

*“Save
Your
Breath
With* **NST[®]**
MODERN SAFETY TECHNIQUES

11388 Breininger Road * P.O.Box 87 * Hicksville,OH 43526
Phone: (800)542-6646 * (888)*MOD-SAFE* * (419)542-6645
Fax: (419) 542-6475 * Email Address: modsafe@bright.net

**SERVICE MANUAL
MODEL BA100BA-S1
BREATHING AIR PANEL**

WARNING: Do not attempt to operate this equipment without first reading and understanding the service manual enclosed with this device.

GENERAL OPERATION MANUAL

WARNING: The MST Breathing Air Panel Models:

- 1) WILL NOT remove Carbon Monoxide.
- 2) SHALL NOT be used when the air entering the filtering system is oxygen deficient. The MST Breathing Air Panel will not increase the oxygen content of the air.
- 3) SHALL NOT be used in an Immediately Dangerous to Life and Health Atmosphere (IDLH) unless it is used in conjunction with a Back-Up Escape system or a supplied air Self-Contained Breathing Apparatus (SCBA), where applicable.
- 4) CARBON MONOXIDE MONITOR will alarm if Carbon Monoxide levels exceed requirements for Grade "D" Breathing Air set forth by OSHA/CSA. If alarm should sound, remove respirator or activate SCBA and immediately move to safe breathable atmosphere. Have the proper qualified personnel examine the equipment and make the appropriate corrections before using again.
- 5) SHALL NOT have air inlet pressure greater than 150 PSIG static (10.4bar). Personal injury could result.
- 6) SHALL NOT have air outlet pressure that exceeds Manufacturers' Respirator/Hose Assembly pressure requirements. Personal injury could result.

The MST Breathing Air Panel is a Four Stage Filtration System designed to remove or reduce select contaminants found in compressed air lines while monitoring for carbon monoxide through the CO Monitor. The Breathing Air Panel can be connected directly to shop air from a standard compressed air source to help provide breathing quality air to face masks, helmets, hoods and other supplied air breathing apparatus.

GENERAL FILTER SYSTEM DESCRIPTION

(Refer to Figure No.1)

Air entering the MST Breathing Air Panel at the inlet (A) is usually contaminated with oil, water, dirt, rust, scale and gaseous Hydrocarbons. As the air passes through the First Stage (B) of the MST Prefilter, particulate matter is trapped and retained down to 0.3 microns. The air then enters the Second Stage (C) of the Prefilter which coalesces liquid contaminants down to 0.75 microns with an efficiency rating of 99.97% (meets Underwriters Laboratories Specification UL 586 for High Efficiency, Particulate, Air Filter Units). The liquid contaminants are trapped in the lower chamber of the prefilter and expelled out through the Automatic Float Drain (D). The Third and Fourth Stages (E & F) contain a deep bed of odor absorbing activated charcoal which collects various gaseous Hydrocarbons (such as oil fumes, benzene, etc.). The air is then passed through the Air Pressure Regulator (G), which is used to adjust the air pressure going to the respirator. A sample of the filtered air is taken at (H) and passed through the Carbon Monoxide Monitor (I). The Carbon Monoxide Monitor continuously checks the carbon monoxide levels per OSHA/CSA requirements and digitally displays the amount present in PPM, (parts per million). An audio alarm will alert operators if levels of carbon monoxide exceed OSHA/CSA requirements.

