



**Base Realignment and Closure
Program Management Office West Naval
Facilities Engineering Command**

**Air Monitoring Summary Report
Remedial Action for Parcel G,
Hunters Point Naval Shipyard, San
Francisco, California**

Contract: N62473-11-D-2226, PTO 0002

May 2013



A handwritten signature in black ink, appearing to read "R. Goloubow".

Ron Goloubow, PG
Principal Geologist

Air Monitoring Summary Report

Remedial Action for Parcel G,
Hunters Point Naval Shipyard,
San Francisco, California

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Acronyms and Abbreviations

| | |
|---------|---|
| ARCADIS | ARCADIS U.S., Inc. |
| BRAC | Base Realignment and Closure |
| DCP | Dust Control Plan |
| HPNS | Hunters Point Naval Shipyard |
| NAVFAC | Naval Facilities Engineering Command |
| Navy | United States Department of the Navy |
| PM10 | particulate matter less than 10 microns in diameter |
| TSP | total suspended particles |
| USEPA | U.S. Environmental Protection Agency |

1. Introduction

ARCADIS-US, Inc. (herein after referred to as ARCADIS) is providing environmental remediation services to the U.S. Department of the Navy under the Contract: N62473-11-D-2226, PTO 0002. ARCADIS is performing air monitoring at Hunters Point Naval Shipyard (HPNS) in accordance with the Final Dust Control Plan (DCP), included as Appendix D to the Remedial Action Work Plan for Parcel G, Hunters Point Naval Shipyard, San Francisco, California (ARCADIS 2012). The DMP described procedures that minimized dust during work activities, and required air monitoring to ensure these procedures were effective. The DMP helped prevent exposure of residents and construction crews to potential airborne chemicals of concern, and dust from the work area.

This document summarizes the perimeter air monitoring data collected and analyzed for this project. This summary report describes the following:

- Where and how air monitoring samples were collected
- What test methods were used to analyze air monitoring samples
- How air monitoring data were evaluated

This summary report also presents the air monitoring test results and compares the results with the established threshold criteria included in the DMP.

2. Monitoring Site Locations

Air monitoring stations were mobilized to collect air samples upwind and downwind of work areas for the duration of the project. The predominant wind direction at HPNS is from the west.

Locations of air monitoring stations and wind direction are shown on Figure 1. Air monitoring was performed to ensure effective dust control. The locations of the air monitoring stations were determined based on the prevailing wind direction and were modified as needed. A windsock was used to show wind direction and atmospheric parameters were checked daily at www.wunderground.com (see Appendix A; Table A-1). Atmospheric data provided by www.wunderground.com was collected from station KCASANFR58. Monitoring stations remained stationary while sampling was conducted. In accordance with the DMP, air monitoring samples are collected on a filter from each air monitoring station that operates for a maximum of 24-hours.

Each monitoring station included three separate sample/filter media for:

1. Total suspended particulates (TSP) and for arsenic, lead, and manganese
2. Particulate matter larger than 10 microns in size (PM10)
3. Asbestos

3. Analytical Methods

TSP, Arsenic, Lead, and Manganese. TSP samples were collected with a high-volume (39 to 60 cubic feet per minute) air sampler in accordance with U.S. Environmental Protection Agency's (EPA's) reference sampling method for TSP, described in Title 40 Code of Federal Regulations (CFR), Part 50; Appendix B. Each sample was collected on a filter over an approximately 24-hour period; the filter was then weighed to determine the amount of TSP collected.

Once the amount of TSP was determined, the sample was analyzed for arsenic, lead, and manganese. Arsenic, lead, and manganese were analyzed using a modified EPA Method 6020 (EPA SW846; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its Updates.) The equipment specifications and sampling procedures used, including the sampling apparatus, filters, equipment accuracy, equipment calibration, and quality assurance checks, all conformed to those specified in the analytical method.

PM10. Air samples were collected and analyzed for PM10 in accordance with EPA's reference sampling method for PM10, described in 40 CFR Part 50, Appendix J. Each sample was collected on a filter over an approximately 24-hour period; the filter was then weighed to evaluate the concentrations of PM10 in ambient air.

