operator and the representative from StormwateRx estimated the run time for 8 hours. The sampling interval was decided to be at every 20 minutes. Setup for monitoring started at 8:00 am, with the StormwaterRx running for 40 minutes before the first oil and grease sample was taken. The first composite sample was taken at 9:05am. While taking the 11th sample, the 100mL bottle that was used to sample the outlet was dropped on the ground, and therefore contaminated. Monitors then switched to a new, uncontaminated 100mL bottle to continue taking samples so there was no effect on the composite sample. The Monitors called the Project Supervisor informing that 20 samples have been collected. Sampling lasted until 3:25pm with a sampling window of 6 hours and 30 minutes. 200 ml were extracted from the composite outlet and 100 ml were extracted from the composite inlet for pH and conductivity. The pH results were 6.53 for inlet and 6.15 for outlet, and conductivity results were 280 us for inlet and 390 Us for outlet. The average from the Flow Meter was rated at 1.29 seconds, with a flow rate of 38.66 gpm.

2/28/14 SA-Fontana, CA (SAF)[7]

Water Monitors arrived at SA-Fontana at 7:00 am for sampling. The rain event started on 2/28/2014 at 2:00 am and ended on 2/29/2014. The Scrapyard operator estimated runtime for 8 hours. The sampling interval was decided to be at every 24 minutes. Setup started at 8:00 am, and at 8:20am the first composite sample was taken. The oil and grease sample time was not recorded. Overnight this site received 5/8 inch of rain. Upon arrival at 7:00am there was no rain. From 9:00am to 9:20am it sprinkled. From 10:20am to 11:18am there was heavy rain, followed by light rain. At 11:35am a back washing occurred. At 12:30pm the overflow was ran and continued to be ran throughout the afternoon. At 12:47pm and 1:22pm, another back washing occurred. At 1:40pm the rain stopped. At 3:08pm the

[7] Emergency discharge flow was considered in the estimate for the hydrograph.

pump stopped to change from Settling Tank #1, to Settling Tank #2. The tank change was complete and the pump was reactivated at 3:16pm. Rain picked up heavy again at 3:20pm. The maintenance supervisor had to talk to headquarters and do some emergency releases. They could not store enough water for treatment. The maintenance supervisor ran the pumps for about 10-15 minutes each time to keep the water out of the scales and office. The monitors called the Project Supervisor informing that 18 samples have been collected. Sampling lasted until 3:48pm with a sampling window of 7 hours and 28 minutes. 200 mL were extracted from the composite outlet and 100 mL were extracted from the composite inlet for pH and conductivity measurement. The pH results were 7.4 for inlet and 7.1 for outlet, and the conductivity results were 360 us for inlet and 420 us for outlet. The bucket test had to be administered for this site to obtain the flow rate reading. The average flow rate from the bucket test was rated at 40.17 gpm.

2/28/14 American Metal Recycling- Fontana, CA (AMRF)

Water Monitors arrived at AMR at 7:00 am and started to setup. The rain event started on 2/28/2014 at 2:00 am and ended on 2/29/2014. The site operator informed the monitors that the estimated run time is 8 hours. It was determine that the sampling interval would be at every 30 minutes. The pump was turned on at 7:10 am and sampling started at 8:00 am. The average flow rate was calculated at 27.59 gpm. The pump ran from 8:00 am to 4:00 pm for a total of an 8 hour run time, with 17 samples taken. The pump shutoff time was at 4:20pm. 200 mL were extracted from the composite outlet and 100 mL were extracted from the composite inlet for pH and conductivity measurement. The pH results were 7.05 for inlet and 6.95 for outlet. The conductivity results were 240 us for inlet and 210 us for outlet.

2/28/14 SA- Pomona, CA (SAP)

Water Monitors arrived at SA-Pomona at 7:00 am. The rain event started on 2/28/2014 at 2:00 am and ended on 2/29/2014. When monitors arrived, the site operator informed the monitors that due to a lack of water, the system will not have water running through the pumps until 12:00 pm. The water that was being collected was to fill the tanks and water trucks. The pump started pumping at 10:00 am with the first composite sample being taken at 12:45 pm. The sampling interval was decided to be every 10 minutes. The storm over Pomona had light drizzle from 7:00 am to 9:00 am. The storm was intermittent from 9:00 am to 12:00 pm, with little to no rain from 12:00 pm to 4:00 pm. The total sample collection time was 3 hours and 10 minutes, with 20 samples taken. Upon arrival to the site, the monitors discovered the Flow Meter was no longer working. The bucket test had to be administered for this site to obtain the flow rate reading. The average flow rate from the bucket test was rated at 116 gpm. 200 mL were extracted from the composite outlet, and 100 mL were extracted from the composite inlet for pH and conductivity measurement. The pH results were 7.41 for inlet and 7.43 for outlet. The conductivity results were 300 us for inlet and 300 us for outlet.

Constraints

There were several important constraints on the project. The primary constraint was the lack of rain. The 2012-2013 and 2013-2014 rain seasons in Southern California were the driest in recent years and hindered Coastkeepers ability to perform the planned monitoring of four rain events. Additionally, since we were not using automated samplers we could only collect samples during business hours, 8am to 4pm Monday through Saturday at the participating scrap recycling facilities. This did not pose a serious problem as the yards had the ability to store water on site and would do so until we arrived in the morning after the rain started falling. Specifically we only had only three qualifying rain events that occurred during metal recycling business hours. Other issues we had to deal with were activities such as recycling the water to use on site at the SA Pomona site during one sampling event, an equipment malfunction of the filtration system at SA Santa Ana. Also flow meter failure at the three SA yards and pump variability at the Central Metals facility made accurate measurements of flow difficult or impossible to obtain.

Data Analysis Methods

The method selected to analyze the treated water from scrap metal recycling facilities was by comparing the concentration of contaminants in the effluent from the treatment system with the Scrap Metal Recycling Sector Permit Numeric Action Limits (NALs, based off sector specific Federal Benchmarks). This project is not designed to determine the ability of advanced filtration equipment to treat stormwater to meet these action limits. We did not attempt to determine load reductions as we had limited flow information due to flow meter failures, pump speed variability and monitor errors.

Numeric Action Limits	
Element	**Conc.**
Chemical Oxygen Demand (COD)	120 mg/L
Total Suspended Solids (TSS)	100 mg/L
Total Recoverable Aluminum	750 µg/L
Total Recoverable Copper	18.9 µg/L
Total Recoverable Iron	1000 µg/L
Total Recoverable Lead	122 µg/L
Total Recoverable Zinc	160 µg/L

***Total recoverable Copper, lead and zinc are based on an average hardness range of 125-150 mg/L**

***Figures that are highlighted in yellow on the following charts *Effluent Concentrations at all Metal Recycling Yards Concentrations for 2/20/2013, 3/8/2013 and 2/28/2014,* indicate an exceedance of the Scrap Metal Recycling Sector Permit NALs.**

Table 1- Effluent Concentrations at all Metal Recycling Yards for 2/20/2013

	2/20/2013					
	RMB	AMR	SAP	SAF	CMV	Federal Benchmark
Chemical Oxygen Demand (COD)	590 mg/l	ND	95 mg/l	110 mg/l	-	120 mg/l
Total Suspended Solids (TSS)	23 mg/l	ND	18 mg/l	29 mg/l	-	100 mg/l
Total Recoverabe Aluminum	0.33 mg/l	0.16 mg/l	0.32 mg/l	1.4 mg/l	-	0.75 mg/l
Total Recoverable Copper	1.2 mg/l	0.005 mg/l	0.03 mg/l	0.41 mg/l	-	0.189 mg/l
Total Recoverable Iron	0.42 mg/l	0.26 mg/l	1.1 mg/l	1.4 mg/l	-	1 mg/l
Total Recoverable Lead	0.1 mg/l	0.0049 mg/l	0.021 mg/l	0.17 mg/l	-	0.122 mg/l
Total Recoverable Zinc	0.13 mg/l	0.022 mg/l	0.17 mg/l	0.42 mg/l	-	0.16 mg/l
Oil&Grease	27 mg/l	8.5 mg/l	ND mg/l	3 mg/l	-	15 mg/l
Dissolved Aluminum	0.091 mg/l	0.017 mg/l	0.0083 mg/l	0.028 mg/l	-	
Dissolved Copper	310 mg/l	0.0032 mg/l	0.0043 mg/l	0.17 mg/l	-	
Dissolved Iron	0.24 mg/l	0.046 mg/l	0.091 mg/l	0.062 mg/l	-	
Dissolved Lead	0.064 mg/l	0.008 mg/l	0.0021 mg/l	0.018 mg/l	-	
Dissolved Zinc	0.02 mg/l	ND	0.076 mg/l	0.18 mg/l	-	

***ND=** Not detected at the reporting limit (or MDL or EDL if shown)
*MDL= Method Detection Limit
*EDL= Estimated Detection Limit
* RL= Reporting Limit
*Dissolved Aluminum and Iron have no CTR (California Toxic Rule) criteria.
*No samples were taken at SASA due to weather constraints.

*** Duplicate samples were to be used during sampling and analysis at the CMV site, but due to weather constraints, no samples were taken.**

Table 2- Effluent Concentrations at all Metal Recycling Yards Concentrations for 3/8/2013

	3/8/2013							
	RMB	RMB (DUP)	AMR	SAP	SAF	CMV	CMV (DUP)	Federal Benchmark
Chemical Oxygen Demand (COD)	390 mg/l	210 mg/l	ND	-	88 mg/l	ND	ND	120 mg/l
Total Suspended Solids (TSS)	21 mg/l	18 mg/l	16 mg/l	-	16 mg/l	10 mg/l	ND	100 mg/l
Total Recoverabe Aluminum	0.2 mg/l	0.21 mg/l	0.039 mg/l	-	0.092 mg/l	0.037 mg/l	0.038 mg/l	0.75 mg/l
Total Recoverable Copper	0.86 mg/l	0.89 mg/l	0.0046 mg/l	-	0.16 mg/l	0.031 mg/l	0.034 mg/l	0.0189 mg/l
Total Recoverable Iron	0.34 mg/l	0.36 mg/l	0.1 mg/l	-	250 mg/l	0.054 mg/l	0.064 mg/l	1 mg/l
Total Recoverable Lead	-	-	-	-	-	-	-	0.122 mg/l
Total Recoverable Zinc	0.12 mg/l	0.13 mg/l	0.01 mg/l	-	0.1 mg/l	0.046 mg/l	0.063 mg/l	0.16 mg/l
Oil&Grease	0.011 mg/l	11 mg/l	ND	-	5.6 mg/l	8.3 mg/l	ND	15 mg/l
Dissolved Aluminum	-	-	-	-	-	-	-	
Dissolved Copper	0.63 mg/l	0.62 mg/l	3.1 mg/l	-	0.15 mg/l	0.0021 mg/l	0.003 mg/l	
Dissolved Iron	-	-	-	-	-	-	-	
Dissolved Lead	0.028 mg/l	0.025 mg/l	0.46 mg/l	-	0.01 mg/l	0.0003 mg/l	4E-04 mg/l	
Dissolved Zinc	0.095 mg/l	0.093 mg/l	ND	-	0.1 mg/l	0.034 mg/l	0.014 mg/l	

No data was obtained for SAP and SASA, due to weather constraints.
*Total Recoverable Lead concentrations were not measured due to omission on lab request.
*Dissolved Aluminum and Iron was not run as they were not identified as a priority by the TAC

Table 3- Effluent Concentrations at all Metal Recycling Yards Concentrations for 2/28/2014

	2/28/2014								
	RMB	AMR	SAP	SAF	CMV	CMV- DUP	SASA	SASA- DUP	Federal Benchmark
Chemical Oxygen Demand (COD)	190 mg/l	ND	89 mg/l	110 mg/l	33 mg/l	-	170 mg/l	170 mg/l	120 mg/l
Total Suspended Solids (TSS)	20 mg/l	8.4 mg/l	10 mg/l	26 mg/l	18 mg/l	-	16 mg/l	76 mg/l	100 mg/l
Total Recoverabe Aluminum	0.26 mg/l	0.1 mg/l	0.031 mg/l	0.088 mg/l	0.34 mg/l	.480 mg/l	1.700 mg/l	.750 mg/l	0.75 mg/l
Total Recoverable Copper	0.4 mg/l	0.0076 mg/l	0.023 mg/l	0.093 mg/l	0.064 mg/l	.078 mg/l	.130 mg/l	.100 mg/l	0.189 mg/l
Total Recoverable Iron	0.29 mg/l	0.39 mg/l	0.12 mg/l	0.34 mg/l	.320 mg/l	.360 mg/l	1.800 mg/l	.880 mg/l	1 mg/l
Total Recoverable Lead	0.077 mg/l	0.0062 mg/l	0.005 mg/l	0.019 mg/l	.018 mg/l	.022 mg/l	.090 mg/l	.050 mg/l	0.122 mg/l
Total Recoverable Zinc	0.13 mg/l	0.025 mg/l	0.069 mg/l	0.18 mg/l	.160 mg/l	.210 mg/l	.730 mg/l	.630 mg/l	0.16 mg/l
Oil&Grease	5.2 mg/l	ND	2.2 mg/l	1.6 mg/l	ND	-	4.5 mg/l	2.8 mg/l	15 mg/l
Dissolved Copper	0.24 mg/l	0.0039 mg/l	0.018 mg/l	0.064 mg/l	ND	ND	.095 mg/l	.089 mg/l	
Dissolved Iron	-	-	-	-	-	-	-	-	
Dissolved Lead	0.035 mg/l	0.0022 mg/l	0.0027 mg/l	0.0098 mg/l	ND	ND	.011 mg/l	.0092 mg/l	
Dissolved Zinc	0.09 mg/l	0.014 mg/l	0.066 mg/l	0.17 mg/l	.020 mg/l	51 mg/l	.560 mg/l	.540 mg/l	

***ND=** Not detected at the reporting limit (or MDL or EDL if shown)
*MDL= Method Detection Limit
*EDL= Estimated Detection Limit
* RL= Reporting Limit
*Dissolved Aluminum and Iron was unnecessary for analysis because they do not have CTR (California Toxic Rule

Table 4- Ruby Metals

Lab analyzed constituent data by site

	Ruby Metals						
		2/20/2013		3/8/2013		3/8/2013 (DUP)	
	Analyte	Inlet	outlet	Inlet	Outlet	Inlet	Outlet
Total Metals	Aluminum	420 µg/L	330 µg/L	480 µg/L	200 µg/L	1000 µg/L	210 µg/L
	Copper	2500 µg/L	1200 µg/L	1000 µg/L	860 µg/L	3900 µg/L	890 µg/L
	Iron	430 µg/L	420 µg/L	370 µg/L	340 µg/L	2300 µg/L	360 µg/L
	Lead	120 µg/L	100 µg/L	-	-	-	-
	Zinc	470 µg/L	130 µg/L	530 µg/L	120 µg/L	810 µg/L	130 µg/L
Dissolved Metals	Aluminum	150 µg/L	91 µg/L	-	-	-	-
	Copper	2700 µg/L	310 µg/L	930 µg/L	630 µg/L	880 µg/L	620 µg/L
	Iron	230 µg/L	240 µg/L	-	-	-	-
	Lead	66 µg/L	64 µg/L	49 µg/L	28 µg/L	44 µg/L	25 µg/L
	Zinc	250 µg/L	20 µg/L	470 µg/L	95 µg/L	450 µg/L	93 µg/L
General Chemistry	Total Suspended Solid	13 mg/L	23 mg/L	ND	21 mg/L	20 mg/L	18 mg/L
	Chemical Oxygen Demand	700 mg/L	590 mg/L	200 mg/L	390 mg/L	ND	210 mg/L
	Hardness	66 mg/L	68 mg/L	60 mg/L	64 mg/L	130 mg/L	68 mg/L
	Oil and Grease (HEM)	36 mg/L	27 mg/L	10 mg/L	11 mg/L	9.8 mg/L	11 mg/L

***** Dissolved Aluminum and Iron was unnecessary for analysis on 2/20/2013, because they do not have CTR (California Toxic Rule). Measurements were taken due to lab error.
*Total Recoverable Lead concentrations were not taken on 3/8/2013, due to lab error.
3/8/2013 DUP -Matrix spike (MS/MSD) percent recoveries and %RPD for copper and zinc were outside control limits.

Table 5- AMR

American Metal Recyclers				
	2/20/2013		3/8/2013	
Analyte	Inlet	outlet	Inlet	Outlet
Aluminum	590 µg/L	160 µg/L	150 µg/L	39 µg/L
Copper	25 µg/L	5 µg/L	20 µg/L	4.6 µg/L
Iron	1100 µg/L	260 µg/L	270 µg/L	100 µg/L
Lead	18 µg/L	4.9 µg/L	-	-
Zinc	120 µg/L	22 µg/L	69 µg/L	10 µg/L
Aluminum	16 µg/L	17 µg/L	-	-
Copper	14 µg/L	3.2 µg/L	20 µg/L	3.1 µg/L
Iron	44 µg/L	46 µg/L	-	-
Lead	1.2 µg/L	0.8 µg/L	0.95 µg/L	0.46 µg/L
Zinc	32 µg/L	ND	44 µg/L	ND
Total Suspended Solid	ND	ND	ND	ND
Chemical Oxygen Demand	26 mg/L	ND	ND	16 mg/L
Hardness	28 mg/L	ND	40 mg/L	10 mg/L
Oil and Grease (HEM)	ND	8.5 mg/L	ND	ND

***** Dissolved Aluminum and Iron was unnecessary for analysis on 2/20/2013, because they do not have CTR (California Toxic Rule). Measurements were taken due to lab error.
*Total Recoverable Lead concentrations were not taken on 3/8/2013, due to lab error.

Table 6- SAP

SA -Pomona			
		2/20/2013	
	Analyte	Inlet	outlet
Total Metals	Aluminum	600 µg/L	320 µg/L
	Copper	61 µg/L	30 µg/L
	Iron	1900 µg/L	1100 µg/L
	Lead	52 µg/L	21 µg/L
	Zinc	490 µg/L	170 µg/L
Dissolved Metals	Aluminum	ND	8.3 µg/L
	Copper	4.4 µg/L	4.3 µg/L
	Iron	67 µg/L	91 µg/L
	Lead	2.3 µg/L	2.1 µg/L
	Zinc	260 µg/L	76 µg/L
General Chemistry	Total Suspended Solid	32 mg/L	18 mg/L
	Chemical Oxygen Demand	100 mg/L	95 mg/L
	Hardness	140 mg/L	140 mg/L
	Oil and Grease (HEM)	3.7 mg/L	ND

Dissolved Aluminum and Iron was unnecessary for analysis because they do not have CTR (California Toxic Rule). Measurements were taken due to lab error.

Table 7- SAF

SA -Fontana				
	2/20/2013		3/8/2013	
Analyte	Inlet	outlet	Inlet	Outlet
Aluminum	1500 µg/L	1400 µg/L	280 µg/L	92 µg/L
Copper	980 µg/L	410 µg/L	280 µg/L	160 µg/L
Iron	2700 µg/L	1400 µg/L	510 µg/L	250 µg/L
Lead	350 µg/L	170 µg/L	-	-
Zinc	550 µg/L	420 µg/L	230 µg/L	100 µg/L
Aluminum	31 µg/L	28 µg/L	-	-
Copper	260 µg/L	170 µg/L	170 µg/L	150 µg/L
Iron	45 µg/L	62 µg/L	-	-
Lead	17 µg/L	18 µg/L	13 µg/L	10 µg/L
Zinc	15 µg/L	180 µg/L	190 µg/L	100 µg/L
Total Suspended Solid	54 mg/L	29 mg/L	26 mg/L	16 mg/L
Chemical Oxygen Demand	130 mg/L	110 mg/L	130 mg/L	88 mg/L
Hardness	60 mg/L	40 mg/L	60 mg/L	56 mg/L
Oil and Grease (HEM)	7.7 mg/L	3 mg/L	ND	5.6 mg/L

Dissolved Aluminum and Iron was unnecessary for analysis on 2/20/2013, because they do not have CTR (California Toxic Rule). Measurements were taken due to lab error.
*Total Recoverable Lead concentrations were not taken on 3/8/2013, due to lab error.

Table 8- CMV

Central Metals					
		3/8/2013		3/8/2013 (DUP)	
	Analyte	Inlet	outlet	Inlet	Outlet
Total Metals	Aluminum	980 µg/L	37 µg/L	650 µg/L	38 µg/L
	Copper	370 µg/L	31 µg/L	300 µg/L	34 µg/L
	Iron	2200 µg/L	54 µg/L	1300 µg/L	64 µg/L
	Lead	-	-	-	-
	Zinc	770 µg/L	46 µg/L	670 µg/L	63 µg/L
Dissolved Metals	Aluminum	-	-	-	-
	Copper	100 µg/L	2.1 µg/L	110 µg/L	2.5 µg/L
	Iron	-	-	-	-
	Lead	16 µg/L	0.32 µg/L	14 µg/L	0.38 µg/L
	Zinc	360 µg/L	14 µg/L	460 µg/L	14 µg/L
General Chemistry	Total Suspended Solid	20 mg/L	10 mg/L	31 mg/L	ND
	Chemical Oxygen Demand	160 mg/L	ND	150 mg/L	ND
	Hardness	110 mg/L	34 mg/L	110 mg/L	34 mg/L
	Oil and Grease (HEM)	ND	8.3 mg/L	8.1 mg/L	ND

* Dissolved Aluminum and Iron was unnecessary for analysis because they do not have CTR (California Toxic Rule). Measurements were taken due to lab error.
*Total Recoverable Lead concentrations were not taken due to lab error.
*Central Metals also had a significant drop in effluent constituents on 3/8/13 however, review of the data and field notes do not give any explanation to why there is a significant difference in the influent monitoring data for the sample/duplicate samples collected on 3/8/13. Due to the nature of untreated storm water, the variability in influent data may have to do with the intensity of rain, or level of water in the holding tanks that would cause the influent to be inconsistent.

Lab analyzed constituent data by site

Table 9- Ruby Metals

Ruby Metals			
		2/28/2014	
	Analyte	Inlet	outlet
Total Metals	Aluminum	4000 µg/L	260 µg/L
	Copper	1800 µg/L	400 µg/L
	Iron	3300 µg/L	290 µg/L
	Lead	610 µg/L	77 µg/L
	Zinc	1100 µg/L	130 µg/L
Dissolved Metals	Copper	680 µg/L	240 µg/L
	Lead	70 µg/L	35 µg/L
	Zinc	610 µg/L	90 µg/L
General Chemistry	Total Suspended Solid	100 mg/L	20 mg/L
	Chemical Oxygen Demand	280 mg/L	190 mg/L
	Hardness	72 mg/L	64 mg/L
	Oil and Grease (HEM)	8.6 mg/L	5.2 mg/L

Table 10- AMR

	American Metal Recyclers		
		2/28/2014	
	Analyte	Inlet	outlet
Total Metals	Aluminum	1100 µg/L	100 µg/L
	Copper	43 µg/L	7.6 µg/L
	Iron	2100 µg/L	390 µg/L
	Lead	38 µg/L	6.2 µg/L
	Zinc	370 µg/L	25 µg/L
Dissolved Metals	Copper	24 µg/L	3.9 µg/L
	Lead	5.7 µg/L	2.2 µg/L
	Zinc	170 µg/L	14 µg/L
General Chemistry	Total Suspended Solid	31 mg/L	8.4 mg/L
	Chemical Oxygen Demand	55 mg/L	ND
	Hardness	46 mg/L	12 mg/L
	Oil and Grease (HEM)	1.3 mg/L	ND

Table 11- SAP

SA -Pomona			
		2/28/2014	
	Analyte	Inlet	outlet
Total Metals	Aluminum	73 µg/L	31 µg/L
	Copper	43 µg/L	23 µg/L
	Iron	230 µg/L	120 µg/L
	Lead	7.6 µg/L	5 µg/L
	Zinc	470 µg/L	69 µg/L
Dissolved Metals	Copper	30 µg/L	18 µg/L
	Lead	2.4 µg/L	2.7 µg/L
	Zinc	450 µg/L	66 µg/L
General Chemistry	Total Suspended Solid	41 mg/L	10 mg/L
	Chemical Oxygen Demand	110 mg/L	89 mg/L
	Hardness	92 mg/L	30 mg/L
	Oil and Grease (HEM)	6.5 mg/L	2.2 mg/L

Table 12- SAF

	SA -Fontana		
		2/28/2014	
	Analyte	Inlet	outlet
Total Metals	Aluminum	580 µg/L	88 µg/L
	Copper	340 µg/L	93 µg/L
	Iron	1200 µg/L	340 µg/L
	Lead	81 µg/L	19 µg/L
	Zinc	320 µg/L	180 µg/L
Dissolved Metals	Copper	130 µg/L	64 µg/L
	Lead	19 µg/L	9.8 µg/L
	Zinc	230 µg/L	170 µg/L
General Chemistry	Total Suspended Solid	42 mg/L	26 mg/L
	Chemical Oxygen Demand	150 mg/L	110 mg/L
	Hardness	110 mg/L	86 mg/L
	Oil and Grease (HEM)	5.4 mg/L	1.6 mg/L

Table 13- CMV

	Central Metals				
		2/28/2014		2/28/2014 Duplicate	
	Analyte	Inlet	outlet	Inlet	Outlet
Total Metals	Aluminum	90 µg/L	340 µg/L	99 µg/L	480 µg/L
	Copper	26 µg/L	64 µg/L	24 µg/L	78 µg/L
	Iron	310 µg/L	320 µg/L	260 µg/L	360 µg/L
	Lead	11 ug/L	18 µg/L	9 µg/L	22 µg/L
	Zinc	53 µg/L	160 µg/L	49 µg/L	210 µg/L
Dissolved Metals	Copper	1.5 µg/L	ND	7.6 µg/L	ND
	Lead	ND	ND	ND	ND
	Zinc	26 µg/L	20 µg/L	45 µg/L	51 µg/L
General Chemistry	Total Suspended Solid	3.8 mg/L	18 mg/L	-	-
	Chemical Oxygen Demand	130 mg/L	33 mg/L	-	-
	Hardness	130 mg/L	12 mg/L	-	-
	Oil and Grease (HEM)	2.3 mg/L	ND	-	-

*The duplicate for CMV was a lab duplicate that we ran to confirm the unusual metal results from the sample. The other constituents were not run because those results were not unusual.