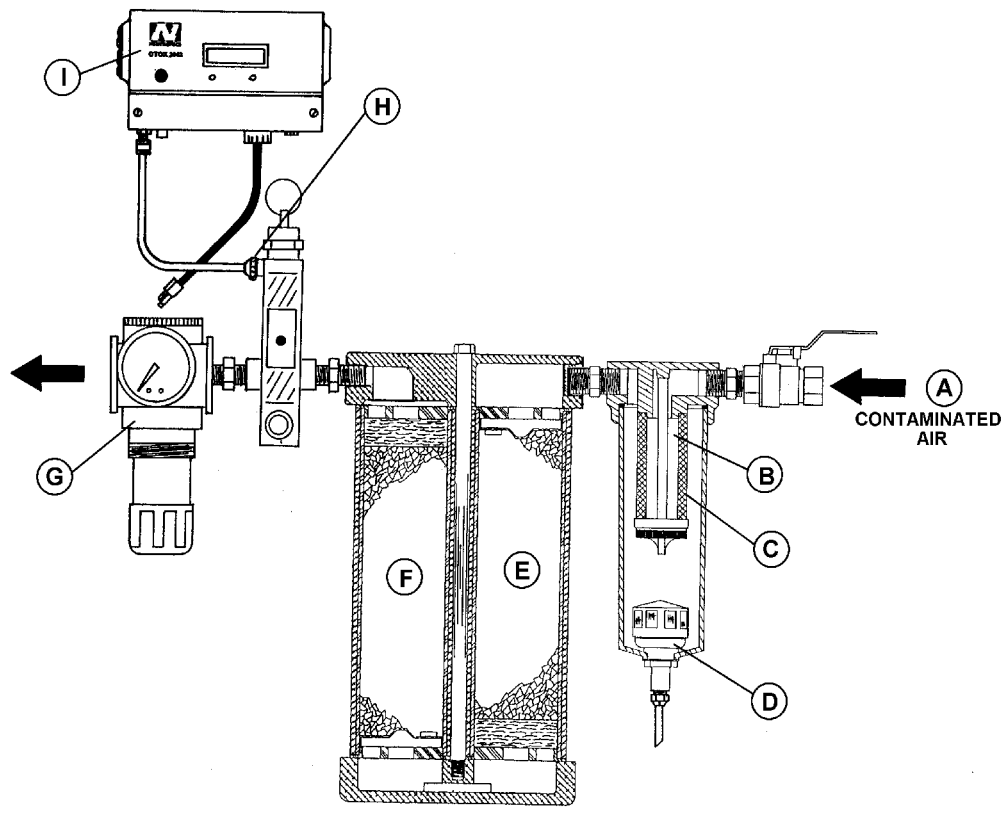


FIGURE NO.1

GENERAL INSTRUCTIONS

The MST Breathing Air Panel, a compressed air purifier, when used in accordance with the following instructions, will remove or reduce selected contaminants from compressed air lines.

WARNING: The MST Breathing Air Panels should not be used when the air entering the filter is oxygen deficient (air with a low oxygen content). The MST Breathing Air Panel will not increase the oxygen content of oxygen deficient air.

MST, Inc. strongly recommends that a complete safety program be initiated to ensure that the respiratory air is in compliance with all OSHA standards and other applicable laws regulating the use of supplied air respiratory systems. MST, Inc. recommends that the air quality be tested upon installation and periodically re-tested to ensure that the minimum requirements for breathing air are maintained.

WARNING: The MST Breathing Air Panels will not remove Carbon Monoxide.

The Carbon Monoxide Monitor in the Breathing Air Panel Model BA100BA-S1 is a standard non-intrinsically safe version. For purposes of this paragraph, "non-intrinsically safe" monitor is defined as one which must not be used in explosive atmospheres. Refer to the Monitor Information Manual for charging, calibration, and operating instructions. MST, Inc. will not assume any liability for accidents or personal injury resulting from the improper use of this equipment. Service on this equipment should only be performed by qualified personnel.

This system is to be used only by trained qualified personnel in accordance with a respirator program as outlined in OSHA Regulation 29 CFR 1910.134(b).

The air supply entering The MST Breathing Air Panel must meet two (2) criteria to ensure maximum efficiency of the MST filter system:

- 1) Temperature range should be between 68-150°F (20-65°C)
- 2) Liquid size range should be between 2-8 microns.

Conditioning equipment may be necessary, prior to the filter, to achieve this temperature range and bulk liquid removal.

WARNING: Maximum pressure supplied to this unit IS NOT to exceed 150 PSIG. Personal injury could result.

The Regulator 80075 is used to adjust the air pressure supplied to the operator(s) to maintain the correct air exchange inside the mask. Consult instructions on your particular breathing mask or hood for pressure requirements per NIOSH.

WARNING: DO NOT Exceed mask and hose assembly manufacturer's requirements for outlet pressure. Personal injury could result.

The filter cartridges used in the Breathing Air Panel Model BA100BA-S1 have an average life expectancy of (1) one month, (depending on the quality of the air in your compressed air lines) under normal conditions. MST, Inc. recommends changing all three (3) filter cartridges after one month of use unless conditions warrant more or less frequent replacement.

WARNING: If the Monitor's alarm should sound, remove mask or hood immediately and move to a safe breathable atmosphere. Have a proper qualified personnel examine the equipment and make the appropriate corrections before using again.

