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BATTERY USER'S HANDBOOK

FEATURING INFORMATION ON:

BATTERY CLEANING

ACID SPILL CONTROL

REGULATORY HIGHLIGHTS

BATTERY ROOM SAFETY INSPECTIONS

BASIC CHEMISTRY FOR BATTERY USERS

CONTENTS:

Section 1 BATTERY CLEANING

WHY CLEAN AND NEUTRALIZE BATTERIES?

Clean batteries last longer and achieve peak performance. Dirt, oils, and acids on a battery case (even in small quantities) diminish battery performance. Wet acid, even dry acid salts allow a trickle discharge and shorts. These shorts or surface currents can cause the battery to overheat, catch fire, and even explode. Controlling electronics can be "fooled" by these currents and equipment can shut down. Personnel can receive shocks and acid burns. Acid causes corrosion of metals. Repair and replacement increase. Battery and equipment warranty claims are challenged because of suspect battery cleaning practices and abuse.

Safe cleaning and neutralizing is a good battery management practice in both motive and stationary batteries.

Regular cleaning and neutralizing will:

- Eliminate corrosion damage to batteries and related equipment.
- Reduce the time required to effectively clean battery.
- Minimize the risk of shocks and acid burns from acid covered batteries.
- Eliminate acid caused shorts, trickle discharge, and resultant overheating.
- Improve battery performance and longevity.

EFFECTIVE CLEANING TOOLS, METHODS, AND CHEMICALS

Cleaning/Neutralization frequency varies. Batteries perform better and last longer when cleaning frequency is increased. When a battery top is visibly dirty the damage has already begun.

PREPARING TO CLEAN

For ease of cleaning and to eliminate the potential of acid damage motive battery tops need to be cleaned and neutralized at least monthly. Stationary batteries should be cleaned and neutralized quarterly. Of course, frequency depends upon the operating environment. Clean only when the battery is "idle". Be sure that vents, service ports, caps and flame arrestors are in place and in proper condition before cleaning begins.

Tools used to clean batteries must be selected carefully. Aggressive brushes and wipes can damage the battery case. Metallic brushes and other conductive tools may shock the user or cause sparks.

Personal protective equipment must be selected carefully. Battery acid can damage eyes, skin, and clothing. Splash protection for eyes and acid resistant gloves are a minimum requirement. Chemically resistant face shields, aprons, and boots are also suggested.

Chemicals used on other surfaces are often inappropriate on batteries. Non-corrosive , water based battery cleaning products are all that should be used. For user safety and environmental regulatory compliance the neutralizing cleaning liquid should contain no hazardous chemical ingredients. Even some products labeled "Battery Cleaner" must be avoided because of hazardous ingredients and damage to batteries and related equipment. Stationary battery plastics are very easy to damage with cleaning chemicals, greases, and oils.

Summarizing!

Use proper personal protective equipment, non-damaging and non-conductive tools, and safe and effective cleaning/neutralizing chemicals. Clean more often than your eye tells you to. With batteries, when you see the dirt and acid the damage is already taking place.

AVOIDING COMMON CLEANING MISTAKES AND HAZARDS

Mistake #1 - Failure to clean batteries regularly.

Consequences - All lead-acid batteries (even sealed valve-regulated "maintenance free") become acid and dirt covered in use. Acid migrates through those events and porous lead posts. Battery gassing, charging, discharging, specific gravity checks, equalization of electrolyte, load testing, and watering will leave acid salts on the case. Electrolyte on the exterior can cause current to run across the battery causing it to overheat and, in some cases to burn or explode. Finally, corrosion damage occurs and battery system performance deteriorates when cleaning/neutralization are overlooked.

Mistake # 2 - Neutralizing with dry alkaline chemicals like soda ash or bicarb.

Consequences - These chemicals have no detergent cleaning power. They react with acid to cause dangerous splatter and splash. Alkaline powders form a chemical paste. A white chemical stain results. Residual alkaline salts conduct current and cause unsafe shorts.

Mistake #3 - Washing batteries with water only.

Consequences - The acid is diluted but not neutralized by water. Acid vapors fill the air. The acid is washed onto the floor and down the drain or into the soil. Environmental laws are violated and fines can result. Making floors and equipment wet with acidified water is a leading cause of corrosion damage.

Mistake #4 - Cleaning batteries with petroleum based chemicals.