Asbestos. Air samples were collected and analyzed for asbestos in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7400, in the NIOSH Manual of Analytical Methods (NIOSH 1994). Method 7400 required that samples be collected on three piece cellulose ester filters, which were fitted with conductive cowlings, at a sampling rate of between 0.5 liter per minute (L/min) and 16 L/min.

4. Analysis of Air Monitoring Data

Analytical results from air monitoring samples were compared with the threshold criteria listed in Table 1. Construction activities did not result in the exceedances of the established threshold criteria at any time during project execution.



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5. Air Monitoring Results

Weather information (including ambient pressure and temperature data) and air monitoring results are presented in the tables included as Appendix 1.

6. References

NIOSH (National Institute for Occupational Safety and Health). 1994. NIOSH Manual of Analytical Methods, Method 7400. August.

ARCADIS. 2012 Final Work Plan Remedial Action Work Plan for Parcel G, Hunters Point Naval Shipyard, San Francisco, California. December.

Table 1 - Threshold Criteria for Analysis of Air Monitoring Data

| Test Parameter | Threshold Criterion | Threshold Criteria Reference |
|------------------|----------------------------|---|
| TSP | 0.5 mg/m ³ | Calculated action level for general dust and particulates |
| Arsenic | 10 µg/m ³ | Cal/OSHA PEL ¹ |
| Lead | 50 µg/m ³ | Cal/OSHA PEL |
| Manganese | 200 µg/m ³ | Cal/OSHA PEL |
| Asbestos | 0.1 fibers/cm ³ | Cal/OSHA PEL |
| PM ₁₀ | 5,000 µg/m ³ | Cal/OSHA PEL |

Notes:

¹ - Cal/OSHA PEL for particulates not otherwise regulated (respiratory) used for PM₁₀

Cal/OSHA = California Division of Occupational Safety and Health Administration

cm³ = cubic centimeter

mg/m³ = milligrams per cubic meter

NIOSH = National Institute of Occupational Safety and Health

PEL = permissible exposure limit

PM₁₀ = particulate matter less than 10 microns in diameter

TSP = total suspended particulates

µg/m³ = micrograms per cubic meter

Air Monitoring Results

Table 1-1
Ambient Pressure and Temperature Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Date | Ambient Pressure (in Hg) | Ambient Temperature (°F) |
|-------------|-----------------------------|-----------------------------|
| 2/19/2013 | 29.94 | 66 |
| 2/20/2013 | 29.95 | 73 |
| 2/21/2013 | 30.06 | 72 |
| 2/22/2013 | 30.15 | 73 |
| 2/25/2013 | 30.16 | 71 |
| 2/26/2013 | 30.11 | 73 |
| 2/27/2013 | 30.26 | 74 |
| 2/28/2013 | 30.35 | 71 |
| 3/1/2013 | 30.32 | 76 |
| 3/4/2013 | 30.05 | 64 |
| 3/5/2013 | 29.97 | 62 |
| 3/6/2013 | 29.96 | 62 |
| 3/7/2013 | 29.89 | 61 |
| 3/8/2013 | 29.94 | 65 |
| 3/11/2013 | 30.16 | 75 |
| 3/12/2013 | 30.06 | 78 |
| 3/22/2013 | 30.11 | 56 |
| 3/27/2013 | 29.99 | 57 |
| 4/9/2013 | 30.07 | 59 |
| 4/15/2013 | 29.97 | 51 |
| 4/19/2013 | 30.25 | 60 |
| 4/24/2013 | 29.96 | 54 |
| 4/30/2013 | 29.87 | 61 |
| 5/3/2013 | 30.08 | 68 |
| 5/9/2013 | 30.20 | 56 |
| | | |

Notes:

°F = degrees Fahrenheit

in Hg = inches of mercury

Ambient pressure and ambient temperature data were gathered from the wunderground weather website (www.wunderground.com). Data were collected from station KCASANFR58.