The Carbon Monoxide Alarm will sound to alert the operator that a problem has developed. The Monitor Alarm will sound due to one or more of the following conditions:

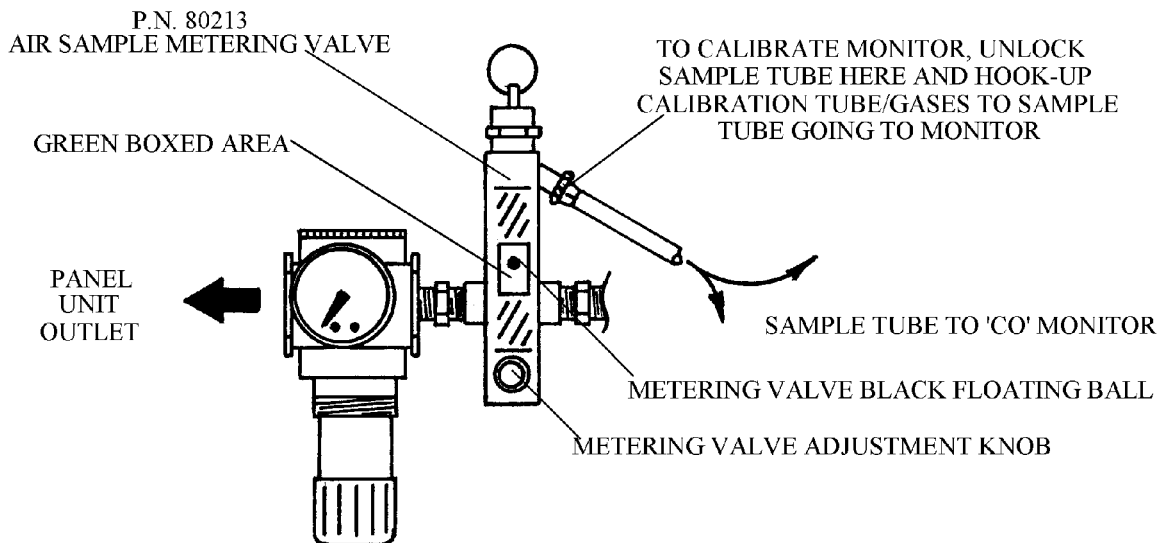
- A) Carbon Monoxide levels exceeding a pre-determined alarm set level is passing through the Breathing Air Panel. The Breathing Air Panel does not remove or reduce the Carbon Monoxide content in the compressed air. Examine the air compressor, the air compressor intake air quality, and the complete system. Have the proper qualified personnel make the appropriate corrections before using again.
- B) Monitor out of Calibration. Calibrate Carbon Monoxide Monitor as outlined in the Monitor Information Manual.
- C) The monitor's carbon monoxide sensor may be bad. See the Monitor Manual for further maintenance on monitor.

AIR SAMPLE TO MONITOR ADJUSTMENT

WARNING : SERIOUS INJURY could result if the AIR SAMPLE METERING VALVE is not properly adjusted. Proper sample air flow to 'CO' monitor is required for monitor to give correct 'CO' level readout.

AIR SAMPLE METERING VALVE ADJUSTMENT

- A) Pressurize system and set regulator for proper air flow to respirator(s).
- B) Adjust Air Sample Metering Valve's adjustment knob so the black floating ball is within the GREEN BOXED area etched on valve body. Proper air sample is now being metered to the 'CO' Monitor. Periodically check to be sure ball is floating in this area.



SERVICE INSTRUCTIONS

(Refer to Figure No.2)

**WARNING: Always turn off air supply and bleed air pressure before disassembling unit or
 SERIOUS INJURY COULD RESULT.**

MST, Inc. recommends replacing all three (3) filter cartridges after one (1) month of use unless conditions warrant more or less frequent replacement. To refill or replace the filter cartridges in the Breathing Air Panels, follow these steps:

1. PREFILTER FIRST/SECOND DUAL STAGE ELEMENT REPLACEMENT

- A) First unscrew Prefilter bowl Assembly (2). Clean in mild soap and water and blow dry with low pressure air.
- B) Remove Dual Stage Element (3) by unscrewing End Cap Retaining Nut (4) .
- C) Inspect the Prefilter Manifold (5) for dirt/contaminates and clean as required. Inspect "O"-Ring (6) for cuts, etc. and replace if required.
- D) Install new Dual Stage Element and tighten End Cap Retaining Nut. Be sure Element is seated squarely on Manifold boss and End Cap.
- E) Apply light film of petroleum jell on Bowl's beveled edge to provide good seal between Bowl and "O"-Ring. HAND TIGHTEN ONLY.
- F) Dispose of used Dual Stage Element according to local, state and federal regulations.