Table 14- SASA

SA-Santa Ana					
		2/28/2014		2/28/2014- DUP	
	Analyte	Inlet	outlet	Inlet	Outlet
Total Metals	Aluminum	460 ug/L	1700 ug/L	1400 µg/L	750 µg/L
	Copper	110 ug/L	130 ug/L	160 µg/L	100 µg/L
	Iron	1300 ug/L	1800 ug/L	3900 µg/L	880 µg/L
	Lead	79 ug/L	90 ug/L	200 ug/L	50 ug/L
	Zinc	920 ug/L	730 µg/L	1200 µg/L	630 µg/L
Dissolved Metals	Copper	83 ug/L	95 µg/L	83 µg/L	89 µg/L
	Lead	16 ug/L	11 µg/L	15 µg/L	9.2 µg/L
	Zinc	750 ug/L	560 µg/L	700 µg/L	540 µg/L
General Chemistry	Total Suspended Solid	99 mg/L	16 mg/L	110 mg/L	76 mg/L
	Chemical Oxygen Demand	220 mg/L	170 mg/L	220 mg/L	170 mg/L
	Hardness	100 mg/L	78 mg/L	96 mg/L	76 mg/L
	Oil and Grease (HEM)	6.4 mg/L	4.5 mg/L	4.6 mg/L	2.8 mg/L

***The samples collected for SASA for 2/28 appears to have a QC problem as the inlet concentrations are higher than the outlet concentrations for most metals. The duplicate sample appears normal. All data from this date has been flagged.**

Preliminary Data Analysis

This project is designed to collect water quality data on the concentrations of target criteria that can be obtained through the implementation of water volume and pollutant reduction BMPs followed by advanced filtration using four proprietary storm water systems. The data collected may be used to help determine new treatment standards for metal recycling yards in the Santa Ana River Watershed. The influent and effluent data received from the three storms during the 2012-2014 wet seasons documents the amounts of metals, suspended solids, COD, and Oil and Grease in untreated runoff from recycling yards and the concentration reductions (if any) achieved by treatment by the four noted filtration systems. Removal rates varied from 20.3%- 100%, depending on the constituent and which was dependent on the location the percentage change for constituents of each metal recycling yard is below. While this analysis is presented for informational purposes, it is important to note that with only three sampling event completed so far, it is not statistically valid. The long term goal of the project is to collect twelve samples from each site to have enough data for statistical analysis. Only data that was not flagged was analyzed. No conclusions should be drawn on the effectiveness of the advanced treatment units used.

Constituent reduction rates for all sites

Table 14- Ruby Metals- StormwaterRx

2/20/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
44.67%	78.65%	TSS in outlet sample, and not in inlet sample	25%
3/8/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
36.13%	48.03%	TSS in outlet sample, and not in inlet sample	More HEM in outlet sample than inlet sample
3/8/2013 Duplicate Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
80.15%	46.29%	10.00%	More HEM in outlet sample than inlet sample
2/28/2014 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
89.30%	73.16%	80%	39.53%

Table 15- American Metal Recyclers- American Storm Water Filtrations system

2/20/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
75.67%	37.50%	100%	HEM in outlet sample, and not in inlet
3/8/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
69.82%	37.50%	100%	100%
2/28/2014 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
85.52%	89.93%	72.90%	100%

Table 16- SA Pomona-Storminator

2/20/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
47.12%	45.55%	44%	100%
2/28/2014 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
69.89%	82.03%	75.61%	66%

Table 17- SA Fontana- Storminator

2/20/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
37.50%	24.46%	46%	61.04%
3/8/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
53.69%	43.46%	38%	HEM in outlet sample, but not in inlet sample
2/28/2014 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
71.44%	35.67%	38.10%	70%

Table 18- SA Santa Ana- Storminator

2/28/2014 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
64.87%	20.03%	31%	39.13%

Table 19- Central Metals- Storm water Systems

3/8/2013 Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
96.11%	96.55%	50%	HEM in outlet sample, but not in inlet sample
3/8/2013 Duplicate Removal Rates			
Total Metals	Dissolved Metals	Total Suspended Solids	Oil & Grease (HEM)
93.18%	97.11%	100.00%	100%

*****All data is available upon request.**

Quality Control Analysis

For each of the sites involved in this project, the analysis of the flow was a critical component. It should be noted that load reductions were not assessed for the filtration systems. This was because of a lack of accurate flow data. Determination of run time for each filtration system was established by the yard operator. The run time of the system also determines the collection time of samples to fill the hydrograph. While the flow readings from the Central Metal site were accurate when recorded, the design of the system causes the pump to shut on and off at irregular intervals, so the flow readings do not accurately reflect the volume of water discharged over time. The flow meters at all three SA yards failed so bucket tests had to be used. All data that did not meet QC requirements such as inaccurate flow measurements, not meeting the hydrograph or any irregular results were flagged and subject to further investigation. Field blanks were not used as part of this project. However 18 of the 36 samples did meet quality guidelines and were used for analysis of reductions in concentrations of pollutants.

Two samples, one at SA Santa Ana and One at Central metals showed a higher concentration of metals in the effluent sample than the influent. To check the lab analysis a lab duplicate was run on the Central metals sample with the same result. This result is unexplained, as the General chemistry number for the samples decreased from the inlet to outlet. Contamination of the bottles is a possibility but there was no report from the monitors or lab of any irregularities in the bottles or their handling. These results were not used in the data analysis and have been flagged.

Table 20- Data Validation

Scrap Metal Facilities Dates samples were collected	Met QC Guidelines? Yes/No	QC Comments
Ruby Metals		
2/20/2013	No	Does not represent 75% of the hydrograph. Does not meet QAPP requirements. Flow data is not available.
3/8/2013	Yes	QC guidelines met
3/8/2013 (Duplicate)	Yes	QC guidelines met
2/28/2014	Yes	QC guidelines met
American Metal Recycling		
2/20/2013	Yes	QC guidelines met
3/8/2013	Yes	QC guidelines met
2/28/2014	Yes	QC guidelines met
SA-Fontana		
2/20/2013	No	Does not represent 75% of the hydrograph.
3/8/2013	No	Does not represent 75% of the hydrograph.
2/28/2014	Yes	QC guidelines met
SA-Pomona		
2/20/2013	Yes	QC guidelines met
2/28/2014	Yes	QC guidelines met
SA-Santa Ana		
2/28/2014	No	QC requirements were not met. Did not conform to SOP. No flow data. Irregularities in data samples. Flagged for further review, and was not used in the data analysis.
2/28/2014 (Duplicate)	No	QC requirements were not met. Did not conform to SOP. No flow data. Flagged for further review.
Central Metals		
3/8/2013	No	Did not meet QAPP requirements by achieving minimum sub-samples. Flow rate only reflects when pump was running.
3/8/2013 (Duplicate)	No	Did not meet QAPP requirements by achieving minimum sub-samples. Flow rate only reflects when pump was running.
2/28/2014	No	Data from sampling was flagged due to irregularities. Flow rate only reflects when pump was running.
2/28/2014 (Duplicate)	No	Data from sampling was flagged due to irregularities. Flow rate only reflects when pump was running.

Site Monitors

All monitors in the table below received classroom training at the OCCK office on 11/29/2012. All monitors also received on-site training at their assigned locations.

2012-2013		
City	**Contact**	**Monitors**
Bloomington, CA	Brian	
Ruby		Stephen Ho
		Johana Torres
		Kristan Culbert
Fontana, CA	Tony	
SA-Fontana		Randy Chua
		Britany D.Moretini
		Trisha DiPaola
Fontana, CA	Dave	
AMR		Matt Trostad
		Hillary Grez
		Julie Coffey
Pomona, CA	Gary	
SA-Pomona		Danny Gambino
		David Feliciano
		Natalie Arenado
Vernon, CA	Pat	
CMV		Nicole McClain
		Forrest Brown
		Nikolas Vokhshoori
		Bryan Menegazzo
Santa Ana, CA	Alex	
SA-Santa Ana		Amanda Bird
		Patricia Bylsma
		Mike McCarthy
Alternates		Robert Caroll
		Kate Forrest

All monitors in the table below received classroom training at the OCCK office on 10/24/2013. All monitors also received on-site training at their assigned locations.

SITE- 2013-2014	CITY	CONTACT	MONITORS
RUBY METALS	BLOOMINGTON, CA	BRIAN CHEN	
			Robin Smith
			Breyan Donaldson
SA-FONTANA	FONTANA, CA	TONY	
			Daniel Lee
			Elaina Hurst
AMR	FONTANA, CA	Todd	
			Russell Carvalho
			Michelle Chan
SA-POMONA	POMONA, CA	Mike	
			Aaron Johnson
			Danny Gambino
CENTRAL METALS	VERNON, CA	PAT	
			FORREST BROWN
			Babs McCoy
SA-SANTA ANA	SANTA ANA, CA	ALEX VILLA	
			Courtney James
			Heath Walton
Alternates			Mike Potter

METAL RECYCLING INDUSTRY

STORMWATER MONITORING

TRAINING MANUAL

By

Richard R. Horner

Prepared for

Orange County Coastkeeper

October 2013

A FRAMEWORK FOR MONITORING

WATER QUALITY VARIABLES

Note: Only variables to be measured in the metal recycling industry monitoring are included. Abbreviations and customary units of measurement are in parentheses; mL—milliliters; L—liters; mg—milligrams; µg—micrograms (1 mg = 1000 µg).

Measures of solids—Impacts include light and visibility reduction, abrasion of sensitive aquatic animal tissues, transport of other pollutants, and sediment deposition.

- Total suspended solids (TSS, mg/L)—Trapped by 0.45-micrometer filter

Metals (µg/L in natural waters, sometimes mg/L in effluents)—Many are toxic to aquatic life, and some bioaccumulate and biomagnify; the first three are most often detected in stormwater runoff and natural waters.

- Copper (Cu) Lead (Pb) Zinc (Zn)
- Aluminum (Al) Iron (Fe)

Metals can be measured as dissolved, "total recoverable," or both. Dissolved metals have the most immediate toxic effects, but those in the solid state can dissolve and also accumulate in sediments and affect life there. The total recoverable metal will be measured for each metal in the list above but dissolved only for Cu, Pb, and Zn.

Calcium (Ca) and magnesium (Mg) are non-toxic metals that reduce solubility and therefore harmful effects of other metals and together produce what we call "water hardness." Treatment standards are based on hardness. Whenever the objective is to determine if natural water metals criteria are met, hardness should be determined and expressed "as mg/L calcium carbonate, $CaCO_3$." Hardness will be measured in the metal recycling industry stormwater.

General measures of organics

- Chemical oxygen demand (COD, mg/L)—COD indirectly measures the total amount of all organic compounds in water. The basis for the test is that nearly all organic compounds can be fully oxidized to carbon dioxide with a strong oxidizing agent under acidic conditions.

Petroleum and its products

- Oil and grease (mg/L)

MONITORING OBJECTIVES

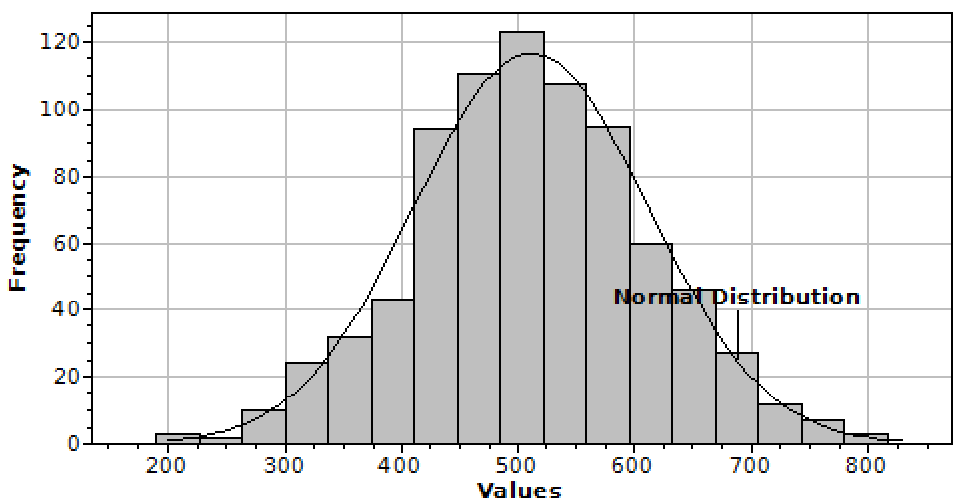
Having definite objectives is an essential prerequisite for effective monitoring. Objectives can be in general and more specific terms. General objectives represent goals at the programmatic level, while specific objectives directly guide the conduct of the monitoring and interpretation of results. Therefore, specific objectives should always be stated and consulted throughout the work. Even if they cannot be formulated initially in great detail, they should be stated as completely as knowledge allows, in numerical terms if at all possible, and improved when information improves.

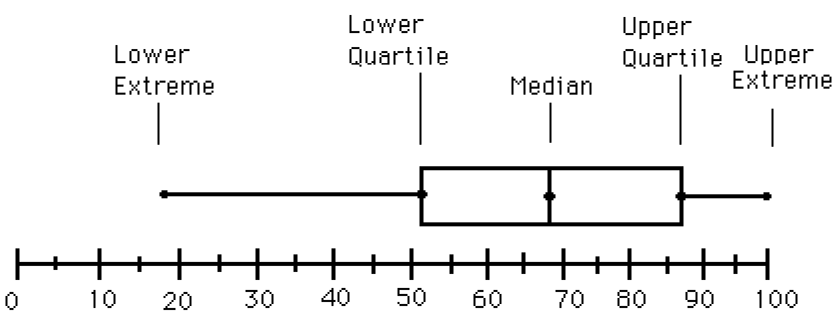
General objectives for the metal recycling industry monitoring program:

- To develop a general profile of metal recycling yard water quality before treatment
- To develop performance characteristics of the StormwateRx and Storminator treatment systems

Specific objectives for the metal recycling industry monitoring program:

- To develop frequency distributions of water quality variables listed above for treatment system influent and effluent





- To provide the basis to judge performance relative to DQRs according to:

   1. If the 75th percentile of post-treatment analytical results is less than the CTR criterion or benchmark, then the DQR will be the CTR or benchmark; or

   2. If the 75th percentile of post-treatment analytical results is above the CTR criterion or benchmark, then the DQR will be the calculated 75th percentile result.

These specific objectives guide many elements of the monitoring program, including **where** to, **when** to sample, what **water quality variables** will be analyzed and the associated procedures that have to be followed to get valid results, and the **numerical standards** against which the data will be judged. The objectives can be tailored according to resources available, for example by limiting the variables analyzed to three instead of five.

MEETING MONITORING OBJECTIVES

The following decisions generally must be made and carried out in a monitoring program. The specific objectives should be the foundation to make all of these decisions. If they are inadequate to do so, sharpen them up! Make each decision for a good reason based on what you are trying to do, your objectives.

- When to sample
- Where to sample
- What to sample
- How to take samples
- How many samples to take
- How to handle samples

The next section covers all of these topics in relation to the metal recycling industry monitoring program.

MONITORING GUIDELINES AND TECHNIQUES

SAFETY CONSIDERATIONS

- Don't allow effluents, contaminated receiving waters, under-water sharp objects, or chemical reagents to contact skin; use rubber boots and gloves.
- Don't enter confined spaces. If the objectives require sampling in such areas, obtain the services of a crew with special training and all of the right equipment.
- Use a proper tool to remove manhole covers, and never let an open manhole unattended.
- Wear a hard hat if there is any possibility of falling objects.
- Wear a reflective vest if there is traffic near the sampling area, and set up rubber traffic cones if necessary to divert vehicles far enough away.

WHEN TO SAMPLE

General

This question involves both the total number of samples to take and how to schedule them. Specific objectives generally determine the schedule, in terms of the issue, the effluent or water body and its characteristics, and the criteria or limits placed on the water quality variables of interest. This is usually a fairly straightforward consideration.

The question then becomes how many times to repeat the sampling cycle, which is a function of the budget and how much certainty in the answer one needs. There are statistical methods for figuring out how many repetitions are necessary to get an answer accurate within a selected margin of error, which will be employed in this monitoring program as data accumulate.

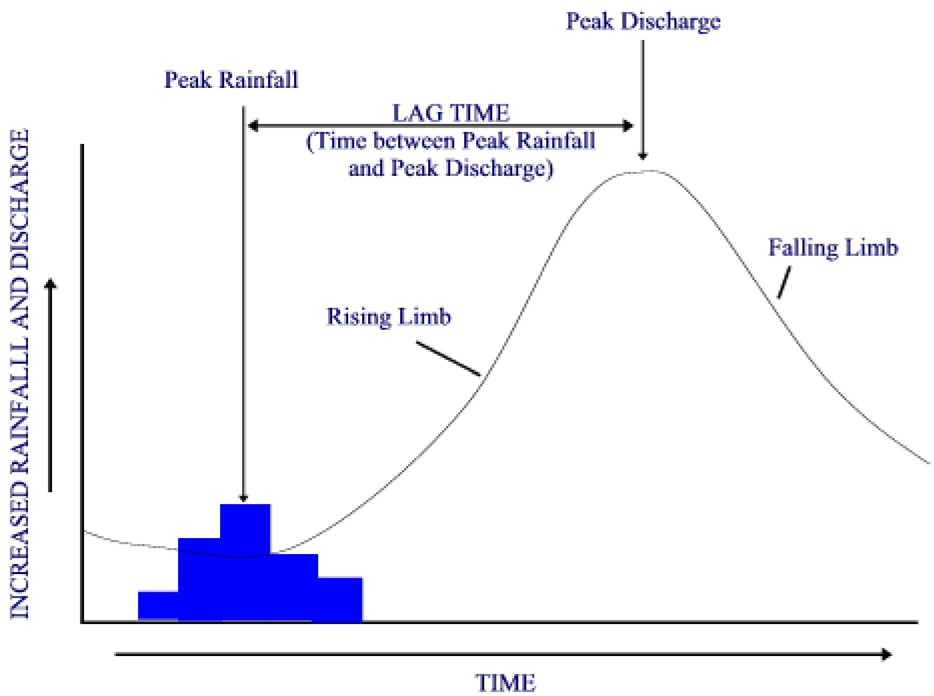
Attempt to devote enough funds to take a representative set of samples. For example, if the discharge quantity and industrial process vary during the year, try at least to bracket the possibilities by sampling when industrial activity is highest and, during that period, when discharge is near maximum (could be highest mass flow rate of pollutants) and minimum (pollutants can concentrate when discharge is low).

Metal Recycling Industry Monitoring Program

- 4 samples each of treatment system inflow and outflow from each recycling yard plus 6 quality control samples over the 2012-2013 wet season.
- Events selected to be representative of precipitation patterns (e.g., not all small or all large storms)

- Target monitoring every event at beginning of program and then be more selective as time goes along to achieve representativeness

- Sample at regular time intervals to cover at least 75 percent of the hydrograph of a rain event



- Composite on a time-proportional basis, plus hold one “first-flush” sample from the early portion of the storm for separate analysis (see How to Sample later for how to composite).

WHERE TO SAMPLE

General

This is generally a question about equally straightforward as when to sample, and is again normally answered according to the objectives and the circumstances they represent.

Metal Recycling Industry Monitoring Program

- Set of recycling yards carefully selected to be representative of permittees while limited to fit within budget

- Inflow and discharge points of treatment devices

WHAT TO SAMPLE

General

What will be analyzed in water samples must be considered carefully before going into the field and, like everything else, depends on the objectives. This early consideration is needed because the proper container cleaned in the designated way must be obtained to ensure a valid sample.

Metal Recycling Industry Monitoring Program

- TSS
- Metals—total recoverable Cu, Pb, Zn, Al, Fe; dissolved Cu, Pb, Zn
- Total hardness
- COD
- Oil and grease
- Continuous flow recording

Preparing for Sample Collection

A good, helpful laboratory is your best friend in this task, saving you a lot of work and making sure that you are properly equipped to take valid samples, in return for the business. Always use a state-certified lab in which you have confidence through experience or trusted recommendations. When preparing for sampling, ask the lab to provide the proper sample containers for the analyses they will perform and, of crucial importance, to clean those containers as designated in EPA and American Public Health Association (“Standard Methods”) procedures to avoid contamination that will invalidate the sample. Cleaning bottles for many purposes requires specified acid-washing procedures and other safeguards that are beyond your own capability. Obtain one or more coolers that will be adequate in size to transport all samples on ice after collection until they reach the lab.

A single container can typically be used to hold samples that will be analyzed for several variables with compatible preservatives. The laboratory will provide the necessary containers for the analyses to be performed in this program.

Oil and grease samples must be collected in a glass container that will be used in the first steps of the lab analysis, to prevent loss of petroleum in pouring from one container to another.

Preparations should also consider what is called quality assurance/quality control (QA/QC), covered in detail below. At the preparation stage it is necessary to pick up extra containers for field replicates and field blanks. A field replicate is a repeated sample taken at exactly the same spot, in exactly the same way, and immediately after the primary sample. The general rule is to select randomly 5-10 percent of samples for field replication. The random selection can be made by assigning each sampling location and occasion an identifying number and then using a random number generator on a calculator to pick the 5-10 percent to be replicated. A field blank is simply a container of distilled water that is carried into the field and returned to the laboratory without disturbance. Its purpose is to indicate if transport has introduced contamination to samples. The field blank should be part of the lab's standard QA/QC procedures for pathogen samples and sometimes for nutrient work.

GETTING STARTED IN THE FIELD

Observations and Records

Sampling begins by looking around the monitoring location and making observations. Always keep careful field notes, even on the most routine matters. Sometimes, making systematic visual observations is a task toward fulfilling the objectives.

Anytime samples are taken, the sample collector should record in a field book any of the following information that is appropriate:

- Date;
- Time of sample collection or visit;
- Name(s) of sampling personnel;
- Weather and flow conditions preceding and during visit;
- Number and type of samples collected;
- Calibration results for field instrumentation;
- Field measurements;
- Log of photographs taken;
- Comments on the working condition of the sampling equipment;
- Deviations from sampling procedures; and
- Unusual conditions (e.g., water color or turbidity, presence of oil sheen, odors, and land disturbances).

HOW TO TAKE SAMPLES

General Types of Samples

Water can be collected either as grab samples or composite samples. Grab samples are collected at a discrete point in time and space. Composite samples are made by combining a number of samples taken at different locations and/or different times. Which type of sample is taken again depends on the objectives. Grab samples will probably be more common in Coastkeeper programs. If flow variation is not an issue (e.g., flow rate is controlled by a pump), composites can be made up of a series of grab samples combined in equal volumes.

In varying flows, flow-proportional composite samples (made up of individual samples combined in relation to flow) are more representative of average water conditions than grab samples or samples taken at certain time intervals and composited without regard to flow. However, flow proportioning cannot be done accurately without good flow measurement equipment. This type of monitoring is usually done with automatic flow meters and samplers linked electronically to accomplish flow proportioning.

Metal Recycling Industry Monitoring Program

- "First-flush" sample—one grab sample from the first 30 minutes of flow, preferably, or otherwise the earliest point possible

- Time-proportional composite

  Examples—

  1. If 20 samples are collected at absolutely regular 15-minute intervals, make the total composite sample volume up from equal amounts of each individual sample.

  2. If 10 samples are collected at 15-minute intervals and 10 are collected at 30-minute intervals, make the total composite sample volume up from one measure of the 15-minute sample volumes and double measures of the 30-minute sample volumes.

  3. If 8 samples are collected at 15-minute intervals and 8 are collected at 30-minute intervals and 4 are collected at 40-minute intervals, make the total composite sample volume up as follows:

     Total volume = (8 * 15-minute sample volumes) + (8 * [30/15] * 30-minute sample volumes) + (4 * [40/15] * 40-minute sample volumes)

How Much Sample to Provide to the Laboratory

Minimum quantities for performing one analysis for the variables to be analyzed in this program are:

- TSS—1 L

- Metals—10 mL for each form (total recoverable and dissolved) of each metal

- Total hardness—75 mL

- COD—50 mL

- Oil and grease—1 L

The best rule is to collect at least 2.5 times the recommended sample volumes to allow for rinsing instrument sensors and possible repeated analyses. Repeated analyses may be needed for analyzing laboratory replicates and for reanalyzing samples when QA/QC criteria are not met (see below).

Special Consideration for Metals Sampling

The technique for collecting metals samples recommended by EPA uses two sampling personnel, one called "clean hands" and the other "dirty hands". Dirty hands deals with the equipment that will not touch the sample, while clean hands works closely with the sampling apparatus. See Appendix B for an outline of the procedure.

