

# Potential Commodities

## NFPA 704

- The NFPA 704 describes the material hazards for each commodity for emergency response.
  - A description of the NFPA 704 symbology is included in this part.

# NFPA 704

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"**NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response**" is a standard maintained by the U.S.-based National Fire Protection Association. First "tentatively adopted as a guide" in 1960,<sup>[1]</sup> and revised several times since then, it defines the colloquial "**fire diamond**" used by emergency personnel to quickly and easily identify the risks posed by hazardous materials. This helps determine what, if any, special equipment should be used, procedures followed, or precautions taken during the initial stages of an emergency response.

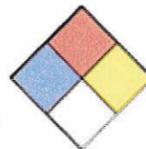


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## Codes

The four divisions are typically color-coded with red indicating flammability, blue indicating level of health hazard, yellow for chemical reactivity, and white containing codes for special hazards. Each of health, flammability and reactivity is rated on a scale from 0 (no hazard) to 4 (severe risk). The latest version of NFPA 704 sections 5, 6, 7 and 8 for the specifications of each classification are listed below. The numeric values in the first column are designated in the standard by "Degree of Hazard" using Arabic numerals (1, 2, 3, 4), not to be confused with other classification systems, such as that in the NFPA 30 Flammable and Combustible Liquids Code, where flammable and combustible liquid categories are designated by "Class", using Roman numerals (I, II, III)<sup>[2]</sup>



Flammability (red)	
0	Materials that will not burn under typical fire conditions (e.g. Carbon tetrachloride), including intrinsically noncombustible materials such as concrete, stone and sand (Materials that will not burn in air when exposed to a temperature of [820 °C (1,500 °F)] for a period of 5 minutes)
1	Materials that require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur (e.g. mineral oil). Includes some finely divided suspended solids that do not require heating before ignition can occur. Flash point at or above 93 °C (200 °F).
2	Must be moderately heated or exposed to relatively high ambient temperature before ignition can occur (e.g. diesel fuel) and multiple finely divided suspended solids that do not require heating before ignition can occur. Flash point between 38 and 93 °C (100 and 200 °F).
3	Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions (e.g. gasoline, acetone). Liquids having a flash point below 23 °C (73 °F) and having a boiling point at or above 38 °C (100 °F) or having a flash point between 23 and 38 °C (73 and 100 °F).
4	Will rapidly or completely vaporize at normal atmospheric pressure and temperature, or is readily dispersed in air and will burn readily (e.g. acetylene, diethylzinc, liquid hydrogen. Includes pyrophoric substances. Flash point below 23 °C (73 °F).

Health (blue)	
0	Poses no health hazard, no precautions necessary and would offer no hazard beyond that of ordinary combustible materials (e.g. wood)
1	Exposure would cause irritation with only minor residual injury (e.g. acetone, sodium bromate)
2	Intense or continued but not chronic exposure could cause temporary incapacitation or possible residual injury (e.g. diethyl ether)
3	Short exposure could cause serious temporary or moderate residual injury (e.g. chlorine, liquid hydrogen, carbon monoxide)
4	Very short exposure could cause death or major residual injury (e.g. hydrogen cyanide, phosphine, sarin, hydrofluoric acid)

Instability/reactivity (yellow)	
0	Normally stable, even under fire exposure conditions, and is not reactive with water (e.g. helium)
1	Normally stable, but can become unstable at elevated temperatures and pressures (e.g. propene)
2	Undergoes violent chemical change at elevated temperatures and pressures, reacts violently with water, or may form explosive mixtures with water (e.g. white phosphorus, potassium, sodium)
3	Capable of detonation or explosive decomposition but requires a strong initiating source, must be heated under confinement before initiation, reacts explosively with water, or will detonate if severely shocked (e.g. ammonium nitrate, chlorine trifluoride)
4	Readily capable of detonation or explosive decomposition at normal temperatures and pressures (e.g. nitroglycerin, chlorine azide, chlorine dioxide)

**Special notice (white)**

The white "special notice" area can contain several symbols. The following symbols are defined by the NFPA 704 standard.

<b>OX</b>	Oxidizer, allows chemicals to burn without an air supply (e.g. potassium perchlorate, ammonium nitrate, hydrogen peroxide).
<b>W</b>	Reacts with water in an unusual or dangerous manner (e.g. cesium, sodium, sulfuric acid).
<b>SA</b>	Simple asphyxiant gas. Specifically limited to the following gases: nitrogen, helium, neon, argon, krypton and xenon. <sup>[2]</sup>

**Non-standard symbols (white)**

These hazard codes are *not part of the NFPA 704 standard*, but are occasionally used in an unofficial manner. The use of non-standard codes may be permitted, required or disallowed by the authority having jurisdiction (e.g. fire department).

<b>COR ACID, ALK</b>	Corrosive; strong acid or base (e.g. sulfuric acid, potassium hydroxide) Acid or alkaline, to be more specific
<b>BIO</b> or 	Biological hazard (e.g. smallpox virus)
<b>POI</b>	Poisonous (e.g. strychnine, arsenic)
<b>RA, RAD</b> or 	Radioactive (e.g. plutonium, uranium)
<b>CYL</b> or <b>CRYO</b>	Cryogenic (e.g. liquid nitrogen)

**See also**

- Globally Harmonized System of Classification and Labelling of Chemicals
- Hazard symbol
- HMIS Color Bar
- Hazchem
- Hazmat

**References**

- Proposed Amendments on Revisions to the Recommended System for the Identification of The Fire Hazards of Materials / NFPA No. 704M — 1969 (<http://www.nfpa.org/Assets/files/AboutTheCodes/704/TCRF-1975-704M.pdf>)
- NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response, 2012 Edition (<http://www.slideshare.net/luijar38/nfpa-704-2012>)
  - 1910.1200 OSHA Hazard Communication ([http://www.setonresourcecenter.com/safety/hazcom/FR\\_59\\_6126%20Hazard\\_Communicaton.pdf](http://www.setonresourcecenter.com/safety/hazcom/FR_59_6126%20Hazard_Communicaton.pdf))
  - University of Oregon Chem Labs - NFPA Hazard Identification System (<http://chemlabs.uoregon.edu/Safety/NFPA.html>)

**External links**

- NFPA 704 frequently asked questions (<http://www.nfpa.org/faq.asp?categoryID=928>)
- Pamphlet produced by the City of Milwaukee summarizing NFPA 704 code requirements (<http://www.milwaukee.gov/ImageLibrary/User/dnscms/pdf/broc/hazmat12.pdf>)

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Categories: Safety | Safety codes | NFPA Standards

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	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	<b>Animal Feed (BIOFOS Additive)</b>	<b>2</b>	<b>0</b>	<b>0</b>	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Animal Feed (BIOFOS Additive)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	-
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Basic Chemicals (Melamine)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Bauxite



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Bituminous Coal



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	<b>Borax</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>-</b>
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Borax



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Cereal Grains (Ground Corn)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Copper Concentrate



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Dried Distillers Grain



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Fertilizer (Mosaic MicroEssentials SZ)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Fuel Oils



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Gasoline



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Iron Ore



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Logs (Douglas Fir)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	<b>Metallic Ores (Zinc Ore)</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>Water Reactive</b>
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Metallic Ores (Zinc Ore)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Muriate of Potash



