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**ENVIRONMENTAL  
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**Maintenance Action Work Plan  
for the New Corehole 8 Interceptor System,  
Oak Ridge National Laboratory,  
Oak Ridge, Tennessee**

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contributed to the preparation of this document and should not be considered an eligible contractor for its review.

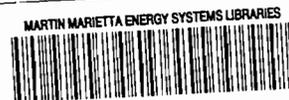
**Maintenance Action Work Plan  
for the New Corehole 8 Interceptor System  
Oak Ridge National Laboratory,  
Oak Ridge, Tennessee**

Date Issued—March 1998

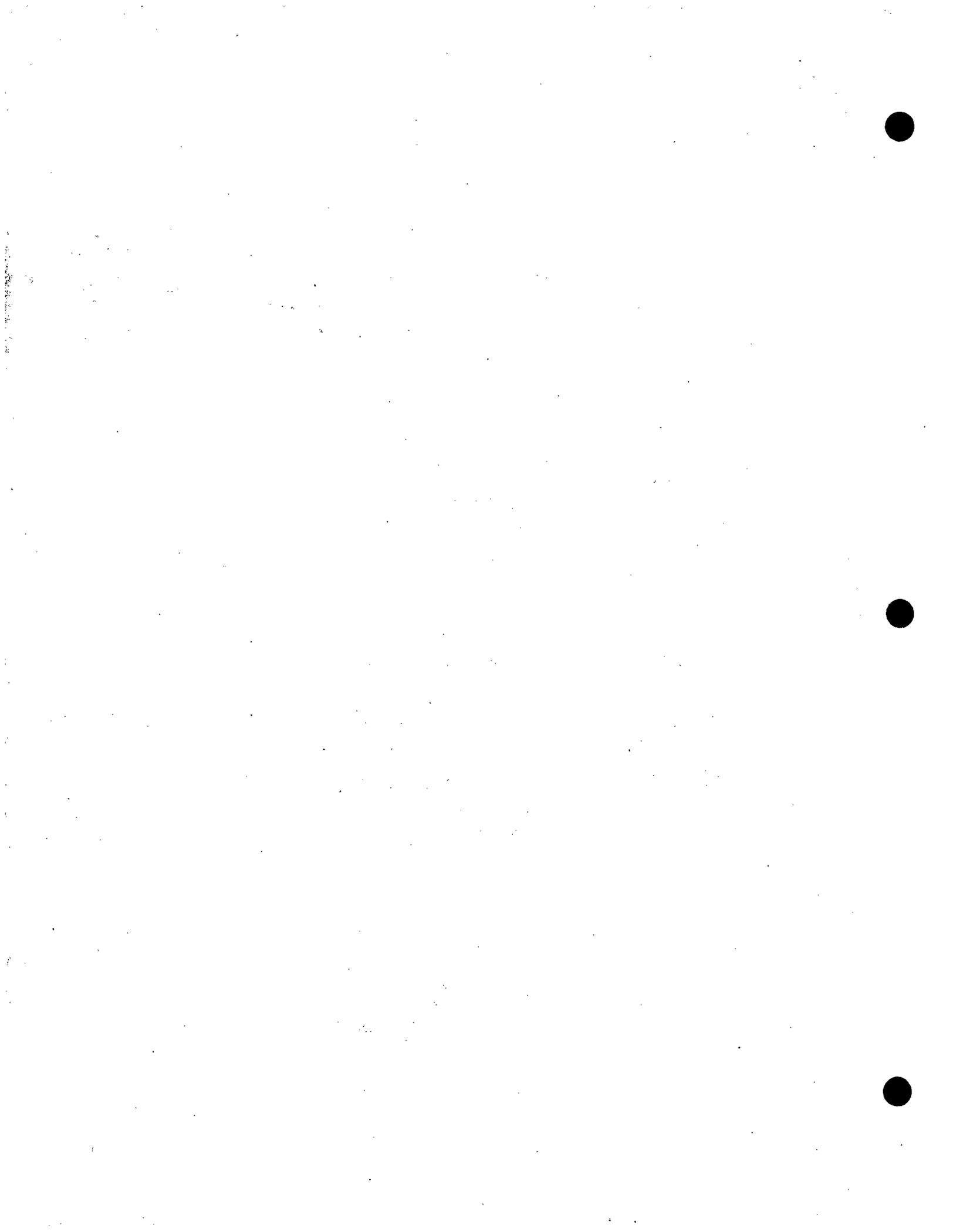
Prepared by  
Lockheed Martin Energy Systems, Inc.  
and  
MK-Ferguson of Oak Ridge Company  
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## EXECUTIVE SUMMARY

This Maintenance Action Work Plan for the New Corehole 8 Interceptor System is composed of two elements: the *Site Safety and Health Plan for the Corehole 8 Interceptor System* and the *Construction Specifications for Corehole 8—New Interceptor System*. Together these elements provide the technical implementation of the Corehole 8 New Interceptor System Project, the purpose of which is to prevent inleakage of radiological contaminants into two manholes in the Oak Ridge National Laboratory (ORNL) storm sewer system.

The Corehole 8 Project was conceived in response to a radiologically contaminated plume that was found when Corehole 8 was installed during remedial investigation efforts in Waste Area Grouping 1. Strontium-90, which constitutes the primary radiological contaminant in the plume, and uranium are entering the ORNL storm sewer system and reaching First Creek. Although the exact source of the plume is not known, recent site investigation has determined that the plume is entering the storm sewer system through inleakage at an existing manhole north of Bldg. 2013. A second manhole south of Bldg. 2013 is also receiving storm water and in the future may contribute to the contamination entering First Creek. The purpose of this action is to limit the release of <sup>90</sup>Sr and uranium into First Creek.

The proposed action will take place at an asphalt-paved area and inside an existing manhole located immediately north of Bldg. 2013 (West Maintenance Service Center). The proposed action will also involve a manhole south of Bldg. 2013 and a lift station east of First Street. Building 2013, which is located northwest of the intersection of Second Street and Central Avenue, is inside the security-fenced region of the main ORNL facilities complex in Bethel Valley.

The proposed action will involve lining two storm sewer manholes (D-31 and D-34) with Xypex, a waterproofing agent, to minimize inleakage. Approximately 30 ft of French drain will be installed to route the contaminated groundwater to Lift Station No. 3 for treatment at the Process Waste Treatment Plant, Bldg. 3544. Installation activities will involve (1) removing a small section of asphalt surface, (2) removing possibly radioactively contaminated soil, (3) installing a gravity-fed French drain, (4) filling the excavated site with clean fill removed during excavation or transported to the site, and (5) repaving the site with asphalt. Additionally, a new 2-in. pipeline will be installed in manholes 23 and 24 in the North Tank Farm area. A flow totalizer and valving will be added to accurately measure and control flow to the Process Waste Treatment Plant. The flux of contaminants will be monitored to measure the effectiveness of the proposed action in reducing contaminants and to determine the need for further actions.



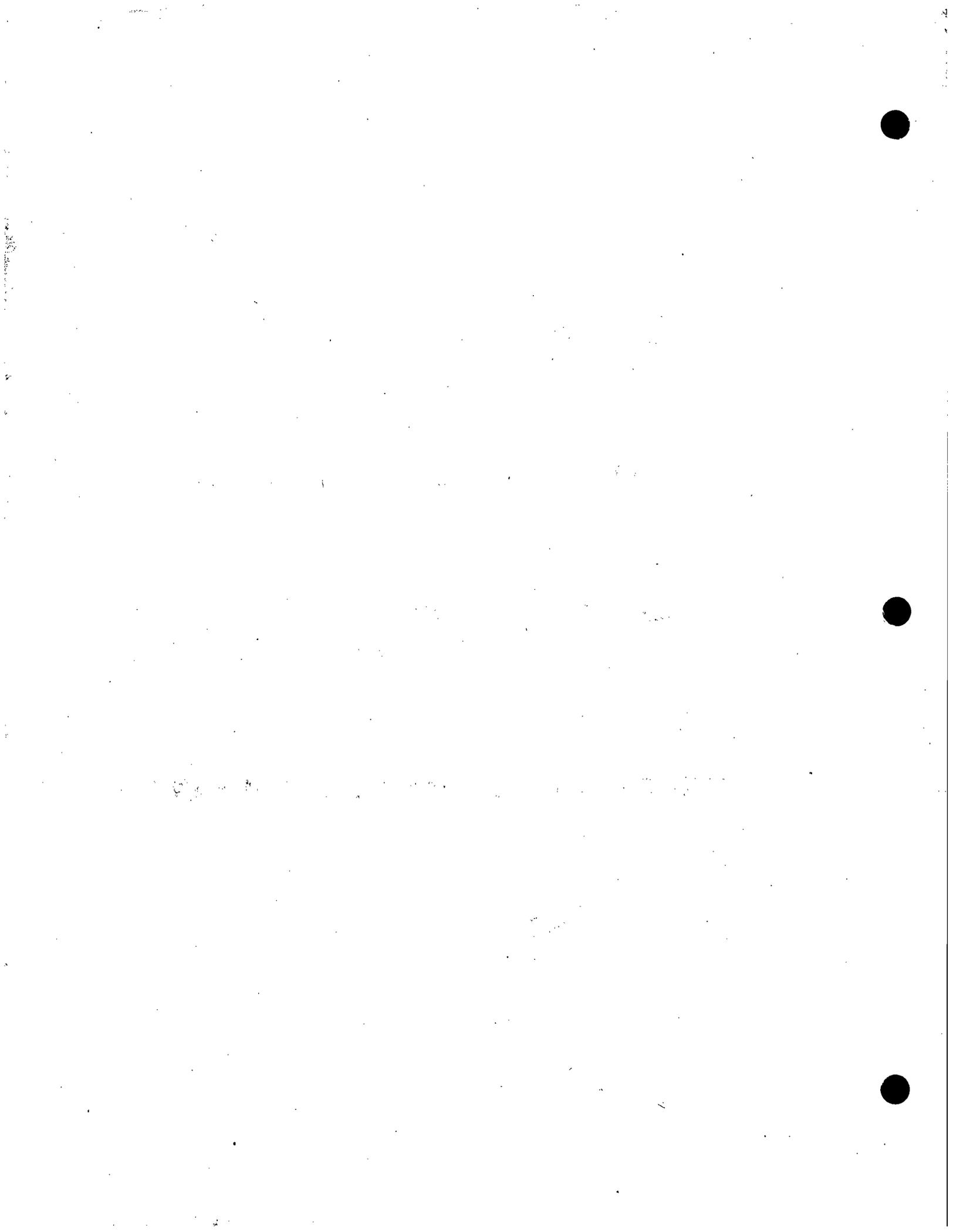
**SITE SAFETY AND HEALTH PLAN**

**COREHOLE 8 INTERCEPTOR SYSTEM**

**OAK RIDGE NATIONAL LABORATORY  
OAK RIDGE, TENNESSEE**

**MK-FERGUSON OF OAK RIDGE COMPANY**

**JANUARY 29, 1998**



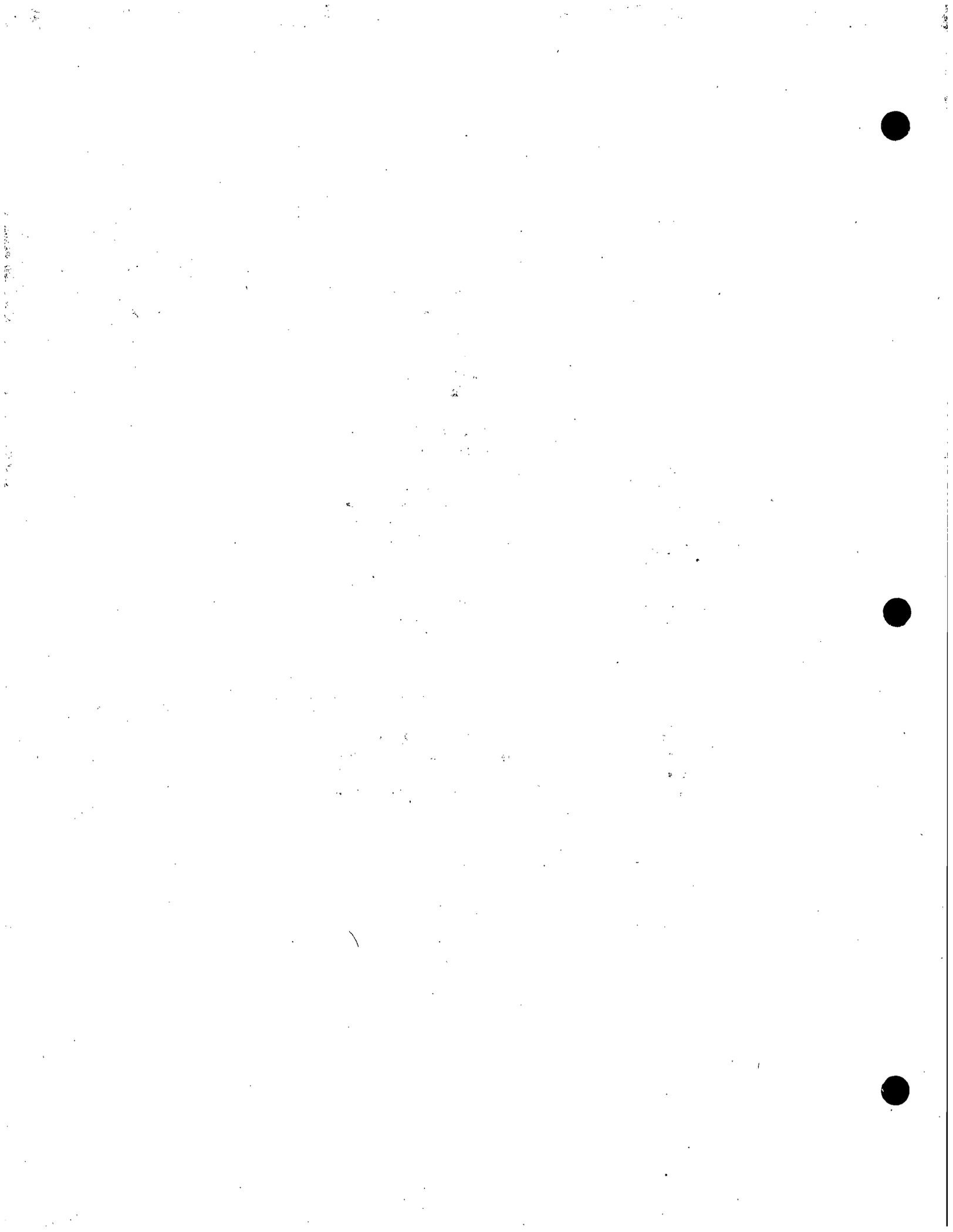
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## LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CRZ	Contamination Reduction Zone
DAC	Derived Air Concentration
DOE	Department of Energy
EPA	Environmental Protection Agency
EZ	Exclusion Zone
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air Filter
HP	Health Physics
HSP	Health and Safety Plan
IH	Industrial Hygiene
LEL	Lower Explosive Limit
LLW	Low Level Waste
LLLW	Liquid Low Level Waste
LSS	Lab Shift Superintendent
MK-F	MK-Ferguson
MSDS	Material Safety Data Sheets
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PA	Public Address
PHA	Preliminary Hazard Analysis
PPE	Personnel Protective Equipment
RWP	Radiation Work Permit
SHS	Safety and Health Supervisor
SSHO	Site Health and Safety Officer
SSHP	Site Safety and Health Plan
STA	Safety Task Assignment
SZ	Support Zone
TLD	Thermoluminescent Dosimeter
WBG	Wet Bulb Globe Thermometer



## **1.0 INTRODUCTION**

### **1.1 OBJECTIVE**

The objective of this Site Safety and Health Plan (SSHP) is to ensure that safe working conditions exist at the site during all activities. This plan explains additional site safety and health requirements, and should be used very closely along with the contract specifications. The SSHP shall be available for on-site inspection and review by all MK-Ferguson of Oak Ridge (MK-F) employees, subcontractors and Lockheed Martin Energy Research, Inc. (LMER) and Department of Energy (DOE) personnel. During on-site activities, all personnel and visitors are expected to fully comply with the requirements of this plan. Site activities will be performed in accordance with applicable MK-F safety and health policies and procedures, Department of Energy (DOE) Orders, Occupational Safety and Health Administration (OSHA) Standards 29 CFR 1926, and applicable Environmental Protection Agency (EPA) requirements and consensus standards.

It is understood that it may not be possible to determine all actual working conditions in advance of the work. Therefore, the plan must allow the opportunity to provide a range of protection based upon actual working conditions. Major changes in the scope of work or site conditions will require an addendum to this SSHP, which must be approved by project management. Minor changes to the SSHP, which are made in the field, will be documented by the SSHO on the Task Instruction form and will be attached to this plan. Changes in the level of personal protective equipment (PPE), zone changes, etc. will be documented in the site log book as well as the Radiation Work Permit (RWP). The RWP is explained in more detail in section 5.3 of this plan.

All personnel involved in the activities of this project must read this document, or have it thoroughly reviewed with them, and sign the Site Safety Acceptance form, (Appendix A), to indicate their understanding. Visitors to the site shall be briefed by the Site Safety and Health Officer (SSHO) and must sign the Visitors Notice (Appendix B), to indicate their understanding.

### **1.2 SITE LOCATION AND DESCRIPTION**

This majority of work related to this project is located north of Building 2013. Additional work will be done at existing manhole #24 at the northeast corner of the intersection of 3rd Street and Central Avenue. Refer to the Site Map, (Attachment II ) Scope work to be performed includes installation of a french drain line, waterproofing of existing manholes, and reconfiguration of existing piping at manhole #24. See the Comprehensive Work Plan for more information.

## **2.0 ON-SITE ORGANIZATION AND COORDINATION**

This section describes the responsibilities and authorities of project personnel with regard to health and safety. Ultimately, the responsibility for health and safety of project personnel lies with each individual. All personnel need to be cognizant of the hazards and the methods utilized to reduce the risk of injury and illness. All personnel shall comply with the rules and procedures set forth in this plan and shall notify project management of any conditions which may jeopardize the welfare of project workers and the general public.

<b>Project Role</b>	<b>Name</b>	<b>Phone Number</b>	<b>Pager</b>
MK-F Lead Construction Superintendent	Charlie Cardwell	576-0069	873-7786
MK-F Construction Engineer	Bruce Womble	241-3615	873-7785
MK-F ORNL Safety Coordinator	Ron Beebe	241-3617	873-7367
MK-F ORNL HP Lead Coordinator	John Richards	241-4753	417-5419
MK-F Site Health and Safety Officer	Ford Arp	576-3404	
LMER Engineer	Steve Laman	574-5766	

### **2.1 MK-F CONSTRUCTION SUPERINTENDENT**

Responsible for directing craft personnel and providing material and equipment to the site. Ensures all required permits are current and maintained on site. Ensures all craft personnel meet the required training level.

### **2.2 MK-F CONSTRUCTION ENGINEER**

Responsible for overall management and direction of the MK-F construction effort. Maintains project status, monitors construction activities, keeps project participants informed of issues and concerns, provides technical direction for construction activities, provides project coordination between MK-F and LMER and serves as MK-F cost account manager.

### **2.3 MK-F ORNL SAFETY COORDINATOR**

Responsible for supervision of the SSHO. Provides assistance to the SSHO as needed and may serve as an alternate SSHO, if required.

### **2.4 SITE SAFETY & HEALTH OFFICER (SSHO)**

Reports to the Safety Coordinator for all safety and health aspects of the project. Serves as the primary on-site contact for safety and health related issues during field activities. Remains on-site, or ensures there is a qualified alternate on-site, during all work activities. Oversees the on-site execution of all field activities regarding safety and health procedures. Stops work if conditions are judged to be hazardous to on-site personnel or to the public. Other specific responsibilities include but are not limited to the following:

1. Ensure that employees meet the required level of training, including 1926.65 training, medical requirements including respirator fit test, briefing on project and potential hazards, ensuring personnel have reviewed the SSHP and emergency response procedures.
2. Require personnel to obtain immediate medical attention in the case of a work-related injury or illness.
3. Deny access to all or any portion of the work area as warranted.
4. Order work to cease, evacuation of the work area by all personnel, and re-establish safe working conditions, as needed.
5. Control access to the site by visitors. Advise visitors of their responsibility before entry is allowed.
6. Ensure the correct field execution of the SSHP including work place and personnel monitoring.
7. Perform or request and oversee monitoring/sampling of site hazards for potential employee exposure and hazard evaluation.
8. Advise emergency response personnel in an emergency.
9. Ensure that all monitoring equipment is correctly calibrated daily prior to use.
10. Assure that waste is handled according to the project waste management plan.
11. Request any changes needed in the Site Safety and Health plan .
12. Administers the site health and safety briefing and visitor briefing.
13. Maintains project log book.

### **2.5 HEALTH PHYSICS TECHNICIANS**

1. Performs pre and post job survey of work areas, equipment and personnel for radiation and contamination.
2. Maintains radiological zoning and posting.
3. Sets monitoring requirements necessary to maintain adequate protection for radioactive contaminants.

4. Order work to cease, evacuation of the work area by all personnel, and re-establish safe radiological working conditions, as needed.
5. Monitors air for airborne radio nuclides, as needed.
6. Determines PPE levels necessary for protecting personnel from radioactive contaminants.
7. Initiates and controls Radiological Work Permits per MK-F Health Physics Procedures.
8. Response checks radiological instruments.
9. Advises SSHO on site radiological conditions.

## **2.6 FIELD PERSONNEL**

Project personnel involved in the on-site execution of the construction activities are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees; being alert to potentially hazardous situations.
2. Performing only those tasks that they believe they can do safely and immediately reporting any accidents and/or unsafe conditions to the SSHO.
3. Notifying the SSHO of any special medical conditions (i.e., allergies, contact lenses, pregnancy, diabetes) and , if necessary, ensuring that all on-site personnel are aware of the condition.
4. Practicing good housekeeping by keeping the work area neat, clean and orderly to the extent possible.
5. Reporting all injuries.
6. Meeting all requirements of this SSHP.

## **2.7 LMER ENGINEER**

Primary contact at LMER. Will coordinate access and security to the site, advise MK-F and subcontractors of proper access and security procedures, and provide Title III Engineering, inspections, approvals and coordination.

Responsible for obtaining all applicable permits. Serves as the principal interface between LMER safety and health personnel and MK-F personnel.

## **3.0 HAZARDS AND CONTROLS**

### **3.1 GENERAL HAZARDS**

#### **3.1.1 Noise**

**Tasks:** Heavy equipment operation.

**Hazards:** The operation of vehicles, track hoes, dozers, and other sources, can create areas where noise levels will exceed 85 decibels on

the A-weighted scale (dBa). Excessive noise levels may lead to temporary or permanent hearing loss.

**Controls:** Hearing protection will be worn where levels are suspected or shown to exceed 85 dBa. The SSHO will perform monitoring in areas where the noise levels potentially exceed 85 dBa and assign the proper hearing protection. Signs denoting hearing protection required shall be utilized when practical.

### **3.1.2 Chemical Exposures**

**Task:** Fueling site equipment and operation of site equipment.

**Hazards:** Eye or Skin contact with fuels, oils, or hydraulic fluids from spills. Other chemical hazards will be determined through site monitoring. See Section 9.0 "Site Monitoring".

**NOTE:** Chemical contamination is not anticipated during excavation. However, if conditions change during excavation which indicate potential contamination, work will halt and the area will be reevaluated.

**Controls:** Equipment will be inspected for worn or decayed hoses prior to use. Spill kits will be maintained on-site. MSDS' will be maintained by the SSHO for all hazardous materials on site. If necessary, the soil will be kept damp to control dusty conditions. Identification and evaluation of other hazards may require that workers be provided appropriate personal protective equipment (PPE).

### **3.1.3. Radiation**

**Tasks:** Excavation

**Hazards:** Radiation hazards will be assessed through site monitoring. See Section 9.0 "Site Monitoring".

**Controls:** Hazards will be reduced through the use of engineering and work practice controls to the extent feasible. Additionally, personnel will be provided with an appropriate level of PPE, as needed. All excavation operations and related activities shall follow ALARA (As Low Reasonably Achievable) guidelines regardless of the classification. ALARA guidelines include measures to protect the environment as well as the health and safety of personnel and include daily inspection of excavation equipment to ensure that leaks of oil and other environmentally controlled substances are maintained ALARA.

### **3.1.4 Excavation**

**Tasks:** Excavating around piping.

**Hazards:** Excavation may pose a number of hazards common to other site tasks such as unexpected chemical exposure and radioactive contamination. In addition, there are specific hazards such as falling.

**Controls:** All excavation will be performed in accordance with the LMER excavation/penetration permit and MK-F ES&H Procedures 3A-2.04 "Excavation and Trenching.

### **3.1.5 Underground Hazards**

**Tasks:** Excavation work

**Hazards:** Underground hazards occur when subsurface structures are encountered during excavation. These structures include product lines, concrete vaults, tanks, etc. These present a potential for explosion, spill/release, or other injuries to the crew.

**Controls:** Project design agency, management and supervision shall take the necessary steps to ensure that all underground utilities are identified on the excavation/penetration permit and neutralized before beginning excavation. Hand excavation may be required to eliminate accidental ruptures or breakage of lines.

### **3.1.6 Hot Work**

**Tasks:** Hot Work (welding, burning, etc.)

**Hazards:** Ignition source

**Controls:** All hot work will be done in accordance with MK-F Procedure 3A 3.04 "Hot Work Permitting". A 10 pound or larger ABC dry chemical fire extinguisher will be kept in the immediate area of hot work. A dedicated, trained fire watch will be present during and thirty minutes after all hot work activities.

## **3.2 SPECIFIC HAZARDS**

Refer to the Preliminary Hazard Analysis

#### 4.0 GENERAL SAFE WORK PRACTICES

The following work practices will be strictly adhered to during site operations:

- . At least one copy of this plan shall be available at the job site at all times.
- . Contaminated protective equipment, such as respirators, hoses, boots, etc. shall not be removed from the contamination reduction zone until cleaned or properly packaged and labeled.
- . Legible and understandable precautionary labels will be prominently affixed to the containers of contaminated scrap, waste, debris, and clothing.
- . No food, beverages, smoking, or chewing articles shall be present or consumed in the radiologically controlled areas or the EZ or CRZ .
- . All crew personnel inside the exclusion zone (EZ) shall use the "buddy system" (each working in groups of two or more). Buddies shall pre-arrange hand signals for communication. Acceptable signals are:

<b>Thumbs up</b>	<b>Ok / Understand</b>
<b>Thumbs down</b>	<b>No / Negative / Do not understand</b>
<b>Grasping Buddy's wrist</b>	<b>Leave site now</b>
<b>Hands on top on head</b>	<b>Need assistance</b>

- . Employees shall immediately inform each other and the SSHO of all non visual effects potentially due to cold stress or toxic exposure such as:
  - **Headaches**
  - **Blurred vision**
  - **Dizziness**
  - **Cramps**
  - **Nausea**
  - **Irritation of eyes skin, or respiratory tract.**
- . Appropriate action to provide secure footing shall be taken at all locations where personnel will be working.
- . All personnel will wear work gloves during loading, unloading, moving, or manual lifting of equipment or materials. These gloves shall be sufficient to prevent cuts or bruises to the wearer's hands.
- . STA shall be provided before each task.
- . Good housekeeping practices shall be followed at all times.

