SPECIFICATIONS - DETAILED PROVISIONS
Section 09878 - Recoating and Disinfection of Interior Surfaces of an Existing Welded Steel Tank Based On 100% Removal of Existing Coating and Replacement with an Epoxy Coating System

C O N T E N T S

SECTION 09878
RECOATING AND DISINFECTION OF INTERIOR SURFACES OF AN EXISTING WELDED STEEL TANK BASED ON 100% REMOVAL OF EXISTING COATING AND REPLACEMENT WITH AN EPOXY COATING SYSTEM

PART 1 - GENERAL

1.01 PURPOSE

A. The purpose of this specification is to establish methods and procedures for coating, curing of coating, and handling of hazardous and non-hazardous materials/wastes.

1.02 SCOPE OF WORK

A. Work to be accomplished includes field application of protective coatings to interior surfaces, including surface preparation, handling of hazardous and non-hazardous materials/wastes, disinfection of interior surfaces and other work necessary to accomplish the approved end result of a totally protected and usable structure, including attachments, accessories and appurtenances, generally as follows:

1. Remove all interior coatings by abrasive blast cleaning.

2. Apply a complete coating system to all interior surfaces in accordance with paragraph 3.07.

3. Electrically detect coating system and repair as required.

4. Apply a flexible sealant to all circumferential shell/roof connections, roof plate lap seams, and other crevices/voids that preclude proper coating application.

5. Cure applied coatings.

6. Wash down coated surfaces and disinfect complete interior.

7. Spot clean, spot prime and spot finish any exterior paint damaged by recoating operations.

8. Test, handle and dispose of any hazardous and non-hazardous wastes generated from interior coating operations in conformance with all regulations.

B. Surfaces not to be coated include all non-damaged exterior surfaces, concrete surfaces, liquid level indicator accessories, glass, plastic, nameplates, and other surfaces on which coatings would not adhere or would interfere with operation or purpose of specific item.

C. If severely corroded or damaged areas are discovered during the course of abrasive blast cleaning operations, the Contractor shall notify the District or authorized representative. Welding and repair of severely corroded areas of tank and other mechanical repairs may be required during project.

1. The Contractor shall allow the District access to make tank repairs while the existing coatings are being removed or repaired. The District reserves the option to repair the tank structure with:

a. Change order to the contract.

b. District employees.

c. A separate Contractor.

d. Any combination of the above.

2. A no cost time extension will be issued should structural repairs delay abrasive blast cleaning and/or coating application. Preparation work shall continue while tank repairs are being made. The time extension will assume the Contractor will be able to re-mobilize and begin coating within two weeks of notification.

D. Remove cathodic protection system if present, re-install system after coating operation completed, and replace anodes and other components as specified in the Special Conditions.

E. Contractor is responsible for the cost of all testing and analyses, unless specifically stated otherwise.

1.03 REFERENCE SPECIFICATIONS AND STANDARDS

A. Without limiting the general aspects or other requirements of this specification, work and equipment shall conform to applicable requirements of municipal, state and federal codes, laws and ordinances governing the work, the Eastern Municipal Water District, SSPC: The Society for Protective Coatings, and manufacturer's printed instructions, subject to District's approval.

B. The Contractor shall meet all the terms of the District's General Conditions for Major Construction and Maintenance. The terms of the General Conditions shall be referenced for contractual procedures.

C. The District's decision shall be final as to interpretation and/or conflict between any of the referenced codes, laws, ordinances, specifications, and standards contained herein.

D. American Society for Testing and Materials (ASTM)

1. ASTM E337, Standard Test Method for Measuring Humidity with a Psychrometer

2. ASTM D1186, Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base

3. ASTM D3359, Standard Test Method for Measuring Adhesion by Tape.

4. ASTM D4138, Standard Test Method for Measurement of Dry Paint Thickness of Protective Coating Systems by Destructive Means

5. ASTM D4285, Standard Test Method for Indicating Oil or Water in Compressed Air

6. ASTM D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages

7. ASTM D4417, Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

8. ASTM D5402, Standard Test Methods for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs

E. American Water Works Association (AWWA)

1. AWWA D102, AWWA Standard for Coating Steel Water Storage Tanks

2. AWWA C652, AWWA Standard for Disinfection of Water Storage Facilities

3. AWWA M42, AWWA Manual of Water Supply Practices, Steel Water Storage Tanks

F. SSPC: Society for Protective Coatings (SSPC)

1. SSPC-SP 1, Solvent Cleaning

2. SSPC-SP 2/3, Hand/Power Tool Cleaning

3. SSPC-SP 6, Commercial Blast Cleaning

4. SSPC-SP 7, Brush-off Blast Cleaning

5. SSPC-SP 10, Near-White Blast Cleaning

6. SSPC-SP 11, Power Tool Cleaning to Bare Metal

7. SSPC-SP 15, Power Tool Cleaning to Commercial Grade Cleanliness

8 SPC-PA1, latest revision, for "Shop, Field and Maintenance Painting

9. SSPC-PA 2, Measurement of Dry Film Thickness with Magnetic Gages

10. SSPC-VIS 1, Visual Standard for Abrasive Blast Cleaned Steel

11. SSPC-VIS 3, Visual Standard for Hand and Power Tool Cleaned Steel

12. SSPC Publication No. 91-12, Coating and Lining Inspection Manual

13. SSPC-Visual Comparison Manual

14. SSPC Guide 12 - Guide for Illumination of Industrial Painting

15. SSPC's Publication 91-12 "Testing Recirculated Abrasives

G. NACE International (NACE)

1. NACE SP 0188-06, Standard Recommended Practice for Discontinuity (Holiday) Testing of Protective Coatings

2. NACE SP 0178-89, Standard Recommended Practice for fabrication Details, Surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service.

1.04 COMPLETION OF WORK

A. All surface preparation, coating application, curing of coating and handling/disposing of hazardous and non-hazardous materials/wastes shall be completed within the number of calendar days consistent with the Contract Completion Schedule. If work is not completed within the number of calendar days specified, Contractor shall bear all additional expenses incurred after contract completion schedule.

1.05 CONTRACTOR

A. The contractor shall be a licensed Painting and Decorating Contractor in the State of California (C-33 Classification).
The Contractor shall have a minimum of five (5) years practical experience and successful history in the application of specified products to surfaces of steel water storage tanks.

The Contractor shall substantiate this requirement by furnishing a written list of references.

1.06 DEFINITIONS

A. "Engineer" refers to the person authorized by the District to oversee the execution of the contract, acting either directly or through his properly authorized agents, each agent acting only within the scope of authority delegated to him.

B. “Lining” refers to protective materials used or applied to interior surfaces. "Paint" refers to protective materials used or applied on exterior surfaces. "Coating" refers to protective materials used or applied on interior or exterior surfaces, or any protective material in general.

C. "District" refers to the Eastern Municipal Water District.

1.07 HOURS OF WORK

A. The Contractor's activities shall be confined to an eight-hour shift between the hours of 7:00 a.m. and 5:00 p.m. Monday through Friday, excluding District-designated holidays. Deviation from these hours will not be permitted without the prior consent of the District, except in emergencies involving immediate hazard to persons or property.

