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September 13, 1999

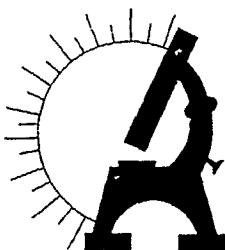
*Abatement Plan for the Removal
of Asbestos at
Contrell Facilities at ASARCO, Inc.
El Paso, Texas*

Prepared for:

ASARCO, Inc.

ATTN: Peggy Munsell
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Prepared by:



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September 13, 1999

ABATEMENT PLAN

Design For:

ASBESTOS ABATEMENT

at

The Cottrell Facilities

FOR

ASARCO, Inc.

ATTN: Peggy Munsell

P.O. Box 1111

El Paso, Texas 79999

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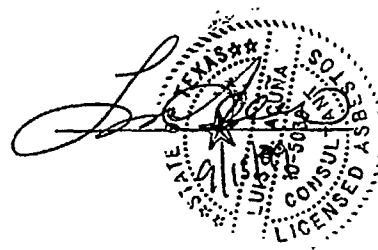


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DRAWING AA-1

ATTACHMENT I

ATTACHMENT II

END OF THIS SECTION

SECTION 01010 SUMMARY OF WORK



PART I - GENERAL

- 1.01 Statement of Work: The work consists of furnishing all labor, plant, and materials and performing all work in strict accordance with this plan. Work shall include but not be limited to: preparation, removal of ACM pipe and fitting insulation, tank insulation, debris. (using full containment or glovebag procedures) and all OSHA, EPA air monitoring and air sampling. Where there is a conflict of applicable laws or this specification, Contractor shall immediately notify Owner or his representative the owners representation the industrial hygienist (IH).
- 1.02 Project Objectives:
- A. Remove asbestos containing materials from areas described in Scope of Work, Drawings, and this Project Manual.
 - B. No individual shall be exposed to asbestos or fiberglass fibers in excess of the shown in these specifications.
 - C. The Contractor shall insure that no asbestos contamination occurs outside any containment erected.
 - D. The Contractor shall insure that all asbestos waste is disposed of in accordance to these specification and all applicable laws. All construction waste contaminated with asbestos containing waste from this project shall be disposed of in an EPA approved landfill.
 - E. The Contractor shall document all activities pertaining to this project in accordance with these specifications and all applicable laws. At the conclusion of the project, contractor shall submit this documentation to the Owner after it has been reviewed by the Industrial Hygienist (IH).
 - F. The Contractor shall insure that all special precautions, as stated in these documents, have been taken to protect electrical motor control centers and other electrical equipment on the first floor work area.
- 1.03 Scope of Work:
- A. Remove asbestos from the areas shown at the pre-bid conference, in the drawings, and in the specifications and addenda. Bidder must field verify types, location, quantities, and access to ACM and any other special or unusual circumstances during the mandatory pre-bid conference.
 - B. The purpose of this project is to completely remove all specified asbestos materials from the Cottrell Facilities as shown on the drawings, specifications, addenda and pre-bid conference.
 - 1. Removal and disposal of 2,040 s.f. of ACM flue insulation.
 - 2. Removal and disposal of 6,624 s.f. of ACM Reverb Hopper Insulation.
 - 3. Removal and disposal of 1,987 s.f. of ACM Converter Cottrell Insulation.
 - 4. Removal and disposal of 3,618 s.f. of ACM Cottrell Hopper Wall Insulation.
 - 5. Removal and disposal of 2,850 s.f. of ACM Converter Inlet Distribution Insulation.
 - 6. Removal and disposal of 1,220 s.f. of ACM Roaster Cottrell Wall Insulation.
 - 7. Removal and disposal of 580 s.f. of pipe insulation on the Cottrell Hot East.
 - C. Additive/Deductive Unit Prices for work described on the specifications for Asbestos Abatement at ASARCO Power House. If a Deductive price varies from the Additive price than Contractor shall state so. BIDDER must submit unit prices. These unit prices shall be used to calculate any additions or deletions to this contract and will be used to make the final determination on the successful bidder.

END OF THIS SECTION

SECTION 01030 SPECIAL PROCEDURES OR CONDITIONS

1.01 The ASARCO Contrell Facilities

- A. Before beginning abatement the Contractor shall do the following:
 - 1. Insure that all high voltage is turned off and locked out with appropriate safety tags.
 - 2. All electrical facilities will be covered with 6 mil polyethylene.
 - 3. Obtain written approval from the Building Owner representative before beginning work.
 - 4. Minimum respiratory protection necessary for all asbestos removal at this project site shall be a half face respirator with dual filters HEPA and organic.

1.02 Alternate Procedures

- A. Any alternate abatement procedure other than those specified herein shall be submitted in writing to IH for approval. IH has final authority to approve or disapprove or discontinue any procedure used if it violates any provision of this specification or applicable asbestos regulations.
- B. Any alternate procedure shall provide equal to or greater protection than the procedure it is intended to replace.

1.03 Pre-abatement Inspection

- A. Contractor shall inspect the work area and shall document all items which are broken or inoperative. This Contractor inspection is intended to protect the Contractor from any claims made by the Owner following the completion of the Scope of Work. The results of the Contractor's inspection shall be reported to the Owner prior to initiation of the Scope of Work.

1.04 Schedule of abatement

- A. *The contractor shall maintain a minimum crew of 4 fully accredited asbestos workers and 1 fully accredited asbestos supervisor on site at all times during the project. This workers shall insure they are registered at the front gate prior to entering the plant.*
- B. *Contractor shall begin asbestos abatement on July 27, 1999 and be completed by November 14, 1999.*

1.05 Site Security

- A. The Contractor shall provide a qualified site security during all the abatement phase. The intent of this precaution is to guard against unauthorized entry into the regulated areas as well as a fire watch.
 - 1. Site Security shall have EPA certification to enter the containment
 - 2. Site Security shall have an OSHA physical.
 - 3. Site Security shall have communication equipment to notify the IH, contractor, fire and or police if the need arises.
 - 4. Site Security shall have a state license to do asbestos work.
 - 5. Site Security shall be licensed as a TDH worker as a minimum.
- B. Site security personnel shall ensure that air filtration equipment is operational at all times, shall restrict unauthorized entry into the regulated area and ensure that the containment is intact at all times. Site security personnel shall keep a daily log of all events.

1.06 Emergency Repairs

- A. The Contractor shall immediately notify the IH of any damages, repair any pipe leaks, or electrical failures that might occur during abatement.
- B. The contractor shall insure that there is an emergency telephone available at the job site and every worker has access to it.

- C. Emergency phone numbers shall be posted on a board in the control center. The number of the industrial Hygienist (IH), Project Manager, Consultant shall also be available.
- 1.07 Medical Emergencies
- A. The Contractor shall provide at least one person on site who is qualified in First Aid and Cardiac Pulmonary Resuscitation (CPR). The contractor shall submit this persons name and qualification to the IH at the pre-construction meeting.
- 1.08 Rental Equipment
- A. The Contractor shall obtain written permission for any rental equipment (includes rental trucks or vehicles) to be used on the asbestos project. The rental company shall be notified of the intended use of equipment and shall submit notice to the Industrial Hygienist (IH) that the equipment may be used on this asbestos abatement project. The Industrial Hygienist (IH) has the right to reject any rental equipment that does not confirm with said letter of understanding. The Contractor assumes all liability for failure to disclose the use of rental equipment for an asbestos abatement project.
- 1.09 Patented Products
- A. The Contractor shall submit a license or equivalent, or written permission to use any patented product and/or procedure in connection with this project. In the event that no patented product and/or procedure is used, the contractor shall submit a notarized statement acknowledging that he is not using patented products or procedures on this project. The contractor assumes all liabilities for failure to disclose the use of a patented product and/or procedure.
- 1.10 Electrical Work
- BEFORE ANY ELECTRICAL WORK IS PERFORMED ON ASARCO PROPERTY, THE CONTRACTOR SHALL OBTAIN WRITTEN PERMISSION FROM THE ASARCO SUPERVISORY PERSONNEL.**
- A. All of the electrical work shall be performed by either a licensed electrician or a licensed apprentice electrician under direct supervision of a licensed electrician. All electrical work shall meet electrical code requirements.
- B. Any electrical work performed in the regulated area shall be done by a licensed electrician who has met the requirements of OSHA 1926.1101, AHERA 40 CFR 763 (24 hour worker Course), OSHA medical exam, respirator fit test and any license required by any Local, State or Federal Asbestos Law.
- 1.11 Special Garments and Training
- A. Before any contractor personnel are allowed on ASARCO property they are required to attend a safety orientation course provided by the ASARCO safety personnel at no cost to the contractor. To schedule this course, contractor shall contact Ms. Peggy Munsell at (915) 521-3640.
- B. All contractor personnel are required to wear long sleeve shirts, boots, hard hat, safety eye wear, hearing protection and a half face respirator with dual HEPA filters. ASARCO will not provide this equipment. Any personnel not complying with this policy shall be barred from entering the premises.
- 1.12 **RESERVED**
- 1.13 **RESERVED**
- 1.14 Landscape

- A. The Contractor is to ensure that his personnel and equipment do not damage or litter the **work area**. Any damage to the environment shall result in monetary damages or replacement by the Contractor. If the possibility of any such damage exist, the Contractor shall submit to the IH a written explanation of the expected damages and the physical location where the damages are expected to occur. The Owner may, at his option, waive the Contractor's responsibility for protection of that portion of the landscape.
 - B. Contractor shall ensure daily that the **work area** is organized and free of objects, material, or waste generated by his work or personnel.
 - C. All authorized construction waste containers will be dumped upon being filled to capacity. Overflow of waste will not be permitted.
- 1.15 Building Interior
- A. The Contractor shall be responsible for the replacement and/or repair of any damages to areas of the buildings which are not scheduled for removal or demolition in the plans and specifications. If the Contractor, after on site inspection of the work specified, expects any damages to unspecified areas, the Contractor shall submit along with the abatement plan an explanation of any expected damages. This abatement plan is subject to approval by the Owner and/or his Representative (IH).
- 1.16 Heat Stress
- A. Contractor shall be responsible for properly training his personnel under 1926.21 regarding Heat Stress. The following chart enclosed (Heat Stress) shall be posted on the emergency bulletin board located in the control center.
 - B. Contractor shall insure that the workers in containment are allowed frequent breaks outside the containment or at the discretion of the Industrial Hygienist or the employee.
- 1.17 Precedence Regarding Conflicts And/Or Questions
- A. Conflicts and questions arising during the bid phase and throughout any asbestos abatement activities shall be resolved on a basis of whether an asbestos or non-asbestos related activity is involved. Any asbestos related conflicts and questions will be governed by the appropriate project manual sections.
 - B. Otherwise, the owner's supplementary and/or up-front "boiler plate" documents and any other non-asbestos related sections of the project manual shall be applicable.
 - C. Conflicts and questions which the selected Contractor fails to bring to the attention of Owner and/or Consultant prior to being awarded the contract shall not be considered.
- 1.18 DISPUTE RESOLUTION:
- A. In an effort to resolve any conflicts that arise during the construction of the project or following the completion of the project, the owner and contractor agree that all disputes between them arising out of or relating to this agreement shall be submitted to non-binding mediation, unless the parties mutually agree otherwise. Mediation shall be prior to the initiation of arbitration or litigation.
 - B. Mediation shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association.

END OF SECTION

SECTION 01043 PROJECT COORDINATION

1.01 Work Requirements:

- A. The contractor shall schedule his work-hours to accomplish the abatement as specified in this project manual, drawing and any addenda. Contractor shall not perform any work on days other than those specified working days without the written permission of the owner.
- B. Before starting work at any location the Contractor shall inform the Owner and his representative the Industrial Hygienist (IH) or his authorized representative of the intent to start such work. Strict adherence with NESHAPS 10 day notice is required.
- C. Before beginning any work under the contract the Contractor shall provide in writing to the Owner and the IH the name of the person assigned as project supervisor and alternate. If a different person is assigned during the performance period, written notification and all documentation required under these specifications shall be provided to the IH before the new person assumes responsibility as project superintendent.
- D. Working Conditions:
 - 1. The contractor shall visit the site to thoroughly familiarize himself with all the details of the work and the existing conditions, and to verify all dimensions in the field. The Contractor shall notify the IH in writing, when a discrepancy is found in the contract drawings, specifications, and/or field conditions.
 - 2. The contractor will not be compensated for any unauthorized work.
 - 3. The contractor shall maintain the work area clean of any and all debris that result from the performance of this project.
 - 4. The contractor shall insure safe working conditions and abide by all applicable OSHA safety regulations during the performance of the contract with the occupants in the building.
 - 5. The Industrial Hygienist (IH) on site does not have the authority to approve any additional work or change the scope of work set forth in these documents. Contractor shall not be paid for any unauthorized work. For any additional work or change of scope of work the Contractor shall follow the directions for addition work set forth in these documents.

1.02 Personnel Qualifications:

- A. All Contractor personnel involved with this project must be trained and have EPA approved certification showing they are fully qualified to do asbestos removal. Contractor shall ensure every worker is thoroughly familiar with the standard operating procedure of the Contractor for abatement work and with all Applicable Laws. All personnel shall have current OSHA (1926.1101) medical examinations and be trained in the use and care of respirators. Anyone without the proper qualifications listed herein shall not be allowed to work in the abatement area at any time.
 - 1. Experience using Occupational Safety and Health Administration (OSHA), and/or Environmental Protection Agency (EPA) recommended asbestos removal methods.
 - 2. Shall not have previous history, during the last three years of abatement projects started and completed by the Contractor, of any "Serious" (OSHA) fines and/or notices of violation regarding compliance with asbestos removal procedures by any State, Local, or Federal Agency.
 - 3. Shall have, as a minimum, a project manager and/or foreman having a working knowledge and three years experience in asbestos related projects. This shall include but not be limited to meeting requirements of 1.03 B. of this section.
 - 4. Contractor shall be licensed to do work in the State of Texas.
- B. Supervisor Qualifications are as follows:
 - 1. Meet requirements of OSHA competent person.
 - 2. Must have knowledge of methods and procedures of the removal, treatment,

handling, and disposal of asbestos and asbestos containing materials and subsequent cleaning of affected environment.

3. This person shall be knowledgeable of Federal, State and Local regulations pertaining to the handling of asbestos.
4. This person shall remain on the job site and in immediate contact with those under his supervision during all phases of this project. The supervisor shall be inside the asbestos containment at least 25% of the time supervising the actual asbestos abatement. Whenever the site supervisor leaves the job site, the IH has the requirement under TDH to stop work until the supervisor returns to site. Any and all extra cost arising from said event shall be the responsibility of the Contractor.
5. Persons shall have current OSHA Medical & EPA approved Supervisors Certificates.
6. Shall have a Texas State License to work as a supervisor.
7. Proof they have attended ASARCO safety and orientation course.

C. Worker Requirements:

1. Meet requirements of OSHA (1926.1101).
2. Must have knowledge of methods and procedures of the removal, treatment, handling, and disposal of asbestos and asbestos containing materials and subsequent cleaning of affected environment.
3. This person shall be knowledgeable of Federal, State and Local regulations pertaining to the handling of friable asbestos.
4. Workers shall have current TDH license, OSHA 1926.1101 medical & and fit testing certification. The workers shall also have the EPA, AHERA current refresher certification as well as a copy of their original certification as an AHERA workers on site as per TDH and ASHARA.
5. All workers shall have State License to work as an Abatement Worker.
6. Proof they have attended ASARCO orientation.

1.03 Permits:

- A. The contractor shall obtain all necessary permits from the City Building Inspection Department, Police, Fire Department and any other Agencies having Jurisdiction prior to commencement of work. Some permits required are, but not limited to:
1. Electrical Permits where new or reinstalled electrical devices are performed.
 2. Building Permits where any structure of the building is disturbed. This includes removal of asbestos pipe insulation.
 3. EPA NESHAPS 10 day notice shall be signed and sent by owner. Contractor nor consultant are allowed to send notification.
 4. Texas State Health Department Notice
 5. Local permits such as fire, police etc.