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

# Portland Cement



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Soda Ash



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

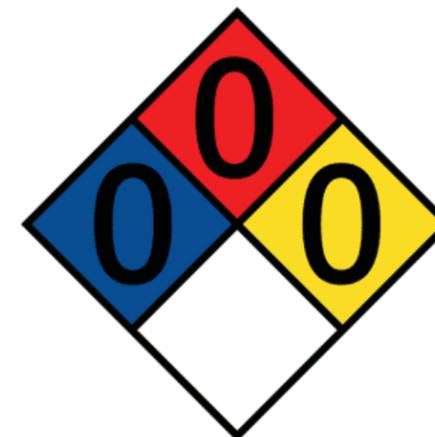
# Sodium Sulfate



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

*\*Information culled from different sources*

## Soybean (Meal)



	Commodity	Health Rating	Fire Rating	Reactivity Rating	Special Hazard Rating
1	Animal Feed (BIOFOS Additive)	2	0	0	-
2	Basic Chemicals (Melamine)	2	1	0	
3	Bauxite*	1	0	0	-
4	Bituminous Coal	1	1	0	-
5	Borax	1	0	0	-
6	Cereal Grains (Ground Corn)	1	1	0	-
7	Copper Concentrate	1	2	0	-
8	Dried Distillers Grain	1	1	0	-
9	Fertilizer (Mosaic MicroEssentials SZ)	2	0	0	-
10	Fuel Oils	2	2	0	-
11	Gasoline	1	3	0	-
12	Iron Ore	1	0	0	-
13	Logs (Douglas Fir)	1	0	0	-
14	Metallic Ores (Zinc Ore)	1	1	0	Water Reactive
15	Muriate of Potash	1	0	0	-
16	Portland Cement*	1	0	0	-
17	Soda Ash	2	0	0	-
18	Sodium Sulfate	2	0	0	-
19	Soybean (Meal)	0	0	0	-
20	Waste/Scrap (Aluminum)	1	0	0	-

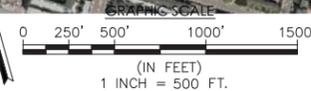
*\*Information culled from different sources*

## Waste/Scrap (Aluminum)



# Air Monitoring Plan

- The Air Monitoring Plan was put in place during the initial phase of the Oakland Army Base Redevelopment Plan.
- The currently installed air monitoring sites will be used to monitor TLS program construction and operations.
- The equipment operating information can be found in the Appendix to the BOD.



Mar 27, 2013 - 10:33am, Plotted By: joaquelinec  
 G:\Cad Files\OAB\OAB02\ARCHITECTURAL DIMENSIONS\X-472.dwg



**ARCHITECTURAL DIMENSIONS**

ARCHITECTURAL DIMENSIONS  
 JAMES HEILBRONNER  
 510-463-8300  
 300 FRANK H. OGAWA PLAZA, SUITE 375  
 OAKLAND, CA 94612

PROJECT INFO.

PRELIMINARY

PROPOSED AIR MONITOR LOCATIONS  
 OAKLAND ARMY BASE  
 CITY OF OAKLAND, ALAMEDA COUNTY, CALIFORNIA

CAT. NO.	AD-0246.01
INV. NO.	21063

REV	DATE	COMMENT

JOB NO.	OAB02
SCALE:	1" = 500'
DATE:	3/27/2013
DRAWN BY:	J. ARMADA
CHECKED BY:	K. ROSSO

DRAWING NO.  
**X-472**  
 SHEET 1 OF 4

# OAKLAND ARMY BASE

OAKLAND, CALIFORNIA

## AIR MONITOR #1 WEST GATEWAY

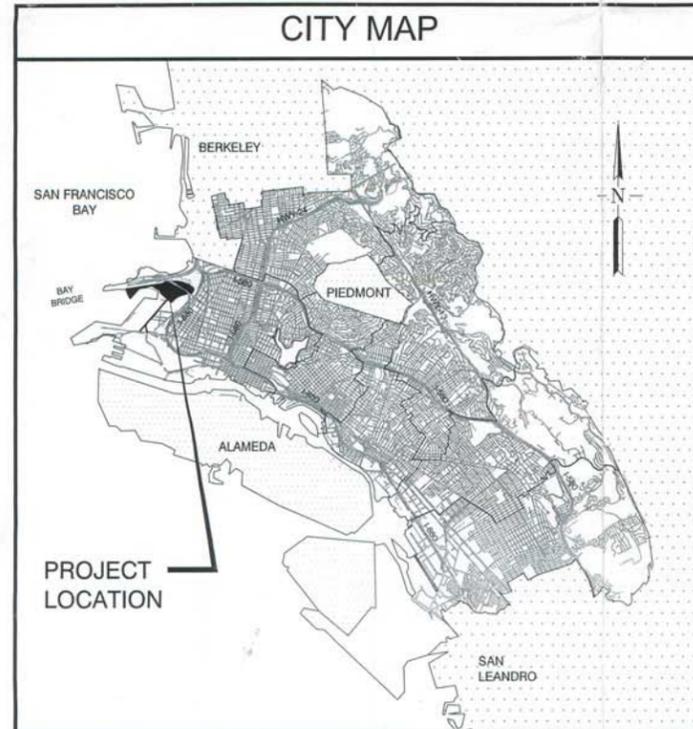
APN 018-0507-001-10

JUNE 3, 2013

APPLICANT  
COPY

PREPARED FOR:

### CITY OF OAKLAND, CA



- SPECIAL INSPECTIONS REQUIRED FOR:
- ✓ CONCRETE  $f_c = 3000 \text{ psi}$
  - ✓ BOLTS INSTALLED IN CONCRETE (FOOTNOTE NO. 5 OF TABLE 26-F)
  - ✓ DOCTILE MOMENT-RESISTING CONCRETE FRAME
  - ✓ REINFORCING STEEL AND PRESTRESSING STEEL
  - ✓ FIELD WELDING
  - ✓ HIGH-STRENGTH BOLTING
  - ✓ STRUCTURAL MASONRY
  - ✓ REINFORCED GYPSUM CONCRETE
  - ✓ INSULATING CONCRETE FILL
  - ✓ SPRAY-APPLIED FIREPROOFING
  - ✓ PILING, DRILLED PIERS AND CAISSONS
  - ✓ SHOTCRETE
  - ✓ SPECIAL GRADING, EXCAVATION AND FILLING
  - ✓ PLYWOOD/PARTICLEBOARD SHEAR WALL NAILING WITH NAIL SPACING 4-IN O.C.
  - ✓ GYPSUM BOARD SHEAR WALL NAILING
  - ✓ CONSTRUCTION & DEMOLITION RECYCLING
  - SPECIAL CASES: STRUCTURAL OBSERVATION



**B1302934 APPROVED**  
CITY OF OAKLAND  
BUILDING SERVICES  
PLAN CHECK SECTION  
For Substantial Compliance With  
Codes and Ordinances  
REVISIONS NEED APPROVAL  
By: Ca. Um  
SUBJECT TO USC SECT 1904.3  
(SG SECT 105.4 & IBC SECT R105.5  
SURVEY (REVIEW ONLY))  
PLOT PLAN REVIEW  
PARKING/LANDSCAPE LAYOUT  
GRADING AND EROSION CONTROL  
SOILS REPORT ON FILE  
ELECT. MECH. PLUMB.  
NOT CHECKED  
DATE: 8/16/13 14

INDEX OF DRAWING	
SHEET NO.	PLAN & TITLE
CS-1	COVER SHEET
X-627	AIR MONITOR LOCATION #1
X-628	AIR MONITOR #1 & AUTOMET TOWER LOCATION
S1	AIR MONITOR #1 & AUTOMET TOWER LOCATION
E-1	AIR MONITOR LOCATION #1

ALL WORK SHALL COMPLY WITH THE CBC, CRC, CPC, CMC, CEC, AND OTHER APPLICABLE CODES AS AMENDED AND ADOPTED BY THE CITY OF OAKLAND IN EFFECT AT THE TIME OF PERMIT APPLICATION