Consequences - These chemicals are hazardous and flammable. Do not use mineral spirits, kerosene, acetone, vinyl top dressing, or lacquer thinner. These chemicals will damage batteries and related equipment by cracking and crazing plastic and rubber. Petroleum distillates don't neutralize the acid. The clean-up waste is hazardous.

Mistake #5 - Washing batteries with common alkaline degreasers.

Consequences - Common degreasers can damage battery plastics, rubber, paint, and metal. There use can violate battery manufacturer warranty requirements. These alkaline (high pH) cleaners are hazardous and should not be put down the drain. They are also unnecessarily hazardous to employees.

Acid Leaks - Common Causes and Detection

Acid leaks usually start small. Those leaks can indicate improper operating conditions or handling practices. Leaks may also indicate pending failure of the battery itself.

Early leak detection helps with determination of cause and a correction before a complete and dangerous failure can occur.

Common Causes of Battery Leaks

- Cracking battery posts by over torquing cable clamps and connectors.
- Using battery posts as handles to move the batteries.
- Dropping batteries during handling.
- Exposure to harsh chemicals and greases.
- Failure to keep watering devices, vents, flame arrestors, and cell caps in proper operating condition.
- Shifting of racks or floors.
- Seal failure of cell covers.

SECTION 2 ACID SPILL CONTROL

HANDLING ACID SPILLS SAFELY AND EFFECTIVELY

Acid spills are common (almost unavoidable) in battery rooms. When acid spills occur it is critical to minimize.

1. Health and safety risk to personnel and the environment.
2. Damage to batteries, equipment, and surrounding surfaces
3. Time to neutralize , absorb, and clean-up.
4. Disposal costs of waste materials.
5. Regulatory compliance risks and fines.

O.S.H.A.'s Hazard Communication Standard calls the rupture of containers or equipment resulting in uncontrolled release of a hazardous chemical a "foreseeable emergency".
Battery electrolyte (sulfuric acid) spills must be anticipated. Proper personal protective equipment and spill neutralizing absorbers must be in place. (See enclosed reprint OSHA 1910-491 and OSHA 1910-178.)

O.S.H.A.'s Hazardous Waste Operations and Emergency Response (HAZWOPER) requires the training of Emergency Response Team for the Site. Battery acid spills require this training. OSHA exempts incidental spills from this particular training requirement. But all acid spills must be neutralized and cleaned-up safely and properly. And the E.P.A. Resource Conservation and Recovery Act (R.C.R.A.) has very demanding waste disposal guidelines.

AVOIDING COMMON ACID SPILL CONTROL MISTAKES

Mistake #1 TURN ON THE WATER HOSE.

- Not a Neutralizer — Water is not a neutralizer. Gallons are required to even begin to dilute the acid.
- Dangerous — Water added to acid splashes and creates acid fumes and mist.
- Hazardous Waste — A large pool of acidified water now presents a significant disposal problem. It can't legally be put in sewer or the soil.
- Damage — The area stays wet and acid fumes fill the air. Corrosion damage to floors and equipment continues. People slip and fall.

Mistake #2 USING SODA ASH OR OTHER ALKALINE POWDERS

- Non-complaint with regulations — Bags of alkaline chemicals are not labeled for use in neutralization of hazardous corrosive spills. O.S.H.A.'s "employee right to know" is violated.
- Dangerous — A vigorous splatter and splash reaction occurs and the spill spreads. Dangerous asphyxiating gas can be created. Heat is generated. Alkalines cannot absorb or dike to contain movement of the spill.
- Neutral? — Alkalines can easily over neutralize creating an equally hazardous high pH corrosive outcome.
- Expensive — Clean-up is difficult. Proper disposal of the wet paste will likely require hazardous waste disposal expense.
- Damage — The area stays wet. A chemical film remains when drying finally occurs.

Mistake # 3 APPLYING ABSORBING PADS AND PILLOWS

- Leaks — Uneven floors and equipment supports leave gaps and acid escapes pick-up.
- Not Neutral — The dripping pads are full of acid. The corrosion hazard is not eliminated. No neutralization has occurred. (Even so-called neutralizing pads are not able to eliminate the hazard.) Most melt and burn at rather low temperatures with emission of carbon monoxide.

- Hazardous Disposal Waste Expense — Hazardous waste disposal is the likely option. The expense is very high.