B. In the event of either a Contractor requested deviation or Contractor caused emergency deviation, inspection service fees for District personnel and any third-party inspector will be charged against the Contractor at the discretion of the District. The service fees will be calculated at overtime rates including benefits, overhead, and travel time. The service fees will be deducted from any amounts due the Contractor. Charges will be made for any change to extraordinary work hours, including standby time due to late crew arrival or "no-show" by crew.

C. Inspection hours made necessary as a result of the Contractor’s crew working over forty hours per week must be scheduled and approved by District and overtime paid for by Contractor at the prevailing rate for overtime. Inspections requested by or made necessary as a result of actions by the Contractor on Saturdays, Sundays or holidays must be scheduled and approved by District and paid for by Contractor at the prevailing rate for overtime or holiday work.

1.08 PRE-BID CONFERENCE

A. Pre-Bid Conference for the project will be conducted by the Engineer as noted in the Notice Inviting Bids.
The object of the Pre-Bid Conference is to acquaint bidders with the existing facility and site. The conditions and requirements of the plans and specifications shall govern over

any information presented at the Pre-Bid Conference, unless amended in writing by the Engineer.

1.09 PRE-CONSTRUCTION CONFERENCE

A. Pre-Construction Conference shall be scheduled prior to start of project. The District, Contractor, and Engineer shall be present. The sequence of work will be discussed and will be mutually agreed upon to ensure that the work is accomplished and completed as stated in the Contract, and to allow for inspection and operations flexibility by District. A schedule of work to be accomplished and a list of labor, material, and equipment rates for additional work will be established and maintained throughout the project. Contractor shall furnish resumes of all personnel assigned to project, and a complete set of approved submittal data for use by inspection personnel. Contractor shall have a designated representative for all projects.

1.10 QUALITY ASSURANCE

A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application, and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and acceptable professional standards and are approved by the District.

B. The Contractor shall submit manufacturers' literature and material Safety Data Sheets (SDS) on all materials to be used in coating operations, including, but not limited to coatings, thinners, solvents, and cleaning fluids. No materials will be allowed which have been stored over 60 days, or manufacturer's recommended shelf life, whichever is less. Contractor shall maintain copies of SDS's at jobsite at all times. Copies of all invoices showing purchased dates and delivery for all material mentioned above will be required.

C. All materials furnished and all work accomplished under the Contract shall be subject to inspection by the District. The Contractor shall be held strictly to the true intent of the Specifications in regard to quality of materials, workmanship, and diligent execution of the Contract.

D. Work accomplished in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection, and the entire cost of removal and replacement, including the cost of all materials which may be furnished by the District and used in the work thus removed, shall be borne by the Contractor, regardless of whether the work removed is found to be defective or not.

Work covered up without the authority of the District, shall, upon order of the District, be uncovered to the extent required, and the Contractor shall similarly bear the entire cost

of accomplishing all the work and furnishing all the materials necessary for the removal of the covering and its subsequent replacement, as directed and approved by the District.

E. The District will make, or have made, such tests as it deems necessary to assure the work is being accomplished in accordance with the requirements of the Contract. Unless otherwise specified in the Special Conditions, the cost of such testing will be borne by the District. In the event such tests reveal non-compliance with the requirements of the Contract, the Contractor shall bear the cost of such corrective measures deemed necessary by the District, as well as the cost of subsequent retesting and re-inspection. It is understood and agreed the making of tests shall not constitute an acceptance of any portion of the work, nor relieve the Contractor from compliance with the terms of the Contract.

F. Warranty Inspection: Warranty inspection shall be conducted between the eleventh and eighteenth months following completion of all work and filing of the Notice of Acceptance. The inspection will be accomplished when there will be minimum inconvenience to the District. All personnel present at the Pre-Job Conference should be present at this inspection. All defective work shall be repaired in strict accordance with this specification and to the satisfaction of the District.

1. Notification: The District shall establish the date for the inspection and shall notify the Contractor at least 30 days in advance. The District will drain the tank and Contractor shall provide, at his own expense, suitable lighting, scaffolding and ventilation for the inspection. At the District's option, warranty inspection for interior surfaces may be accomplished by diving operations with tank in service.

2. Interior Inspection: The entire interior coating systems shall be visually inspected. All defective coating as well as damaged or rusting spots of the tank shall be satisfactorily repaired by and at the sole expense of the Contractor. All repaired areas shall then be electrically tested as specified in the above-mentioned section and repair/electrical testing procedure repeated until surface is acceptable to the District. Defective coating shall be any of those defined by SSPC's Visual Comparison Manual.

3. Inspection Report: The District shall prepare and deliver to the Contractor an inspection report covering the first anniversary inspection, setting forth the number and type of failures observed, the percentage of the surface area where failure has occurred, and the names of the persons making the inspection.

4. Schedule: Upon completion of inspection and receipt of Inspection Report as noted herein, District shall establish a date for Contractor to proceed with remedial work. Any delay on part of Contractor to meet schedule Contract and District may proceed to have defects remedied as outlined under General Provisions.

5. Remedial Work: Any location where coating has peeled, bubbled, or cracked and any location where rusting is evident shall be considered to be a failure of the system. The Contractor shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surface, and reapplying the same system. If the area of failure exceeds 25 percent of a specific coated surface, the entire applied system may be required to be removed and reapplied based on the District's sole judgment in accordance with the original specification.

   a. Specific coated surfaces are defined as follows:

      (i) Underside of roof and entire roof support structure

      (ii) Interior shell wall

      (iii) Floor

      (iv) Attachments, accessories and appurtenances

6. Upon completion of warranty remedial repairs, Contractor shall disinfect tank as originally specified.

7. Costs: All noted costs for Contractor's inspection and all costs for repair shall be borne by the Contractor and in figuring his bid, the Contractor shall include an appropriate amount for testing and repair as no additional allowance will be paid by the District for said inspection and repair.

1.11 SAFETY AND HEALTH REQUIREMENTS

A. Contractor shall fully comply with California Code of Regulations pertaining to the work including, but not limited to, the following Construction Safety Orders (CSO) or General Industry Safety Orders (GISO):

1.	Illness Injury Prevention Program	CSO/GISO	1508/3203
2.	Confined Space Plan	GISO	5156/5159
3.	Respiratory Protection	CSO/GISO	1531/5144
4.	Hazard Communication	GISO	5194
5.	Lead-Based Paint Compliance Plan	CSO	1532.1
6.	Rolling Scaffolds	CSO	1646

7.	Employee Safety Instruction	CSO	1510
8.	Emergency Medical Service	CSO	1512
9.	Dusts, Fumes, Mists, Vapors & Gases	CSO	1528
10.	Fall Protection	CSO	
11.	Hearing Conservation	GISO	

B. General: Contractor assumes the responsibility to accomplish all work in a safe and prudent manner, and to conform to all applicable safety requirements, regulations and guidelines of federal, state and local regulatory agencies, as well as applicable manufacturer's printed instructions and appropriate technical bulletins and manuals. Without in any way limiting that responsibility or assuming responsibility for safety, District is particularly concerned that the following are strictly observed:

1. Life Saving Equipment: Contractor shall provide and require use of personal protective life saving equipment for all its personnel working in or about the project site.