2. THIRD/FOURTH STAGE CARTRIDGE REPLACEMENT

- A) Loosen Bracket Screw (7) from Bracket (8) .
- B) Loosen the five Manifold Bolts (9) and remove the front two Bolts. Now slide out the Third (10) and Fourth (11) Stage Aluminum Tube Assemblies.
- C) Remove the End Cap (12) from Third Stage Aluminum Tube Assembly and slide old Third Stage Filter Cartridge (13) out of aluminum tube. Clean aluminum tube in mild soap and water, dry and install new Third State filter cartridge. Be sure the Flow Direction Arrow on Third Stage Filter Cartridge is pointing down. Remove End Sealing Label (14) and install new End Cap.
- D) Follow same procedure for the Fourth Stage Filter Cartridge (15) replacement as in step (C). Be sure the Flow Direction Arrow on Fourth Stage Filter Cartridge is pointing up. Also be sure to remove End Sealing Label before installing new End Cap.
- E) Now slide the Third and Fourth Stage Aluminum Tube Assemblies back in place and install the front two Manifold Bolts.
- F) Tighten Manifold Bolts in sequence from center outward to 100 inch-pounds (1.15 Kg-M). Repeat sequence and re-torque bolts to 250 inch-pounds (2.88 Kg-M).
- G) Dispose of used cartridges according to local, state and federal regulations.

3. FINAL CHECK AND CALIBRATION

- A) Pressurize system and check for leaks.
- B) Flush system with compressed air for five (5) minutes.
- C) Calibrate Carbon Monoxide Monitor as outlined in Monitor Information Manuals.