## 5.0 SITE CONTROL

The flow of personnel and equipment shall be controlled by the establishment of work zones, appropriate posting of those zones, and monitoring by the SSHO. Work zones, as listed in section 5.1 of this plan, shall be established where there is potential for the accidental spread of hazardous substances to clean areas.

The SSHO shall ensure that personnel are properly protected against hazards present in the work area, that work activities and contamination are confined to the appropriate area through established zones.

### 5.1 WORK ZONES

Zones for this project will incorporate radiological and Hazwoper zones. The areas are typically zoned as follows:

#### HAZWOPER ZONES

- Exclusion Zone (EZ) - includes the areas of suspected or known contamination. It has the highest potential for exposures.
- Contamination Reduction Zone (CRZ) -- provides an area for decontamination. The purpose is to avoid transferring contamination out of the EZ.. Entry into and exit from the EZ must be through the CRZ.
- Support Zone (SZ) --- covers all areas outside of the EZ and CRZ. Exposure is unlikely.

The Radiological Control Manual gives requirements for posting radiologically contaminated areas. The radiological contamination posting will follow these requirements. MK-F's instruction 3B-4.108/O follows the requirements of the manual and has the following zoning/posting requirements.

- Airborne Radioactivity Area - Any area where the measured concentration of airborne radioactivity, above natural background, exceeds or is likely to exceed either: 10 percent of the Derived Air Concentration (DAC) values listed in Appendix A or Appendix C of 10 CFR 835, as applicable.
- Contamination Area - Area where contamination levels are greater than the values specified in Appendix D of 10 CFR 835, but less than or equal to 100 times those levels.
- High Radiation Area - Any area, accessible to personnel, in which radiation levels could result in a person receiving a deep dose equivalent in excess of 0.1 rem (1 mSv) but less than or equal to 500 rad in 1 hour at 1 meter from the radiation source or from any surface that the radiation penetrates.

- **Radiation Area** -- Any area where an individual can receive a dose equivalent greater than 5 mrem but less than 100 mrem in one hour at a distance of 30 cm from the radiation source or from any surface through which the radiation penetrates.
- **Radiological Area** - Any area within a Controlled Area (but not including the Controlled Area) which must be posted as a "Radiation Area," "High Radiation Area," "Very High Radiation Area," "Contamination Area," "High Contamination Area," "Airborne Radioactivity Area," or "Radiological Buffer Area" in accordance with 10 CFR 835.603.
- **Radiologically Controlled Area** -- Any area to which access is controlled in order to protect individuals from exposure to radiation or radioactive materials.

For the purpose of this document, the radiological areas, other than the Radiological Buffer Area, and any chemically contaminated areas will be considered Exclusion Zones (EZ) and the areas established for decontamination, donning/doffing, and frisking will be considered the Contamination Reduction Zone (CRZ). Hazwoper signs and radiological posting materials will be used to identify these zones.

The HP, in close coordination with the SSHO, shall establish these zones based on the amount and nature of radioactive and/or chemical material present and the safety hazards associated with specific work activities. The SSHO will control access to and from the CRZ.

No person will enter the EZ or CRZ without proof of sufficient training and medical requirements (as per OSHA 29 CFR 1926.65). The RWP entry control form will be used to log entry/exit into the EZ and CRZ by employees.

Equipment will be surveyed for radiological contamination both before entering and before exiting radiologically controlled areas and the CRZ. The technicians performing the survey will log the results of these surveys in their log. All equipment will be tagged to show the results of the radiation survey.

## 5.2 **EXCAVATION-CLASSIFICATION CATEGORIES**

**Category I** - Soil generated from excavation operations where alpha activity is near the lower limit of field instrument detection capabilities (less than 300 dpm/100cm<sup>2</sup>), and/or beta/gamma readings below 1000 dpm 100cm<sup>2</sup>.

**Category II** - Waste (soil) generated from excavation operations where alpha activity is equal to or greater than 300 and/or less than 6000 dpm/100cm<sup>2</sup> and beta/gamma readings are equal to or greater than 1000 dpm/100cm<sup>2</sup> but less than 5.0 mrad/hr.

**Category III** - Waste (soil) generated from excavation operations where alpha activity is equal to or greater than 6000 dpm/100 cm<sup>2</sup> and/or beta/gamma is equal to or greater than 5.0 mrad/hr.

**CLASS**      **PROTECTIVE MEASURES**

**Category I**      Protective clothing , as identified by the RWP, will be needed if radioactive or chemical contamination is detected. Generated waste will be disposed as nonradioactive and nonhazardous waste if neither radioactive nor chemical hazards (including oils and oily wastes) are encountered during operations.

Health, Safety and HP personnel will monitor operations during excavation activities and again at completion of construction

**Category II**      Protective clothing, as identified by the RWP, will be required. Measures will be taken to contain generated waste.

Surveillance for radiation will be continuous with periodic surveillance required for environmental compliance and industrial hygiene control throughout excavation activities.

Proper disposal containers for radiological and/or chemically contaminated and/or oily waste will be available on site.

**Category III**      Protective clothing, as identified by the RWP, will be required. Measures will be taken to contain generated waste.

Health Physics, Industrial Hygiene and Environmental personnel will perform continuous surveillance during all excavation activities.

Proper disposal containers will be required.

Health Physics will determine when a Radiation Work Permit will be required.

**5.3**      **RADIATION WORK PERMIT (RWP)**

The site HP will develop an RWP and all involved individuals are required to review and sign the RWP. Any changes in work activities or exposure levels will require a new RWP to be developed. The RWP will explain radiation survey data, PPE requirements, monitoring requirements, dosimetry required, and special HP requirements. All employees are required to read the RWP and sign the RWP entry control form upon entry and exit from the CRZ.

## **5.4 VISITORS**

Personnel, other than MK-F project personnel, entering the EZ or CRZ will be considered visitors. Entry into these areas will require the same level of training and medical surveillance as required in sections 6.0 and 7.0. The SSHO will inform visitors of the site hazards and will provide them with a site-specific briefing prior to entering the CRZ. Visitors to the site:

- . Visitors shall be cautioned to avoid skin contact with contaminated or suspected contaminated surfaces.
- . Visitors will be required to sign the RWP control log to record their entry/exit times.
- . Visitors will be required to sign the Visitor Notice form (Appendix B) prior to entry.

## **6.0 TRAINING**

Prior to commencement of work activities in the CRZ and EZ, all on-site personnel covered by this plan are required to provide proof of current training to the SSHO. Training will be documented on the Training Matrix form, which will be maintained on site. Visitors requesting access to the CRZ or EZ must also provide proof of current training to the SSHO. A separate Training Matrix will be maintained specifying visitor training requirements.

### **6.1 PRE-ENTRY BRIEFING**

Prior to entry into the EZ or CRZ a pre-entry briefing will be conducted by the SSHO. The SSHO will explain the requirements of the SSHP and the hazards/controls of the project. The Site Safety and Health Plan Acceptance Form (Appendix A) will be used to document this training.

The HP will explain the current RWP, contamination levels, PPE requirements, and dosimetry required.

### **6.2 HAZARDOUS WASTE SITE TRAINING**

Site workers, as defined in 1926.65(e)(3)(I), will have received a minimum of 40 hours of off-site training and shall receive a minimum of three days of actual on-site experience under the direct supervision of a trained, experienced supervisor. On-site supervisors, as well as the SSHO, shall receive eight hours of additional supervisory training.

Occasional workers, as defined by 1926.65(e)(3)(ii), and regular workers who work in areas which have been fully characterized indicating that there are no health hazards or the possibility of an emergency developing, as defined by 1910.120(e)(3)(iii), shall receive 24 hours of off-site training and at least one day of actual field experience.

All personnel shall receive eight hours of refresher training annually.

### **6.3 RADIATION TRAINING**

All personnel entering a radiologically controlled area shall have current radiation worker training certification in accordance with 10 CFR 835.

### **6.4 CONFINED SPACE TRAINING**

All workers who will be entering, monitoring, attending, or supervising a confined space shall have current confined space training in accordance with 29 CFR 1926.65.

### **6.5 LEAD AWARENESS TRAINING**

Lead Awareness Training will be provided to all employees on site with the potential for exposure to lead

### **6.6 TRAINING OUTLINE**

The following is a list of minimum requirements for entry into the work site. All personnel requesting access to the site will be required to provide proof of training. Required training must be documented on the Training Matrix which is attached to the Preliminary Hazard Analysis (PHA).

#### **6.6.1 Support Zone**

1. SSHP Site Briefing
2. General Employee Training

#### **6.6.2 Contamination Reduction Zone and Exclusion Zone**

1. SSHP Site Briefing
2. General Employee Training
3. OSHA 1926.65 40-hr HAZWOPER (for workers)
4. OSHA 1926.65 24-hr HAZWOPER (for non-workers "visitors")
5. Radiation Worker Training
6. HAZWOPER Baseline Physical

7. Whole Body Count, as per RWP
8. Urinalysis, as per RWP
9. Fall Protection

NOTE: If respiratory protection is required personnel with only 24-hour HAZWOPER training will not be allowed to enter area.

## **7.0 MEDICAL SURVEILLANCE**

A Physician's Statement of ability and fitness to perform work and wear a respirator shall be made available for those employees entering the EZ or CRZ .

### **7.1 MEDICAL ASSESSMENT**

Employees entering the EZ or CRZ shall have a complete physical examination. Such examination shall be performed prior to the individual starting work, and shall be repeated at twelve month intervals. The examination shall include the following elements:

1. An Occupational Work History Evaluation shall be completed by each employee and provided to the examining physician.
2. Medical History Evaluation
3. Complete Physical Examination
4. Testing Requirements
  - . Chest X-ray(PA)
  - . Electrocardiogram (12 Lead)
  - . Pulmonary Function (containing at least forced vital capacity and forced expiratory volume and indicating the individual is capable of wearing half mask or full face air-purifying respiratory protection)
  - . Hematology (standard battery)
  - . Vision : near and distant visual acuities (with or without glasses), color blindness
  - . Hearing
  - . Urinalysis
5. Special Toxic Material Tests as directed by physician and from Occupational Work History Evaluation
6. Additional Tests as required by the Examining Physician

### **7.2 RESPIRATOR FIT TEST AND TRAINING**

Upon presentation of the physician's statement of medical fitness for respirator use, each employee who is capable of wearing respirators will be quantitatively

fit tested and trained for each type of respirator to be worn. Employees with facial hair that interferes with the respirator seal shall neither be fit tested nor allowed to enter areas where respiratory protection is required. Respirators of the type needed will be supplied by LMER and maintained on-site by MK-F. Respiratory fit test records for direct hire employees are maintained in the MK-F dispensary at Y-12 (Bldg. 9626) and on-site employees requiring respirators will have current respirator certification cards.

### **7.3 BIOASSAY EVALUATION**

Each employee that will be entering a radiologically controlled area shall be on the bioassay program, designated per the RWP, which may include an annual whole body count and quarterly urinalysis. Known or suspected exposures that occur during the project will require additional bioassay evaluation as necessary.

## **8.0 PERSONNEL PROTECTIVE EQUIPMENT (PPE)**

### **8.1 PPE DESIGNATION**

The SSHO with assistance from HP shall determine PPE requirements. The HP shall prescribe that clothing on the Radiation Work Permit (RWP) based on the contamination level in the work area, the anticipated work activity, worker health considerations, and regard for non-radiological hazards that may be present. At a minimum, Level D PPE shall be worn in the exclusion zone when performing work activities. Table 1 provides general guidelines for selection of PPE. As referenced in this table, a full (single) set and double set of protective clothing (PC's) typically includes:

#### **Full (Single) Set of PC's**

1. Coveralls
2. Cotton glove liners
3. Rubber gloves
4. Shoe covers
5. Rubber overshoes
6. Tape all seams
7. Hard Hat
8. Hood
9. Safety Glasses w/side shields

#### **Double Set of PC's**

1. Two pairs of coveralls
2. Cotton glove liners
3. Two pairs of rubber gloves
4. Two pairs of shoe covers
5. Rubber overshoes
6. Tape all seams
7. Hard Hat
8. Hood
9. Safety Glasses w/side shields

**Table 1 Guidelines for Selecting Protective Clothing**

<b>WORK ACTIVITY</b>	<b>REMOVABLE CONTAMINATION LEVELS</b>		
	<b>LOW (1x to 10 x Table 4 values)</b>	<b>MODERATE (10x to 100x Table 4 values)</b>	<b>HIGH (&gt; 100x Table 4 values)</b>
Routine	Full set of PCS	Full set of PCS	Full set of PCS, double gloves, double shoecovers
Heavy Work	Full set of PCS, work gloves	Double set of PCS, work gloves	Double set of PCS, work gloves
Work with liquids	Full set of nonpermeable PCS	Double set of PCS (outer set nonpermeable), rubber boots	Double set of PCS and nonpermeable outer clothing, rubber boots

**NOTE:** For hands-off tours or inspections in areas with removable contamination at levels 1x to 10x the values in Table 4, lab coats, shoecovers and gloves may be used instead of full PC's.

**8.2 SITE SPECIFIC PPE LEVEL**

The SSHO with assistance from the HP Technician shall determine PPE requirements.

The need for respiratory protection will be based upon air samples taken for chemical contamination, radioactive nuclides, existing contamination and job requirements. The soil will be kept wet to control the potential for airborne contamination. The respiratory protection requirement will be eliminated as soon as air samples indicate it is allowable.

For operations requiring respiratory protection, all personnel who have received fit testing and training will ensure a proper fit by conducting a positive/negative fit check.

All on-site personnel shall wear hearing protection in areas where noise levels exceed or are suspected to exceed 85 dBa. Initial and periodic monitoring will be performed by the SSHO in areas with a potential for high noise levels.

Changes to the PPE level will be documented on the RWP and in the SSHO's daily log.

### **8.3 REMOVAL OF PROTECTIVE CLOTHING**

Sequence for removal of PC's is very important to ensure that the skin and/or personal clothing is not inadvertently contaminated. The following guidelines shall be used for the removal of PC's in the CRZ.

#### **8.3.1 Removal of Single Set of PC's**

Before stepping out of the Contamination Area to the step-off pad, the worker should:

1. Remove exposed tape
2. Remove rubber overshoes
3. Remove gloves
4. Remove hood from front to rear
5. Remove coveralls, inside out, touching inside only
6. Take down barrier closure, as applicable.
7. Remove tape or fastener from inner shoe cover
8. Remove each shoe cover, placing shoe onto clean step-off pad
9. Remove cloth glove liner.
10. Replace barrier closure, as applicable.
11. Commence whole body frisk.
12. Monitor badge and dosimeter.

#### **8.3.2 Removal of Double Set of PC's**

Before stepping out of the High Contamination or Airborne Radioactivity Area to the inner step-off pad, the worker should:

1. Remove exposed tape
2. Remove rubber overshoes
3. Remove gloves
4. Remove hood from front to rear
5. Remove outer coveralls, inside out, touching inside only
6. Remove respiratory protection, as applicable.
7. Remove tape from inner coverall and sleeves
8. Remove each shoe cover, stepping on inner step-off pad as each is removed.

Before stepping to the outer step-off pad, the worker should:

9. Remove inner rubber gloves
10. Remove inner coveralls, inside out, touching inside only
11. Take down barrier closure, as applicable.
12. Remove tape or fastener from inner shoe cover
13. Remove each inner shoe cover, placing shoe on clean outer step-off pad
14. Remove cotton glove liners
15. Replace barrier closure, as applicable.

16. Commence whole body frisk
17. Monitor badge and dosimeter.

Proper donning and doffing of PC's is taught in MK-F Radworker Training and shall be reaffirmed by the SSHO and HP covering the project.

## **9.0 SITE MONITORING**

### **9.1 RADIATION MONITORING**

Radiation and contamination surveys and air monitoring will be performed by HP personnel prior to starting operations and continuously during project activities. General area air monitoring will be performed throughout the project by Health Physics if deemed necessary according to actual site conditions. Air concentrations for radionuclides in air as determined by HP personnel, will be in accordance with 10 CFR 865. The instruments that may be used are friskers; Ludlum Model 2, Ludlum Model 3 or Bicron Surveyor M and dose meters; Ludlum RO2 or Bicron RSO5 or equivalent.

### **9.2 DOSIMETRY**

Thermoluminescent dosimeters (TLD's) will be worn by all employees in the chest area (below the neck and above the waist), or as placed by HP for dose control to track whole body and extremity exposures. Pocket dosimetry may be used as a guide for controlling external exposure while entering the EZ.

### **9.3 INDUSTRIAL HYGIENE MONITORING**

Site characterization does not indicate the potential for chemical contamination. If conditions change, based on air sampling results, during excavation that indicate the potential for chemical contamination, work will be stopped until further investigation can be completed. If areas appear to have discoloration or have an organic odor, an organic vapor survey will be initiated by the SSHO. The "organic" survey will be taken (within one inch of the soil) by the SSHO using a Organic Vapor Analyzer or such similar equipment. Noise monitoring will be performed initially and periodically thereafter in all areas suspected to exceed 85 dBa.

### **9.4 DOCUMENTATION OF MONITORING**

Health Physics personnel shall record all monitoring results on the following applicable forms: Form 2; 3B-4.126/1 MK-F Radiological Survey Report, and Form 1; 3B-4.126/1 the Health Physics Air Sampling Data Sheet. Current forms will be kept on-site in the project working file. The SSHO will document organic surveys and all other IH monitoring on the ORNL Site Monitoring Data

Sheet . The confined space monitoring will be documented on the entry permit.

## **9.5 EQUIPMENT MAINTENANCE, CALIBRATION, AND OPERATION**

Air monitoring equipment will be maintained and calibrated according to the established sampling and analytical methods, the manufacturer's instructions, and recommendation by the SSHO. Real-time instrument maintenance and calibration data will be recorded on the daily log by the SSHO.

The calibration of all radiation measurement equipment will be certified as current throughout the duration of the job. This calibration will be checked with the appropriate check source at the beginning of each shift by the HP technicians, and after any unusual reading or event (i.e., after dropping the unit). A log of all calibration checks will be kept and become a part of the project working file which will be maintained on-site by the SSHO.

## **10.0 DECONTAMINATION**

All equipment leaving the work site shall be decontaminated to remove any harmful substances that may have adhered to them. Some equipment and clothing may be disposed of rather than decontaminated. Disposal will be handled according to the project waste management plan. This section gives guidelines regarding the decontamination procedures to be implemented according to the SSHO.

### **10.1 PERSONNEL DECONTAMINATION**

Prior to exiting the CRZ, employees will perform a self whole body frisk. If contamination is identified the employee shall contact HP. Attempts will be made to remove the contamination by both dry and wet methods.

### **10.2 EQUIPMENT DECONTAMINATION**

All equipment used to perform activities within the CRZ shall be dedicated to the work and shall not be removed from the exclusion zone until there is no longer a need for the equipment.

HP will check the tools and equipment for radioactive contamination prior to removal from the CRZ. Contaminated tools and equipment will be decontaminated as directed by the SSHO and HP personnel using dry and wet methods. If wet methods are used, such as steam cleaning, a diked area will be constructed to collect the wash water.

### **10.3 EMERGENCY DECONTAMINATION**

In the event of an accident, work will stop immediately, and the LSS will be

notified for emergency assistance. The affected employee(s) will be assisted through the decontamination process and treated as necessary.

## **11.0 SANITATION**

### **11.1 POTABLE WATER**

Cool drinking water shall be made available in the support zone. Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Containers used to distribute drinking water shall be clearly marked as to their contents and not used for any other purpose. Single-service cups (to be used one time) will be supplied with both a sanitary container for dispensing unused cups and a receptacle for disposing of the used cups shall be provided.

### **11.2 FOOD HANDLING**

As a minimum control measure, all personnel must wash their hands before handling food. Eating and drinking will be confined to a dedicated clean area. Suspected contamination of any of the approved areas will result in its discontinued use for food handling or storage. No food or drink will be allowed in the EZ or CRZ.

### **11.3 WASHING FACILITIES**

Washing facilities will be made available at the MK-F Field facility for washing hands and arms.

## **12.0 ILLUMINATION**

Operations will generally occur during daylight hours. Natural lighting will provide adequate illumination for activities. Portable lighting will be provided for any activities scheduled after daylight hours. Artificial lighting will be monitored to ensure it is providing a minimum of 10 foot candles in all general work areas.

## **13.0 EMERGENCY PREPAREDNESS**

The Laboratory Shift Superintendent (LSS) on duty is the designated Plant Emergency Director who has the responsibility to coordinate and respond to all emergency situations. In the event of an emergency, the SSHO will notify or will assign someone to notify the LSS of the emergency situation as soon as possible. The MK-F Occurrence Reporting Coordinator shall be notified of all emergency situations, including those which may occur during off-hours.

### 13.1 REPORTING AN EMERGENCY

- a. **Telephone**
  - . Tell the type of emergency.
  - . Tell the location of the emergency.
  - . Identify who is calling.
  - . **In case of an injury, tell if an ambulance is needed.**
  - . Listen to and follow any instructions that are given.
- b. **Radio**
  - . Notify the MK-F Radio Base operator and have them contact the ORNL LSS. Same details shall be given as in (a.) above.
- c. **Fire Alarm Pull Boxes**

Pulling a fire alarm box automatically transmits the location of the emergency to the Fire Department and the Emergency Control Center. The person pulling the alarm should remain at the alarm box and supply any needed information to the responding emergency squad.

### 13.2 ALARM SIGNALS

a. **Evacuation Alarms**

Evacuation alarms are denoted by a steady or continuous sounding from the plant public address (PA) system. The SSHO or will designate the evacuation routes. Evacuate the building or area and proceed to the designated assembly point to await further instructions.

b. **Radiation Alarms**

Radiation alarms are denoted by a steady sound from a clarion horn and rotating red beacon lights. Evacuate the building or area and proceed to the designated assembly station to await further instructions.

c. **Take Cover Alarms**

Take cover alarms are denoted by the intermittent or wailing siren sound from the plant PA system. Seek immediate protective cover in a strong sheltered part of a building. Evacuate mobile structures to a permanent building.

d. **Standard Alerting Tone**

The standard alerting tone is an alternating high-low tone from the plant PA system. Listen carefully, an emergency announcement will follow.

### 13.3 IMPORTANT REMINDERS

- Know the telephone number of the LSS: 574-6606
- Know how to summon an ambulance: Dial 911 and give the location. Wait to meet the arrival of the first aid personnel.
- Know the quickest way to summon the plant emergency squad: Pull a fire alarm box and wait for the arrival of the Emergency Response Team.
- Any off-normal ES&H occurrences should be reported to the MK-F Occurrence Coordinator (phone number below) and the ORNL-ER ES&H Management(phone number listed in Section 2.0).

### 13.4 IMPORTANT PHONE NUMBERS

ORNL Emergency Response	911
ORNL Shift Superintendent	574-6606
ORNL Emergency Communication	574-6646
MK-F ORNL Lead Construction Engineer	576-9492
MK-F ORNL Safety Coordinator	241-3617
MK-F Occurrence Coordinator	576-2146

Note: The above listed important phone numbers shall be posted, as required by the SSHO.

### 14.0 EMERGENCY PROCEDURES

The Health and Safety Plan has been established to allow site operations to be conducted without adverse impacts on worker's health and safety. In addition, supplementary response procedures have been developed to cover extraordinary conditions that might occur at the site.

#### 14.1 GENERAL

All accidents, incidents, or injuries will be immediately reported to the SSHO. Additionally, the following procedures will be implemented.

- First aid or other appropriate initial action will be administered by properly trained personnel. Assistance will be given in a manner that ensures those rendering it are not placed at an unacceptable risk.

- All incidents will be reported to the SSHO who is responsible for coordinating emergency response in an efficient, rapid, and safe manner.

- If either the SSHO or qualified designee determines that evacuation is necessary, all personnel will assemble in the support zone and be accounted for at that time.

- Radiation incidents will be reported to the SSHO.

The following emergency equipment will be available at the site:

- Industrial first-aid kits
- ABC multipurpose dry chemical fire extinguisher (10 lb. or larger)
- Eye wash or shower unit
- Spill kit

## **14.2 RESPONSE TO SPECIFIC SITUATIONS**

Emergency procedures for specific situations are given in the following paragraphs:

### **14.2.1 Fire**

Fire extinguishers (10:BC to 20:BC) will be provided at each remediation activity location. If a localized fire breaks out immediately notify the LSS. Fire extinguisher may be used if feasible. A fire blanket, non-contaminated soil, or other inert material may be placed on the burning area to extinguish flames and to minimize the potential for spreading.

MK-F personnel are not professional fire fighters and, as such, will not risk their health or safety in order to fight a fire.

### **14.2.2 Spills**

Spills will be controlled and cleaned up where and when they occur as conditions allow. This includes the following basic steps:

- Achieve containment using sorbent boom, diking material, loose or pillowed amorphous silica absorbent, or a combination of these (soil and other material may be used in an emergency but manufactured absorbent materials are preferred). "Spill Kits" will be maintained in the Support Zone.
- Pick up spilled material with appropriate absorbent.

- . Decontaminate the area (if deemed necessary by the Site Safety and Health Officer).
- . Containerize sorbent/waste material in DOT/disposal site approved container.
- . Arrange transportation, storage, and disposal with ES environmental department.
- . All spills must be reported to the SSHO immediately. If spill involves an unknown substance or if danger to safety or health exists, actions shall be limited to reporting to ORNL emergency personnel for assistance.





**Table 2 Organic Vapor Action Levels**

**ACTION LEVEL**

1 ppm above zero at soil. Perform breathing zone (BZ) survey.

1 ppm above zero in BZ Stop work in excavation area. If readings persist, call MK-Ferguson Industrial Hygiene Manager or designee to determine the best course of action.

**NOTE:**

1.Organic Vapor Monitoring will only be performed if site conditions indicate potential for chemical contamination.

2.Breathing zone samples shall be taken with the probe three to six feet from ground level for ten minutes.

**Table 3 Criteria for Posting Contamination Areas**

AREA	CRITERIA	POSTING
Contamination	Levels (dpm/100cm <sup>2</sup> ) > 1 times but ≤ 100 times Table 4 values	"CAUTION, CONTAMINATION AREA" and "RWP Required for Entry"
High Contamination	Levels (dpm/100cm <sup>2</sup> ) > 100 times Table 4 values	"CAUTION, HIGH CONTAMINATION AREA" and "RWP Required for Entry"
Fixed Contamination	No Removable Contamination and Total Contamination level > Total Contamination levels of Table 4	"CAUTION, FIXED CONTAMINATION"
Soil Contamination	Contaminated Soil not released in accordance with DOE Order 5400.5	"CAUTION, SOIL CONTAMINATION AREA"
Airborne Radioactivity Area	Airborne levels exceeds either: (1) 10% of the DAC averaged over 8 hrs. or (2) A peak concentration of 1 DAC. DAC values contained in Attachment 1 of DOE Order 5480.11	"CAUTION, AIRBORNE RADIOACTIVITY AREA", and "RWP Required for Entry"

**Table 4**  
**MK-F Administrative**  
**Surface Radioactivity Guides**

<u>Activity Type</u>	<u>Transferable Contamination Limits</u>	<u>Total Contamination Limits</u>
Alpha	20 dpm/100 cm <sup>2</sup> (*1)	300 dpm/100 cm <sup>2</sup>
Beta-Gamma	200 dpm/100 cm <sup>2</sup> (*2)	1000 dpm/100 cm <sup>2</sup>

(\*1) A smear survey must be performed and this transferable contamination limit must be strictly adhered to for the uncontrolled release of items off-site. However, for on-site surveys, when no alpha contamination is detected during direct frisking survey techniques, no smear survey is required and transferable contamination results may be logged as "NO DETECTABLE ACTIVITY". When removable alpha contamination is detected, the survey item/area shall be considered contaminated and the applicable survey results shall be logged on the appropriate survey documentation.