END OF THIS SECTION

SECTION 01091 DEFINITIONS AND STANDARDS

1.01 Applicable Publications:

- A. The regulations listed below form a part of this specification to the extent referenced. The regulations are referred to in the text by basic designation only. The following regulations shall be on site during all operations of this project.
- B. Texas Department of Health Protection Rules (TDHPR) 3 December 1998 and/or any current local, state, federal amendments and policy letters, or current Texas Department of Health (TDH) promulgations of said TDHPR.
- C. OSHA Regulations:
 - 1. 29 CFR 1910.20 Access to Employee Exposure and Medical Records
 - 2. 29 CFR 1910.134 Respiratory Protection
 - 3. 29 CFR 1910.1001 OSHA - Asbestos Industry Standard.
 - 4. 29 CFR 1926.1101 Asbestos, Tremolite, Anthophyllite, and Actinolite Construction Standard.
 - 5. 29 CFR Parts 1910 and 1926 Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules; Amendment
 - 6. 29 CFR 1910.1200 Hazard Communications
 - 7. 29 CFR 1910 Occupational Safety and Health Standards
 - 8. 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts and Mists
 - 9. 29 CFR 1926.57 Ventilation
 - 10. All applicable OSHA regulations such as but not limited to Heat Stress, Noise, Electrical Standards (Lockout and Tagout) Scaffolding, Ladders, OSHA 200, Slips, Trips, and Falls, and Fire Safety-Contingency Plans.
- D. Environmental Protection Agency
 - 1. 40 CFR 61 Subparts A & M (Revised Subpart B) National Emission Standards for Hazardous Air Pollutants
 - 2. 40 CFR Part 763, Subpart E Asbestos Containing Material in Schools; Find Rules and Notice.
 - 3. 40 CFR Part 763, Subpart G Asbestos Abatement Projects; Worker Protection; Final Rule.
 - 4. Environmental Protection Agency (EPA) Publication, Guidance for Controlling Friable Asbestos-Containing Materials in Buildings, June 1985.
- E. Department of Transportation (DOT):
 - 1. 49 CFR Part 173, Subpart J.
 - 2. 49 CFR 172 Hazardous Materials Tables & Communications Regulations
 - 3. 49 CFR 178 Shipping Container Specification
- F. American National Standards Institute, Inc., (ANSI), Standards:
 - 1. ANSI Z88.2-1980 Practices for Respiratory Protection
 - 2. ANSI Z9.2-1979 Fundamentals Governing Design & Operation of Local Exhaust Systems
- G. Testing Standards
 - 1. NIOSH Method 7400 Fiber Analysis of Asbestos using PCM
 - 2. NIOSH Method 7402 Fiber Analysis of Asbestos using TEM

1.02 Definitions:

- A. **Abatement** - Means all activities associated with the control of Asbestos containing materials for Buildings during removal.
- B. **ACGIH** - American Conference of Governmental Industrial Hygienists 6500 Glenway Avenue Building D-5 Cincinnati, Ohio 45211
- C. **AIHA** - American Industrial Hygiene Association, 345 White Pond Dr. Akron, Ohio 44320
- D. **Aggressive Air Sampling** - Means using extreme efforts to simulate actual building conditions. Occupancy characteristics by causing air circulation patterns with equipment such as fans or leaf blowers.
- E. **Airlock** - A system for permitting ingress and egress with minimum air movement between a

- contaminated area and an uncontaminated area, typically consisting of two curtained doorways separated by a distance of at least 3 feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow through contamination.
- F. **Air Monitoring** - Means the process of collecting air samples on a fiber membrane cassette and then having them analyzed to determine the number of fibers present. Analytical results are expressed in terms of fibers per cubic centimeter of air.
 - G. **Air Monitoring Professional** - A specially trained individual, who has successfully completed a NIOSH 582 Training Course, employed by the Owner, who is qualified by education and/or experience to obtain and test air samples in and around the work areas to determine airborne concentrations of asbestos fibers.
 - H. **Amended Water** - Water to which surfactant has been added. Surfactant should be 50% polyoxyethylene ester and 50% polyethylene ether according to EPA recommendations.
 - I. **A.N.S.I.** - American National Standards Institute, 1430 Broadway, New York, New York 10018.
 - J. **Asbestos** - means a mineral that readily separates into long flexible fibers suitable for use as a noncombustible, nonconducting or chemically resistant material. Asbestiforms include chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
 - K. **Asbestos Containing Material (ACM)** - Material composed of asbestos of any type and in an amount greater than 1% by weight, either alone or mixed with other fibrous or non-fibrous materials.
 - L. **Asbestos Containing Waste Material** - Asbestos containing material or asbestos contaminated objects requiring disposal.
 - M. **Asbestos Fibers** - Means asbestos fibers longer than 5 micrometers.
 - N. **Asbestos Project Manager** - An individual designated as the Owner's representative and responsible for overseeing the asbestos abatement project.
 - O. **Asbestos Worker** - Means employees that meet all the requirements outlined in OSHA Regulations 29 CFR 1926.1101.
 - P. **ASTM** - American Society For Testing and Materials, 1915 Race Street, Philadelphia, PA 19103.
 - Q. **Authorized Visitor** - The Building Owner [and any designated representatives] and any representative of a regulatory or other agency having jurisdiction over the project.
 - R. **Bidder** - Each prospective Contractor who bids on the work specified herein, and has been pre-qualified by Sun City Analytical, Inc.
 - S. **Building Owner** - Owner is **ASARCO, INC.** or his representative.
 - T. **Bulk Sample** - The collection of any building material section suspected of containing asbestos. A small portion of suspected material is removed from sample area and placed in a plastic bag or air tight container.
 - U. **CIH** - An Industrial Hygienist who by virtue of their education and passing the American Board of Industrial Hygiene Core Examination in either the Comprehensive Practice or an Aspect Examination has been given the right to use CIH by AIHA.
 - V. **Clean Room** - An uncontaminated area or room which is a part of the worker decontamination enclosure system with provisions for storage of worker's street clothes and clean protective equipment.
 - W. **Clean Air Sample** - Means air sample collected immediately following the completion of corrected action. These samples are routinely collected to determine the effectiveness of the corrected action and establish the contractual requirements of acceptable fiber concentrations levels prior to breaking down of abatement control area.
 - X. **Containment** - When used in this specifications means the same as regulated area, shrouding, bubble, temporary enclosure, or controlled area. The means of using plastic to establish work areas and using air filtration pressure to prevent fiber contamination of building and occupants.
 - Y. **Contractor** - Means any contractor that has been pre-approved by ASARCO and Sun City Analytical, Inc.
 - Z. **Control Center** - Means the area in close proximity of the entrance to the regulated area where the supervisor or outside man is stationed. This center should be where all documentation required by specifications are, along with emergency numbers and first-aid kits, are available.
 - AA. **CSP** - A Safety Professional who by virtue of their education and passing the Board of Certified Safety Professionals Core Examination has been given the right to use CSP by BCSP.
 - AB. **Curtained Doorway** - Means a device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing two overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the door and along the opposite

- vertical side of the doorway. Other effective designs are permissible.
- AC. **Designated Decontamination Area** - Means an area designated by the Industrial Hygienist (IH). The area is used for the purpose of decontaminating asbestos contaminated objects and shall be located adjacent to the work area and meet Industrial Hygienist (IH) approval.
 - AD. **Designated Clean Area** - Means an area designated by Industrial Hygienist (IH). The area is within site of the work area free of any asbestos for the purpose of storing decontaminated objects.
 - AE. **Designated Holding Area** - Means an enclosed area designated by Industrial Hygienist (IH). The enclosure is used for the storing of sealed containers of asbestos containing materials and asbestos contaminated waste.
 - AF. **Decontaminate** - Means to remove all visible asbestos dust from the surface to be decontaminated by the means of damp cleaning and/or vacuuming with HEPA filtration equipment.
 - AG. **Encapsulant** - A liquid material which can be applied to asbestos containing material which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).
 - AH. **Enclosure** - The construction of an air-tight, impermeable, permanent barrier around asbestos containing material to control the release of asbestos fibers into the air.
 - AI. **EPA** - U.S. Environmental Protection Agency 401 M Street S.W., Washington, D.C. 20460
 - AJ. **Equipment Decontamination Enclosure System** - Means that a portion of a decontamination enclosure system designed for controlled transfer of materials and equipment into or out of the work area, typically consisting of a washroom and holding area.
 - AK. **Equipment Room** - A contaminated area or room which is part of the worker decontamination enclosure system with provisions for storage of contaminated clothing and equipment.
 - AL. **Filtered Exhaust System** - A portable exhaust system equipped with HEPA filtration and capable of maintaining a constant low velocity air flow through contaminated areas from adjacent uncontaminated areas and maintaining a lower pressure in the containment area as compared to the adjacent uncontaminated areas.
 - AM. **Fixed Object** - A piece of equipment or furniture in the work area which cannot be removed from the work area.
 - AN. **Friable Asbestos** - Asbestos containing material which can be crumbled to dust, when dry, under hand pressure.
 - AO. **HEPA Filter** - Means High Efficiency Particulate Air Filter that is capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter or larger.
 - AP. **HEPA Vacuum** - Means a special type of vacuum cleaner used in the abatement project that must be equipped with a HEPA filter.
 - AQ. **Glovebag** - Means a special purpose custom containment bag with protective gloves and arm sleeves, tool pouch and side port for the use of repairing or removing pipe insulation.
 - AR. **HVAC** - Means heating, ventilation and air conditioning system.
 - AS. **Industrial Hygiene** - "Is that science and art devoted to the recognition, evaluation, and control of those environmental factors or stresses, arising in or from the work place, which may cause sickness, impaired health and well-being, or significant discomfort and inefficiency among workers or among the citizens of the community."
 - AT. **Industrial Hygienists (IH)** - An individual who by education or experience has gained competence in the field of industrial hygiene. In this manual the IH is the owners representative and/or the air monitoring professional.
 - AU. **Movable Object** - A piece of equipment or furniture in the work area which can be removed from the work area.
 - AV. **Air Filtration System** - A portable exhaust system equipped with HEPA filtration and capable of maintaining a constant low velocity air flow into contaminated areas from adjacent uncontaminated areas.
 - AW. **NESHAPS** - The National Emission Standards for Hazardous Air Pollutants.
 - AX. **NIOSH** - The National Institute for Occupational Safety and Health. CDC-NIOSH Building J N.E. Room 3007 Atlanta, GA 30333
 - AY. **OSHA** - The Occupational Safety and Health Administration, 200 Constitution Avenue, Washington, D.C. 20210. For work in New Mexico the regional office the Environmental Improvement Division (505) 827-2452. In Texas the Regional OSHA office is 1-800-692-4202.
 - AZ. **Regulated Area** - The demarcated areas in which asbestos train personnel activity takes place. This includes any area roped off by the contractor or owner with asbestos warning signs and/or tape.

- BA. **Shower Room** - A room between the clean room and the equipment room in the worker decontamination enclosure with hot and cold or warm running water controlled at the tap and suitably arranged for complete showering during decontamination.
- BB. **Shrouding (Full)** - Means the process of covering all the interior surfaces (floor, walls, doorways, windows, ceiling) of a room with polyethylene sheeting.
- BC. **Semi-Shrouding** - Means the process of covering a portion of the interior surfaces (floor, walls doorways, windows, ceiling, etc.) of a room with polyethylene sheeting.
- BD. **Surfactant** - A chemical wetting agent added to water to improve penetration.
- BE. **Tunneling** - Means the forming of connected enclosed corridors with plastic sheeting for passageways between shrouded and/or semi-shrouded enclosures.
- BF. **Visible Emissions** - Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- BG. **Waste Transfer Airlock** - A decontamination system utilized for transferring containerized waste from inside to outside of the work area.
- BH. **Wet Cleaning** - The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with water and afterwards thoroughly decontaminated or disposed of as asbestos contaminated waste.
- BI. **Work Area** - Means the portion of the building (or structure) comprised of the room(s) and connecting passageway(s) (such as other rooms, hallway, corridors, etc.) required to gain access to the designated material(s) to be removed.
- BJ. **Work day** - Means any day between the project start and the completion date, with the exception of weekends. Weekends may become work days if authorized by the Owner.

END OF THIS SECTION

SECTION 01300 SUBMITTALS

1.01 RESERVED

1.02 Submittals required 5 working days prior to the Pre-Construction Meeting. This submittal shall be sent to Sun City Analytical, Inc. at 1409 Montana in El Paso, Texas 79902.

- A. Prior to starting project Contractor shall submit to the Industrial Hygienist the following data on all materials, fixtures or equipment intended for use on this project. All material, equipment, and fixtures shall be approved by the Industrial Hygienist. Each item not meeting standard shall be repaired or replaced by Contractor at no added expense to Owner. Each item on the list submitted by the Contractor shall be clearly identified as to proposed location with appropriate reference to drawings and/or specifications. Catalogs, drawing and similar literature shall be clearly marked to identify the items as noted on the lists submitted, and shall be cross-reference therewith. Approval of such items will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor shall be responsible for the dimensions and design of adequate connections, details and satisfactory construction of all work. Contractor shall submit complete narrative, pictorial or manufactures' specifications and technical data brochure(s) to describe:
 - B. All enclosures, shrouding complete with detailed layout of decon facilities, air filtration system units, emergency exit waste load out and control center.
 - C. Air filtration system machines shall have the following:
 - 1. HEPA filter set, along with primary and secondary filter.
 - 2. Time meter and filter pressure drop gauge.
 - 3. All accessories of air filtration system as: automatic shut-down if HEPA ruptures or air discharge is blocked, lockout to prevent usage without HEPA filter.
 - 4. Air Filtration System pressure recorder, water gauge or equivalent for use to verify pressure differential.
 - D. Work force to be used, supply number and work schedule for completion of project. Show back up personnel capabilities in the event Contractor falls behind schedule.
 - E. Truck or vehicle to be used to transport ACM waste to landfill. Show load capabilities and condition of vehicle.
 - F. Proof that EPA 10 Day Notice has been submitted. Also proof that local police and fire departments have been notified of project and conditions of project.
 - G. Proof that notice has been submitted for permission to dump waste at EPA approved Landfill.
 - H. Decontamination center to be used:
 - 1. Pre-fab or portable showers to be used have Hot and Cold water taps, and made of non-porous materials.
 - 2. Waste water filtration system to be used that have 20 micron primary filter and 5 micron secondary filter. Also submit data on replacement filters.
 - I. All respiratory protection equipment brochures describing:
 - 1. Air purifying respirator with HEPA filters and NIOSH approval number. (Only to be used during preparation on this project).
 - 2. Powered Air Purifying respirators with full-facepiece, HEPA filters and NIOSH number.
 - 3. Type C Supplied air complete with full face piece, pressure demand regulator, NIOSH approval number, back up egress system. Panel board complete with compressor failure alarm, high temperature alarm, carbon monoxide alarm, in line filtration to assure Grade D air, low pressure compressor, and proper CO alarm calibration procedure.
 - J. Submit samples of the following:
 - 1. Plastic sheeting.
 - 2. Duct tape.
 - 3. Plastic bags.
 - 4. Glove bag.