- Damage — The area retains a wet film of acid and acid fumes fill the air. Corrosion damage to floors and equipment continues.

SECTION 3 REGULATORY HIGHLIGHTS

Business and industry operate under a wide variety of regulations. Battery users are no exception. Battery related regulations have been written by O.S.H.A., D.O.T., E.P.A. and local agencies.

This handbook does not attempt to reprint these lengthy and ever changing regulations. The reader will want to do his own in-depth regulatory investigation to assure compliance.

These regulations can be organized into roughly three categories. 1. Battery Rooms. 2. Batteries in high voltage systems. 3. Batteries as hazardous chemical "containers".

1.Regulations specifically written for battery rooms, changing, and charging have been issued by the Occupational Safety and Health Administration. These regulations define how battery rooms are to be designed , equipped, and operated. Refer to O.S.H.A. 1926.441 and 1910.178 for the specifics.
A review will show that acid-resistant personal protective equipment and acid spill neutralizer absorber are required in all battery rooms. Many battery operations are found to be deficient when inspected.

2. When a high voltage electrical power system contains batteries (like U.P.S. type) another rule from O.S.H.A. applies. It is called the Electric Power Rule # 1910-269. Telecommunication workers are covered in rule 1910.268.

It highlights how those working around electrical power systems must be trained, equipped, and supervised. Employees and contractors are included. Those working on batteries near any electrical service are to be trained.

3. Because batteries contain hazardous corrosive chemicals there are some additional regulations that apply. These are from O.S.H.A., E.P.A. (R.C.R.A.), and D.O.T..

O.S.H.A. 29 CFR Part 1910.1200 is the Hazard Communications Standard which is sometimes called "Employee Right-To-Know". Those that handle batteries require training, material safety data sheets for batteries and all chemicals used around them, personal protective equipment and more.

O.S.H.A. 29 CFR Part 1910.120 is called HAZWOPER for Hazardous Waste Operations and Emergency Response. This rule requires the training of an Emergency Response Team (ERT) of first responders. When a hazardous chemical spill happens the ERT takes appropriate action. Large battery acid spills would be covered here. Also covered are training, writing spill response plans, providing and using personal protective and clean-up equipment.

E.P.A. has the Resource Conservation Recovery At (RCRA). It defines what constitutes hazardous waste and how it can be handled and disposed of legally. There are training requirements in 40CFR Section 262.34 for small generators and in 264.16 for large generators. Remember that scrap batteries are exempt from hazardous waste regulations as long as they are properly transported to a licensed disposal site (i.e. smelter). Be careful to document these transactions.

O.S.H.A. has the Emergency planning and Community Right-to-know (SARA) in 40 CFR355. Most battery users will find they are beyond the threshold planning quantity (T.P.Q.) of 1,000 lbs. or more of sulfuric acid (battery electrolyte). The electrolyte inside all the batteries must be included in the T.P.Q. totals. Therefore, this sulfuric acid should be reported with any SARA Section 302 Notification published by that facility.

Any release or spill beyond reportable quantities (1,000 lbs. of electrolyte) will need to be reported according to CERCLA/SARA Section 304. See Section 311 regarding chemical reporting obligations and Section 312 regarding hazardous material inventory reporting (battery areas are Tier II).

D.O.T. regulates batteries being handled and shipped. These would cover any batteries entering or leaving the facility. HM126-F contains numerous training and emergency response issues.

Also, look specifically into

49 CFR 173.1 (b)	General requirements for shipping and packaging
49 CFR 177.800(b)	Carriage by Public Highway
49 CFR 173.101	DOT - Proper Shipping Names
49 CFR 173.260 (d) (2) (e)	DOT Blocking and Bracing

Remember: Your Battery Power Specialist is your best resource for information on Federal regulations that apply to batteries.

OSHA REGULATION 1926.441

Battery rooms and battery charging

(a) - General Requirements

1. Batteries of the unsealed type shall be located in enclosures with outside vents or in well-ventilated rooms and shall be arranged so as to prevent the escape of fumes, gases, or electrolyte spray into other areas.
2. Ventilation shall be provided to ensure diffusion of the gases from the battery and to prevent the accumulation of an explosive mixture.
3. Racks and trays shall be substantial and shall be treated to make them resistant to the electrolyte.
4. Floors shall be of acid resistant construction unless protected from acid accumulations.
5. Face shields, aprons and rubber gloves shall be provided for workers handling acids or batteries.
6. Facilities for quick drenching of the eyes and body shall be provided within 25 feet (7.62m) of battery handling areas.
7. Facilities shall be provided for flushing and neutralizing spilled electrolyte and for fire protection.