Table 1-2
Total Suspended Particulates and Metals Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Date | Sample Location | Volume of Air Pumped meters ³ | TSP (mg/m ³) | TSP Exceedance? (Yes/No) | Arsenic (µg/m ³) | Arsenic Exceedance? (Yes/No) | Lead (µg/m ³) | Lead Exceedance? (Yes/No) | Manganese (µg/m ³) | Manganese Exceedance? (Yes/No) |
|-------------|-----------------|--|--------------------------|--------------------------|------------------------------|------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|
| 2/21/2013 | 1B | 1,444 | 0.164 | No | 0.0010 | No | 0.0194 | No | 0.0970 | No |
| 2/21/2013 | 2B | 1,422 | 0.042 | No | 0.0008 | No | 0.0069 | No | 0.0218 | No |
| 2/26/2013 | 1B | 1,703 | 0.138 | No | 0.0011 | No | 0.0153 | No | 0.0998 | No |
| 2/26/2013 | 2B | 1,677 | 0.031 | No | 0.0007 | No | 0.0034 | No | 0.0137 | No |
| 3/4/2013 | 1B | 1,037 | 0.121 | No | 0.0014 | No | 0.0154 | No | 0.0781 | No |
| 3/4/2013 | 2B | 948 | 0.062 | No | 0.0014 | No | 0.0083 | No | 0.0295 | No |
| 3/7/2013 | 1B | 1,425 | 0.141 | No | 0.0009 | No | 0.0147 | No | 0.0772 | No |
| 3/7/2013 | 2B | 1,403 | 0.032 | No | 0.6700 | No | 3.6000 | No | 0.0100 | No |
| 3/12/2013 | 1B | 1,703 | 0.130 | No | 0.0011 | No | 0.0170 | No | 0.0881 | No |
| 3/12/2013 | 2B | 1,750 | 0.038 | No | 0.0006 | No | 0.0049 | No | 0.0149 | No |
| 3/18/2013 | 1B | 1,677 | 0.103 | No | 0.0007 | No | 0.0161 | No | 0.0775 | No |
| 3/18/2013 | 2B | 1,858 | 0.033 | No | 0.0003 | No | 0.4393 | No | 0.0237 | No |
| 3/22/2013 | 1B | 1,481 | 0.097 | No | 0.0011 | No | 0.0135 | No | 0.0655 | No |
| 3/22/2013 | 2B | 1,549 | 0.037 | No | 0.0008 | No | 0.0045 | No | 0.0161 | No |
| 3/27/2013 | 1B | 1,629 | 0.107 | No | 0.0006 | No | 0.0147 | No | 0.0737 | No |
| 3/27/2013 | 2B | 1,173 | 0.051 | No | 0.0004 | No | 0.0102 | No | 0.0290 | No |
| 4/9/2013 | 1B | 1,795 | 0.016 | No | 0.0004 | No | 0.0095 | No | 0.0423 | No |
| 4/9/2013 | 2B | 1,185 | 0.039 | No | 0.0004 | No | 0.0080 | No | 0.0278 | No |
| 4/15/2013 | 1B | 1,703 | 0.114 | No | 0.0010 | No | 0.0153 | No | 0.0646 | No |
| 4/15/2013 | 2B | 1,210 | 0.104 | No | 0.0010 | No | 0.0182 | No | 0.0570 | No |
| 4/19/2013 | 1B | 1,629 | 0.088 | No | 0.0004 | No | 0.0172 | No | 0.0368 | No |
| 4/19/2013 | 2B | 1,132 | 0.017 | No | 0.0007 | No | 0.0300 | No | 0.0884 | No |
| 4/24/2013 | 1B | 1,573 | 0.228 | No | 0.0007 | No | 0.0140 | No | 0.0502 | No |
| 4/24/2013 | 2B | 1,099 | 0.115 | No | 0.0008 | No | 0.1747 | No | 0.0837 | No |