5. Warning signs, labels and barrier tape.
 6. Disposable clothing.
 - K. Submit brochures for other equipment and supplies:
 1. Wetting agent (surfactant).
 2. Encapsulants.
 3. Plastic lined drum.
 4. Vacuum equipment along with HEPA filter to be used.
 5. Air sampling apparatus.
 6. Ground fault interpreters.
 7. Communication system between regulated area and control area.
 - L. Contractor shall submit the TDH laboratory license and the individual license of all air monitors to used on this project. Laboratory to be used shall be capable of analyzing the air samples and have results to the field within in 2 hours daily.
 - M. Submit company Standard Operating Procedures for asbestos abatement projects.
 - N. Submit company fire and emergency procedures and spill response plan.
 - O. Submit company Respiratory Program and Hazard Communications Program.
- 1.03 Submittals required Daily during Abatement:
- A. Daily, during the project the following items shall be maintained by the contractor and may be verified by the IH.
 - B. Air monitoring results from previous day of sampling. The results shall be hard copy from the approved lab. All air sample results must be posted within twenty four (24) hours.
 - C. Daily narrative log of work progress, to include delays, potential change orders, stoppage of work and results of visitors' inspections.
 - D. Documentation of inspection of all areas and equipment. Contractor shall note corrections or planned actions for correction.
 - E. Notification of any accident or emergency requiring a doctor's treatment or evacuation of any employee.
 - F. Documentation of all personnel entering and leaving regulated area.
 - G. Within 24 hours submit the documentation of any ACM waste that has been taken to landfill.
 - H. Updated construction schedule and abatement plan.
 - I. Documentation of filter changes on respirators, HEPA vacuums, filtered Air Filtration System, and other engineering controls.
 - J. When Grade D air is required Contractor shall provide compliance with OSHA 1910.134 and document that CO monitor is calibrated on daily basis.
 - K. Site Security daily logs submitted to the IH.
- 1.04 Submittals Required at Conclusion of Project
- A. Submit within five (5) days of final ACM dumping the Texas waste manifest documenting landfill used and total amount of ACM that was buried.
 - B. All air sample results from testing lab that were not previously submitted.
 - C. A complete log book of all documentation acquired during the project. Contractor shall insure that minutes of final walk-thru with IH, and Owner are incorporated into final project documents along with corrective action taken by Contractor.
 - D. Complete written reports on proper OSHA forms of any accident, emergency or other safety and/or health incident.
 - E. Summary of corrective actions taken of punch list, if any, drawn up by Owner and IH.
- 1.05 Disapproved Submittals:
- A. Submittal which have been disapproved, the Contractor shall re-submit within 5 days of receipt of the disapproved submittals.

END OF THIS SECTION

SECTION 01410 TESTING LABORATORY SERVICES

1.01 Air Monitoring and Sampling:

- A. General Requirements: Air monitoring and sampling shall be in accordance with standards and methods required by all applicable regulations. All air monitoring technicians and the testing laboratory shall be licensed in the State of Texas in accordance with 295.31 through 295.70 Texas rules and regulations.
- B. The Contractor shall obtain the services of an Industrial Hygienist or Professional Air Monitor specialized in air monitoring for the purpose of air monitoring and sampling.
- C. The Contractor shall retain a list of qualifications and experience of the individuals who shall be responsible for air monitoring and sampling.
- D. Throughout the removal and subsequent cleaning operations, AMBIENT (AREA) MONITORING will be conducted by the Contractor's representative to ensure compliance with all regulations and is conducting the work in a manner which minimizes airborne asbestos levels as well as minimizes the contamination of other facilities. Analytical results will be available at the Control Center.
- E. For each set of air samples submitted to the laboratory by the Contractor for analysis, the Contractor shall submit blank cassettes for analysis (minimum of 10%). Each blank cassette shall be submitted as a part of the Contractor's quality control program.
- F. The Industrial Hygienist (IH) may request to QC sample taken by the Contractor. The Industrial Hygienist (IH) will randomly ask for wedge of cassette filter or read a percentage of the Contractor's samples.
- G. Air monitoring results shall include as a minimum for each sample the following: sample ID, laboratory ID, date sample taken, flow (liters/minutes), time (minutes), blank count (fibers/field), fibers/cc, detection limit (fibers/cc), location, employee's name, type of activity and the name of the analyst and the date the sample was analyzed.
- H. All personnel samples for asbestos shall be in accordance with 29 CFR 1926.1101 and as specified in this manual. The Contractor shall sample employees who are anticipated to have the greatest risk of exposure as determined by the industrial hygienist. At least 25% of the work crew or a minimum of two employees, whichever is greater, during a work shift shall be sampled.

1.02 Third-party Air Monitoring:

- A. General Requirements: Third party area monitoring and project clearance for airborne concentrations of asbestos fibers during an abatement project shall be performed by a project monitor under contract to the building owner to collect samples by and for the owner of the facility being abated.
- B. Project monitors observe abatement activities performed by contractors and generally serve as a building owner's representative to ensure that abatement work is completed according to specification and in compliance with all relevant statutes and regulations.
- C. Project monitors perform the vital role of air monitoring for purpose of determining final clearance.
- D. Project monitor is required to comply with ASHARA, have EPA 5-day supervisor course, NIOSH 582 or 3-day Air Monitoring course, the OSHA medical, TDH license.
- E. Schedule of Air Samples:
 - 1. Baseline: The owner's representative will secure the following air samples to establish a baseline before start of work.
The samples will be taken in accordance with the following schedule:

LOCATION	SAMPLES	VOLUME	RATE
At the discretion of the Industrial Hygienist	3	1,250 liters	< 10 LPM

Baseline shall be an ambient air quality level expressed in fibers per cubic centimeter (f/cc). The baseline results shall be used for reference in establishing clearance criteria. The baseline or a level of <0.005 F/cc which ever is the least shall be the established clearance criteria.

2. Daily: From start of work through the end of the project, the owner's representative shall take the following samples on a daily basis. The samples should be taken in accordance with the following schedule:

LOCATION	VOLUME	RATE
Inside containment	Quantification by air monitoring professional (AMP)	< 10 LPM
Outside containment but inside the building	Quantification by the AMP	< 10 LPM
At negative air unit discharge	Quantification by the AMP	< 10 LPM
Immediately outside the entrance to the decontamination facility	Quantification by the AMP	< 10 LPM
Outside the bag out facility (during gag out activities)	Quantification by the AMP	< 10 LPM

3. Additional samples may be taken at the owner's representative's discretion. If airborne fiber counts exceed allowed limits, additional samples may be taken as necessary to monitor fiber levels.

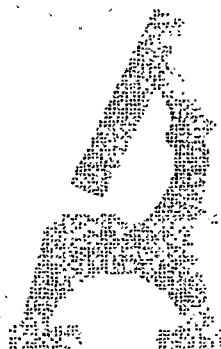
1.03 Methods of Analysis:

- A. Air samples shall be analyzed by Phase Contrast Microscopy method using the NIOSH 7400 method.
- B. Air samples shall be analyzed by an analytical laboratory who possess the following:
 1. Lab shall use the NIOSH 7400 method for analysis according to 29 CFR 1926.1101, Appendices A or B which describes the OSHA ORM method and which utilizes the acetone/triacetin sample preparation or equal.
 2. Lab to used shall be independent of the Contractor and shall be approved by the Industrial Hygienist.
 3. Lab shall have technicians who have their NIOSH 582 Class. Certificate must be submitted to Industrial Hygienist (IH) upon request.
 4. Lab shall be a successful participate in the Proficiency Analytical Testing Program (PAT) for the last 4 rounds and have National Institute of Standards and Technology (NIST) certification.
 5. Lab shall be capable of delivering results within 24 hours of sampling to the client so the can be posted on the job site.
 6. Lab shall have current Texas State License.

1.04 Clearance Samples

- A. Transmission Electron Microscopy - is not required on this contract. If the contractor requests such testing, then he shall bear all costs associated with TEM sampling and analysis. Owner reserves the right to use TEM analysis for clearance testing to verify PCM analysis.
 - 1. Any TEM analysis shall follow 40 CFR 763 AHERA regulations sampling and analysis protocols.
- B. On this project Phase Contrast Microscopy with NIOSH 7400 method in accordance with SECTION 01714 WORK AREA CLEARANCE, shall be the method used for clearance testing. Clearance samples shall be done in the normal work shift of the contract and shall be noted in the contractors construction schedule and abatement plan. The clearance level has been established as <.005 f/cc or baseline data which ever is lower.

END OF THIS SECTION



SECTION 01500 TEMPORARY FACILITIES AND CONTROLS

- 1.01 Temporary Buildings
 - A. Contractor shall provide first aid facilities at control center and in waste disposal vehicle.
- 1.02 Telephone Service
 - A. The Owner will not furnish telephone service, Contractor shall designate a telephone for emergencies. Contractor shall not use any owner's equipment which includes communication equipment.
- 1.03 Water for Construction
 - A. The Owner will furnish water used during construction so long as the required amounts are within the capacity of the existing building systems. Contractor shall provide piping, valves, and any other appurtenances required to properly convey the water to the location where it is needed.
 - B. No water connection from any potable public water supply system shall be made inside the containment area or from any other area where there could be a potential for contamination of the public water source unless connected with an internal air gap or a mechanical back-flow prevention device. No water hoses or pipes shall be brought into the containment area or from any other area where there could be a potential for contamination of the public water source can occur unless hoses or pipes are connected to the previously described devices in this section, 1.03.
 - C. All internal air gap or mechanical back-flow prevention devices shall conform to American Water Works Association (AWWA) C150, C151, and manual M14 in accordance with Texas Natural Resources Conservation Commission (TNRCC) Title 30 Environmental Quality Part 1, Chapter 290, Sub-Chapter D.
- 1.04 Electricity for Construction
 - A. Any electrical hook up shall be coordinated with ASARCO personnel.
 - B. The Owner will provide electrical energy from existing panels as required to operate power tools and equipment and to provide temporary light so long as the required amounts are within the capacity of the existing building systems. Contractor shall provide temporary wiring and outlets as required and temporary lighting if necessary. Contractor is responsible to verify quantity quality of the electrical source provided to them.
- 1.05 Employee Conduct
 - A. The Contractor shall be responsible for ensuring that all employees comply with all Applicable Laws and perform work in a safe manner. Any employees entering the work area under the influence of alcohol or drugs shall be immediately removed by the Contractor from the job site.
 - B. The Contractor shall instruct all his employees to refrain from talking with anyone about this project. Any interviews or discussions about the asbestos project shall be done only by written consent from the owner.
- 1.06 Advertising
 - A. At no time will any kind of advertisement be displayed, published, or reported to news media without the expressed written consent of the Owner and IH.
- 1.07 Barricades
 - A. The Contractor shall provide sufficient barricades, walkways to protect all personnel from injury or exposure to asbestos. All work areas shall be barricaded with proper signs.

1.08 Security

- A. Site security shall be provided by Contractor at Contractor's expense. See Section 01030.

1.09 Toilets

- A. Contractor may use the toilets facility of ASARCO. ASARCO has a designated break and shower facility available for use by contractor personnel. The contractor shall be responsible for maintaining this facility clean.. Contractor shall lose privilege of these facilities if they are not kept clean at all times. Contractor shall provide chemical latrines whenever the ASARCO facilities are not available.

END OF THIS SECTION



SECTION 01513 AIR FILTRATION SYSTEM

1.01 Air filtration system

- A. Air Filtration must be established in the work area by means of a local exhaust system. The equipment shall exhaust through a three-(or more) stage HEPA filtration system to outside of the building. The equipment shall be in operation for 24 hours per day until final air clearance.
- B. The system shall have the following characteristics:
 - 1. Filtration equipment in compliance with ANSI Z9.2, Local Exhaust Ventilation.
 - 2. Capable of maintaining a minimum pressure differential of minus 0.02 inches of water (4.98 Pa) gauge in the work area relative to adjacent areas.
 - 3. Air filtration system pressure system units shall be employed in sufficient quantity to provide four (4) air changes per hour in the work place. Use the formula to determine total air flow requirement.
$$\text{Total CFM} = \text{Volume of work area} / 15 \text{ min}$$
$$(\text{Total M}^3/\text{min} = \text{Volume of work area} / 15 \text{ min})$$
$$\text{Number of units} = \text{Total CFM} / 80\% \text{ capacity of unit}$$
$$(\text{Number of units} = [\text{Total M}^3/\text{min}] / [80\% \text{ capacity of unit}])$$
 - 4. The hose used to duct the exhaust shall be either new temporary plastic tubing or new wire reinforced ducts.
 - 5. The air filtration unit shall have a warning sound or horn if any restriction is found in the intake or exhaust.
- C. Provide a chart recording measuring device or equivalent for use to verify the pressure differential. This data shall be submitted to the IH at the end of the work shift.
- D. Contractor shall install on the containment one fully operational (including filters) backup ventilation machine.
- E. Units shall be placed to provide maximum air flow and prevent short circuiting air flow.
- F. Pre-filter shall be changed as needed as conditions warrant or when directed by the I.H.
- G. The HEPA filter will be checked by Industrial Hygienist (IH) for integrity and usage, and shall be changed by Contractor if damaged or overloaded.
- H. Any electrical work performed by the Contractor in association with this section will be done by a licensed electrician. Any electrical work performed in the regulated area shall be done by a licensed electrician who has met the requirements of OSHA 1926.1101, AHERA 40 CFR 763 (24 hour worker Course), OSHA medical exam, respirator fit test and any license required by any Local, State or Federal Asbestos Law. All electrical work will conform to current National Electrical Codes (NEC) requirements.
- I. All fan unit(s) will be factory made and certified by current industry standards related to air movement equipment and air filters.

2.01 Fan Unit Instrumentation

The Contractor shall provide but not limited to the following:

- A. Manometer: Factory installed manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed
- B. Static Pressure Table: A table indicating the usable air-handling capacity for various static pressure readings on the manometer affixed near the gauge for reference, or the manometer reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (Cubic Meter per Minute) air delivery at that point
- C. Time Meter: Factory installed or equivalent elapsed time meter to show the total accumulated hours of operation
- D. Pressure Chart Recorder: Provide factory installed chart recording measuring device or equivalent for use to verify the pressure differential. This data shall be submitted to the IH at the end of the work shift.

3.01 Fan Unit Safety and Warning Devices: All fan unit safety and warning devices will be factory installed.

All fan unit safety and warning devices will meet current National Electric Codes (NEC) , National Electrical Manufacturers Association (NEMA) requirements, and any other pertinent safety industry standards and government regulations related to fan unit air movement equipment as required in this section. The Contractor will need prior approval for the factory installed safety and warning devices from the IH before installing and operating any fan unit(s) in the containment area.

- A. Lockout(s): Electrical and/or mechanical lockout(s) to prevent fan from operating without a HEPA filter.
- B. Automatic Shutdown: An automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge.
- C. Warning Lights: The color of the warning lights will be of the type which meet current acceptable industry standards and government regulations.
 - 1. Normal operation--GREEN LIGHT or equal
 - 2. Too high a pressure drop across the air filters due to but not limited to a filter overloading--YELLOW LIGHT or equal
 - 3. Too low of a pressure drop due to but not limited to a rupture in HEPA filter, obstructed discharge, etc.--RED LIGHT or equal
- D. Audible Alarm:
 - 1. If fan unit(s) shut down due to any operation of previously described of safety systems, an audible alarm will be activated to alert the Contractor and/or site security.
 - 2. The audible alarm will generate a sound level, dbA scale, which currently meets local, state, and federal government safety regulations. If local, state, and federal regulations to not exist, the sound level will be as the manufacture recommends for the working conditions at the project site. The warning device such as bell or horn if should sound if:
 - a. any restriction is found in the intake or exhaust, or
 - b. any rupture occurs in the HEPA filter, or
 - c. any loss of electrical power occurs
- E. Smoke and Heat Detector(s):
 - 1. At least one, smoke and heat detector shall be placed near the fan inlet to alert security, the Contractor and any workers in the containment area that a fire heat and/or smoke danger is in progress.
 - 2. Site security and/or containment worker supervisor shall have a readily accessible "kill switch" to de-energize the electrical power to all negative air fan units.
 - 3. The smoke and heat detector(s) shall be approved by but not limited to Underwriters Laboratory (UL), National Electrical Codes (NEC), or Federal Mutual (FM).
 - 4. The factory installed smoke and heat detector(s) shall be an integral ancillary component of the fan unit(s) used by the asbestos abatement Contractor.
 - 5. In the case of fan unit(s) that do not have factory installed smoke and heat detectors, the Contractor shall need to follow the manufacturer's recommends to the use and location of their product(s).
 - a. The recommendations shall also adhere to current industry, local, state, and federal regulations.
 - b. The Contractor will obtain prior approval from the IH before locating and installing the smoke and heat detectors.
 - 6. The smoke and heat detector(s) shall be "hard wired" and/or battery powered as per manufacturer requirements. If the smoke and heat detector(s) are "hard wired" by the Contractor, the wiring will be perform by a licensed electrician and all electrical work will conform to current NEC codes.
- F. Fan Unit Electrical Components:
 - 1. The fan unit's electrical components shall be approved by but not limited to the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL) requirements.