**NOTICE**  
THE CITY OF OAKLAND IS NOT RESPONSIBLE FOR ENFORCING THE AMERICANS WITH DISABILITIES ACT OR THE FAIR HOUSING AMENDMENTS ACT OF 1988. APPROVAL OF THESE PLANS DOES NOT INDICATE COMPLIANCE WITH THESE FEDERAL REQUIREMENTS. FOR FURTHER INFORMATION CALL OUR OFFICE:  
U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE PROGRAM  
SUITE 601 1111 18TH STREET, NW  
WASHINGTON, DC 20036-3894  
1-800-4-A-BLE (672-2258)  
OFFICE OF HUB PROGRAM COMPLIANCE  
ROOM 5094, 401 SEVENTH ST. SW  
WASHINGTON, DC 20410-0500  
1-202-755-2616  
**EXEMPT SINCE UN-OCCUPIED EQUIPMENT INSTALLATION**

ALL WORK SHALL COMPLY WITH ALL PROVISIONS OF THE CLEAN WATER ACT (1973) AS AMENDED BY WATER QUALITY ACT OF 1987 AND CITY OF OAKLAND STORM WATER MANAGEMENT AND CONTROLS ORDINANCE NO. 11690 C.M.S. AND SHALL UTILIZE ALL NECESSARY BEST MANAGEMENT PRACTICES TO PREVENT SEDIMENTS OR POLLUTANTS FROM ENTERING INTO THE STORM DRAIN SYSTEM.

Aug 13, 2013 4:28pm. Plotted By: jcofflineo  
C:\osd Files\OAB\OAB02 LATEST PACKAGES\AIR MONITOR\CS-1\_AIR MONITOR\_1.dwg

<b>OAKLAND GLOBAL</b>  "One vision, one team, one project"	<b>ARCHITECTURAL DIMENSIONS</b> ARCHITECTURAL DIMENSIONS JAMES HEILBRUNNER 510-463-8300 300 FRANK H. OGAWA PLAZA, SUITE 375 OAKLAND, CA 94612	PROJECT INFO. COVER SHEET INFORMATION SHEET CITY OF OAKLAND, ALAMEDA COUNTY, CALIFORNIA	REV	DATE	COMMENT	JOB NO.	OAB02	DRAWING NO.
			CAT. NO.	AD-0329.01			SCALE:	N.T.S.
INV. NO.	25834		8/13/2013	PLAN CHECK COMMENTS	DATE:	6/3/2013	SHEET 1 OF 4	
					DRAWN BY:	K. ROSSO		
					CHECKED BY:	J. HEILBRUNNER		

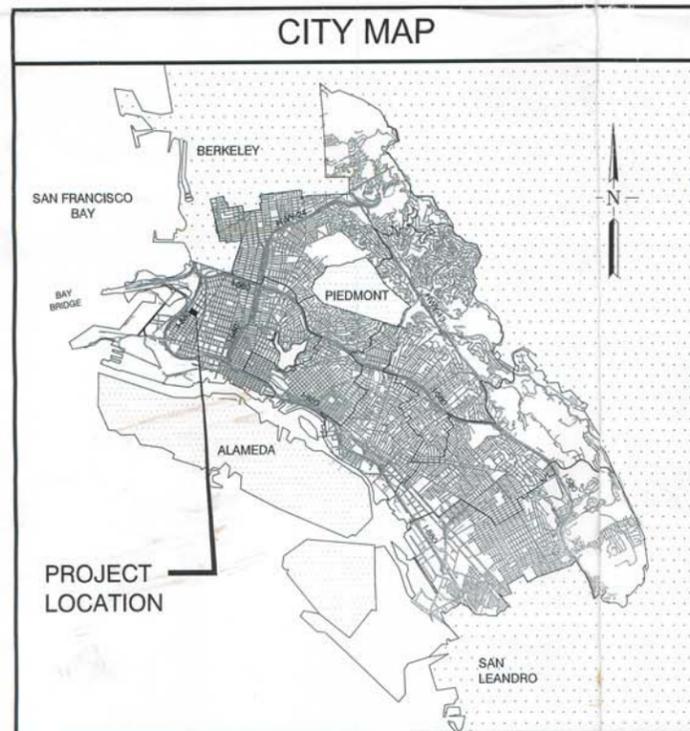
# OAKLAND ARMY BASE

OAKLAND, CALIFORNIA

APPLICANT COPY

## AIR MONITOR #2 - RAIMONDI PARK 1800 WOOD STREET, WEST OAKLAND

JUNE 3, 2013



PREPARED FOR:

**CITY OF OAKLAND, CA**

APPLICANT COPY

RESUBMITTAL FOR PERMIT  
B1301814

- SPECIAL INSPECTIONS REQUIRED FOR:
- ✓ CONCRETE  $f_c = 3000$  psi
  - ✓ BOLTS INSTALLED IN CONCRETE (FOOTNOTE NO. 5 OF TABLE 26-F)
  - ✓ DUCTILE MOMENT-RESISTING CONCRETE FRAME
  - ✓ REINFORCING STEEL AND PRESTRESSING STEEL
  - ✓ FIELD WELDING
  - ✓ HIGH-STRENGTH BOLTING
  - ✓ STRUCTURAL MASONRY
  - ✓ REINFORCED GYPSUM CONCRETE
  - ✓ INSULATING CONCRETE FILL
  - ✓ SPRAY-APPLIED FIREPROOFING
  - ✓ PILING, DRILLED PIERS AND CAISSONS
  - ✓ SHOTCRETE
  - ✓ SPECIAL GRADING, EXCAVATION AND FILLING
  - ✓ PLYWOOD/PARTICLEBOARD SHEAR WALL NAILING WITH NAIL SPACING  $\leq 4$ -IN O.C.
  - ✓ GYPSUM BOARD SHEAR WALL NAILING
  - ✓ CONSTRUCTION & DEMOLITION RECYCLING
  - ✓ SPECIAL CASES: *SPECIAL OBSERVATIONS*

**B1302930 APPROVED**  
CITY OF OAKLAND  
BUILDING SERVICES  
PLAN CHECK SECTION  
For Substantial Compliance With  
Codes and Ordinances  
REVISIONS NEEDED APPROVAL  
By: *G. Lim*  
DATE: *8/16/13*

INDEX OF DRAWING	
SHEET NO.	PLAN & TITLE
CS-1	COVER SHEET
X-584	AIR MONITOR #2 - SITE PLAN
X-585	AIR MONITOR #2 - PLAN AND SECTION
S1	AIR MONITOR #2 - STRUCTURAL
E-2	AIR MONITOR #2 - ELECTRICAL

ALL WORK SHALL COMPLY WITH THE CBC, CRC, CPC, CMC, CEC, AND OTHER APPLICABLE CODES AS AMENDED AND ADOPTED BY THE CITY OF OAKLAND IN EFFECT AT THE TIME OF PERMIT APPLICATION

**NOTICE**  
THE CITY OF OAKLAND IS NOT RESPONSIBLE FOR ENFORCING THE AMERICANS WITH DISABILITIES ACT OR THE FAIR HOUSING AMENDMENTS ACT OF 1988. APPROVAL OF THESE PLANS DOES NOT INDICATE COMPLIANCE WITH THESE FEDERAL REQUIREMENTS. FOR FURTHER INFORMATION CALL OR WRITE:  
U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD  
SUITE 601, 1111 18TH STREET, NW  
WASHINGTON, DC 20036-5094  
1-800-USA-ABLE (877-2253)  
OFFICE OF HUD PROGRAM COMPLIANCE  
ROOM 6204, 451 SEVENTH ST. SW  
WASHINGTON, DC 20410-0600  
1-202-708-2618