(\*2) A smear survey must be performed and this transferable contamination limit must be strictly adhered to for the uncontrolled release of items off-site. However, for on-site surveys, transferable Beta-Gamma contamination limits shall be set at <200 dpm/100 cm<sup>2</sup>.

**NOTES:**

1. The administrative limits specified in this attachment are control limits established by MK-F for the release of items within and from each applicable site serviced by MK-F. These contamination limits also apply to the uncontrolled release of items to the general public.
2. When releasing an item from one site to another, ensure that contamination limits meet the off-site release criteria of the destination site. If an item meets the release criteria of the originating site, but does not meet the off-site release criteria of the destination site, the item shall not be transported to the destination site.
3. For the purpose of this attachment, the category "Total Contamination Limits", means Total Fixed plus Transferable - Contamination.
4. Any item or surface area exceeding the contamination limits of this table shall be evaluated and identified for immediate decontamination and/or posting.

**COMPREHENSIVE WORK PLAN**  
**COREHOLE 8 INTERCEPTOR SYSTEM**

**WORK ORDER 40164**

**INTRODUCTION**

The storm drains which discharge into First Creek are receiving inflow of contaminated ground water from a plume located nearby. Modifications to the existing storm drain catch basins and installation of a french drain system are the planned activities for the project to intercept the contaminated inflow. The storm water runoff will continue to be discharged into First Creek and the groundwater will be routed from the french drain into an existing pump station and then transferred to a treatment system.

**METHOD OF ACCOMPLISHMENT**

The HAZWOPER portion of the work will be accomplished by MK-F direct hire forces to include a full time site safety and health officer whose duties will include health physics monitoring during excavation activities. Areas found to be contaminated will be posted accordingly by health physics. Significant changes in conditions will result in a temporary suspension of work and an evaluation of these changes and a subsequent modification to the project safety and health documents. Workers will be briefed on these changes prior to resuming work.

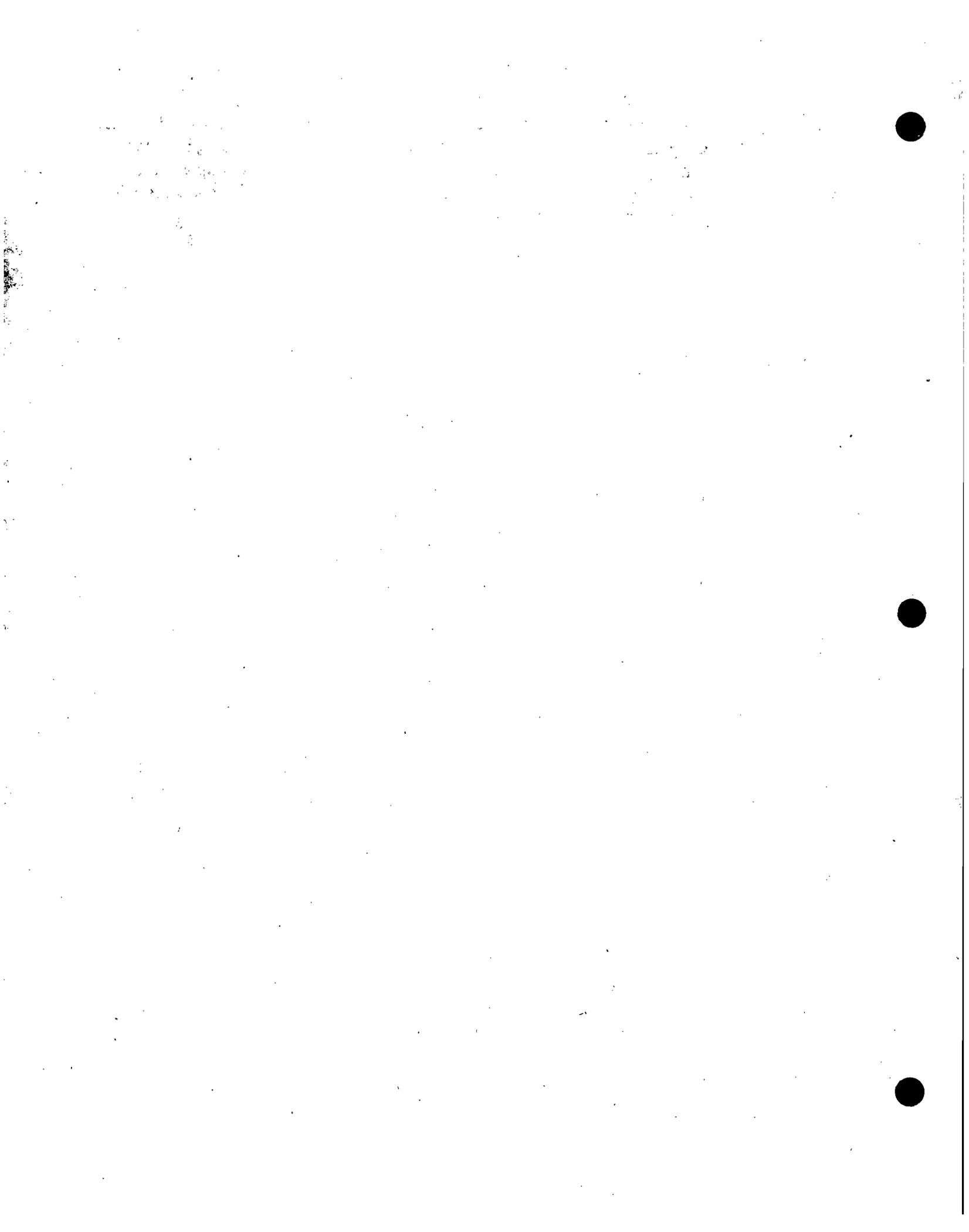
**MOBILIZATION**

All areas of construction will be posted as a construction site with appropriate flagging and postings. The primary work location is north and northwest of Building 2013. Orange fencing and HAZWOPER signage will be erected to identify the controlled areas. MK-F health physics will establish contamination control zones. The site safety and health officer will control site access, conduct pre-entry briefings and ensure compliance to all site specific documentation.

**DETAILED WORK PLAN**

The existing storm drain manhole will be entered as a confined space. Waterproofing will be applied to the interior surface to prevent migration of water into the manhole. A french drain and perforated pipe will then be installed near the existing manhole and the existing lift station just north of Building 2013 in order to divert contaminated groundwater from the manhole to the lift station. Excavation depths will be determined in the field as warranted by existing conditions. Some excavation will be by hand and some by machine, based on the location of existing underground utilities, as shown on the project Excavation/Penetration permit. Soils generated by excavation are expected to be returned to the source of origination. Classification of soils with regards to contamination level will be determined by health physics and reuse and/or disposal will occur based on these findings. In addition, work will include excavation between Manholes

**#23 and #24, located in the North Tank Farm area, near the intersection of 3rd Street and Central Avenue. Existing piping between these manholes will be modified and new piping installed underground and into Manhole #24. The piping will be anchored to the inside wall and base of Manhole #24. Monitoring for Industrial Hygeine and Radiation Contamination concerns will be conducted prior to any entry and the appropriate permits issued accordingly.**



**oml**

**OAK RIDGE  
NATIONAL  
LABORATORY**

**LOCKHEED MARTIN** 

**CONSTRUCTION SPECIFICATIONS  
FOR**

**Corehole 8 - New Interceptor System**

(Direct Hire)

**OAK RIDGE NATIONAL LABORATORY**

**MANAGED BY  
LOCKHEED MARTIN ENERGY SYSTEMS, INC.  
FOR THE UNITED STATES  
DEPARTMENT OF ENERGY**

February 5, 1998

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DIVISION 1

GENERAL REQUIREMENTS INDEX

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DATE: 2/5/98

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Lockheed Martin Energy Research, Corp.

DATE: 2/9/98



SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Work is located at the Oak Ridge National Laboratory, a Government-owned facility, managed by Lockheed Martin Energy Research Corp., for the Department of Energy (DOE), in Oak Ridge, TN.
- B. Work consists of furnishing labor, materials, tools, equipment, and services (except that specified to be furnished or performed by others) to construct the new Corehole 8 interceptor system.

1.02 SECURITY

- A. Work may be accomplished by uncleared personnel.

1.03 FACILITIES MANAGER INTERFACE

- A. The Facilities Manager will perform Title III activities to ensure work is in accordance with specified requirements.

1.04 SPECIFICATION AND DRAWINGS

- A. Specification - The specification is written in a streamlined form and directed to the Contractor, unless specifically noted otherwise.
- B. Work shall conform to Drawing C3E020154A017, Rev.0.
- C. No reference drawings are furnished for this project.

1.05 WORKING AND STORAGE AREAS

- A. Limit construction activities and storage to the areas adjacent to Building 2013.
- B. Personnel shall enter and exit the plant through Portal #6.
- C. Parking is available in the Construction Personnel lot located west of First Street and south of White Oak Avenue. Parking along roads is prohibited.

1.06 PROJECT COORDINATION

- A. Submit requests for outages a minimum of 8 calendar days in advance of need.

- B. Facilities Manager will provide the excavation/penetration permit at the pre-construction meeting.
- C. Request task specific Facilities Manager supplied permits 48 hours in advance of need.

## **PART 2 PRODUCTS**

### **2.01 PROPERTY FURNISHED BY THE CONTRACTOR**

- A. The Contractor shall provide personal protective equipment (PPE) which consists of:

1. Respirators and cartridges, as required.
2. Coveralls.
3. Gloves.
4. Shoe covers.

### **2.02 PROPERTY FURNISHED TO THE CONTRACTOR**

- A. The Seller will provide the containers for contaminated waste material.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Training

1. Ensure work specific training is provided before performing work activities.

- B. The Contractor shall perform specified tests in accordance with the following:

1. Provide labor and technical support, annually calibrated (unless more frequent calibration is specified) and properly maintained equipment, and materials required to perform testing. Equipment calibration records shall be submitted upon request.
2. Perform tests and inspections in a manner that allows observation by the Facilities Manager.
3. Submit a copy of tests performed at the project completion.

**END OF SECTION**

SECTION 01110

SAFETY AND HEALTH

PART 1 GENERAL

1.01 SUMMARY

- A. This section provides safety and health requirements for the project.

1.02 SAFETY AND HEALTH PROGRAM

- A. Before starting on-site work, provide an orientation of the Safety and Health Program contents and ensure required training has been performed for on-site personnel.

1.03 RELATED SECTIONS

- A. Section 01150, Work in Radiological Areas.
- B. Section 01155, Work on Hazardous Waste Sites.
- C. Section 01180, Respiratory Protection.

1.04 SUBMITTALS

- A. MSDS's.

1.05 HAZARDOUS WORK

A. Excavation

- 1. Excavation activities shall be performed in accordance with Section 01155.
- 2. During excavation, if either chemical or radiological contamination is encountered, the soil shall be contained and stored or disposed of as hazardous waste.

B. Confined Space

- 1. A confined space is not meant for constant human occupancy, has a restricted entry/exit, or contains a hazardous environment or unknown environment.
- 2. Work inside the manholes or lift station(s) has been identified as a confined space for this project.
- 3. Work inside Manhole #24 shall be considered a confined space.

4. Excavations greater than 4 feet deep and welding in confined space will be evaluated by the Safety & Health Evaluation Support Team (SHEST) and the CM's safety officer for risk classification.
  5. Perform confined space work in accordance with 29 CFR 1910.146.
- C. Lockout/Tagout
1. Perform lockout/tagout in accordance with the requirements of 29 CFR 1910.147.
  2. Lockout/tagout requirements apply for work on the lift station(s) or changing out pumps.
  3. A Company issued lockout/tagout permit is required before performing work on operating equipment or systems.
  4. The Company will perform the initial lockout/tagout of the system or equipment and will remove the final lock. Five-day advance notice is required.
- D. Hoisting and Rigging
1. Perform hoisting and rigging activities in accordance with 29 CFR 1910 Subpart N, 29 CFR 1926 Subparts H and N, and ANSI B 30 and B56 Series.
  2. No critical lifts have been identified by the Facilities Manager for this project.
  3. Hoisting or rigging activities using forklifts, backhoes, and trackhoes are not permitted unless the manufacturer's documentation specifies the equipment is designed for that purpose and lifting limits are properly identified.
- E. Fall Protection
1. Train employees in accordance with the CM's 100% fall protection program (provided as part of General Employee Training).
  2. Employees are required to wear a Class C full-body harness and twin shock-absorbing lanyards with double-locking hook connectors, whenever the potential fall distance is 6 ft. or more.
- 1.06 OCCUPATIONAL HEALTH PROTECTION THRESHOLD EXPOSURE LIMITS.
- A. Limit exposure to chemical substances, physical agents, heat stress, and biological hazards to the permissible exposure limits of 29 CFR 1926, Subpart Z. The American Conference of Government Industrial Hygienists (ACGIH) "Threshold Limit Values and Biological Exposure Indices guidelines are to be implemented as recommended by the Industrial Hygienist. Follow the most restrictive requirements.

**1.07 HEARING PROTECTION**

- A. Document the development and implementation of a continuous effective Hearing Conservation Program in accordance with 29 CFR 1926.52.
- B. Determine the boundaries where continuous or intermittent noise is expected to exceed 85 dBA and enforce the use of hearing protection within those boundaries.

**1.08 EMERGENCY SERVICES AND EQUIPMENT**

- A. The Facilities Manager will provide emergency ambulance and fire fighting service.
- B. Provide first aid supplies and equipment in accordance with 29 CFR 1926.50.
- C. The Facilities Manager will provide fire extinguishing equipment for the project duration.

**1.09 TRAFFIC AND PEDESTRIAN CONTROL**

- A. Coordinate the blocking or partially blocking of the Building 2013 access road with the Facilities Manager before starting work in the roadway.
- B. Provide and maintain sufficient traffic control signs and barriers when closing adjacent sidewalks and roadways.
- C. Provide an adequate number of concrete barricades in front of open trenches adjacent to vehicle traffic.

**1.10 HAZARD MATERIAL COMMUNICATION**

- A. Adhere to personal protective equipment and safety and health recommendations from manufacturer's MSDSs. Use respirators where dust masks are recommended.
- B. Submit a copy of MSDS before delivery of material to the work site.

**1.11 TRANSPORT VEHICLES FOR FLAMMABLES**

- A. Flammable liquid tank trucks, refueling vehicles, and other vehicles transporting flammable liquids or gases will be inspected by the CM with assistance from the Facilities Manager's fire department and may require Facilities Manager escort while on Government property.

**1.12 VEHICLE AND EQUIPMENT CONTAMINATION SURVEYS**

- A. Vehicles and equipment are subject to security inspections and contamination monitoring when entering and exiting the Plant. Inspections will be made at access portal or at locations designated by the Facilities Manager.

1.13 EVACUATION OF THE WORK AREA

- A. Observe and participate in notices to evacuate the work area. The evacuation notices may be a drill or actual event.
- B. Perform evacuation in accordance with the approved Health and Safety Program.
- C. Before evacuating the work area, shut down or make safe equipment or processes which could become a safety or fire hazard if left unattended.

1.14 EQUIPMENT AND TOOLS

- D. Inspect, maintain, and ensure that equipment and tools used are safe, environmentally acceptable, and adequate for the purpose intended. Defective or otherwise unsafe equipment shall be tagged "Do Not Use" and immediately removed from the work site to a secure place to prevent inadvertent use. Reinspect repaired items before reentering the site.
- E. Utilize equipment only for the purpose for which it was designed. Modifications, extensions, replacement parts, or repairs of equipment shall maintain at least the same factor of safety as the original equipment. Modifications shall be authorized in writing by the manufacturer.
- F. Inspect equipment containing liquid systems (including, but not limited to, bulldozers, backhoes, bobcats, drill rigs, trucks, hoists, and cranes) daily to ensure leak free liquid containing systems; hoses, tubing, and hydraulic lines are in good operating condition; and plugs, stoppers, and valves are properly sealed for leak free operation. Systems not maintained leak free shall minimize leakage by using a secondary containment. Clean up spillage to prevent release to the environment.
- G. Provide a spill kit for equipment on-site.

1.15 CONCRETE

- A. Activities that generate concrete silica dust will require appropriate engineering controls (wet methods) or PPE to prevent employee exposure to silica above that recommended by ACGIH. Wet methods are recommended to reduce the amount of dust generated.

1.16 STORM DRAINS

- A. Protect storm drains from erosion materials. Install and maintain straw bales around storm drains during excavation work.
- B. Cover excavated material with plastic during inclement weather to prevent excessive silt run-off.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**



SECTION 01120

SAFETY REQUIREMENTS FOR WELDING, CUTTING, BURNING,  
AND INCIDENTAL WELDING

PART 1 GENERAL

1.01 SUMMARY

- A. This section provides on-site safety requirements for incidental welding, cutting, and hotwork.

1.02 DEFINITIONS

- A. **Hotwork and Welding Permit:** A permit issued by the Facilities Manager, before start of welding activities, used to ensure the Work area is inspected and safety requirements are considered.
- B. **Incidental Welding:** Welding required to perform work without technical requirements. Examples are welds on gang boxes, tool fixtures, weather caps for non-welded ductwork systems, and electrical system racks which are not identified as seismically qualified. Tack welds, temporary attachments to systems, structures, and components are not incidental welds.
1. **On-Site:** Incidental welding activities within the DOE facilities managed by the Facilities Manager.
  2. **Off-Site:** Incidental welding activities which occur outside boundaries of DOE facilities operated by the Facilities Manager.

1.03 RELATED SECTIONS

- A. Section 18100, General Welding Requirements.

1.04 REFERENCES

- A. NFPA Standard 51B-1989, Fire Prevention in Use of Cutting and Welding Processes.
- B. OSHA 29 CFR 1926, Subpart J, Welding, Cutting, and Brazing.
- C. ANSI Z 49.1, Safety in Welding and Cutting.

PART 2 PRODUCTS

Not used.

**PART 3 EXECUTION**

**3.01 ON-SITE INCIDENTAL WELDING**

- A. Before welding, burning, or cutting on-site, request and receive an approved Hotwork/Welding Permit. This permit is valid only for the duration and location noted. Attach the permit to welding equipment.
- B. Perform welding, burning, and hotwork in accordance with 29 CFR 1926, Subpart J, and ANSI Z 49.1.
- C. Visual inspection of incidental welds is sufficient.
- D. Division 18, Welding, applies for welding which is not incidental.

**3.02 PROTECTION**

- A. Provide continuous fire watch during on-site cutting, welding, burning, and hot-work operations. Maintain fire watch during work breaks, lunch breaks, and 30 minutes after completion of work or after quitting time. Fire watch personnel shall not perform other tasks during the fire watch period.
- B. The CM will train fire watch personnel in accordance with NFPA Standard 51B.
- C. Fire retardent clothing (all layers) shall be worn for all welding and burning activities.

**END OF SECTION**

SECTION 01150

WORK IN RADIOLOGICALLY CONTAMINATED AREAS

PART 1 GENERAL

1.01 SUMMARY

- A. This section provides requirements for construction work in areas containing radioactive contamination.
- B. Description
  - 1. The work area soil has the potential to be radiologically contaminated. Portions of the soil may be category 3 type as defined by ORNL.
  - 2. The Construction Manager will provide Health Physics (HP) personnel to support this project.
  - 3. The Construction Manager's Health Physics (HP) Department will issue a Radiation Work Permit (RWP).
  - 4. Perform work in accordance with 10 CFR 835 and additional job specific requirements stated herein.
  - 5. The Contractor shall submit a written As Low As is Reasonably Achievable (ALARA) Plan to the Company for approval as soon as high contamination levels or high dose rates are encountered.

1.02 DEFINITIONS

- A. The following definitions are in addition to those provided in 10 CFR 835.2.
  - 1. Radiation Work Permit (RWP): A permit, used to maintain the radiological exposure of personnel as low as reasonably achievable through control of work at the job site when significant radiation exposure potential exists. It specifies the controls required for work based on current site conditions.
  - 2. Radiological Buffer Area: An intermediate area established to prevent the spread of radioactive contamination and to protect personnel from radiation exposure.
  - 3. Surface Contamination: Unwanted radioactive material which is deposited on the surfaces of structures, areas, objects, or personnel.

4. Radiological Soil Classification

- a. **Category 1 Soil:** This soil has unrestricted use on the Oak Ridge Reservation. Direct measurements taken at the surface of the soil are less than 100 dpm/100 cm<sup>2</sup> alpha and less than 1,000 dpm/100 cm<sup>2</sup> beta/gamma. Smear counts from equipment that contacted the soil are less than 20 dpm/100 cm<sup>2</sup> alpha and less than 200 dpm/100 cm<sup>2</sup> beta/gamma. If there is historical evidence of alpha or low-energy beta contamination, the soil should be analyzed in the laboratory.

If the laboratory analyses indicate alpha activity greater than 0.33 Bq/g or beta/gamma activity greater than 1.8 Bq/g, they may not be used in an unrestricted manner but must be considered "contaminated" soil.

- b. **Category 2 Soil:** Soil in this category may be used for limited backfilling. Measurements at the surface of this soil are equal to or greater than 100 and less than 6,000 dpm/100 cm<sup>2</sup> alpha and equal to or greater than 1,000 dpm/100 cm<sup>2</sup> and less than 5.0 mrad/h beta/gamma. If laboratory analyses have been conducted, soil having alpha activities less than 0.75 Bq/g and beta-gamma activities less than 450 Bq/g may be used for limited backfilling.

Soil in this category may be used for backfill at the site of origin or in a contaminated zone of similar radiation levels, provided that the area to be backfilled is not intended for continuous human occupation. In each location where Category 2 soil is used as backfill, at least 1 ft of clean uncontaminated soil must be placed over the contaminated backfill; and the site must be identified as a maintained area and marked on maps that are kept updated. In no case should contaminated soil be used as backfill in uncontaminated areas.

Soil not needed for backfill shall be considered as radwaste (Category 3) and sent, after proper packaging, to the designated solid waste storage area.

- c. **Category 3 Soil:** Soil in this category may not be used for backfill but will be considered as radwaste. Surface readings are equal to or greater than 6,000 dpm/100 cm<sup>2</sup> alpha and equal to or greater than 5.0 mrad/h beta/gamma. If soil has been analyzed in the laboratory, activities equal to or greater than 0.75 Bq/g alpha and equal to or greater than 450 Bq/g beta/gamma indicates the soil qualifies as radwaste.

1.03 RELATED WORK

- A. Section 01155, Work in Hazardous Waste Sites  
B. Section 01180, Respiratory Protection.

1.04 REFERENCES

- A. American Standard for Testing and Materials (ASTM) D-2986-91, Standard Practice for Evaluation of Air Assay Media by the Monodisperse DOP (Dioctyl Phthalate) Smoke Test.
- B. Standard 10 CFR 835, Occupational Radiation Protection.
- C. Standard 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response.

1.05 SUBMITTALS

- A. Trained Personnel: List of training received by personnel. Provide employee's full name, job title, title of course(s), training date, and training organization. Include a copy of the training certification(s).

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Remove packaging to the maximum extent possible prior to transporting equipment and material into radiological areas.
- B. Waste Disposal: Dispose of radiologically contaminated waste in B-25 metal storage boxes (approximately 4 ft X 6 ft X 4 ft).
- C. Tools and Equipment: Tools and equipment, including power equipment and temporary scaffolding, shall remain within the radiological area until checked for contamination and tagged for removal. Contaminated items shall be decontaminated by the Contractor.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Contractor Furnished Equipment:
  - 1. Coveralls, gloves, shoe covers, and other protective clothing needed to work in radiological areas.
  - 2. Respirators and cartridges.
  - 3. Radiation dosimeters.
  - 4. Personnel monitoring station and equipment necessary to perform required monitoring.

### PART 3 EXECUTION

#### 3.01 PREPARATION

##### A. Radiation Worker Training

1. Personnel shall complete a 16-hour Radiation Worker II Training Program and pass a written examination. After completion of the examination, a 2-hour monitoring and 2-hour dress-out orientation is required. Oral examinations are not permitted. Retraining is required every 2 years.
2. Training will be provided by the CM. Submit a written request for training at least 7 days in advance.

##### B. Hazardous Waste Site Training

1. Personnel involve in the excavation of material shall complete the Hazardous Waste Operations and Emergency Response Training as specified in 29 CFR 1910.120, para. (e).

##### C. Radiation Monitoring

1. Before starting on-site work, bioassay (urine analysis) and in-vivo (body) monitoring is required. Schedule medical monitoring at least 14 days in advance. Monitoring will require 4 hours per employee.
2. The Contractor will be issued radiation dosimeter identification badges before the start of on-site work. Wear dosimeter badges at all times while on-site.

##### D. Radiation Work Permit

1. The Contractor shall provide a RWP before starting the scheduled work activity. The RWP shall be posted before access is permitted to the radiological area.

##### E. Equipment Testing

1. Equipment having a HEPA filter shall be tested before being used on-site. HEPA filter replacement requires retesting of the equipment. The Facilities Manager will perform the test in accordance to ASTM D-2986. Notify the CM at least 24 hours in advance of the needed test.

#### 3.02 APPLICATION

##### A. The Facilities Manager will provide the following services:

1. Laundry service for protective clothing and cleaning service for respirators.

2. Bioassay and in-vivo monitoring. This service is required of employees before starting work, periodically during construction, and on completion of the last day. Each monitoring activity requires 4 hours.
  3. Permits for removal of waste, contractor's tools, and equipment.
  4. Metal storage boxes for disposal of contaminated waste.
  5. HEPA filter in-place testing.
  6. 55-gal drums, if required.
- B. The CM will provide the following services:
1. Health Physics technician
  2. Health Physics monitoring
  3. RWP.
  4. Personnel exposure records.
  5. PPE.
  6. Spill Kit.
- C. Radiological Control Work Requirements
1. Review potential radiological hazards with all personnel working in the radiological area.
  2. Maintain a log of personnel entering the radiological area.
  3. No eating, drinking, use of tobacco, or chewing gum is allowed.
  4. Enter only to perform required work.
  5. Shoe covers are required.
  6. Personnel monitoring is required before leaving the area.
  7. C-area coveralls or lab coats and cotton gloves are required.
  8. No personal clothing except underwear and socks are permitted.
  9. Wear gloves over surgeons gloves (double gloves) for hands-on work.