2. Access Facilities: All ladders, scaffolding and rigging shall be designed for their intended uses. Ladders and scaffolding shall be erected where requested by District to facilitate inspection and be moved by the Contractor to locations requested by the District.

3. Ventilation: Contractor shall ensure there is proper ventilation, air eduction and exhausting of solvent vapors to reduce the concentration of air contaminants to a level which poses no hazard to personnel at or near the job site. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured. Forced air eduction during blast cleaning and coating application operations is mandatory. The exhaust blower capacity shall be sufficient to maintain air changes within tank interior in accordance with Cal-OSHA, coating manufacturer's recommendations, and local air quality management district regulations.

a. If dehumidification is not used, exhaust blower shall exhaust into a District-approved structure which precludes the exhausting of lead-laden or non-hazardous coating chips or particulate matter onto the site or into the atmosphere.

4. Dehumidification: Dehumidification equipment or other alternate ventilation systems must be approved by the District. Equipment must be operated on a continuous basis during all blasting, coating and curing operations, including shifts during which no work is being accomplished. Requirement for exhausting of dust, etc. from tank interior noted in Part 1.11B.3.a above applies to all dehumidification operations.

5. Head and Face Protection and Respiratory Devices: Equipment shall include protective helmets which shall be worn by all persons while in the vicinity of the work. During abrasive blasting operations, nozzlemen shall wear U.S. Bureau of Mines approved positive pressure air-supplied helmets and all other persons who are exposed to blasting dust shall wear respiratory protection determined necessary by the exposure assessment of the Certified Industrial Hygienist.

   Positive pressure air-fed hoods and/or masks shall be supplied by an air source currently certified to produce "Class D Breathing Air". Contractor shall at all times during the work maintain onsite current documentation to substantiate the quality of the breathing air.

   Barrier creams shall be used on any exposed areas of skin.

6. Grounding: All hoses shall be grounded to prevent accumulation of charges of static electricity.

7. Illumination: Sparkproof artificial lighting shall be provided for all work in confined spaces. Light bulbs shall be guarded to prevent breakage. Lighting fixtures and flexible cords shall comply with the requirements of NFPA 70 "National Electric Code" for the atmosphere in which they will be used. Whenever required by the District, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the District.

8. Toxicity and Explosiveness: The maximum allowable concentration of vapor shall be kept below the maximum safe concentration for eight-hour exposure, plus Lower Explosive Limit (L.E.L.) must be strictly maintained. All regulations related to safety of personnel and handling of such materials shall be strictly followed. Cost of handling and disposing of such materials will be borne by the Contractor.

a. When interior coatings have been determined to contain lead or other hazardous materials at any concentration, Contractor's responsibility for meeting all regulations relating to toxic and hazardous materials includes, but is not limited to, obtaining all permits and EPA numbers, having a Certified Industrial Hygienist onsite the first day of blasting to sample the air, processing paperwork, blood testing of personnel at start and finish of project, sampling and testing of wastes, paying fees, handling and packaging of wastes at site, and delivering materials to the selected Class I dumpsite using licensed hazardous materials transporters. All regulations relating to working with heavy metals or confined spaces shall be strictly enforced.

9. Protective Clothing: When handling and mixing coatings, workmen shall wear gloves and eye shields. If working with lead or other heavy metals, regulations regarding handling of exposed clothing shall be strictly enforced.

10. Fire: Contractor shall provide appropriate fire abatement devices and prohibit any flames, welding and smoking during mixing and application of materials.

11. Sound Levels: Whenever the occupational noise exposure exceeds the maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

a. Noise suppression shall be practiced at all times to minimize disturbance to persons living or working nearby, and to the general public. Measures to be used in effecting noise suppression shall include (but not limited to) equipping all internal combustion engines with critical residential silencers (mufflers), shielding noise-producing equipment from nearest areas of human occupancy by location in such positions as to direct the greatest noise emissions away from such areas, and conducting operations in the most effective manner to minimize noise generation consistent with the prosecution of the Contract in a timely and economic manner. Whenever levels are objectionable, they shall be adjusted as directed by the District.

1.12 COMPLIANCE WITH ENVIRONMENTAL REGULATORY REQUIREMENTS

A. Contractor shall comply with all current federal, state, and local environmental laws and regulations, including, but not limited to the laws and regulations of the U.S. Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and the South Coast Air Quality Management District (SCAQMD).

PART 2 - COATING AND DISINFECTION MATERIALS

2.01 GENERAL

A. Standard products of manufacturers other than those specified on the Approved Material List provided, will be accepted when it is proved to the satisfaction of the District they are equal in composition, durability, usefulness and convenience for the purpose intended. Substitutions will be considered provided the following minimum conditions are met:

1. The proposed coating system shall have a dry film thickness equal to or greater than that of the specified system.

2. The proposed coating system shall employ an equal or greater number of separate coats.

3. The proposed coating system shall employ coatings of the same generic type.

4. All requests for substitution shall carry full descriptive literature and directions for application, along with complete information on generic type, non-volatile content by volume and a list of 10 similar projects, all at least three years old, where the products have been applied to similar exposure.

5. The District requires that the Contractor provide certified laboratory data sheets showing the results of complete spectrographic and durability tests accomplished on the proposed substitute. Tests shall be accomplished by an independent testing laboratory satisfactory to the District and all costs incurred in the testing program shall be borne by the Contractor. In any case, the District shall be sole and final judge of the acceptability of any proposed substitution. Requests for substitution must be approved in writing prior to date of bid.

B. All materials shall be brought to the jobsite in the original sealed containers. They shall not be opened or used until District's representative has physically inspected contents and obtained necessary data from information printed on containers or label. Materials exceeding storage life recommended by the manufacturer shall be rejected. Copy of invoice showing purchase and delivery dates will be required.

C. Flammability, toxicity, allergenic properties, and any other characteristic requiring field precautions shall be identified and specific safety practices shall be stipulated as required by federal, state, local manufacturer, or SDS.

D. All coating materials shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable materials must be stored to conform with District, County, State and Federal safety codes for flammable materials. Coatings shall be protected from freezing at all times.

E. Contractor shall use products of same manufacturer for all coats.

2.02 INTERIOR COATING MATERIALS

A. All coating materials for interior surfaces of tank must appear on the Standard 61 of the National Sanitation Foundation (NSF) or Standard 61 of the Underwriters' Laboratory, latest. Products containing perchloroethylene (PCE), trichloroethylene (TCE), lead, or chromium will not be permitted.

1. The Contractor shall provide, prior to coating any surfaces of the reservoirs, written certifications from the coating manufacturers stating that the coating materials, thinners, solvents, and equipment cleaning fluids provided by the manufacturers do not contain PCE or TCE. The Contractor shall also certify, in writing, that no material containing PCE, TCE, lead, or chromium in any form will be used for the interior coatings of the reservoir. This shall include all solvents, thinners, and cleaning fluids at the job site, regardless of where the materials were obtained.

2. The District may require all solvents, thinners and cleaning fluids be tested for TCE and PCE prior to being used at the job site. The Contractor shall provide the District with samples of each material at no cost to the District. Unacceptable materials shall be removed from the job site.