Table 1-2
Total Suspended Particulates and Metals Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Date | Sample Location | Volume of Air Pumped meters ³ | TSP (mg/m ³) | TSP Exceedance? (Yes/No) | Arsenic (µg/m ³) | Arsenic Exceedance? (Yes/No) | Lead (µg/m ³) | Lead Exceedance? (Yes/No) | Manganese (µg/m ³) | Manganese Exceedance? (Yes/No) |
|---------------------------|-----------------|--|--------------------------|--------------------------|------------------------------|------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|
| 4/30/2013 | 1B | 1,092 | 0.100 | No | 0.0023 | No | 0.0192 | No | 0.0778 | No |
| 4/30/2013 | 2B | 1,111 | 0.129 | No | 0.0025 | No | 0.0216 | No | 0.0990 | No |
| 5/3/2013 | 1B | 1,589 | 0.133 | No | 0.0008 | No | 0.0157 | No | 0.0818 | No |
| 5/3/2013 | 2B | 1,630 | 0.101 | No | <0.0015 | No | <0.0007 | No | <0.0007 | No |
| 5/9/2013 | 1B | 1,989 | 0.110 | No | 0.0007 | No | 0.0151 | No | 0.0704 | No |
| 5/9/2013 | 2B | 2,039 | 0.080 | No | 0.0005 | No | 0.0177 | No | 0.0589 | No |
| Screening Criteria | | | 0.500 | | 10 | | 50 | | 200 | |

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Total Suspended Particulates and Metals Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Date | Sample Location | Volume of Air Pumped meters ³ | TSP (mg/m ³) | TSP Exceedance? (Yes/No) | Arsenic (µg/m ³) | Arsenic Exceedance? (Yes/No) | Lead (µg/m ³) | Lead Exceedance? (Yes/No) | Manganese (µg/m ³) | Manganese Exceedance? (Yes/No) |
|-------------|-----------------|--|--------------------------|--------------------------|------------------------------|------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|
|-------------|-----------------|--|--------------------------|--------------------------|------------------------------|------------------------------|---------------------------|---------------------------|--------------------------------|--------------------------------|

Notes:

Sample locations are shown on Figure 1.

The threshold criteria are as follows: TSP = 0.5 mg/m³, arsenic = 10 µg/m³, lead = 50 µg/m³, manganese = 200 µg/m³.

The detection limit for TSP is 0.06 µg/m³ assuming a minimum sample volume of 1,600 m³. The detection limits for arsenic, lead, and manganese are 16 ng/m³ assuming minimum sample volumes of 1,600 m³.

µg/m³ - micrograms per cubic meter

mg/m³ - milligrams per cubic meter

ng/m³ - nanograms per cubic meter

TSP - total suspended particulates

Samples Analyzed by TestAmerica

The screening levels for TSP is the calculated action level for general dust and particulates

Screening Levels for arsenic, lead, and manganese are based on the Cal/OSHA permissible exposure limit.