(b) - Charging

1. Battery charging installations shall be located in areas designated for that purpose.
2. Charging apparatus shall be protected from damage by trucks.
3. When batteries are being charged, the vent caps shall be kept in place to avoid electrolyte spray. Vent caps shall be maintained in functioning condition.

OSHA REGULATION 1910.178

Subparagraph (g)-changing and charging storage batteries.

(g) - CHANGING AND CHARGING STORAGE BATTERIES

1. Battery charging installations shall be located in areas designated for that purpose.
2. Facilities shall be provided for flushing and neutralizing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation.
3. (O.S.H.A. deleted)
4. A conveyor, overhead hoist, or equivalent material handling equipment shall be provided for handling batteries.
5. Reinstalled batteries shall be properly positioned and secured in the truck.
6. A carboy tilter or siphon shall be provided for handling electrolyte
7. When charging batteries, acid shall be poured into water; water shall not be poured into acid.
8. Trucks shall be properly positioned and brake applied before attempting to change or charge batteries.
9. Care shall be taken to assure that vent caps are functioning. The battery (or compartment) cover(s) shall be open to dissipate heat.
10. Smoking shall be prohibited in the charging area.
11. Precautions shall be taken to prevent open flames, sparks or electric arcs in battery charging areas.
12. Tools and other metallic objects shall be kept away from the top of uncovered batteries.

Section 4

BATTERY ROOM SAFETY INSPECTION

This inspection of your battery room covers the critical aspects of equipping and operating safe battery rooms and equipment. It identifies compliance issues regarding current regulations. Some elements in this inspection will call for professional judgment where others can be analytically measured against industry standard. Particular attention is paid to O.S. 1926.441 and 1910.178.

The inspection is intended to discover and identify hazards, and operational deficiencies. The specific remedial actions should be discussed confidentially with your battery specialist

Battery power is the safest and most reliable power choice available. The actions taken as a result of this inspection will result in an increased margin of safety and performance.

COMPANY: INSPECTION DATE:
LOCATION: INSPECTED BY:

PART A - BATTERY ROOM DESIGN AND LAYOUT

			IF NO-ACTION PLANNED
1. Is lighting adequate for safe operation?	YES	NO	
2. Is ventilation to the outside adequate to properly remove any accumulating hydrogen gases?	YES	NO	
3. Are aisles open to allow access to marked exits?	YES	NO	
4. Is there sufficient space to accommodate the number of batteries being used?	YES	NO	
5. Is existing battery handling equipment of substantial design, and is it appropriate to this application?	YES	NO	
6. Has the room been audited for point by point compliance with OSHA, Uniform Fire Code, Building Code, and ANSI/IEEE Standards	YES	NO	

PART B - BATTERY ROOM EQUIPMENT/CONDITIONS

1. Is the floor clean, dry and undamaged?	YES	NO
2. Is there evidence of corrosion damage to equipment?	YES	NO
3. Is the electrical service to the battery equipment appropriate? Nothing temporary or loose.	YES	NO
4. Is the electrical service to this equipment clearly labeled?	YES	NO
5. Is the following safety equipment in place?		
.Hydrogen Detector	YES	NO
.Smoke Detector	YES	NO
.Fire Extinguisher	YES	NO
.Plumbed eye wash and safety shower	YES	NO
.Acid spill kit/neutralizing absorber	YES	NO
6. Is the battery room free of non-related or stored items.	YES	NO
7. Are there open floor drains?	YES	NO
If so, are these drains properly plumbed to containment and or treatment equipment?	YES	NO
8. Are batteries requiring service or removal properly tagged?	YES	NO
9. Are there proper safety containers with corrosive labels for acid?	YES	NO
10. Is there a hydrometer in good condition available?	YES	NO
11. Is approved water used to refill batteries?	YES	NO
12. Are battery watering devices in good condition?	YES	NO
13. Is there a battery thermometer available?	YES	NO