10. Implement the following additional requirements using ALARA concepts when Airborne Radioactivity is possible:
    - a. Engineering controls.
    - b. Point source ventilation and/or glove bagging techniques.
    - c. Additional layers of protective clothing, including a hood.
    - d. Respiratory protection to eliminate or reduce the air-radioactivity hazard to acceptable levels.
  - D. Containment of Dust and Debris - for contaminated work areas.
    1. Always implement dust-suppression techniques. Dry sweeping, using compressed air for cleaning, or other dust-creating activities are prohibited.
    2. HEPA filters and respirator cartridges shall be discarded as contaminated waste.
  - E. Personnel Monitoring
    1. Each worker exiting the radiological area into a less restrictive area shall be self-monitored. Monitoring requirements will be provided during the Radiation Monitoring Training program. Follow posted instructions and utilize the equipment provided.
      - a. A whole body frisk is required (estimated time is 4 min).
      - b. A hand and foot frisk is required (estimated time is 2 min).
    2. Contamination is not expected to be found during monitoring. If contamination is found, remain at the monitoring station and notify the Construction Manager. Decontamination must be completed before the worker leaves the monitoring station.
  - F. Respiratory Protection
    1. Respiratory protection is required for activities that disturb or damage existing surfaces such as drilling, cutting, or demolition. Provide respiratory protection in accordance to Sect. 01180, Respiratory Protection.
- 3.03 PROTECTION
- A. To finish the radiation monitoring, arrange for a bioassay, in-vivo analysis, and whole body count of personnel upon completion of their work in the radiological area. Copies of personnel exposure records will be provided to the Contractor when radiation monitoring is complete for the project.

END OF SECTION

SECTION 01155

WORK ON HAZARDOUS WASTE SITES

PART 1 GENERAL

1.01 This section provides work requirements involving remediation activities on hazardous waste sites which fall under the scope of 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response (HAZWOPER).

A. Description

1. Excavation activities shall be performed in accordance to the requirements of this section.
2. Perform work in accordance with 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response (HAZWOPER) including Appendices A, B, and C and additional job-specific requirements stated herein.

1.02 DEFINITIONS

A. The following definitions are in addition to those provided in 29 CFR 1926.65.

1. Exposure: Employee exposure at or above the action levels, permissible exposure limits or published exposure levels. This applies to chemical, physical, and radiological contamination.
2. Exclusion Zone: The area where contamination does or could exist.
3. Contamination Reduction Zone: The transition area between the contaminated area and the clean area. This is the area where decontamination takes place.
4. Support Zone: The uncontaminated area where workers should not be exposed to hazardous conditions. This is the location of administrative and other support functions needed to keep the operations in the EZ and CRZ running smoothly.

1.03 RELATED WORK

A. Section 01500, Construction Facilities and Temporary Controls

1.04 REFERENCES

- A. 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response.
- B. 29 CFR 1910.1030, Bloodborne Pathogens.

1.05 SUBMITTALS

- A. Before starting work on-site, provide the following for information:
1. **Training Certificates:** Copy of a training certificate that contains the name of the Company providing the training, title of the course, date, signature of the instructor, and name of the trainee.
  2. **Trained Personnel:** List of trained personnel. Include employee's full name, job title, and social security number.
  3. **Medical Examinations:** Copy of the physician's written opinion of medical fitness for work for each employee, verification medical examination conforms to the requirements of 29 CFR 1926.65, and date of examination.
  4. **Site Safety and Health Officer (SSHO) Qualifications:** Copy of resume and qualifications of the SSHO and alternate SSHO. See Attachment 2 for qualifications.
- B. Provide the following for approval: All other submittals are for information.
1. **Site Specific Health and Safety Plan (SSHASP):** Plan as described in Attachment 1.
  2. **Comprehensive Work Plan (CWP):** Description of the tasks and objectives of the project, logistics, and resources required to meet tasks and objectives.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. **Facilities Manager-Furnished Equipment**
1. The Facilities Manager will furnish the metal B-25 boxes to the Contractor. Requests for equipment shall be through the CM a minimum of 48 hours in advance of need.
- B. **Change Facilities**
1. Change facilities will be provided by the Contractor for use.
  2. Provide change facilities meeting the requirements of 29 CFR 1926.65 and Section 01500.

## PART 3 EXECUTION

### 3.01 PREPARATION

#### A. SSHO Qualifications

1. Provide a full-time on-site SSHO that meets Level 2 requirements stated in Attachment 2.

#### B. SSHASP and CWP Requirements

1. Submit within 5 calendar days after notice to proceed a written SSHASP and CWP for approval by the Facilities Manager. Do not start on-site work until the plan is approved by the Facilities Manager.
2. Develop the SSHASP in accordance with Attachment 1.

#### C. Training Requirements

1. Provide training to personnel involve in excavation activities in accordance with 29 CFR 1926.65 and OSHA Training Requirements for Hazardous Waste Operations, DOE Office of Environment, Safety, and Health.
2. Do not participate in or supervise field activities until trained to the required level for their particular work function and responsibility.

#### D. Ensure a resume and qualifications of the SSHO and alternate SSHO are available upon request. Previous work experience on similar sites is required.

#### E. Medical Examination

1. Provide a physician's written opinion of medical fitness to perform work in accordance with hazardous waste medical surveillance program. Include if employee is physically fit to work while using a respirator.

#### F. Pre-entry Briefing

1. Conduct a preentry briefing before initiating the project and as necessary to ensure employees are aware and adhering to the safety and health plan. Address project health, safety, and environmental protection concerns (including, but not limited to, regulatory compliance) and elements of the CWP and SSHASP in the preentry briefing. Document preentry briefing in the site logbook.

2. Review the following:
  - a. Names of personnel and alternates responsible for site safety and health.
  - b. Safety, health, and other hazards present on the site; routes of exposure; signs and exposure; and potential health effects.
  - c. Type and use of PPE, as well as donning and doffing procedures.
  - d. Self monitoring methods.
  - e. Personnel decontamination procedures.
  - f. Work practices to minimize risks from the hazards.
  - g. Contents of the site safety and health plan.
  - h. Safe use of engineering controls and equipment on-site.
  - i. Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazards.
3. Keep a copy of the SSHASP and CWP at the project site at all times.
- G. Work on the HAZWOPER site cannot start until all preparation requirements are completed in accordance with Article 3.01.

### 3.02 INSTALLATION/APPLICATION/ERECTION

- A. Establish site control at hazardous waste sites by establishing an exclusion zone, CRZ, and support zone based on preliminary site evaluation and monitoring. Adjust zones if additional investigation and monitoring conducted during construction encounters hazards outside the original exclusion zone and the CRZ or perimeter monitoring indicates the need to change the location of the zones.
- B. Provide HP support for interpretation and guidance, and provide daily site visits.

END OF SECTION

## ATTACHMENT 1

### SITE-SPECIFIC SAFETY AND HEALTH PLAN

Comply with the requirements of 29 CFR 1926.65. The following items are clarification and additional requirements. The SSHASP shall contain the sections outlined below.

**A. Organizational Structure**

Outline the organizational structure and detail the identity and responsibilities of the Contractor personnel specific to the project. The organizational structure includes (a) the individual who has the responsibility and authority to direct the site operation/activity, (b) the individual (SSHO) who has the responsibility and authority to implement the SSHASP during operations/activities and verify compliance, (c) the alternate SSHO, and (d) all other individuals needed for site operations/activities. Clearly outline the line of authority, responsibility, and communication for these individuals. Include current telephone numbers.

**B. Site Characterization and Analysis**

Include information from preliminary evaluation and available site characterization/historical data supplied by the Facilities Manager to identify specific site hazards and appropriate safety and health control procedures needed to protect workers. Address methods to deal with potential safety problems (i.e., heavy equipment operations; presence of live electrical sources; and slip, trip, fall hazards). Identify site contaminants, affected media, concentrations, the potential routes of exposure, and health effects.

**C. Hazard or Risk Analysis for Site Tasks**

Provide a safety and health risk or hazard analysis for each site task identified in the work plan. The intent of the site task hazard analysis is to identify potential health and safety concerns that may be encountered by site personnel for each task, to aid in developing and implementing effective control measures for different site operations/activities, and to specify personal protective equipment that is appropriate for each site task or activity.

**D. Site Control**

Describe the site control program and include as a minimum a site map, site work zones, the use of buddy-system, site communications, and safe work practices.

**E. Worker Training for Site Tasks**

Provide a description of initial classroom and on-the-job training required for all tasks to which workers will be assigned (training in accordance with 29 CFR 1926.65 as well as Radiation Worker Training, Confined Space Training, etc., - any required training). Approved training shall be appropriate to the level of hazard anticipated for each site task and documented in the SSHASP. Also define visitor access requirements.

F. Personal Protective Equipment for Site Tasks

Provide a description of appropriate PPE used by employees for each of the site tasks and operations/activities being performed. Provide detailed instructions/procedures for PPE donning and doffing (or a map of donning/doffing stations).

G. Medical Surveillance Requirements for Site Tasks

Provide a description (and elements) of the subcontractor medical surveillance program. Include a description of the medical surveillance program elements for workers under the scope of hazardous waste worker medical surveillance program per the following criteria: (a) may be exposed to hazardous substances at or above the permissible exposure limits or wear a respirator for 30 days/year or (b) are members of a HAZMAT team. Supplemental monitoring will be required whenever there is an actual or suspect exposure to chemical contaminants in excess of applicable limits or if site personnel experience any symptoms of exposure.

H. Monitoring for Site Tasks

Provide frequency and types of air monitoring and environmental sampling techniques that will be used at the site as well as techniques to be employed, types of instrumentation, and methods of maintenance and calibration for sampling and monitoring equipment. The SSHASP shall describe the components of an air-monitoring program to address all known and suspected site contaminants. Include specific personal monitoring to meet the specific personal monitoring requirements for substances listed in 29 CFR 1926.1101 through .1148 if present or suspected on-site.

I. Decontamination Methods for Site Tasks

Provide decontamination procedures (or detailed steps/instructions) appropriate for the anticipated on-site contaminants for employees and equipment.

J. Emergency Response Plan for Site Tasks

Provide a written emergency response plan to handle anticipated emergencies for the project. The written emergency response plan must be a separate part of the written SSHASP. The emergency response plan shall address the following elements: (a) preemergency planning; (b) personnel roles, lines of authority, and communication; (c) emergency recognition and prevention; (d) identification of safe distances and places of refuge; (e) site security and control; (f) evacuation routes and procedures; (g) emergency decontamination procedures; (h) emergency medical treatment; and (i) emergency alerting and response procedures.

K. Spill Containment for Site Tasks

Include procedures for spill prevention and control that will be employed in the event of a spill/release at the project site.

L. Confined Space Entry Procedures.

**ATTACHMENT 2**

**SITE SAFETY AND HEALTH OFFICER QUALIFICATIONS**

- A. Level 1 - for sites with minimal safety and health hazards where Level D protection is required.**
1. High school education.
  2. Prior experience as SSHO at projects of similar size and nature.
  3. Ability to implement and ensure project activities comply with the SSHASP.
  4. Proficient in calibration and use of monitoring instruments.
  5. Current 40-hour and 8-hour annual refresher and 8-hour supervisor HAZWOPER training.
- B. Level 2 - for sites with moderate safety and health hazards where Level C protection (or less) is necessary.**
1. Associate degree in IH or other related field. Can substitute work experience if amount and type are appropriate to project requirements.
  2. Two-years' health and safety work experience in hazardous waste operations, including implementation of site safety and health plans.
  3. Proficient in calibration and use of monitoring instruments.
  4. Current 40-hour and 8-hour annual refresher and 8-hour supervisor HAZWOPER training.
- C. Level 3 - for sites with significant health and safety hazards which require Level B protection or higher.**
1. Four-year degree in IH or related field (chemistry, environmental health, life sciences, etc.). Can substitute work experience if amount and type are appropriate to project requirements.
  2. Two-years' field experience including hazardous waste operations.
  3. Capable of developing and implementing a site safety and health plan.
  4. Proficient in calibration and use of monitoring instruments.
  5. Current 40-hour and 8-hour annual refresher and 8-hour supervisor HAZWOPER training.
- D. Additionally, if the SSHO is designated to provide first-aid or CPR, the SSHO shall fall under the collateral duty provision, 29 CFR 1910.1030, "Bloodborne Pathogens."**



SECTION 01180

RESPIRATORY PROTECTION

PART 1 GENERAL

1.01 SUMMARY

- A. This section provides respiratory protection requirements for construction personnel.
- B. When respiratory protection is used, perform work in accordance with ANSI Z88.2-1992, "Practices for Respiratory Protection"; ANSI Z88.6-1984, "For Respiratory Protection - Respirator Use - Physical Qualification for Personnel"; and OSHA Regulations for Construction, Standard 29 CFR 1926.103, "Respiratory Protection."
- C. Limit exposure to chemical substances, physical agents, and biological hazards to the permissible exposure levels identified in Threshold Limit Values for Chemical Substances and Physical Agents, and Biological Exposure Indices, American Conference of Government Industrial Hygienists (ACGIH); and 29 CFR 1926, Subpart Z.
- D. Where feasible, administrative and engineering controls are required to be used before the option of respiratory protection is required. When engineering controls are not used, provide documentation listing reasons why they are not feasible.
- E. As a minimum, respiratory protection is required during the following work/operations:
  - 1. Mixing the Xypex material.
  - 2. Abrasive blasting.
  - 3. Work on surfaces with the potential to generate airborne lead and/or lead particulates and mercury vapors.
  - 4. Work with substances or on surfaces with the potential to generate respirable man-made fibers.
  - 5. Work on radiologically contaminated or activated surfaces with the potential to generate airborne radioactivity or entry into posted airborne radioactivity areas.
  - 6. Work that creates silica dust and man-made fibers that are known or suspected to be a health hazard.

F. Waiver for Respiratory Protection

1. Usage of respiratory protection may be waived by the CM upon receipt of a written recommendation, based on workplace assessment, by a Certified Industrial Hygienist or Professional Industrial Hygienist.

1.02 DEFINITIONS

- A. Single-use of respirator: The time period starting at entry into the hazardous work area until the respirator face-to-face piece seal is broken. Essentially one donning and doffing cycle.
- B. Certified Industrial Hygienist or Professional Industrial Hygienist: Individual recognized in the state of Tennessee in accordance with Tennessee Code Annotated, Title 4, Chap. 3, Part 14, Titles 62 and 63.
- C. Disposable Respirator: A respirator for which maintenance is not intended; has a filter element which is an inseparable part of the respirator; and that is designed to be discarded after excessive resistance, sorbent exhaustion, physical damage, or end-of-service-life renders it unsuitable for use. Examples of this type of respirator are a disposable half-face and full-face respirator or a disposable escape-only self-contained breathing apparatus.
- D. Engineering Controls: Mechanism for controlling dispersal of airborne contamination at point of origin such as wetting, vacuuming, enclosures, filters, and exhaust ventilation.
- E. Administrative Controls: Methods of controlling employee exposures to contaminants by job rotation, work assignment, or time periods away from the contaminant.

1.03 REFERENCES

- A. ANSI Z88.2, 1992, Practices for Respiratory Protection.
- B. ANSI Z88.6, 1984, For Respiratory Protection - Respirator Use - Physical Qualifications for Personnel.
- C. OSHA Regulations for Construction, Standard 29 CFR 1926.103, Respiratory Protection.
- D. ANSI/CGA G7.1, Commodity Specification for Air.
- E. Tennessee Code Annotated, Title 4, Chap. 3, Part 14, Titles 62 and 63.
- F. ACGIH, American Conference of Governmental Industrial Hygienists, 1994.
- G. National Institute of Occupational Safety and Health (NIOSH).

1.04 QUALITY ASSURANCE

A. Required Records

1. Maintain records in accordance with ANSI Z88.2, ANSI Z88.6, and 29 CFR 1926.103.
2. These records shall include, but are not limited to, the items below:
  - a. Respirator Inspection - inspection dates, findings, and remedial actions for respirators maintained for emergency or rescue use.
  - b. Training - type of training received, type of respirator equipment, manufacturer of respirator, names of persons trained, and date training occurred.
  - c. Respirator Fit Testing - type of respirator used; specific make, model, and size of respirator tested; NIOSH approval number; name of person tested; name of test operator; date of test; and results of respirator fit test (protection factor and fit factor).
  - d. Medical Approval - documented opinion by health services that a person is physiologically and psychologically able to wear respiratory protective devices while performing the job.
  - e. Program Appraisal - the findings, outcomes, and actions resulting from the annual Respiratory Protection Program evaluation.
  - f. Program Surveillance - the findings, outcomes, and actions resulting from spot checks of operations where respirators are in use.

1.05 SUBMITTALS

A. Provide the following for information:

1. Physician's medical evaluation.
2. List of trained personnel.
3. List of personnel receiving fit test.
4. Qualifications of personnel performing the fit testing.
5. Total number of personnel needing respirators.
6. Compressed breathing air quality data.
7. Written operating procedure for fit test.

8. Copy of fit-test results/cards.

B. Submit the following for approval.

1. Waiver not to use respirators.

2. Request not to use engineering controls.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Temporary storage of respirators for use shall be in accordance with 29 CFR 1926.103 (e)(6) and (h)(5)(i).

PART 2 PRODUCTS

2.01 MATERIAL

A. Provide optical corrections for appropriate respirators.

B. Disposable respirators are permitted if manufacturer's literature states a positive and negative pressure check can be performed. The Facilities Manager may perform random testing to assure respirator compliance.

C. Air purifying respirators (APR) shall not be worn in oxygen deficient or immediately dangerous to life or health (IDLH) environments.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect respirator before use to ensure that it is working properly.

B. Inspect respirators stored for emergency or rescue use monthly.

3.02 PREPARATION

A. Medical Evaluation

1. Before an employee is issued a respirator, submit a physician's written approval. This approval shall verify the employee will be able to function normally wearing a respirator and the employee's safety and health will not be impaired. The medical evaluation and physician's approval shall be in accordance with the requirements of ANSI Z88.2 and ANSI Z88.6 and shall be updated annually.

**B. Training**

1. Before an employee is issued a respirator, the employee shall complete the general training that conforms to ANSI Z88.2. Submit a list of all trained personnel. Update training annually, except where a particular substance requires more frequent training.

**C. Fit Test**

1. Before an employee is issued a respirator and within 60 days of the training and medical examination, the employee shall receive a quantitative fit test in accordance with ANSI Z88.2. Submit records of personnel receiving a fit test and the qualifications of personnel performing the fit test. Perform fit testing for initial fitting and annually afterwards except where a particular substance requires more frequent fit testing.

- D. Documentation of the medical evaluation, training, and fit test must be submitted to ORNL Respiratory Protection Program Office before respiratory equipment is issued.

**3.03 INSTALLATION/APPLICATION/ERECTION**

**A. Respirator Information**

1. Single-use of respirators is required in the following situation:
  - a. In radiological areas involving the abrading of fixed surface contamination, airborne radioactivity areas where the air concentration exceeds the derived air concentration, or in other areas where removable surface contamination has the potential to be resuspended during normal operations and no feasible method of checking for the presence of such contamination exists; and
  - b. In nonradiological areas where surface contamination of the respirator may occur and no feasible method of checking for the presence of such contamination exists.
2. Provide optical corrections in accordance with NIOSH and OSHA requirements.
3. Quarter-mask respirators and disposable dust masks are prohibited for any operations where respiratory protection is recommended.

**B. Face-piece Seal**

1. Personnel wearing a respirator shall check the respirator seal with a positive and negative pressure check before entering a harmful or potentially harmful atmosphere.

**C. General Requirements**

1. Train personnel on job-specific respirator requirements.
2. Modifications to the respirator or its parts are prohibited.
3. The Contractor's supervisor shall monitor use of the respirator to ensure they are properly worn.

**3.04 FIELD QUALITY CONTROL**

- A. The Facilities Manager may perform periodic surveillance of the Contractor's respiratory protection program to ensure compliance with this section.

**END OF SECTION**

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. This section provides requirements and information concerning temporary utilities, protection of the project area, change facilities, borrow sites, and dust control.

1.02 REFERENCES

- A. American National Standards Institute (ANSI) A225.1, 1987, Manufactured Home Installation.
- B. ANSI/NFPA 70-1993, National Electrical Code (NEC).
- C. NFPA 501A, 1992, Manufactured Home Installation, Sites, and Communities.
- D. ANSI D 6.1, "Manual on Uniform Traffic Control Devices for Streets and Highways."

PART 2 PRODUCTS

2.01 MATERIALS

- A. Barrier Fence: 48 in. high, orange plastic barrier fence, Vallen Safety Catalog No. FNC-450.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Temporary Utilities
  - 1. Provide temporary lines to use existing plant utilities. Tie-ins and disconnects to existing systems will be performed by the Facilities Manager. Provide material and equipment, in place and ready for tie-in. Remove temporary utilities after final disconnect.
  - 2. Electric power, 120 V, is available at the site. Provide GFCIs for temporary electrical lines. Perform temporary electrical work in accordance with ANSI/NFPA 70 (NEC) requirements.

3. Water is available at the site. Install reduced-pressure backflow preventers in temporary water lines.
  4. Telephone service is available through U.S. West. The Contractor is responsible for providing their own telephone service.
- B. Protection of the Work Area
1. Provide and maintain a orange plastic barrier fence around the perimeter of the site and storage areas.
  2. Post a sign providing Contractor's name, telephone number, project title, and contract number for storage areas not located within the site.
- C. Change Facilities
1. Provide a change facility that includes change areas, lockers, and storage for protective clothing.
  2. Locate the trailer a minimum of 35 feet clear of existing buildings.
  3. Provide a platform, stairs, and handrails at each exterior door. Platforms shall be level with the trailer floor. Platforms and steps shall have a non-skid surface.
  4. Anchor and support the trailer to prevent sliding and overturning according to ANSI A225.1 and NFPA 501A.
  5. Outside the trailer, provide a sign containing the company's name, name and phone number of supervisor. Provide a listing of phone numbers to reach a responsible individual at all times including off-shift and weekend hours.
  6. Provide portable fire extinguishers that are properly mounted and clearly identified.
- D. Borrow
1. Borrow is available at the West Borrow Area, located south of Bear Creek Road approximately 4 miles west of the Y-12 Plant.
- E. Dust Control
1. Control dust emissions during work. Prevent dust from migrating to areas adjacent to the site. Limit use of water to prevent erosion. Provide hoods, enclosures, and other methods of containment during sandblasting or similar operations.

END OF SECTION

SECTION 01550

WASTE MANAGEMENT AND ENVIRONMENTAL COMPLIANCE

PART 1 GENERAL

1.01 SUMMARY

- A. This section provides requirements for environmental compliance, handling, packaging, transportation, and disposal of project waste.

1.02 REFERENCES

- A. DOT, Hazardous Material Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements, 49 CFR 172.
- B. DOT, Shippers-General Requirements for Shipments and Packaging, 49 CFR 173.
- C. EPA, Identification and Listing of Hazardous Waste, 40 CFR 261 and TN Rule 1200-1-11-.01.
- D. EPA, Standards for the Management of Used Oils, 40 CFR 279 and TN Rule 1200-1-11-.14.

1.03 SUBMITTALS

- A. For Information: Spill Contingency Plan.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inspect sanitary waste and construction debris containers daily (excluding weekends and holidays) to ensure they contain only proper materials. Notify the Company if unauthorized waste is found.
- C. Assign an on-site individual and alternate to coordinate and supervise waste packaging and segregation activities. These individuals shall attend 2 hour training provided by the Company. One of the individuals shall be present continuously during waste generating activities and may perform other work functions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide dumpsters and containers for storage of construction waste.

- B. The Company will provide containers for storage of the following wastes:
  - 1. Dumpsters for non-contaminated scrap metal.
  - 2. Containers for contaminated waste for radiological, lead, or RCRA materials.

### PART 3 EXECUTION

#### 3.01 WASTE DISPOSAL AND HANDING REQUIREMENTS

- A. A Company provided UCN Form 2109, Request for Transfer Storage or Disposal of Wastes, shall be approved before removing waste material from the site.
  - 1. Health Physic's green tag may be required before transferring waste material to the landfill.
  - 2. Landfill personnel require the Seller to provide copies of the approved UCN Form 2109 before disposing of waste. Seller shall provide copies of the approved UCN Form 2109 to the Company. Seller shall provide to the Company copies of all transportation permits

#### 3.02 WASTE HANDLING

- A. A Health Physics green tag shall be completed before removing materials from the staging area.
- B. Deliver construction/demolition wastes to the Construction/Demolition Landfill VI between the hours of 9:00 a.m. and 2:00 p.m. daily. Additional hours may be scheduled through the Company.
- C. Segregate waste into the following categories before delivery to the landfill:
  - 1. Combustible waste: Lumber, siding, paneling, flooring, windows, doors, and miscellaneous building demolition materials.
  - 2. Non-combustible debris: Brick, concrete, masonry materials, soil, rock, gravel, road spoils, rebar (embedded in concrete), paving material, clay material, PVC material, sheetrock/gypsum board, roofing materials, siding, paneling, flooring, miscellaneous metals associated with demolition, windows, doors, and miscellaneous building demolition materials including non-friable asbestos.
  - 3. Plastic and rubber.
  - 4. Glass and glass containers (broken and crushed before delivery) to be deposited into designated container for glass. There are no special handling/packaging requirements for transport.

- D. Hazardous waste generated such as lead shall be managed in accordance with 40 CFR 261.
- E. Radioactive hazardous waste as defined in 40 CFR 261, PCB waste as defined in 40 CFR 761, and free liquid wastes will not be accepted for disposal at the Y-12 Landfill VI.
- F. Remove unused materials brought on-site by the Seller from the plant boundaries unless directed otherwise by the Company.
- G. Segregate and transport the following recyclable materials:
  - 1. Wood: Segregate into treated and untreated material. Segregate the untreated wood into painted and unpainted material. Band material together and store on pallets. Transport to a plant location designated by the Company.
  - 2. Aluminum: Store cans in clear plastic bags on-site for Company to pick-up.
  - 3. Cardboard: Keep neatly stacked and dry. Transport to a plant location designated by the Company.
  - 4. Scrap Metal: The Company will provide dumpsters to store scrap metal.
  - 5. Used Oil/Lubricants: Store and manage used oils and lubricants from Seller's equipment at the site in accordance with 40 CFR 279. Recycle collected oil and lubricates at a facility outside the plant boundaries unless otherwise directed by the Company.
- H. RCRA Waste
  - 1. Store RCRA generated waste on-site in a Company approved 90 Day Accumulation Area or a Satellite Accumulation Area (SAA).
  - 2. Handle RCRA wastes in accordance with 40 CFR 261 such as radioactive wastes, liquid waste materials, filled gas cylinders, and large containers such as metal drums and bulk metal.
- I. Liquid Waste Requirements
  - 1. Water used to sterilize or flush pipelines cannot be released to the environment due to possible high concentrations of chlorine. Place water into Company provided storage tanks until instructed to discharge the water.
  - 2. Due to possible contamination, the Company may sample water accumulated on-site due to excavation before discharge into a stream or sewer system.
  - 3. Liquid waste shall not be disposed of in the sanitary or storm systems, waterways, or drainage ditches without written approval from the Company.
  - 4. Report material spills to the Company immediately and make every effort to contain the spill if can be accomplished safely.

J. Spoil

1. Transport excavated earth not used for fill to the Y-12 landfill unless directed otherwise by the Facilities Manager. Before soil is transported to the disposal area, the Company will analyze samples. Provide a 48 hour advance notice before the schedule material transport.

K. Provide a sufficient amount of oil absorbent booms to prevent sewer contamination from oil run-off on newly paved asphalt surfaces.

L. Flushing empty concrete trucks or dumping excess concrete is prohibited. Transport excess concrete back to the batch plant. The truck chute may be washed at the site. The Company will designate the location.

M. Waste Oil, Solvents, and Sludge Packaging Requirements

1. Package oil and solvents in DOT approved 55 or 30 gal. polyethylene-lined bung top drums. Package sludges in DOT approved open top drums with polyethylene lining. Leave 5 inches of head space in each drum to allow for expansion of drum contents. Assure drums are in good condition and free of dents, rust, corrosion, and residue. Assure drums are free of any labels identifying previous contents. Appropriately label containers with regards to contents.