HOW TO HANDLE SAMPLES

Labeling

To avoid mistakes, it is imperative to label a sample bottle with an indelible marker at or before the time of collection. It is most efficient to prepare and attach labels before going into the field. The laboratory may agree to make preprinted labels for a continuing monitoring program. Sample labels must include station designation, date, time, collector's name, and any preservative added. The analyses to be performed and any pertinent remarks may also be recorded on the label.

Preservation

Appendix A lists preservatives for common analyses. Other than placing on ice, most preservation is done with acid addition, nitric acid for metals. Ask the laboratory to supply dropper bottles with acids and to advise on the number of drops to add for the sample size to drop pH below 2.

Holding Times

The holding times given in Appendix A are total times allowed until the analysis is complete.

Custody Transfer

It is recommended that a sample tracking record be kept for each sample. This record registers possession of a sample as it travels from collection through analysis, which may allow misplaced samples to be found more readily. It is most common to use chain-of-custody records such as the example in Appendix C.

Quality Assurance/Quality Control (QA/QC) Guidelines

The effectiveness of any monitoring effort depends on a QA/QC program. The QA/QC program provides quantitative measurements of the "goodness" of the data. For some variables QA/QC involves calibration of instruments with known standards. To obtain measures of accuracy and precision, QA/QC may further involve analyses of blanks, replicate samples, control samples, and spiked samples. Some of the terms regularly used in QA/QC programs are:

- Accuracy--Agreement between the measurement of a variable in a sample and the true value of the variable in that sample. The term "error" is used when the discrepancy between the measured and true values is expressed in the units of the measured variable. The term "relative error" is used when the error is expressed in terms of the percentage deviation from the true value.

- Precision--Agreement among replicate laboratory measurements. Precision is measured by the standard deviation when the units of the measured variable are used. The term "relative standard deviation" is used when the standard deviation is expressed as a percentage of the mean of the replicate values.

- Field replicates--Separate samples collected simultaneously at the identical source location and analyzed separately; should be used taken for 5-10 percent of samples, randomly selected. Field replicates are used to assess total sample variability (i. e., field plus analytical variability).

- Laboratory replicates--Repeated analyses of a variable performed on the contents of a single sample bottle; should be performed on randomly selected samples, generally at the rate of 5-10 percent. Laboratory replicates are used to assess analytical precision. Usually duplicate analyses are sufficient for procedures that are well proven in the laboratory.

- Calibration samples--Samples prepared from distilled-deionized water that contains a known concentration of a specific substance or will produce a known instrument response; used for all instrumental analyses. When calibration samples are analyzed during an analytical run, they are often referred to as control samples or check standards.

- Blanks--Samples prepared from distilled water, perhaps with reagents added, to represent zero concentration of a specific substance, or to produce an instrument response that indicates zero concentration; used for nutrients, metals, and organics.

- Spiked samples--Samples prepared by adding known concentrations of a specific substance to an environmental sample; used for metals and organics.

The laboratory should have specific criteria for accepting or rejecting the results of analyzing control samples, replicates, blanks, and spiked samples.

APPENDIX A. SAMPLE COLLECTION, HANDLING, AND ANALYSIS INFORMATION

RECOMMENDED SAMPLE COLLECTION, HANDLING, AND ANALYSIS PROCEDURES

VARIABLE	CONTAINER[a]	PRESERVATION[b]	MAXIMUM HOLDING TIME	ANALYTICAL METHODS[c]	REPORTING LIMIT	UNIT
Miscellaneous:						
pH	P, G	None (field)	None	EPA 150.1; SM 4500-H^+	0.1	pH
Dissolved oxygen	G[d]	None (field) [e]	None [e]	EPA 360.1, 360.2; SM 4500-O	0.1	mg/L
Conductivity	P, G		28 days	EPA 120.1, SM 2510	1	µS
Total hardness	P, G	HNO_3 to pH < 2	6 months	EPA 130.1, 130.2; SM 2340B	0.5	mg/L
Alkalinity	P, G		24 hours	EPA 310.1, 310.2; SM 2320	0.1	mg/L
Biochemical oxygen demand	G[d]		24 hours (6 preferred)	EPA 405.1; SM 5210	3	mg/L
Chemical oxygen demand	P, G	H_2SO_4 to pH < 2	28 days	EPA 410.1; SM 5220	10	mg/L
Residual chlorine	P, G	None (field)	None	EPA 330.5; SM 4500-Cl	0.1	mg/L
Cyanide	P, G	NaOH to pH > 12	14 days	EPA 335.2; SM 4500-CN^-	3	µg/L
Solids:						
Total suspended solids	P, G		7 days	EPA 160.2; SM 2540D	1	mg/L
Total dissolved solids	P, G		7 days	EPA 160.1; SM 2540C	1	mg/L
Turbidity	P, G		48 hours	EPA 180.1; SM 2130	0.05	NTU
Particle size distribution	P, G			SM 2560	1	µL/L

VARIABLE	CONTAINER[a]	PRESERVATION[b]	MAXIMUM HOLDING TIME	ANALYTICAL METHODS[c]	REPORTING LIMIT	UNIT
Nutrients:						
Total phosphorus	P, G	H_2SO_4 to pH < 2	28 days	EPA 365.1; SM 4500-P F	5	µg/L
Soluble reactive phosphorus	P, G	H_2SO_4 to pH < 2	48 hours	EPA 365.1; SM 4500-P F	2	µg/L
Ammonia-nitrogen	P, G	H_2SO_4 to pH < 2	28 days	EPA 350.1; SM 4500-NH_3	10	µg/L
Nitrate + nitrite-nitrogen	P, G	H_2SO_4 to pH < 2	28 days	EPA 353.1; SM 4500-NO_2, NO_3	10	µg/L
Total nitrogen	P, G	H_2SO_4 to pH < 2	28 days	SM 4500-N	10	µg/L
Total Kjeldahl nitrogen	P, G	H_2SO_4 to pH < 2	28 days	EPA 351.1; SM 4500-N_{org}	100	µg/L
Metals:						
Silver	↑	↑	↑	↑	0.2	µg/L
Aluminum					25	µg/L
Arsenic					0.5	µg/L
Cadmium					0.2	µg/L
Chromium (total)	P, Teflon, or borosilicate glass	HNO_3 to pH < 2	48 hours to filter for dissolved, 6 months to analyze	EPA 200.8; SM 3125	1	µg/L
Copper					1	µg/L
Nickel					2	µg/L
Lead					1	µg/L
Zinc				↓	1	µg/L
Chromium (Cr^{+6})				EPA 218.4; SM 3500-Cr	50	µg/L
Selenium	↓	↓	↓	EPA 270.2, 270.3; SM 3500-Se	2	µg/L

VARIABLE	CONTAINER[a]	PRESERVATION[b]	MAXIMUM HOLDING TIME	ANALYTICAL METHODS[c]	REPORTING LIMIT	UNIT
Mercury	G or Teflon	5 mL/L of 12 N HCl or BrCl[f]	48 hours to filter for dissolved, 28 days to analyze	EPA 245.2; SM 3112	0.5	µg/L
Pathogens:						
Fecal coliforms	Sterile P, G	None[g]	8 hours	SM 9221, 9222	1	cfu/100 mL or MPN/100 mL
Escherichia coli	Sterile P, G	None[g]	8 hours	SM 9221, 9222	1	cfu/100 mL or MPN/100 mL
Total coliforms	Sterile P, G	None[g]	8 hours	SM 9221, 9222	1	cfu/100 mL or MPN/100 mL
Enterococci	Sterile P, G	None[g]	8 hours	SM 9230	1	col/100 mL
Total petroleum hydrocarbons:						
TPH-gasoline	G		14 days	EPA SW 8015	50	µg/L
TPH-Diesel	G		7 days to extract, 40 days to analyze	EPA SW 8015	50	µg/L
TPH-motor oil	G		7 days to extract, 40 days to analyze	EPA SW 8015	50	µg/L
Oil and grease	G	HCl or H_2SO_4 to pH < 2	28 days	SM 5520	5	µg/L

VARIABLE	CONTAINER[a]	PRESERVATION[b]	MAXIMUM HOLDING TIME	ANALYTICAL METHODS[c]	REPORTING LIMIT	UNIT
Pesticides:						
Organochlorines	Amber glass		↑	EPA SW 8081. 8085; SM 6630	0.01-0.1	µg/L
Organophosphorus	Amber glass			EPA SW 8085	0.01-0.1	µg/L
Nitrogen	Amber glass		7 days to extract, 40 days to analyze	EPA SW 8085	0.01-0.1	µg/L
Carbamates	Amber glass			EPA SW 8321	0.07-3.5	µg/L
Herbicides	Amber glass		↓	EPA SW 8085; SM 6640	0.1-1.0	µg/L
Miscellaneous organics:						
Polynuclear aromatic hydrocarbons	Amber glass	None[g]	7 days to extract, 40 days to analyze	EPA SW 8270, 8310; SM 6440	0.05	µg/L

[a] P—plastic (polyethylene); G--glass
[b] Hold all samples on ice in the field and at 4°C in the laboratory, in addition to any preservation listed. HNO_3—nitric acid; H_2SO_4—sulfuric acid; HCl—hydrochloric acid
[c] EPA—from U.S. Environmental Protection Agency (1983); SM—from American Public Health Association (1998); EPA SW—from U.S. Environmental Protection Agency (1986)
[d] Biochemical oxygen demand bottle
[e] Can be chemically fixed in the field and titrated in the laboratory
[f] Filter for dissolved sample analysis before preservation
[g] Normally none except holding at 4°C but add sodium thiosulfate in the presence of chlorine

APPENDIX B. SAMPLING USING "CLEAN HANDS/DIRTY HANDS" TECHNIQUE

Demonstration of Sample Collection Using Clean Hands/Dirty Hands Technique

Preliminary Preparation

- Laboratory cleans fluoropolymer sample collection bottles and double bags them in zip type bags.
- Sample collectors clean and bag sampling equipment.
- Sample collectors prepare sampling packages.

Sampling Packages

- Designated clean cooler(s) containing:
  - Cleaned and bagged sample tubing
  - Zip bags with dust masks and non-talc Class 10 clean gloves
  - Plastic sheet for ground cover
  - Sample bottles (from laboratory)
  - Tyvek suits- (optional)
- Peristaltic pump with easy load head. Extension cord, if necessary.
- Waste bucket.
- Sample storage cooler.
- Carboy with DI water for Field Reagent Blank, if necessary.

Site Preparation

- Upon arrival at the sampling site, the sample collectors unload equipment and prepare for sample collection.
- Anything covering the sample site, such as a grate or manhole, is removed and set aside.
- Plastic is laid out for ground cover, with coolers on the ends to secure.
- Set up peristaltic pump.
- Clean Hands (CH) and Dirty Hands (DH) sample collectors get into position.
- CH and DH wait ten minutes before beginning sample collection to allow the sampling environment to stabilize.

Sample Collection

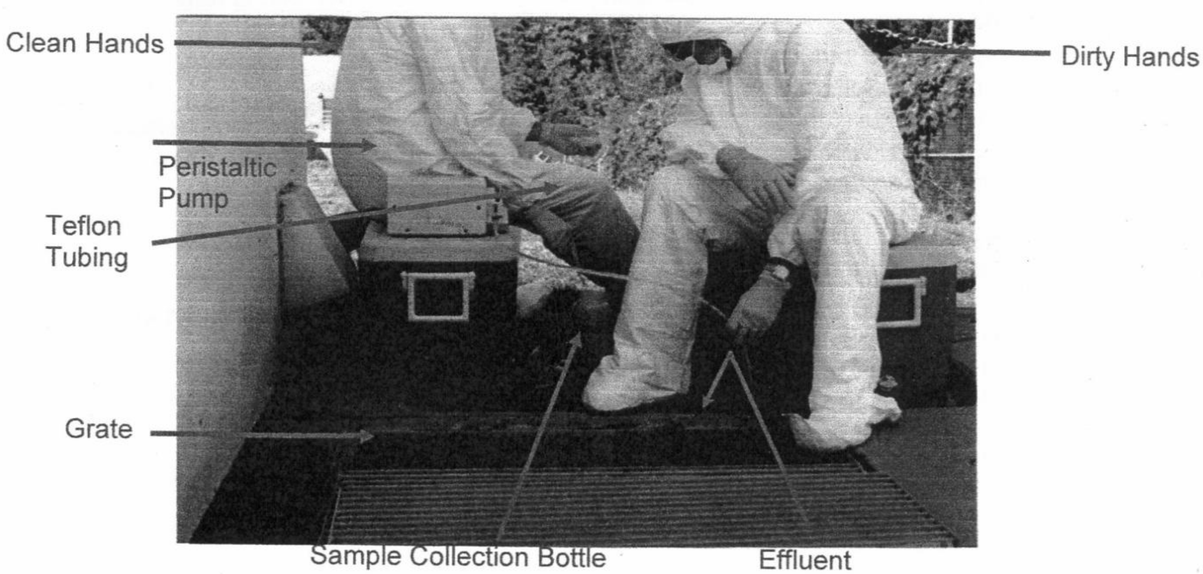
A. Field Reagent Blank

1. DH opens the cooler and removes plastic bags containing gloves and masks.
2. CH and DH put on dust masks first and then gloves.
3. DH removes the lid from the carboy containing DI water for the FRB.
4. DH removes the bag containing the sample tubing from the cooler.
5. DH opens the bag.
6. CH removes the tubing and does not allow the tubing to touch anything.
7. CH removes the protective covering from the inlet side of the tubing.
8. CH lowers the weighted end of the tubing into the carboy.
9. Once the inlet end of the tubing enters the carboy, DH holds the tubing.
10. DH inserts the flexible portion of the tubing into the peristaltic pump, while CH holds the discharge end of the tubing, protecting it from contamination.

11. CH removes the protective covering from the discharge end of the tubing and holds it over the purge container.
12. CH tells DH to turn the pump on.
13. CH holds the sample line over a purge container while purging for a minimum of five minutes.
14. After purging, CH tells DH to turn the pump off.
15. DH opens the cooler containing the double-bagged sample bottle.
16. DH opens the outside bag and does not touch the inside bag.
17. CH removes the inside bag (containing the sample bottle).
18. CH opens the bag and sample bottle.
19. CH holds the discharge end of the tubing over the sample bottle and tells DH to turn the pump on.
20. Once the sample bottle is filled, CH tells DH to turn the pump off.
21. CH tightly caps the sample bottle and reseals it in the inside plastic bag.
22. DH holds the outside bag open and CH places the inside bag, with the sample, into it.
23. DH reseals the outside bag.
24. The sample is then placed into the storage cooler.

B. Sample Collection

1. CH removes the inlet end of the tubing from the carboy of DI water and places it into the sample location.
2. DH holds the tubing and makes sure that the inlet end and sides of the tubing do not contact anything.
3. Sampling proceeds as in A12 – A24 above.
4. Sampling site is cleaned and the sample is transported to the lab.



APPENDIX C. CHAIN-OF-CUSTODY RECORD

…G Marine Laboratories, Inc.
2020 Del Amo Blvd., Suite 200, Torrance, CA 90501-1206
(310) 533-5190 FAX (310) 533-5003

CHAIN-OF-CUSTODY RECORD

Client Name and Address:	
Sampled By:	
Phone:	
FAX:	
Project Manager:	
Project/PO Number:	

	Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container #	Container Type	Requested Analysis
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Correct Containers:	Yes	No	
Sample Temperature:	Ambient	Cold	Warm
Sample Preservative:	Yes	No	
Turnaround Time:	Specify:		

Comments:

RELINQUISHED BY	
Signature:	
Print:	
Company:	
DATE:	TIME:

RECEIVED BY	
Signature:	
Print:	
Company:	
DATE:	TIME:

Metal Recycling Industry
Storm Water Monitoring Training

October 24, 2013

Presented by:

Orange County Coast Keeper and AMEC Environment & Infrastructure

Outline

- Introductions/Background
  - Monitoring Objectives
  - Advanced Media Filtration Systems
- Quality Assurance Project Plan (QAPP)
- Safety
- Monitoring Program
  - When, where, what to sample
  - How to take samples
  - How many samples to collect
  - How to handle samples
- Forms
  - Labels
  - Chain-of-Custody
  - Sample Forms
- Clean Hands/Dirty Hands Techniques

Background

Monitoring Objectives

- The QAPP includes Project Action Limits (PALs) based on the Numeric Action Limits (NALs) in the Sector Specific General Permit for Scrap Metal Recycling Facilities (Scrap Metal Permit)

- In the Scrap Metal Permit, if the selected measures do not achieve NALs, treatment may be necessary

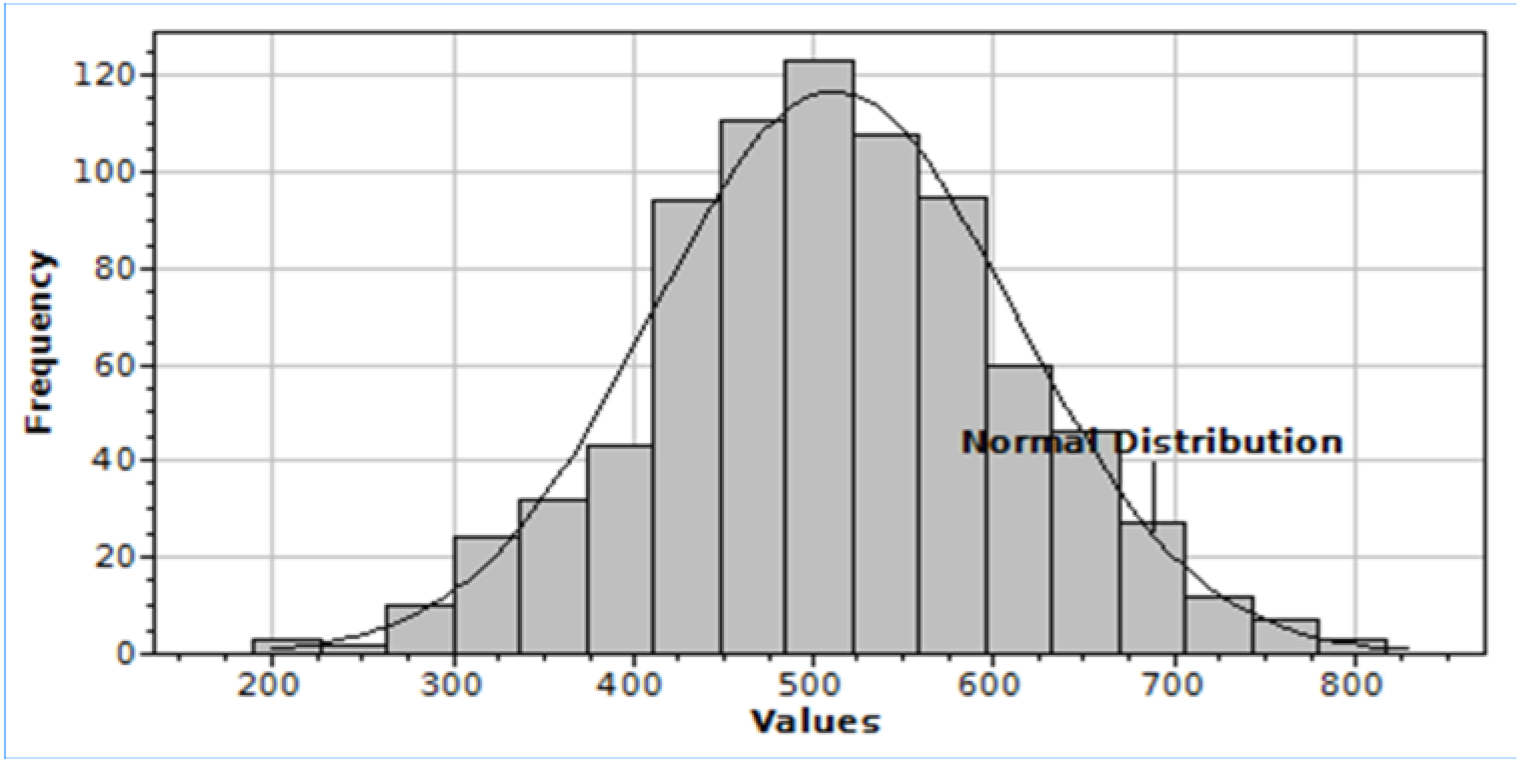
- Because these sites still may not meet the PALs or NALs after installing advanced treatment, new numeric performance goals may be developed with the data collected during this project

Monitoring Objectives – Project Action Limits Listed in QAPP
(Based on Numeric Action Limits in the Scrap Metal Permit)

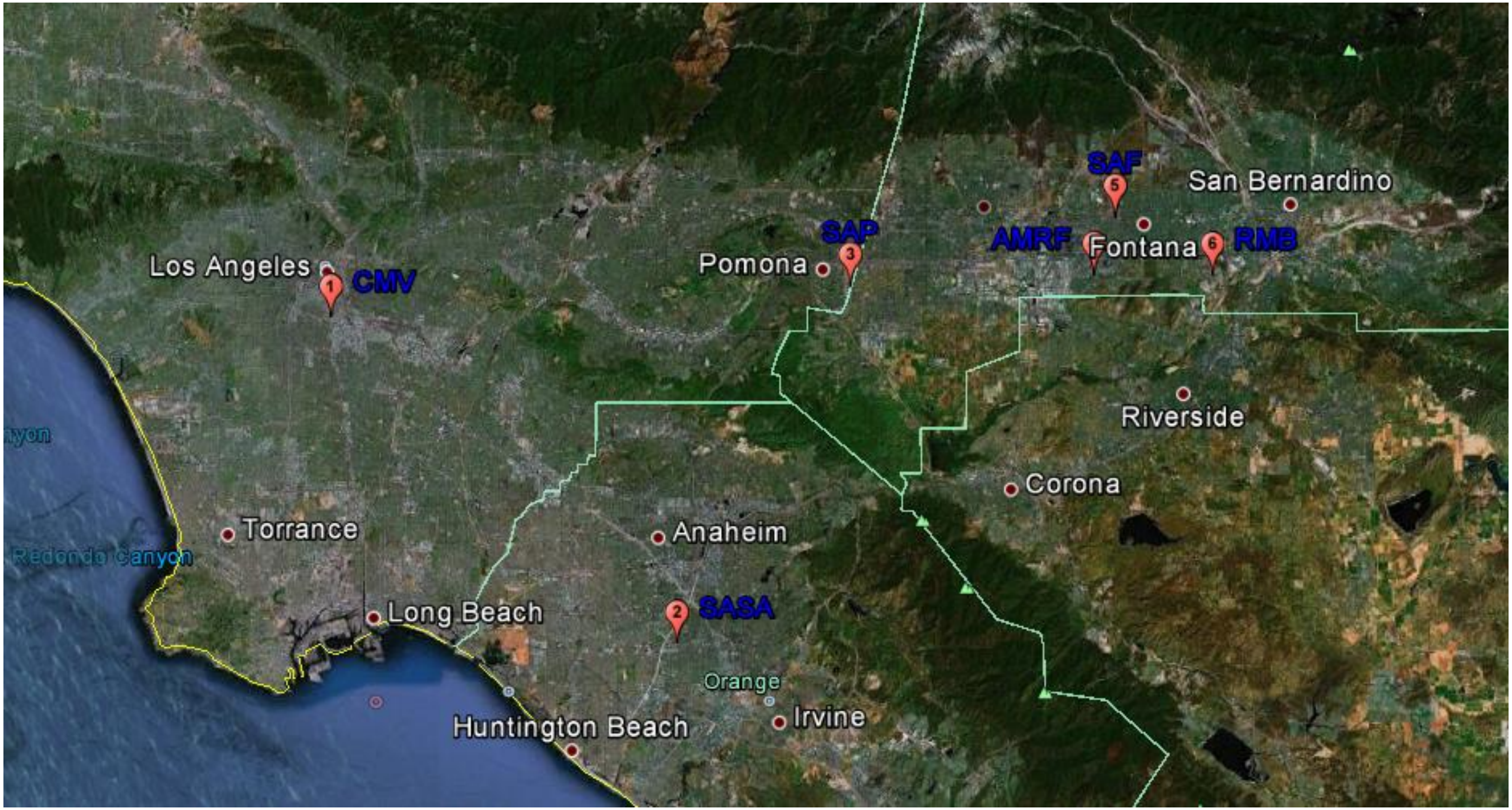
Priority Pollutant	*Project Action Limit (mg/l or µg/L)*
From Federal Benchmarks	
Chemical Oxygen Demand (COD)	120 mg/l
Total Suspended Solids (TSS)	100 mg/l
Total Recoverable Aluminum	0.75 mg/l
Total Recoverable Copper	0.0189 mg/l
Total Recoverable Iron	1.0 mg/l
Total Recoverable Lead	0.122 mg/l
Total Recoverable Zinc	0.16mg/l
Oil & Grease	15 mg/l
From California Toxics Rule	
Dissolved Copper	9.0 µg/L
Dissolved Lead	2.5 µg/L
Dissolved Zinc	120 µg/L

Specific Objective

- To develop frequency distributions of parameters selected for treatment system influent and effluent monitoring.