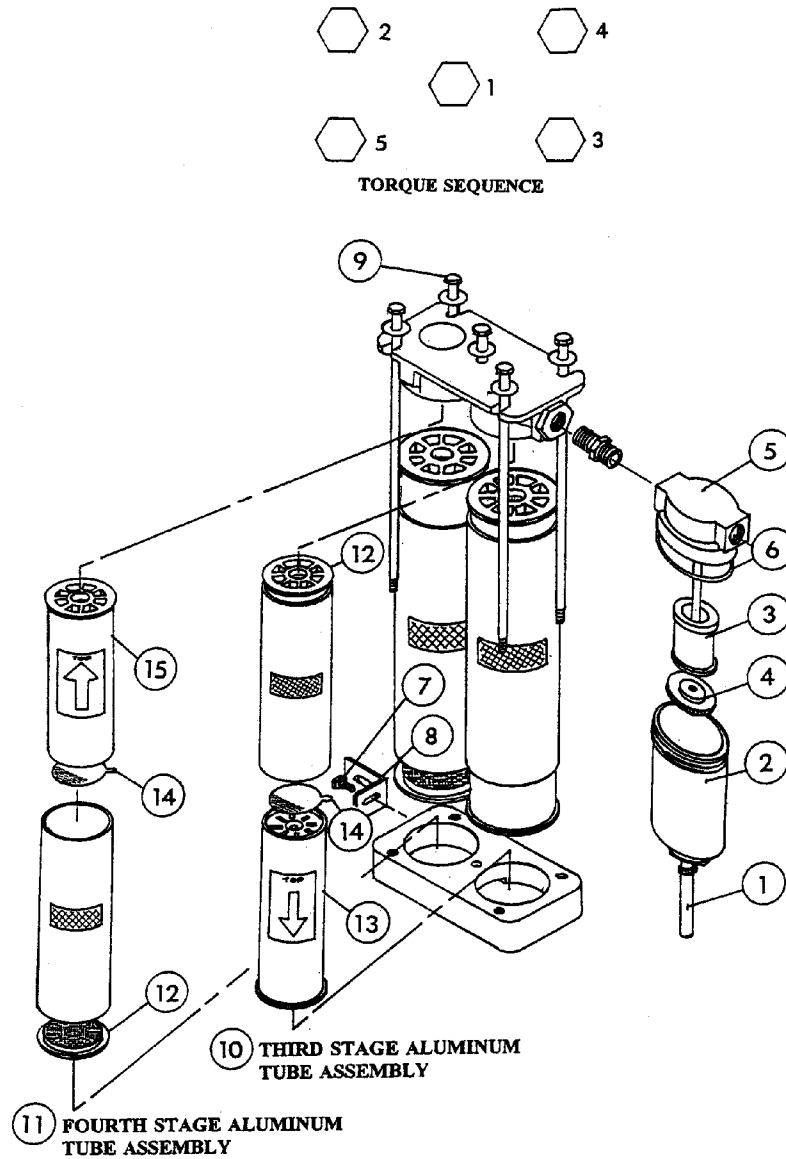


FIGURE NO.2

RECORD KEEPING

Record all periodical air quality checks, monitor calibration dates, filter cartridge change intervals and any other service performed on the MST Breathing Air Panel.

MST INC. SHALL NOT BE LIABLE FOR ANY INJURY, LOSS OR DAMAGE, (DIRECT OR CONSEQUENTIAL), ARISING OUT OF THE USE OF OR THE INABILITY TO USE THIS PRODUCT, BEYOND THE REPLACEMENT OF DEFECTIVE MATERIALS OR WORKMANSHIP. USER OF SUPPLIED AIR RESPIRATORS SHOULD EVALUATE THEIR OWN PARTICULAR APPLICATION AND PERFORM THEIR OWN TESTS FOR AIR QUALITY TO DETERMINE THE SUITABILITY FOR USE OF THIS PRODUCT.

For further information, or questions about service or maintenance care of this unit, contact your local distributor or MST, Inc. at (800) 542-6646.

MST, INC.
SERVICE RECORD
BREATHING AIR PANEL MODEL BA100BA-S1

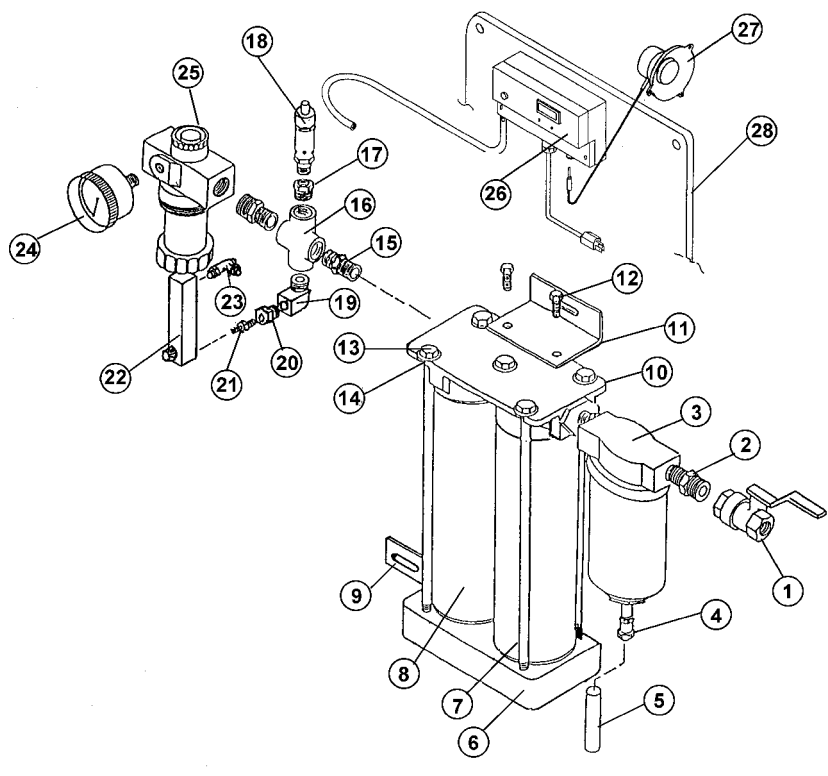
DATE OF SERVICE	SERVICE PERFORMED

**SPECIFICATIONS
BREATHING AIR PANEL
MODEL BA100BA-S1**

INLET PRESSURE (MAX.)	150 PSIG STATIC (10.4 BAR)
RATED AIR FLOW (MAX.)	100 SCFM (47.2L/s)
OPERATING PRESSURE	100 PSIG DYNAMIC (6.9 BAR)
OUTLET PRESSURE RANGE	0-125 PSIG (0-8.6 BAR)
OPERATING TEMP. RANGE	68-150°F (20-65°C)
OUTSIDE DIMENSIONS	24" L x 24" W x 5.5" (610 mm x 610 mm x 140 mm)
WEIGHT (LESS MONITOR)	25 LBS. (11.3 Kg.)
REPLACEMENT FILTER SET	FB100