Table 1-3
Particulate Matter Smaller than 10 microns in Diameter (PM10) Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Identification | Sample Date | Sample Location | Sampling Period (hours) | Volume of Air Pumped in cubic meters | PM10 ($\mu\text{g}/\text{m}^3$) | PM10 Exceedance? Yes/No |
|-----------------------|-------------|-----------------|-------------------------|--------------------------------------|-----------------------------------|-------------------------|
| ARC020713-19-1A | 2/21/2013 | 1A | 19.0 | 1,311 | 57.9 | No |
| ARC020713-18-1B | 2/21/2013 | 2A | 19.75 | 1,369 | 17.0 | No |
| | | | | | | |
| ARC020713-16-1A | 2/26/2013 | 1A | 25.25 | 1,742 | 42.1 | No |
| ARC020713-15-1B | 2/26/2013 | 2A | 25.25 | 1,750 | 13.3 | No |
| | | | | | | |
| ARC020713-12-1A | 3/4/2013 | 1A | 18.75 | 1,294 | 37.4 | No |
| ARC020713-14-1B | 3/4/2013 | 2A | 20.0 | 1,386 | 21.7 | No |
| | | | | | | |
| ARCO20713-10-1A | 3/7/2013 | 1A | 21.5 | 1,484 | 33.5 | No |
| ARCO20713-13-2A | 3/7/2013 | 2A | 21.5 | 1,490 | 13.3 | No |
| | | | | | | |
| ARCO20713-2-1A | 3/12/2013 | 1A | 21.8 | 1,501 | 43.4 | No |
| ARCO20713-4-2A | 3/12/2013 | 2A | 24.0 | 1,777 | 17.9 | No |
| | | | | | | |
| ARC030713-23-1A | 3/18/2013 | 1A | 20.3 | 1,397 | 37.9 | No |
| ARC030713-22-2A | 3/18/2013 | 2A | 21.5 | 1,592 | 19.2 | No |
| | | | | | | |
| ARC031713-27-1A | 3/22/2013 | 1A | 20.0 | 1,380 | 35.8 | No |
| ARC031713-25-2A | 3/22/2013 | 2A | 21.8 | 1,610 | 17.5 | No |
| | | | | | | |
| ARC030713-31-1A | 3/27/2013 | 1A | 22.0 | 1,518 | 33.9 | No |
| ARC030713-31-2A | 3/27/2013 | 2A | 23.8 | 1,758 | 12.4 | No |
| | | | | | | |
| ARC030713-33-1A | 4/9/2013 | 1A | 24.3 | 1,673 | 16.7 | No |
| ARC030713-36-2A | 4/9/2013 | 2A | 24.0 | 1,777 | 6.9 | No |
| | | | | | | |
| ARC030713-38-1A | 4/15/2013 | 1A | 23.0 | 1,587 | 44.5 | No |
| ARC030713-40-2A | 4/15/2013 | 2A | 24.5 | 1,814 | 27.5 | No |
| | | | | | | |
| ARC030713-35-1A | 4/19/2013 | 1A | 22.0 | 1,518 | 32.7 | No |
| ARC030713-43-2A | 4/19/2013 | 2A | 21.8 | 1,610 | 11.9 | No |
| | | | | | | |
| ARC030713-47-2A | 4/24/2013 | 1A | 21.3 | 1,466 | 30.0 | No |
| ARC030713-48-2B | 4/24/2013 | 2A | 22.3 | 1,647 | 76.8 | No |
| | | | | | | |
| ARC30713-51-1A | 4/30/2013 | 1A | 14.8 | 1,018 | 36.4 | No |
| ARC30713-50-2A | 4/30/2013 | 2A | 22.5 | 1,666 | 23.1 | No |
| | | | | | | |
| ARC030713-53-1A | 5/3/2013 | 1A | 21.5 | 1,481 | 50.8 | No |
| ARC030713-55-2A | 5/3/2013 | 2A | 22.0 | 1,519 | 38.2 | No |
| | | | | | | |
| ARC 041713-57-1A | 5/9/2013 | 1A | 26.9 | 1,854 | 34.2 | No |

Table 1-3
Particulate Matter Smaller than 10 microns in Diameter (PM10) Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Identification | Sample Date | Sample Location | Sampling Period (hours) | Volume of Air Pumped in cubic meters | PM10 ($\mu\text{g}/\text{m}^3$) | PM10 Exceedance? Yes/No |
|-----------------------|-------------|-----------------|-------------------------|--------------------------------------|-----------------------------------|-------------------------|
| ARC041713-59-2A | 5/9/2013 | 2A | 27.5 | 1,900 | 28.3 | No |

Notes:

Sample locations are shown on Figure 1.

The threshold value for PM10 is $5,000 \mu\text{g}/\text{m}^3$ based on the Cal/OSHA permissible exposure limit for particulates not otherwise regulated (respiratory) used for PM10.

The detection limit for PM10 is $0.06 \mu\text{g}/\text{m}^3$ assuming a minimum sample volume of $1,600 \text{ m}^3$.