B. All coating materials shall comply with air pollution regulations, specifically the local air quality management district or air pollution control district rules, and rules for the District. Please refer to www.aqmd.gov/rules/reg/reg11/r1113.pdf.

C. All interior coating materials shall also conform to regulations and applicable requirements of local, State and Federal health regulatory agencies, and must appear on the current National Sanitation Foundation (ANSI/NSF) Standard 61, latest.

D. Coatings shall be in accordance with the systems specified in Part 3.07.

E. Joint sealant shall be an NSF-61 certified approved flexible polyurethane or polysulfide product, meeting Federal Specification TT-S-230.

2.03 DISINFECTION MATERIALS

A. Disinfection materials shall conform to all requirements of AWWA Standard C652, latest revision.

B. Cleaner for pre-disinfection cleaning of interior surfaces shall be Gre-Sa-Way or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. All surface preparation, coating application shall conform to applicable standards of the Society for Protective Coatings, the Eastern Municipal Water District and the manufacturer's printed instructions. Material applied prior to approval of the surface preparation by the District shall be removed and reapplied to the satisfaction of the District at the expense of the Contractor.

B. All work shall be accomplished by skilled craftsmen qualified to accomplish the required work in a manner comparable with the best standards of practice. Resumes of personnel to be used on the project shall be submitted upon Notice of Award. Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the District.

C. The Contractor shall provide a supervisor to be at the work site during cleaning and application operations. The supervisor shall have the authority to sign and change orders, coordinate work and make other decisions pertaining to the fulfillment of their contract.

D. Contractor shall provide approved sanitary facilities for all Contractor personnel, as no existing facilities will be available to the Contractor. Facilities shall be maintained during the project to complete standards established by District and shall be removed prior to Contractor's departure from the site at completion of the project.

E. Dust, dirt, oil, grease or any foreign matter which will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved commercial cleaning solution, rinsed with clean water and wiped dry with clean rags.

F. The Contractor's equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Blotter test shall be accomplished at each start-up period and as deemed necessary by the District. Contractor's equipment shall be subject to approval of the District. This approval does not relieve the Contractor's responsibility for the safe operation of the equipment or its performance.

1. Cleanliness of compressed air supply shall be verified daily, and as deemed necessary by District, by directing a stream of air, without abrasive, from the blast nozzle onto a white blotter or cloth for twenty seconds. If oil or water appears on the blotter or cloth, all traps and separators shall be blown down until two subsequent twenty-second tests show no further oil or water.

G. Application of the first coat shall follow immediately after surface preparation and cleaning within an eight-hour working day. Any cleaned areas not receiving first coat within an eight-hour period shall be recleaned prior to application of first coat. If

dehumidification equipment is used, cleaned areas may have first coat applied at last shift of the week, provided dehumidification equipment has run continuously during the complete week, and surfaces meet all requirements of the specification. Monitoring devices approved by the District shall be used to ensure continuous operation.

H. Because of presence of moisture and possible contaminants in atmosphere, care shall be taken to ensure previously coated or painted surfaces are protected or recleaned prior to application of subsequent coat(s). Methods of protection and recleaning shall be approved by the District.

1. Project is subject to intermittent shutdown if, in the opinion of the District, cleaning and application operations are creating a localized condition detrimental to ongoing facility activities, personnel or adjacent property.

2. In the event of emergency shutdown by the District, Contractor shall immediately correct deficiencies. All additional costs created by shutdown shall be borne by Contractor.

I. The Contractor shall provide, at his own expense, all necessary power required for his operations under the contract.

J. Contractor shall tightly seal any tank vents, pumps, motors, and other open areas to prevent intrusion of coating or other contaminants. The sealing system shall be designed to allow continuous operation of facilities or equipment, with no detrimental effects. If necessary, sealing system shall be removed daily at termination of work, or as directed by the District.

K. Overspray Control: The Contractor shall conduct all operations so as to confine abrasive blasting debris and coating overspray to within the bounds of the site. The Contractor shall take all precautions necessary to prevent adverse off-site consequences of application operations. Any complaints received by the District relating to any such potential off-site problems will be immediately delivered to the Contractor-assigned jobsite representative. The Contractor shall immediately halt blast cleaning or application work and shall take whatever corrective action is required to mitigate any such problems. All costs associated with protection of off-site properties and/or correction of damage to property as a result of blast cleaning or application operations shall be borne directly by the Contractor at no additional expense to the District.

1. District approval of Contractor's overspray prevention procedures and District's presence on project does not free Contractor from responsibility for overspray. Daily approval of procedures will be required prior to start of spray operations.

3.02 REMOVE AND REINSTALL EXISTING CATHODIC EQUIPMENT

A. When the tank has an existing cathodic protection system installed, the Contract Price shall include, but not be limited to, all labor, materials, and equipment to perform the following work:

1. Disconnect wiring to cathodic equipment, anodes, and reference cells.

2. Remove all existing header wires, control boxes, mounting hardware, anodes and reference cell. Protect equipment during the surface preparation and coating processes.

3. Upon completion of all coating refurbishment work, re-install header wires, control boxes, mounting hardware, anodes and reference cell, and attendant wiring. Contractor shall replace all components specified in the Special Conditions. Test and verify to the satisfaction of the District Representative that the cathodic equipment is fully functional. Once the cathodic protection system is accepted as fully functional, it shall be disconnected for the duration of the 18-month coating warranty period.

4. Any cathodic protection components inadvertently damaged during the removal and re-installation process shall be replaced with new components to the satisfaction of the District Representative.

5. Where new anodes are required as detailed in the Special Conditions, anode materials and installation shall be as follows:

MAGNESIUM ANODES (20', Standard Potential)

a. Anodes shall be extruded magnesium alloy rods in accordance with ASTM B107 with a steel wire core. The standard potential magnesium alloy shall have a theoretical energy capacity of 1000 ampere-hours per pound and have a nominal useful capacity of 500 ampere-hours per pound.

b. The chemical composition shall be as follows:

Aluminum	2.5 to 3.5%
Manganese	0.20% Min.
Zinc	0.7 to 1.3%
Silicon	0.05% Max.
Copper	0.01% Max.
Nickel	0.001% Max.
Iron	0.002% Max.
Other (each)	0.05% Max.

Other (total)	0.30% Max.
Magnesium	Remainder

The open circuit potential of the anode shall be between 1.40 and 1.50 volts versus a copper/copper-sulfate reference electrode.

c. Anodes shall have an outside diameter of 2.024-inch and a nominal weight of 2.5 pounds per linear foot. Lengths are 20 feet or as shown on the Drawings. The steel wire core shall be 3/16-inch diameter.

d. The anode lead cable shall be attached to the steel wire anode core with suitable brass crimp connector. The connection shall be silver soldered or brazed as shown in the Drawings. The connection shall be insulated with a heat shrink, mastic filled sleeve. The sleeved connection and 2 inches of the anode shall be fully encapsulated with a PVC cap filled with potting epoxy as shown in the Drawings.