2. Each fan unit shall be equipped with factory installed overload protection sized for the respective electrical components. The fan electric motor shall be equipped with factory installed manual reset thermal overload protection. Automatic reset thermal overload shall not be permitted unless current local, state, or federal regulations allow the use of this type of reset under specific work site conditions.
3. Fan unit components including but not limited to the electric motor, fan, fan housing, and cabinet shall be grounded in accordance with current National Electrical Codes (NEC) and National Electrical Manufacturers Association (NEMA) standards.

4.01 Auxiliary Generator(s):

If the availability of electrical power is insufficient and/or unreliable at any of the building project sites, the asbestos abatement Contractor shall provide auxiliary generator(s) to operate, as a minimum, the negative air fan unit(s) and any other ancillary equipment related to asbestos abatement activities. The Contractor may use other alternate sources of electrical power with prior approval from the Project Manager and/or IH.

- A. Auxiliary Generator(s): Provide generator(s) with the capacity to power all the required HEPA filtered fan unit(s) and any other ancillary equipment related to asbestos abatement activities. The generator(s) shall be of the self-starting type or manually start type depending on the project site conditions. The starting method shall be reviewed and approved by the Project Manager prior to operating any generator(s).
- B. Power Outages: In buildings where power outages are possible, the Contractor shall connect auxiliary generator output power to the building's existing power panel(s) or provide other electrical power routes that conform to current industry standards and/or current NEC requirements.
 1. State-of-the-art solid state automatic power switching shall be provided to start the operation of auxiliary generator(s). State-of-the-art solid state automatic switch-over components shall provided the transfer of electrical power generated from the auxiliary generator(s), at a switch-over rate as recommended by the generator manufacturer, to the HEPA filtered fan unit(s) and/or any other ancillary equipment being used in abatement activities.
 2. There shall be no electrical conflicts between the switch-over and "kill switch" electrical circuits of auxiliary generator(s).
- C. Location of Auxiliary Generator(s):
 1. Provide auxiliary generator(s) outside of the building in a location protected from the weather and/or as recommended by the manufacturer.
 2. The asbestos abatement Contractor will insure that the location of the auxiliary generator(s) will not create a fire and/or safety hazard to the workers and any structures in the vicinity or in the structure where asbestos abatement activities are occurring. Any fire damage or injury costs related to the use and location of the auxiliary generator(s) will be at the Contractors own expense.

END OF SECTION

SECTION 01527 WORK AREA PROTECTION

1.01 Preparation of Work Areas

- A. Post warning signs meeting the specifications of OSHA 29 CFR 1926.1101 at any location and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the work area to permit an employee to read the sign and take the necessary protective measures to avoid exposure. Additional signs may need to be posted following construction of workplace enclosure barriers. Contractor shall post warning signs in both English and Spanish.
- B. Protect all electrical equipment located below work areas. All electrical equipment below work area are going to remain live. Provide temporary power and lighting. Insure safe installation (including ground faulting) to temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems.
- C. Shut down and lock out of all fans and equipment. Investigate the work area and agree on pre-abatement condition with the Industrial Hygienist (IH). Isolate work area using barrier tape.
- D. Preclean all movable objects within the work area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the work area and carefully stored in an uncontaminated location. This shall be done with strict coordination with Industrial Hygienist (IH).
- E. Preclean all fixed objects in the work area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination significant. After precleaning, enclose fixed objects in 4 mil polyethylene sheeting and seal securely in place with tape.
- F. Cover floors in the work area with fire rated polyethylene sheeting. Floor shall be covered with two layers of 6 mil (minimum) sheeting. Additional layers of sheeting may be utilized as drop cloths to aid in cleanup of bulk materials.
- G. Plastic shall be sized to minimize seams. If the floor area necessitates seams, those on successive layers of sheeting shall be staggered to reduce the potential for water to penetrate to the flooring material. A distance of at least 6 feet between seams is sufficient. Do not locate any seams at wall/floor joints.
- H. Floor sheeting shall extend at least 12" up the sidewalls of the work area. Sheeting shall be installed in a fashion so as to prevent slippage between successive layers of material. (Vinyl sheeting may be used for improved traction on floors.)
- I. Cover walls in the work area with two (4) layers of four mil polyethylene sheeting. They can be decontaminated by using HEPA vacuums and wet cleaning techniques. Walls with mortar joints (i.e. tile) are considered porous. In addition, openings through these walls to uncontaminated areas of the building must be sealed.
- J. Walls shall be covered with two layers of 4 mil polyethylene sheeting. Plastic shall be sized to minimize seams. Seams shall be staggered and separated by a distance of at least 6 feet. Wall sheeting shall overlap floor sheeting by at least 12 inches beyond the wall/floor joint to provide a better seal against water damage and for establishing air filtration pressure.
- K. Wall sheeting shall be secured adequately to prevent it from falling away from the walls. This will require additional support/attachment when air filtration ventilation systems are utilized.

1.02 Fire Protection

- A. General Requirements:
 - 1. The Contractor shall employ his supervisor or a designated safety control officer to provide training to the workers of the proper use of fire extinguishers, implementation of Fire Safety Program and proper evacuation of the containment area.
 - 2. Training shall meet the minimum requirements of OSHA 1926.150(a)(5).
 - 3. All fire protection equipment shall be in place before any preparation or removal of

asbestos will be allowed. Such equipment shall be clearly identified with an appropriate signs.

4. All combustible rubbish, including bagged asbestos, shall be removed from the containment on a daily basis. Absolutely no bulk debris shall be allowed to remain in the containment over night.
5. During demolition or alterations, existing sprinkler installations shall be retained in service as long as practicable.
6. Contractor shall provide a safe means of egress from fire and any type of emergencies.

B. Work Area:

1. Polyethylene used on this project shall be limited to 4 and 6 mil. Material Safety Data Sheets (MSDSs) shall be maintained on the site for the inspection by any outside agencies of jurisdiction to prove the presence of this type of poly.
2. Smoke/heat detectors shall be adequately spaced about the containment and/or work area. A minimum of one per 1000 square foot of floor space is required. One shall be placed 15 feet from the decontamination station.
3. The Contractor shall provide a 4A/60BC chemical extinguishers for every 1000 square feet, or fraction, of containment area (IAW Texas Department of Health regulations 295.60 (m)(1). All Workers shall be within a maximum of 100 feet travel distance of a fire extinguisher.
4. All air filtration units shall be able to be switched off from a single switch located at the control center. In the event that a fire starts or a smoke and/or heat detector is activated, the air filtration units shall be immediately switched off. The machines shall remain in the off mode until such time as it has been verified that a fire does not exist.

C. Cleanroom and/or Decontamination Unit:

1. A smoke and/or heat detector shall be located in the cleanroom area.
2. 4A/60BC chemical extinguishers shall be located at either end of the decontamination unit.

1.03 Viewing Inspection Window

1. Contractor shall construct a minimum of window (s) to permit the viewing of at least 51% of the abatement work area in accordance with TAHPR 295.60 (d). This window (s) shall be of clear 1/8 inch thick acrylic sheet measuring approximately 18" x 18". The bottom of the window shall be at a reasonable viewing height from the outside floor.
2. All such windows shall be sealed leak-tight with industrial grade duct tape.

END OF THIS SECTION

SECTION 01528 ENTRY INTO CONTROLLED AREAS

1.01 Entry and Exit of Work Area

- A. General Requirements: Unless otherwise indicated (such as contract drawing, emergency evaluation, and these specifications) entry and exiting of the work area shall be through the "Worker and Equipment Enclosure" or an "Airlock".
- B. Entry and Exit through "Worker and Equipment Enclosure":
- C. Entering the Work Area: Each worker and/or authorized visitor shall enter the clean room, remove street cloths, put on a clean approved respirator and protective clothing and disposable footwear. From this point, workers and/or visitors shall not eat, drink, smoke, chew gum or tobacco while in the work area. Respirator shall be tested for proper fit and operation. After completing the work and/or visiting the worker and/or visitor shall then proceed through shower room to the equipment room. At the discretion of the Industrial Hygienist (IH) smoke testing of respirator shall be performed on all personnel donning respirators.
- D. In the Equipment Room any tools, equipment, etc. needed shall be picked up here. Non-Disposable footwear shall be put on then proceed to work area.
- E. Exiting the Work Area: Prior to entering the equipment room, worker and/or authorized visitor shall brush off any gross contamination. Use the buddy system to visually check clothing for asbestos debris.
- F. In the equipment room, any tools, equipment, etc. shall be stored, and all clothing except respirator shall be removed. Disposable type clothing shall be placed in a disposable container (plastic bag). Non-disposable footwear shall be removed and stored while still wearing the respirator the proceed naked to the shower.
- G. While showering, first wash and soak filters and then remove respirator and continue to wash respirator with soap and water after washing respirator, proceed to wash body and hair with appropriate soap and shampoo. Finally dry off and proceed to the clean room.
- H. In the clean room, worker and/or visitor shall proceed to dress in street their clothes or clean coveralls. Coveralls worn outside the clean room or the enclosure shall be of a different color or marked for easy identification from those worn in the work area.
- I. Before re-entering the work area from the clean room, each worker and/or authorized visitor shall put on a clean respirator and dress in clean protective clothing and follow the above procedures.
- J. In the vestibule airlock remove protective clothing while still wearing the respirator and place into a disposable bag. The exterior of the respirator shall then be wiped with a damp rag or disposable towel which is placed in the disposable bag. While still wearing the respirator, exit the airlock after the disposable bag is sealed and left in vestibule.
- K. Once outside the airlock, the respirator shall be removed, respirator cartridges removed and disposed as asbestos contaminated waste. The respirator shall then be washed, new cartridges installed and placed in a the appropriate storage container.

END OF THIS SECTION

SECTION 01560 RESPIRATORY PROTECTION

1.01 Respiratory Protection

- A. Respiratory protection shall be provided to workers in conjunction with a Respiratory Protection Program which shall meet the requirements of 29 CFR 1910.134. **This program shall be posted at the work site and shall meet the new April 1998 version of OSHA 1910.134 which requires the program to be work site specific.** Respirators shall be personally issued, fitted and marked. All workers shall be familiar with the contents of the respiratory program.
- B. The Contractor shall provide documentary evidence that all personnel required to wear respiratory protection have been trained in accordance with 40 CFR Part 763, 29 CFR 1910.134, 1910.1001 and 1926.1101.
- C. The Contractor shall provide the workers with clean and properly maintained respiratory equipment approved by NIOSH/MSHA during all work phases in this project.
- D. Air purifying respirators (half-mask or full-face) with high efficiency particulate (HEPA) filters shall **ONLY** be used for pre-abatement activities, and when removing waste from outside the containment to disposal storage, and/or when loading and unloading the covered waste disposal storage facility.
- E. **PAPR shall be the only respirator worn when OSHA Class I asbestos abatement project are performed.** Type C supplied air or SCBA with full face piece operated in a pressure demand mode shall be used inside any containment utilizing pressure differential to maintain inward air flow. The Type C air supply must also have an auxiliary self-contained SCBA operating in a pressure demand mode, or high efficiency particulate (HEPA) filter which provides a 15 minute escape time in the event of compressor failure or malfunction. See Section 01030 for respiratory protection specified.
- G. When Type C respirators are employed, the air supply system shall provide grade "D" or better breathing air in accordance with OSHA 29 CFR 1910.34 and ANSI Z862.1 Commodity Specification for Air.
- H. The air shall be tested by the Contractor to verify that certain criteria established by the Compressed Gas Association, Inc. has been met or exceeded. The Contractor must provide a written copy of the analytical test results prior to using system. The Contractor shall be responsible for all fees associated with these tests. All tests will be performed at the job site and in the presence of the Owners representative.
- I. For bottled air filled with compressed air, or manufactured air Contractor shall follow the same test as above. For bottled air the Contractor must provide a certificate from the supplier stating the air is grade "D" or better.
- J. It is the Contractor's responsibility to provide adequate respiratory protection for any foreseeable contingency.
- K. Anytime the compressor or the Grade D Panel is moved, the Contractor shall perform a new Grade D air Test as stated in G and H. above.
- L. The Carbon Monoxide (CO) calibration of the panel shall be done and recorded in the log book daily.

END OF THIS SECTION

SECTION 01562 PERSONNEL PROTECTION

1.01 Personnel Protection:

- A. General Requirements: The Contractor shall provide all personnel training, equipment, materials, services and liability insurance required to perform the work in accordance with applicable Federal, State and Local regulations and this specification. Contractor shall have 1.5 respirators per man on site to comply with the Texas rules and regulations.
- B. Prior to commencement of work, workers shall be instructed, and be knowledgeable of the specific Asbestos Removal Procedures to be used in this project. In addition to the instructions, on-site training in the use of equipment and facilities unique to the job site shall be performed, to include emergency procedures, such as equipment power failures, fires, evacuations, etc.

1.02 Worker and Visitor Protection

- A. Provide workers with sufficient sets of protective full-body clothing. Such clothing shall consist of full-body coveralls and respirator. Provide eye protection and hard hats as required by applicable safety regulations. Non-disposable type protective clothing and footwear shall be left in the contaminated equipment room until the end of the abatement work, at which time such items shall be disposed of as asbestos waste, or shall be thoroughly cleaned of all asbestos containing waste. Disposable type clothing, and footwear may be used and shall be disposed of as asbestos waste. Bare feet will not be permitted.
- B. Provide authorized visitors with suitable protective clothing, respirator, headgear, eye protection and footwear, as described in paragraph A. above, whenever they are required to enter the work area.
- C. Each worker shall, upon entering the job site: Remove street clothes in the clean change room, put on a respirator and clean protective clothing before entering the equipment room or work area, the exception shall be that workers intending to reuse contaminated protective shall enter equipment room wearing respirators.
- D. Each time the worker leaves the work area, the worker shall remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except respirators; Still wearing the respirator, proceed to the shower, clean the outside of the respirator with soap and water while showering; remove the respirator, thoroughly shampoo and wash themselves, remove filters (where required) and place them in the container provided for the purpose; and wash and rinse the inside of respirator.
 - 1. Contractor is responsible for providing soap, shampoo, clean and dry towels daily to employees and visitors.
- E. After showering, each worker shall proceed directly to the clean change room and dress in clean clothes at the end of each day's work, or before eating, smoking or drinking. Before re-entering the work area from the clean change room, each worker and authorized visitor shall put on a clean respirator with filters (where required) and shall dress in clean protective clothing, the exception shall be that workers intending to reuse contaminated protective clothing stored in the equipment room shall enter the equipment room wearing respirators.
- F. Asbestos contaminated footwear shall be stored in the equipment room when not in use in the work area. Upon completion of abatement, dispose of footwear as asbestos contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from equipment and access area. Store asbestos contaminated protective clothing in the equipment room for reuse or place in receptacles for disposal with other asbestos contaminated materials.
- G. Workers shall not eat, drink, smoke or chew gum or tobacco, or utilize sanitary toilet facilities at the worksite except in established locations outside the work and containment areas, and enclosures.
- H. Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbances of asbestos-containing or asbestos contaminated waste materials and until final clean-up is completed. This includes removal of fixtures, ceilings, or anything else which may disturb the ACM.
- I. Provide and post, in the Equipment Room and Clean Room, the decontamination and work procedures to be followed by workers.