BREATHING AIR PANEL MODEL BA100BA-S1 PARTS

1	80347, (1), 3/4" BALL VALVE	15	S608-008, (2), HEX NIPPLE - 1/2"
2	S608-009, (2), HEX NIPPLE -3/4"	16	80348, (1), CROSS - 1/2"
3	80104, (1), PREFILTER-100 SCFM	17	S638-008, (1), 1/2" X 1/4" HEX BUSHING
4	80051, (1), TUBE LOCKING COLLAR	18	80014, (1), PRESSURE RELIEF VALVE
5	S711-020, (1), DRAIN TUBE	19	S623-004, (1), 1/2" x 90° ST. ELBOW
6	80001, (1), BLUE BASE	20	S638-008, (1), 1/2" x 1/4" HEX BUSHING
7	80005, (1), A1 TUBE THIRD STAGE	21	S608-002, (1), 1/8" x 1/4" HEX NIPPLE
8	80005, (1), AL TUBE FOURTH STAGE	22	80213, (1), FLOWMETER
9	80114, (1) BASE BRACKET	23	80261, (1) 90° TUBE LOCK FITTING
10	80083, (1), BLUE MANIFOLD	24	80076, (1), PRESSURE GAUGE, 0-160
11	80009, (1), MANIFOLD BRACKET	25	80075, (1), REGULATOR
12	S006-148, (3), BRACKET BOLTS	26	80077, (1), OTOX 2002 MONITOR
13	S011-040, (5), MANIFOLD BOLTS	27	8008403, (1), REMOTE ALARM
14	12021, (5), MANIFOLD WASHERS	28	80111, (1), MOUNTING BOARD



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MATERIAL SAFETY DATA SHEET

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Revision Date: 2/17/95Revision No.: 2**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Name: Nuchar WV-B Activated Carbon
 Chemical Name: Activated Carbon
 Chemical Family: Carbon
 Formula: C
 CAS Registry Number: 7440-44-0

Manufacturer: **WESTVACO CORPORATION**
 Carbon Department
 Washington Street
 Covington, VA 24426

Telephone Numbers:
 Transportation Emergencies:
 CHEMTREC (U.S.A.): (800) 424-9300 (24 hours)
 CHEMTREC (International): (202) 483-7616 (24 hours, call collect)
 Product Information: (703) 962-1121 (EST, 8:00 a.m.-5:00 p.m., M-F)

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>Components</u>	<u>CAS #</u>	<u>% by Wt.</u>	<u>Hazardous*</u>
Carbon	7440-44-0	> 95	Yes
Phosphoric Acid	7664-38-2	≤ 5	Yes

* By OSHA definition, 29 CFR 1910.1200 (See Section 3 for Hazards Identification, Section 8 for Exposure Guideline, and Section 16 for other information).

3. HAZARDS IDENTIFICATION**EMERGENCY OVERVIEW**

This product is an odorless black granular material. Never enter a confined space containing activated carbon since it will adsorb oxygen and asphyxiation may result. Prolonged or repeated exposure to dust may cause eye and respiratory tract irritation.

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Revision Date: 2/17/95
Revision No.: 2**3. HAZARDS IDENTIFICATION (Continued)****Potential Health Effects:**

- | | |
|--|--|
| Routes of Entry: | · Inhalation, ingestion, eye and skin contact |
| Medical Conditions Aggravated by Exposure: | · None documented |
| Eyes: | · Irritant. Not corrosive |
| Skin: | · Is not a primary skin irritant, skin sensitizing, or corrosive agent |
| Ingestion: | · LD ₅₀ (rats) indicates that it is not toxic. |
| Inhalation: | · Possible irritation of upper respiratory tract |
| Target Organ Effects: | · Eye irritant |
| Chronic Effects (Cancer Information): | · NTP: Not listed |
| | · IARC: Not listed |
| | · OSHA: Not regulated |

4. FIRST AID MEASURES

- | | |
|-------------|--|
| Eyes: | · Promptly flush eyes with running water for 15 minutes, including water under eyelids. Consult a physician if irritation develops. |
| Skin: | · Wash affected area well with soap and water. Get medical help if irritation develops. |
| Ingestion: | · Give 2-3 glasses of milk or water to dilute. Contact physician or poison control center promptly for instructions. If vomiting occurs, give more fluids. |
| Inhalation: | · Remove to fresh air. Get medical help if irritation develops. |