$\mu\text{g}/\text{m}^3$ - micrograms per cubic meter

PM10 - particulate matter smaller than 10 microns in diameter

Samples Analyzed by TestAmerica

Table 1-4
Asbestos Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Date | Sample Location | Sampling Period (hours) | Volume of air pumped in Liters | Asbestos (fibers/cm ³) | Asbestos Exceedance? Yes/No |
|-------------|-----------------|-------------------------|--------------------------------|------------------------------------|-----------------------------|
| | | | | | |
| 2/19/2013 | CG472322 | 24 | 1,728 | < 0.001 | No |
| 2/19/2013 | CG472623 | 24 | 1,728 | < 0.001 | No |
| | | | | | |
| 2/26/2013 | CG472332-1 | 24 | 1,656 | <0.002 | No |
| 2/26/2013 | CG472332-2 | 24 | 1,836 | <0.001 | No |
| | | | | | |
| 3/1/2013 | CG-472903-1 | 24 | 1,008 | < 0.003 | No |
| 3/1/2013 | CC-472295-2 | 24 | 936 | < 0.003 | No |
| | | | | | |
| 3/7/2013 | CG472292-1 | 24 | 1,548 | < 0.002 | No |
| 3/7/2013 | CG472291-2 | 24 | 1,386 | < 0.002 | No |
| | | | | | |
| 3/12/2013 | CG472384-2 | 24 | 1,872 | < 0.001 | No |
| 3/12/2013 | CG472354-1 | 24 | 1,697 | < 0.002 | No |
| | | | | | |
| 3/21/2013 | CG-472836-1 | 24 | 540 | <0.005 | No |
| 3/21/2013 | CG-472434-2 | 24 | 683 | <0.004 | No |
| | | | | | |
| 3/27/2013 | CG472258-1 | 24 | 1,980 | <0.001 | No |
| 3/27/2013 | CG472462-2 | 24 | 1,980 | <0.001 | No |
| | | | | | |
| 4/9/2013 | CG472316-2 | 24 | 2,183 | < 0.001 | No |
| 4/9/2013 | CG472354-1 | 24 | 2,160 | < 0.001 | No |
| | | | | | |
| 4/15/2013 | CG-472270-1 | 24 | 2,070 | < 0.001 | No |
| 4/15/2013 | CG-472254-2 | 24 | 2,205 | < 0.001 | No |
| | | | | | |
| 4/19/2013 | CG472301-1 | 24 | 1,980 | < 0.001 | No |
| 4/19/2013 | CG472328-2 | 24 | 1,976 | < 0.001 | No |
| | | | | | |
| 4/24/2013 | CG472276-1 | 27.25 | 2,453 | <0.001 | No |
| 4/24/2013 | CG472353-2 | 28.25 | 2,543 | <0.001 | No |
| | | | | | |
| 4/29/2013 | CG-472278-1 | 14.75 | 1,328 | <0.002 | No |
| 4/29/2013 | CG-472326-2 | 22.5 | 2,025 | <0.001 | No |
| | | | | | |
| 5/3/2013 | CG472306-1 | 21.47 | 1,932 | 0.003 | No |
| 5/3/2013 | CG472309-2 | 22.02 | 1,982 | 0.002 | No |
| | | | | | |
| 5/8/2013 | CG472289-1 | 26.87 | 2,418 | < 0.001 | No |
| 5/8/2013 | CG472250-2 | 27.53 | 2,478 | < 0.001 | No |

Notes:

Sample locations are shown on Figure 1.

The threshold value for asbestos is 0.1 fibers/cm³ based on the Cal/OSHA permissible exposure limit.

Reporting limit is calculated using a minimum detection limit of 7 fibers/millimeter².

Table 1-4
Asbestos Monitoring Results
 Hunters Point Naval Shipyard
 San Francisco, California

| Sample Date | Sample Location | Sampling Period (hours) | Volume of air pumped in Liters | Asbestos (fibers/cm ³) | Asbestos Exceedance? Yes/No |
|-------------|-----------------|-------------------------|--------------------------------|------------------------------------|-----------------------------|
|-------------|-----------------|-------------------------|--------------------------------|------------------------------------|-----------------------------|

fibers/cm³ - fibers per cubic centimeter
 Samples Analyzed by EMLab P&K