2. Once the drums are filled, tighten the large (2 1/4-in.-diam) bung with a bung wrench. For drums of waste oil and solvents, replace the smaller (3/4-in.-diam) bung with a vent plug.

3. After filling, wipe the exterior (sides and top) of drums clean of residue. Apply appropriate label/tag for the site to the side of each drum. If the material is being managed as a used oil it must be labeled as a "Used Oil". If the material is not being managed as a used oil a waste determination must be made and labeled appropriately.

4. Segregate oil, solvent, and sludge waste by type, origin, and contaminants.

3.03 VEHICLE AND EQUIPMENT INSPECTION

- A. Perform a daily inspection of equipment containing liquid systems, including but not limited to, bulldozers, backhoes, bobcats, drill rigs, trucks, hoists, and cranes, to ensure no leaks exist. Verify hoses, tubing, and hydraulic lines are in good operating condition.

3.04 TRANSPORTATION

- A. Provide complete containment for spoil, waste, and salvageable materials during transport.

- B. Transport waste to designated disposal facility utilizing shortest possible route. Waste can not be taken off-site without the Company's approval.

3.05 SPILL CONTINGENCY PLAN

- A. Submit a written Spill Contingency Plan, for approval, at least 10 days before and within 20 of Notice to Proceed. The plan shall address:
  - 1. Identify spill response equipment.
  - 2. Identify emergency communication equipment.
  - 3. Process of notifying the Company in the event of a spill.
  - 4. List of roles and responsibilities of staff personnel.
  - 5. Planned measures used to prevent spills.

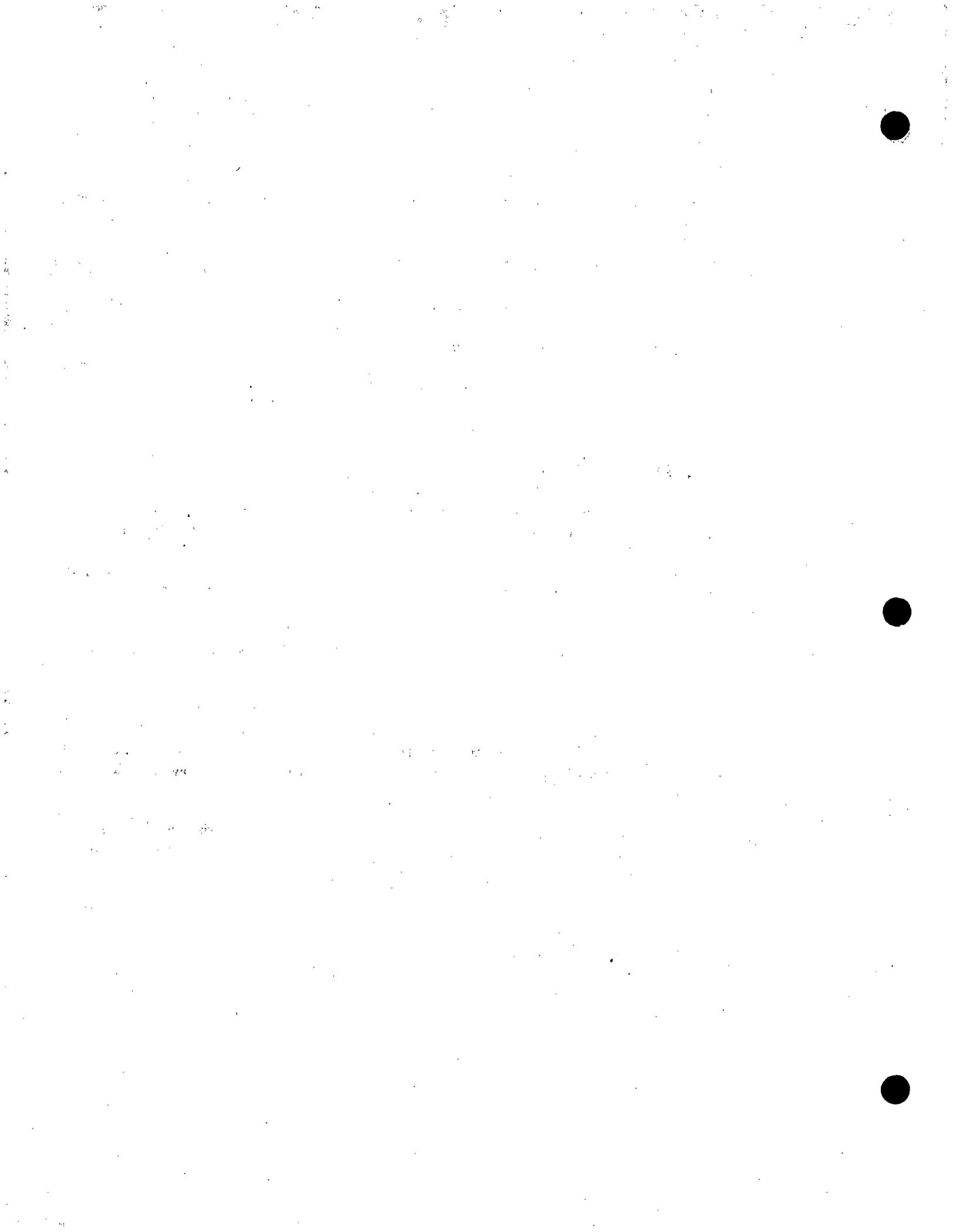
3.06 HAZARDOUS MATERIALS

- A. Label drums and containers brought to the construction site, in a noticeable location, with the drum's contents and appropriate hazard warnings. Always keep drums covered except when in active use.
- B. Unused Health Physics green tagged materials supplied by the Seller shall be removed from the plant by the Seller at the completion of the job unless directed otherwise by the Company.
- C. Health Physics green tagged excess chemicals or materials brought to the site by the Seller, shall be removed from the plant by the Seller at the completion of the job unless otherwise directed by the Company.
- D. Empty drums and containers shall be labeled "EMPTY".
- E. Petroleum products, including gasoline, kerosene, stored in quantities greater than 500 gallons shall be appropriately labeled and have secondary containment capable of preventing any release to a drainage system or the environment.
- F. The Seller shall provide and/or utilize proper storage for hazardous materials used on-site. The storage shall be limited to daily usage quantities unless prior approval is received by the Company. Equip storage areas with adequate spill control equipment.

3.07 EROSION CONTROL

- A. Implement good erosion and sediment control throughout the project.

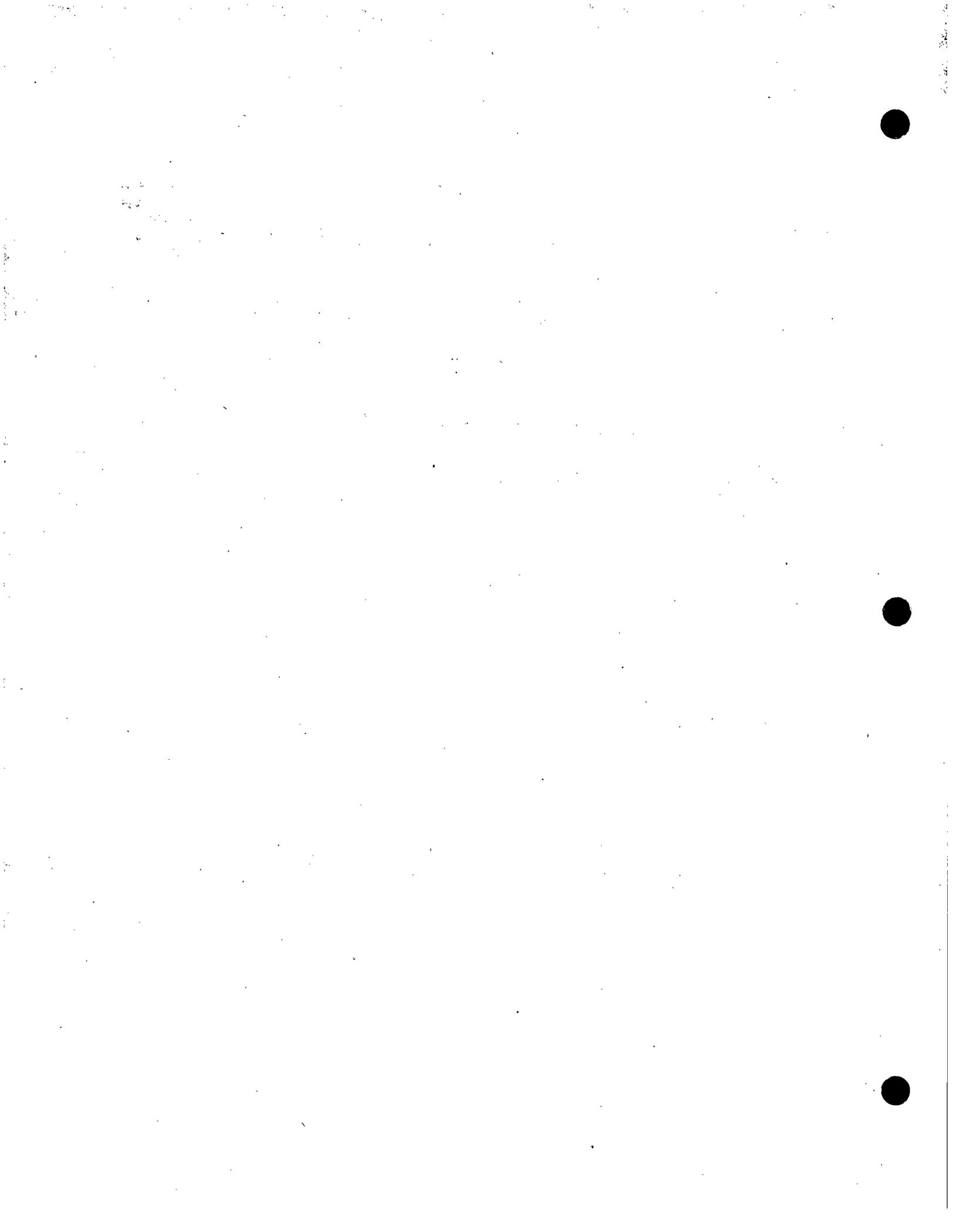
END OF SECTION



DIVISION 2  
SITE WORK INDEX

Section	Title	Revision
<del>02223</del>	<del>EXCAVATING, BACKFILLING, AND COMPACTION FOR STRUCTURES</del>	<del>0</del>
<del>02224</del>	<del>FLOWABLE FILL</del>	0
02225	TRENCHING	0
02270	SLOPE PROTECTION AND EROSION CONTROL	0
02276	GEOTEXTILE FABRIC	0
<del>02700</del>	<del>STORM DRAINS OUTSIDE BUILDINGS</del>	<del>0</del>

02936 SEEDING



## SECTION 02225

### TRENCHING

#### PART 1: GENERAL

##### 1.01 DESCRIPTION

Section includes: Removal of asphaltic concrete pavement and removal and stockpiling of topsoil, excavation of trenches for utilities, compaction of bedding under and fill over utilities to subgrade elevation, and compaction and backfill requirements.

##### 1.02 RELATED SECTIONS

- A. Section 02224, Flowable Fill.
- B. Section 02700, Storm Drains Outside Buildings.
- C. Division 1, Specific Contract Requirements.

##### 1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM), Annual Book of Standards
  - 1) ASTM D 698-91, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>).
  - 2) ASTM D 2216-92, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.
  - 3) ASTM D 2922-91, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 4) ASTM D 3017-88, Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- B. Occupational Safety and Health Administration (OSHA), Code of Federal Regulations 29 CFR 1926, Subpart P-Excavation, latest revision.
- C. Tennessee Department of Transportation (TDOT), Standard Specifications for Road and Bridge Construction, 1981 edition.

#### PART 2: PRODUCTS

##### 2.01 MATERIALS

- A. Backfill: Earth, free of clods, boulders, broken rock, or concrete exceeding 3 in. in largest dimension or organic or vegetable matter, rubbish, or other unsuitable material.

- B. Bedding materials for storm drain pipes and 2 in. dia. HDPE pipe shall be Class "B", Grading "E" mineral aggregate base in accordance with TDOT, Subsections 204.04 and 903.05.
- C. Bedding for perforated drain pipes shall be No. 4 stone in accordance with TDOT, Subsections 903.17 and 903.22.
- D. Bedding and backfill for 4" dia. HDPE pipe shall be in accordance with Section 02224, Flowable Fill and the Construction Drawings.
- E. Topsoil: Natural, friable soil representative of productive soils.
- F. Underground Warning Tape shall consist of a solid aluminum foil core, a coated imprint and a reinforced protective plastic jacket bonded to the foil core, and composed of the following minimum properties:

Width	6.0 in.
Weight	34.8 lb/thousand ft <sup>2</sup>
Thickness	9.1 mils
Color	Blue or Green

Imprinted on the tape shall be the following words in black lettering, at regular intervals no more than 12-in. apart:

**CAUTION-HDPE WASTEWATER PIPE BURIED BELOW**

Install Underground Warning Tape above all HDPE pipe installed on this project.

**PART 3: EXECUTION**

**3.01 INSPECTION**

- A. Verify that excavated materials to be used as fill are acceptable. Do not use frozen material.
- B. Verify areas to be backfilled are free of debris, snow, ice, or water and that surfaces are not frozen.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stockpile excavated materials in areas designated on-site, and remove excess materials not being used from site. For temporary stockpiling of radiologically contaminated soil, see Division 1.
- C. Grade excavation top perimeter to prevent surface water run-off into excavation. Keep trench bottom free of standing water. Provide side drainage ditches along the trench bottom or dewatering pumps as required. Direct discharge of water collected in trench to surface drainage channels such as grass, wooded, or vegetated areas or through straw bales, with approval of the Construction Manager.
- D. Notify Construction Manager of unexpected subsurface conditions, and discontinue work in affected area until notification to resume work.

### 3.03 INSTALLATION/APPLICATION/ERECTION

#### A. Excavation

- 1) Excavate trenches to a width necessary for proper installation of pipe or other utility to be accommodated. Clearance between pipe and trench walls shall be as indicated on the construction drawings.
- 2) Grade bottom of trench to provide uniform bearing and support for utility either on undisturbed soil or properly compacted backfill throughout the length of the utility except where necessary to hand excavate for bell and spigot or coupling for proper sealing of pipe joints.
- 3) Remove soft, spongy, or otherwise unstable materials encountered at elevation of pipe which will not provide a firm foundation for the pipe. Backfill with compacted earth or mineral aggregate base.
- 4) Backfill unauthorized excavation with compacted earth, or crushed stone.

#### B. Bedding/Backfill

- 1) Promptly backfill utility trenches and around utility structures after as-built survey data has been obtained and required tests on utilities have been approved by Construction Manager.
- 2) Deposit bedding material in uncompacted 6-in. lifts, and carefully ram or tamp until utility has a cover of not less than 6 in. The remainder of the backfill shall be placed in horizontal lifts 6 in. in depth (uncompacted) and compacted by hand-manuevered power compaction tools to the required density.
- 3) For pavement underdrain pipes, the installation of the geotextile fabric, and placement of bedding and backfill materials, shall be conducted in accordance with TDOT Subsection 710.07.

~~4) Compact mineral aggregate base course and soil backfill under roads and paved areas to a minimum of 95% of maximum dry density at not less than 3% below nor more than 3% above the optimum moisture content as determined by ASTM D 698.~~

- 5) Compact aggregate and soil backfill under yards and grounds to a minimum of 90% of maximum dry density at not less than 3% below nor more than 3% above the optimum moisture content as determined by ASTM D 698.
- 6) Remove temporary blocking or cribbing material used to support utility before backfilling. Where applicable, coordinate backfilling requirements with the requirements of Section 02224, Flowable Fill.

#### C. General

- 1) Employ a placement method that does not disturb or damage utility or trench.
- 2) In areas where topsoiling is required, stop fill or backfill the required distance below finish grade to permit installation of topsoil. See drawings for details of grass restoration.
- 3) In areas where paving is required, temporarily backfill flush with adjacent surfaces and maintain throughout project until pavement is restored. See drawings for details of pavement restoration.

- 4) Support pipe during placement and compaction of bedding fill. Where pipe is to be encased in flowable fill, ensure that the pipe does not float or shift during and after placement of the flowable fill.
- 5) Coordinate the requirements of this section with Section 02700, Storm Drains Outside Buildings.

### 3.04 FIELD QUALITY CONTROL

#### A. Testing

- 1) Compaction of fill and backfill to the specified moisture-density relationship of soils shall be verified by in-place density tests using ASTM D 2922 or other ASTM in-place density tests approved by the Construction Manager. Maximum density determination and in-place density tests shall be performed by a certified independent testing laboratory employed by the Construction Manager.
- 2) Testing for moisture content of soils and aggregate shall be in accordance with ASTM D 2216 or D 3017. Testing will be performed by a certified independent testing laboratory employed by the Construction Manager.
- 3) A minimum of one in-place density test shall be conducted per 250 linear ft of bedding. Layer to be tested shall be selected randomly by the soils technician or as directed by the Construction Manager.
- 4) Proctor tests shall be completed for each type of soil to be used for fill. A sample shall be obtained each time a change in appearance of the material is noted.

- B. Top of subgrade shall be a uniformly smooth grade surface without high or low points and shall not be more than 0.10 ft above or below specified grades. Bind thin layers of added materials to material in place by scarifying and recompacting.

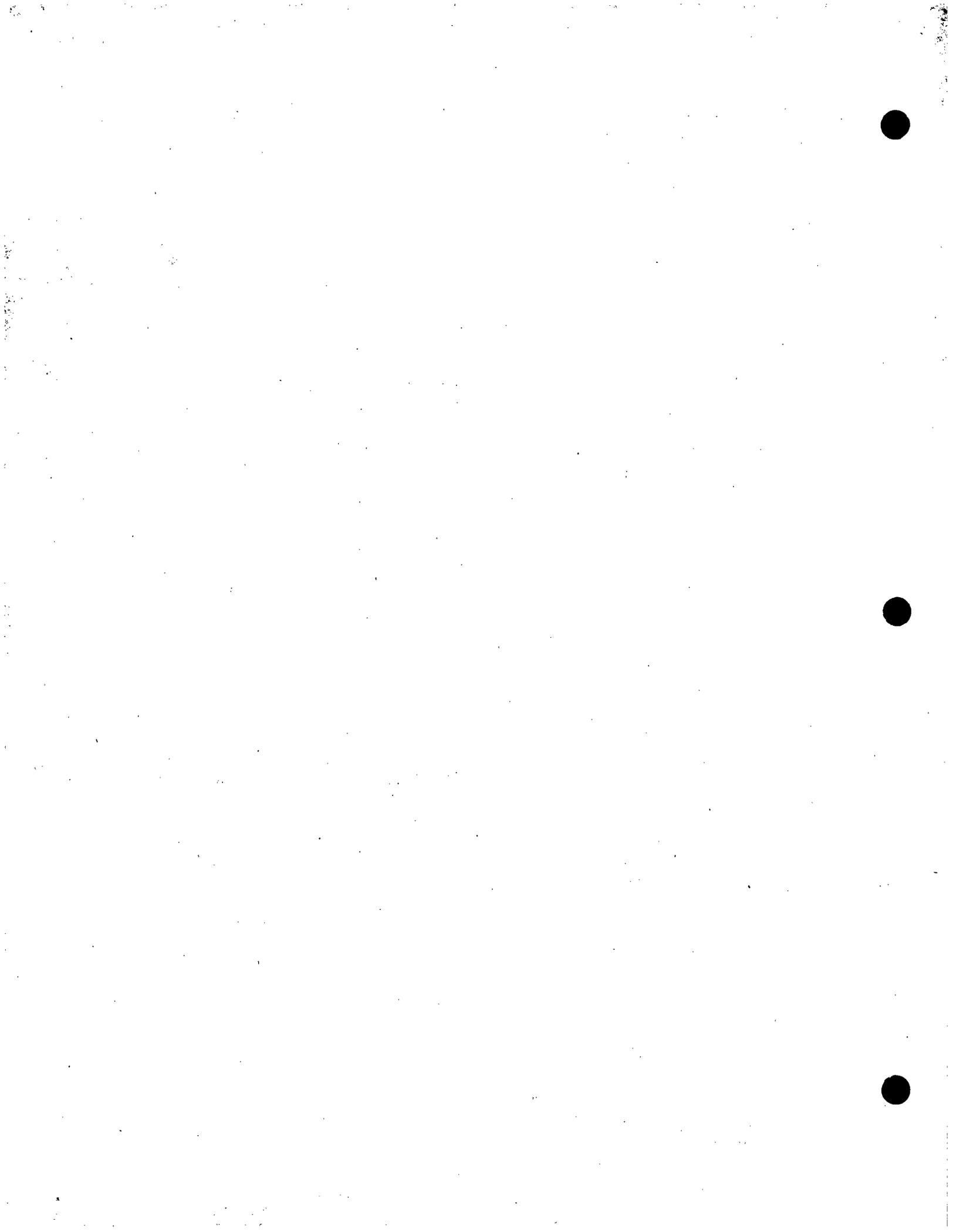
### 3.05 PROTECTION

Protect excavation by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in of loose soil into excavation. Protection shall be in accordance with OSHA 29 CFR 1926, Subpart P-Excavations, latest revision.

- A. Trenches more than 5 ft in depth shall be shored, laid back to a stable slope, or provided with some other equivalent means of protection.
- B. Refer to OSHA 29 CFR 1926, Subpart P-Excavations, Appendices A and B, as a guide to minimum requirements for slopes that are laid back.
- C. Refer to OSHA 29 CFR 1926, Subpart P-Excavations, Appendices C-E, as a guide to minimum requirements for shoring or bracing.
- D. Trenches less than 5 ft in depth shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected.

- E. Employees required to be in trenches 4 ft deep or more shall have an adequate means of exit, so as to require no more than 25 ft of lateral travel.

END OF SECTION



## SECTION 02270

### SLOPE PROTECTION AND EROSION CONTROL

#### PART 1: GENERAL

##### 1.01 DESCRIPTION

Section includes: Temporary control measures for slope protection and controls to reduce erosion, sedimentation, and water pollution through the use of erosion control devices.

##### 1.02 RELATED SECTIONS

Not used.

##### 1.03 REFERENCES

Tennessee Department of Transportation (TDOT), Standard Specifications for Road and Bridge Construction, 1981 edition.

##### 1.04 SUBMITTALS

Submit manufacturer's data for information.

##### 1.05 PROJECT/SITE CONDITIONS

Coordinate temporary pollution control provisions with permanent erosion control features to assure economical, effective, and continuous erosion control throughout construction and postconstruction periods.

#### PART 2: PRODUCTS

##### 2.01 MATERIALS

###### A. Silt Fences

- 1) Geotextile Filter Cloth: Pervious sheets of strong rot-proof plastic fabric meeting the requirements of TDOT, Subsection 918.27.
- 2) Wire Fence: Minimum 36 in. height, minimum 14 gage steel wire, and maximum mesh spacing of 6 in. Use wire fence reinforcement with all filter fabrics except those approved for use without a wire fence reinforcement.
- 3) Posts: Wood or steel and a minimum 5 ft long. Wood posts shall be at least 2 in. x 2 in. of oak or similar hardwood. Steel posts shall be round, "U," "T," or "C" shaped with a minimum weight of 1.33 lb/ft and having projections for fastening wire to fence.
- 4) Wire Staples: 9 gage and minimum 1 in. long.

- B. **Mulching Material:** Dry oat or wheat straw reasonably free of noxious weed seed and other materials detrimental to plant growth. Material shall be suitable for spreading with standard mulch blowing equipment.

### **PART 3: EXECUTION**

#### **3.01 PREPARATION**

**Site Preparation:** Prepare site in accordance with good engineering practices for installation of surface erosion control features. Compact surface and remove and replace pockets of soft soil with compacted earth material to provide a consistently uniform and stable surface.

#### **3.02 INSTALLATION/APPLICATION/ERECTION**

##### **A. General**

Control surface water runoff on-site and provide temporary soil stabilization measures as required to prevent removal of soil by action of either water or wind, more commonly known as erosion. Protect land areas adjacent to work site from sedimentation by installation of erosion and sediment control measures. Provide, as a first step in construction operation, perimeter barriers, and other measures intended to deter erosion and transport of sediment associated with construction activities before upslope land disturbance takes place.

##### **B. Silt Fences**

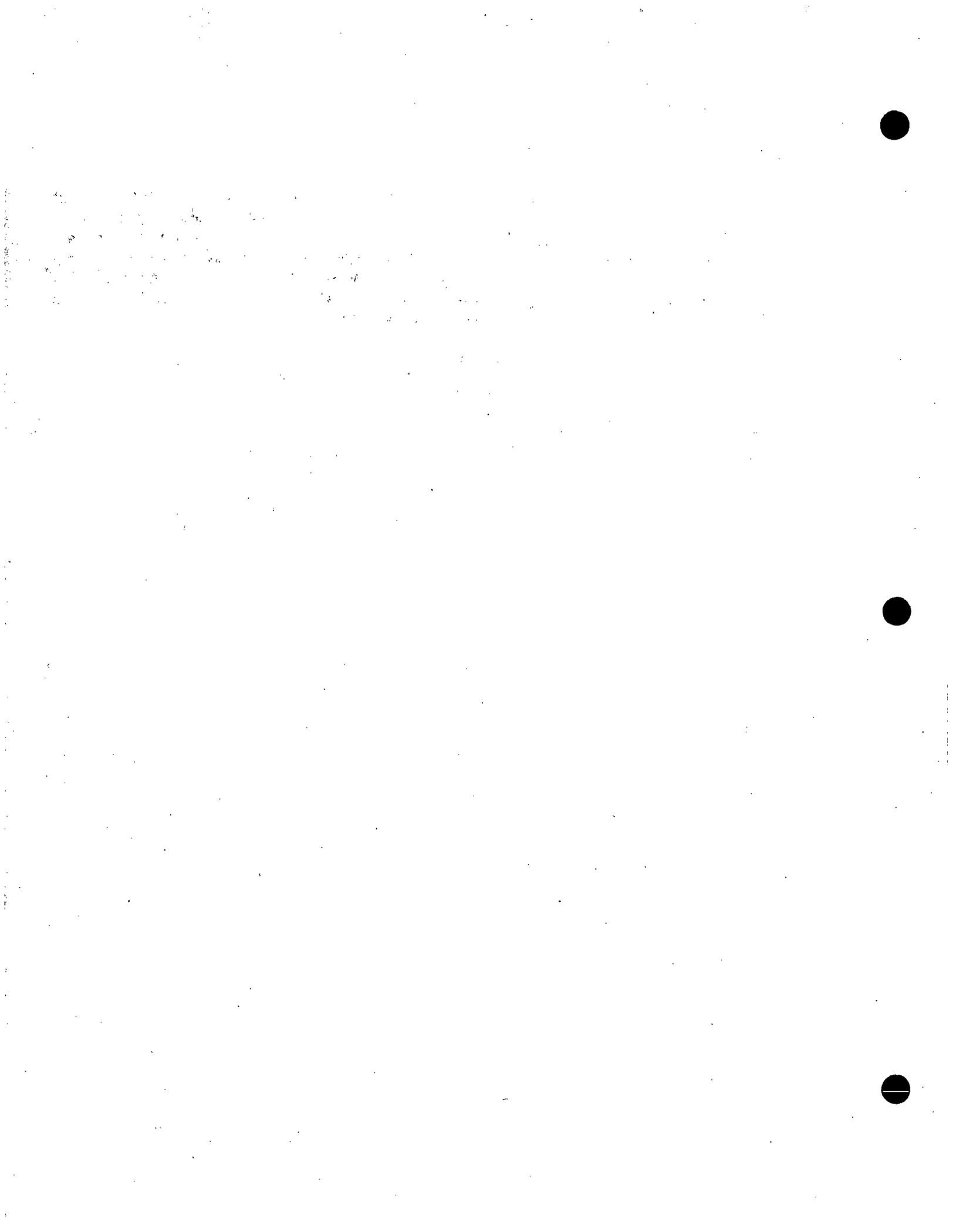
- 1) Install silt fence as indicated on plans to reduce the quantity of sediment and flow velocities to downstream areas.
- 2) Space posts at a spacing of 6 to 10 ft apart and securely install with at least 2 ft in ground. Excavate trench approximately 6 in. wide and 6 in. deep along line of posts and upslope from the barrier. Securely fasten wire reinforcement fence to upslope side of posts using wire staples, tie wires, or hog rings. Extend wire into trench a minimum of 6 in. Attach geotextile filter cloth directly to posts and wire reinforcement fence as required using wire, staples, or other means accepted to the Construction Manager. Install filter fabric in a manner such that fabric height above grade is 2 to 3 ft and that 12 to 18 in. of fabric is extended along the sides and bottom of the trench. Do not staple fabric to trees. Do not use fabric with defects, rips, holes, flaws, deterioration, or other damage. Backfill trench and compact soil over the fabric as installed.