5. FIRE FIGHTING MEASURES

- | | |
|---|---|
| Flammable Properties: | |
| Hazardous Combustion Products: | · Material will burn in a fire, releasing combustion products of carbon monoxide, carbon dioxide, water, and phosphorus pentoxide. |
| General Hazards: | · Other materials adsorbed onto the carbon may also be released. |
| Extinguishing Media: | · Water fog, fire fighting foam, dry chemical, or carbon dioxide |
| Fire Fighting Instructions: | · Remove all carbon from the building. Fire fighters should wear full protective gear and use self-contained breathing apparatus with a full facepiece. (MSHA/NIOSH approved or equivalent) |
| Other Information: | |
| Flashpoint: | · Not applicable |
| ASTM Ignition Temperature, D4366: | · 420-450°C |
| Flammability Limits in Air (% by volume): | · LFL: Not applicable |
| | · UFL: Not applicable |

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Revision Date: 2/17/95Revision No.: 2**6. ACCIDENTAL RELEASE (SPILL MEASURES)**

- Notify safety personnel for large spills. Avoid generation of airborne dust. Scoop up solid for recovery or disposal. Those involved in clean-up need protection against skin and eye contact and inhalation of dust or mist.

7. HANDLING AND STORAGE

- Handling:
- Follow good handling and housekeeping procedures, avoiding spills, accumulation of dust, and generation of airborne dust.
 - Avoid prolonged contact with skin and eyes.
 - Avoid inhalation of dust.
 - Wear rubber gloves and safety glasses or goggles.
 - Use with adequate ventilation.
 - Wash thoroughly after handling.
- Storage:
- Store in a sealed container in a clean, dry, well-ventilated area away from strong oxidizers, ignition sources, combustible materials, and heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

- Engineering Controls:
- Use general and local exhaust ventilation for nuisance dust and to prevent irritating concentrations of dust or mist in the workplace. Ventilation requirements will depend on the process and should be adequate to avoid exceeding the recommended TLV's.
- Eye Protection:
- Wear safety glasses with side shields, safety goggles, or a face shield, especially in dusty conditions. Provide an eye wash station nearby.
- Skin Protection:
- Wear work or disposable gloves and long sleeve shirts to prevent long term exposure.
- Respiratory Protection:
- Wear a NIOSH approved dust mask to limit exposure. An approved self-contained breathing apparatus with full facepiece is recommended for nonroutine or emergency conditions for inhalation protection.
- Other Protective Equipment:
- Wear clothing to limit skin contact, i.e., aprons, coveralls, long sleeve shirts, etc.
- Exposure Guidelines
- OSHA and ACGIH suggest that exposure to any dust or mist be kept below the level of a nuisance particulate. For particulates not otherwise regulated, the OSHA PEL for the respirable fraction is 5 mg/m³ and for total dust the OSHA PEL is 15 mg/m³. The ACGIH threshold limit value for particulates not otherwise classified (PNOC) is 10 mg/m³ for an 8-hour TWA. OSHA PEL and ACGIH TLV for phosphoric acid is 1 mg/m³ for an 8-hour TWA and 3 mg/m³ for a 15-minute STEL.

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Revision Date: 2/17/95Revision No.: 2**9. PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)**

Boiling Point, °C:	4000	Apparent Density, lbs/ft ³ :	14 - 19
Melting Point, °C:	3500	Solubility in Water:	Insoluble
Freezing Point, °C:	Not applicable	Water Solubles, % max:	4.0
Vapor Pressure, mm Hg:	Not applicable	Physical State:	Solid
Surface Area (Nitrogen BET Method), m ² /g:	1400 - 1600	Appearance:	Black granules
Total Pore Volume, cm ³ /g:	2.2 - 2.5	Odor:	Odorless

10. STABILITY AND REACTIVITY

Chemical Stability:	• Stable
Conditions to Avoid:	• Heat and ignition sources, strong oxidizers, and combustible materials
Hazardous Decomposition Products:	• CO, CO ₂ , P ₂ O ₅
Hazardous Polymerization:	• None