END OF THIS SECTION

SECTION 01563 DECONTAMINATION UNITS

1.01 Enclosures:

- A. General Requirements: Several types of enclosures are used, one for the workers and equipment entry and exit of the work area, a second as a holding area for waste storage and load-out area, and a third as a separation between the work area and the non-work area. Enclosure types required for this project shall be governed by special instructions on this specification.
- B. Enclosures can be portable pre-fabricated units or site fabricated units. Contractor shall submit for approval the type of enclosures to be used for this project. The submittal shall be submitted in conjunction with Section 1300 of this specification and included, but not be limited to the following:
 - 1. Floor Plan layout with dimensions showing all components.
 - 2. Material list with sizes and thickness.
 - 3. Plumbing layout showing shower(s), piping, drains, filtration systems(s) and water heater (if used).
 - 4. Electrical (if used) a layout showing lighting and/or outlets.
 - 5. Photographs may be submitted in conjunction with the above items.
- C. The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate.
- D. Worker and Equipment Enclosure: Shall consist of 3 (three) compartments; clean room, shower room and equipment room separated by airlocks. The envelope of the enclosure shall be leak free.
- E. Clean Room: This room shall be provided with a locker or container for each worker's street clothing, respirators, respirator cartridges, clean work clothing, towels, and personnel supplies. Joint use of this space for other functions, such as office, storage of equipment, materials or tools, shall be prohibited.
- F. Shower Room: This room shall have an adequate number of showers, soap, shampoo and containers (plastic bags) for respirator cartridges. Shower(s) shall be piped with hot and cold or warm water. The room is to be free of any leaks. Under no circumstance shall the shower room be used for cleaning equipment.
- G. Equipment Room: This room shall be used for storage of equipment such as ladders, vacuums, scraping tools, non-disposable footwear, hardhats, goggles and any additional asbestos contaminated work items. This room shall be provided with receptacles, such as plastic bags or approved containers, for the use of disposable coveralls (if used) and asbestos contaminated waste before exiting to the shower. The room may also be provided with a wash area for equipment.
- H. This area shall be cleaned daily (several times a day is recommended) to prevent asbestos debris from being tracked into the shower area.
- I. Airlocks: Airlock curtain (door) shall be formed by two (2) overlapping sheets of plastic (4 mil, minimum) the full height and width of the passageway, each sheet being attached at the ceiling and one side. Each sheet is to be attached on opposite sides of the passageway. The sets of curtains (overlapping sheets) are required, one at each end of a space forming a vestibule, dead space. The space (vestibule) shall be two (2) feet in length by the width of passageway for enclosures and four (4) to six (6) feet in length by width of passageway for other location requiring airlocks.
- J. Filtration System: The shower drain and equipment room drain (if any) shall be connected to a filtration system before being discharged to the sanitary sewer. Filters shall be arranged in parallel banks with a 100 micron pre-filters feeding into a 1 micron final filters. Replaced filters shall be treated as asbestos contaminated waste and disposed of properly.

- K. Holding Area (Waste Storage and Load-Out): Shall consist of at least 1 (one) compartment with an air lock between the compartment and the intended disposal vehicle. The envelope of the compartment and air-lock shall be leak free. Passage between compartment and work area shall have two sheets of plastic overlapping each other.
- L. Separation(s) shall be constructed as follows:
 - 1. Framing of suitable materials such as 2 x 4 wood or metal studs shall be erected between floor with a bottom plate and ceiling with a top plate for distance. Support as required.
 - 2. Cover both sides with double layer of plastic sheeting (4 mil) with joints staggered and sealed with tape.
 - 3. Seal all edges of separation at floor, walls and ceiling with caulking to be airtight.
- M. Maintenance of enclosure systems shall be performed by the Contractor.

END OF THIS SECTION



SECTION 01632 PRODUCTS

1.01 Materials:

- A. General Requirements: Materials shall conform to the following:
1. All material shall be delivered to the job site in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name.
 2. Store all materials subject to damage off the ground, away from wet or damp surfaces, under cover sufficient to prevent damage or contamination.
 3. Damaged or deteriorating materials shall not be used and shall be removed from the premises and properly disposed of.
 4. All material not in original containers will be reviewed by Industrial Hygienist (IH).
- B. Polyethylene plastic that is used on this project shall be limited to 4 and 6 mil. MSDSs shall be maintained on the site for the inspection of the building owner to prove the presence of this type of poly. Plastic (polyethylene) sheets shall be six mil thickness with a tear resistance of no less than M.D. 512 grams, T.D. of 2,068 grams, and a dart impact of no less than 297 rams as measured using ATSM methods D1709, D1922, and D882. Submit a sample of each thickness intended to be used.
- C. Tape: Capable of sealing joints of adjacent sheets of plastic sheets and for attachment of plastic sheet to finished or unfinished surfaces or dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water. Submit a sample of each type to be used.
- D. Surfactant (Wetting Agent): Shall consist of 50 percent polyoxyethylene ether and 50 percent of polyoxyethylene polyglycol ether, or equivalent, and shall be mixed with water to provide a concentration of one ounce surfactant to five (5) gallons of water.
- E. Impermeable Containers shall be suitable to receive and retain any asbestos-containing or contaminated materials until disposed of. The containers must be both airtight and watertight. The containers shall be labeled in accordance with OSHA Regulations 29 CFR 1926.1101. The container shall be of six (6) mil plastic bag (submit sample), or plastic lined drum (submit brochure), etc. Submittal required for each type intended to be used in this delivery order.
- F. The Glovebag shall consist of a 6 mil bag equipped with long-sleeve gloves, a tool pouch, and side port opening used for water and vacuum application. The glovebag with a zipper arrangement is preferable but not mandatory. Glovebags shall be of at least 6 mil and be seamless at the bottom.
- G. Warning Labels: Container shall have the following notation in accordance with Applicable Laws 29 CFR 1926.1101.

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE
HAZARD

- H. Encapsulant: A sealant specifically designed to be used after the removal of asbestos to capture any fibers which may be left on surfaces in accordance with requirements of the U.S. Environmental Protection Agency (EPA).

- I. Warning Signs: Signs shall have the following notation in accordance with Applied Laws:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE
HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

- J. Other Materials - provide all other materials as specified in drawings; also, other materials such as lumber, nails, and hardware, which may be required to construct and dismantle the decontamination area and the barriers that isolate the work area.
- 1.02 Equipment:
- A. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI 29.2-79. See Section 01513. This equipment:
1. Shall be portable and equipped with a high efficiency particulate absolute (HEPA) Filtration systems in compliance with ANSI 29.2-79.
 2. Deliver its rated volume of air with a clean first stage filter, an intermediate filter and a primary HEPA filter in place.
 3. The HEPA filter shall be certified capable of removing particles to 0.3 microns at a minimum efficiency of 99.97 percent.
 4. Shall be able to deliver no less than 70 percent rated capacity when the HEPA filter is installed or measure 2.5 inches of static pressure differential on a magnehelic gage.
 5. Shall provide manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0%.
 6. Shall have an electric mechanism which automatically shuts the machine off in the event of a filter breach or absence of a filter.
 7. Shall have an audible horn which sounds an alarm when the machine has shut itself off.
 8. Shall have an automatic safety mechanism which prevents a workman from improperly inserting the main HEPA filter.
- B. Vacuum equipment: Shall be portable and equipped with High Efficiency Particulate Absolute (HEPA) filters.
- C. Respirator Equipment:
1. Respirators shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health Department, of Health, Education and Welfare, under the provisions of 30 CFR Part II and shall be used in accordance with Applied Laws 29 CFR 1910.1001.

END OF THIS SECTION

SECTION 01701 PROJECT CLOSEOUT

1.01 Re-establishment of the Work Area and Systems:

- A. Re-establishment of the work area shall only occur following the completion of clean-up procedures and after IH has declared area clean.
- B. Contractor, owner and IH shall visually inspect the site for any damage or discrepancies. Owner or IH shall generate a punch list for contractor to repair.
- C. Any damage or discrepancies shall be repaired by contractor at his expense and reasonable fees may be retained by owner till such time as discrepancies are repaired.
- D. Re-secure mounted objects removed from their former position during preparation activities.
- E. Re-establish all work areas and electrical system in proper working order.
- F. Final payment will be dependent on owner receiving executed waste disposal certificates, all contractor documents and Release of Material and Labor liens (AIA G706). Contractor site documentation shall be reviewed and forwarded by the Industrial Hygienist prior to any payment being made.

END OF THIS SECTION



SECTION 01712 CLEANING AND DECONTAMINATION PROCEDURES

1.01 Clean-up Procedures:

NOTE: The clean up procedures can be started by the contractor whenever his supervisor and the Industrial Hygienist inspect and approve the asbestos abatement areas. The encapsulation shall not be done until the contractor is given approval by the Industrial Hygienist on site.

- A. Remove and containerize all visible accumulations of asbestos containing material and asbestos contaminated debris utilizing rubber dust pans and rubber squeegees to move material around. Do not use metal shovels to pick up or move accumulated waste. Special care shall be taken to minimize damage to floor sheeting. All equipment not required on the project shall be decontaminated and removed from the area. All ACM disposal bags shall be removed from the containment prior to receiving approval for encapsulation or lockdown.
- B. Wet clean all surfaces in the work area using rags, mops and sponges as appropriate. (Note: Some HEPA vacuums may not be wet-dry vacuums. To pick up excess water and gross wet debris, a wet-dry shop vacuum may be used. This will be contaminated and require cleaning prior to removal from the work area).
- C. Visually inspect all areas where asbestos removal has taken place. Any dust, debris or residue in the containment area shall be considered to be contaminated and shall be treated as asbestos. The area inspection shall be accomplished using good Industrial Hygiene practices and ASTM E-1368-90, AHERA 40 CFR 763 and all applicable asbestos regulations concerning clearance and testing.
- D. The Contractor shall provide the Industrial Hygienist with all proper lighting, ladders, or scaffolding and any necessary tools to perform the clearance inspection.
- E. The Industrial Hygienist (IH) shall insure that a thorough job of removal and clean up has been conducted. The IH has the right to terminate his inspection and re-direct further cleanup of the whole area if upon discovery of incomplete removal or discovery of debris.
- F. Upon written approval by the Industrial Hygienist in the Contractors logbook, encapsulation or lockdown shall be done on all surfaces including all poly. If the inspection fails, Contractor shall re-clean using all the above mentioned steps.
- G. When encapsulation or lockdown has been applied the Contractor shall wait for a drying period of not less than six (6) hours or at the discretion of the on-site Industrial Hygienist.
- H. When encapsulation has dried, the Contractor shall remove outer layer of poly from the wall, floors and ceilings. The ceiling poly shall be the first layer removed and shall be placed on the floor. Next remove the walls and place them on the floor. The floor shall then be rolled inward to avoid contamination of the inner layer of poly. Double bag the poly and remove from the containment as contaminated waste.
- I. Following the satisfactory removal of the outer layer of poly, another inspection shall be performed by the on-site Industrial Hygienist (IH). If any debris is found, the IH shall instruct the Contractor to re-clean the entire area. If the area is clean the IH shall begin with his first step of pre-clearance testing. (See section 01714) Clearance Testing).
- J. Upon achieving the clearance criteria for pre-clearance the inner layer of poly shall be removed following instructions of H. above. The critical barriers, air filtration machines and the decon shall remain in place and operational.
- K. Following the satisfactory removal of the inner layer of poly, another inspection shall be performed by the Industrial Hygienist (IH). If any debris is found, the IH shall instruct the Contractor to re-clean the entire area. If the area is clean the IH shall begin with his final clearance testing. (See section 01714) Clearance Testing).
- L. Upon achieving the clearance criteria for final clearance the Contractor can begin to remove all critical barriers, air filtration machines and begin his demobilization process.

END OF THIS SECTION

SECTION 01714 WORK AREA CLEARANCE

1.01 Clearance Air Monitoring:

- A. The Contractor shall insure completion of cleanup operations in order to commence clearance air monitoring.
- B. The Contractor shall then arrange for an Industrial Hygienist to sample the air in the work area for airborne fiber concentrations.
- C. The air sampling shall be conducted using sampling pumps calibrated at a flow rate of at not more than 10 liters per minute using collection media and procedures in accordance with 40 CFR 763 AHERA and NIOSH Analytical Method 7400 and 7402. Air volumes shall be sufficient to provide reliable results down to a concentration of 70 structures per centimeter squared or <0.05 fibers per cubic centimeter of air (f/cc) respectfully. Volume requirements for electron microscope methods should be in accordance with 40 CFR 763 AHERA, the analytical laboratory.
- D. The number of samples that are required and the specific locations where they shall be taken should be established by the Industrial Hygienist.
- E. Aggressive sampling shall be performed with portable fans circulating air in the work area to simulate actual use conditions. The number of fans necessary for circulating air shall be determined by the Industrial Hygienist (IH). Air filtration ventilation units shall not be utilized for this purpose but must remain on at all times until clearance has been achieved.
- F. All samples at all locations shall indicate concentrations of airborne fibers less then 0.01 f/cc for passing of the pre-clearance testing and <70 structures per millimeters squared for final TEM clearance.
- G. The final clearance shall be a two step process, a pre-final and a final-final set of air samples.
 - 1. Pre-final samples shall be taken when the Industrial Hygienist (IH) on site declares area is ready for final testing. The process for this testing shall be with one layer of poly containment, decon-station, and air filtration system still in place. When samples are analyzed and all samples are found to be <0.01 f/cc then contractor shall proceed to step 2. (final-final testing).
 - 2. Containment poly shall be removed, but decon-station, air filtration machine, and critical barriers shall remain in place and air tight. Industrial Hygienist (IH) shall take air samples in area and when air samples are analyzed and found to be <0.70 s/mm², the Industrial Hygienist (IH) may declare area clean.
- H. When contractor fails to achieve clean air in any of the above said clearance sampling methods, contractor shall reclean area till samples achieve standards set forth above. Any and all cost arising from this extra cleaning shall be the responsibility of the contractor.