PART C. PERSONNEL SAFETY ITEMS

1. Are the tools used to clean, change, and service the batteries non-conductive and non-flammable?	YES	NO
2. Is material safety data (MSDS) available for the batteries and all chemicals used around them?	YES	NO
3. Are chemicals used to clean /neutralize the batteries non-hazardous. Safe for battery, user, environment?	YES	NO
4. Are there proper safety signs posted?		
No Smoking	YES	NO
Exits	YES	NO
Fire Extinguishers	YES	NO
Eye wash/safety shower	YES	NO
Shock Hazard	YES	NO
Explosive Hazard	YES	NO
Corrosive Hazard	YES	NO
5. Is there appropriate safety wear immediately available?		
Full face shield	YES	NO
Splash proof goggles and gloves	YES	NO
Acid proof goggles and gloves	YES	NO
Steel toe rubber boots	YES	NO
Heavy duty acid apron	YES	NO
6. Has formal safety training been given in charging, watering and cleaning/ neutralizing (OSHA 29CFR Part 1910.1200?	YES	NO

GLOSSARY OF CHEMICAL TERMS FOR BATTERY USERS

ACID
Any chemical that undergoes dissociation in water with the formation of hydrogen ions. Acids are corrosive and can cause severe skin burns. Acids turn litmus paper red and have pH values from 0 up to neutral pH7. Battery acid of any specific gravity is hazardous and corrosive at a pH of 1.

BASE (ALKALINE)
A substance that liberates hydroxide (OH) ions when dissolved in water. Bases have greater than 7 up to 14 and turns litmus paper blue. High pH alkalines are corrosive and may cause severe skin burns.

BIODEGRADABLE
Capable of being broken down into innocuous products by the action of living things, like bacterial breakdown.

CORROSIVE
A chemical that causes visible destruction of, or irreversible alterations in living tissue by chemical action at the site of contact.

FORMULA
The scientific expression for the chemical composition of a material. For example, water is H2O and sulfuric acid is H2SO4.

HAZARDOUS CHEMICAL
Any chemical whose presence or use is a physical hazard or a health hazard. These are heavily regulated in the transport, handling, storage, use, and disposal.

MSDS
Material Safety Data Sheets. Must be available for employee review at all times under O.S.H.A. "employee right to know" regulations. This includes all chemicals and batteries.

NEUTRALIZE
To eliminate potential corrosive hazards by inactivating strong acids or alkalines. For example, acids can be neutralized by adding an appropriate amount of alkaline substance to the spill. Extreme caution must be excercised as some mixtures can create a very vigorous reaction. A pH outcome of 7.0 (Neutral) is usually desired.

REACTIVITY
Chemical reaction with the release of energy. Undesirable effects such as pressure build-up, temperature increase, formation of noxious, toxic or corrosive by-products may occur because of the reactivity of a substance to heating, burning or direct contact with other materials.

SPECIFIC GRAVITY
The weight of a material compared to the weight of an equal volume of water. An indirect expression of the density or heaviness (specific gravity) of a material. Battery electrolyte (dilute sulfuric acid) is typically in the range of 1.2 - 1.3. It is, therefore, heavier than an equal volume of water.

CORROSION: Good News / Bad News

Good News Inside the Battery

Controlled "corrosion" inside a lead acid battery is required if electrolysis is to be accomplished and electric current is to result. This "corrosion" might better be called oxidation and reduction. This chemical reaction can only occur if an electrolyte is present. In lead acid batteries that electrolyte is diluted. Sulfuric acid.

Here is how it works. Oxidation and reduction occur because electrons are transferred from one atom to another. The atom losing the electron is oxidized, the atom gaining the electron is reduced.

In lead acid battery metallic lead cathode (so-called "negative" plate) is oxidized to form lead sulfate. At the "positive" plate or anode, lead dioxide is reduced to form lead sulfate and water by the gain of electrons. Electrons flowing in the circuit from negative to positive cause the current.

Bad News Outside the Battery

When acid or acid salts are found on exterior battery surfaces and surrounding equipment we have a different corrosion result. Exterior acid, if not neutralized and removed rots and rusts ferrous metals and erodes concrete. That means the battery case, cables, connections, racks, floors, and battery powered equipment suffer corrosion damage. Structural weakness can result.

But that is not the only problem caused by exterior acid. Personnel can suffer acid burns and shocks. Acid salts can carry current that results in trickle discharge and shorts which interrupt performance and damage the equipment the battery is intended to serve. External acid can cause batteries to overheat and even catch fire or explode. External acid must be discovered and completely neutralized.