*EXEMPT FROM REQUIREMENTS SINCE UN-OCCUPIED EQUIPMENT INSULATION*



**ARCHITECTURAL DIMENSIONS**

ARCHITECTURAL DIMENSIONS  
JAMES HEILBRUNNER  
510-463-8300  
300 FRANK H. GAWA PLAZA, SUITE 375  
OAKLAND, CA 94612

PROJECT INFO.  
**COVER SHEET**  
RAIMONDI PARK, 1800 WOOD STREET, WEST OAKLAND  
CITY OF OAKLAND, ALAMEDA COUNTY, CALIFORNIA

REV	DATE	COMMENT	JOB NO.	OAB02	DRAWING NO.
					CS-1
					SHEET 1 OF 5

CAT. NO.	AD-0329.04	DATE	3/13/2013	PLAN CHECK COMMENTS	DRAWN BY:	K. ROSSO
INV. NO.	25837	DATE	7/11/2013	CITY COMMENTS	CHECKED BY:	J. HEILBRUNNER

Aug 13, 2013 4:29pm, Plotted By jpcavelino  
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# OAKLAND ARMY BASE

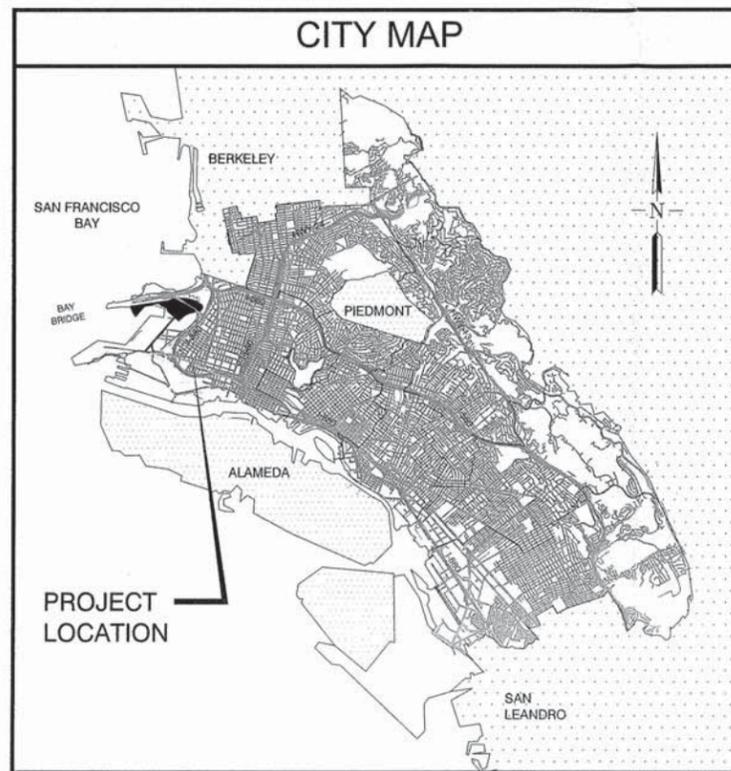
OAKLAND, CALIFORNIA

## AIR MONITOR #3 - PRESCOTT ELEMENTARY 8TH STREET & CAMBELL, WEST OAKLAND

AUGUST 22, 2013

PREPARED FOR:

### CITY OF OAKLAND, CA



INDEX OF DRAWING	
SHEET NO.	PLAN & TITLE
CS-1	COVER SHEET
X-443	AIR MONITOR LOCATION #3 - SITE PLAN
X-470	AIR MONITOR #3 - PLAN AND SECTION
S1	AIR MONITOR #3 - STRUCTURAL PLAN
E-1	AIR MONITOR #3 - PLAN & SECTION - ELECTRICAL

APPLICANT COPY

Sep 12, 2013 11:45am, Plotted By: jrouleaux, G:\od Files\OAB\OAB02\LA TEST PACKAGES\AIR MONITORS\CS-1\_AIR MONITOR 3.dwg



**ARCHITECTURAL DIMENSIONS**

ARCHITECTURAL DIMENSIONS  
JAMES HEILBRONNER  
510-463-8300  
300 FRANK H. OGAWA PLAZA, SUITE 375  
OAKLAND, CA 94612

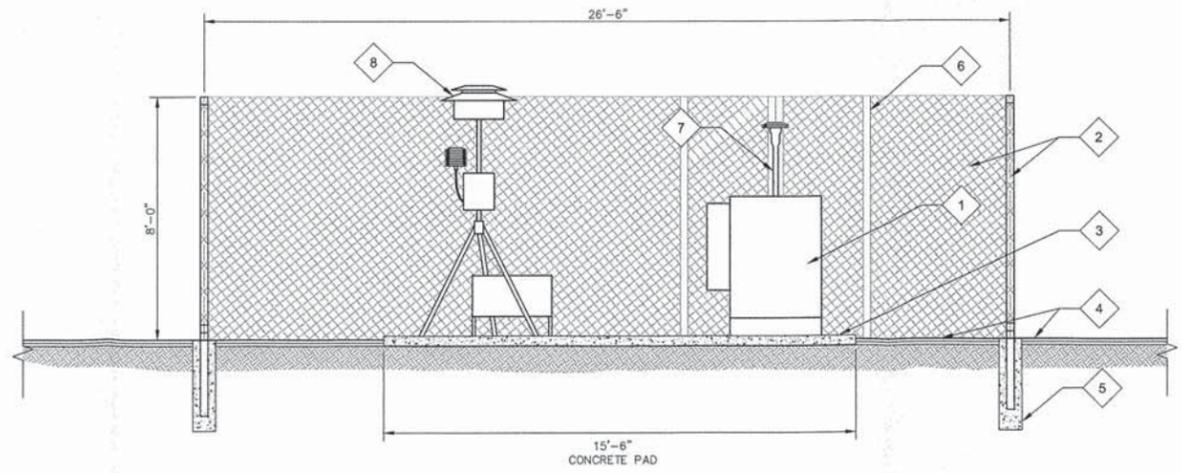
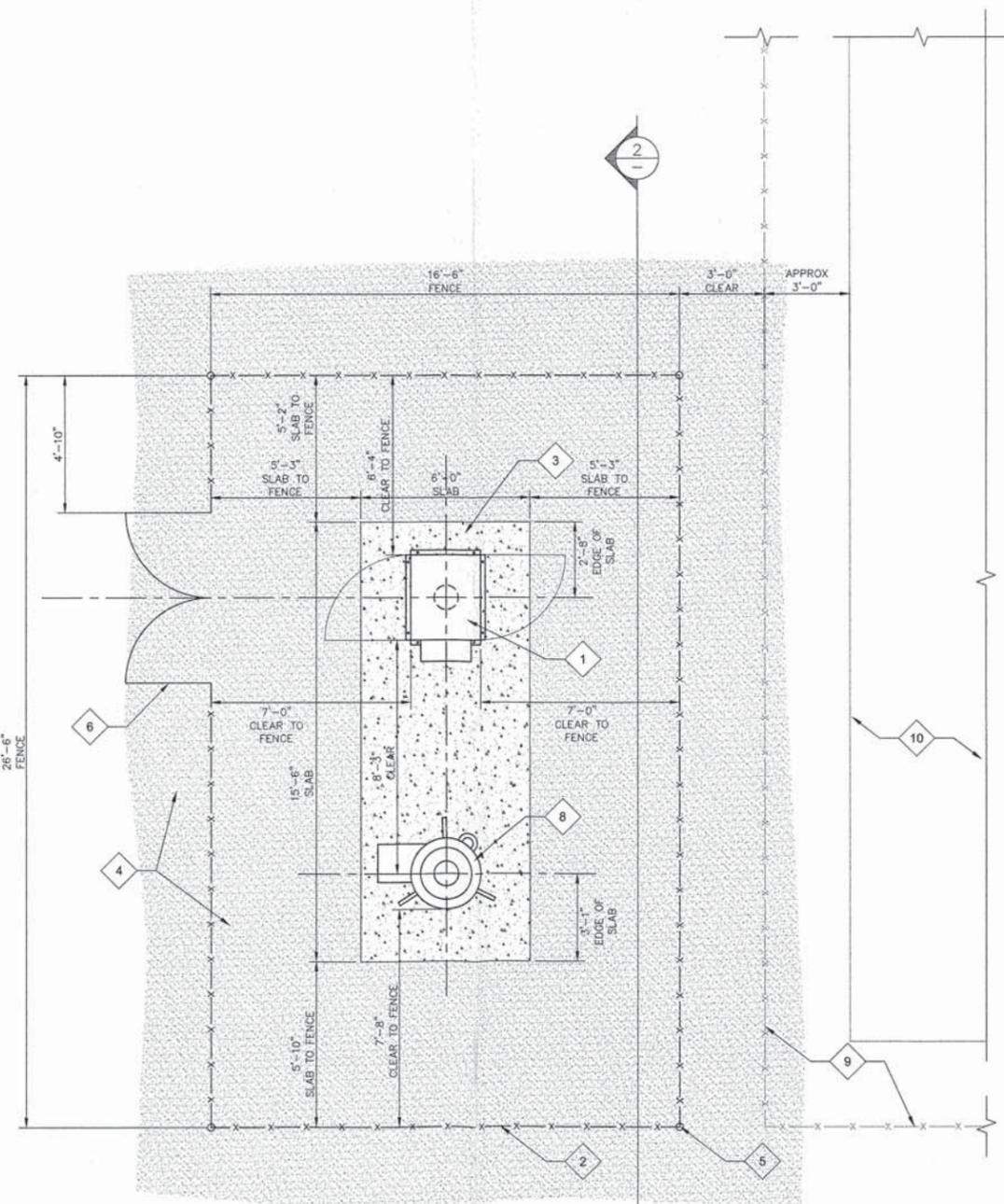
PROJECT INFO.