6. Where new reference cell is required as detailed in the Special Conditions, reference cell materials and installation shall be as follows:

COPPER SULFATE REFERENCE ELECTRODE (PERMANENT)

a. General Requirements: Copper sulfate reference electrodes (or cells) shall be constructed with an ion trap to prevent contamination. The reference electrode shall have a design life of 15 years and a stability of +/-5 millivolts under a 3.0-microampere load.

b. Reference Electrode Wires: Provide each reference electrode with a No. 14 AWG THWN lead wire. The cells shall have red insulation. For reference cells installed inside tank, each lead wire shall be long enough to extend from the electrode to the anode resistor box without any splices. For buried reference cells installed inside tank, each lead wire shall be long enough to extend from the pipe trench to the test box without any splices.

c. Type: Use STAPERM Model CU-2-FW, or approved equal.

3.03 TREATMENT OF HAZARDOUS MATERIALS (WHEN PRESENT AT ANY CONCENTRATION)

A. All regulations related to safety, worker protection and handling of such materials shall be strictly followed. When interior surfaces have been determined, by laboratory analyses, to contain varying levels of lead and other heavy metals, submittal of a written plan of action for the project shall be accomplished by Contractor prior to start of project.

B. When heavy metals are present, Contractor shall comply with requirements of the Codes and Regulations listed in Section 3.03.F. below for handling and disposing of hazardous wastes resulting from surface contamination and removed coating particles. Submittal of a written plan of action for the project shall be accomplished by Contractor prior to start of project.

C. When heavy metals are present, District will remove four representative samples of soil from jobsite prior to start of work. Samples will be tested under requirements listed below for determination of lead and other heavy metals to ensure soil does not contain excessive levels of lead and other heavy metals. If soils contain excessive levels of lead or other heavy metals, site remediation will be the responsibility of the District. Copies of laboratory analyses reports shall be forwarded to Contractor immediately upon receipt from laboratory, prior to start of any work. Any required remediation schedule will be determined by the District.

D. When interior coatings have been determined to contain lead, all work must be accomplished in compliance with 29 CFR Part 1926, Lead Exposure in Construction, and Title 8, Section 1532.1. In addition, when lead is present at any concentration, Contractor shall perform the following:

1. On first day of any heavy metals based coating removal, work environment must be tested by a Certified Industrial Hygienist (CIH) to determine levels of protection required to protect workers and the environment from lead and other heavy metal contamination. All costs related to testing by the CIH shall be borne by the Contractor.

2. Testing will include air sampling and testing of filters removed from the workers' respirators or personal air monitors to determine the level of lead exposure. Upon completion of testing, the CIH shall file a written report on the results of the testing. Level of exposure will then determine the type respiratory protection, clothing, housekeeping, hygiene facilities, medical surveillance, medical removal protection, employee information and training, signs, record keeping, and observation of monitoring required for the project.

   No work shall re-commence until the report from the CIH is filed and worker and environmental protection required is in place. Costs for the time delay shall be included in the Contractor's original bid.

E. When interior surfaces of tank contain hazardous materials, dust emissions, abrasive deflection, and removed coating particles shall be confined to interior of containment structure where abrasive blasting is being accomplished.

F. All lead coating removal work shall be governed by, but not necessarily limited to, the following:

1. Health and Safety Code, Division 20, Chapters 5 and 6 (California Hazardous Waste Control Act)

2. Title 22 California Administrative Code (Minimum Standard for Management of Hazardous and Extremely Hazardous Materials)

3. Title 8, California Administrative Code

4. Code of Federal Regulations (29 CFR 1910 and 1926, applicable sections)

G. When existing coatings have been determined by laboratory analysis to be toxic or hazardous, coating and coating/abrasive residue mixture shall be tested to assure conformance with hazardous material tolerances have been met. It shall be the responsibility of the Contractor to provide adequate containers on the jobsite to retain spent media and removed coating until tests have been completed or approval for disposal from a landfill has been obtained. Disposal of hazardous or toxic waste at other than government regulated landfills will not be permitted. Documentation of all hazardous or toxic waste disposal will be required.

H. When heavy metals are present, then upon completion and acceptance of all recoating operations, site soil will be retested by District, in same locations tested prior to start of work, for presence of lead or other heavy metals. Testing will be accomplished by the same laboratory as the original testing. If soils contain excessive levels of lead or other heavy metals above those levels determined by testing at start of work, Contractor shall be responsible for removal and disposal of contaminated soil, and returning the site to its original condition. Copies of laboratory analyses reports shall be forwarded to Contractor immediately upon receipt from laboratory, prior to start of any work. Any required remediation schedule will be determined by the District. Handling, storing, transporting and disposal of any hazardous wastes shall be in complete compliance with all regulatory requirements.

3.04 SURFACE PREPARATION, GENERAL

A. The latest revision of the following surface preparation specifications of the Society for Protective Coatings shall form a part of this specification. (Note: An element of surface area is defined as any given square inch of surface).

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods, which involve a solvent or cleaning action.

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter present to degree specified by hand chipping, scraping, sanding and wire brushing.

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale and other detrimental foreign matter present to degree specified by power wire brushing, power impact tools or power sanders.

4. Commercial Blast Cleaning (SSPC-SP6): Blast cleaning until at least two-thirds of each element of surface area is free of all visible residues.

5. Brush-off Blast Cleaning (SSPC-SP7): Blast cleaning to remove loose rust, loose mill scale, and other detrimental foreign matter present to the degree specified.

6. Near-White Blast Cleaning (SSPC-SP10): Blast cleaning to near-white metal cleanliness, until at least ninety-five percent of each element of surface area is free of all visible residues.

7. Power Tool Cleaning to Bare Metal (SSPC-SP11): Power tool cleaning to produce a bare metal surface and to retain or produce a surface profile of at least 1.0 mil.

8. Brush-Off Water Jet Blast (SSPC-SP12): Low pressure water jet blast at a maximum pressure of 5,000 psi to remove loose rust, loose paint, and other detrimental foreign matter present.

B. Any burrs, weld spatter, sharp edges, corners, or rough welds which would cause difficulty in achieving a defect-free paint system shall be chipped or ground smooth in conformance to NACE Standard RP0178, latest. It is not the intent to have the welds or "scars" ground "flush". The object of the grinding is to eliminate sharp edges, corners, and overlaps to provide a surface for the application of a uniform thickness of coating or paint without voids or other defects.

C. Abrasive blasting nozzles shall be equipped with "deadman" emergency shut-off nozzles. Blast nozzle pressure shall be a minimum of 95 P.S.I. and shall be verified by using an approved nozzle pressure gage at each start-up period or as directed by the District. Number of nozzles used during all blast cleaning operations must be sufficient to ensure timely completion of project, subject to designation and approval by District.

D. All blast hose connections shall be tethered and secured to prevent separation during blast cleaning operations, and shall be taped with duct tape prior to pressurizing. All taped connections shall be visually inspected for leaks within five minutes after start of blast cleaning operations and at the end of blast cleaning operations. Leaking connections shall be immediately repaired to prevent further damage.

E. Field blast cleaning for all surfaces shall be by dry method unless otherwise directed. Contractor is responsible for maintaining dust emissions within the legal level and that level which would not create a nuisance.