END OF THIS SECTION

SECTION 01716 DISPOSAL PROCEDURES

1.01 Disposal Procedures

- A. The Contractor is responsible for disposal of all the asbestos waste. The disposal Contractor shall be responsible for transportation of all asbestos containing waste to the storage areas, and proper containerizing of the asbestos waste. **Contractor shall abide by all regulations and policies for handling regulated waste set forth by all regulatory agencies.**
- B. On a daily basis or at the discretion of the Industrial Hygienist (IH) contractor shall remove ACM waste from containment. Contractor shall not allow excess debris to accumulate on the floor of the containment, Industrial Hygienist (IH) has the right to stop work and direct clean-up.
- C. The Contractor shall coordinate transportation of waste to the EPA approved landfill with the Industrial Hygienist on site. **Prior to bringing waste transportation vehicle on site, Contractor shall coordinate with the Environmental Section of ASARCO through point of contact Ms. Peggy Munsell at (915) 521-3640. Environmental Section shall brief the operator and contractor on the steps require to enter into ASARCO. Highlight of some rules are as follows:**
 - 1. Transportation vehicle shall be totally enclosed.
 - 2. Contractor shall have empty weight and exit weight recorded through ASARCO weight station.
 - 3. Contractor shall provide a bill of ladden along with manifest.
 - 4. Vehicle carry proper insurance requirements.
 - 5. Vehicle shall have fire extinguisher, safety kit, and spill plan available.
- D. The Contractor shall fill out and sign the Waste Manifest prior to departure to the EPA approved landfill.
- E. All dump receipts, trip tickets, and manifests must be submitted within 48 hours of dumping, unless contractor has made other written agreement with the owner or IH.
- F. Transportation of ACM waste shall be done in an enclosed compartment vehicle. The truck driver shall be knowledgeable of ACM spill plan carried in the vehicle. The Contractor shall be responsible for developing a spill plan in accordance with current city, state, federal regulations.
- G. All double bagged ACM shall be placed inside approved safety containers prior to being removed from building. Approved safety containers shall be:
 - 1. DOT approved steel drums.
 - 2. Cardboard type drums with sealable tops.
- H. Approved containers shall be moved by use of buddy system, hand trucks, or carts.
- I. Truck cargo or container used to transport ACM waste shall be lined with one layer of six mil poly to prevent contamination and spillage.
- J. Truck cargo or container shall have appropriate warning labels and shall be locked to prevent entry by unauthorized personnel. Warning signs in accordance with 40 CFR part 61 NESHAPS regulations shall be placed on the vehicle when loading and unloading vehicle.
- K. Personnel loading asbestos containing waste shall be protected by disposable clothing including head, body and foot protection and at a minimum, half-facepiece, air-purifying, dual cartridge respirators equipped with high efficiency filters.
- L. Loading of any vehicle shall be closely monitored to avoid overloading vehicle capacity. Contractor shall insure proper load bearing distribution of ACM waste.
- M. The disposal Contractor shall have a spill plan in effect for spills that may occur in transportation or unloading. Any bag found to be broken at landfill shall be re-bagged and area of contamination shall be cleaned up immediately.
- N. Asbestos waste containers shall be placed on the ground at the disposal site. The Contractor shall insure that bags are not pushed or thrown out of the transport vehicle.
- O. Personnel unloading containers at the Storage Site shall wear protective equipment consisting of disposable head, body and foot protection and, at a minimum, half-facepiece, air-purifying, dual cartridge respirators equipped with high efficiency filters.

- P. Upon completion of un-loading vehicle the poly used to protect the vehicle shall be discarded as ACM waste. Any spillage discovered shall be cleaned and area decontaminated immediately by the disposal contractor.

END OF THIS SECTION



SECTION 02081 GENERAL REMOVAL PROCEDURES

1.01 Removal Procedures

- A. See Section 01560 and Section 01563 for minimum personnel protection. Industrial Hygienist (IH) shall authorize commencement of removal procedures. Clean and isolate the work area in accordance with Section 01527.
- B. Spray all asbestos containing material with amended water solution, removal encapsulant, or chemical remover using spray equipment capable of delivering a low pressure mist to reduce the release of asbestos fibers. Adequately wet the ACM to the substrate. Spray the ACM continuously during the removal practices to maintain adequate wet conditions and minimize fiber release and dispersion. Follow all manufacturers recommended procedures if a manufactured product is used for removal processes.
- C. Saturated asbestos containing material shall be removed in manageable sections. As ACM is removed, material will be placed in a suitable container (6 mil(0.152mm) polyethylene bags or drum). Material shall not be allowed to dry out prior to containerizing. Surrounding areas shall be periodically sprayed and maintained in a wet condition until visible material is cleaned up.
- D. All material removed shall not be thrown or dropped to the floor. Removal of intact and manageable sections is highly recommended as it will reduce fiber dispersion. All ACM containerized shall be carefully lowered to the ground floor by asbestos personnel; where this is not feasible, contractor may use other mechanical means to lower containers. Mechanical means may include but is not limited to inclined chutes, scaffolding, and pulleys, etc.
- E. Containers (6 mil(0.152mm) polyethylene bags or drums) shall be sealed when full. All ACM containerized shall be double lined. Bags shall not be overfilled as wet material is heavier than dry material. All containerized material shall be sealed with suitable duct tape, do not use wire or cord as it may break the container. All containerized material shall be decontaminated on the exterior surfaces before leaving the work area.
- F. Large components removed intact shall be wrapped in 2 layers of 6 mil(0.152mm) polyethylene sheeting secured with tape for transport to the landfill.
- G. Asbestos containing waste with sharp-edged components (e.g. nails, screws, metal lath, tin sheeting) will tear the polyethylene bags and should be placed into drums for disposal.
- H. After completion of all stripping work, surfaces from which asbestos containing materials have been removed shall be wet brushed and sponged or cleaned by some equivalent method to remove all visible residue.
- I. Clean-up shall proceed in accordance with Section 01712.
- J. After the work area has been rendered free of visible residues, and Industrial Hygienist (IH) inspection and approval, a thin coat of a satisfactory encapsulating agent shall be applied to all surfaces in the work area including structural members, building components and plastic sheeting on walls, floors and covering non-removable items, to seal in non-visible residue. (Note: 1) High temperature components such as boilers and pipes may not permit the application of some encapsulants. 2) If insulation or acoustical materials are to be reapplied to the abated area, be certain that the encapsulant selected will permit good adhesion to the substrate. A small area should be tested before application).
- K. Special circumstances (e.g. live electrical equipment, high amosite content of material, materials previously coated with an encapsulant or paint) may prohibit the adequate use of wet methods to reduce fiber concentrations. For these situations, a dry removal method may be required. The contractor will have to acquire special permits, different from those mentioned herein from the NESHAP enforcement agency.

END OF THIS SECTION

SECTION 02082 GLOVEBAG METHOD OF ABATEMENT

1.01 Procedures

- A. Lock out and tag out all electrical power where actual asbestos removal will occur.
- B. Asbestos removal shall be performed by full containment. If glove bag method is used, then single layer secondary containment shall be erected. See Section 02081 General Removal Procedures.

1.02 Glovebag Procedures

- A. The glovebag shall consist of a 6-12 mil (0.152-0.305mm) bag fitted with long sleeve gloves, a tool pouch and an opening for water spray nozzle. The glovebag shall be seamless at the bottom.
 - 1. Materials necessary but not limited to, shall be:
 - a. glovebag
 - b. sprayer
 - c. HEPA vacuum
 - d. utility knife
 - e. nylon scrub brush
 - f. encapsulant
 - g. wire cutters
- B. A team of two persons shall perform the glovebag method.
- C. Before work begins, all necessary Sections of this specification shall be followed. See Section 01527 Work Area Protection, Section 01560 Respiratory Protection, Section 01562 Personnel Protection and Section 01563 Decontamination Units.
- D. Mix the surfactant with water in the sprayer. Bring into the work area all materials that will be used.
- E. Check the pipe where asbestos removal will be done; if it is damaged, wrap the entire length of pipe in poly and candy-stripe with duct tape. If pipe is abandoned, remove in manageable sections. If pipe is not abandoned, proceed with installing the glovebag. Install all glovebags before any removal begins. Seal all exposed ends with duct tape or bridging encapsulant.
- F. Place a sheet of poly underneath the pipe wide enough to cover the area where debris might fall to floor. Usually 2 feet (0.61m) extending on either side of pipe.
- G. Each glovebag shall be installed so that it completely covers the circumference of pipe or other structure where the work is to be done.
- H. Glovebags shall be smoke-tested for leaks and any leaks sealed prior to use.
- I. Glovebags may be used only once and may not be moved. Glovebags shall not be used on surfaces whose temperature exceeds 150° f. Special glovebags shall be used on hot steam lines.
- J. Prior to disposal, glovebags shall be collapsed by removing air within them using a HEPA vacuum.
- K. Proceed with Section 01712 Cleaning and Decontamination, Section 01714 Work Area Clearance, Section 01701 Project Closeout, Section 01716 Disposal Procedures.

END OF SECTION

SECTION 02088 REMOVAL OF ACM FLUE INSULATION

1.01 Procedures

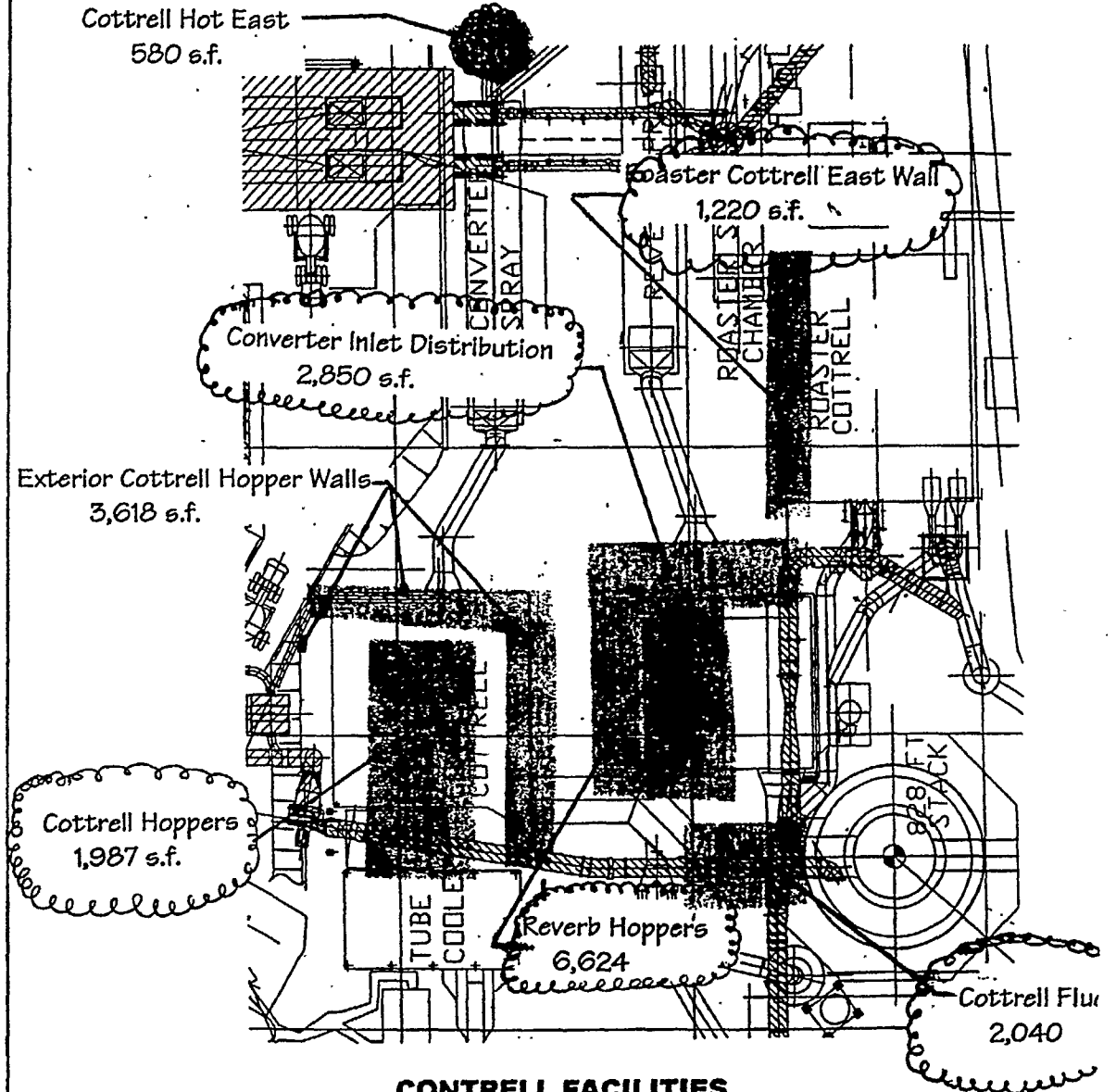
- A. Lock out all electrical power where actual asbestos removal will occur.
- B. Asbestos removal of asbestos containing flue insulation material shall be performed using all personal protective equipment to dual filter respirator. A decontamination station shall be erected, as specified, in its respective section on all areas of abatement.
- C. Prior to starting any work the contractor shall insure that all personnel are trained in the hazards of working with lead, arsenic, cadmium, working with Converter Cottrell Dust, and in high nose areas. Attachments to this manual contain material safety data sheets for Converter Cottrell Dust to aid in training asbestos personnel.

1.02 Removal of ACM Flue Insulation

- A. Set up barrier tape, warning signs, and control center. Minimum respirator shall be a full-face APR with HEPA and Acid Gas filter. A full body coverall such as the tyvek suit (or equivalent) shall be used during all work.
- B. Contractor shall follow all procedures in this manual which are applicable to full containment procedures.
- C. Removal shall be accomplished using a two man team. One man shall be equipped with water sprayer (amended water) while the other man removes the insulation from the tank.
- D. All ACM material and debris shall be double bagged and disposal procedures in SECTION 01716 of this Manual shall be followed. Contractor is warned that all ACM waste shall be placed in approved steel or cardboard drums. Contractor shall insure that the tank insulation wire lath does not cut plastic containment and if it does the Contractor shall insure that immediate repair methods are taken.
- F. SECTION 01712 CLEANING AND DECONTAMINATION PROCEDURES shall be followed when IH approves abatement.
- G. When directed by the IH, proceed with SECTION 01714 CLEARANCE TESTING PROCEDURES.
- H. Follow SECTION 01701 PROJECT CLOSEOUT AND DEMOBILIZATION.

END OF THIS SECTION

ABATEMENT AREAS



CONTRELL FACILITIES

ASARCO, Inc

**Sun City
Analytical, Inc.**
Environmental Services



1409 Montana
El Paso, Texas 79902
(915) 533-8840 FAX (915) 533-8843

Abatement Areas

RF

MA

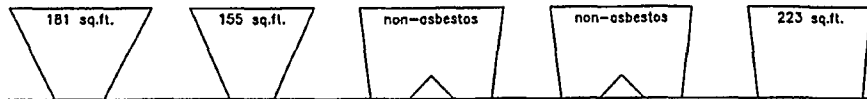
99SA-249

9/99

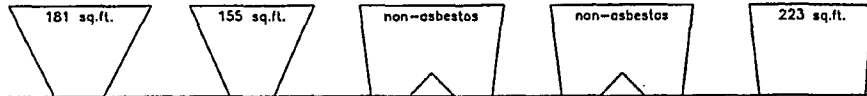
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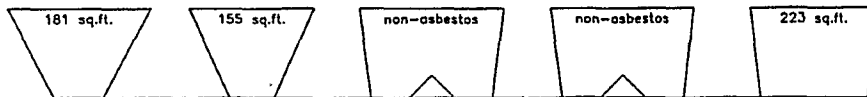
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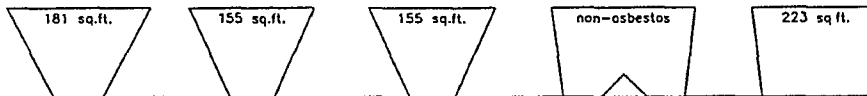
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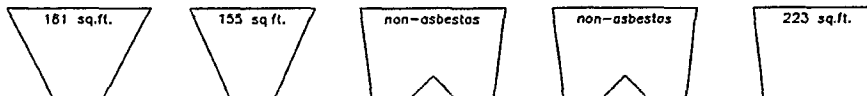
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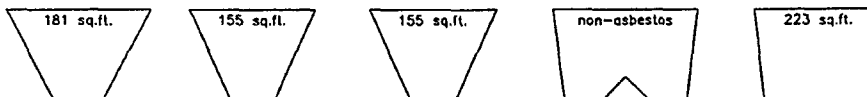
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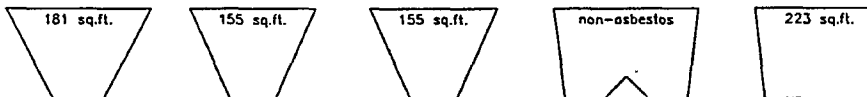
Row 3



Row 2



Row 1



Old Slag Road

COTTRELL HOPPERS
NOT TO SCALE



Designed By
A Sun City
Analytical Inc.
Environmental Services
1409 Montana Ave.
El Paso, Texas 79902
(915) 533-8840 fax (915) 533-8843