COVER SHEET  
PRESCOTT ELEMENTARY, 8TH STREET & CAMBELL, WEST OAKLAND  
CITY OF OAKLAND, ALAMEDA COUNTY, CALIFORNIA

CAT. NO.	AD-0285.11
INV. NO.	22743

REV	DATE	COMMENT	JOB NO.	OAB02	DRAWING NO.
					CS-1
			SCALE:	N.T.S.	
			DATE:	8/22/2013	
			DRAWN BY:	K. ROSSO	
			CHECKED BY:	J. HEILBRONNER	SHEET 1 OF 5

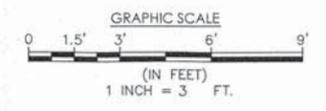




- 1 BAM 1020 IN ENVIRONMENTAL ENCLOSURE WITH 3'0" WIDE ACCESS DOORS ON BOTH SIDES BOLTED TO CONCRETE PAD
- 2 NEW 8' HIGH CHAIN LINK FENCE WITH 9 GAUGE METAL WOVEN FABRIC 1 1/4" MESH. POSTS SPACED AT 10' MAX
- 3 CONCRETE PAD - SEE STRUCTURAL DRAWINGS BY BIGGS CARDOSA
- 4 EXISTING ASPHALT
- 5 POST WITH CONCRETE FOOTINGS - SEE STRUCTURAL DRAWINGS BY BIGGS CARDOSA
- 6 (2) 3'0" W x 8'0" H 1 1/4" MESH SECURE CHAIN LINK GATES WITH INDUSTRIAL GATE LATCH BY INTERNATIONAL SECURITY PRODUCTS, PRODUCT # PL152 OR EQUAL.
- 7 MONITOR HEAD
- 8 SASS / SUPER SASS AIR MONITORING SYSTEM
- 9 EXISTING FENCE
- 10 BUILDING "L"

1 AIR MONITOR LOCATION #3 PLAN  
1"=3'

2 AIR MONITOR LOCATION #3 SECTION  
1"=3'



Sep 11, 2013 - 12:06pm - PrintM4.dwg  
 G:\Code Files\048\04803\ARCHITECTURAL\_DIMENSIONS\X-470.dwg

**OAKLAND GLOBAL ARCHITECTURAL DIMENSIONS**

ARCHITECTURAL DIMENSIONS  
 JAMES HEILBRONNER  
 510-463-8300  
 300 FRANK H. OGAWA PLAZA, SUITE 375  
 OAKLAND, CA 94612

PROJECT INFO.

AIR MONITOR LOCATION #3 - PLAN AND SECTION  
 PRESCOTT ELEMENTARY, 8TH STREET & CAMBELL, WEST OAKLAND  
 CITY OF OAKLAND, ALAMEDA COUNTY, CALIFORNIA