F. Particle size of abrasives used in blast cleaning shall be that which will produce a 2.0 mil surface profile or in accordance with recommendations of the manufacturer of the specified coating system to be applied, subject to approval of District.

G. Abrasive used in blast cleaning operations shall be new, washed, graded and free of contaminants which would interfere with adhesion of coatings and shall not be reused unless specifically approved by the District. Abrasives shall be certified for unconfined dry blasting pursuant to the California Administrative Code, Section 92520 of Subchapter 6, Title 17, and shall appear on the current listing of approved abrasives. Invoices or load sheets confirming above shall be required.

H. During blast cleaning operations, caution shall be exercised to ensure existing paints are not exposed to abrasion from blast cleaning.

I. Blast cleaning from rolling scaffolds shall only be accomplished within confines of interior perimeter of scaffold. Reaching beyond limits of perimeter will be allowed only if blast nozzle is maintained in a position which will produce a profile acceptable to the District.

J. The interior surfaces of the outlet nozzle and that portion of the inlet nozzle permanently attached to the tank shall be cleaned of all old coating and rust by blast cleaning or other approved methods. Precautions shall be taken so as to prevent any damage to the existing gate or butterfly valves at the inlet and outlet nozzles. All exposed surfaces of the valves shall be masked prior to blast cleaning the nozzles.

K. During blast cleaning operations, inlet, outlet, overflow and bottom drain openings shall be covered with plywood bulkheads, or other approved barriers, to prevent entry of spent abrasive, removed coating or other foreign materials.

L. The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities. Spent abrasives and other debris shall be removed at the Contractor's expense as directed by the District. When existing paints have been determined by laboratory analysis to be toxic or hazardous, handling shall be in accordance with Paragraph 3.03.G herein.

M. Blast cleaned and coated surfaces shall be cleaned prior to application of specified coatings via a combination of blowing with clean dry air, brushing/brooming and/or

vacuuming as directed by the District. Air hose for blowing shall be at least ½" in diameter and shall be equipped with a shut-off device.

N. All welds, when required, shall be neutralized with a suitable chemical compatible with the specified coating materials.

O. Brush-Off Water Jet Blast Cleaning (SSPC-SP12) shall be used only when and as directed by District. Pressures shall be those determined by District to effectively accomplish removal of loose, peeling/flaking coating or other detrimental surface contaminants.

3.05 SURFACE PREPARATION, INTERIOR

A. All surfaces shall be blast cleaned, in conformance to Society for Protective Coatings Specification SSPC-SP10 (Blast Cleaning to Near-White Metal).

1. Bottom surfaces are to be blast cleaned at beginning of project before any other surfaces are blast cleaned.

B. Wooden wedges shall be placed between roof plates and rafters. Wedges shall be positioned to provide a 1" minimum gap between roof plates and rafters.
Roof plates shall not be bent or deformed while inserting wedges. Wedges shall be repositioned during blasting operations to ensure that all areas are blasted.

C. All sandblast sand, removed coating, and any other residual debris shall be collected, removed from the site, and disposed of at an approved legal disposal site. Said material shall be collected and directly moved from site. Said materials shall not be stockpiled outside the reservoir prior to removal and disposal.

3.06 APPLICATION, GENERAL

A. Coating application shall conform to the requirements of the Society for Protective Coatings Paint Application Specification SSPC-PA1, latest revision, for "Shop, Field and Maintenance Painting," the Eastern Municipal Water District, the manufacturer of the coating materials printed literature and as specified herein.

B. No coating shall be applied under the following conditions:

1. When the surrounding air temperature or the temperature of the surface to be coated or painted is below 55 degrees F for epoxy coatings, below 45 degrees F for epoxy low temperature cure coatings, or above 110 degrees F for all materials.

2. Wet or damp surfaces or in rain, fog or mist.

3. When the temperature is less than 5 degrees F above the dewpoint.

4. When it is expected the air temperature will drop below 55 degrees F for epoxy coating, below 45 degrees F for epoxy low temperature cure coatings, or less than 5 degrees F above the dewpoint within two hours after application of coatings or paints.

    a. Dewpoint shall be measured by use of an instrument such as a sling psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables or equivalent. If dehumidification is used, equipment must run continuously during all phases of contract, except disinfection phase.

If above conditions are prevalent, coating application shall be delayed or postponed until conditions are favorable. The day's application shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

C. Thinning shall only be permitted as recommended by the manufacturer and approved by the District and shall not exceed limits set by applicable regulatory agencies.

1. If Contractor applies any materials which have been modified or thinned to such a degree as to cause them to exceed established VOC levels, Contractor shall be responsible for any fines, costs, remedies, or legal action and costs that may result.

D. Each application of coating shall be applied evenly, free of brush marks, sags, runs and no evidence of poor workmanship. Care should be exercised to avoid lapping on glass or hardware. Coatings shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes as defined by SSPC's Visual Comparison Manual.

E. Protective coverings or drop cloths shall be used to protect floors, fixtures, equipment, prepared surface and applied coatings. Personnel entering tank or walking on exterior roof of tank shall take precautions to prevent damage or contamination of coated or painted surfaces. If required by District, personnel shall wear soft-soled shoes, or shoe coverings approved by District. Care shall be exercised to prevent coating from being spattered onto surfaces which are not to be coated. Surfaces from which such material cannot be removed satisfactorily shall be refinished as required to produce a finish satisfactory to the District.

F. All materials shall be applied as specified herein.

G. All welds and irregular surfaces shall receive a brush coat of the specified product prior to application of each complete coat. Coating shall be brushed in multiple directions to ensure penetration and coverage, as directed by the District. These areas include, but are not limited to, welds, nuts, bolts, roof lap seams, pitted areas, ends and flanges of rafters and girders, etc. Care shall be exercised to ensure dry film thickness of coatings does not

exceed the maximum thickness allowed by the manufacturer of the specific product being applied.

H. At conclusion of each day's blast cleaning and coating operations, a 6" wide strip of blast cleaned substrate shall remain uncoated to facilitate locating point of origin for successive day's blast cleaning operations.

I. Epoxy coated surfaces or other multi-component materials exposed to excessive sunlight or an excessive time element beyond manufacturer's recommended recoat cycle, shall be scarified by Brush-Off Blast Cleaning (SSPC SP-7) or methods approved by District, prior to application of additional coating. Scarified coating shall have sufficient depth to assure a mechanical bond of subsequent coat.

J. All attachments, accessories, and appurtenances shall be prepared and finished in the same manner as specified for adjoining tank sections, except as specifically designated by the District.

K. All coating components shall be mixed in exact proportions specified by the manufacturer. Care shall be exercised to ensure all material is removed from containers during mixing and metering operations.

L. All coatings shall be thoroughly mixed, utilizing an approved slow-speed power mixer until all components are thoroughly combined and are of a smooth consistency. Coatings shall not be applied beyond pot-life limits or recoat cycles specified by manufacturer.

M. Thinners shall be added to coating materials only as required in accordance with manufacturer's printed literature and in the presence of the District. Quantities of thinner shall not exceed limits set by applicable regulatory agencies.