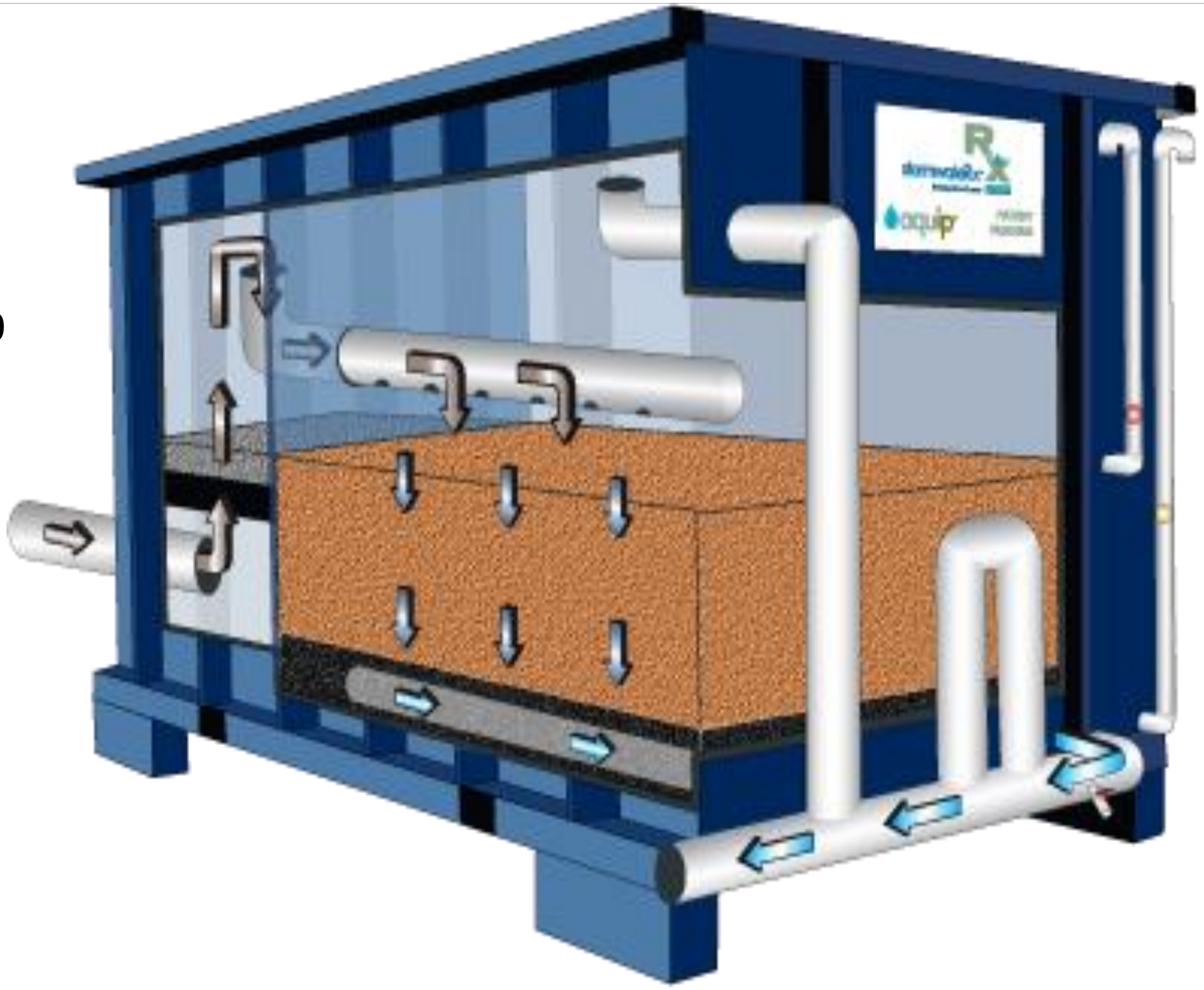


Aerial Map of the Metal Recycling Yards and Sampling Locations



StormwaterRx Advanced Media Filtration

- Passive filtration system installed on grade with one pump station



Storminator

Above ground, self contained unit using a combination of pumps and filters

System requires backwashing the pressure vessels

American Metal Recycling (AMR) Filtration System

Quality Assurance Project Plan (QAPP)

What is a QAPP?

- This document describes the program's quality systems in terms of:

1. organizational structure;
2. functional responsibilities of management and staff;
3. the lines of authority; and
4. interfaces for those planning, implementing, and assessing activities conducted.

QAPP (Continued)

- Our QAPP includes:
  - Project/Task Organization
  - Background
  - Quality Objectives and Criteria for Measurement Data
  - **Special Training Needs/Certifications**
  - Documents and Records Required for the Project
  - **Sampling Process Design**
  - **Sampling Methods**
  - **Sample Handing and Custody**
  - Analytical Methods
  - Quality Control
  - **Field Equipment Testing, Inspection, and Maintenance**
  - Data Management
  - Assessment and Response Actions
  - Data Review, Verification and Validation, and Validation Requirements

Personnel Responsibilities

Name	Organizational Affiliation	Title	Contact Information
Ray Hiemstra	Orange County Coastkeeper	Project Manager	(714) 850-1965
Nicole McClain	Orange County Coastkeeper	QA Officer	(714)850-1965
Jonathan Bousselaire	Test America	Laboratory Project Manager	(949)261-1022

Safety

Safety Requirements at Metal Recycling Yards

- This project is being run in cooperation with the scrap metal industry and project yards. Check with the Facility Manager/Yard Supervisor for site-specific health and safety issues such as emergency exits, health and safety plans, etc.

- Wear a reflective vest if there is traffic near the sampling area, and set up rubber traffic cones if necessary to divert vehicles far enough away.

- Be aware of your surroundings during sampling (i.e., traffic, scrap piles, sharp objects)

- Wear Personal Protective Equipment (PPE) as required
  - Hard hat; Safety glasses, Steel-toed boots, Foul weather gear
  - During sampling - Powder free latex gloves

Safety Considerations During Sampling

- Avoid skin contact with the samples/runoff
- Don’t enter confined spaces
- Be careful around manholes
- Report any safety issues to Ray Hiemstra

Monitoring Program

Monitoring Program – Meeting the Project Objectives

- **What to sample**
- **Where to sample**
- **When to Sample**
- **How to take samples**
- **How many samples to take**
- **How to handle samples**

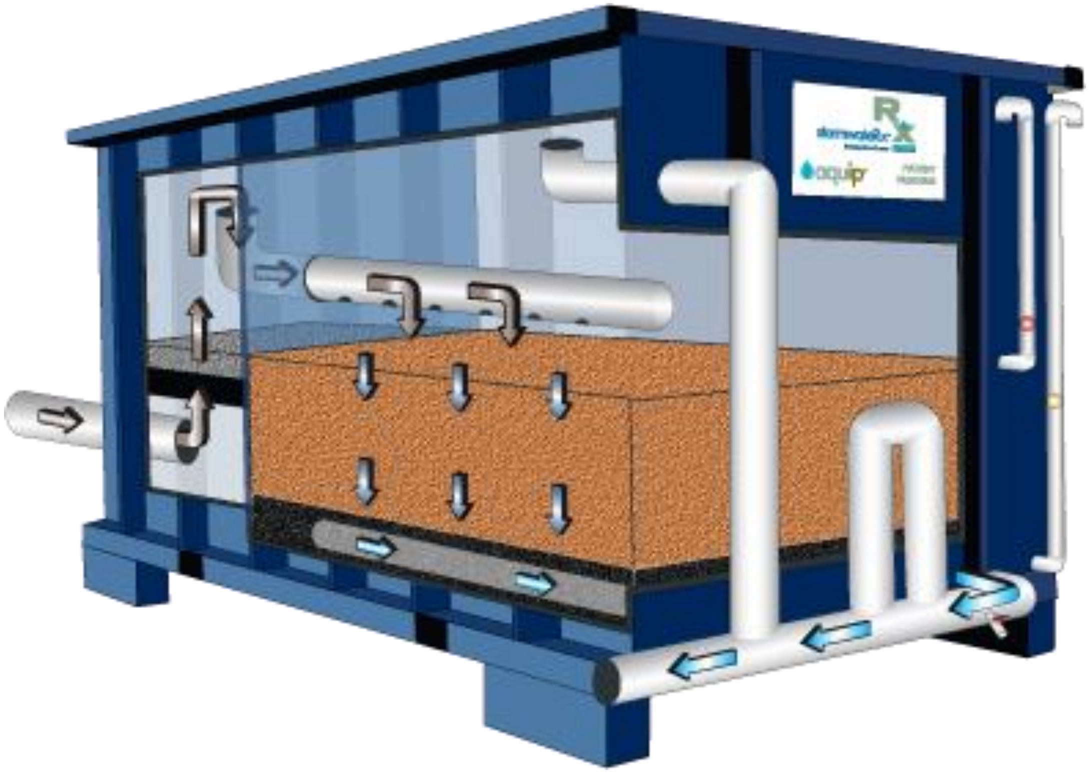
- How to analyze samples
- How to assess data

What to Sample

- Total Suspended Solids:
  - Measurement of solids trapped by a 0.45-micrometer filter
- Metals total recoverable Cu, Pb, Zn, Al, Fe; dissolved Cu, Pb, Zn
- Total hardness
  - Water hardness reduces solubility for hardness-dependent metals
- Chemical Oxygen Demand
  - Measure the total amount of organic compounds, uses a strong oxidizing agent (acid) to oxidize organic compounds to carbon dioxide
- Oil and Grease
- Flow recording

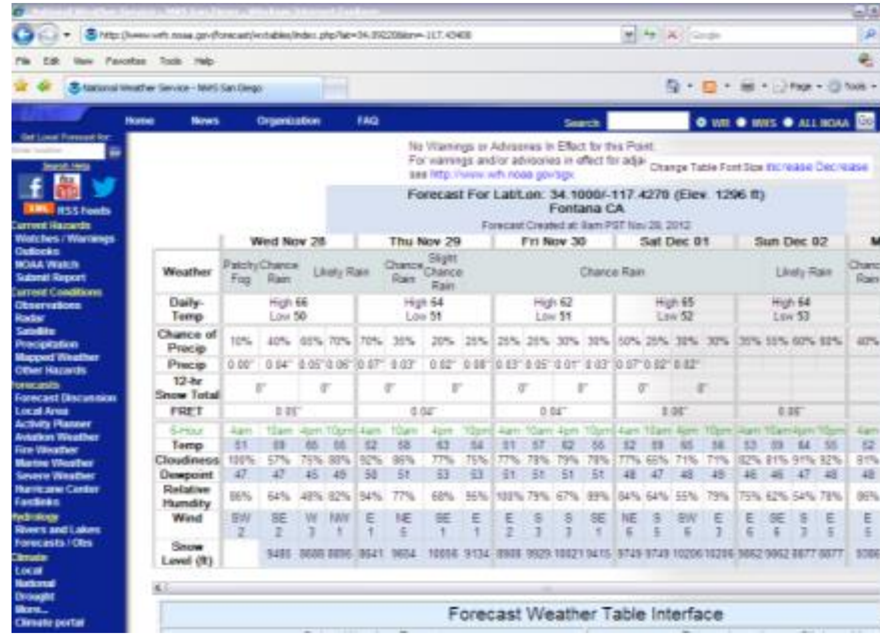
Where to Sample

- The inlet/outlet sample ports will be shown during the site visits



When to Sample

- OCCK's project manager will target four representative storms
- Final notification with the time the monitoring staff will need to arrive will be based on a 70% probability of rain and the amount expected (one-quarter inch, half-inch, or more)
- It is critical that monitoring staff arrive on-time to capture the storm
- Events selected to be representative of precipitation patterns (e.g., not all small or all large storms)



How to take samples - Getting Started in the Field

- Verify list of all equipment and field instruments prior to each sampling event (QAPP Appendix A)

- Verify field meters have been calibrated by OCCK's staff

- Setup sampling area and start treatment equipment pumps – Equipment should run for 10 minutes before initial sample *(verify run-time with project manager prior to sampling)*

- Verify sampling time-interval with field supervisor and site manager *(see instructions for time-proportional composite sampling)*


BLUE ICE

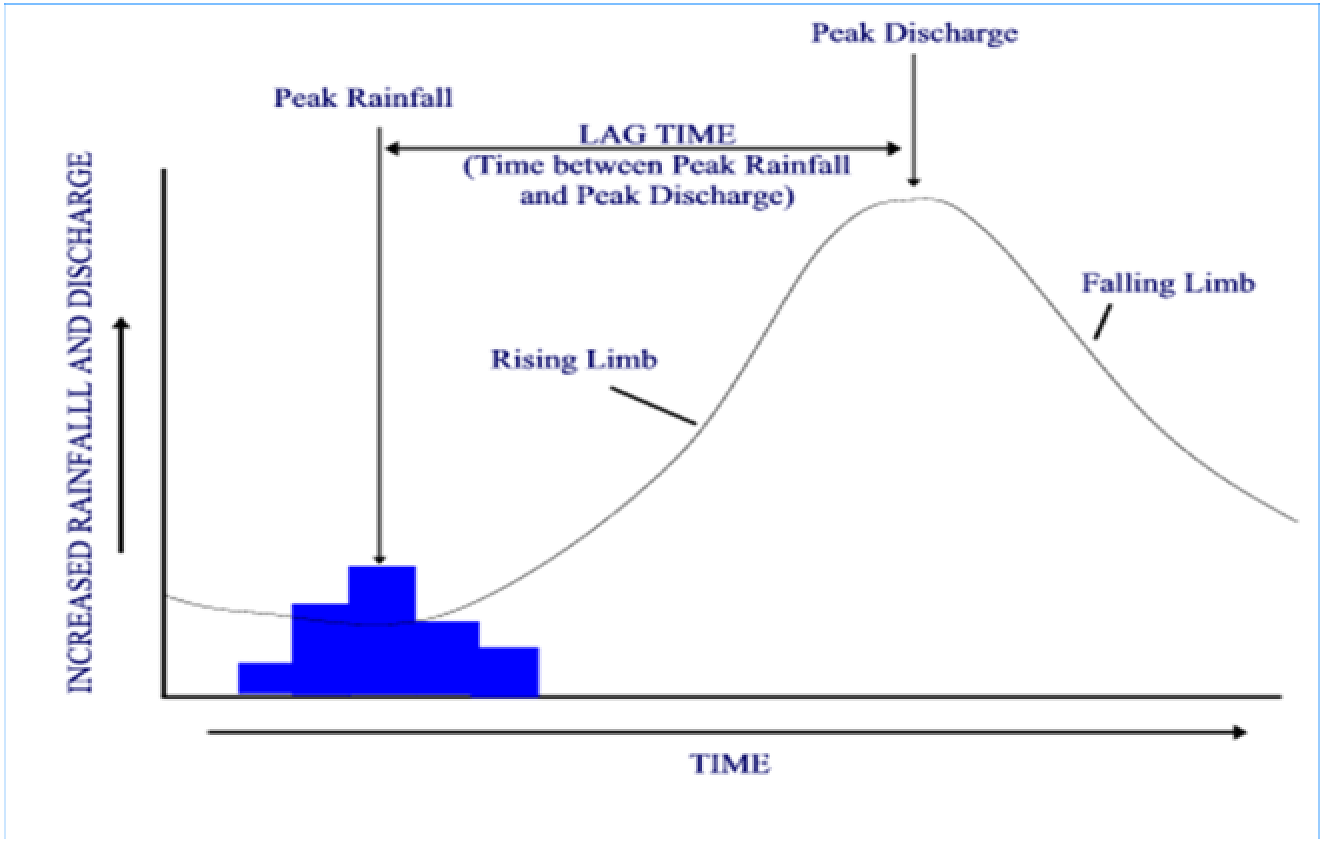
How to take samples - Oil and Grease

- Oil and grease sample will be collected at the beginning of each monitoring event
- Collect one sample at the inlet and one at the outlet
- Use bottles with preservative provided by the lab
- Pour directly from the sample port into the sample container and fill the 1 Liter amber glass bottle with preservative

How to take samples – Example Hydrograph

Because the flow will be going through the treatment system at a constant rate – this project will use a time-proportional composite sample

Record the flow rate during sampling using flow meter/gauge on the treatment unit



How to take samples - Time-proportional composite examples

- The remaining samples will be collected as a time-proportional composite. Below are examples:
  - **If 20 samples are collected at absolutely regular 15-minute intervals, make the total composite sample volume up from equal amounts of each individual sample.**
  - If 10 samples are collected at 15-minute intervals and 10 are collected at 30-minute intervals, make the total composite sample volume up from one measure of the 15-minute sample volumes and double measures of the 30-minute sample volumes.
  - If 8 samples are collected at 15-minute intervals and 8 are collected at 30-minute intervals and 4 are collected at 40-minute intervals, make the total composite sample volume up as follows:
    - Total volume = (8 * 15-minute sample volumes) + (8 * [30/15] * 30-minute sample volumes) + (4 * [40/15] * 40-minute sample volumes)

How to take samples - Time-proportional composite examples

- How to collect Time-Weighted Samples in this project
  - The goal is to collect 20 discreet 100 mL samples over the storm event. A minimum of 12 discreet 100 mL samples from a constant flow is required.
  - Discuss with the project manager or field supervisor on the sampling interval prior to sample collection based total volume stored and current forecast
    - Estimate run time through the treatment system
    - Sample time interval (minutes) = Estimate run time (minutes)/20 samples
    - If sample runtime is underestimated, use a second container to collect additional samples
  - Need to collect 75% of the hydrograph/flow

How to take samples – Time-Weighted Composites

- Sample containers will be pre-cleaned by the lab so no equipment cleaning or decontamination will be necessary
- Make sure laboratory supplies a sample bottle for both the inlet and outlet to avoid cross-contamination
- Place the sample bottle under the sample collection nozzle and fill to the 100 mL mark
- Transfer 100 mL sample to a two liter composite bottle

How to take samples – Field Measurements

- After sample collection is completed, pour 100 mL of the composite sample back into the dedicated sample container.
- Do **NOT** test pH or conductivity directly from the 2 liter sample bottle.
- Use the 100 mL composite sample to complete the field test for pH and conductivity.
- Field meters will **NOT** require field calibration. They will be calibrated within 24 hours prior to sampling by OCCK (as described in QAPP Appendix D).
- Record conductivity and pH test results for the inlet and outlet on the sample collection form.
- Record the equipment identification # on the sample collection form.

How many samples to collect

- 4 samples each of treatment system inflow and outflow from each recycling yard
- 6 quality control samples
- Samples containers per storm event:
  - Influent
    - One oil & grease sample container (1 L)
    - One composite sample container (2 L)
  - Effluent
    - One oil & grease sample container (1 L)
    - One composite sample container (2 L)
  - QA/QC sample (as directed by project manager)

How many samples to collect – QA/QC Samples

- To obtain measures of accuracy and precision, QA/QC may further involve analyses of blanks, replicate samples, control samples, and spiked samples
  - Accuracy—agreement with true value (control sample); expressed by error = difference between measured and true values (or relative error as a %)
  - Precision—agreement among replicates; expressed by standard deviation (or relative SD as a %)

QAQC

- **Field replicate** (5-10%)—assesses total sample variability
- Laboratory replicate (5-10%)—assesses analytical precision
- **Blanks (field** and lab)—should show non-detectable concentrations
- Spiked sample—added known concentration

How many samples to collect - Field Replicate and Field Blank

- The project manager will assign the field replicate or field blank prior to sampling

- If your site is selected for a field replicate:
  - Sample in the exact same spot (influent or effluent) per the project manager's direction
  - Collect in the same exact way
    - Time-composite
    - Collect immediately after the primary sample
  - Label sample so we know internally this was a duplicate.

- If your site is selected for a field blank:
  - Fill up the 2 liter sample with DI water carried to/from the site undisturbed.
  - Cap and label according to labeling procedures

How to handle samples

- Place the samples in a sturdy cooler partially filled with ice or blue ice. As a general rule, samples should be kept at approximately 39°F (4°C) until the cooler is delivered to the lab
- Check all caps and lids for tightness prior to shipping or delivering samples and check samples to make sure they are secure (we don't want to break glass bottles)
- Put a completed chain-of-custody form enclosed in a re-sealable plastic bag inside the cooler. If you have several coolers complete a separate chain-of-custody form for each cooler.
- Seal cooler with tape before shipping
- Contact OCCK's project manager for sample pickup or deliver sample to lab.

Forms

Chain of Custody Record & Laboratory Analysis Request	Orange County Coastkeeper 441 Old Newport Blvd. Suite 103 Newport Beach Ca. 92663 Office (949)723-5424 Fax (949) 675-7091

amec

Turnaround Requested:
Contact:

Coastkeeper
Page ___ of

Lab Contact:	Project:
Lab:	
Address:	Proj. No.:
City, etc: :	Sampler:
Phone:	Shipping Method:
Fax:	AirBill #:

Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Con-tainers	Analyses Requested										Notes/ Comments:

Relinquished: (Signature)	Relinquished: (Signature)	Relinquished: (Signature)	Special Instructions/Notes	
Printed Name:	Printed Name:	Printed Name:		
Company:	Company:	Company:		
Date/Time:	Date/Time:	Date/Time:		
Received By:	Received By:	Received By:		
Printed Name:	Printed Name:	Printed Name:		
Company:	Company:	Company:	# of Coolers:	Cooler Temp(s):
Date/Time:	Date/Time:	Date/Time:	COC Seals Intact?	Bottles Intact?

Chain-of-Custody

- Chain-of-custody (C-O-C) procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of analytical results

- Fill out chain-of-custody completely

- After samples are collected, samples can not leave your possession without documenting it on the C-O-C and someone taking possession

Labels

- Preprint information (recommended)
  - Outfall location
  - Station designation
  - Preservative added for O&G sample
  - Analyses to be performed
- After sample collection, use permanent marker to add the following information:
  - Date
  - Time
  - Collector's name
  - Sample ID
    - Site Identifier_City_Date

Labels – Sample ID

- Example Site Identifiers:
  - CMV In or Out - Central Metal, Vernon
  - SASA In or Out - SA, Santa Ana
  - SAP In or Out - SA, Pomona
  - AMRF In or Out - American Metal Recycler, Fontana
  - SAF In or Out - SA, Fontana
  - RMB In or Out - Ruby Metals, Bloomington

- Example Sample Label:
  - CMV Out_Vernon_20121229
  - CMV Out2_Vernon_20121229 (if a field replicate was selected)
  - CMV FB Vernon_20121229 (Field Blank)

Sample Forms

- Need to record the following information:
  - Testing location
  - Project Name
  - Arrival Time
  - Date
  - GPS Coordinates
  - Estimated Pump Time
  - Conductivity Test Results
    - Inlet and outlet
    - Equipment identification #
  - pH Test Results
    - Inlet and outlet
    - Equipment Identification #
  - Sample collection information
    - Time, flow, volume
  - Rainfall Characteristics

ORANGE COUNTY COASTKEEPER

Sample Collection Form

Testing Location: ____________ Date: ____________

Project Name ____________ GPS Coordinates ____________

Arrival Time: ____________ Estimated Pump Time: ____________

Conductivity Test Results: Inlet: ____________ pH Test Results: Inlet: ____________

Outlet: ____________ Outlet: ____________

Equipment Identification #: ____________ Equipment Identification #: ____________

Sample Collection Log

Sample #	Time:	Flow:	Volume:
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Rainfall Characteristics

	Time:
Rain event start time:	
Rain event end time:	
Pump start time:	
Pump Shutoff time:	
Backflush start time:	
Backflush end time:	
Total sample collection time:	

Comments:

Recorded By: ____________

Sample Forms – Sample Collection Log

- Time:
  - Record the sample collection time after the inlet and outlet were collected.
- Flow:
  - Each treatment system is equipped with a flow measurement device
  - Record instantaneous flow in GPM on the sample form.
- Volume:
  - Record 100 mL collected (unless a different volume was collected)

Sample Forms - Comments

- Use the comments field on the sample form to record the following information:
  - Weather and flow conditions preceding and during visit;
  - Log of photographs taken;
  - Comments on the working condition of the sampling equipment, flow meter and/or advanced filtration system;
  - Deviations from sampling procedures; and
  - Unusual conditions (e.g., water color or turbidity, presence of oil sheen, odors, and land disturbances).

Clean Hands/Dirty Hands Techniques

Clean Hands/Dirty Hands

- Example tasks using Clean Hands (CH)/Dirty Hands (DH) techniques:
  - DH tasks may include:
    - Paper work
    - Flow measurements
    - Photos
    - Assisting CH with opening the cooler , removing containers from plastic bags, checking on project specific instructions
  - CH tasks may include:
    - Removing the cap on the sample bottle
    - Handling and filling the “clean” container used to get the 100 mL sample
    - Pouring the 100 mL sample into the composite sample container
    - Placing the cap back on the composite sample container
    - Checking the bottle to make sure the sample container cap is on tight

Clean Hands/Dirty Hands

- CH should NOT touch valves or other objects and handle samples
- Do NOT place fingers inside the sample containers
- If the sampler designated as CH comes in contact with something that may cross-contaminate the sample, change gloves
- Change gloves between influent and effluent sampling locations to avoid cross-contamination

Questions?