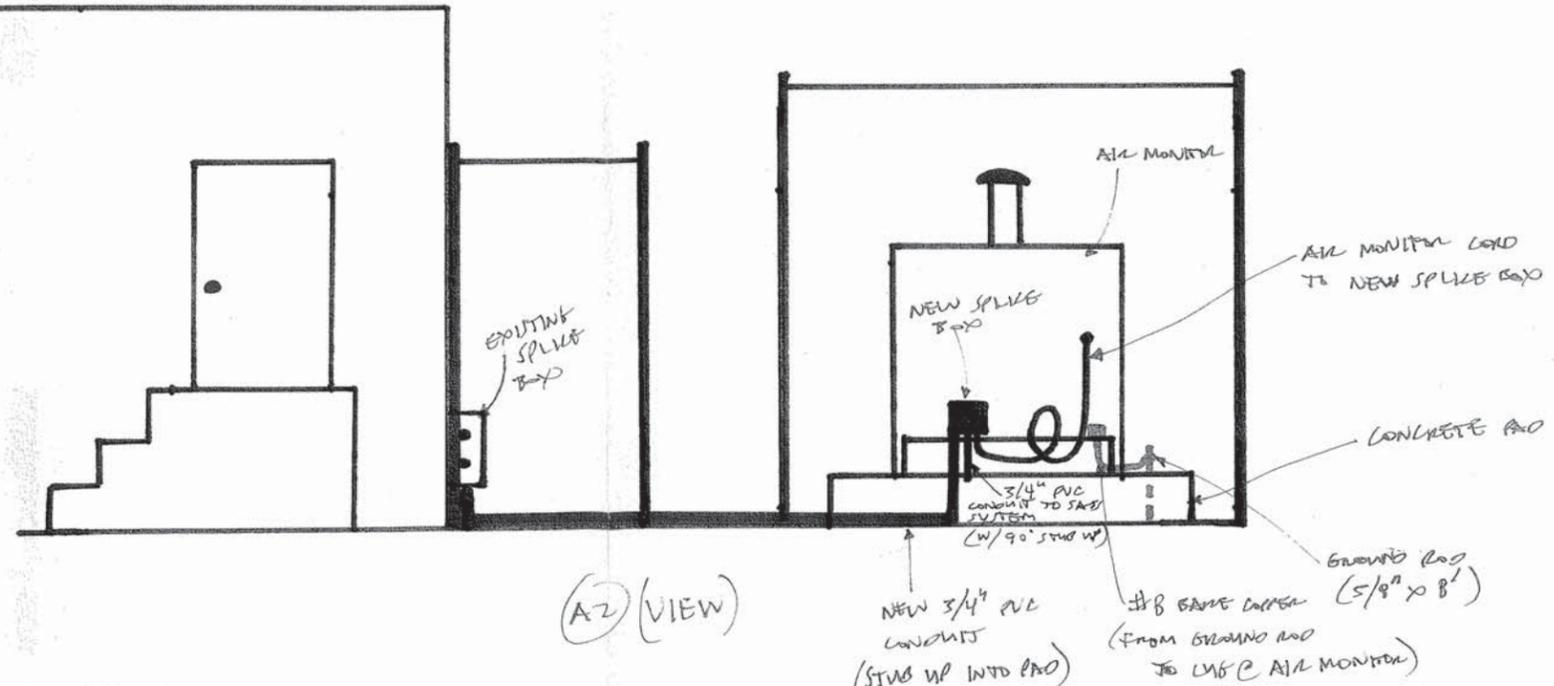
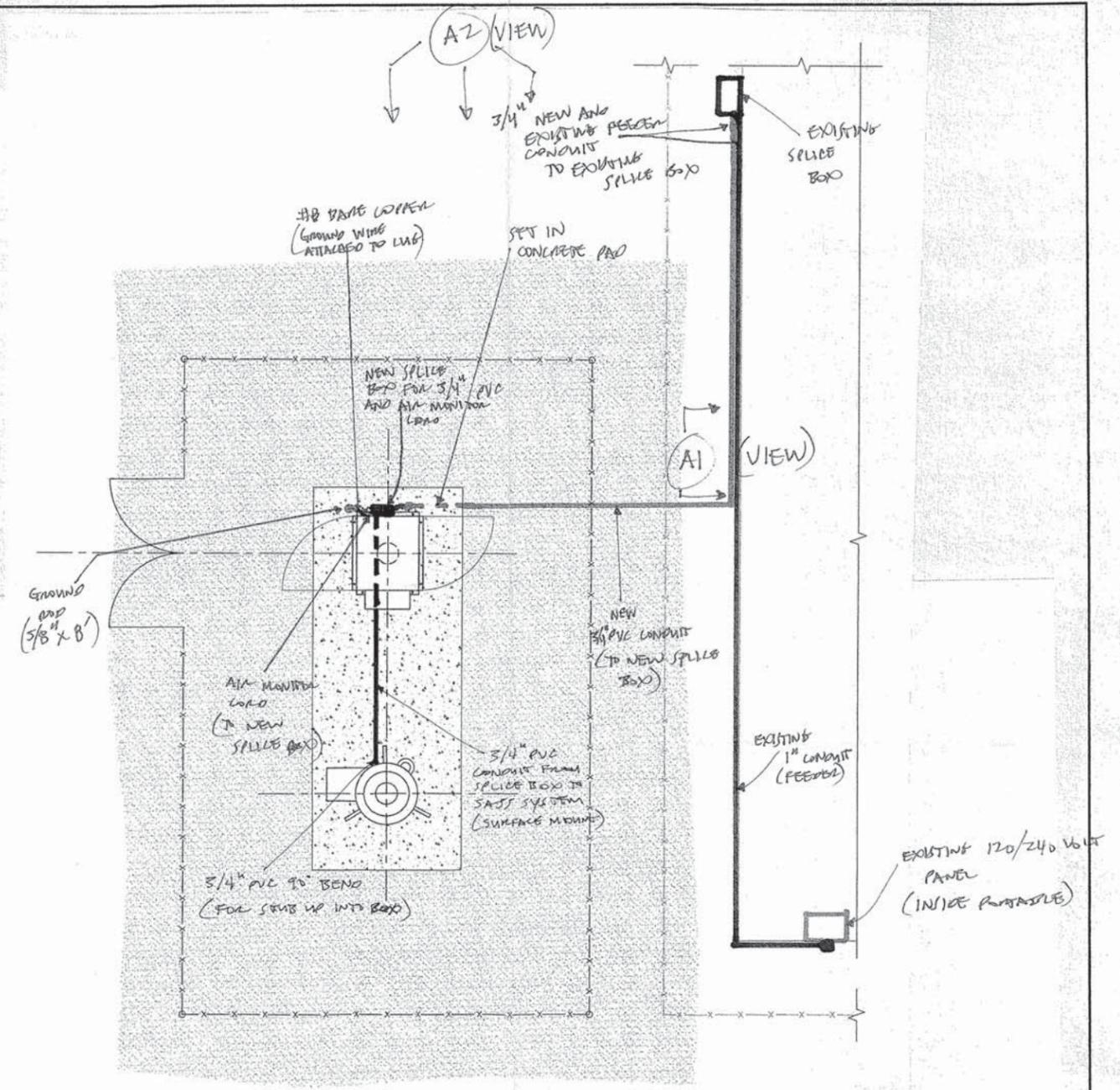
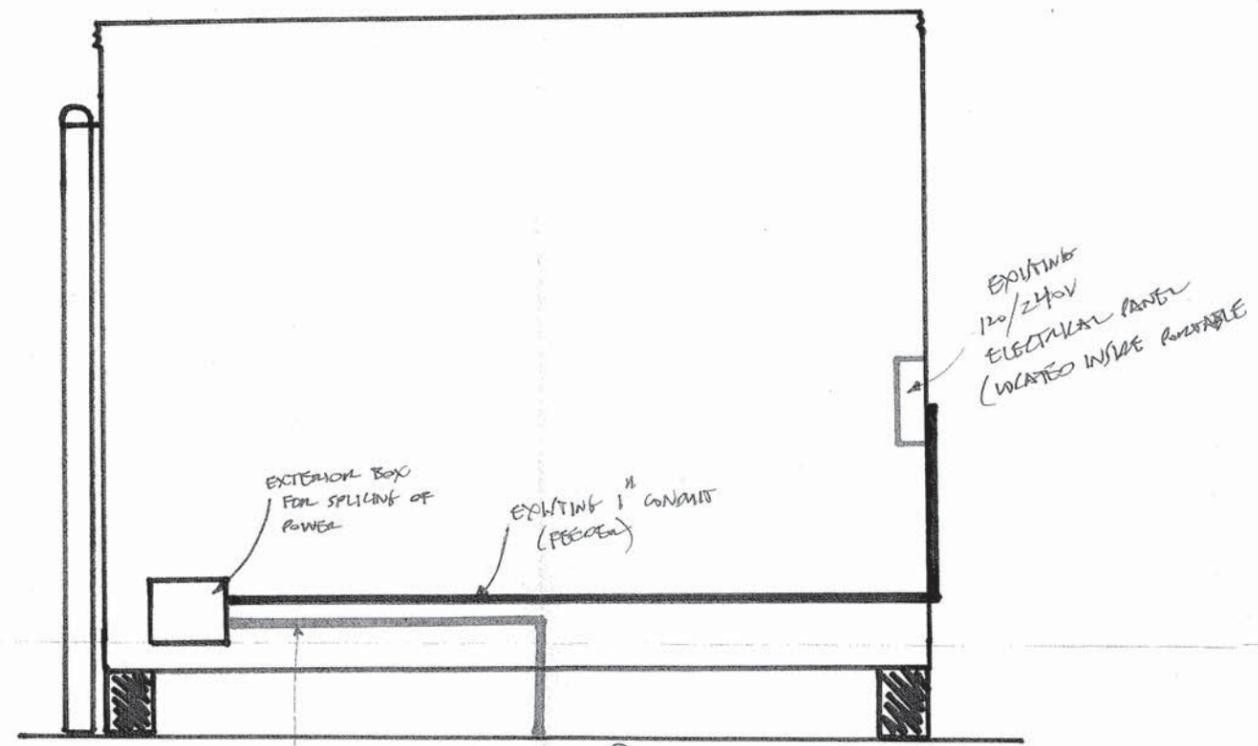
REV	DATE	COMMENT	JOB NO.	DRAWING NO.
			OAB02	X-470
			SCALE: VARIES	
			DATE: 3/26/2013	
			DRAWN BY: J. ARMADA	
			CHECKED BY: K. ROSSO	

CAT. NO. AD-0245.03  
 INV. NO. 21042

SHEET 3 OF 5



Jun 17, 2013 - 2:34pm. Plotted By: shanafflick  
 S:\13101 Oakland Army Base Design Package\613101 elec\Fig\_Skive - Standard\F-1\_AIR MONITOR LOCATION #1 - WEST GATEWAY.dwg



MORROW-MEADOWS CORPORATION  
 ELECTRICAL CONTRACTORS  
 PAT SAXTON  
 (510)562-1980  
 7677 OAKPORT STREET, SUITE 105  
 OAKLAND, CA 94621

PROJECT INFO.