WORK DESCRIPTION:
ASBESTOS ABATEMENT

PROJECT NUMBER:
97276

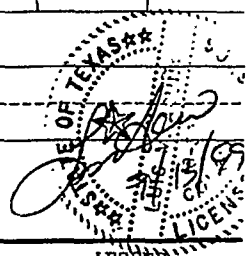
ACAD TITLE:
.. \RG \ CONV - COT

DRAWN BY:
RG

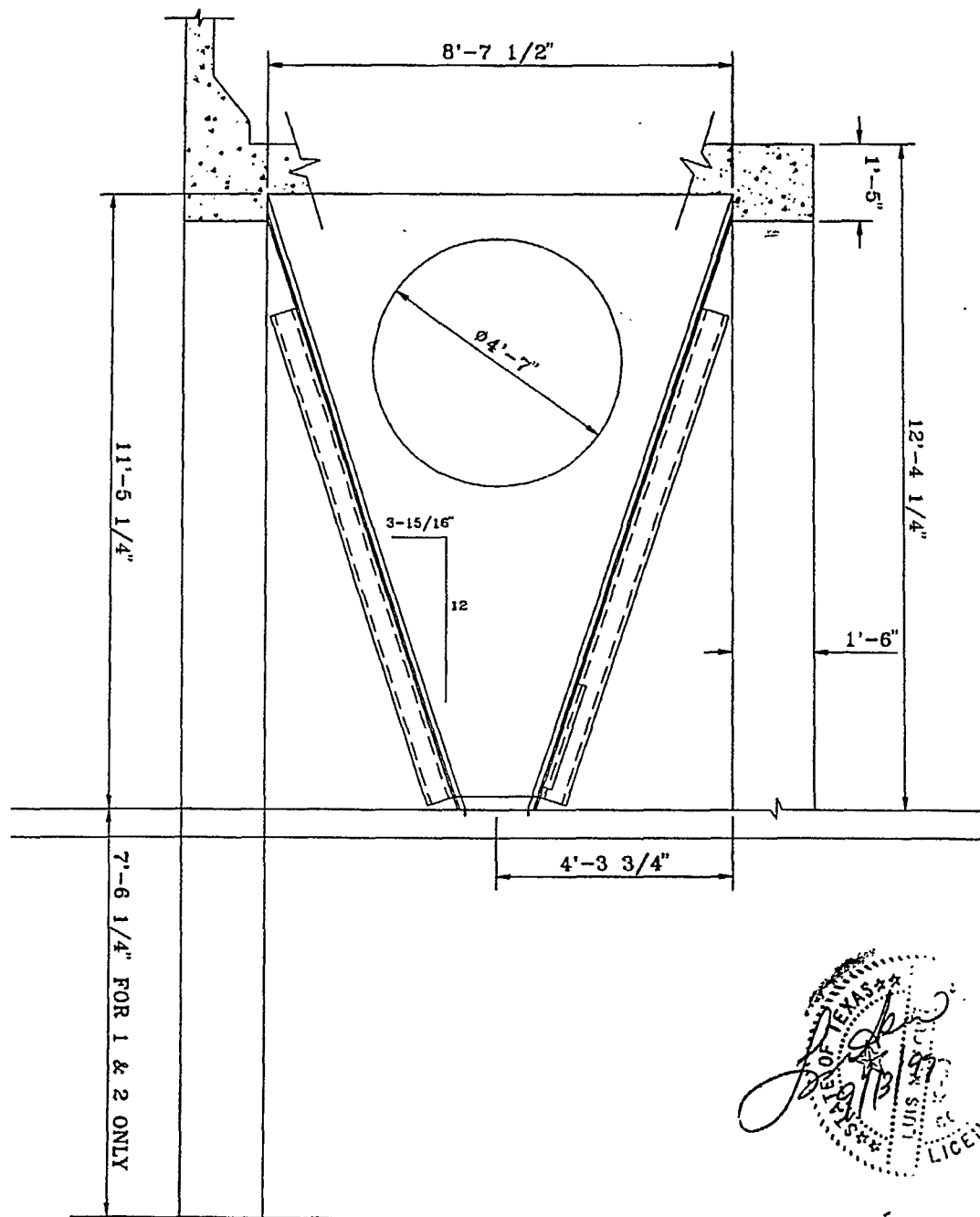
DIRECTOR:
LMA

DATE:
11/97

LEGEND
4,378 total sq.ft



ASARCO ELP 0013499



ASARCO-TYPICAL HOPPER
SCALE: 3/8"=1'

Designed By
Sun City Analytical Inc.
Environmental Services
1409 Montana Ave.
El Paso, Texas 79902
(915) 533-8840 fax (915) 533-8843

WORK DESCRIPTION:
ASBESTOS ABATEMENT

AA-1

ACAD TITLE:
..RG\ASARCO_H

DRAWN BY:
RG

DIRECTOR:
MM

DATE:
7/97

LEGEND
TOTAL ACM TO BE
REMOVED FROM HOPPER
(APPROX. 6,250 S.F.)
(APPROX. 6" THICK)



ATTACHMENT I

ASARCO

EP CONVERT COTTRELL DUST MATERIAL SAFETY
DATA SHEET

A. PRODUCT/COMPANY IDENTIFICATION

TRADE NAME (COMMON NAME OR SYNONYM) Converter Cottrell Dust		ASARCO PRODUCT CODE# 6140215	
CHEMICAL NAME Complex Mixture	FORMULA Complex Mixture		MOLECULAR WEIGHT Not Applicable
ADDRESS (No., STREET, CITY, STATE AND ZIP CODE) ASARCO Incorporated 180 Maiden Lane New York, New York 10038 Phone: 212-510-2000			
CONTACT General Information - Department of Environmental Sciences DAY 801-262-2459 NIGHT 801-561-3044 First Aid Information - (Medical Dept.) 415-457-0383 Transportation Emergencies - CHEMTREC 800-424-9300		PHONE NUMBER	ISSUED DATE 2/04/86
			REVISED DATE 11/1/93

B. COMPOSITION/INFORMATION ON INGREDIENTS

MATERIAL OR COMPONENT	C.A.S. #	WT. %	PERMISSIBLE AIR CONC.(mg/cu.m.)	
			OSHA	ACGIH
Lead	7439-92-1	30-40	0.05	0.15
Zinc	7440-66-6	3	None Published	None Published
Cadmium	7440-43-9	2-5	0.005 as Cd	Cd & its com 0.01 total/0. 1.0 as dust
Copper	7440-50-8	1	1.0 as dust	0.2
Arsenic	7440-38-2	10	0.01	0.5
Antimony	7440-36-0	1-2	0.5	

C. HAZARDS IDENTIFICATION

PRIMARY ROUTES OF ENTRY INGESTION ☐ INHALATION ☒ SKIN ☐	CARCINOGENICITY IARC and NTP classify cadmium and certain cadmium compounds as Group 2A carcinogens (probably carcinogenic to humans). IARC classifies lead, lead compounds and antimony trioxide as Group 2B carcinogens (possibly carcinogenic to humans). IARC, NTP and OSHA classify arsenic and compounds as Group 1 carcinogens (carcinogenic to humans).
ACUTE OVEREXPOSURE (SYMPTOMS AND EFFECTS) Extremely high doses of lead may cause encephalopathy, a brain condition that can result in seizures, coma and death. It should be recognized, however, that exposures of this magnitude in an industrial environment are extremely unlikely. Arsenic and antimony compounds may cause irritation of the respiratory system, skin and eyes, and gastrointestinal disturbance. Inhalation of dust or fume from cadmium compounds may cause irritation of the nose and throat. Inhalation of high concentrations of freshly-formed fume may cause a delayed reaction of pulmonary edema with symptoms of coughing, chest pain, chills, shortness of breath and weakness. Metal fume fever with symptoms of fever, chills, metallic taste, chest tightness or nausea may result from inhalation of zinc oxide fume or dust. Soluble copper salts can cause respiratory irritation, and irritation and/or burns to the skin and eyes.	
CHRONIC OVEREXPOSURE (SYMPTOMS AND EFFECTS) Chronic overexposure to lead may cause diseases of the blood-forming organs, kidneys and liver, damage to the reproductive system, a decrease in fertility in men and women, damage to the fetus of a pregnant woman, anemia, muscular weakness and kidney dysfunction. Symptoms include: tiredness, uneasy stomach, irritability, poor appetite, metallic taste and loss of sleep. Prolonged overexposure to arsenic compounds may cause liver and kidney abnormalities, peripheral neuritis of the hands and feet and an increased risk of lung cancer. Symptoms include weight loss, nausea, diarrhea, weaknesses, loss of appetite and skin lesions. Long term overexposure to cadmium may cause lung injury (emphysema), lung cancer, and kidney dysfunction (proteinuria). Bone lesions characterized by pain in the back and extremities have been reported.	
ADDITIONAL CONDITIONS POSSIBLY AGGRAVATED Diseases of the blood and blood-forming organs, hypertension, kidneys, nervous and possibly reproductive systems.	

ASARCO ELP 0013502

D. FIRST AID MEASURES

Inhalation: Remove from exposure; place individual under care of a physician.
Ingestion: Induce vomiting in conscious individual and call a physician.
Skin or Eyes: Flush with plenty of water. If symptoms develop, consult a physician.

E. FIRE FIGHTING MEASURES

FLASH POINT Not Applicable	AUTO IGNITION TEMPERATURE Not Applicable	FLAMMABLE LIMITS IN AIR (% BY VO Not Applicable
UNUSUAL FIRE AND EXPLOSION HAZARDS Not Applicable	FIRE EXTINGUISHING AGENTS RECOMMENDED No specific agents recommended	FIRE EXTINGUISHING AGENTS TO A No specific agents
SPECIAL FIRE FIGHTING PRECAUTIONS Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in fire.		

F. RELEASE MEASURES

SPILLS OR LEAKS

Any method which keeps dust to a minimum is acceptable. Vacuuming is preferred for dust. Use approved respiratory protection if possibility of dust or fume exists. Do not use compressed air for cleaning.

G. HANDLING AND STORAGE

NORMAL HANDLING Use of approved respirators is required for applications where adequate ventilation cannot be provided. Activities which generate dust or fume should be avoided. When melted, the temperature should be kept as low as possible.	STORAGE General storage procedures acceptable.
--	---

H. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS

Local exhaust ventilation is recommended for dust and/or fume generating operations where airborne exposures may exceed permissible air concentrations.

PERSONAL HYGIENE

Avoid inhalation or ingestion. Practice good housekeeping and personal hygiene procedures. No tobacco or food in work area. Wash thoroughly before eating or smoking. Shower and change clothes at end of work shift. Do not wear contaminated clothing home. Do not blow dust off clothing with compressed air.

RESPIRATORY PROTECTION

Where airborne exposures may exceed OSHA/ACGIH permissible air concentrations, the minimum respiratory protection recommended is a negative pressure air purifying respirator with cartridges that are NIOSH/MSHA approved against dust, fumes and mists having a TWA less than 0.05 mg/cu.m.

SPECIAL: PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS
Where airborne exposures may exceed the OSHA action level and or PEL, refer to the OSHA L 29CFR1910.1025, OSHA Arsenic Standard 1910.1018, OSHA Cadmium Standard 1910.1027
LABEL SIGNAL WORD: WARNING

EYES AND FACE

Safety glasses recommended where the possibility of particles in eyes exists.

OTHER CLOTHING AND EQUIPMENT

Full protective clothing is recommended for exposures that exceed permissible air concentrations. All contaminated clothing removed before leaving plant premises.

I. PHYSICAL/CHEMICAL PROPERTIES

MATERIAL IS (AT NORMAL CONDITIONS) Solid		APPEARANCE AND ODOR Gray Powder, odorless	
MELTING POINT (DEGREES C) Not Available	BOILING POINT (DEGREES C) Not Available	SPECIFIC GRAVITY (H2O = 1) Not Available	VAPOR DENSITY (A Not Applicable
SOLUBILITY IN WATER (% BY WT.) Not Available	pH Not Available	VAPOR PRESSURE (mm Hg) Not Applicable	EVAPORATION RATE Not Applicable

J. STABILITY AND REACTIVITY

STABILITY Stable	CONDITIONS TO AVOID Not Applicable
1. COMPATIBILITY (MATERIALS TO AVOID) None known	HAZARDOUS DECOMPOSITION PRODUCTS At temperatures above the melting point oxide fumes may be evolved.
HAZARDOUS POLYMERIZATION Will not occur	CONDITIONS TO AVOID Not Applicable

K. TOXICOLOGICAL INFORMATION

LD50 (SPECIES, ROUTE) Arsenic: 763 mg/kg(rat, oral) Lead oxide: 630mg/kg(rat, intraperitoneal) Cadmium: 225 mg/kg(rat, oral) Antimony Oxide: 700 mg/kg(rat, oral)	LC50 (SPECIES) Cadmium: 25mg/cu.m./30min.(rat)	MUTAGENICITY Lead, cadmium and antimony tests positive as mutagens in the Ames test Rats given 580ug/kg of arsenic orally showed developmental abnormalities
---	---	--

L. ECOLOGICAL

ECOTOXICITY LC50s are given for the following materials and species: Lead: 3600 ug/mL - daphnia magna Cadmium: 50 ug/mL - daphnia magna Copper: 20 ug/mL - daphnia magna	ENVIRONMENTAL FATE Lead and cadmium are bioaccumulative in most aquatic mammals. Lead is highly mobile as dust or fume, yet forms complexes with organic material which limits its mobility. Arsenic is found as As ⁵⁺ in water, making it mobile in aqueous solution. Copper and Antimony are not bioaccumulative
--	--

M. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE, AND LOCAL DISPOSAL OR DISCHARGE LAWS) If hazardous under 40 CFR 261, Subparts B and C, material must be treated or disposed in a facility meeting the requirements of 40 CFR 264 or 265. If non-hazardous, material should be disposed in a facility meeting the requirements of 40 CFR 257. EPA Hazardous Waste Numbers: Lead - D008, Arsenic - D004, Cadmium - D006	RCRA STATUS OF UNUSED MATERIAL If discarded in unaltered form, material should be tested to determine if it must be classified as a hazardous waste for disposal purposes. Under specific circumstances, application can be made to the EPA Administrator to have a particular waste designated non-hazardous.
---	---

N. TRANSPORT

DOT REGULATION AND ID (OR PIN) NUMBER This material is regulated by the DOT as a Class 9, PG III and has an ID no. of UN3077.
--

O. REGULATORY INFORMATION

WHMIS CLASSIFICATION, SARA REGULATION AND OTHER INFORMATION WHMIS classifies this material as a Class D-2A poison. TSCA Status.....: On TSCA Inventory Regulated under SARA Title III: Sect. 302.....: None Sect. 311/312.....: Immediate and Delayed Sect. 313 Chemicals.....: Arsenic, Lead, Zinc, Cadmium, Copper, Antimony CERCLA Reportable Quantity.....: Arsenic compds = 1#
--

WARNING: the state of California has listed lead and cadmium as chemicals known to cause cancer, birth defects or other reproductive harm, and has listed arsenic as a chemical known to cause cancer.

P. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES OSHA regulations for airborne contaminants 29 CFR 1910.1000 and 1018; ACGIH Threshold Limit Values for Chemicals
--

P. REFERENCES (Continued)

HAZARD INFORMATION REFERENCES

Documentation of the Threshold Limit Values, 6th Ed., ACGIH
Patty's Industrial Hygiene and Toxicology, Vol. 2A, 3rd Rev. Ed., 1981
NFPA Fire Protection Guide on Hazardous Materials, 10th Ed., 1991
Handbook of Toxic and Hazardous Chemicals; Sittig, Marshall; 1981
TOMES Plus Database; Micromedex, Inc., Vol. 17, 1993
DATATOX Database; Spectrum Research, Inc., Version 2.0, 1992

GENERAL

Handbook of Chemistry and Physics, 57th Ed., 1976-77, Weast, R.C., Editor, CRC Inc.