Quality Assurance Project Plan
For
Metal Recyclers BMP Monitoring Project
Revision 3 October 2013

Prepared for

Metal Recyclers WQ Standards Committee

Prepared by

Orange County Coastkeeper

3151 Airway Ave, Suite F-110

Costa Mesa, CA 92626

Revised December 2014

APPROVAL

CONTRACTOR ORGANIZATION:

Title:	Name:
Contractor Project Manager	Ray Hiemstra
Contractor QA Officer	Nicole McClain

TECHNICAL ADVISORY COMMITTEE:

Title:	Name:
OCCK Project Manager	Ray Hiemstra
OCCK QA Officer	Nicole McClain
SA Environmental Officer	Lindsay Maine
AMR	Dave Prieto
Ruby Metals	Brian Chen
Central Metals/H20 Stormwater Systems	Pat Bolton
AMEC	Tim Simpson
SARWQCB	Michael Adcakapara
University of Washington	Dr. Richard Horner

* All members of the Technical Advisories Committee were provided with copies of the draft QAPP and were requested to make any necessary comments. Comments were received from Dr. Richard Horner

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LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

1. DISTRIBUTION LIST

Title:	Name:
Contractor Project Manager	Ray Hiemstra
Contractor QA Officer	Nicole McClain

TECHNICAL ADVISORY COMMITTEE:

Title:	Name:
OCCK Project Manager	Ray Hiemstra
OCCK QA Officer	Nicole McClain
SA Environmental Officer	Lindsay Maine
AMR	Dave Prieto
Ruby Metals	Brian Chen
Central Metals/H20 Stormwater Systems	Pat Bolton
AMEC	Tim Simpson
SARWQCB	Michael Adcakapara
University of Washington	Dr. Richard Horner

4. PROJECT/TASK ORGANIZATION

4.1 Involved Parties and Roles

The Project Manager will be responsible for all management tasks including invoicing and reporting, management of the laboratory contract, and oversight of project progress. The Project Manager is the author of the QAPP and will be responsible for the scientific integrity of the data collection effort throughout the life of the project. The Project Manager also is responsible for technical dialogs with advisors and experts, and for collaboration with agencies and stakeholders. The Quality Assurance officer works independently from the project manager and is responsible for the data meeting all quality objectives. Jonathan Bousselaire is the Lab Project Manager and will be responsible for all lab activities. Personnel Responsibilities are listed (in table 1).

Table 1: Personnel Responsibilities

Name	Organizational Affiliation	Title	Contact Information
Ray Hiemstra	Orange County Coastkeeper	Project Manager	(714) 850-1965
Nicole McClain	Orange County Coastkeeper	QA Officer	(714)850-1965
Jonathan Bousselaire	Test America	Laboratory Project Manager	(949)261-1022

Project Planning and Coordination

Ray Hiemstra of Orange County Coastkeeper will be the overall project manager responsible for developing and completing the sampling plan and QAPP, and he will make financial decisions on various project expenses. Ray will supervise the tasks to be performed by various contractors and personnel involved in this project. He will resolve any issue of concern related to this project. Nicole McClain of Orange County Coastkeeper will serve as the Quality Assurance manager for this project**.**

Field Sample Collection

Ray Hiemstra will serve as the Field Team Leader, providing direction on field sampling logistics, personnel assignments, and field operations. Specifically, Mr. Hiemstra will supervise all field collection activities and will be responsible for ensuring accurate sample positioning; recording sample locations and identification; ensuring conformity to sampling and handling requirements, including field decontamination procedures; and physical evaluation and chain-of-custody through delivery to the analytical laboratory.

Mr. Hiemstra will be responsible for documenting collection of water samples, observations, and chain-of-custody up until the time the samples are delivered for analysis to the analytical laboratory for chemical analysis. He will also ensure that the water samples are stored under proper conditions until delivery, and will be responsible for documenting field sampling activities. This report provides details of the sampling effort, sample preparation, sample storage/transport procedures, and field quality assurance.

Laboratory Preparation and Analyses

The lab project manager, Jonathan Bousselaire from Test America, will be responsible for generating the raw chemical data in accordance to the laboratory methods as stated in Test Americas Quality Assurance Project Plan. Any laboratory problem in regard to this project will be addressed to him. The contract lab managers will receive and analyze the submitted samples in accordance with EPA’s approved protocol and the terms of the Metal Recyclers BMP Monitoring Project QAPP, their internal QA/QC requirements, and requirements as specified in this or any subsequently revised sampling plan. A report of analytical results and QA/QC procedures will be prepared by the contract lab upon completion of the analyses.

Final Sampling and Analysis Results Report

Ray Hiemstra will be responsible for preparation of progress reports and the final report which will include analysis of sampling data, the sampling effort, analytical methods, QA/QC narrative, and analytical testing results.

4.2 Quality Assurance Officer Role

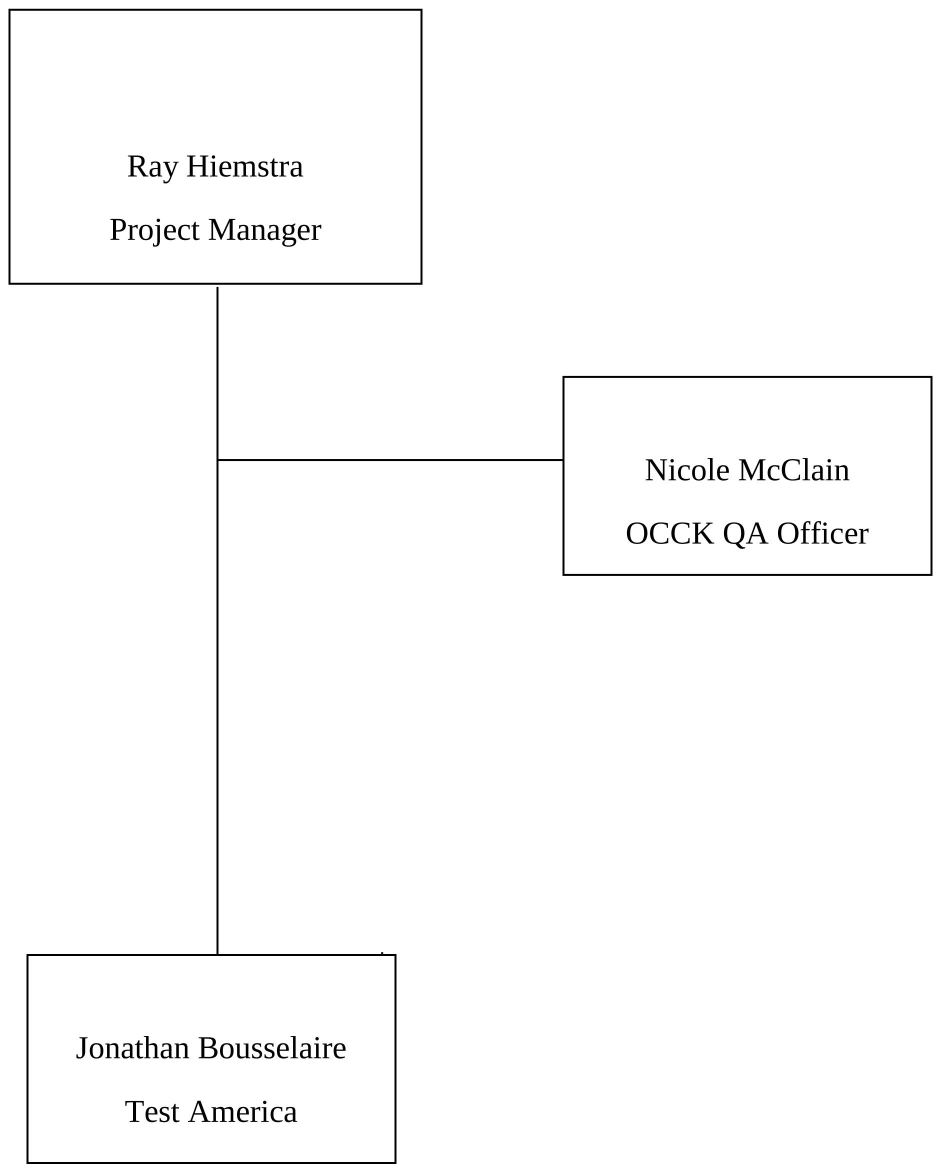
Nicole McClain of OCCK will serve as the Quality Assurance (QA) Officer for this project. Her role as QA Officer is to provide independent oversight and review of the quality of the data being generated by the project with respect to the quality that is required. Thus, the QA Officer will be independent of that generating project information and will not report to the proposed project director or to any of the proposed technical staff. In this role, the QA Officer has the responsibility to require data which is of insufficient quality to be flagged, or not used, or for work to be redone as necessary so that the data meets specified quality measurements.

4.3 Persons Responsible for QAPP Update and Maintenance

Changes and updates to this QAPP may be made after a review of the evidence for change by Ray Hiemstra. Ray will be responsible for submitting drafts for review, preparing a final copy, and submitting the final QAPP for signature.

4.4 Organizational Chart Showing Lines of Authority

Figure 1: Organizational Chart



5. PROBLEM DEFINITION/BACKGROUND

5.1 Problem Statement

Metal Recycling yards in the Santa Ana Watershed commonly contain pollutants such as oil and grease, metals, and suspended solids in their stormwater runoff. These pollutants can affect beneficial uses and pose a threat to receiving waters, so they must be dealt with on site to protect water quality downstream. There are a number of Best Management Practices (BMPs) that are implemented to reduce these pollutants including roof drains, paving, permeability and landscape coverage. This project is designed to collect water quality data on the concentrations of target criteria that can be obtained through the implementation of water volume and pollutant reduction BMPs followed by advanced filtration using four proprietary stormwater water systems. The data collected may be used to help determine new treatment standards for metal recycling yards in the Santa Ana River Watershed. The creation of this new criterion is necessary to provide metal recycling yards with performance goals that are achievable and cost effective while also protecting water quality and beneficial uses in receiving waters.

The four proprietary advanced filtration units to be monitored are: American Storm Water Filtration, H2O Storm Water System, Storminator and StormwateRx. All four technologies were selected as they are commercially available units in current use at metal recycling facilities. These four systems have undergone extensive manufacturer based testing and monitoring. This will be the first comprehensive third party monitoring for these systems in an operating metal recycling yard setting.

The parameters to be monitored include oil and grease (HEM), total suspended solids (TSS), COD, total hardness as well as total and dissolved metals, pH and conductivity. Fifty four water samples will be collected from four representative storms at the inlet and outlet of the advanced filtration unit at each of the six project site during storm events over the 2012-2013 wet seasons. Each sample collected for analysis except for oil and grease will be a composite made up of a minimum of 12 discreet 100 ml samples from a constant flow (as documented by a flow meter) representing 75% or more of the hydrograph of the storm event. The samples will be collected by the sample collection team and composited at the sample site using US EPA approved procedures. The oil and grease sample will be a single sample due to the need to sample in the bottle in which the analysis commences and to use a preservative at the time of sampling. The oil and grease sample will be collected at the beginning of the each monitoring event. Some of the composite sample will be poured out for conductivity and pH measurements.

The samples will then be placed on ice and transported to Test America Laboratory in Irvine Ca. within 48 hours. At the lab the composite sample will be filtered and divided as required for analysis by lab personnel.

The sample collected at the inlet will not be considered representative of the water quality that can be achieved by BMPs other than advanced filtration. The sample from the outlet will be considered representative of the water quality that metal recycling yards can achieve through the use of advanced filtration. The data generated from this project will be used by the Santa Ana Regional Water Quality Control Board, Orange County Coastkeeper, metal recycling yards and filtration manufacturers to measure unit performance and develop new treatment standards for metal recycling yards.

5.2 Decisions or Outcomes

The outcome of this project will be data documenting the concentrations of target pollutants that can be achieved through the implementation of volume and pollutant reduction BMPs along with advanced filtration by four proprietary stormwater treatment units as installed in a metal recycling yard application. The data collected will be from a variety of metal recycling yards with five located within the Santa Ana Watershed and one in the Los Angeles Watershed. This data will then be logged and analyzed to be used to assist in developing a numerical standard for use in the Santa Ana Region metal recycling yard permit.

5.3 Water Quality or Regulatory Criteria/Permits

Currently all metal recycling yards in the Santa Ana Region are required to meet water quality standards as detailed in the California Toxics Rule and the Multi-sector General Permit for Industrial Activities (see section 7.2). Metal recycling yards in the state fall under the General Industrial Stormwater Permit which requires the submittal of a SWPPP as well as requirements to protect water quality. The Santa Ana Regional permit includes requirements for metal recycling facilities to take a series of steps to implement BMPs to reduce the amount of Stormwater runoff needing treatment and will require the use of advanced filtration (if necessary) to meet performance goals in the permit. Numeric performance goals may be developed with the data collected during this project. This project is being run in cooperation with the scrap metal industry and the project yards. No permits will be necessary for sampling activities.

6. PROJECT/TASK DESCRIPTION

6.1 Work Statement and Produced Products

This project is a stormwater quality monitoring project where samples will be collected from the influent and effluent of proprietary advanced filtration stormwater treatment units. These units are from four different manufacturers and will be located at five different metal recycling yards in the Santa Ana Watershed and one in the Los Angeles Watershed (LA Watershed does not drain into the Santa Ana Watershed). All of these units have been installed as end of the line treatment units at each site.

All sites have been chosen to represent the multitude of recycling facilities located in the Santa Ana Watershed, with the exception of Central Metals located in the Los Angeles Watershed. The Pomona and Santa Ana yards are both small collector yards were metal is collected, sorted and stored before it is shipped to an offsite processing facility. The Fontana yard is a large processing facility. All of the SA metal scrap yards collect both ferrous and nonferrous metals. The SA metal scrap yards have installed Storminator systems at their three facilities. Ruby Metals, Inc. located in Bloomington is both a collecting and processing facility and has installed the Stormwater RX filtration system. American Metal Recycling located in Fontana a collecting facility and the developer of the American Filtration system. Central Metals located in Vernon (Los Angeles County), has the H2O Storm Water Systems installed at their yard.

As many sets of samples as possible will be collected each wet season; four storms will be selected to be representative of small, medium and large events based on total rainfall amounts of ¼ inch to ½ inch, ½ inch to 1 inch, and over one inch storm totals. Timed composite samples will be collected to represent at least 75% of the hydrograph of the projected storm. These samples will include individual analytes which will only be measured during storm runoff events. The sampling technique that will be utilized, is the creation of composite samples using a minimum of 12, 100ml discreet samples collected at regular time intervals from a constant flow (as documented by a flow meter) just before and after the media filter. The bottles will be label with the site identifier, city and date. This project will provide annual progress reports as well as a final report documenting the findings of this project.

6.2 Constituents to be Monitored and Measurement Techniques

The samples will be tested for Oil and Grease (HEM), Total Suspended Solids, Total Hardness (as CaCO3) Chemical Oxygen Demand (COD), total Iron, Aluminum, Copper, Lead, Zinc and dissolved Copper Lead and Zinc by Test America laboratory. Conductivity and pH will be analyzed from subsets of the composite samples in the field using meters. The results will be logged and documented in the final report.

6.3 Project Schedule

Table 2 Project Schedule Timeline For 2013

Activity	Date	
	Anticipated Date of Initiation	Anticipated Date of Completion
Assemble Background Data	July 15, 2013	October 15, 2013
Prepare QAPP	October 11, 2013	October 23, 2013
TAC Review of QAPP	October 24, 2013	On-going
Sampling	November 1, 2013	April 30, 2014

Chemical Analysis	November 1, 2013	May 30, 2014
Data Validation	November 1, 2013	On-going
Data Analysis	November 1, 2013	On-going
Prepare Draft Report	June 2014	July 2014
TAC Review of Draft Report	August 2014	August 2014
Prepare Annual Report	September 2014	September 2014

6.4 Geographical Setting

The project area is predominantly located in the Santa Ana River watershed (The Vernon site is located in the Los Angeles Watershed) in southern California, and includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County, and a small portion of Los Angeles County. The climate of the region is classified as Mediterranean: generally dry in the summer with mild, wet winters. The average annual rainfall in the region is about fifteen inches, most of it occurring between October and April.

6.5 Constraints

Extreme dry weather would limit or prevent representative sampling due to low flow and/or harsh conditions that would adversely affect the parameters being monitored. Also the number of recycling yards willing to participate in the project may affect the total number of sample sites and samples collected.

7. Quality Objectives and Criteria for Measurement Data

7.1 Data Quality Objectives

Measurement or Analyses Type		Applicable Data Quality Objective
Laboratory Analysis Metals		Accuracy, Precision, Recovery, Completeness

Accuracy is how close the measured values are to the true value. Accuracy will be determined by measuring one or more selected performance testing samples or standard solutions other than those used for calibration. Precision is a measurement of how often a reading can be repeated. Precision will be the measure of mutual agreement between individual analytical results of replicate analyses. Precision will be determined on both field and laboratory measurements. Recovery measurements will be determined by laboratory spiking of a replicate sample with a known concentration of analyte. Completeness is the number of analysis generating useable data for each analysis divided by the number of samples collected for analysis.

Precision will be the measure of mutual agreement between individual analytical results and assessed using replicate analyses. Accuracy will be the degree of agreement of an analytical measurement with an accepted reference value. Accuracy is assessed using fortified samples and external samples of known concentration.

All methods will establish precision and accuracy standards that must be met by the laboratory and EPA's approved methods. The contract laboratory/s will fulfill the method limits to establish their analysis within control.

This project is designed to be representative and eliminate bias by sampling from a sufficient number and variety of metal recycling yards to assure that the samples collected are representative of all the metal recycling yards in the watershed. The data set will be large enough to allow for valid statistical analysis. Data acquisition activities will consist of field measurements and laboratory analyses, and the Measurement Quality Objectives (MQOs) will meet SWAMP-comparable values. The Data Quality Objectives for this project provide quality specifications for the level of the study in question and are listed below.

Table 3: Method Quality Objectives for Laboratory and Field Measurements

Group	Parameter	Accuracy	Precision	Recovery	Target Reporting Limits	Completeness

Metals	Al, Cu, Zn, Fe, Pb	standard reference materials (SRM, CRM, PT) 75% to 125%.	Field replicate, laboratory duplicate, or MS/MSD+ /- 25% RPD except Hg in sediment at + /- .35%. Lab duplicate minimum.	Matrix spike 75%- 125%.	10.0 µg/L 1.0 µg/L 5.0 µg/L 10. 0 µg/L 1.0 µg/L	95%
Lab Test	*Oil and Grease (HEM)*	*± 0.5%*	*No SWAMP requirement – suggest ± 0.5 or 5%*	NA	5.0 µg/L	*No SWAMP requirement – suggest 90%*
Lab Test	*COD*	*± 5%*	*No SWAMP requirement – suggest ± 5%*	NA	20.0 µg/L	*No SWAMP requirement – suggest 90%*
Lab Test	*TSS*	*± 5%*	*No SWAMP requirement – suggest ± 5%*	NA	10.0 µg/L	*No SWAMP requirement – suggest 90%*
Lab Test	*Total Hardness*	*± 5%*	*No SWAMP requirement – suggest ± 5%*	NA	4.0 µg/L	*No SWAMP requirement – suggest 90%*
Field Test	*pH*	*± 0.2 pH units*	*± 0.2 pH units*	NA	-1 pH	*90%*
Field Test	*Conductivity*	*± 2 µS/cm*	*± 10 % or ± 2 µS/cm, Whichever is greater*	NA	0 µs/cm	*90%*

A quality control analysis will be completed as part of the final report for this project.

<u>7.2 Project Action Limits for All Parameters of Interest -</u> Project Action Limits are based off the Scrap Metal Recycling Sector Permit Numeric Action Limits (NALs, based off sector specific Federal Benchmarks).

Table 4: Project Action Limits

Priority Pollutant	***Project Action Limit (mg/l or µg/L)***
From Federal Benchmarks	
Chemical Oxygen Demand (COD)	120 mg/l
Total Suspended Solids (TSS)	100 mg/l
Total Recoverable Aluminum	0.75 mg/l
Total Recoverable Copper	0.0189 mg/l
Total Recoverable Iron	1.0 mg/l
Total Recoverable Lead	0.122 mg/l
Total Recoverable Zinc	0.16 mg/l
Oil & Grease	15 mg/l
From California Toxics Report	
Dissolved Copper	9.0 µg/L
Dissolved Lead	2.5 µg/L
Dissolved Zinc	120 µg/L

<u>*The pollutants tested were recommended by the Project Technical Advisory Committee based on professional experience.</u>

<u>*Total recoverable Copper, Lead and Zinc are based on a hardness range of 125-150 mg/L.</u>

<u>7.3 Acceptance Criteria for All Previously Collected Data</u>

The data for this project will be based on the water samples collected during the term of the project. No previously collected data will be used.

8. Special Training Needs/Certification

8.1 Specialized Training or Certifications

All personnel will be trained to use US EPA approved methods for all field activities. They will also be trained in the proper techniques and equipment use for sampling and processing the samples in the field and packaging them for shipment to the lab. The contract lab, Test America is certified by the state to do the selected analysis. Mr. Hiemstra will be responsible for assuring these are satisfied. Although no specialized safety training is necessary, all personnel participating in the sampling will receive training in safety issues.

8.2 Training and Certification Documentation

The training of personnel involved in the sampling will be documented with a list at O.C. Coastkeeper. Contract laboratory certification documentation will be kept at the contract laboratory and will be available for inspection if needed.

8.3 Training Personnel

Raymond Hiemstra will conduct the sampling and safety training sessions for personnel working on the sampling. Nicole McClain will also be present in the field during sampling to reinforce the training. Contract laboratory personnel will be trained by the resident Q/C officer.

TRAINING	TRAINER
SAMPLING AND SAMPLE PROCESSING PROCEDURES	RAY HIEMSTRA
SAFETY	RAY HIEMSTRA

9. DOCUMENTS AND RECORDS

Ray Hiemstra will be responsible for developing, maintaining, and updating the Quality Assurance Project Plan (QAPP). All field observations gathered by this project will be recorded on standardized field data entry forms. These forms and this process are described in more detail in element 19 titled data management. Documentation for analytical data will be kept on file at the laboratory and will be available for review during any external audits. The laboratory records will include the analyst' s comments on the condition of the sample and progress of the analysis, raw data, instrument printouts, and results of calibration and QC checks. All original QAPPs will be held at Orange County Coastkeeper. This QAPP and its revisions will be distributed to all parties involved with the project via email, including Regional Board Staff, members of the Project Technical Advisory Committee, and the project metal recycling yards. Copies will also be sent to the Test America Laboratory manager for internal distribution. Upon revision, the replaced QAPPs will be discarded.

Sample collection records will include all information and observations from the sample collection site at the time of sample collection. All sample collection notes will be examined by the project manager for completeness and hardcopies kept at the Orange County Coastkeeper office.

The Orange County Coastkeeper project manager will oversee the maintenance of all records and will arbitrate any issues related to records retention. The Test America Laboratory Project Manager will be responsible for maintaining and retaining all analytical records, including sample receipt records, chain-of-custody forms, and printed and electronic data from laboratory analyses.

All records generated by this project will be stored at Orange County Coastkeeper. All lab records will also be stored at Test America Laboratory' s Irvine office. Copies of the records will be maintained at Orange County Coastkeeper and Test America Laboratory for five years following project completion. Data files will be maintained without discarding. The Test

America Laboratory will archive all analytical records generated for this project. Ray Hiemstra of Orange County Coastkeeper will be responsible for archiving all other records.

All field operation records will be entered into electronic formats and maintained in a dedicated directory at Orange County Coastkeeper. Each file will also have at least two back-up copies. The lab will have a dedicated directory for Orange County Coastkeeper in their data repository. The contract lab will deliver data in hardcopy and electronic format to Orange County Coastkeeper, and the Project Manager will be responsible for storage and safekeeping of these records.

To maintain updates to our QA documents (as required by SWAMP) we will send a memo project Technical Advisory Team describing and justifying the proposed update. These approved updates will be filed and maintained by Nicole McClain, the QA Officer for this proposed project.

Table 5 Documents and Record Retention, Archival, and Disposition Information

Identify Type Needed	Retention	Archival	Disposition
Field observation forms	OCCK	Hardcopies	Hardcopies kept for 5 years. Digital data indefinitely
Laboratory Report	OCCK and Test America	Hardcopies and digital Records	Hardcopies kept for 5 years. Digital data indefinitely
Project Database	OCCK and Test America	Hardcopies and digital Records	Hardcopies kept for 5 years. Digital data indefinitely

GROUP B: DATA GENERATION AND ACQUISITION

10. SAMPLING PROCESS DESIGN

Monitoring Station locations and a justification for selection of these sites are fully described here. Station location map and other details are also provided in the Appendices of this QAPP.

The study question to be answered is what is the concentration of target pollutants in metal recycling yard stormwater runoff that has been treated using volume and pollutant reduction BMPs followed by advanced filtration using two proprietary stormwater water filtration systems.

The general objective is to develop performance characteristics of the selected treatment system(s), specifically including frequency distributions of water quality of treatment system influent and effluent.

The specific objective to be developed with reference to statistical and other analyses of existing data to arrive at comprehensive statements of purpose stating quantitatively what we want to establish, the level of certainty we wish to attain, and the monitoring coverage (number of samples) needed for achievement, weight against available budget.

Sampling stations located at the inlet and outlet of these advanced filtration system can be found at each of the six project recycling yards selected with the intent of a fixed station for long term monitoring. The timing of monitoring will be selected with the intent of addressing monitoring storm runoff.

The study sites were selected using a directed sampling design principle. Sites were selected to be representative of a particular industry and include a variety of common site types. As for the timing when monitoring will occur, the sampling will be based on the systematic sampling design principle, and the time of day (diurnal sampling design) will be systematic.

The sampling design principles used can be defined as follows: Systematic - A deterministic approach in which points are selected deliberately at fixed intervals of area, length, or time; Directed - A deterministic approach in which points are selected deliberately based on knowledge of their attributes of interest as related to the environmental site being monitored. This principle is also known as "judgmental," "authoritative," "targeted," or "knowledge-based." Random (stratified) - A probabilistic approach in which points are deliberately selected at random from a given population of "eligible" points that all have the same chance of being selected. Points are often grouped, or "stratified" by specific attributes of interest. Non-deliberate - none of the above; points are selected anecdotally, or opportunistically, or as dictated by given constraint, or in response to spills, etc.

The target pollutant data will be considered critical to the project. All other data such as observations and on site measurements to support laboratory analysis is ancillary and do not apply to the analysis.