### 3.03 MAINTENANCE

#### Silt Fences

Inspect immediately after each rainfall, at least daily during prolonged rainfall and weekly during dry periods. Provide required repairs immediately. Should fabric decompose or become ineffective and still be necessary, replace fabric promptly. Remove sediment deposits after each storm event. As a minimum, remove sediment when deposits reach approximately one-third the height of barrier. Dispose of sediment as directed by Construction Manager. Maintain fabric silt fence until final acceptance of the work by the Construction Manager, at which time all silt fence shall be removed. All areas disturbed by silt fence removal shall be seeded.

END OF SECTION



## SECTION 02276

### GEOTEXTILE FABRIC

#### PART 1: GENERAL

##### 1.01 DESCRIPTION

Section includes: Use of geotextile fabric in subsurface drainage applications such as lining trenches, and french drains in which fabric serves as a filter/separator. Fabric shall provide a permeable barrier between gravel or sand and clay soils allowing water to pass while retaining soil.

##### 1.02 RELATED WORK

Section 02223, Excavating, Backfilling, and Compaction for Structures.

##### 1.03 DEFINITION OF TERMS

- A. Polymer: Plastic materials composed of numerous cross-linked molecules.
- B. Nonwoven Fabric: Fabrics made by extruding and spraying fibers onto a moving conveyor belt to form a continuous web. Fabrics are then bonded by melt-bonding, resin-bonding, or needle punching. Nonwoven fabrics are nondirectional and have equal properties in all directions.

##### 1.04 QUALITY ASSURANCE

###### Manufacturer's Material Certification

Producer of fabric to maintain a competent laboratory at point of manufacture to ensure quality control in accordance with ASTM testing procedures. That laboratory shall maintain records of its quality control results and provide, prior to shipment, a manufacturer's certificate. The certificate shall include the name of manufacturer, chemical composition, product description, statement of compliance to specification requirements, and signature of authorized official attesting to the information required.

##### 1.05 REFERENCES

American Society for Testing and Materials (ASTM), Annual Book of Standards

- A. ASTM D 3776-90, Standard Test Methods for Mass Per Unit Area (weight) of Woven Fabric.
- B. ASTM D 3786-87, Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics-Diaphragm Bursting Strength Tester Method.
- C. ASTM D 4491-92, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- D. ASTM D 4533-91, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- E. ASTM D 4632-91, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

- F. ASTM D 4751-93, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- G. ASTM D 4833-88, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

#### 1.06 SUBMITTALS

Submit Manufacturer's Material Certification as described in Article 1.04 for approval.

### PART 2: PRODUCTS

#### 2.01 MATERIALS

##### A. Fabric

- 1) Nonwoven fabric consisting of polymeric filaments or fibers.
- 2) Fabric shall be inert to commonly encountered chemicals and hydrocarbons, mildew and rot resistant, insect and rodent resistant, and shall conform to properties in attached table.
- 3) Minimum average roll value for strength properties of individual rolls tested from manufacturing lot or lots of a particular shipment shall be in excess of minimum average roll value stipulated in attached tables.

##### B. Packaging and Identification Requirements

- 1) Provide geotechnical fabric in rolls wrapped with protective covering to protect fabric from mud, dirt, dust, and debris. Free fabric of defects or flaws which significantly affect its physical properties.
- 2) Number rolls of fabric in shipments with a number or symbol to identify that production run.

### PART 3: EXECUTION

#### 3.01 INSPECTION

- A. Verify that grades and elevations are correct.
- B. Verify that subgrade does not contain unsuitable, unstable, or soft material. Free subgrade from mud or soft soil materials which would clog fabric openings. Subgrade preparation shall be in accordance with Section 02223, Excavating, Backfilling, and Compaction for Structures. If unstable materials are encountered, stop work and notify Construction Manager.

#### 3.02 INSTALLATION/APPLICATION/ERECTION

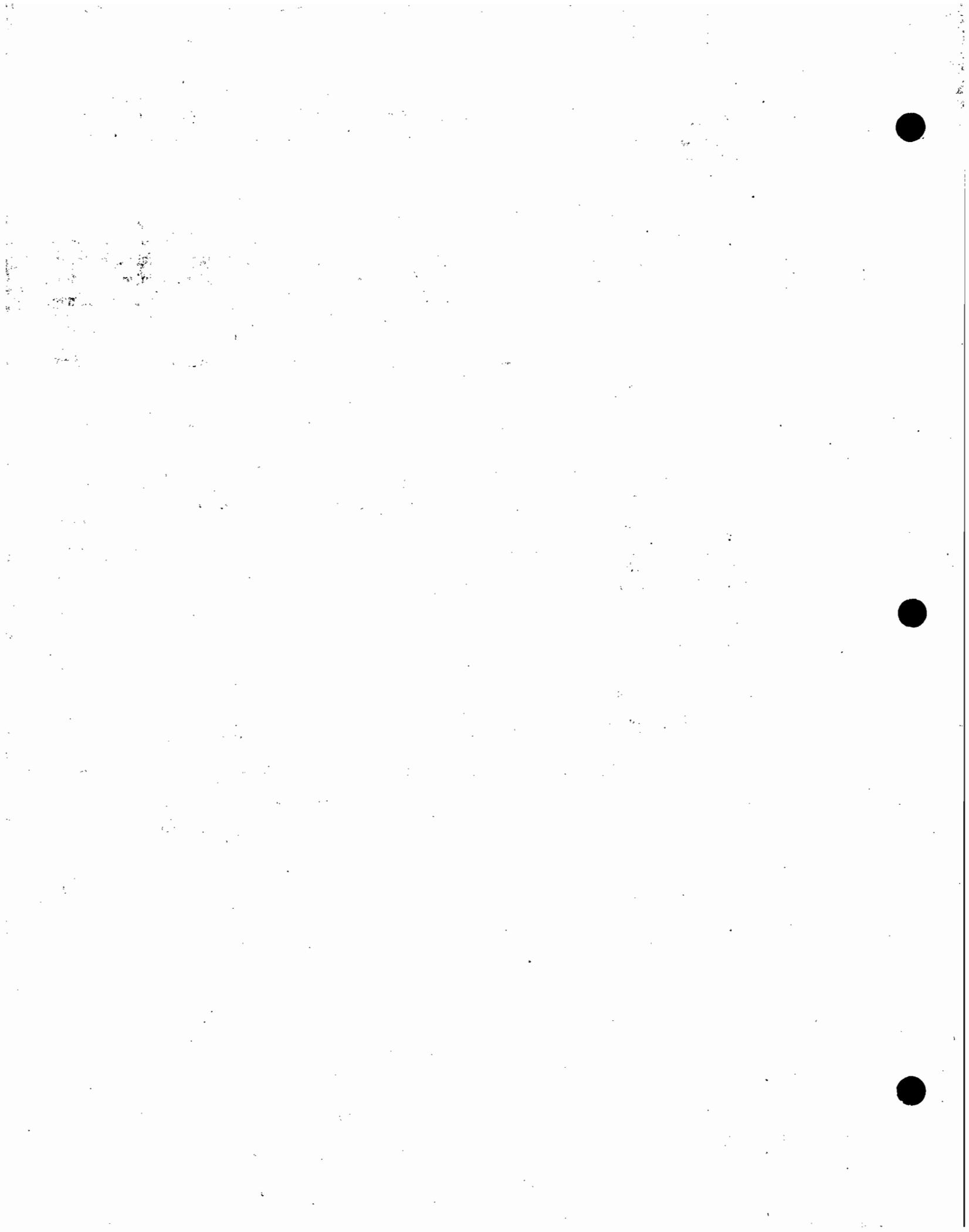
- A. Install geotextile fabric as indicated on drawings.

- B. Sew seams in field with nylon thread at a stitch density of at least 5 stitches per inch and two rows of single-thread stitches or one row of double-thread stitches. Overlaps when necessary shall be 18 in. minimum.
- C. Use sand bags or other weight for temporary anchoring.
- D. Free backfill material placed directly on fabric from mud or soft soil material which would clog fabric openings. Place No. 4 stone on geotextile fabric carefully to avoid damage to fabric by heavy equipment blades, buckets, or tracks. Initial lift of stone upon fabric shall be a minimum of 6 in. uncompacted and shall be compacted with equipment which will not penetrate soil layer and damage fabric.
- E. Exposure of geotextiles to elements between lay down and cover shall be a maximum of 14 days to minimize damage potential.
- F. Place geotextile patch over damaged areas and extend 3 ft beyond perimeter of tear or damage.

**Table 1**  
**Physical Requirements for Geotextile Fabric in French Drains**

Property	Physical Properties	Test Method
Unit Weight (oz/yd <sup>2</sup> )	4 minimum	ASTM D 3776
Tensile (Grab) Strength (lb)	100 minimum	ASTM D 4632
Elongation (%)	50 minimum	ASTM D 4632
Puncture (lb)	50 minimum	ASTM D 4833
Burst Strength (psi)	150 minimum	ASTM D 3786
Trapezoidal Tear (lb)	40 minimum	ASTM D 4533
Permittivity (l/s)	1.0 minimum	ASTM D 4491
Apparent Opening Size (U.S. Sieve)	50-100	ASTM D 4751

END OF SECTION



SECTION 02936

SEEDING

PART 1 - GENERAL

1.01 DESCRIPTION

This work includes [seeding] [~~hydroseeding~~], fertilizing, and liming.

1.02 RELATED WORK

Section 02212, Finish Grading

1.03 QUALITY ASSURANCE

Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.04 REFERENCES

Tennessee Department of Transportation (TDOT), Bureau of Highways, Standard Specifications for Road and Bridge Construction, latest edition.

- 1) Section 918.14, Grass Seed
- 2) Section 918.15, Commercial Fertilizer
- 3) Section 805, Erosion Control Matting

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

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APPROVED: *W. E. Mansueti*

DATE: 6/6/91

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PART 2 - PRODUCTS

2.01 MATERIALS

A. Seed Mixture

- 1) Seed Mixture: In accordance with the requirements of the Tennessee Department of Agriculture and TDOT Specification, Sect. 918.14. The percentages forming the group shall be as set out below.

<u>Seed</u>	<u>Quantity % by Weight</u>	<u>Seeding Dates</u>
<u>Group A</u>		
Kentucky 31 Fescue	80	Feb. 1-July 1
English Rye	5	
Korean Lespedeza	15	
<u>Group B</u>		
Kentucky 31 Fescue	55	June 1- Aug. 15
English Rye	20	
Korean Lespedeza	15	
German Millet	10	
<u>Group C</u>		
Kentucky 31 Fescue	70	Aug. 1-Dec. 1
English Rye	20	
White Clover	10	
<u>Group C1</u>		
Crown Vetch	25	Feb. 1-Dec. 1
Kentucky 31 Fescue	70	
English Rye	5	

B. Topsoil

Topsoil in accordance with Sect. 02212, Finish Grading.

C. Accessories

- 1) Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- a. All straw mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.

b. Straw shall be suitable for spreading with standard mulch blower equipment.

[Choose para. 1 above or para. 1 below]

1) ~~Mulching Material: [Hemlock] [ ] species wood cellulose fiber, [dust] [chip] form, free of growth or germination inhibiting ingredients.~~

~~Wood fiber in accordance with the requirements of TDOT Specification, Sect. 918.18.~~

2) Fertilizer: Standard commercial fertilizer conforming to the requirements of TDOT Specification, Sect. 918.15 with the guarantee of analysis conforming to a 6-12-12 formula. The fertilizer shall be uniform in composition, free flowing, and suitable for application with approved equipment.

3) Agricultural Limestone: Agricultural Limestone shall contain not less than 85% of calcium carbonate and magnesium carbonate combined and be crushed so that at least 85% will pass the No. 10 mesh sieve and 50% through a 40 Mesh Sieve.

4) Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

5) Erosion Control Matting: Shall be in accordance with TDOT Specification, Sect. 805 and shall meet the requirements of the following Subsections of Div. III, Materials:

<u>Material</u>	<u>Subsection</u>
Jute Mesh	918.19
Excelsior Matting	918.28
Erosion Control Fabric	918.29
Staples	918.19

**PART 3 - EXECUTION**

**3.01 INSPECTION**

Verify that prepared soil base is ready to receive the work of this section and that the final dressing is within reasonably close conformity to the lines, grades, and cross-sections.

**3.02 INSTALLATION/APPLICATION/ERECTION**

**A. Fertilizing and Limestone**

1) Apply commercial Grade 6-12-12 fertilizer at a rate of not less than 20 lb/1000 ft<sup>2</sup> and agricultural limestone at a rate of not less than 75 lb/1000 ft<sup>2</sup>.

- 2) Apply after smooth raking of topsoil [and prior to roller compaction.]
- 3) Do not apply fertilizer at same time or with the same machine used to apply seed.
- 4) Uniformly incorporate into the soil for a depth of approximately 1/2 in.
- 5) Lightly water to aid the dissipation of fertilizer.

#### B. Seeding

- 1) Apply seed at a rate of [5] lb/1000 ft<sup>2</sup> evenly in two intersecting directions. Rake in lightly. Do not seed area in excess of that which can be mulched on same day.
- 2) Planting Season: [MARCH].
- 3) Do not sow immediately following rain, when ground is too dry, or during windy periods.
- 4) Roll seeded area with an approved roller.
- 5) Immediately following seeding [and compacting], [apply mulch to a thickness of (1/8) ] in. and at a rate of 100 lb/1000 ft<sup>2</sup>. Maintain clear of shrubs and trees.] [~~apply wood fiber at the rate of 28 lb to 35 lb/1000 ft<sup>2</sup>.~~] [~~apply [ ] [ ] as directed by the Construction Manager.~~]
- 6) Apply water with a fine spray immediately after each area has been mulched. Saturate to (4) [ ] in. of soil.

#### C. Hydroseeding

- 1) Apply seeded slurry at a rate of [ ] lb/1000 ft<sup>2</sup> evenly in two intersecting directions with a hydraulic seeder. Do not hydroseed area in excess of that which can be mulched on same day.
- 2) Immediately following seeding, apply mulch to a thickness of [1/8] [ ] in. and at a rate of 100 lb/1000 ft<sup>2</sup>. Maintain clear of shrubs and trees.
- 3) Apply water with a fine spray immediately after each area has been mulched. Saturate to [4] [ ] in. of soil.

#### D. Seed Protection

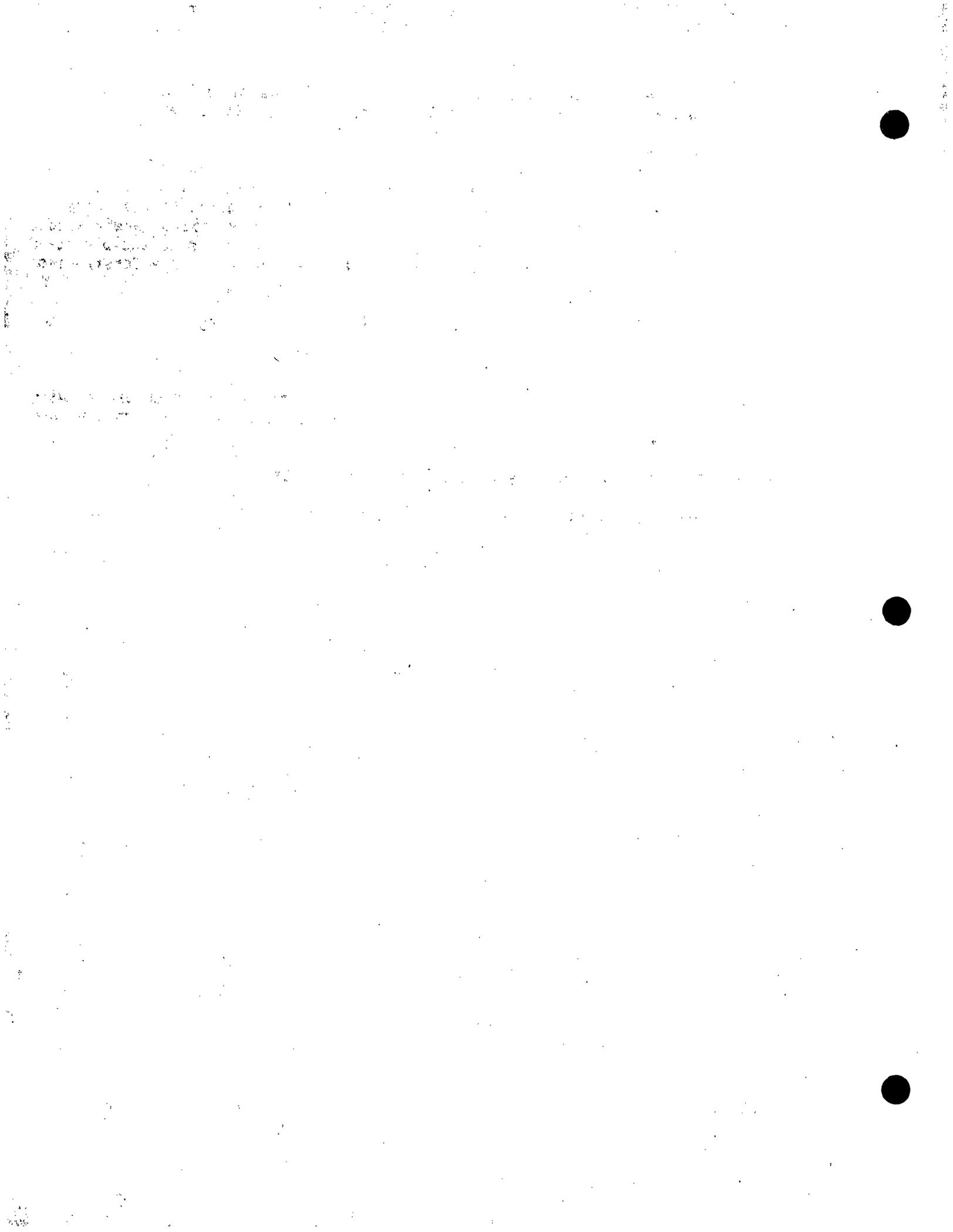
- 1) Cover seeded slopes where grade is [4] [ ] in./foot or greater or other areas at locations shown on the plans with erosion fabric control matting.
- 2) The placing and securing of either jute mesh, excelsior matting, erosion control fabric, or other approved matting on previously shaped and seeded channels, slopes, or other areas and locations shown on the plans or as

required by the Construction Manager shall be in accordance with the construction requirements of TDOT Specification, Sect. 805.

**E. Maintenance**

- 1) Maintain newly graded and topsoiled and seeded areas until final acceptance. Restore areas showing settlement or washes to the specified grades at no additional cost to the Construction Manager. Newly seeded areas shall be watered as necessary or reseeded until an acceptable stand of grass has been achieved at no additional expense to the Construction Manager.
- 2) Immediately remove clippings after mowing and trimming.
- 3) Water to prevent grass and soil from drying out.
- 4) Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- 5) Immediately reseed areas which show bare spots.
- 6) Protect seeded areas with warning signs during maintenance period.

**END OF SECTION**



**DIVISION 3**  
**CONCRETE INDEX**

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Section	Title	Revision
03000	CONCRETE, GENERAL	0

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## SECTION 03000

### CONCRETE

#### PART 1: GENERAL

##### 1.01 SUMMARY

This specification covers requirements for constructing reinforced concrete with minimum inspection.

##### 1.02 RELATED SECTIONS

Section 02223, Excavating, Backfilling, and Compaction for Structures.

##### 1.03 REFERENCES

###### A. American Concrete Institute (ACI)

- 1) ACI 302.1R-89, Guide for Concrete Floor and Slab Construction.
- 2) ACI 305R-91, Hot Weather Concreting.
- 3) ACI 306R-88, Cold Weather Concreting.
- 4) ACI 308-92, Standard Practice for Curing Concrete.
- 5) ACI 318-92, Building Code Requirements for Reinforced Concrete.

###### B. American Society for Testing and Materials (ASTM), Annual Book of Standards

- 1) ASTM A 615-B-92, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- 2) ASTM C 31-91, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- 3) ASTM C 33-92a, Standard Specification for Concrete Aggregates.
- 4) ASTM C 94-92a, Standard Specification for Ready-Mixed Concrete.
- 5) ASTM C 150-92, Standard Specification for Portland Cement.
- 6) ASTM C 260-86, Standard Specification for Air-Entraining Admixtures for Concrete.
- 7) ASTM C 494-92, Standard Specification for Chemical Admixture for Concrete.

## 1.04 SUBMITTALS

- A. Submit for information: concrete air content, slump, cylinder break strengths, and mix design for proposed concrete.
- B. Provide documentation for information that indicates the batch plant has met requirements established by the TDOT within the last 6 months.
- C. If desired, request the use of water-reducing, retarding, accelerating, or plasticizer admixtures. Provide manufacturer's data for information.
- D. Submit method for concrete repair for approval as required by Article 3.04 of this section.

## PART 2: PRODUCTS

### 2.01 MATERIALS

- A. Portland cement: ASTM C 150; normal—Type I.
- B. Aggregates: ASTM C 33.
  - 1) Fine aggregates: natural sand or sand prepared from stone.
  - 2) Coarse aggregates: crushed, washed limestone only.
- C. Water: clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.
- D. Air entrainment (for all exterior exposed concrete): ASTM C 260. Add air-entraining admixture to the mixer in the amount necessary to produce the specified air content.
- E. Water-reducing, set-controlling admixtures: ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Add water-reducing admixtures at the mixer separately from air-entraining admixtures in accordance with manufacturer's printed instructions.

### 2.02 REINFORCEMENT

- A. Reinforcing steel: ASTM A 615, 60 ksi yield strength; deformed billet steel bars; plain finish.
- B. Tie wire: Minimum 16 gauge annealed type.

### 2.03 CONCRETE MIX

- A. Use ready-mix concrete.
- B. Mix and proportion to produce minimum 4,000 psi concrete at 28 days with maximum slump of 4 in.  $\pm 1$  in. and  $4 \frac{1}{2}\%$   $\pm 1 \frac{1}{2}\%$  air entrainment, ASTM C 94.

- C. Use accelerating admixture in cold weather only when acceptable to Construction Manager. Use of admixtures shall not relax cold-weather placement requirements. Do not use calcium chloride.
- D. Use set-retarding admixtures during hot-weather concrete placement.

### PART 3: EXECUTION

#### 3.01 EXAMINATION

Examine the subgrade to verify that rough grading elevations are correct.

#### 3.02 CONSTRUCTION

##### A. Subgrade Preparation

- 1) Fill soft spots and hollows with additional fill to meet required elevations.
- 2) Level and compact subgrade to receive concrete. Subgrade shall be prepared in accordance with Section 02223.
- 3) Maintain bench marks, monuments, and survey control references.

##### B. Forming

- 1) Forms: free from warp, tight enough to prevent leakage of mortar, and substantial enough to maintain their shape and position without springing or settlement when concrete is placed or vibrated.
- 2) Use clean forms.
- 3) For exposed surfaces, provide a smooth, even finish without fins or board marks.
- 4) Set forms for slabs on ground at exact finished grade. Check for line and grade and correct immediately before concreting. Provide uniform bearing.

##### C. Placing Concrete

- 1) Place concrete on a moist compacted subgrade or base, free from loose material. Do not place concrete on a muddy or frozen subgrade.
- 2) Spade concrete thoroughly along forms and expansion joints, and work carefully into corners and around reinforcement. Tamp and screed to a dense mass.
- 3) Do not mix or place concrete when the air temperature is below freezing. If the temperature may be expected to fall below 40°F within 24 hr after concrete is placed, heat water and aggregate to bring the temperature of concrete mix to at least 50°F. Consolidate concrete by means of a mechanical vibrator.

- 4) Time in transit: maximum 90 min between loading concrete on truck and placing in final position.
- 5) Retempering: do not add water after the concrete has been placed on truck unless authorized by Construction Manager.
- 6) Weather conditions: in addition to ACI 302.1R, comply with the following:
  - a. Cold weather: ACI 306R.
  - b. Hot weather: ACI 305R.
- 7) Protection: Do not remove forms for 24 hr after placing concrete. Protect concrete from traffic for a period of 7 days after placing.

**D. Finishing Concrete**

- 1) General: strike-off, consolidate, and finish concrete with mechanical equipment.
- 2) Hand finishing: permitted in narrow widths, areas of irregular dimensions, and in event of breakdown on the mechanical equipment to finish the concrete already deposited on grade.
- 3) Final surface finish: Broomed or burlap drag finish providing a uniform, skid-resistant texture for exterior slabs. Steel trowel finish for interior slabs.

**E. Curing Concrete**

Curing of concrete shall be in accordance with ACI 308 and ACI 318 and the following requirements.

- 1) Curing of all slabs shall be by wet cure for 7 days using wet burlap and plastic or wet burlene. Burlap shall be kept wet continuously.
- 2) Covering materials used for moist curing shall not discolor or stain exposed finished concrete surfaces.
- 3) Formed surfaces may be cured by either of the following methods:
  - a. Leave forms in place for a minimum of 7 days. During hot weather, formwork shall be kept moist through this period.
  - b. Remove forms after concrete has set and apply curing compound.
- 4) Compounds shall be allowed to cure concrete for a period of not less than a total of 7 days unless otherwise directed by the Construction Manager or extended beyond that limit by manufacturer's recommendations.
- 5) Cold weather protection: Whenever the air temperature may be expected to reach the freezing point, spread straw or other blanketing material to sufficient depth to keep concrete from freezing or provide enclosure and heating device capable of maintaining concrete temperature to at least 50°F. Maintain such protection for at least 5 days.

- 6) Remove and replace any concrete injured by frost action.
- 7) Failure to follow these procedures may result in cracking and will be cause for rejection by Construction Manager.