Q. ADDITIONAL INFORMATION

INFORMATION (HAZARDS, FIRST AID, ETC.) IS ABBREVIATED. MORE INFORMATION IS CONTAINED IN REFERENCES FOUND IN SECTION

OSHA Biological Limit for Blood-Lead level is a 3-sample/6-month average of 50 mcg per 100 g of blood and/or two consec samples of 60 mcg per 100 g.

The ASARCO recommended airborne exposure for antimony trioxide is 0.2 mg/cu.m. measured as antimony.

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, INVESTIGATION. ASARCO INCORPORATED PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HER



ATTACHMENT II

MSDS: #172 -SULFUR DIOXIDE

Revised: Tuesday, May 30, 1995

Formula: SO ₂	Part Number: NOT GIVEN
Specification: 12-R-1	Keyword: Gas
Synonyms: SULFUROUS ACID ANHYDRIDESULFUROUS ANHYDRIDESULFUROUS OXIDE	
Stock Items: NOT GIVEN	

<i>Manufacturer</i>	
RHONE-POULENC BASIC CHEMICALS CO.	Phone Number: 203-925-3300
1 CORPORATE DRIVE, BOX 881	Emergency Phone: 800-424-9300
SHELTON CT 06484-	
<i>Supplier</i>	
RHONE-POULENC BASIC CHEMICALS CO.	Phone Number: 203-925-3300
1 CORPORATE DRIVE, BOX 881	Emergency Phone: 800-424-9300
SHELTON CT 06484-	

<i>Physical/Chemical Characteristics</i>	
Boiling Point:	EQ 14 F -10°C @ 760 MMHG.
Melting Point:	NG
Freezing Point:	EQ -104 F -75.5°C.
Pour Point:	NG
Softening Point:	NG
Specific Gravity:	EQ 1.36 @ 25°C(77°F).
Vapor Pressure:	EQ 2475 68 MMHG, 20°C,47.8PSIG.
Vapor Density:	EQ 2.26 @ 20°C.
Percent Volatiles:	NG
Evaporation Rate:	NG
pH:	NG
Molecular Weight:	EQ 64.07
Viscosity:	NG
Solubility in Water	11G/100G WATER.
Odor/Apperance/Other Characteristic:	COLORLESS GAS OR LIQUID, SUFFOCATING, PUNGENT ODOR / ODOR THRESHOLD: 0.5 PPM.

<i>Fire and Explosion Data</i>	
Closed Cup Flash Pt.:	N* NOT COMBUSTIBLE.
Open Cup Flash Pt.:	N* NOT COMBUSTIBLE.
Fire Point:	NG
Auto Ignition:	NO NONE.
Lower Explosion Limit:	NO NONE.
Upper Explosion Limit:	NO NONE.

Shipping Regulations

UN/NA Number:	UN UN 1079
DOT Hazard Class:	2.3
Shipping Label:	POISON GAS
Shipping Name:	SULFUR DIOXIDE, LIQUEFIED

Prepared

Preparer's Name & Title:	NOT GIVEN
Preparation Date:	Tuesday, January 04, 1994

Components

SULFUR DIOXIDE	
OSHA Pel:	NG ppm , 5 mg/m3
ACGIH TLV:	NG ppm , 5.2 mg/m3
STEL:	NG ppm , NG mg/m3
Percent of Product:	EQ 100 % CAS No.: 7446095
Note: PEL & TLV: 2 PPM.	

Text Sections**IDENTIFICATION**

SEE DATA PAGES FOR ADDITIONAL INFORMATION.
PRODUCT NAME(S): SULFUR DIOXIDE
CHEMICAL NAME OF PRIMARY COMPONENT(S): Sulfur dioxide
SYNONYMS: Sulfurous acid anhydride; sulfurous anhydride; sulfurous oxide.
CAS # AND NAME: 7556-09-5 Sulfur dioxide
SUPERCEDES: MAY 7, 1993
TELEPHONE: (203) 925-3300
24-HOUR EMERGENCY TELEPHONE: CHEMTREC 1-800-424-9300
MANUFACTURER'S NAME AND ADDRESS:
RHONE-POULENC BASIC CHEMICALS CO.
1 CORPORATE DRIVE
BOX 881
SHELTON, CT 06484
(203) 925-3300

INGREDIENTS/SUMMARY OF HAZARDS

SEE COMPONENT PAGE(S) FOR ADDITIONAL INFORMATION.
OSHA HAZARDOUS (H)/
INGREDIENT(S) NON-HAZARDOUS (NH)
(1) Sulfur dioxide H
WARNING STATEMENTS: WARNING! HARMFUL IF INHALED. LIQUID CAUSES BURNS.
EXTREMELY IRRITATING GAS AND LIQUID UNDER PRESSURE. MAY CAUSE ALLERGIC
RESPIRATORY REACTION
Avoid breathing gas. Use with adequate ventilation. Do not get in eyes, on skin or on clothing. Keep container closed. Wash thoroughly after handling.

Wear goggles and face shield, NIOSH-approved respirator, rubber gloves and protective clothing when handling.
(See HEALTH HAZARD DATA/FIRST AID PROCEDURES Section for complete Health Hazard Data)

NATIONAL FIRE PROTECTION ASSOCIATION RATING/HAZARDOUS MATERIALS

IDENTIFICATION SYSTEM:

NFPA HMIS 4: Extreme/Severe

3: High/Serious

HEALTH 3 3 2: Moderate

FIRE 0 0 1: Slight

REACTIVITY 0 0 0: Minimum

SARA TITLE III HAZARD CLASSIFICATION:

IMMEDIATE (ACUTE) HEALTH: YES

DELAYED (CHRONIC) HEALTH: NO

FIRE: NO

SUDDEN RELEASE OF PRESSURE: YES

REACTIVE: NO

PHYSICAL DATA

SEE DATA PAGES FOR ADDITIONAL INFORMATION.

(For additional technical information call 1-800-642-4200)

FIRE AND EXPLOSION HAZARD DATA

SEE DATA PAGES FOR ADDITIONAL INFORMATION.

EXTINGUISHING MEDIA: Not combustible. Use appropriate extinguishing media for material that is supplying fuel.

SPECIAL FIRE FIGHTING PROCEDURES: Wear a NIOSH/MSHA approved self-contained

breathing apparatus and full protective clothing. Evacuate residents who are downwind of fire. Prevent unauthorized entry to fire area. Dike area to prevent runoff and contamination of water sources.

Persons who may have been exposed to contaminated smoke should be immediately relieved from duty and checked for symptoms of poisoning. These should not be mistaken for heat exhaustion or smoke inhalation. See HEALTH HAZARD DATA/FIRST AID PROCEDURES Section, for symptoms of poisoning, first aid procedures and notes to physician.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep fire-exposed containers cool with water spray. A fire may warm the contents causing a rise in vapor pressure and possible container rupture. Do not apply water directly to sulfur dioxide leaks. Contain spilled material to prevent entry to streams or sewers.

REACTIVITY DATA

STABILITY: Stable under normal and fire conditions.

CONDITIONS TO AVOID: Elevated temperatures can cause containers to burst.

MATERIALS TO AVOID: As a liquid, reacts violently with alkali, oxidizing agents, powdered potassium and sodium metals. Reacts with water and steam to form corrosive sulfurous acid. Reacts with chlorates to form unstable chlorine dioxide. Moist gas corrodes most metals.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

HAZARDOUS POLYMERIZATION: Will not occur.

HEALTH HAZARD DATA/FIRST AID PROCEDURES

EXPOSURE LIMITS:

CHEMICAL NAME(S) ACGIH (TLV) OSHA (TWA)

Sulfur dioxide 2 ppm, 5.2 mg/m³ (TWA) 2 ppm, 5 mg/m³

TOXICOLOGY DATA:

ORAL LD50 (RATS): No information available

DERMAL LD50 (RABBIT): No information available

INHALATION LC50 (RAT - 1 HR EXPOSURE): 2520 ppm (1)

SKIN EFFECTS (RABBIT): No information available

EYE EFFECTS (RABBIT): Mild (6 ppm/4H/32D)

CARCINOGENICITY: While there have been suggested associations between sulfur dioxide and lung cancer in an epidemiology study and animal experiments, other studies do not support this hypothesis. (4) Sulfur dioxide is not designated as a carcinogen by IARC, NTP, ACGIH or OSHA.

SIGNS OF POISONING: Acute poisoning from sulfur dioxide is rare because the gas is easily detected. It is so irritating that contact cannot be tolerated.

Symptoms include coughing, hoarseness, sneezing, tearing, and breathing difficulty. However, workers who cannot escape high accidental exposure may suffer severe pulmonary damage which can be fatal.

EFFECTS OF SINGLE OVEREXPOSURE:

SWALLOWING: Swallowing liquid sulfur dioxide will burn the mouth, esophagus, and stomach due to the freezing effect of the liquid. Ingestion is not likely to occur.

INHALATION: Breathing sulfur dioxide gas will irritate the eyes, throat and upper respiratory system. Concentrations of 5-10 ppm cause irritation of the nose and throat. Higher concentrations cause irritant coughing. Concentrations of 50-100 are considered dangerous. Exposures to 400-500 ppm are life-threatening. A small percentage of persons with asthma may suffer severe asthma-like reactions of following exposure to relatively low levels of sulfur dioxide.

SKIN CONTACT: Contact with liquid sulfur dioxide causes burns (frostbite).

EYE CONTACT: Liquid causes corneal burns. Concentrations of gas above 20 ppm causes lacrimation (tears) and irritation of eyes.

EFFECTS OF REPEATED OVEREXPOSURE: Repeated exposure of animals to sulfur dioxide can produce a thickening of the mucous layer in the trachea and an increase in goblet cells and mucous glands similar to changes observed in human chronic bronchitis. (2)

Epidemiology studies indicate that chronic exposure at levels above 2 ppm can cause respiratory disease and reduced pulmonary function. (2) Chronic effects include inflammation of the lining of the nose, dry throat and cough. (3)

OTHER EFFECTS OF OVEREXPOSURE: No other effects known.

EXISTING MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:

Skin irritation

may be aggravated in individuals with existing skin lesions. Breathing of gas may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.

EMERGENCY AND FIRST AID PROCEDURES: Remove the patient from immediate source

of exposure and assure that the individual is breathing. If not breathing, use artificial respiration. **GET MEDICAL ATTENTION.**

SWALLOWING: If victim is conscious and alert, give two or more glasses of water or milk to drink. **DO NOT INDUCE VOMITING!** If vomiting occurs, give fluids again. Do not give anything by mouth to an unconscious or convulsing person. **GET IMMEDIATE MEDICAL ATTENTION.**

SKIN: Wash all affected areas with plenty of soap and water while under a safety shower for at least 15 minutes, while removing contaminated clothing and shoes. Do not attempt to neutralize with chemical agents. Seek medical attention immediately. Discard any contamination clothing and shoes.

INHALATION: Remove victim to fresh air. If breathing has stopped, administer artificial respiration. If heart beat is absent, start CPR (cardiopulmonary resuscitation). **GET IMMEDIATE MEDICAL ATTENTION.**

EYES: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes using an eyewash fountain, if available. Lift upper and lower lids and rinse well under them. **GET IMMEDIATE MEDICAL ATTENTION.**

NOTES TO PHYSICIAN: No specific antidote is available. All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Personnel involved in

cleaning up a spill or stopping a leak should wear gas masks and/or self-contained breathing apparatus and impervious protective clothing. Small leaks may be readily located by spraying the potential leak area with ammonium hydroxide solution. A dense, white fume will form if sulfur dioxide is present. Locate and control leakage by closing or capping valves. Spill must be contained and prevented from entering streams or sewers. **NEVER APPLY WATER TO A SULFUR DIOXIDE LEAK!** Water causes sulfur dioxide to be more corrosive. A leaking sulfur dioxide container should be shifted so that gaseous rather than liquid material will escape.

A small liquid spill or leak can be handled routinely by passing sulfur dioxide through an alkaline neutralizing solution. One pound of sulfur dioxide is equivalent to about two pounds of lime or one and one-half pounds of caustic soda.

Large spills should be handled according to a predetermined plan. For assistance in developing a plan, contact the Technical Service, 1-800-642-4200.

WASTE DISPOSAL METHOD: Absorbed sulfur dioxide solution must be oxidized to inert sulfate salts before disposal, then disposed of in accordance with Local, State and Federal regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Only trained personnel using

appropriate protective equipment should handle sulfur dioxide. Use NIOSH Analytical Method 7600 & 7024. Avoid breathing gas. Do not get in eyes, on

skin or on clothing. Store in a cool, dry place in properly designed pressure vessels, away from heat and protected from physical damage. Segregate from combustible materials.

SPECIAL PROTECTION INFORMATION

PROTECTIVE EQUIPMENT SHOULD BE USED DURING THE FOLLOWING PROCEDURES:

Manufacture or formulation of this product

Repair and maintenance of contaminated equipment

Clean up of leaks and spills

Any other activity that may result in hazardous exposures

RESPIRATORY PROTECTION: Use NIOSH/MSHA approved full-face respirator with acid gas cartridge. Use positive pressure self-contained breathing apparatus for emergency or other conditions requiring a higher level of protection.

VENTILATION: Use local exhaust as needed to maintain airborne exposure below exposure limits.

PROTECTIVE CLOTHING: Full-body protective clothing, chemical-resistant gloves and boots. Insulated gloves if liquid contact is anticipated.

EYE PROTECTION: Chemical Worker Goggles and full-face shield.

OTHER PROTECTIVE EQUIPMENT: Maintain a sink, safety shower and eyewash fountain in the work area. Have oxygen readily available.

REGULATORY STATUS

TSCA INVENTORY STATUS: This product is listed on the TSCA inventory.

TRANSPORTATION STATUS:

DOT: This material is poisonous by inhalation and has been assigned Special Provision #3 in 49 CFR 172.101

PROPER SHIPPING NAME: Sulfur Dioxide, Liquified

HAZARD CLASS: 2.3

ID #: UN 1079

LABEL: Poison Gas

PACKING GROUP: N/A

SARA TITLE III:

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE LIST: Sulfur dioxide, RQ=1 lb

SECTION 313 TOXIC CHEMICALS: Not listed

REPORTABLE QUANTITY (RQ) UNDER US EPA CERCLA: Not listed specifically, but RQ=100 lb as D002 waste

RCRA HAZARDOUS WASTE: D002 (corrosive)

STATE/INTERNATIONAL RIGHT-TO-KNOW REGULATIONS:

SULFUR DIOXIDE:

CALIFORNIA: Not listed

CONNECTICUT: Survey

FLORIDA: Toxic

ILLINOIS: Toxic, Chem

LOUISIANA: RTK

MASSACHUSETTS: RTK, EHS, Spill RQ=1 lb

NEW JERSEY: ID# 1759, RTK, TCPA list

NEW YORK: SPILL: Air RQ=1 lb, L/W RQ=1 lb

PENNSYLVANIA: RTK

RHODE ISLAND: Hazard list, Note TF
CANADA: List, 1%, No. 1483; WHMIS A, D-1, E

REFERENCES

- (1) RTECS, 4/91
- (2) Documentation of TLVs and BEIs, ACGIH
- (3) Sittig, Handbook of Toxic and Hazardous Chemicals and Carcinogens, 2nd edition
- (4) Peacock, P. and Spence, J. "Incidence of Lung Tumors in Mice Exposed to (1) Free Radicals, (2) Sulfur Dioxide", British Journal of Cancer, 21: 606, 1967.

A in the right margin indicates an addition.

R in the right margin indicates a revision.

SPECIAL NOTES

The information herein is given in good faith but no warranty, expressed or implied, is made.

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