There will be a total of four sampling sessions at each site and a total of fifty four total samples. Stations will be visited at a frequency dependent on rainfall frequency with the goal of having a representation of precipitation patterns in the Santa Ana watershed. The planned interval between visits will be dependent on the frequency and size of rain events. The study will not require continuous monitoring.

A two person team of Orange County Coastkeeper staff will go to each of the metal recycling sites during rain events and collect grab samples. Each sample collected for analysis except for oil and grease will be a composite made up of a minimum of 12 discreet 100 ml samples from a constant flow (as documented by a flow meter or bucket test) representing at least 75% of the hydrograph of the storm event. The samples will be collected by the sample collection team and composited at the sample site using US EPA approved procedures. The oil and grease sample will be a single sample due to the need to sample in the bottle used to begin the analysis and to use a preservative at the time of sampling. Conductivity and pH measurements will be taken from a subset of the composite sample in the field using meters. The samples will then be placed on ice and transported to Test America Laboratory in Irvine Ca. within 48 hours. At the lab the composite sample will be filtered and divided as required for analysis by lab personnel.

Natural variability in the frequency and intensity of the rain events that are samples are the major source of uncertainty in the sampling methodology. To deal with this uncertainty we are planning to select events that represent precipitation patterns in the Santa Ana watershed. Measurement error is another aspect of uncertainty; all aspects of measurement error have been described elsewhere in this document. Uncertainty due to sample misrepresentation and bias will be minimized by collecting all samples at sampling points just before and after the terminal water treatment device.

The project design includes a series of actions to assure the collection of quality data. Before sampling monitors will be trained at a training session covering sample collection methodology to assure that all monitoring is consistent. Additionally monitors will visit their sample site in dry weather before any sampling event so they will be familiar with the site and the equipment they are collecting samples from. Sample bottles and equipment will be placed in a sealed cooler(s) and distributed to the monitoring team captains in advance of sampling. When a storm event is predicted with 70% confidence the monitoring teams will be notified of the time they are to arrive to their sample site and they will arrive and set up at the treatment site in the yard to begin sampling. As the treatment equipment has been started and brought up to speed a grab sample of the first flush will be taken followed by a series of samples timed to collect a minimum of 12 samples representing 75% of the hydrograph of the storm. When all the samples have been collected a composite sample will be created and the team captain will call the project manager to arrange for pickup of the samples for delivery to the lab. All samples will be delivered to the lab and processed for analysis within 48 hours of collection.

The critical information will be the number of samples collected for compositing and the lab analysis data. The observational data collected at the site is for informational purposes only.

In the event a project site becomes unavailable this will be noted in the records and a new site will be selected if available.

11. SAMPLING METHODS

- See appendix 4 for the SOP.
-

Table 6 Complete Lists of Analytes and Sampling Method

Sample Location	WATER ANALYSIS	METHOD	HOLDING TIME Extraction; Analysis	MDL	BOTTLE	Preservation Chemical temperature
All Metal Recycling yards	Metals (ICP/MS)	EPA 200.8	1 year	µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Total Copper (Cu)	EPA 200.8	1 year	0.5 µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Total Aluminum	EPA 200.8	1 year	8.5 µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Total Iron	EPA 200.8	1 year	8.0 µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Total Zinc	EPA 200.8	1 year	4.0 µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Dissolved Copper	EPA 200.8	1 year	1.0 µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Dissolved Lead	EPA 200.8	1 year	1.0 µg/L	2L Poly Bottle	4 degree C
All Metal Recycling yards	Dissolved Zinc	EPA 200.8	1 year	4.0 *µg/L*	2L Poly Bottle	4 degree C
All Metal Recycling yards	COD	SM 5220D	1 year	16 mg/L (PPM)	2L Poly Bottle	4 degree C
All Metal Recycling yards	Total Suspended Solids (TSS)	SM 2540D	1 year	1 mg/L (PPM)	2L Poly Bottle	4 degree C
All Metal Recycling yards	Total Hardness	SM 2340C	1 year	4 mg/L (PPM)	2L Poly Bottle	4 degree C
All Metal Recycling yards	HEM	EPA 1664A	1 year	1.4 mg/L (PPM)	1L Amber Glass	4 degree C
All Metal Recycling yards	pH	Digital Meter	1 year	pH units	None	None

All Metal Recycling yards	Conductivity	Digital Meter	1 year	µs/Cm	None	None

Sample Collection

Water samples will be collected by placing an acid washed bottle under the sample collection nozzle and filling to the 100ml mark and then transferring to an acid cleaned 4 liter amber glass compositing bottle. Clean bottles are provided by the contract lab. Field notes for all samples will be maintained as samples are collected.

Sample Processing

Samples for metal analysis will be composited in the field using the techniques detailed in the Metal Recycling Industry Stormwater Monitoring Training Manual included as Appendix D in this document. All sampling will be collected using the "Clean Hands/Dirty Hands" technique discussed in Appendix D. For composite samples a minimum of twelve discreet 100 ml samples representing at least 75% of the hydrograph will be collected and poured into a 4 liter bottle to create a composite sample. After the composite sample is complete it will be placed on ice and delivered to Test America lab within 48 hrs. where lab staff will filter and divide the composite sample as necessary for the various analysis required. Any problems will be reported to the project manager and documented along with corrective actions. No equipment and support facilities are needed for this project.

Detailed sample container information and sample volumes are listed in table 12.1 of element 12.

Oil and Grease samples will be preserved with HCl. All samples will be collected in pre-cleaned bottles supplied by the contract lab. All samples will be labeled with information including the project name, client name, site identification, analysis requested, date and time.

Ray Hiemstra will be responsible for determining all corrective actions regarding sampling. If any equipment related to the monitoring fails (such as a flow meter), Orange County Coastkeeper personnel will report any problems in the comment section of their field notes and will not record data values for the variables in question. Actions will be taken to replace or repair any broken equipment prior to the next field use. No data will be entered into the database that was known to be collected with faulty equipment. All standard operating procedures for the project are contained in the Metal Recycling Industry Stormwater Monitoring Training Manual included in this document as Appendix D.

12. SAMPLE HANDLING AND CUSTODY

Orange County Coastkeeper has six monitoring teams that will be collecting samples at the project yards. Each team has a captain that will be responsible for the samples and their custody during sampling.

Field crews will keep a field log which will consist of sampling forms for each sampling event. SOP's for Field Sample Collection provided in the Scrap Metal Industry Stormwater Monitoring Training Manual will be followed. In the field log the following items will be recorded: time of sample collection, sample identification numbers, results of any field measurements and the time that they were made, qualitative descriptions of relevant water and weather conditions at the time of sample collection, and a description of any unusual occurrences associated with the sampling event (especially those that could affect sample or data quality). The samples will be collected using pre cleaned bottles supplied by the lab so no equipment cleaning or decontamination should be necessary.

The field crews will have custody of samples during field sampling and chain-of-custody forms will accompany all samples to the analyzing laboratory. Chain-of-custody procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of analytical results. The analytical laboratory will maintain custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times. The analytical laboratory has a sample custodian who examines the samples for correct documentation, proper preservation and holding times. The laboratory will follow sample custody procedures outlined in its QA plans, which are on file.

In the field, all samples will be packed in wet ice or frozen ice packs during shipment, so that they will be kept at approximately 4 deg. C. All samples will be handled, prepared, transported and stored in a manner so as to minimize bulk loss, analyte loss, contamination or degradation. Sample containers will be clearly labeled with an indelible marker. All caps and lids will be checked for tightness prior to shipping. Ice chests will be sealed with tape before shipping. Samples will be placed in the ice chest with enough ice, or frozen ice packs, to completely fill the ice chest. The Data Sheet forms will be placed in an envelope and taped to the top of the ice chest or they may be placed in a plastic bag and taped to the inside of the ice chest lid. Transport of the samples to the analytical laboratory will be by staff and/or personal vehicles. As soon as the samples are properly packaged and cooled with ice they will promptly be transported to the analytical laboratory for analysis along with the appropriate chain-of-custody forms. Refer to Table 6 for sample method, volume, container and holding time.

13. ANALYTICAL METHODS

In situ monitoring methods will be used with this project. No continuous monitoring will be used. All of the field methods, instruments and/or kits that will be used are listed with SWAMP-comparable information in Table 13-1.

Table 7 (Element 13) Laboratory and Field Analytical Methods

Analyte	**Laboratory/ Organization**	**Project Action Limit (units, wet or dry weight)**	**Project Quantification? Limit (units, wet or dry weight)**	**Analytical Method**		**Achievable Laboratory Limits**	
				Analytical Method/ SOP	Modified for Method yes/no	MDLs (1)	Reporting Limit
Metals	Test America	µg/L	µg/L	EPA 200.8	No		
Total Copper (Cu)	Test America	18.9 µg/L	µg/L	EPA 200.8	No	.5 µg/L	1 µg/L
Total Aluminum	Test America	750 µg/L	µg/L	EPA 200.8	No	8.5 µg/L	10 µg/L
Total Iron	Test America	1000 µg/L	µg/L	EPA 200.8	No	8 µg/L	10 µg/L
Total Zinc	Test America	160 µg/L	µg/L	EPA 200.8	No	4 µg/L	5 µg/L
Dissolved Copper	Test America	9.0 µg/L	µg/L	EPA 200.8	No	.5 µg/L	1 µg/L
Dissolved Lead	Test America	2.5 µg/L	µg/L	EPA 200.8	No	.3 µg/L	1 µg/L
Dissolved Zinc	Test America	120 µg/L	µg/L	EPA 200.8	No	4 µg/L	5 µg/L
Oil and Grease	Test America	15 mg/L	mg/L	EPA 1664A	No	1.4 mg/L	5 mg/L
COD	Test America	120 mg/L	mg/L	SM5220D	No	16 mg/L	20 mg/L
TSS	Test America	100 mg/L	mg/L	SM2540D	No	1 mg/L	10 mg/L
Hardness	Test America	None	mg/L	SM2340C	No	4 mg/L	4 mg/L
pH	Field Test	5.5> x> 9.5	pH units		No	-1 pH	-1 pH
Conductivity	Field Test	1000 µs/cm	Us/cm		No	0 µs/cm	0 µs/cm

* No action limit was used for hardness. This test is only used to assist in comparison of metals with CTR criteria.

Test America will provide the analyses for samples that are submitted for laboratory analysis. All of the methods that will be used are listed in Table with specific method performance criteria that are SWAMP-comparable.

Under a Performance Based Method System (PBMS), the data quality needs of the proposed project are specified. These served as criteria for selecting SWAMP-comparable methods which will meet those needs in a cost-effective manner, rather than the use of specified or mandated methods. None of the proposed methods (listed in Table 7) require modification for use in this project.

Jonathan Bousselaire will be responsible for any corrective actions that may be needed in the event of methods failure to produce SWAMP-comparable data. If a method fails to provide SWAMP-comparable data for any reason, including analyte or matrix interferences, instrument failures, etc., then the involved samples will be analyzed again if possible. The laboratory's SOP for handling these types of problems will be followed. The citation for the laboratory's SOP is described in Appendix B. When a method fails to provide SWAMP-comparable data, then the laboratory's SOP for documenting method failures will be used to document the problem and what was done to rectify it. The citation for the laboratory's SOP is in Appendix B.

After analysis of the project's samples has been completed by the laboratory they will be disposed of it in compliance with all federal, state, and local regulations. The laboratory has standard procedures for disposing of its waste, including left over sample materials. The citation for the laboratory's SOP is in Appendix B.

Turnaround times for sample analyses will be as fast as possible based on the laboratory's work load. However, the turnaround times will not exceed the SWAMP-comparable holding times that were described in element 12 (sample handling) for the parameters listed. The laboratory understands and has agreed to meet the turnaround times needed for our proposed sample analyses.

The measurement principals for the field instruments are as follows:

A pH meter measures essentially the electro-chemical potential between a known liquid inside the glass electrode (membrane) and an unknown liquid outside. Because the thin glass bulb allows mainly the agile and small hydrogen ions to interact with the glass, the glass electrode measures the electro-chemical potential of hydrogen ions or the potential of hydrogen.

A Conductivity meter measures the conductivity of a solution by measuring the amount of current (proportional to ion concentration) when a potential difference is applied between the two parts of the probe.

14. Quality Control

This section addresses the QA/QC procedures for the project. A strong QA/QC program is necessary to insure data accuracy. Laboratory and field blanks will have no detectable amount of substance in blanks. Accuracy, precision, recovery, and blanks will be a minimum of 1 in 20 (5%) with at least one in every batch.

Field QC results will meet SWAMP MQOs and frequency requirements on a sample batch level where a batch as 20 or fewer field samples prepared and analyzed with a common set of QC samples. If SWAMP MQOs conflict with those prescribed in the utilized method or SOP, the more rigorous of the objectives must be met. Field blanks - Field blanks will be taken to the field, transferred to the appropriate container, preserved (if required by the method), and treated the same as the corresponding sample type during the course of a sampling event. If field blank performance is acceptable, further collection and analysis of field blanks will be performed on an as-needed basis. The water used for field blanks will be free of target analyte(s) and appropriate for the analysis being conducted. Laboratory QC Samples - Laboratory QC samples will satisfy SWAMP measurement quality objectives (MQOs) and frequency requirements using analytical batches of 20 or fewer samples and associated quality control that are processed by the same instrument within a 24-hour period (unless otherwise specified by method). Matrix Spikes - A matrix spike (MS) will prepared by adding a known concentration of the target analyte to a field sample, which is then subjected to the entire analytical procedure. Matrix spikes will be analyzed in order to assess the magnitude of matrix interference and bias present. Because matrix spikes are analyzed in pairs, the second spike is called the matrix spike duplicate (MSD). Both the MS and MSD will be split from the same original field sample. In order to properly assess the degree of matrix interference and potential bias, the spiking level will be approximately 2-5x the ambient concentration of the spiked sample. In addition to the recoveries, the relative percent difference (RPD) between the MS and MSD will be calculated to evaluate how matrix affects precision. If the percent recovery for any analyte in the MS or MSD is outside of the limits specified then the chromatograms (in the case of trace organic analyses) and raw data quantization reports will be reviewed. Data will be scrutinized for evidence of sensitivity shifts (indicated by the results of the CCVs) or other potential problems with the analytical process. If associated QC samples (reference materials or LCSs) are in control, matrix effects may be the source of the problem. If the standard used to spike the samples is different from the standard used to calibrate the instrument, it will be checked for accuracy prior to attributing poor recoveries to matrix effects. Laboratory Blanks - Laboratory blanks (also called extraction blanks, procedural blanks, or method blanks) will be used to assess the background level of a target analyte resulting from sample preparation and analysis. Laboratory blanks will be carried through precisely the same procedures as the field samples. For both organic and inorganic analyses, a minimum of at least one laboratory blank will be prepared and analyzed in every analytical batch. Some methods may require more than one laboratory blank with each analytical run. Blanks that are too high require corrective action to bring the concentrations down to acceptable levels.

15. Instrument/Equipment Testing, Inspection, and Maintenance

There are two field measurements planned for this project. Field instruments will be maintained to manufacturer specifications. Laboratory measurement equipment will be maintained in accordance with the lab's Standard Operating Procedures (SOPs). This includes procedures specified by the manufacturer and also any that are specified by the methods used. Maintenance logs will be kept and each piece of equipment will have its own log that documents the dates and description of any problems, the action(s) taken to correct problem(s), maintenance procedures, system checks, follow-up maintenance dates, and the person responsible for maintaining the equipment. The existence of any quality management plans (QMPs), QAPPs, sampling and analysis plans, or field sampling plans pertinent to the work requested will be communicated to the contractor. There are no bacterial or benthic measurements planned with this project.

Table 8 (Element 15) Testing, Inspection, Maintenance of Sampling Equipment and Analytical Instruments

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Responsible Person	Frequency	SOP Reference
pH meter	Cleaning/Calibration	Ray Hiemstra	Before each Sampling Session	Appendix D
Conductivity Meter	Cleaning/Calibration	Ray Hiemstra	Before each Sampling Session	Appendix D

16. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Ray Hiemstra and Jonathan Bousselaire will be responsible for element 16 instrument/equipment calibrations and frequency. This will include documenting and checking that the specified calibration procedures were performed for each of the selected parameters being measured (as listed in the narrative and in Table 16-1 below).

16.1 Field Measurements

Within 24 hours of any sampling event all pH and Conductivity meters will be calibrated as detailed in the SOP in Appendix D.

16.2 Laboratory Analyses

Conventional - Prior to sample analysis of conventional constituents in water, external calibration will be made using 3 - 5 standards that cover the range of sample concentrations. The lowest standard will be at or near the Method Detection Limit (MDL). Linear regression will be < 0.995 or better. Calibration verification will be run after every 20 samples after the initial calibration and will use a standard source that is different from that used for the initial calibration. Acceptable recovery is 80 - 120%. Metals in water - Prior to sample analysis of trace metals in water, external calibrations will be made using 3 - 5 standards that cover the range of sample concentrations. The lowest standard will be at or near the MDL. Linear regression will be < 0.995 or better. Calibration verification will be run after every 20 samples after the initial calibration and will use a standard source that is different from that used for the initial calibration. Acceptable recovery is 90 - 110% except for mercury which is 80 - 120%.

16.3 Biological Measurements

There are no bacterial or benthic measurements planned with this project.

17. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Table 9 (Element 17) Inspection/Acceptance Testing Requirements for Consumables and Supplies

Project-Related Supplies / Consumables	**Inspection / Testing Specifications**	**Acceptance Criteria**	**Frequency**	**Responsible Individual**
Sample bottles	Sealed, Clean, proper type	Accept if they meet criteria	On delivery	Ray Hiemstra

Critical supplies

Critical supplies will include sample bottles, cooler, ice packet, and latex gloves. For a complete list of equipment and supplies see Appendix 1.

18. NON-DIRECT MEASUREMENT (EXISTING DATA)

Not applicable for this project

19. DATA MANAGEMENT

Test America QAPP is the SOP that will be used for managing laboratory analytical data with the proposed project. This SOP describes standardized record-keeping and tracking practices, and the document control system (or it cites other written documents). It thus provides a standardized approach for data management from field to final use and storage for all laboratory data. The SOP identifies all data handling equipment/procedures that should be used to process, compile, analyze, and transmit laboratory analytical data reliably and accurately. The SOP does not specifically describe (or reference documentation) on how laboratory data will be formatted and entered or prepared for upload into the project database. The SOP describes (or references) documentation for using SWAMP's standardized list of analytes and these protocols will be followed so that SWAMP comparable data will be produced. Our SOP and/or referenced documents describe how we will manage data involving analysis of chemicals.

GROUP C: ASSESSMENT AND OVERSIGHT

20. ASSESSMENTS & RESPONSE ACTIONS

Field Activity Audits

Ray Hiemstra will be responsible for reviewing all field activity audits after each sampling event. Any problems that are noted will be documented by him along with recommendations for correcting the problem. Ray Hiemstra has authority to stop any sampling or field measurement activity that could potentially compromise data quality.

Post Sampling Event Reviews

Ray Hiemstra will be responsible for post sampling event reviews. Any problems that are noted will be documented along with recommendations for correcting the problem. All test results will be reviewed and documented. All results will be documented by Ray Hiemstra.

Laboratory Data Reviews

Jonathan Bousselaire will be responsible for reviewing the laboratory' s data for completeness and accuracy. The data will also be checked after each laboratory test to make sure that the specified methods were used and that all related QC data was provided with the sample analytical results. Jonathan Bousselaire will document and correct any laboratory issue.

21. REPORTS TO MANAGEMENT

Ray Hiemstra of Orange County Coastkeeper will be responsible for developing the QAPP. Mr. Hiemstra will also be responsible for Annual Reports which will be provided September of each year and a final report which will be provided September 2014 to Recyclers Water Quality Standards Committee. This information is additionally summarized in the following Table.

Table 10 Quality Assurance Management Reports

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Dates(s)	Person(s) Responsible for Report Preparation	Report Recipients
Annual Report	Annually	September 2014	Ray Hiemstra	Regional Board
QAPP	Once	Before monitoring begins	Ray Hiemstra	Regional Board Water monitors, participating yards, and vendors
Contract Lab Reports	Four times per year	October through May	Jonathan Bousselaire	Orange County Coastkeeper
Project Final Report	Once	October 2015	Ray Hiemstra	Regional Board

GROUP D: DATA VALIDATION AND USABILITY

22. Data Review, Verification, and Validation Requirements

Defining data review, verification, and validation procedures helps to ensure that project data will be reviewed in an objective and consistent manner. Data review is the in-house examination to ensure that the data have been recorded, transmitted, and processed correctly. Nicole McClain will be responsible for data review. This includes checking that all technical criteria have been met, documenting any problems that are observed and, if possible, ensuring that deficiencies noted in the data are corrected.

In-house examination of the data produced from the proposed project will be conducted to check for typical types of errors. This includes checking to make sure that the data have been recorded, transmitted, and processed correctly. The kinds of checks that will be made will include checking for data entry errors, transcription errors, transformation errors, calculation errors, and errors of data omission.

Data generated by project activities will be reviewed against method quality objectives (MQOs) that were developed and documented in Element 7. This will ensure that the data will be of acceptable quality and that it will be SWAMP-comparable with respect to minimum expected MQOs.

QA/QC requirements were developed and documented in Elements 14, 15, 16, and 17 and the data will be checked against this information. Checks will include evaluation of field and laboratory duplicate results, field and laboratory blank data, matrix spike recovery data, and laboratory control sample data pertinent to each method and analytical data set. This will ensure that the data will be SWAMP-comparable with respect to quality assurance and quality control procedures.

Field data consists of all information obtained during sample collection and field measurements, including that documented in field log books and/or recording equipment, photographs, and chain of custody forms. Checks of field data will be made after each sampling session. Lab data consists of all information obtained during sample analysis. Initial review of laboratory data will be performed by the laboratory QA/QC Officer in accordance with the lab's internal data review procedures. However, once we receive the lab data then we will perform independent checks to ensure that it is complete, consistent, and meets the data management requirements that were developed and documented in Element 19. This review will include evaluation of field and laboratory QC data and also making sure that the data are reported in compliance with procedures developed and documented in Elements 12, 13, and 14.

Data verification is the process of evaluating the completeness, correctness, and conformance / compliance of a specific data set against the method, and procedural specifications. We will conduct data verification, as described in Element 14 on Quality Control, in order to ensure that it is SWAMP-comparable with respect to completeness, correctness, and conformance with minimum requirements. Nicole McClain will be responsible for data verification.

Data validation is an analyte- and sample-specific process that evaluates the information after the verification process (i.e., determination of method, procedural, or contractual compliance) to determine analytical quality and any limitations. We will conduct data validation in order to ensure that the data is SWAMP-comparable with respect to its end use as described in Element 5.2 (Decisions or Outcomes). Nicole McClain will be responsible for data validation.

Data will be separated into three categories for use with making decisions based upon it. These categories are: (1) data that meets all acceptance requirements, (2) data that has been determined to be unacceptable for use and (3) data that may be conditionally used and that is flagged as per US EPA specifications.

23. VERIFICATION AND VALIDATION METHODS

Defining the methods for data verification and validation helps to ensure that project data are evaluated objectively and consistently. Information on these methods is provided below.

All data records for the proposed project will be checked visually and will be recorded as checked by the checker's initials as well as with the dates on which the records were checked. Nicole McClain will conduct all of these reviews. Nicole McClain will perform an independent re-check of at least 10% of these records as the validation methodology.

All of the laboratory's data will be checked as part of the verification methodology process. Nicole McClain will conduct reviews of all laboratory data for verification of their accuracy. Nicole McClain will perform independent re-checks of at least 10% of them as the validation methodology.

Any data that is discovered to be incorrect or missing during the verification or validation process will immediately be reported to the Project Director. If errors involve laboratory data then this information will also be reported to the laboratory's QA officer. The laboratory's QA manual details the procedures that will be followed by laboratory personnel to correct any invalid or missing data. Nicole McClain will be responsible for reporting and correcting any errors that are found in the data during the verification and validation process.

If there are any data quality problems we will try to identify whether the problem is a result of project design issues, sampling issues, analytical methodology issues, or QA/QC issues (from laboratory or non-laboratory sources). If the source of the problems can be traced to one or more of these basic activities then the person or people in charge of the areas where the issues lie will be contacted and efforts will be made to immediately resolve the problem. If the issues are too broad or severe to be easily corrected then the appropriate people involved will be assembled to discuss and try to resolve the issue(s) as a group. Ray Hiemstra has the final authority to resolve any issues that may be identified during the verification and validation process.