AIR MONITOR LOCATION #3 - PLAN AND SECTION  
 PRESCOTT ELEMENTARY, 8TH STREET & CAMBELL, WEST OAKLAND  
 CITY OF OAKLAND, ALAMEDA COUNTY, CALIFORNIA

REV	DATE	COMMENT	JOB NO.	613101	DRAWING NO.
					E-1
					SHEET OF

## BAM-1020

Continuous Particulate Monitor



### Features

- U.S. EPA Federal Equivalent Method for PM<sub>10</sub> and PM<sub>2.5</sub> monitoring
- Long term unattended remote operation of up to 60 days between site visits
- Very low operating costs
- Automatic hourly span checks
- Fast and easy field audits using common FRM audit tools
- Bench top or equipment rack mounting in mobile or stationary shelters
- Rugged anodized aluminum, stainless steel, and baked enamel construction
- Highly accurate, reliable, and mechanically simple flow system
- Hourly filter advances minimize effects on volatile compounds
- Advanced Smart Heater technology precisely controls sample relative humidity
- Integrated datalogger allows the connection of up to six additional meteorological sensors
- Internal memory provides up to 182 days of digital data storage
- Data retrieval through RS-232 serial ports using direct PC connections, modems, printers, or digital data collection systems

### Designations

The Met One Instruments Model BAM-1020 has longstanding U.S. EPA designation as a Federal Equivalent Method (FEM) for continuous PM<sub>10</sub> particulate monitoring. In addition, the BAM-1020 is the world's first instrument to obtain U.S. EPA FEM designation for continuous PM<sub>2.5</sub> monitoring, when configured with the specified settings and accessories. The BAM-1020 has also obtained corresponding certifications in other countries and regions.

### Principle

The BAM-1020 automatically measures and records airborne particulate concentration levels (in milligrams or micrograms per cubic meter) using the industry-proven principle of beta ray attenuation. Thousands of BAM-1020 units are currently deployed worldwide, making the unit one of the most successful air monitoring platforms in the world.



### Operation

Each hour, a small <sup>14</sup>C (carbon-14) element emits a constant source of high-energy electrons (known as beta rays) through a spot of clean filter tape. These beta rays are detected and counted by a sensitive scintillation detector to determine a zero reading. The BAM-1020 automatically advances this spot of tape to the sample nozzle, where a vacuum pump then pulls a measured and controlled amount of dust-laden air through the filter tape, loading it with ambient dust. At the end of the hour this dirty spot is placed back between the beta source and the detector thereby causing an attenuation of the beta ray signal which is used to determine the mass of the particulate matter on the filter tape and the volumetric concentration of particulate matter in ambient air.



### Data Collection

All data files are accessible via an industry standard two-way RS-232 serial port using common terminal programs or Met One Instruments software such as MicroMet Plus® and Comet.™ The data is available in a variety of formats including daily reports, last record, all data, and new records since last download. Configuration files, error logs, and flow statistics are also available. Digital dataloggers may obtain data from the unit using serial port commands or by recording the automatic hourly serial output.

### Error Handling

The BAM-1020 performs continuous user selected evaluation of a variety of criteria for data validation

including flow statistics and a comprehensive set of error codes including power failures, flow failures, hardware failures, tape errors, nozzle errors, span check errors, beta count errors, and more.

### Maintenance

The BAM-1020 is designed to run continuously with only monthly or bi-monthly scheduled maintenance—a single roll of filter tape will last more than 60 days. The BAM-1020 also contains a comprehensive self-test function which allows the unit to preemptively test itself for any mechanical failures in the tape control system.

**PARAMETER**

Operating Principle  
U.S. EPA Designations  
Approvals

**SPECIFICATION**

Measures ambient particulate concentrations using beta ray attenuation  
PM<sub>10</sub>: FEM (EQPM-0798-122), PM<sub>2.5</sub>: Class III FEM, (EQPM-0308-170)  
CE, NRC, TUV, California ARB, ISO 9001

**PERFORMANCE**

Accuracy Exceeds US-EPA Class III PM<sub>2.5</sub> FEM standards for additive and multiplicative bias  
Measurement Resolution 0.1 µg/m<sup>3</sup>  
Display Resolution 1 µg/m<sup>3</sup>  
Lower Detection Limit (2σ) 1 hour < 4.8 µg/m<sup>3</sup> (less than 4.0 µg/m<sup>3</sup> typical)  
Lower Detection Limit (2σ) 24 hour < 1.0 µg/m<sup>3</sup>  
Standard Range 0 – 1.000 mg/m<sup>3</sup> (0 - 1000 µg/m<sup>3</sup>)  
Optional Ranges 0 – 0.100, 0.200, 0.250, 0.500, 2.000, 5.000, 10.000 mg/m<sup>3</sup> (special applications)  
Measurement Cycle Time 1 hour  
Flow Rate 16.7 liters/minute adjustable 0–20 LPM range actual or standardized flow  
Filter Tape Continuous glass fiber filter tape, 30mm x 21m roll > 60 days/roll  
Span Check Automatic 0.800 mg (typical) span foil, verified hourly  
Beta Source <sup>14</sup>C (carbon -14), 60 µCi ±15 µCi (< 2.22 x 10<sup>6</sup> Beq), half-life 5730 years  
Beta Detector Type Photomultiplier tube with organic plastic scintillator

**ENVIRONMENTAL**

Operating Temperature 0 to +50°C  
Ambient Temperature -30° to +60°C  
Ambient Humidity 0–90% RH, noncondensing  
Sample Humidity Control Active Smart Heater module, 10–99% RH setpoint  
Enclosure Weatherproof enclosure or shelter is required

**INTERFACE**

User Interface Menu-driven interface with 8-line 40-character LCD display and dynamic keypad  
Analog Output Isolated 0–1 VDC output standard. 0–10 V, 4–20 mA, 0–16 mA switch-selectable  
Serial Interface RS-232 two-way serial port for PC or modem communications  
Printer Output Output-only serial port for data or diagnostic output to a PC or serial printer  
Telemetry Inputs Clock reset (voltage or contact closure), telemeter fault (contact closure)  
Alarm Contact Closures Data error, tape fault, flow error, power failure, maintenance  
Error Reporting User-configurable available through serial port, display, and relay outputs  
Memory 4369 records (182 days at 1 record/hr)

**ELECTRICAL**

Power Supply 100–230 VAC, 50/60 Hz. Factory configured.  
Power Consumption Less than 0.4 kw, 3.4 A, worst case with pump and smart heater running.

**PHYSICAL**

Weight 54 lbs (24.5 kg) without external accessories.  
Unit Dimensions Height = 12.25" (31 cm) Width = 17" (43 cm) Depth = 16" (40 cm).