11. TOXICOLOGICAL INFORMATION

Eyes:	• Irritant
Skin:	• Not a primary skin irritant, sensitizing, or corrosive agent
Inhalation:	• Not established
Ingestion:	• Oral LD ₅₀ > 5g/kg (rats)
Subchronic Effects:	• Not established
Teratology (Birth Defects):	• Not established
Mutagenicity (Genetic Effects):	• Not established

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:	
• LC ₅₀ (minnows):	Not established
• Effect of low concentrations on aquatic life is unknown.	
Chemical Fate Information:	Not established

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Revision Date: 2/17/95Revision No.: 2**13. DISPOSAL CONSIDERATIONS**

Activated Carbon is not classified as a hazardous waste. Follow federal, state, and local regulations for industrial waste disposal. Incineration or landfilling in permitted facilities is recommended.

14. TRANSPORT INFORMATION

DOT Description:
 Proper Shipping Name:
 Hazard Class:

- Carbon, activated
- Nuchar Activated Carbon was tested according to the IMDG Code "Self-Heating Test for Carbon" and is not considered spontaneously combustible. Therefore, Nuchar Activated Carbon is not subject to the provisions contained in the IMDG Code for "Carbon, activated."

UN/NA Number:

- Not applicable

15. REGULATORY INFORMATION

U.S. Federal Regulations:

OSHA (29 CFR 1910.1200):
 CERCLA (40 CFR 302.4):

- Air contaminate, Table Z-1-A
- Phosphoric acid is listed as a CERCLA hazardous substance, RQ=5000 lbs

RCRA (40 CFR 261.33, 261.20-24):

- Listed Hazardous Waste: No
- Exhibits characteristics of hazardous waste: No

SARA Section 312 (40 CFR 355)
 Hazard Category:

- Physical Hazards: None known
- Health Hazards: Eye irritant

SARA Section 313:

- This product contains phosphoric acid which is subject to the reporting requirements of SARA Title III, Section 313.

Toxic Substance Control Act:

- Listed in the TSCA inventory of chemicals, 7440-44-0.

State Right to Know Acts (MA, NJ, PA):

- Component subject to reporting is:
 Phosphoric acid ≤ 10%

California Proposition 65:

- The required chemical analyses and risks assessments were performed on this product. Results indicate that there are no significant risks (or observable effects) as defined by this statute, associated with this product under conditions of normal use.

International Regulations:

Canada (DSL):
 Canada (NPRI):

- Listed in inventory: 7440-44-0
- This product contains phosphoric acid which is subject to the reporting requirements of NPRI.

Canada (WHMIS):
 Europe (EINECS):
 Japan (MITI):
 Australia (AICS):

- Activated carbon is regulated under WHMIS
- Listed in inventory: 2311533
- Not applicable
- Listed in inventory: 7440-44-0

FCC:

- Nuchar activated carbon meets all specifications set forth in the 1981 edition and later supplements of the Food Chemicals Codex.

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Revision Date: 2/17/95Revision No.: 2**16. OTHER INFORMATION**

Hazard Rating:

HMIS:

- Health - 1
- Flammability - 1
- Reactivity - 0
- Protective Equipment - To be set by user

Revision Summary:

- Add FCC statement and correct composition

Supersedes:

- 5/18/94

ABBREVIATIONS

1.	ACGIH	American Conference of Governmental Industrial Hygienists
2.	BOD _x	Biochemical Oxygen Demand (After x Days)
3.	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
4.	CFR	Code of Federal Regulations
5.	COD	Chemical Oxygen Demand
6.	cps	Centipoise
7.	DOT	Department of Transportation
8.	EPA	Environmental Protection Agency
9.	HMIS	Hazardous Material Information System
10.	IARC	International Agency for Research on Cancer
11.	LC ₅₀	A single calculated concentration in air or water resulting in 50% mortality of a group of test animals.
12.	LD ₅₀	A single calculated dose of a material expected to kill 50% of a group of test animals.
13.	LEL	Lower Explosive Limit in air
14.	MSHA	Mine Safety and Health Administration
15.	NIOSH	National Institute for Occupational Safety and Health
16.	NTP	National Toxicology Programs
17.	OSHA	Occupational Safety and Health Administration
18.	PEL	Permissible Exposure Limit established by OSHA
19.	SARA	Superfund Amendments and Reauthorization Act
20.	TLV	Threshold Limit Value
21.	TSCA	Toxic Substances Control Act
22.	TOC	Total Organic Carbon
23.	UEL	Upper Explosive Limit in air