24. RECONCILIATION WITH USER REQUIREMENTS

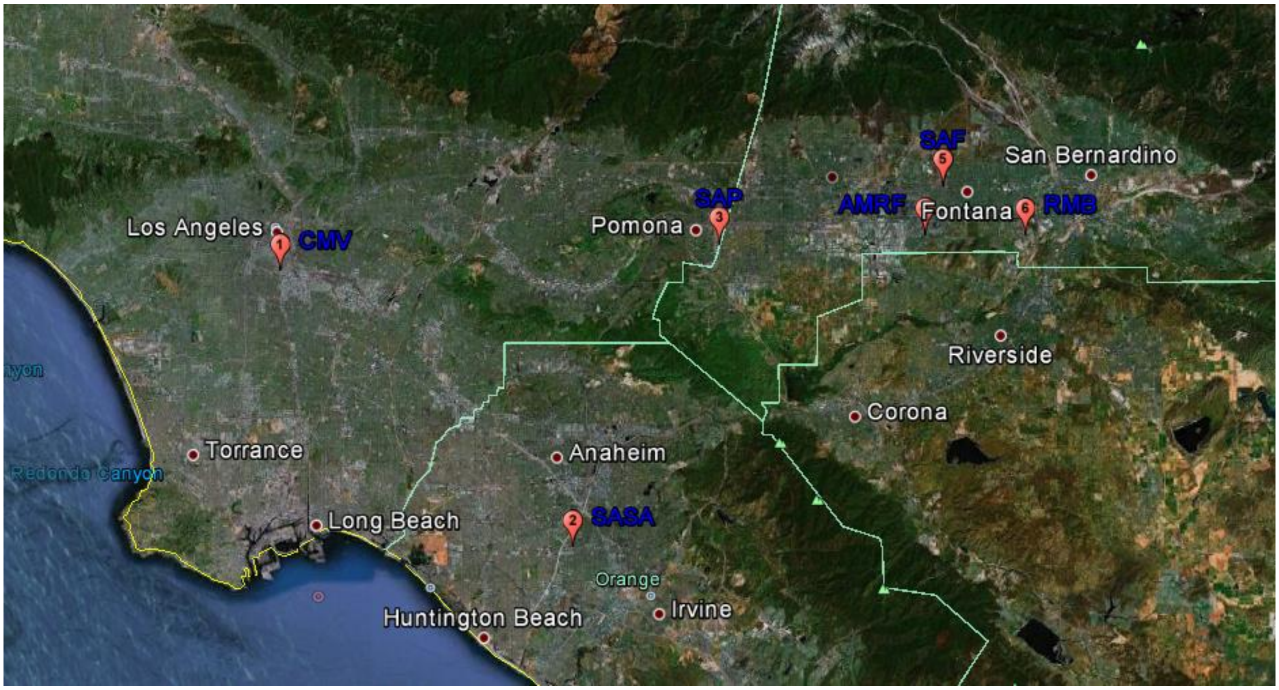
The purpose of this project is to collect water quality data on the concentrations of target criteria that can be obtained through the implementation of water volume and pollutant reduction BMPs followed by filtration using four proprietary stormwater water advanced filtration systems in order to create a new numeric standard for recycling yard runoff.

Information from field data reports (including field activities, post sampling events, corrective actions, and audits), laboratory data reviews (including errors involving data entry, transcriptions, omissions, and calculations and laboratory audit reports), reviews of data versus Measurement Quality Objectives (MQOs), reviews against Quality Assurance and Quality Control (QA/QC) requirements, data verification reports, data validation reports, independent data checking reports, and error handling reports will be used to determine whether or not the project's objectives have been met. The above evaluations will provide a comprehensive assessment of how well the project meets its objectives. No other evaluations will be used.

Data from all monitoring measurements will be summarized in tables. In addition, data that show significant changes over time during the monitoring period will be plotted in graphs and charts. The proposed project will provide SWAMP-comparable data for the selected analytes described in Element 6.

Nicole McClain will be responsible for reporting project reconciliation. This will include measurements of how well the project objectives were met and the degree to which the data is SWAMP-comparable.

Figure 2. Aerial Map of Metal Recycling Yards with Proposed Sampling Locations



CMV- Central Metal, Vernon	SASA- SA, Santa Ana	SAP- SA, Pomona
AMRF- American Metal Recycler, Fontana	SAF- SA, Fontana	RMB- Ruby Metals, Bloomington

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APPENDIX A

LIST OF ALL EQUIPMENT AND FIELD INSTRUMENTS

	Quantity on Hand	Quantity Needed
distilled/DI water		1 gal/day
paper towels		2 rolls per day
sample jars		2
sample labels		2
clear tape/adhesive strips		1
addresses/phone numbers		1
sharpies		5
permanent ball point pens		4
Coolers		1
cooler labels		1
Scissors		1
Ice		8 pounds
COC forms		1
Field data sheet		2
SOPs		1
QAPP		1
hard hat		1 per person
safety glasses		1 per person
steel-toed boots		1 per person
foul weather gear		1 per person
Powder free latex gloves		1 box
first aid kit		1
Sunscreen		1
trash bags		2

APPENDIX B

TEST AMERICA SAMPLING ANALYSIS METHOD

During this project Test America will perform tests in accordance with both EPA and Standard Methods for the Examination of Water and Wastewater. EPA Method 1664A will be utilized during oil and grease tests while EPA Method 200.8 will be used during the testing of metals. While conducting the COD tests, Test America will follow Standard Methods (SM) 5220D. SM 2540D will be used during the solids and TSS testing and SM 2340C will be utilized during the hardness tests. For more information about the EPA testing methods please visit the website for the EPA listed below. For more information regarding the Standard Methods for the Examination of Water and Wastewater please review Edition 21 or the Standard Method website listed below.

http://water.epa.gov/scitech/swguidance/methods/
http://www.standardmethods.org/

APPENDIX C

TEST AMERICA IRVINE QUALITY ASSURANCE MANUAL

Please see the attached document or pdf file for Test America Irvine's Quality Assurance Manual.

APPENDIX D

SAMPLE COLLECTION TECHNIQUES FROM THE METAL RECYCLERS WATER QUALITY STANDARDS COMMITTEE TRAINING MANUAL

GENERAL

What will be analyzed in water samples must be considered carefully before going into the field and, like everything else, depends on the objectives. This early consideration is needed because the proper container cleaned in the designated way must be obtained to ensure a valid sample.

Metal Recycling Industry Monitoring Program

- TSS
- Metals—total recoverable Cu, Pb, Zn, Al, Fe; dissolved Cu, Pb, Zn
- Total hardness
- COD
- Oil and grease
- Continuous flow recording

PREPARING FOR SAMPLE COLLECTION

A good, helpful laboratory is your best friend in this task, saving you a lot of work and making sure that you are properly equipped to take valid samples, in return for the business. Always use a state-certified lab in which you have confidence through experience or trusted recommendations. When preparing for sampling, ask the lab to provide the proper sample containers for the analyses they will perform and, of crucial importance, to clean those containers as designated in EPA and American Public Health Association ("Standard Methods") procedures to avoid contamination that will invalidate the sample. Cleaning bottles for many purposes requires specified acid-washing procedures and other safeguards that are beyond your own capability. Obtain one or more coolers that will be adequate in size to transport all samples on ice after collection until they reach the lab.

A single container can typically be used to hold samples that will be analyzed for several variables with compatible preservatives. The laboratory will provide the necessary containers for the analyses to be performed in this program.

Oil and grease samples must be collected in a glass container that will be used in the first steps of the lab analysis, to prevent loss of petroleum in pouring from one container to another.

Preparations should also consider what is called quality assurance/quality control (QA/QC), covered in detail below. At the preparation stage it is necessary to pick up extra containers for field replicates and field blanks. A field replicate is a repeated sample taken at exactly the same spot, in exactly the same way, and immediately after the primary sample. The general rule is to select randomly 5-10 percent of samples for field replication. The random selection can be made by assigning each sampling location and occasion an identifying number and then using a random number generator on a calculator to pick the 5-10 percent to be replicated. A field blank is simply a container of distilled water that is carried into the field and returned to the laboratory without disturbance. Its purpose is to indicate if transport has introduced contamination to samples. The field blank should be part of the lab's standard QA/QC procedures for pathogen samples and sometimes for nutrient work.

GETTING STARTED IN THE FIELD

OBSERVATIONS AND RECORDS

Sampling begins by looking around the monitoring location and making observations. Always keep careful field notes, even on the most routine matters. Sometimes, making systematic visual observations is a task toward fulfilling the objectives.

Anytime samples are taken, the sample collector should record in a field book any of the following information that is appropriate:

- Date;
- Time of sample collection or visit;
- Name(s) of sampling personnel;
- Weather and flow conditions preceding and during visit;
- Number and type of samples collected;
- Calibration results for field instrumentation;
- Field measurements;
- Log of photographs taken;
- Comments on the working condition of the sampling equipment;
- Deviations from sampling procedures; and
- Unusual conditions (e.g., water color or turbidity, presence of oil sheen, odors, and land disturbances).

HOW TO TAKE SAMPLES

GENERAL TYPES OF SAMPLES

Water can be collected either as grab samples or composite samples. Grab samples are collected at a discrete point in time and space. Composite samples are made by combining a number of samples taken at different locations and/or different times. Which type of sample is taken again depends on the objectives. Grab samples will probably be more common in Coastkeeper programs. If flow variation is not an issue (e.g., flow rate is controlled by a pump), composites can be made up of a series of grab samples combined in equal volumes.

In varying flows, flow-proportional composite samples (made up of individual samples combined in relation to flow) are more representative of average water conditions than grab samples or samples taken at certain time intervals and composited without regard to flow. However, flow proportioning cannot be done accurately without good flow measurement equipment. This type of monitoring is usually done with automatic flow meters and samplers linked electronically to accomplish flow proportioning.

<u>Metal Recycling Industry Monitoring Program</u>

- "First-flush" sample—one grab sample from the first 30 minutes of flow, preferably, or otherwise the earliest point possible

- Time-proportional composite

  Examples—

2. If 20 samples are collected at absolutely regular 15-minute intervals, make the total composite sample volume up from equal amounts of each individual sample.

3. If 10 samples are collected at 15-minute intervals and 10 are collected at 30-minute intervals, make the total composite sample volume up from one measure of the 15-minute sample volumes and double measures of the 30-minute sample volumes.

4. If 8 samples are collected at 15-minute intervals and 8 are collected at 30-minute intervals and 4 are collected at 40-minute intervals, make the total composite sample volume up as follows:

   Total volume = (8 * 15-minute sample volumes) + (8 * [30/15] * 30-minute sample volumes) + (4 * [40/15] * 40-minute sample volumes)

HOW MUCH SAMPLE TO PROVIDE TO THE LABORATORY

Minimum quantities for performing one analysis for the variables to be analyzed in this program are:

- TSS—1 L
- Metals—10 mL for each form (total recoverable and dissolved) of each metal
- Total hardness—75 mL
- COD—50 mL

- Oil and grease—1 L

The best rule is to collect at least 2.5 times the recommended sample volumes to allow for rinsing instrument sensors and possible repeated analyses. Repeated analyses may be needed for analyzing laboratory replicates and for reanalyzing samples when QA/QC criteria are not met (see below).

SPECIAL CONSIDERATION FOR METALS SAMPLING

The technique for collecting metals samples recommended by EPA uses two sampling personnel, one called "clean hands" and the other "dirty hands". Dirty hands deals with the equipment that will not touch the sample, while clean hands works closely with the sampling apparatus. See Appendix B for an outline of the procedure.

HOW TO HANDLE SAMPLES

LABELING

To avoid mistakes, it is imperative to label a sample bottle with an indelible marker at or before the time of collection. It is most efficient to prepare and attach labels before going into the field. The laboratory may agree to make preprinted labels for a continuing monitoring program. Sample labels must include station designation, date, time, collector's name, and any preservative added. The analyses to be performed and any pertinent remarks may also be recorded on the label.

PRESERVATION

Appendix A lists preservatives for common analyses. Other than placing on ice, most preservation is done with acid addition, nitric acid for metals. Ask the laboratory to supply dropper bottles with acids and to advise on the number of drops to add for the sample size to drop pH below 2.

<u>Holding Times</u>

The holding times given in Appendix A are total times allowed until the analysis is complete.

CUSTODY TRANSFER

It is recommended that a sample tracking record be kept for each sample. This record registers possession of a sample as it travels from collection through analysis, which may allow misplaced samples to be found more readily. It is most common to use chain-of-custody records such as the example in Appendix C.

Demonstration of Sample Collection Using Clean Hands/Dirty Hands Technique

Preliminary Preparation

- Laboratory cleans fluoropolymer sample collection bottles and double bags them in zip type bags.
- Sample collectors clean and bag sampling equipment.
- Sample collectors prepare sampling packages.

Sampling Packages

- Designated clean cooler(s) containing:
    - Cleaned and bagged sample tubing
    - Zip bags with dust masks and non-talc Class 10 clean gloves
    - Plastic sheet for ground cover
    - Sample bottles (from laboratory)
    - Tyvek suits- (optional)
- Peristaltic pump with easy load head. Extension cord, if necessary.
- Waste bucket.
- Sample storage cooler.
- Carboy with DI water for Field Reagent Blank, if necessary.

Site Preparation

- Upon arrival at the sampling site, the sample collectors unload equipment and prepare for sample collection.
- Anything covering the sample site, such as a grate or manhole, is removed and set aside.
- Plastic is laid out for ground cover, with coolers on the ends to secure.
- Set up peristaltic pump.
- Clean Hands (CH) and Dirty Hands (DH) sample collectors get into position.
- CH and DH wait ten minutes before beginning sample collection to allow the sampling environment to stabilize.

Sample Collection

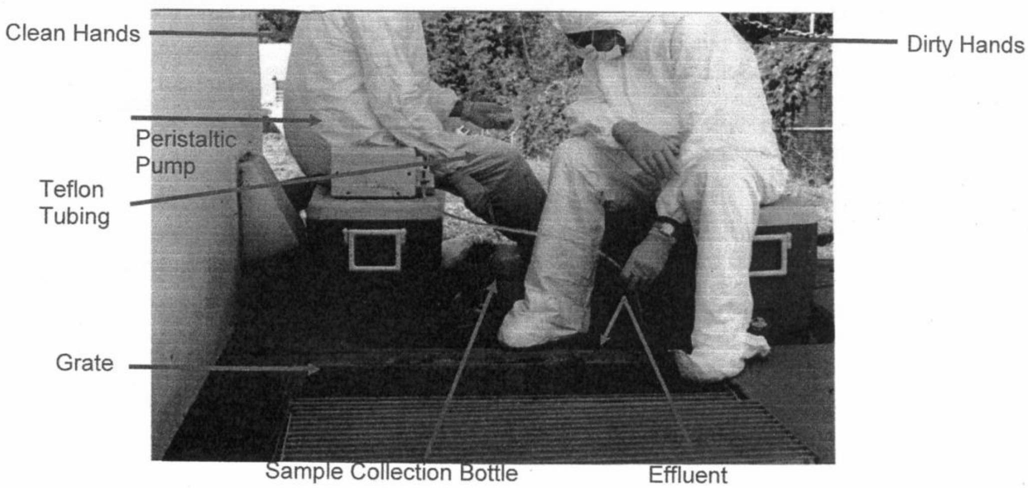
A. Field Reagent Blank

1. DH opens the cooler and removes plastic bags containing gloves and masks.
2. CH and DH put on dust masks first and then gloves.
3. DH removes the lid from the carboy containing DI water for the FRB.
4. DH removes the bag containing the sample tubing from the cooler.
5. DH opens the bag.
6. CH removes the tubing and does not allow the tubing to touch anything.
7. CH removes the protective covering from the inlet side of the tubing.
8. CH lowers the weighted end of the tubing into the carboy.
9. Once the inlet end of the tubing enters the carboy, DH holds the tubing.
10. DH inserts the flexible portion of the tubing into the peristaltic pump, while CH holds the discharge end of the tubing, protecting it from contamination.

11. CH removes the protective covering from the discharge end of the tubing and holds it over the purge container.
12. CH tells DH to turn the pump on.
13. CH holds the sample line over a purge container while purging for a minimum of five minutes.
14. After purging, CH tells DH to turn the pump off.
15. DH opens the cooler containing the double-bagged sample bottle.
16. DH opens the outside bag and does not touch the inside bag.
17. CH removes the inside bag (containing the sample bottle).
18. CH opens the bag and sample bottle.
19. CH holds the discharge end of the tubing over the sample bottle and tells DH to turn the pump on.
20. Once the sample bottle is filled, CH tells DH to turn the pump off.
21. CH tightly caps the sample bottle and reseals it in the inside plastic bag.
22. DH holds the outside bag open and CH places the inside bag, with the sample, into it.
23. DH reseals the outside bag.
24. The sample is then placed into the storage cooler.

B. Sample Collection

1. CH removes the inlet end of the tubing from the carboy of DI water and places it into the sample location.
2. DH holds the tubing and makes sure that the inlet end and sides of the tubing do not contact anything.
3. Sampling proceeds as in A12 – A24 above.
4. Sampling site is cleaned and the sample is transported to the lab.



Specific Conductance and pH SOP

Specific conductance and pH should be recorded for each visit in final form on the Field Data Sheet.

pH and Specific Conductance Sampling Equipment

< pH and Conductivity meter, calibrated according to the Recommended Procedures for Calibration and Maintenance

pH and Specific Conductance Sampling Procedure

Preferably, pH and specific conductance is measured directly in-stream at the depth(s) specified in Field Measurements on prior pages. Since this is not possible for this project we will measure these variables from a subsample of the composite sample created for lab analysis. 100 ml of the composite sample will be poured into a container where the measurements will be taken. Allow the pH conductivity probe to equilibrate for at least one minute before measurements are recorded.

Calibration Procedure for Conductivity Meter (Oakton Conductivity Meter Manual)

The conductivity meter should be calibrated before each sampling day within twenty four hours of use. Calibrate the meter by submerging the tip in a standard solution similar to what you will encounter in the field and adjusting the reading using the up or down buttons under the meter battery cap until it reads the same as the standard solution

Calibration Procedure for pH Meter (Oakton pH Meter Manual)

The conductivity meter should be calibrated before each sampling day within twenty-four hours of use. Calibrate the meter by submerging the tip in a standard solution and press the CAL button to enter calibration mode. The CAL indicator will be shown. Allow about two minutes for the tester reading to stabilize before pressing the HOLD/ENT to confirm the first calibration point. Repeat with other buffers if necessary.

APPENDIX E

PROJECT FORMS

Chain of Custody Record & Laboratory Analysis Request	_Orange County Coastkeeper_ _441 Old Newport Blvd. Suite 103_ _Newport Beach Ca. 92663_ _Office (949)723-5424_ _Fax (949) 675-7091_

Turnaround Requested:

Coastkeeper Contact: **_Page ___ of ____ _**

Lab Contact:		_Project:_			_Analyses Requested_										**_Notes/ Comments:_**
Lab:															
Address:		_Proj. No.:_													
City, etc: :		_Sampler:_													
Phone:		_Shipping Method:_													
Fax:		_AirBill #:_													
Sample ID	_Sample Date_	_Sample Time_	_Sample Matrix_	_Number Con- Tainers_											

Relinquished: (Signature)	*Relinquished: (Signature)*	*Relinquished: (Signature)*	*Special Instructions/Notes*	
Printed Name:	*Printed Name:*	*Printed Name:*		
Company:	*Company:*	*Company:*		
Date/Time:	*Date/Time:*	*Date/Time:*		
Received By:	*Received By:*	*Received By:*		
Printed Name:	*Printed Name:*	*Printed Name:*		
Company:	*Company:*	*Company:*	*# of Coolers*	*Cooler Temp(s*
Date/Time:	*Date/Time:*	*Date/Time:*	*COC Seals Intact?*	*Bottles Intact?*

Firm	***Contact***	***Title***	***Telephone***	***Facsimile***	***E-mail***
Orange County Coastkeeper					
SAMPLING AND MONITORING TEAM					
LABORATORIES					
MAINTANCE SHOPS AND EQUIPMENT DEALERS					

ORANGE COUNTY COASTKEEPER

Sample Collection Form

Testing Location: ____________ Date: ____________

Project Name ____________ GPS Coordinates ____________

Arrival Time: ____________ Estimated Pump Time: ____________

Conductivity Test Results: Inlet: ____________ pH Test Results: Inlet: ____________

Outlet: ____________ Outlet: ____________

Equipment Identification #: ____________ Equipment Identification #: ____________

Sample Collection Log

Sample #	Time:	Flow:	Volume:
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			

Rainfall Characteristics

	Time:
Rain event start time:	
Rain event end time:	
Pump start time:	
Pump Shutoff time:	
Total sample collection time:	

Backflush

	Start time:	End time:
1		
2		
3		
4		
5		
6		

Comments:

Recorded By: ____________

440-38955

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0911)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
6000 S. Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

Page ____ of ____

Client Name/Address: OC Coastkeeper, 3151 Airway Ave B110, Costa Mesa, CA

Project/PO Number: Scrapyard Runoff Treatment

Project Manager: Ray Hiemstra

Phone Number: 714 850 1965

Sampler:

Fax Number:

Analysis Required

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	1664-Oil &Grease	COD-SM5220D	TSS-2540D	Hardness-SM2340C	TOTAL Metals 200/8: Cu, Pb, Zn, Fe, Al	Diss Metals 200/8: Cu, Pb, Zn, Fe, Al				Special Instructions
SA FONTANA	water	oil/grease	1	2/20	11:30	yes	X									J Flag all
SA FONTANA	water	oil/grease	1	2/20	11:30	yes	X									
SA FONTANA INLET	water	COMP	1	2/20				X	X	X	X	X				
SA FONTANA OUTLET	WATER	COMP	1	2/20				X	X	X	X	X				

Relinquished By:	Date/Time:	Received By:	Date/Time:
BRITTANY MORETTINI	2/20/13 2:56	[signature]	2/20/13 256
Relinquished By: [signature]	2/20/13 4:35	Received By: [signature]	2/20/13 4:15
Relinquished By: [signature]	2/20/13 4:50	Received in Lab By: [signature]	2-20-13 1650

Turnaround Time: (Check)
same day ____ 72 hours ____
24 hours ____ 5 days ____
48 hours ____ normal ____

Sample Integrity: (Check)
intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

4.5°C

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
Tel: (949) 261-1022 / Fax: (949) 260-3297

440-38751

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Ray Hiemstra	Site Contact:	Date:
OC Coastkeeper	Tel/Fax:	Lab Contact: Debby Wilson	Carrier:
3151 Airway Ave. F110	Analysis Turnaround Time		
Costa Mesa, CA 92626	Work Days (W) ____		
(714) 850-1965 Phone	TAT if different from Below ______		
(714) 850-1592 FAX	☐ Standard		
Project Name: Scrapyard	☐ 5 days		
Site:	☐ 2 days		
P.O.#:	☐ 1 day		

COC No: ____ of ____ COCs
Job No.
SDG No.

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	1664-Oil and Grease	COD-SM5220D	TSS-2540D	Hardness-SM2340C	Total Metals 200/8: Cu, Pb, Zn, Al, Fe	Diss Metals 200.8: Cu, Pb, Zn, Al, Fe	Sample Specific Notes:
SA Pomona Inlet	2/20		Comp	Water	1			x	x	x	x	x	
SA Pomona Outlet	2/20		Comp	Water	1			x	x	x	x	x	Flag all J-Flags
SA Pomona Inlet Oil + Grease	2/20		Single	Water	1		x						
SA Pomona Outlet Oil + Grease	2/20		Single	Water	1		x						

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Special Instructions/QC Requirements & Comments: Lab to split, filter and preserve the 1 galon poly for: COD, TSS, hardness, total metals and dissolved metals

Relinquished by: [signature]	Company: OCCK	Date/Time: 2pm 2/20/15	Received by: Danny Lu	Company: OCCK	Date/Time: 2/20/13 ~pm
Relinquished by: [signature]	Company: OCCK	Date/Time: 2/20/13 4:55	Received by: [signature]	Company: TA I	Date/Time: 2-20-13 1655
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

6.3°c

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
Tel: (949) 261-1022 / Fax: (949) 260-3297

Chain of Custody Record

440-38749

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Ray Hiemstra	Site Contact:	Date:
OC Coastkeeper	Tel/Fax:	Lab Contact: Debby Wilson	Carrier:
3151 Airway Ave. F110	Analysis Turnaround Time		
Costa Mesa, CA 92626	Work Days (W) ___		
(714) 850-1965 Phone	TAT if different from Below ______		
(714) 850-1592 FAX	☐ Standard		
Project Name: Scrapyard	☐ 5 days		
Site:	☐ 2 days		
P.O.#:	☐ 1 day		

COC No: ____ of ____ COCs
Job No.
SDG No.

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	1664-Oil and Grease	COD-SM5220D	TSS-2540D	Hardness-SM2340C	Total Metals 200/8: Cu, Pb, Zn, Al, Fe	Diss Metals 200.8: Cu, Pb, Zn, Al, Fe	Sample Specific Notes:
Ruby Inlet	2/20		Comp	Water	1			X	X	X	X	X	
Ruby Outlet	2/20		Comp	Water	1			X	X	X	X	X	
Ruby Inlet oil & grease	2/20	7:35	oil & gr	water	1		X						with preservatives
Ruby Outlet oil & grease	2/20	7:50	oil & gr	water	1		X						— " —
													Flag all J-Flag

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months

Special Instructions/QC Requirements & Comments: Lab to split, filter and preserve the 1 galon poly for: COD, TSS, hardness, total metals and dissolved metals

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Stephen Tso / Robert Carroll	OCCK	2/20	[signature]	OCCK	2/20 11:51
[signature]	OCCK	2/20 4:15	[signature]	OCCK	2/20 9:15
[signature]	OCCK	2/20 0:54	[signature]	TAI	2-20-13 16:52

5.5

440-38946

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
6000 S. Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

TAL-0013 (0911)

Page ______ of ______

Client Name/Address: OC Coastkeeper, 3151 Airway Ave P110, Costa Mesa

Project/PO Number: Scrapyard Treatment Runoff

Project Manager: Ray Hiemstra

Phone Number: 714 850 1965

Sampler:

Fax Number:

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	1664 - Oil & grease	COD SM5220D	TSS 2540D	Hardness SM2340C	Total Metals Cu, Pb, Zn, Al, Fe	Diss Metals Cu, Pb, Zn, Al, Fe				Special Instructions
AMR	water	comp	1	2/20/13				X	X	X	X	X				
AMR	water	comp	1	2/20/13				X	X	X	X	X				
AMR Inlet oil & grease	water	oil & grease	1	2/20/13	8:40am	yes	X									
AMR Outlet oil & grease	water	oil & grease	1	2/20/13	8:40am	yes	X									Flag all J Flag

Relinquished By:	Date/Time:	Received By:	Date/Time:
Matt T	2/20/13 2:50pm	[signature]	2/20/13
[signature]	2/20 4:15	[signature]	2/20/13 4:15
[signature]	2/20 4:52	Received in Lab By: [signature]	2-20-13 1652

Turnaround Time: (Check)
same day ______ 72 hours ______
24 hours ______ 5 days ______
48 hours ______ normal ✓

Sample Integrity: (Check)
intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

5.9 °C

ER 3/3/14

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0513)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

Page ____ of ____

Client Name/Address: Orange County Coastkeeper, 3151 Airway Ave F-110, Costa Mesa, CA 92626

Project/PO Number: Metal Recyclers

Project Manager: Ray Hiemstra

Phone Number: 714-850-1965

Sampler: Daniel Lee / Elaina Hurst.