### 3.03 INSPECTION

An independent concrete testing laboratory shall be retained by the Construction Manager to perform the following concrete testing.

- A. Check and monitor truck at the site for total mixing time. Deposit concrete within 90 min. after the batch ticket time. There is no tolerance or exception to this requirement.
- B. Test the first truck for slump and percentage air. The Construction Manager shall obtain this information for each additional 30 yd<sup>3</sup> of concrete placed.
- C. Make four compression test cylinders for each truck that has been accepted for slump and air content. Maintain on-site in accordance with ASTM C 31 for the first 24 hr and then transport to the laboratory for curing. Test two cylinders from each set at 7 days for information and one at 28 days for acceptance. Hold the fourth cylinder in reserve and test only at the direction of the Construction Manager.
- D. If concrete being placed is suspect, the Construction Manager may request additional tests or cylinders to be taken at anytime during placement.

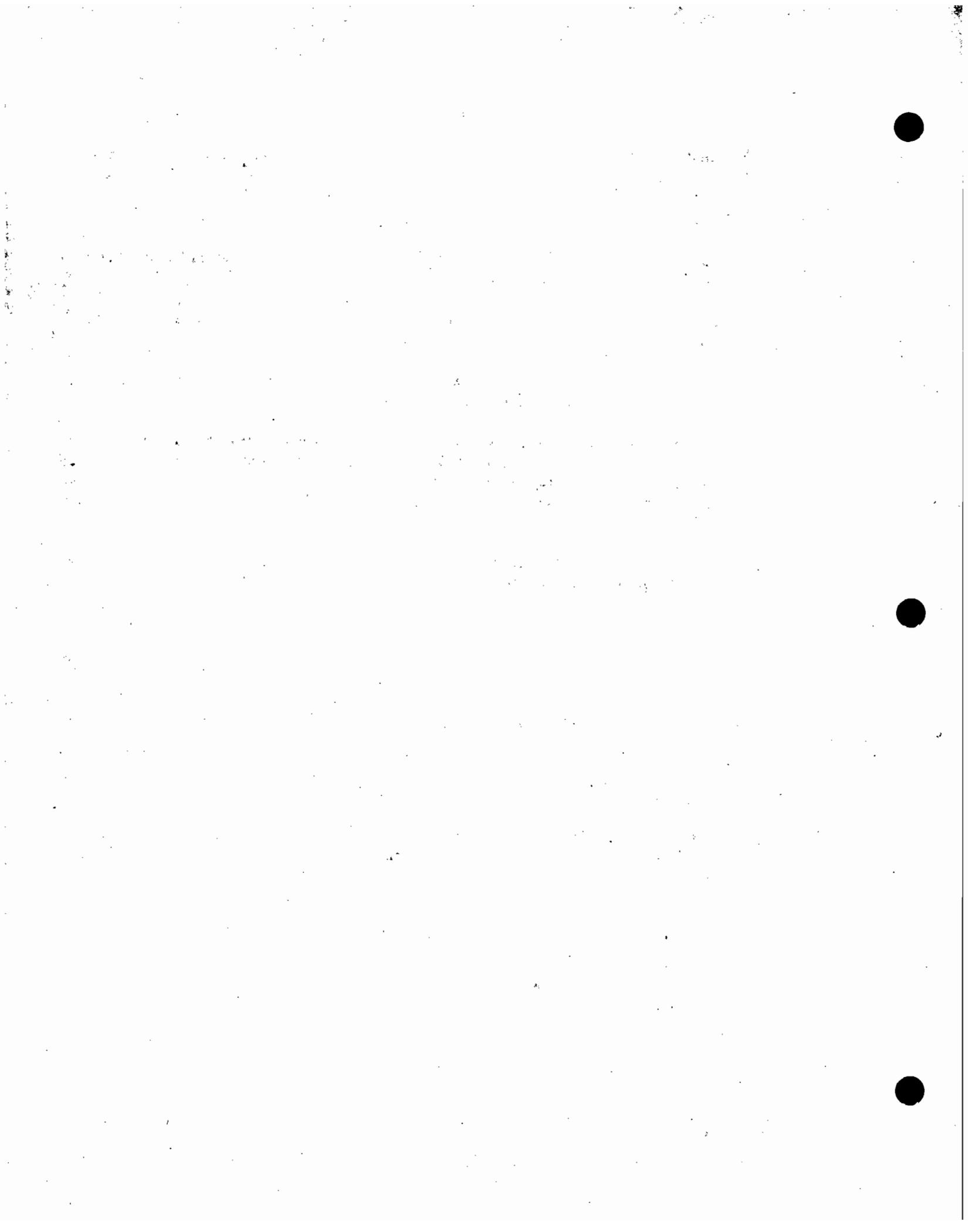
### 3.04 CONCRETE REPAIRS

- A. Bring concrete areas determined inadequate, honeycombed, defective, porous, contaminated, or deteriorated to the attention of the Construction Manager.
- B. Submit proposed methods of repair to the Construction Manager for approval.
- C. Match color and texture of repairs on exposed surfaces.

### 3.05 PROTECTION

Protect the finished concrete during the remainder of the job. Place plastic sheeting on surfaces where work is not being performed. Do not use the structure for miscellaneous work stations or loading areas without approval from Construction Manager.

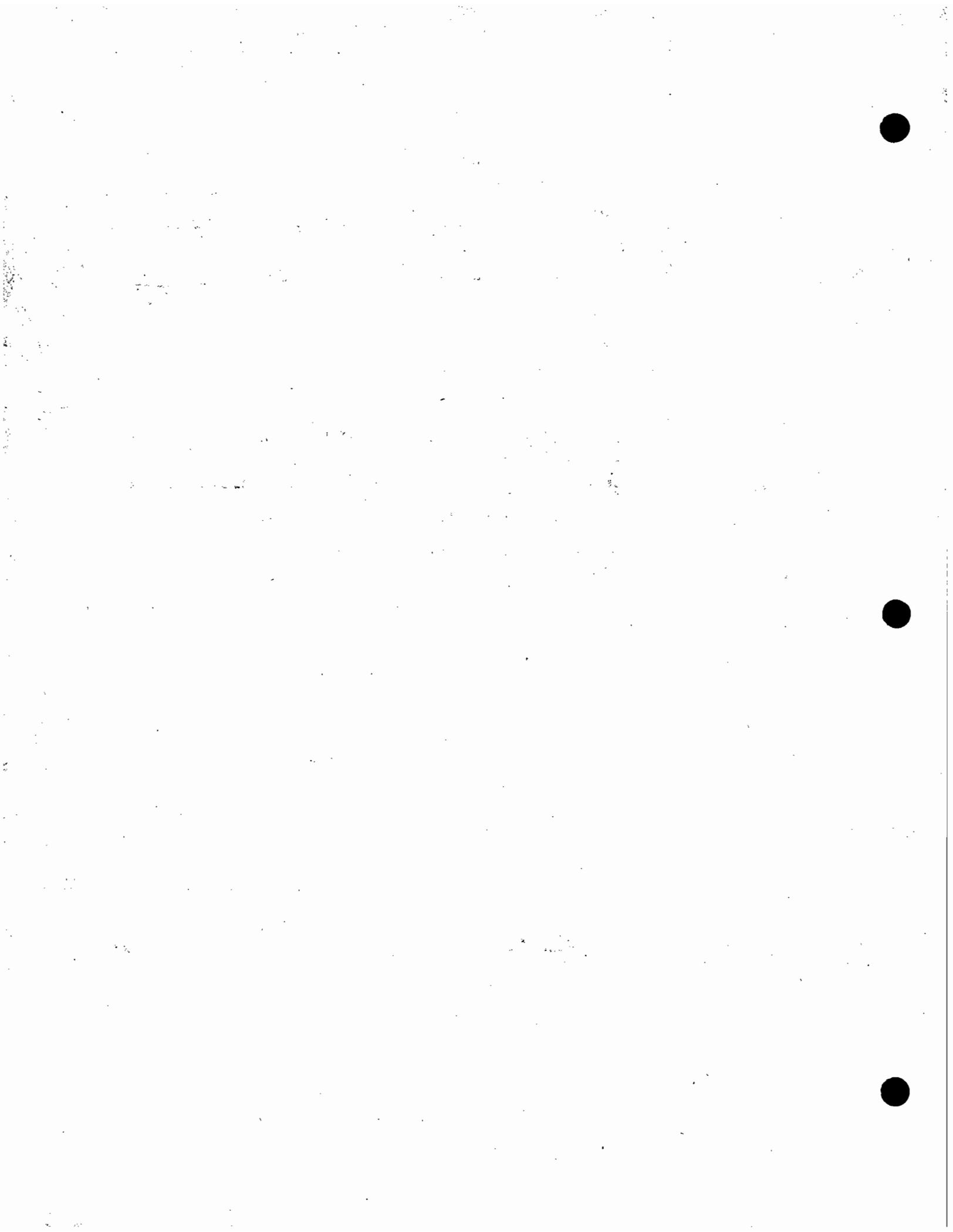
END OF SECTION



DIVISION 15  
MECHANICAL INDEX

Section	Title	REVISION	Pages
15050A	PIPING SYSTEMS—METALLIC	0 5	
<del>15050B</del>	<del>PIPING SYSTEMS—HDPE</del>	<del>0</del>	
15072	CLEANING	0 3	
15073	PRESSURE/LEAK TESTING	0 3	
15074	PIPING SYSTEMS IDENTIFICATION AND LABELING	0 3	
15100	VALVES	0 3	
15146	STAINLESS STEEL SYSTEMS, SCHEDULE 40S, MODERATE SERVICE	0 3	
<del>15147</del>	<del>UNDERGROUND HDPE WASTEWATER</del>	<del>0</del>	
<del>Attachment A</del>	<del>DS-EM-020154-A001, Submersible Sump Pumps Data Sheet</del>	<del>0</del>	
<del>Attachment B</del>	<del>DS-EM-020154-A002, Liquid Waste Collection Basin Data Sheet</del>	<del>0</del>	

Prepared by: K.L. Sevito Date: 2/17/98  
 Approved by: D.W. Hatch Date: 2/17/98



SECTION 15050A  
PIPING SYSTEMS - METALLIC

PART 1: GENERAL

1.01 SUMMARY

- A. Section includes: Fabrication and installation requirements for stainless steel piping systems.

1.02 RELATED SECTIONS

- A. Division 2, Site Work.
- B. Section 15072, Cleaning.
- C. Section 15073, Pressure/Leak Testing.
- D. Section 15074, Piping Systems Identification and Labeling
- E. Section 15100, Valves.
- F. Section 15146, Stainless Steel Systems, Schedule 40S, Moderate Service.
- G. Division 18A, Welding.

1.03 REFERENCES

- A. ANSI B1.20.1-83 (R92), Pipe Threads, General Purpose (Inch).
- B. ANSI B31.3-93, Chemical Plant and Petroleum Refinery Piping.
- C. American Society for Testing and Materials (ASTM), as noted within.
- D. American Society of Mechanical Engineers (ASME), as noted within.

1.04 SUBMITTALS

- A. The Construction Manager (CM) shall submit to the Facilities Manager (FM) all information, procedures, certification, methods, training records, vendor data, specification deviations, and other data required by sections contained in Division 15.
- B. Submit for approval equipment, procedures, and methods utilized to perform cold bending prior to performance of cold bending.
- C. Submit for information changes made from routing shown on drawings.
- D. Submit Design Compliance Statement. See Article 3.03.

## 1.05 QUALITY ASSURANCE

- A. Cold bending is allowed at CM option unless otherwise specified.
- B. Bends are allowable only after approval of equipment and procedure by the FM.
- C. Make cold bends only with FM approved bending methods.
- D. Perform Cold Bending Procedure Qualification tests as follows.
  - 1) Bend three consecutive samples.
  - 2) Inspect samples to specification requirements.
  - 3) Examine surface of samples for cracks and tears by liquid penetrant or magnetic particle method.
  - 4) Measure wall thickness either directly by sectioning bend or by ultrasonic methods. Bend pipe so that minimum wall thickness is not less than that allowed by code requirements of material before bending.
- E. Hot Bending  
Hot bending is not allowed.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping and valves to site in clean and protected condition.
- B. Maintain end seals on piping and valves. Maintain flange covers in place. Remove seals and covers only for cleaning, fabrication, erection, or inspection.
- C. Exercise care in handling and storage of piping materials and prefabrications to ensure that contamination by moisture, grease, dirt, or injurious foreign matter does not occur.
- D. Reinstall end seals or covers on partially erected systems to prevent introduction of foreign materials, dirt, or contamination into piping.

## PART 2: PRODUCT

### 2.01 MATERIALS

- A. Furnish materials of quality required by ANSI and ASTM standards or other approved standards and specifications.
- B. Construction/fabrication materials which may be exposed to the elements (air, water, earth) shall be certified to contain no material that would be harmful to the environment.
- C. Asbestos, lead, mercury, PCB's, and other hazardous materials shall not be used.

- D. Materials provided with certifications shall be marked to provide traceability of certifications. Mark all materials to be consistent with the certifications furnished. Transfer tubing and pipe markings by vibro-etching markings onto any length of tubing or pipe to be cut before the cutting operation to ensure that each length of tubing or pipe bears the marking.
- E. Attach stainless steel tags embossed with applicable V-numbers to all valves procured by the CM. Do not attach tags to handwheel. Tags and bead chain for CM procured valves will be furnished by the FM. FM furnished valves will be tagged by the FM.

## 2.02 FABRICATION

- A. Cutting: Cut pipe and tubing accurately with pipe or tube cutters. Ream cuts to remove burrs. Remove defects by machining, chipping, or grinding.
- B. Cold Bending
  - 1) Make cold bends only after approval of equipment and procedure by the FM.
  - 2) Requalify and approve change in process, equipment manufacturer, equipment model, pipe schedule, wall thickness, material specification type, specification grade, or a decrease in bend radius of cold bending.
  - 3) Fabricate bends free from cracks, buckles, wrinkles, bulges, and grooves.
  - 4) Locate weld seams as near as practical to neutral axis of bend. In compound bends, locate weld seam no closer than 30 degrees to inner or outer radius.
  - 5) Bend pipe and tubing with 1/2-in. actual outside diameter and larger so that ovality does not exceed 8% after bending. Calculate ovality as follows:

$$\text{Percent Ovality} = \frac{100 \times (D_{\max} - D_{\min})}{D_o}$$

where

D<sub>max</sub> = maximum diameter after bending,  
 D<sub>min</sub> = minimum diameter after bending,  
 D<sub>o</sub> = minimum diameter before bending.

- C. Hot Bending

Hot bending is not allowed.

## 2.03 SOURCE QUALITY CONTROL

Shop-Fabricated Piping Tolerance:  $\pm 1/8$  in. max on overall dimensions.

## PART 3: EXECUTION

### 3.01 INSTALLATION AND ERECTION

- A. Follow piping routing shown on drawing. Work pipe carefully into place. Do not force or spring pipe into place. Record changes required to suit field conditions from routing or components shown on drawings.
- B. Locate flanges, unions, and valves to be accessible after erection.
- C. Valves
  - 1) Pack and make leakproof valves for test pressure specified.
  - 2) Disassemble, prior to heating, valves which are to be welded. Allow valves to cool, clean if necessary, and reassemble.
  - 3) Blank off valved connections provided for future expansion as follows:
    - a. Socket-Weld Valve: Install 4-in. nipple and screwed pipe cap.

### 3.02 JOINING METHODS

- A. Flanged Joints
  - 1) Use full face gaskets between stainless steel flat face flanges and ring gaskets between stainless steel raised face flanges.
  - 2) Prior to bolt up, align flange faces to the design plane within 1/16 in./ft (0.5%) measured across any diameter. Align flange bolt holes to within 1/8-in.-max offset. Assemble mating flanges flush and true.
  - 3) Center gaskets evenly between flange faces with ring gaskets engaging fully upon raised-face flanges.
  - 4) Use bolts that extend through nuts by at least one full thread when made up. Use bolts of a uniform length on a single flange.
  - 5) Coat bolt threads with high-temperature thread compound prior to installation.
  - 6) Tighten bolts uniformly to draw flanges evenly and firmly upon gasket. Use standard industrial practice bolt torque unless otherwise specified.

- B. Welded Joints

Welding shall be performed in accordance with Division 18A.

**3.03 COMPLIANCE**

- A. Certify to FM that valves or materials furnished meet all requirements of the specifications or list deviations and obtain written approval for each deviation before installing valves, or other items in the piping section.**
  
- B. Prior to turn-over of the piping system, the CM shall complete a design compliance statement and get this statement approved by the FM. Each line assigned an individual line number on the design drawings shall be field verified for design compliance by the CM and witnessed by the FM. Design compliance includes inspections for the following:**
  - 1) Proper line sizes and schedule.**
  - 2) Proper pipe material and support material certification documents.**
  - 3) Pipe routed as shown on drawings.**
  - 4) Correct fittings used in locations shown on drawings.**
  - 5) Instrument connections provided in the locations shown on drawings.**
  - 6) Proper labeling and painting used.**
  - 7) Correct valves/types are installed in locations shown on drawings and are tagged correctly.**
  - 8) A change request has been approved by the FM and that change is noted on as-built drawings for any item not meeting the above requirements.**
  
- C. Final acceptance of all piping is contingent upon FM approval of the compliance statement.**

**END OF SECTION**



SECTION 15072

CLEANING

PART 1: GENERAL

1.01 SUMMARY

Section includes: Requirements for cleaning of piping systems.

1.02 RELATED SECTIONS

A. Section 15050A, Piping Systems - Metallic.

*KYS*  
*2/6/98* ~~B. Section 15050B, Piping Systems - HDPE.~~

C. Section 15073, Pressure/Leak Testing.

D. Section 15146, Stainless Steel Systems, Schedule 40S, Moderate Service.

*KYS*  
*2/6/98* ~~E. Section 15147, Underground HDPE Wastewater.~~

1.03 SEQUENCING AND SCHEDULING

Complete cleaning prior to testing.

1.04 SUBMITTALS

No submittal required for Type II cleaning.

1.05 QUALITY ASSURANCE

A recognized commercial cleaning contractor is not required to perform Type II cleaning. Cleaning shall be performed by the CM and in accordance with the manufacturer's recommendations and this specification.

PART 2: PRODUCTS

2.01 MATERIALS

A. The FM will furnish the flushing media.

B. The CM shall furnish all labor, unless otherwise specified; tools and equipment; and all other materials and services not furnished by the FM.

C. Other products required are described in Part 3.

PART 3: EXECUTION

3.01 EXAMINATION

Inspect pipe and components for physical defects. Replace defective items.

3.02 PREPARATION

- A. Remove all loose scale, rust, dirt, and other foreign materials by brushing, scrubbing, or flushing.
- B. Remove excess dirt, rust, grease, oil, or other contaminants from exterior surface.
- C. Install caps or protective covers over ends of pipe, valves and fittings until ready to install.

3.03 ERECTION/INSTALLATION/APPLICATION

A. Type II Cleaning

*2" pipe between the meter pit and MH-24 prior to installation the flow totalizer*

Type II (Flushing): Flow potable water through the ~~4 in. gravity inlet pipe~~. Introduce potable water ~~at the catch basin, located behind Building 2013. Do not flush the 4 in. gravity inlet pipe that runs parallel to the west of the northwest corner of Building 2016. During flushing operations the water level in the basin shall not extend past the bottom of 4 in. inlet pipe.~~ The CM shall monitor the flushing media for materials/debris that may cause damage to the ~~pump~~ <sup>Flow Meter</sup> and internal piping, before manually starting the pumps to flush the 2 in. discharge line. Obtain approval of plans for disposal of flushing media from the FM in accordance with applicable state and federal regulations. Notify FM a minimum of 72 hours before flushing operation.

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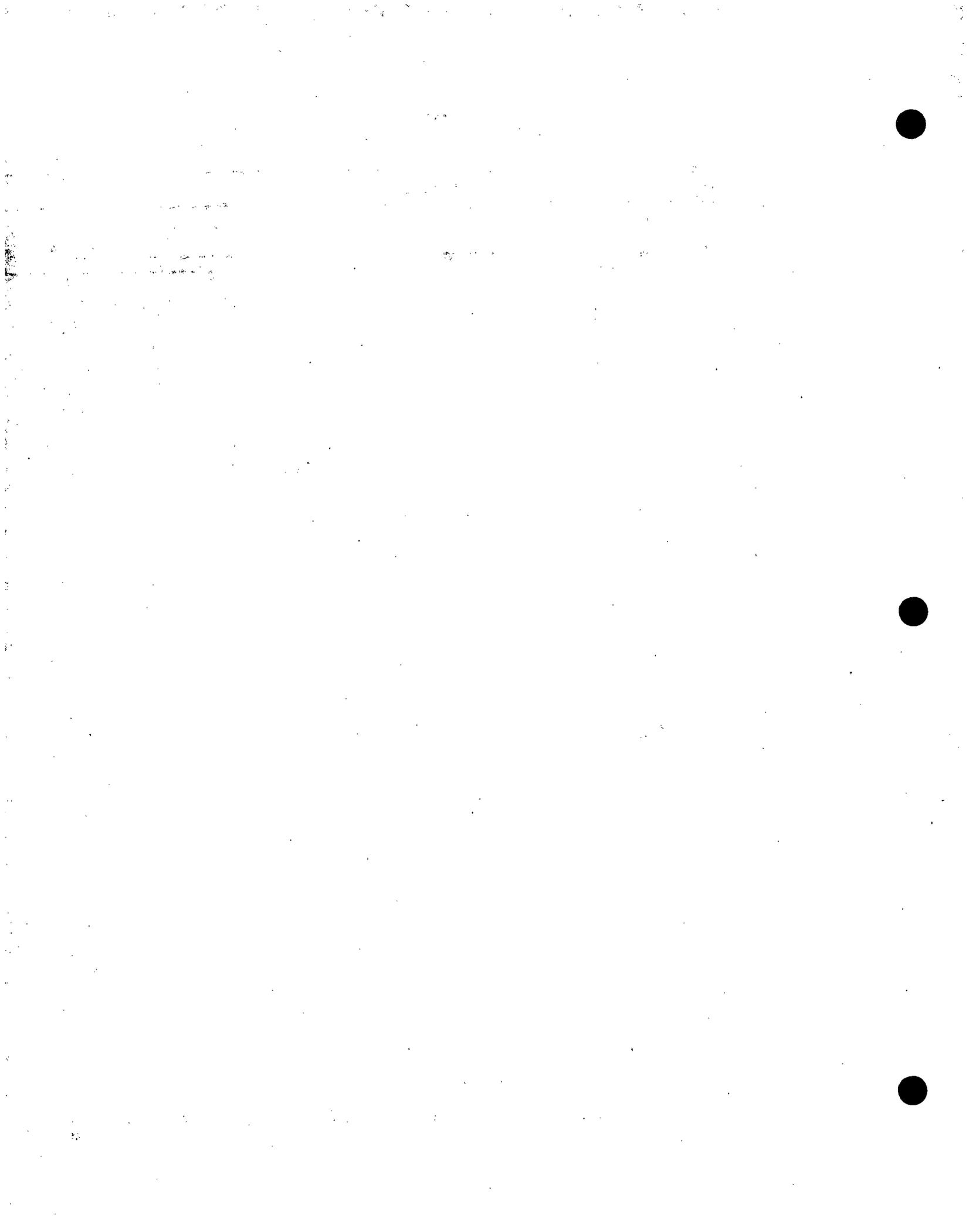
B. General Procedure

- 1) Isolate equipment, pumps, compressors, and other equipment that could be harmed by purging or flushing action. Block control valves in open position. Remove orifice plates, traps, strainers, instruments, or other equipment that could be adversely affected by flow or accumulation of particles cleaned by purge/flush procedure.
- 2) Introduce flushing media at remote end of piping system. Where possible, flow from upstream side of globe or check valves. If not possible, remove globe or check valves and replace with spool pieces.
- 3) Open each branch or drop extremity of piping system to flush entire system for specified minimum time period.
- 4) Reconnect isolated, removed, or bypassed items in preparation for testing in accordance with Sect: 15073.
- 5) Table 1 outlines the cleaning schedule.

Table 1  
Cleaning Schedule

Section	Preerection	Posterection	Remarks
15146	—	II	
<i>Z/S</i> <i>2/6/98</i> 15147	—	II	

END OF SECTION



SECTION 15073

PRESSURE/LEAK TESTING

PART 1: GENERAL

1.01 SUMMARY

Section includes: Testing and inspection of piping systems.

1.02 RELATED SECTIONS

A. Section 15050A, Piping Systems - Metallic

*KYS*  
*2/6/98* ~~B. Section 15050B, Piping Systems - HDPE.~~

C. Section 15146, Stainless Steel Systems, Schedule 40S, Moderate Service.

*KYS*  
*2/6/98* ~~D. Section 15147, Underground HDPE Wastewater.~~

1.03 TEST CLASSES

A. Class B, Hydrostatic Test.

1.04 REFERENCES

A. ANSI B31.3-93, Chemical Plant and Petroleum Refinery Piping.

1.05 SEQUENCING

A. Perform testing after installation and erection.

PART 2: PRODUCTS

2.01 MATERIALS

A. The FM shall furnish the testing media.

B. The Contractor shall provide testing equipment and materials.

PART 3: EXECUTION

3.01 GENERAL

A. Blank off or replace with spool pieces vessels, pumps, instruments, controls, and other equipment items rated for pressures below test pressure.

B. Visually inspect system installation for compliance with drawings and specifications.

- C. Use adequate safety precautions during testing. Clear the installation area of all personnel not engaged in the testing.
- D. Notify the FM 24 hours in advance of testing.
- E. Perform tests in the presence of the FM or an authorized FM representative.
- F. All parts of the system shall be inspected for leaks, especially at valves, flanges, welds, threaded connections, and packed joints. Repair all leaks and retest the repaired joints.

3.02 CLASS B - HYDROSTATIC TEST

A. General

- 1) Class B testing consists of hydrostatically pressure testing piping systems or isolated sections with water as specified in Table 1 as per ANSI B31.3.
- 2) Test pressure shall be 1.5 times the design pressure or 50 psig, whichever is greater.

B. Test Procedure

- 1) Protect equipment per Article 3.01.
- 2) Pressurize system to 1.5 times the design pressure and hold for a minimum of 10 minutes.
- 3) Visually inspect welds, joints, and connections for leaks. Repair leaks, retest to test pressure for 10 minutes, and inspect.
- 4) Drain test media from system.
- 5) Reconnect instruments and equipment.

C. Test Media: Table 1 lists test media for Class B tests.

Table 1

Section	Service	Media
15146	Moderate Service S.S. Systems	Potable water
15147	<del>Underground HDPE Wastewater</del>	<del>Potable water</del>

*KAS*  
*2/6/98*

3.04 DEMONSTRATION

Perform tests in presence of the FM or an authorized FM representative.

3.05 TEST PRESSURE TOLERANCE

Use test pressure tolerance of +5 psig and -0 psig.

END OF SECTION



## SECTION 15074

### PIPING SYSTEMS IDENTIFICATION AND LABELING

#### PART 1: GENERAL

##### 1.01 SUMMARY

Section includes: Identification and labeling of valves and exposed piping systems.

##### 1.02 RELATED SECTIONS

- A. Section 15050A, Piping Systems - Metallic.
- B. Section 15146, Stainless Steel Systems, Schedule 40S, Moderate Service.