N. Application shall be by airless spray method, except as otherwise specified. Drying time between coats shall be strictly observed as stated in manufacturer's printed instructions, except there shall be a minimum of 24 hours between coats

O. When two or more coats are specified, each coat shall contain sufficient approved color additive to act as an indicator of coverage or the coats must be of contrasting color. A fine bristle broom and air shall be used to remove dust and other matter from each coat prior to application of any additional coats.

P. Care shall be exercised during spray operations to hold the spray nozzle perpendicular and sufficiently close to surfaces being coated, to avoid excessive evaporation of volatile constituents and loss of material into the air or the bridging of cracks and crevices. Reaching beyond limits of scaffold perimeter will not be permitted. All overspray identified by the District shall be removed by hand or pole sanding prior to application of subsequent coat.

Q. All mixing, thinning, application and holiday detection of coatings shall be accomplished in the presence of the District.

R. A time element equivalent to 7 days curing time at 70 degrees F and 50% relative humidity shall be allowed before placing the epoxy coating into service, as determined in Part 3.09 "DEHUMIDIFICATION".

S. Paint shall not be applied when wind speeds exceeds fifteen miles per hour.

T. Care shall be exercised during spray operations to hold the spray nozzle perpendicular and sufficiently close to surfaces being coated to avoid excessive evaporation of volatile constituents and loss of material into the air or the bridging of cracks and crevices. Reaching beyond limits of scaffold perimeter will not be permitted. All dryspray or overspray shall be removed as directed by Engineer and the area recoated.

3.07 APPLICATION, INTERIOR COATING SYSTEMS

A. After completion of surface preparation as specified, all surfaces shall receive a coating system as follows:

SEE SECTION 09878.1 (CUSTOM)

B. Shell/roof junction, roof plate lap seams, and designated void areas:

1. After completion of coating application, as specified, all void areas shall be filled with a joint sealant as specified. Joint sealant may be applied by caulking gun, trowel or other approved method. Sealant shall be pressed firmly into voids to insure 100% filling/sealing.

3.08 QUALITY CONTROL, INTERIOR COATING SYSTEMS

A. Surface Preparation: surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces," SSPC-Vis 1 and as described herein. Anchor profile for prepared surfaces shall be measured by using a nondestructive instrument such as a Testex Press-0-Film System in accordance with ASTM D4417. Temperature and dewpoint requirements shall apply to all surface preparation operations, except low and high temperature limits.

B. Dry film thickness verification and holiday inspection shall be performed by the Contractor in the presence of the District. Contractor shall provide all inspection equipment and a minimum of two of his personnel at the top of each scaffold to perform the inspections. District will provide one inspector for each scaffold being used by Contractor to witness Contractor's performance. Contractor shall check every square inch of the interior coating, including nuts, bolts, ends of rafters, mating surfaces, etc. and shall mark and repair all holidays as specified herein. All areas not meeting the specified dry film thickness and all areas with holidays shall be recoated and repaired by Contractor as directed by District.

C. Film Thickness Testing: thickness of coatings and paint shall be checked with a non-destructive film thickness gauge in accordance with ASTM D1186 and/or ASTM D7091. An instrument such as Tooke Gage should be used in accordance with ASTM D4138 if a destructive tester is deemed necessary. The sampling of film thickness of flat (e.g. plate) surfaces shall be tested in accordance with SSPC-PA2. The sampling of structural members or irregular surfaces shall be tested in frequency and locations, as directed by the District.

D. Holiday Detection: coating integrity of all interior coated surfaces shall be tested with an approved inspection device in accordance with NACE SP 0188.

All pinholes shall be marked, repaired in accordance with the manufacturer's printed recommendations, and retested. No pinholes or other irregularities will be permitted in the final coating.

E. Inspection Devices: Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coatings. They shall also furnish National Institute of Standards and Technology/National Bureau of Standards (NIST/NBS) certified thickness calibration plates to test accuracy of thickness gauges. Dry film thickness gauges and holiday detectors shall be available at all times until final acceptance of application. Inspection devices shall be operated by, or in the presence of the District with location and frequency basis determined by the District. The District is not precluded from furnishing its own inspection devices and rendering decisions based solely upon their tests.

F. Acceptable Inspection Devices: acceptable devices for ferrous metal surfaces include, but are not limited to Tinker-Rasor Models AP and AP-W holiday detectors, and SSPC, Type II units for dry film thickness gauging. Inspection devices shall be calibrated and operated in accordance with the manufacturer's instructions and SSPC-PA2.

G. Upon completion of the interior coating operations and after the required curing intervals, holiday detection shall be accomplished on all coated surfaces. A thorough visual holiday detection shall be completed on all surfaces above the overflow with any suspected holidays verified by high-voltage detection, as noted. The instrument shall be set at 2,000 volts, include a wire brush electrode, and be properly grounded. Repairs shall be retested. The contractor shall obtain a letter from the coating manufacturer approving

this test procedure, prior to any testing. Should the manufacturer not approve of the use of a high-voltage testing device, a 67.5 volt device such as a Tinker and Rasor M-1 tester shall be used.

H. Upon completion of epoxy application to shell surfaces and abrasive blast cleaning of floor plates, and before application of epoxy to bottom surfaces, surfaces of completed epoxy coating on lower shell which may have been subjected to damage from abrasive blast cleaning of floor areas, shall be holiday detected again and repaired as specified herein.

I. All holiday detection of coatings shall be performed in the presence of the District.

J. Whenever and wherever required by Inspector, Contractor shall furnish illumination (level of illumination as determined by District) and scaffolding (level of scaffolding as determined by District) to permit inspection prior to acceptance of work. Contractor shall move lights and scaffolding as directed by Inspector to enable him to inspect all surfaces, inside and out.

3.09 DEHUMIDIFICATION

A. Dehumidification shall be used to control the environment within the tank space 24 hours a day during blast cleaning and coating application. The system shall be similar or equal to the following requirements

B. Operation Criteria:

1. The tank shall be continuously dehumidified 24 hours per day, 7 days per week during blasting, coating, between applications of coating, and until the system application is complete, until unless approved otherwise in writing by the Engineer. The equipment shall provide a relative humidity within the work space that does not exceed 35 percent 24 hours per day.

2. Maintain the dehumidification system at all times. Only ventilation equipment, not dehumidification equipment is required throughout final cure period.

3. Dehumidification equipment shall also provide the necessary ventilation for the removal of solvent vapors during the coating. At all times, maintain the concentration of solvent vapors in all parts of the tank at 10-percent below the lower explosive limit (LEL).

4. Ducting shall be a minimum of 18 inches in diameter, airtight and reinforced with spirally-wound wire to prevent collapse. Size of ducting shall be larger if deemed necessary by the Contractor in order to comply with these specifications or any local, state, or federal safety regulations. Sizing of the ducting, ventilation, and dehumidification equipment shall be the sole responsibility of the Contractor.

Provide an appropriate connecting device between the 18-inch duct and designated opening. All bends in duct work shall have a minimum radius of 2 X ID of the ducting (i.e. 18" ID = 36" minimum radius).