Fax Number: 714-850-1592

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total HARDNESS	TSS	COD	Total by US EPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by US EPA 200.8 Cu, Pb, Zn	oil + grease				Special Instructions
SAF	Water	Amber	1	2/28/14	8:20am	HCL						✓				
SAF	Water	Amber	1	2/28/14	8:20am	HCL						✓				
SAF	Water	Amber	1	2/28/14	3:48pm	none	✓	✓	✓	✓	✓					Report
SAF	Water	Amber	1	2/28/14	3:48pm	none	✓	✓	✓	✓	✓					
																ALL
					rk 3-3-14											J-Flags

440-71753 Chain of Custody

Relinquished By:	Date/Time:	Received By:	Date/Time:
Daniel Lee	2/28/14 ~~7:00am~~ 4:00pm	Austin Brown	2/28/14 4:00PM.
Relinquished By: Austin Brown	2/28/14	Received By:	Date/Time:
Relinquished By: [signature]	3/1/14 1:50pm	Received in Lab By: [signature]	3/1/14 1350

Turnaround Time: (Check)
same day ____ 72 hours ____
24 hours ____ 5 days ____
48 hours ____ normal X

Sample Integrity: (Check)
intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3-3/2-7 2-6/1-4 -4/2022 3-3/11 2-1/0-9 3-1/1-9 3-1/1-9 (68)

440-71766 Chain of Custody

ENVIRONMENTAL TESTING

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

3/3/14

TAL-0013 (0513)

Page ______ of ______

Client Name/Address:	Project/PO Number:
ORANGE COUNTY COASTKEEPER, 3151 AIRWAY AVE. F-110, COSTA MESA, CA 92626	METAL RECYCLERS
Project Manager: RAY HIEMSTRA	Phone Number: 714-850-1965
Sampler: Danny Gambino, Aaron Johnson	Fax Number: 714-850-1592

Analysis Required

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	TOTAL HARDNESS	TSS	COD	TOTAL by US EPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by US EPA 200.8 Cu, Pb, Zn	Oil & grease				Special Instructions
SAP	water	Amber	1	2/28/14	12:45pm	HCL						✓				
SAP	water	Amber	1	2/28/14	12:45pm	HCL						✓				Report
SAP	water	Amber	1	2/28/14	3:55pm	none	✓	✓	✓	✓	✓					
SAP	water	Amber	1	2/28/14	3:55pm	none	✓	✓	✓	✓	✓					All
																J-
																FLAGS

RE 3-3-14

Relinquished By:	Date/Time:	Received By:	Date/Time:	Turnaround Time: (Check)
[signature]	3/01/14 1:50pm			same day ____ 72 hours ____
Relinquished By:	Date/Time:	Received By:	Date/Time:	24 hours ____ 5 days ____ 48 hours ____ normal X
Relinquished By:	Date/Time:	Received in Lab By: [signature]	Date/Time: 3/1/14 1350	Sample Integrity: (Check) intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3.3/2.7 3.4/2.2 2.1/0.9 3.1/1.9
2.6/1.4 3.3/1.1 3.1/1.9

(63)

CO 3/3/14

440-71769 Chain of Custody

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

TAL-0013 (0513)

Page ____ of ____

Client Name / Address: Orange County Coastkeeper, 3151 Airway Ave. Suite F-110, Costa Mesa, CA 92626

Project/PO Number: Metal Recyclers

Project Manager: Ray Hiemstra

Phone Number: 714-850-1965

Sampler: Russell, Michele

Fax Number: 714-850-1592

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total Hardness	TSS	COD	Total by US EPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by US EPA 200.8 Cu, Pb, Zn	Oil & grease			Special Instructions
AMRF	Water	Amber	1	2/28/14	8:00am	HCL						✓			
AMRF	Water	Amber	1	2/28/14	8:00am	HCL						✓			
AMRF	Water	Amber	1	2/28/14	4:00pm	none	✓	✓	✓	✓	✓				
AMRF	Water	Amber	1	2/28/14	4:00pm	none	✓	✓	✓	✓	✓				Report
															All
															J-Flags

Relinquished By: Nicole McClain	Date/Time: 3/1/14 1:50pm	Received By:	Date/Time:	Turnaround Time: (Check) same day ___ 24 hours ___ 48 hours ___	72 hours ___ 5 days ___ normal X
Relinquished By:	Date/Time:	Received By:	Date/Time:		
Relinquished By:	Date/Time:	Received in Lab By: [signature]	Date/Time: 3/1/14 13:50	Sample Integrity: (Check) intact ✓	on ice —

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3-3/2.1 2-3/1.1 3.1/1-9 (63)
2-6/1-4 2-1/0-9
3-4/2.2 3.1/1-9

CO 3/3/14

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0513)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

Page ____ of ____

Client Name / Address: orange county Coastkeeper, 3151 Airway Ave., Suite F-110, Costa Mesa, CA 92626	Project / PO Number: Metal Recyclers
Project Manager: Ray Hiemstra	Phone Number: 714-850-1965
Sampler: Nicole LaFace, Babs McCoy	Fax Number: 714-850-1592

Analysis Required

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total HARDNESS	Total by US EPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by US EPA 200.8 Cu, Pb, Zn	oil & grease	COD					Special Instructions
RMB	water	Amber	1	2/28/14	9:05am	HCL				✓						
RMB	water	Amber	1	2/28/14	9:05am	HCL				✓						
RMB	water	Amber	1	2/28/14	3:25pm	none	✓	✓	✓		✓					
RMB	water	Amber	1	2/28/14	3:25pm	none	✓	✓	✓		✓					Report
																All
			rk 3-3-14													J-Flags

440-71759 Chain of Custody

Relinquished By: [signature]	Date / Time: 3/1/14 1:50pm	Received By:	Date / Time:	Turnaround Time: (Check) same day ____ 72 hours ____
Relinquished By:	Date / Time:	Received By:	Date / Time:	24 hours ____ 5 days ____ 48 hours ____ normal X
Relinquished By:	Date / Time:	Received In Lab By: [signature]	Date / Time: 3/1/13 1330	Sample Integrity: (Check) Intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3.3/2.7 3.3/1.1 3-1/1.9
2-6/1.4 2-1/0.9 (6)
3-4/2.2 3-1/1.9

cw 3/3/14

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0513)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

Page ____ of ____

Client Name / Address: Orange County Coastkeeper, 3151 Airway Ave, Suite F-110, Costa Mesa, CA 92626

Project / PO Number: Metal Recyclers

Project Manager: Ray Hiemstra

Phone Number: 714-850-1965

Sampler: Forrest Brown, Alex Barnuelos

Fax Number: 714-850-1592

Analysis Required

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total Hardness	TSS	COD	Total by USEPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by USEPA 200.8 Cu, Pb, Zn	Oil & grease				Special Instructions
CMV	water	Amber	1	2/28/14	8:32am	HCL						✓				
CMV	water	Amber	1	2/28/14	8:44am	HCL						✓				
CMV	water	Amber	1	2/28/14	1:30pm	none	✓	✓	✓	✓	✓					Report
CMV	water	Amber	1	2/28/14	1:30pm	none	✓	✓	✓	✓	✓					ALL
																J-Flags
				ME 3-3-14												

440-71770 Chain of Custody

Relinquished By:	Date / Time:	Received By:	Date / Time:	
Nicole McClain	3/1/14 1:50pm			Turnaround Time: (Check) same day ___ 72 hours ___
Relinquished By:	Date / Time:	Received By:	Date / Time:	24 hours ___ 5 days ___ 48 hours ___ normal X
Relinquished By:	Date / Time:	Received in Lab By: [signature]	Date / Time: 3/1/14 1350	Sample Integrity: (Check) Intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3-3/2-1 3-3/1-1 3-1/1-9
2-6/1-4 2-1/0-9
3-4/2-2 3-1/1-4

63

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TAL-0013 (0513)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

Page ____ of ____

Client Name / Address: Orange County Coastkeeper, 3151 Airway Ave, Suite F-110, Costa Mesa, CA 92626

Project / PO Number: Metal Recyclers

Project Manager: Ray Hiemstra

Phone Number: 714-850-1965

Sampler: Forrest Brown, Alex Banuelos

Fax Number: 714-850-1592

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total Hardness	TSS	COD	Total by USEPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by USEPA 200.8 Cu, Pb, Zn	Oil & grease				Special Instructions
CMV	water	Amber	1	2/28/14	8:32am	HCL						✓				
CMV	water	Amber	1	2/28/14	8:44am	HCL						✓				
CMV	water	Amber	1	2/28/14	1:30pm	none	✓	✓	✓	✓	✓					Report
CMV	water	Amber	1	2/28/14	1:30pm	none	✓	✓	✓	✓	✓					
																ALL
																J-Flags
				ML												
				3-3-14												

440-71770 Chain of Custody

Relinquished By:	Date / Time:	Received By:	Date / Time:
Nicole McClain	3/1/14 1:50pm		
Relinquished By:	Date / Time:	Received By:	Date / Time:
Relinquished By:	Date / Time:	Received In Lab By:	Date / Time:
		[signature]	3/1/14 1350

Turnaround Time: (Check)
same day ____ 72 hours ____
24 hours ____ 5 days ____
48 hours ____ normal X

Sample Integrity: (Check)
Intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3.3/2.1 3-3/1.1 3-1/1.9
2-6/1.4 2-1/0.9
3-4/2.2 3-1/1.0

63

00 3/3/14

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0513)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

Page ______ of ______

Client Name/Address: Orange County Coastkeeper, 3151 Airway Ave. Suite F-110, Costa Mesa, CA 92626

Project/PO Number: Metal Recyclers

Project Manager: Ray Hiemstra

Phone Number: 714-850-1965

Sampler: Courtney James, Heath Walton

Fax Number: 714-850-1592

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total Hardness	TSS	COD	Total by US EPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by US EPA 200.8 Cu, Pb, Zn	Oil & grease				Special Instructions
SA-SA	water	Amber	1	2/28/14	8:50am	HCL						✓				
SA-SA	water	Amber	1	2/28/14	8:50am	HCL						✓				
SA-SA	water	Amber	1	2/28/14	12:53pm	none	✓	✓	✓	✓	✓					
SA-SA	water	Amber	1	2/28/14	12:53pm	none	✓	✓	✓	✓	✓					Report
																All
																J-Flags
		MK														
		3-5-14														

440-71767 Chain of Custody

Relinquished By:	Date/Time:	Received By:	Date/Time:	Turnaround Time: (Check)
Nicole McClain	3/1/14 1:50pm			same day ____ 72 hours ____
Relinquished By:	Date/Time:	Received By:	Date/Time:	24 hours ____ 5 days ____
				48 hours ____ normal X
Relinquished By:	Date/Time:	Received in Lab By:	Date/Time:	Sample Integrity: (Check)
		[signature]	3/1/14 1350	intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3-3/2.1 2-3/1.1 3.1/1-9
2-6/1-4 2-1/0-9
3-4/2-2 3-1/1-9
(68)

CO 3/3/14

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THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0513)

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297

Page ______ of ______

Client Name/Address: Orange County Coastkeeper, 3151 Airway Ave., Suite F-110, Costa Mesa, CA 92626

Project/PO Number: Metal Recyclers

Project Manager: Ray Hiemstra

Phone Number: 714-850-1965

Sampler: Courtney James, Heath Walton

Fax Number: 714-850-1592

Analysis Required

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	Total Hardness	TSS	COD	Total by US EPA 200.8 Cu, Pb, Zn, Al, Fe	Dissolved by US EPA 200.8 Cu, Pb, Zn	oil & grease				Special Instructions
SA-SA-DUP.	water	Amber	1	2/28/14	9:05am	HCL						✓				
SA-SA-DUP.	water	Amber	1	2/28/14	9:05am	HCL						✓				
SA-SA-DUP.	water	Amber	1	2/28/14	12:57pm	none	✓	✓	✓	✓	✓					
SA-SA-DUP.	water	Amber	1	2/28/14	12:57pm	none	✓	✓	✓	✓	✓					Report all J-Flags

440-71764 Chain of Custody

pk 3-3-14

Relinquished By:	Date/Time:	Received By:	Date/Time:	Turnaround Time: (Check)
Nicole McClain	3/1/14 1:50pm			same day ____ 72 hours ____
Relinquished By:	Date/Time:	Received By:	Date/Time:	24 hours ____ 5 days ____
				48 hours ____ normal X
Relinquished By:	Date/Time:	Received in Lab By:	Date/Time:	Sample Integrity: (Check)
		[signature]	3/1/14 1350	Intact ✓ on ice ✓

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3.3 / 2.1 2.1 / 0.9
2.6 / 1.4 3.1 / 1.9
3.4 / 2.2 3.1 / 1.9
2.3 / 1.1

63

440-40354

TestAmerica

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CHAIN OF CUSTODY FORM

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4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
6000 S. Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

TAL-0013 (0911)

Page ____ of ____

Client Name/Address: OC Coastkeeper, 3151 Airway Ave #110, Costa Mesa, CA 92626

Project/PO Number: Scrapyard Runoff treatment

Project Manager: Ray Hiemstra / Jonathan Bousselaire

Phone Number: (714) 850-1965

Fax Number: (714) 850-1592

Sampler:

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	1664 Oil & Grease	COD	TSS	Hardness	Total Metals Cu, Al, Pb, and Zn	Diss. Metals Cu, Pb, and Zn				Special Instructions
AMR Inlet	Water	Amber 4L	1	3/8/13	8am–2:20pm	None		x	x	x	x	x				Flag All J-Flags
AMR Outlet	Water	Amber 4L	1	3/8/13	8am–2:30pm	None		x	x	x	x	x				
AMR Inlet Oil & Grease	Water	Amber 1L	1	3/8/13	8 am	HCl	x									
AMR Outlet Oil & Grease	Water	Amber 1L	1	3/8/13	8 am	HCl	x									

Relinquished By:	Date/Time:	Received By:	Date/Time:	Turnaround Time: (Check)
Kate Forrest, OCCK	3/08/13 3:15pm	[signature]	3/8/13 3:15	same day ____ 72 hours ____
Relinquished By: Austin Brown	Date/Time: 3/8/13 5:48	Received By: [signature]	Date/Time: 3/4/13 3:44	24 hours ____ 5 days ____ 48 hours ____ normal x
Relinquished By: [signature]	Date/Time: 3/4/13 1430	Received in Lab By: [signature]	Date/Time: 03/09/13 12:30	Sample Integrity: (Check) intact x on ice x 2.1c

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TAL-0013 (0911)

CHAIN OF CUSTODY FORM

440-40359

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
6000 S. Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

Client Name/Address: OC Coastkeeper, 3151 Airway Ave F110, Costa Mesa, CA 92626

Project/PO Number: Scrapyard Runoff Treatment

Project Manager: Ray Hiemstra / Jonathan Bouxclaire

Phone Number: (714) 850-1965

Fax Number: (714) 850-1592

Sampler:

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	1664 - Oil & Grease	COD	TSS	Hardness	Total Metals Cu, Al, Fe & Zn	Diss Metals Cu, Pb & Zn				Special Instructions
Central Metals Inlet A	Water	Amber 4L	1			None		X	X	X	X	X				Filter All
Central Metals Outlet A	Water	Amber 4L	1			None		X	X	X	X	X				
Central Metals Oil & Grease Inlet A	Water	Amber 1L	1			HCl	X									Diss Metals
Central Metals Oil & Grease Outlet A	Water	Amber 1L	1			HCl	X									
Central Metals Inlet B	Water	Amber 4L	1			None		X	X	X	X	X				
Central Metals Outlet B	Water	Amber 4L	1			None		X	X	X	X	X				
Central Metals Inlet Oil & Grease B	Water	Amber 1L	1			HCl	X									
Central Metals Outlet Oil & Grease B	Water	Amber 1L	1			HCl	X									

Relinquished By:	Date/Time:	Received By:	Date/Time:	Turnaround Time: (Check)
[signature]	3/8/13 1830			same day ____ 72 hours ____
Relinquished By:	Date/Time:	Received By:	Date/Time:	24 hours ____ 5 days ____ 48 hours ____ normal X
Relinquished By:	Date/Time:	Received in Lab By: [signature]	Date/Time: 03/08/13 18:30	Sample Integrity: (Check) intact X on ice 2.1°C

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

440-40358

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
6000 S. Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

TAL-0013 (0911)

Page ______ of ______

Client Name/Address: OC Coastkeeper, 3151 Airway Ave #410, Costa Mesa, CA 92626

Project/PO Number: Scrapyard Runoff Treatment

Project Manager: Roy Herrnstra / Jonathan Bousselaire

Phone Number: (714) 850-1965

Sampler:

Fax Number: (714) 850-1592

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	1664-Oil & Grease	COD	TSS	Hardness	Total Metals Cu, Al, Fe and Zn	Diss. Metals Cu, Pb and Zn				Special Instructions
Ruby Metals Inlet A	Water	Amber 4L	1			None		X	X	X	X	X				Flag All J-Flags
Ruby Metals Outlet A	Water	Amber 4L	1			None		X	X	X	X	X				
Ruby Metals Inlet Oil & Grease A	Water	Amber 1L	1			HCl	X									
Ruby Metals Outlet Oil & Grease A	Water	Amber 1L	1			HCl	X									
Ruby Metals Inlet B	Water	Amber 4L	1			None		X	X	X	X	X				
Ruby Metals Outlet B	Water	Amber 4L	1			None		X	X	X	X	X				
Ruby Metals Inlet Oil & Grease B	Water	Amber 1L	1			HCl	X									
Ruby Metals Outlet Oil & Grease B	Water	Amber 1L	1			HCl	X									

Relinquished By	Date/Time	Received By	Date/Time
[signature]	3/8/13 2:15PM	Austin Brown	3/8/13 2:15PM
Austin Brown	3/8/13 5:47	[signature]	3/8/13 5:48
[signature]	3/8/13 18:30	Received in Lab By: [signature]	03/08/13 18:30

Turnaround Time: (Check) same day ____ 72 hours ____ 24 hours ____ 5 days ____ 48 hours ____ normal ____

Sample Integrity: (Check) intact X on ice X 2.6

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3/19/2013

440-40350

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

CHAIN OF CUSTODY FORM

17461 Derian Ave., #100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
4625 E. Cotton Center Blvd., Suite 189, Phoenix, AZ 85040 (602) 437-3340 FAX (602) 454-9303
6000 S. Eastern Ave., Suite 5E, Las Vegas, NV 89119 (702) 429-1264

TAL-0013 (0911)

Page ____ of ____

Client Name/Address: OC Coastkeeper, 3151 Airway Ave F110, Costa Mesa, CA 92626

Project/PO Number: Scrapyard Runoff Treatment

Project Manager: Ray Hiemstra / Jonathan Bousselaire

Phone Number: (714) 850-1965

Sampler:

Fax Number: (714) 850-1592

Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date	Sampling Time	Preservatives	1664 - Oil & Grease	COD	TSS	Hardness	Total Metals Cu, Al, Fe and Zn	Diss. Metals Cu, Pb and Zn				Special Instructions
SA-Fontana (Inlet)	Water	Amber 4L	4			None		x	x	x	x	x				Flag All J-Flags
SA-Fontana (Outlet)	Water	Amber 4L	1			None		x	x	x	x	x				
SA-Fontana (Inlet Oil & Grease)	Water	Amber 1L	1			HCl	x									
SA-Fontana Outlet Oil & Grease	Water	Amber 1L	1			HCl	x									

Relinquished By	Date/Time	Received By	Date/Time
Brittany Morettini	3/8/13 1625	Austin Brown	3/8/13 — 1626
Austin Brown	3/8/13 5:48	[signature]	3/8/13 5:49
[signature]	3/8/13 1830	Received in Lab By: [signature]	03/08/13 1830

Turnaround Time: (Check) same day ____ 72 hours ____ 24 hours ____ 5 days ____ 48 hours ____ normal X

Sample Integrity: (Check) intact X on ice X 2.4°

Note: By relinquishing samples to TestAmerica, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.

3/19/2013

Exhibit C

Supplemental Environmental Project (SEP)

Certificate of Completion

The following information is provided as proof of completion of the SEP project described below.

Enforcement Order: Settlement Agreement and Stipulation for Entry of Administrative Civil Liability, Order No. R8-2012-0049

Name of Discharger: Elsinore Valley Municipal Water District

SEP Funds: $55,000 (Allocated by the Discharger to Fund the Project)

Name of Project: Evaluation of Control Measures at Scrap Metal Facilities

Implementing Party: Orange County Coastkeeper

Contact Person:

Raymond Hiemstra, Associate Director
Orange County Coastkeeper
ray@coastkeeper.org
(714) 850-1965

Project Summary:

See attached report and associated documents

Date Project Started: 10/1/2012 Date of Completion: 9/1/2014 (final report revised 12/30/14)

Date the SEP Funds were received by the Implementing Party: 12/6/2012

Total Project Cost (including funds from other sources): $62,494.48

How was the SEP Fund Used for This Project?[1]

Overhead/Management $8,250

- 15% of total SEP funds

Design/Consultation $1,530

- AMEC $1,530 for Presentation Development /Monitor Training

Construction/Implementation $ 37,790.60

- Labor (including Taxes/Workmans Comp Ins) $34,098.91
- Mileage $1775.38
- Supplies $1,916.31

Lab and analytical costs $6,390

- $3,768 (2013)
- $2,604 (2014)

Other expenses (explain) $ 1039.40

- Payroll fees, phone, postage, printing

Total Project Cost (SEP funds only) $55.000

Under penalty of perjury under the laws of the State of California, I certify that: (1) the entire amount of the SEP funding received has been used for the project as Indicated above; (2) the portion of the project for which this SEP funding was earmarked has been completed In accordance with Order No. RB-2012·0049; (3) the Implementing Party followed all applicable environments/laws and regulations In the Implementation of the SEP Including, but not limited to the California Environmental Quality Act (CEQA}, the federal Clean Water Act, and the . Porter-Cologne Act. ·

Signature: Raymond T. Hiemstra Date: December 30, 2014

Name: Raymond Hiemstra Title: Associate Director Orange County Coastkeeper

1 This may include external payments to outside vendors or contractors implementing the SEP. In making such certification, the official may rely upon the Implementing Party's normal project tracking systems that capture employee time expenditures and external payments to outside vendors such as environmental and information technology contractors or consultants. To substantiate the

expenses, the Implementing Party may provide copies of Invoices, receipts, etc. The certification need not address any costs Incurred by the Regional Water Board for oversight.

Comparison to Projected Budget

The projected budget in the SEP included:

SEP funding		**$55,000**
OCCK funding		**$31,480**
Total Revenues		**$86,480**

Item	Cost Computation	Total
Sample Analysis	54 samples at $300 each	$16,200
Labor	12 trained samplers at $25/hr, 2 supervisors at $100/hr.	$34,000
Travel	Mileage for 8 cars at 100mi/car for 5 days at $.55/mi	$2,200
Supplies	Canopies, gloves, hand sanitizer etc.	$1,200
Training	Training consultant at $200/hr. personal safety gear	$3,000
Planning, Data QA/QC, Analysis and Reporting	186 hrs. at $100/hr.	$18,600
Project Administration	15% of total project cost	$11,280
Total Expenses		**$86,480**

Budget Comparison Narrative

The overall cost of $62,494.48 for the phase of the project supported by SEP funding came in under the anticipated project budget of $86,480. Overall labor costs (including labor, planning, data QA/QC, analysis and reporting were projected at $52,600 and were actually $40,211.63 with $34,098.91 coming from SEP funding. This savings was primarily due to our ability to reduce planning, QA/QC and reporting costs by using training materials and a QAPP from a demonstration project in 2011 as templates for the documents for this project and minimizing analysis and reporting costs. Travel costs were about what was expected at $1775.38 out of an expected $2,200. Consultant costs for training was also less than expected at $1530 funds as we were able to utilize the local company AMEC at a favorable rate. Supplies were a little more expensive than expected at $1916.31 rather than the planned $1,200. The supplies costs include personal safety gear which had been included under training costs. Lab costs were also lower than budgeted for as we were able to get our samples run for Approximately $198/sample rather than the planned for $300, and we had less samples than expected due to a lack of rain events. Project administration costs were as expected at 15% of the project cost Overall the project utilized the full $55,000 in SEP funds and another $7,494 of other funding.

This represents a huge cost savings over the standard method of sample collection using automated samplers. The estimated cost of running the project using automated samplers and a consulting firm was $200,000 and this project was less than 30% of that cost.