**Standard Equipment**

- Operation Manual
- Automatic Span Membrane
- Internal Flow Sensor
- Internal Flow Controller
- Internal Filter Temperature, Pressure, and RH Sensors
- Six-Channel Datalogger for Accessory Sensors
- Serial Communications Cable
- Universal Power Cable
- Pump Control Cable and Air Tubing
- Rack Mounting Hardware
- Reusable Packing Materials
- Comet™ Data Collection Software
- Glass Fiber Filter Tape, One Roll

**Required Accessories**

- BX-802 EPA PM<sub>10</sub> Inlet (all units)
- BGI Inc. VSCC™ PM<sub>2.5</sub> Cyclone (PM<sub>2.5</sub> FEM units)
- BX-596 Ambient AT/BP Combo Sensor (PM<sub>2.5</sub> FEM units)
- BX-302 Zero Filter Calibration Kit, with leak test valve (PM<sub>2.5</sub> FEM units)
- BX-827 or BX-830 Smart Inlet Heater (PM<sub>2.5</sub> FEM units)
- BX-801 Inlet Tube Kit, with roof flange and support struts (most installations)
- Medo Linear Piston, or Gast Rotary Vane Vacuum Pump



**Optional Accessories**

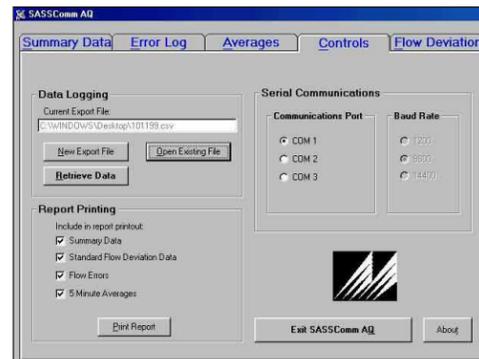
- BX-305 Leak Test Valve
- BX-308 Service Tool Kit
- BX-803 TSP Inlet, with Debris Screen
- BX-344 Inlet Cleaning Kit
- BX-592 Ambient Temperature Sensor
- BX-996 Modem Kit
- Custom-length inlet tubes and extension kits, max 16'
- Communications options including radio, cell, and satellite systems
- Weatherproof Outdoor Mini Enclosures BX-902 and BX-903
- Ambient RH, BP, WS, WD, and solar sensors



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# Specifications

Supplied Software, SASSComm allows the user to transfer data to Laptop PC, Modem, or Data Transfer Module.



- Analytes:** PM<sub>2.5</sub> Mass and Trace Metals  
 PM<sub>2.5</sub> Organic and Elemental Carbon  
 PM<sub>2.5</sub> Sulfate, Nitrate and other ions  
 PM<sub>2.5</sub> Elements
- Canisters:**  
 SASS Five (5), Four (4) Canisters with One (1) duplicate  
 SUPER SASS Four (4), or Eight (8) Canisters
- Programming:**  
 SASS Single Day set by Hot Key Command  
 SUPER SASS Single or Sequential Days set by Menu Command
- Flow Rate:** 6.7 Actual Liters/min (+0.1, -0.2)
- Inlet:** Sharp Cut Cyclone (SCC), (D<sub>50</sub> 2.5µm AED) Detachable from canister
- Power:** 110AC/60Hz (optional 230 AC/50 Hz)

# SASS/SUPER SASS™ Speciation Samplers

Met One's Speciation Samplers are designed to comply and exceed EPA Speciation requirements. Two models provide a choice for compliance monitoring: SASS is a 5 channel sampling system and SUPER SASS is 8 channel, multiple event sampling system. The SASS conforms to original EPA requirements and SUPER SASS adds benefits suggested by state and local authorities.

Both models use concepts pioneered by Met One Instruments, such as the contamination free Canister, solar radiation shield, and modular design.

SASS and SUPER SASS not only comply to EPA specifications they exceed the specifications, as proven in EPA and California Air Resources Board field studies.

#### SASS

- Portable integrated ambient particulate sampling system
- Inlet for PM<sub>2.5</sub> at 6.7 liter/minute sample rate
- Solar shield maintains cassettes to less than 5°C over ambient temperature
- Canister provides data integrity - contamination proof
- New multi-cell denuder and multiple filter medias



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<http://www.metone.com>



**Met One Instruments, Inc.**

# SASS/SUPER SASS™

## ► SUPER SASS

This unit offers all the features of the SASS plus it has sequential programming to allow multiple day operation. SUPER SASS will sample up to eight days depending on the number of sample channels used per day. SUPER SASS comes standard with four independent volumetric flow controllers, one for each sampler group.

## SUPER SASS, Additional Features

- Up to 8 Channel Operation
- One to Eight day Sampling, Sequential
- Automatic Volumetric Flow Controllers
- Each Channel may be operated independently
- Advanced Field Audit Screens

## ► Testing and Experience

The SASS and SUPER SASS are based on designs that have been field tested for eight years with 3 years of testing in the EPA program. This testing has proven the concept and helped to refine the design.

## ► Portability

Designed for programs on the move, both units offer superior flexibility and portability. SASS and SUPER SASS are composed of a portable pump box, tripod, sample head and controller, they are easy to carry and easy to install. Installation takes less than one hour.

## ► No Field Maintenance

The SASS allows all critical maintenance to be performed in the lab. Other instruments suffer contamination of inlet, manifold and PM2.5 separator because they must be serviced in the field. With the integrated canister every element of the sampler that is contacted by the sampled air stream is cleaned with each sample change.



## ► No Field Contamination

Sample Canisters are loaded in the lab, with blank filter cassettes. Sealed canisters are shipped to speciation field sites for deployment. After exposure the canisters are sealed for shipment to the lab. This approach circumvents contamination due to field handling of the sample.



## ► Temperature Control

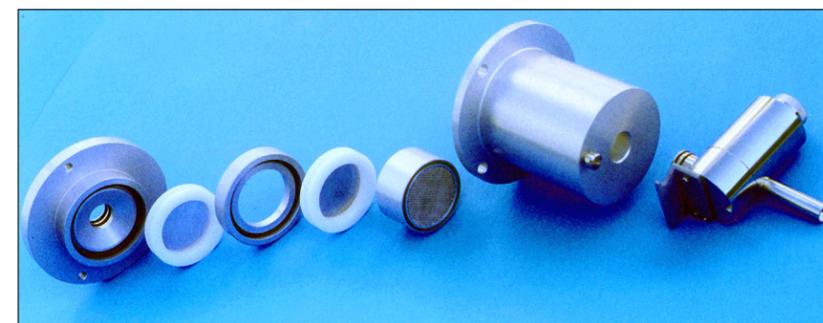
SASS incorporates a convective solar radiation shield to maintain the samples within 5°C of ambient temperature.

## ► Field and Lab Tested PM 2.5 Inlet

A Sharp Cut Cyclone (SCC) with a flow of 6.7 liters/min is integrated in every sampling canister to remove particles larger than 2.5µm aerodynamic diameter. Test report available upon request.

## ► Canister Configurations

The sample canister contains the SCC all necessary components for excluding particles above 2.5 µm aerodynamic diameter, for removing interfering gases, and for collecting particles including semi-volatile. The sampling canisters are designed to accommodate denuders and one or two filters for sampling of semi-volatile species, and for collection of gases such as nitric acid, ammonia, and



(4) Tandem Quartz for organic and elemental carbon, with backup filter for artifact correction, (5) Denuded carbon-impregnated filter for semi-volatile organic compounds.

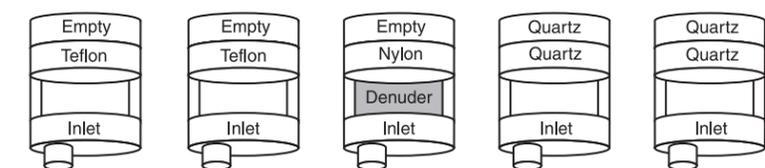


speciation

continuous

monitoring

formic acid. For example, a Teflon Nylon filter pair can be operated behind a nitric acid denuder to give inorganic ions and nitrate in the same cassette. Canisters can be used as follows: (1) Teflon filter for mass and trace metals, (2) Teflon or Quartz for inorganic ions by ion chromatography, (3) Denuded Nylon or impregnated filter for nitrate,



#1 Mass (grav) Metals (XRF)  
 #2 Ions (IC)  
 #3 Nitrate  
 #4 Organic & Elemental Carbon  
 #5 Replicate (shown for carbon)