Understanding pH and Corrosion Hazard

pH is a unit of measurement. It measures the acidity or alkalinity of a solution. pH will measure the abundance of Hydrogen ions (acidic) over Hydroxide ions (alkaline). If both these ions in a given solution are equal in number the solution will be neutral. Why is low pH or high pH a concern? Numbers near either end of the 0 to 14 scale are hazardously corrosive to human skin, eyes, mucous membranes. Of course, they are corrosive to equipment and surfaces.

The pH scale is a negative logarithm scale. Simply stated, going from one pH unit to the next increases the strength by ten times per unit.

7.0 is absolute neutral
6.0 is 10 times more acidic than 7.0
1.0 is 10 x 10 x 10 x 10 x10 x 10
times more acidic than 7.0

pH Examples (approximate) 0

1.0	Battery Electrolyte (Acid)
R 2.5	Lemon Juice
A 4.2	Beer
N 6.5	Cows Milk
G 7.0	Distilled Water
E 7.2	Human Blood
9.5	Antacid Tablets
13.0	Industrial Degreasers(Alkalines)
14	

MATERIAL SAFETY DATA SHEET

N/A = Not Applicable Effective Date 1/95 Rev: 1/98

** EMERGENCY CONTACT: RAMSEY GROUP, Inc. 704-684-4952 **

32 Old Shoals Road Arden, N.C. 28704

SECTION 1 PRODUCT IDENTIFICATION

PRODUCT NAME: Neutra Clean (RG-2500)

GENERIC NAME: Industrial Cleaner

PROPER SHIPPING NAME: N/A

NPCA Hazard Material ID System

Health	2
Flammability	0
Reactivity	0
Max Personal Protection	Sect 8

SECTION 2 INGREDIENTS

CHEMICAL NAME	CAS No.	Wt %	PEL	TWA-TLV	CARCINOGEN

This Product Contains No Hazardous Ingredients.

SECTION 3 PHYSICAL DATA

BOILING RANGE: 212 F initial

VAPOR PRESSURE: 22mmHg

VAPOR DENSITY: >1

% VOLATILE: N/A

SOLUBILITY IN WATER: Complete

PHYSICAL DESCRIPTION: Orange Liquid

SPECIFIC GRAVITY: 1.02

pH: 10 - 11

EVAPORATION RATE: <1

SECTION 4 FIRE & EXPLOSION HAZARD

FLASH POINT: N/A

UPPER EXPLOSIVE LIMIT: N/A

LOWER EXPLOSIVE LIMIT: N/A

EXTINGUISHING METHOD: N/A

SPECIAL FIRE FIGHTING PROCEDURE: N/A

UNUSUAL FIRE & EXPLOSION HAZARD:N/A

SECTION 5 REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY: None Known

HAZARDOUS DECOMPOSITION PRODUCTS: None Known

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 6 STORAGE AND HANDLING

PRECAUTIONS IN HANDLING & STORAGE

For use by trained personnel only.

Keep container closed during storage.

Follow good personal hygiene.

SECTION 7 HEALTH HAZARDS & FIRST AID

EFFECTS OF OVEREXPOSURE:

Skin: Prolonged exposure may cause irritation.

Eyes: Prolonged exposure to liquid & mist may cause irritation.

Inhalation: Mist may irritate nasal passages

Ingestion: Irritating to mouth throat and stomach

FIRST AID PROCEDURE

Skin: Remove contaminated clothing, Flush with water

Eyes: Flush eyes with large amounts of water for 15min.

Inhalation: Remove to fresh air.

Ingestion: Do not induce vomiting. Drink water.

SHOULD SYMPTOMS PERSIST - - SEEK MEDICAL ATTENTION

SECTION 8 SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Local ventilation

PROTECTIVE GLOVES: Chemical resistant

VENTILATION: Local ventilation.

EYE PROTECTION: Safety goggles with side shields or face shields.

OTHER PROTECTIVE EQUIPMENT: Follow safety procedure for material to be neutralized.

SECTION 9 SPILL OF LEAK PROTECTION INFORMATION

MATERIAL RELEASE OF SPILL: Mop up or absorb with inert material.

WASTE DISPOSAL METHOD: Consistent with federal, state, & local regulations.