5. The Contractor shall design and submit for review a dehumidification and ventilation plan, which provides for a minimum cross-draft velocity of 100 feet per minute in the vicinity of the work area. The cross-draft velocities shall be obtained with the use of a portable blower or fans.

6. The areas adjacent to the surface that are to be blasted and coated shall not be exposed to a relative humidity over thirty-five percent. Furthermore, these areas shall not have a surface temperature that is less than 15 degrees F above dew point at any time during cleaning and coating phases.

C. Equipment:

1. The dehumidification equipment shall be a solid desiccant (not liquid, granular, or loose lithium chloride) design having a single rotary desiccant bed capable of continuous operation, fully automatic, with drip-proof automatic electrical controller.

2. The equipment shall be capable of making two complete air changes every sixty minutes unless the 100 feet per minute cross-draft velocity requirement requires a larger volume.

3. The processed air from the dehumidification unit must maintain a relative humidity of fifteen percent or less.

4. During the coating phase, dehumidification units shall have auxiliary heaters capable of maintaining a constant air temperature inside the tank.

5. Air heaters are not acceptable as substitutes for dehumidification units.

6. Air chillers, heaters, or air conditioners may be used downstream of the dehumidifiers if they are approved for use by the manufacturer of the dehumidification equipment and the Engineer.

D. Dehumidification equipment shall be operating continuously, 24 hours a day, seven days per week from the time abrasive blasting begins, through to completion of all lining application. Equipment shall be turned off only for regular servicing or fueling of climate control equipment or generator(s). Equipment can be turned off during periods when

there is no demand for dehumidification only if automatic controls are installed that perform the following:

1. Activates and deactivates the equipment by determining the difference between the coldest surface temperature and the dew point temperature in the tank.

2. Measures and logs surface temperature, inside air temperature, inside dew point temperature and equipment run time at 1-minute intervals. Copies of this data will be delivered to the District's representative.

3.10 FINAL CURING OF EPOXY COATINGS

A. Upon completion and acceptance of applied coating system, Contractor shall furnish an approved exhaust fan or blower of sufficient capacity to insure removal of solvent vapors during curing process. The fan or blower, after approval by District, shall be installed as approved by the District and shall remain in continuous operation until coating is completely cured as determined by the manufacturer of the coating system. Operation and maintenance of blower during curing operations shall be the responsibility of the Contractor.

1. If dehumidification is being used, the equipment shall remain in-place and run continuously during all curing operations.

B. After completion of curing cycle as required by the coating manufacturer, the Contractor shall test the applied coating with a solvent rub test performed in accordance with ASTM D 5402 to verify adequate curing has been attained.

1. If final cure has not been attained, based on above tests, ventilation shall be continued until applied coating passes the "acetone" or "hardness test".

C. After final cure is approved by the District, Contractor shall remove fan or blower.

3.11 REPAIR OF DAMAGED EXTERIOR PAINT SYSTEM

A. If Contractor's interior recoating operations damage exterior painted surfaces, damaged areas must be prepared and repainted to the satisfaction of the District. Method of preparation and application procedures/materials will be determined by the District, as required by the District's standard specifications for repainting of exterior surfaces of steel tanks. All repair of damaged areas will be at no cost to the District.

3.12 DISINFECTION

A. Disinfecting of interior surfaces of tank shall be accomplished in the presence of the District, in conformance to AWWA Standard C652 Section 4.2 Chlorination Method 2 as modified herein:

1. Disinfection shall be accomplished after completion and acceptance by District of all interior recoating and curing of coating as required in Part 3.10 "FINAL CURING OF EPOXY COATINGS".

2. Prior to disinfecting, the complete interior shall be cleaned with an approved cleaner or detergent applied via high pressure hot solution method. If deemed necessary by the District, immersed areas shall be scrubbed with a brush or similar implement which will apply force and pressure to the surface to completely remove residual solvents and other surface contaminants.

   Cleaned surfaces shall then be rinsed with clean water. Residual water and contamination removed during washing process shall be thoroughly flushed from tank. Contractor shall obtain approval of District prior to draining any residual water to waste. This operation shall be accomplished after completion of interior coating work as directed by the District.

3. After completion of cleaning cycles as noted above, all interior surfaces shall jet washed with a chlorine or chloramine solution having a content of 200 PPM. Chlorine or chloramine solution which accumulates on the bottom shall be drained to waste. Contractor shall obtain approval of District prior to draining any high strength chlorinated water to waste. Rinsing with clean water is not required unless directed by District.

4. Once the tank has been completely filled, the tank will be isolated from the water system and the District will take a Bac-T test. Bac-T samples will need to be taken immediately after filling the tank and a second Bac-T is to be taken after 24 hours. The tank is to remain off line until the results pass California drinking water standards: Absent for coliform bacteria and E. coli, and HPCs less than 500 CFU per mL. Should the Bac-T test fail, the Contractor will be responsible for reimbursing the District for the rejected and drained water and will be required to rechlorinate the reservoir as described above until the Bac-T tests are negative.

3.13 TESTING FOR VOLATILE ORGANIC COMPOUNDS (VOC'S) AND ODOR

A. VOC samples are to be taken for information only as a precautionary measure, as long as the coatings are NSF 61 approved, to be sure that there are no high levels of VOCs leaching

into the tank. To monitor the presence of VOC's leached into the water from the coating process, the following procedure shall be utilized:

1. After satisfactory curing, the tank shall be filled by District in accordance with standard filling procedure. Water shall then be retained for a period of 5 days.

2. On the sixth day following completion of filling of tank, samples of water shall be removed by District, in accordance with latest Health Department memoranda. Samples shall then be forwarded, by District, to an approved test laboratory for testing to determine presence of VOC's.

3. After testing of samples, results must show levels of leached organics to be in accordance with levels established by the Health Department for various VOC's. Results will be verified by Health Department and tank will then be placed into operating service.

4. If levels of leached organics exceed those acceptable to the Health Department, the tank shall be drained, flushed, refilled and retested at the Contractor's expense. Failure of the tank to attain levels acceptable to the Health Department shall be the responsibility of the Contractor and remedial measures to attain such levels shall be at his sole expense.

5. If leached organics produce any taste and odor objectionable to consumers of the water from the tank, the tank shall be drained, recleaned, flushed, refilled and retested at the Contractor's expense. Failure of the tank to be taste and odor-free shall be the responsibility of the Contractor and remedial measures to attain such a condition shall be at his sole expense.

B. A physical sample will be taken and sent to lab for odor analysis. A passing odor of 3 TON or less will indicate consumer acceptance.

3.14 CLEANUP

A. Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the District. Coating and thinner containers, and excess coating and thinners, shall be disposed of in conformance to current regulations. Coating spots upon adjacent surfaces shall be removed and the entire jobsite cleaned. All damage to surfaces resulting from the work of this section shall be cleaned, repaired or refinished to the complete satisfaction of the District at no cost to the District.

3.15 OMISSIONS

A. Care has been taken to delineate herein those surfaces to be coated. However, if coating requirements have been inadvertently omitted from this section or any other section of the specifications, it is intended that all metal surfaces, unless specifically exempted herein, shall receive a first-class protective system equal to that given the same type surface pursuant to these specifications.

END OF SECTION 09878