##### 1.03 REFERENCES

- A. ANSI A13.1-81, Schemes for Identification of Piping Systems (R 1985).
- B. NEMA Z535.1-91, Safety Color Code.

##### 1.04 DEFINITIONS

Exposed piping is defined as all piping that is visible in the open or that may be visible after removal of covers or panels designed to provide access for inspection or maintenance.

#### PART 2: PRODUCTS

##### 2.01 MATERIALS

Labels and Banding Materials: Weather-resistant, service rating for outdoor service, -20° to 220°F service temperature range, compatible with specified operating environment, low-halide content (for stainless steel application only).

##### 2.02 LABEL FABRICATION

- A. Fabricate labels with label format in accordance with ANSI A13.1.
- B. Fabricate labels with background and letter colors in accordance with NEMA Z535.1.
- C. Fabricate labels of type compatible with operational and service conditions.
- D. Fabricate adhesive film labels with one or more adhesive-backed layers.

- E. Fabricate system labels for piping systems common to sites and some piping systems unique to specific sites using the approved piping label attributes listed below:

<u>System Name</u>	<u>Background Color</u>	<u>Letter Color</u>	<u>Section Number</u>
Process <del>Cold Water</del>	<del>Green</del>	White	15146
Waste	Yellow	X/S 2/17/98	

- F. Fabricate labels with text letter heights in accordance with NEMA Z535.1 as follows:

<u>Pipe or covering outside diameter (in.)</u>	<u>Letter height (in.)</u>
Up to 1/2	1/2
1/2 to 2	3/4
2 1/2 to 6	1 1/4
8 to 10	2 1/2
10 and up	3 1/2

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2/6/98

- G. Fabricate flow direction labels of same background color as system labels.
- H. Supplemental Labels
- 1) Fabricate supplemental pressure and temperature labels of same background color, letter color, and letter height as system labels.
  - 2) Fabricate supplemental pressure labels to numerically indicate line operating pressure and end with letters PSIG.
  - 3) Fabricate supplemental temperature labels to numerically indicate normal operating temperature and end with symbol °F.

### PART 3: EXECUTION

#### 3.01 LABEL INSTALLATION

- A. Install labels on straight sections of pipelines outside buildings at maximum intervals of 100 ft.
- B. Install labels on lines that penetrate walls or floors on each side of penetration not more than 5 ft from penetration.
- C. Install labels with label format in accordance with ANSI A13.1.
- D. Install labels with approved piping label attributes as shown in Table 1 or coordinated between Operating and Engineering Divisions.
- E. Install labels with background colors, letter colors, and letter heights in accordance with NEMA Z535.1.

- F. Install labels of type compatible with operational and service conditions.

On bare pipe, install manufacturer's standard adhesive film labels or band-on labels. Stenciling may be used on services approved by the FM or FM authorized representative.

- G. Install flow direction labels adjacent to system label to indicate the direction of flow.

### 3.02 LABEL APPLICATION

- A. Ensure that surface to be labeled is free of scale, dirt, dust, grease, and moisture. Ensure that mastic coatings on insulated lines are completely dry before applying labels.
- B. Firmly press label in place. Rub thoroughly, particularly along edges, until adhesive bonds.
- C. Apply banding tape or flow-arrow tape over abutting edges of adhesive labels when multiple labels are required for supplemental information.

END OF SECTION



## SECTION 15100

### VALVES

#### PART 1: GENERAL

##### 1.01 SUMMARY

- A. Section includes: Requirements for general duty valves used in piping systems. Valves are listed by V-number (V-1, V-4, etc.), and V-number sheets are included in this section.
- B. Special duty valves are specified in sections where required by the piping system.

##### 1.02 RELATED SECTIONS

- A. Section 15050A, Piping Systems - Metallic
- B. Section 15146, Stainless Steel Systems, Schedule 40S, Moderate Service.

##### 1.03 REFERENCES

- A. See reference standards on V-number sheets.
- B. ANSI B16.34-88, Valves-Flanged, Threaded, and Welding End.
- C. ANSI B18.2.1-81, Square and Hex Bolts and Screws Inch Series
- D. ASTM A 182, Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature (1994A).
- E. ASTM A 276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes (1994B).
- F. ASTM A 351, Specification for Steel Casting, Austenitic, for High Temperature Service (1994).
- G. ASTM A 743, Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, and Nickel-Base Corrosion-Resistant for General Application (1993A).
- H. ASTM A 744, Specification for Castings Iron-Chromium-Nickel, Corrosion-Resistant, for Severe Service (1994).
- I. MSS SP-25-78: Standard Marking System for Valves, Fittings, Flanges, and Unions (R 1988).
- J. MSS SP-72-87: Ball Valves with Flanged or Butt-Welding Ends for General Service.

##### 1.04 SUBMITTALS

Submit for information Cv data when V-number sheets include Cv requirements.

## PART 2: PRODUCTS

### 2.01 MANUFACTURERS

See manufacturers listed on V-number sheets.

### 2.02 MATERIALS

See materials listed on V-number sheets.

### 2.03 VALVE MARKING

A. Provide valves marked by manufacturer in accordance with MSS SP-25.

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~~B. Provide valves requiring FM or UL approval with FM or UL markings in addition to MSS SP-25 markings.~~

### 2.04 VALVE TAGS

A. Tag valves with a stainless steel tag embossed with the V-number and valve identification number in 3/4-in.-high letters and numerals.

B. Provide tags from stainless steel, .020 in. thick, 1/2 in. wide, 2 1/2 in. long with rounded corners and beveled edges. Provide a 3/16-in.-diam attachment hole at each end.

C. Attach tag to valve using stainless steel beaded chain. Do not attach tags to handwheels, levers, or other parts of valves which would interfere with operation.

### 2.05 VALVE GASKETS AND PACKING

A. Manufacturer's Standard Gaskets: Nonasbestos type.

B. Manufacturer's Standard Stem Packing: Nonasbestos type.

## PART 3: EXECUTION

### 3.01 INSTALLATION

Install valve where handles are accessible.

### 3.02 TESTING

Perform valve testing as indicated on V-number sheets.

### 3.03 CLEANING

Clean valves in accordance with manufacturer's standards unless otherwise indicated on V-number sheets.

VALVE, BALL, V-6175

Material:

Body: ASTM A182-94c or A351-94  
Grade CF8M or CF3M  
Ball: ASTM A276-94b, AISI Type 316  
Stainless Steel  
Stem: ASTM A276, AISI Type 316  
Stainless Steel  
Ends: ASTM A182, A276, or A351  
Grade CF3M (AISI Type 316L  
Stainless Steel)  
Bolts & Nuts: AISI Type 300 series  
nongalling Stainless  
Steel  
Handle & Other  
External  
Parts: AISI Type 300 Series  
Stainless Steel

Seats,  
Gaskets  
& Stem  
Seal: >15% Glass Microsphere  
filled PTFE

Suggested Manufacturers:

Worcester  
TBV

*RF*  
2/13/98

Minimum Acceptable Rating:

Primary: 150 psig at 375°F  
Nonshock: 600 psig at 100°F

Characteristics:

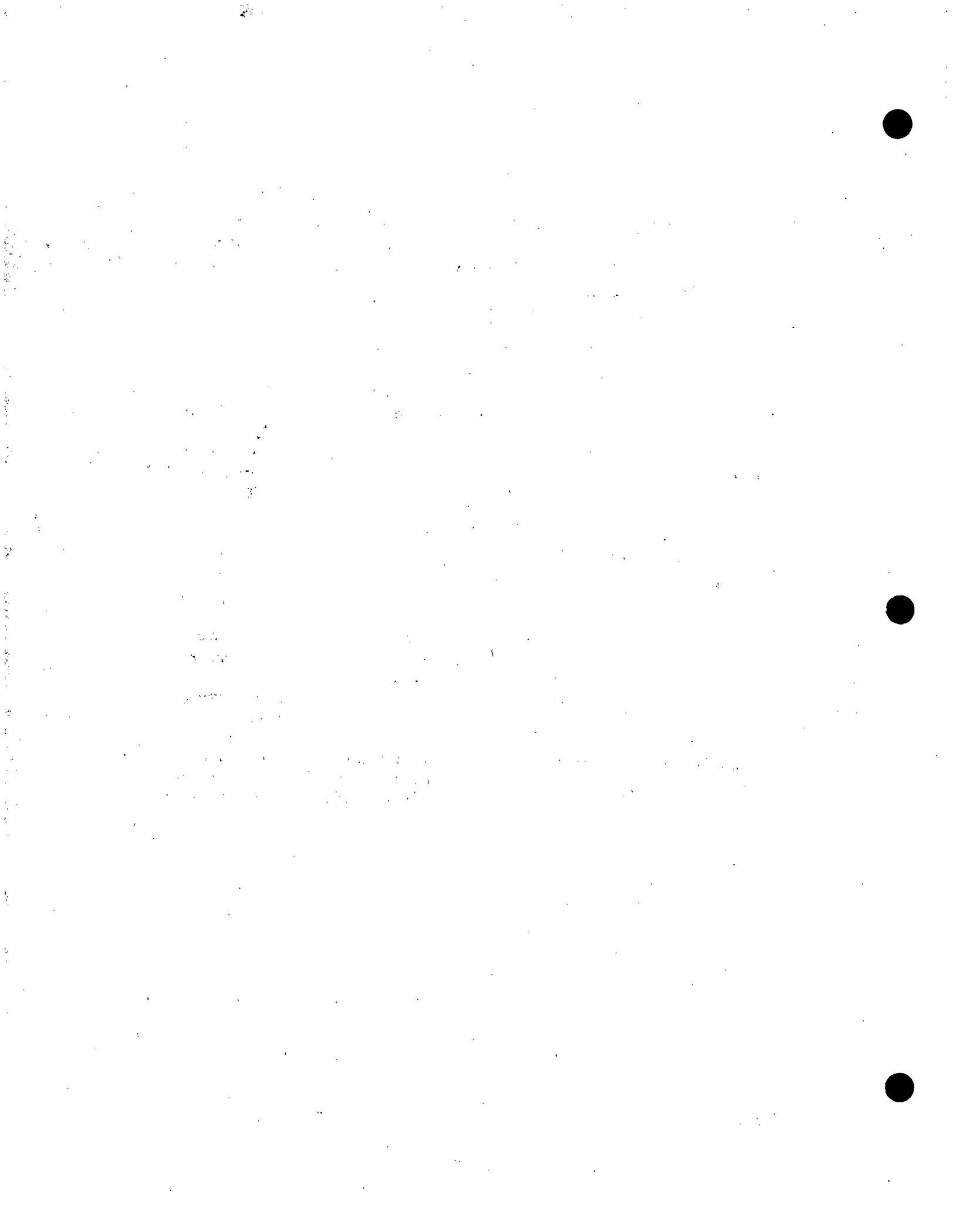
Type: Ball  
Construction: 3 Piece  
Ends: Socket Weld  
Seat: Ring Type  
Disc: Ball Type  
Operation: Hand Lever, 90° Travel  
with stop  
Stem to Ball: Slot  
Port: Full  
Adjusting Nut: Under handle to permit  
removal of handle  
during operation.

Stem Seals - Adjustable for temperature  
variance of 300°F thru 5000 close, open,  
close operating cycles. Nut or  
adjustment below handle to maintain stem  
seal when handle is removed.

Part Identification - All metal parts  
shall be stamped with the manufacturer's  
code for identification of the material.

Body, seats, seals and disc to be  
renewable without removing pipe ends  
from the line.

Wetted Parts: Pickled and passivated  
for hot acid service.



## SECTION 15146

### STAINLESS STEEL SYSTEMS, SCHEDULE 40S, MODERATE SERVICE

#### PART 1: GENERAL

##### 1.01 SUMMARY

- A. Section includes: Moderate service stainless steel piping systems with a 70°F design temperature and 35-psig design pressure.
- B. The piping specified by this section will be used from the inside new valve box to Manhole 24.
- C. Install this piping system per general requirements of Section 15050A and specific requirements as outlined below.

##### 1.02 RELATED SECTIONS

- A. Section 15050A, Piping Systems—Metallic.
- B. Section 15072, Cleaning.
- D. Section 15073, Pressure/Leak Testing.
- E. Section 15074, Piping Systems Identification and Labeling.
- F. Section 15100, Valves.
- G. Division 18A, Welding.

##### 1.03 REFERENCES

- A. ANSI B16.5-88, Pipe Flanges and Flanged Fittings; Addenda B-16.5-92.
- B. ANSI B16.9, Factory-Made Wrought Steel Buttwelding Fittings (1993).
- C. ANSI B31.3, Chemical Plant and Petroleum Refinery Piping (1993).
- D. ASTM A-182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service (1994A).
- E. ASTM A-193, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service (1994B).
- F. ASTM A-194, Standard Specification for Carbon and Alloy-Steel Nuts and Bolts for High Pressure and High Temperature Service (1994A).

- G. ASTM A-262, Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels (1993A).
- H. ASTM A-312, Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes (1994A).
- I. ASTM A-358, Standard Specification for Electric - Fusion - Welded Austenitic Chromium - Nickel Alloy Steel Pipe for High-Temperature Service (1994A).
- J. ASTM A-403, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings (1994).

PART 2: PRODUCTS

2.01 MATERIALS

- A. Use materials selected from list below [except where shown otherwise on drawings].
- B. Pipe (~~1/2 in. to 1 in.~~ <sup>2 in. XFS 2/6/98</sup>): Stainless steel, Type 304L, Schedule 40S, seamless or welded, ASTM A-312 or A-358, Class 4, welded.
- C. Fittings (~~1/2 in. to 1 in.~~ <sup>2 in. XFS 2/6/98</sup>): Stainless steel, Type 304L, Schedule 40S, ASTM A-403, Grade WP, 304L or WP-W-304L, butt-weld ends, ANSI B16.9.
- D. Flanges (~~1/2 in. to 1 in.~~ <sup>2" XFS 2/6/98</sup>): Stainless steel, Type 304L, slip-on or weld neck, ASTM A-182 and ANSI B16.5, 150-lb standard, R.F. and/or F.F. as required.
- E. Unions: Use flanges.
- F. Gaskets: Reinforced RTFE, 1/8 in. thick.
- G. Dope: Teflon ribbon thread sealant, Permacel or Scotch Corp or approved equal as a minimum.
- H. Valve Stem Packing (1/8 in. and greater, for repacking only): Teflon, Chevron type, John Crane Chemlon, Type C-VH or approved equal as a minimum.
- I. Valve Bonnet Gaskets (for replacement): Reinforced RTFE.
- J. Bolts: Semifinished heavy hex head, Type 304 stainless steel, ASTM A-193, Grade B8, UNC threads.
- K. Nuts: Semifinished regular hex head, Type 303 stainless steel, ASTM A-194, Grade 8F, UNC threads.
- L. ~~Caps (1/2 in.)~~ <sup>XFS 2/6/98</sup> Elbowlet (1" x 2") <sup>9 XFS 2/6/98</sup> Stainless steel, Type 304L, ASTM A-182, ANSI B16.1, 3000-lb, standard.
- M. Valves (See Sect. 15100 for valve descriptions.)

Service	Size (in.)	Number	End type
Shutoff	2" XFS 2/6/98	V8-6175 XFS 2/6/98	Socket Weld

- N. Material is not required to pass ASTM A-262 Practice A (Oxalic Acid Test) or Practice C (Nitric Acid Test).
- O. Manufacturer's material certificate of compliance (COC) with material specifications are required for all piping and piping components that consolidate the pressure boundary of systems handling fluids, vapors or gases. CM to submit all COC's to the FM for record keeping.

**PART 3: EXECUTION**

**3.01 INSTALLATION**

- A. Install system in accordance with ANSI B31.3 and Sect. 15050A.
- B. Perform welding activities in accordance with Division 18A.
- C. Identify and label piping system in accordance with Sect. 15074.

**3.02 FIELD QUALITY CONTROL**

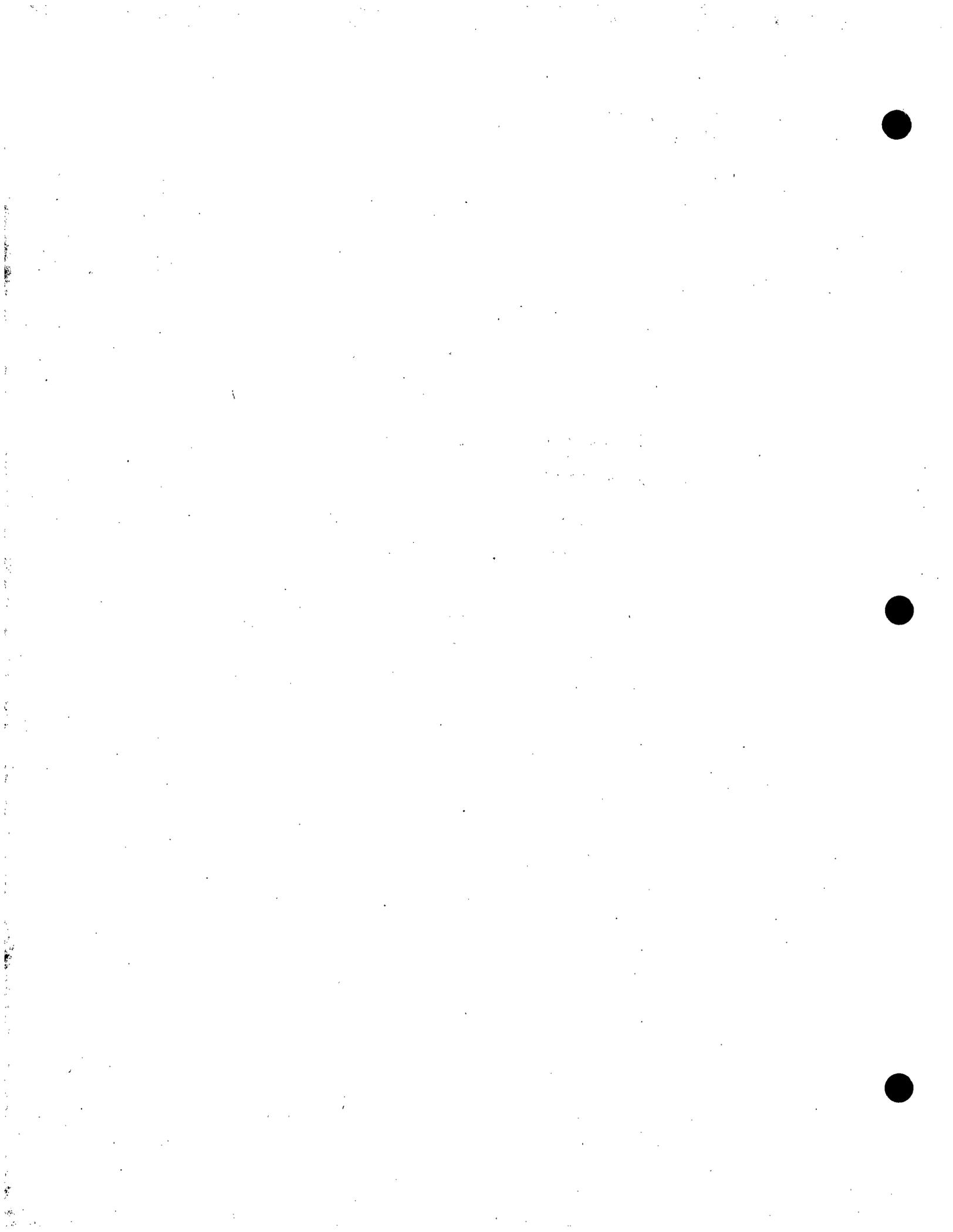
- A. Test and inspect piping system in accordance with Sect. 15073, Class B. Perform any additional tests and/or examinations in accordance with drawing requirements.

**3.03 CLEANING**

Clean piping system in accordance with Sect. 15072.

**END OF SECTION**

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DIVISION 18A

WELDING INDEX

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APPROVED BY:  DATE: 10/17/94

Revised by: K.J. Swits Date 2/17/98



Revision 1  
7/5 2/19/98

**DIVISION 18A**

**WELDING INDEX**

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APPROVED BY: D. J. Etzler DATE: February 16, 1998



## SECTION 18100

### GENERAL WELDING REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES:

- A. Welding fabrication and construction activities occurring both on-site and off-site. These requirements apply to pipe welding when invoked by other technical sections or when drawings require fabrication to codes addressed by this document. These requirements do not apply to work on ASME-stamped components, AWWA tanks, or API tanks.
- B. The off-site welding requirements are specified in Part 2 of this section.
- C. For on-site welding, Part 3 of this section identifies the welding program requirements and responsibilities. The on-site program including welding procedure specifications, weld joint details, welder qualifications requirements, and a filler material control procedure necessary to comply with this section are contained in Div. 18B which is available from the CM.
- D. Approval of a Contractor's welding procedures and welders for on-site welding may be granted for either of the following:
  - 1. The Contractor wishes to use a welding process not included in Div. 18.
  - 2. The majority of the fabrication is off-site, and the Contractor will use the welding procedures and welders approved for off-site welding for the on-site installation welding.

##### 1.02 RELATED SECTIONS

- A. Section 01120, Safety Requirements for Welding and Cutting (Burning) and Incidental Welding.
- B. Section 15146, Stainless Steel Piping

##### 1.03 REFERENCES

- A. AWS QC-1, Specification for Qualification and Certification of Welding Inspectors, 1988 Edition.
- B. ASME Boiler and Pressure Vessel Code, Sect. IX, Welding and Brazing Qualifications, 1992 Edition.
- C. ASME Boiler and Pressure Vessel Code, Sect. V, Nondestructive Examination, 1992 Edition.
- D. ASME Boiler and Pressure Vessel Code, Sect. II, Part C, Material Specification, 1992 Edition.

- E. Technical Specification Div. 18B, On-Site Welding, June 1993 Edition (available on request).
- F. ASME B31.3, Chemical Plant and Petroleum Refinery Piping, 1993 Edition.
- G. ASNT, Recommended Practice SNT-TC-1A, December 1988 Edition.

#### 1.04 DEFINITIONS

- A. **Engineer:** The Facilities Manager's engineering organization responsible for the design of the system, component, or structure.
- B. **Examination:** Nondestructive testing performed on a weld to determine its compliance with established acceptance standards. A visual examination evaluates specifically listed attributes to established acceptance criteria.
- C. **Examiner:** A qualified individual who performs examination functions.
- D. **Faying Surface:** The mating surface of a member which is in contact or in close proximity with another member to which it is to be joined.
- E. **Inspection:** Oversight function of welding provided by the Facilities Manager or CM to ensure that requirements applicable to welding are satisfied. A visual inspection evaluates such things as configuration, appearance, and location and is useful in identifying areas requiring further examination.
- F. **Inspector:** A qualified individual who is designated to perform welding inspection functions.
- G. **On-Site:** Welding activities which occur at any one of the DOE facilities managed by the Facilities Manager, including ORNL, K-25, and Y-12 at Oak Ridge TN.
- H. **Off-Site:** Welding activities which occur outside the boundaries of the DOE facilities operated by the Facilities Manager such as vendor shop fabrication of welded structures and equipment.
- I. **Procedure Qualification Record (PQR):** Written documentation of the qualification of a weld procedure by examination and testing of physical weld specimens made using the weld procedure.
- J. **Performance Qualification Test (PQT):** Standard performance test(s) which a welder must successfully pass in order to be qualified to weld. The requirements for these tests are based on a qualified WPS and establish a specific range of essential variables the welder is qualified for.
- K. **Welder Performance Qualification (WPQ):** The record which documents a welder's successful completion of a performance qualification test and establishes the range of variables the welder is qualified for.
- L. **Welding Procedure Specification (WPS):** A written document which establishes the essential, nonessential, and supplementary essential (when required) variables for welding and

provides direction to the welder for making production welds to ensure compliance with requirements.

## 1.05 SUBMITTALS

### A. Off-Site Welding

1. Approval of the following are required prior to welding.
  - a. Welder/welding operator qualification records, including evidence of updates.
  - b. Welding procedures and PQRs.
  - c. Visual examination and nondestructive examination procedures.
  - d. Qualifications of examination personnel.
2. Submit weld examination reports prior to delivery of the equipment.

### B. On-Site Welding

1. Submit the following for approval when the Contractor requests approval to use their procedures on-site.
  - a. Welder/welding operator qualification records.
  - b. Weld procedures and PQRs.
2. Submit one copy of the welder qualification request forms (Attachment A) and welder process usage form (Attachment B) for information as described on the form.

## 1.06 QUALITY ASSURANCE

- A. Welding to this specification requires that welders, welding procedures, examiners, and examination procedures meet the requirements specified in Part 2 or Part 3. For on-site welding, examinations are performed by Facilities Manager examiners using Facilities Manager procedures. For off-site welding, the Contractor performs examinations using personnel and procedures approved by the Facilities Manager.

## PART 2 PRODUCTS

### 2.07 MATERIAL REQUIREMENTS

#### A. Welding Rods and Electrodes

1. Verify filler materials delivered are legibly marked in accordance with the General Requirements for each specification listed in AWS or the ASME Boiler and Pressure Vessel Code, Sect. II, Part C, Material Specifications.

2. Verify bare filler material is identified with the applicable classification and/or specification numbers and is attached to each rod, strip, coil, or spool. Label each end of 36-in. rods.
3. Control, handle, and identify welding rods and electrodes at all times to avoid material degradation and to ensure they are identifiable as acceptable material until the material is consumed in the welding process.
  - a. Unless otherwise specified by the Facilities Manager, store and handle low-hydrogen electrodes in accordance with AWS D-1.1.

**B. Base Material**

1. Control base material and the marking of cut material to ensure the material is identifiable and traceable to applicable documentation when required by the Technical Specification or Contract.

**C. Welding Equipment for On-Site Welding at X-10**

1. For welded systems placed under ground or in direct contact with low resistance materials having contact with the ground, in addition to OSHA, follow the requirements of Attachment D, Welding Machine Requirements for Field Welding.

**2.08 OFF-SITE WELDING REQUIREMENTS**

**A. Welding Procedures**

1. Prepare written welding procedures and qualify them for the scope of welding required in accordance with the applicable code in para. 3.01.

**B. Qualification of Welders**

1. Qualify welders and welding operators to weld using the appropriate approved and qualified welding procedure(s). Submit records of qualification, including updates, required by the applicable code for the procedure. The welder qualification requirements and limits of qualification are those of the code for which the procedure is qualified.
2. Written approval of the qualification records is required prior to welding.

**C. Welder Stamps**

1. The Contractor assigns each welder or welding operator a unique identification symbol. Welders use this symbol to identify each weld, either by stenciling the symbol adjacent to the weld or by records traceable to the weld joint.

**2.09 INSPECTION/EXAMINATION OF WELDS MADE OFF-SITE**

- A. The Contractor is responsible for the performance of specified weld examinations. These examinations may be performed by qualified Contractor personnel or by an outside qualified

examination service. The following applies for examination of welds made off-site:

1. Certify examination personnel per the requirements in Part 3 of this Section.
  2. Submit weld examination procedures in accordance with the applicable construction code in Part 3.
  3. Examine welds in accordance with Part 3.
- B. Welds are subject to inspection by the Facilities Manager and/or the CM. The Facilities Manager or CM may request additional weld examinations on any weld to establish the quality of the weld. The Facilities Manager reserves the right to accept, reject, or demand removal of welds which are interpreted to be in violation of this specification.

### **PART 3 EXECUTION**

#### **3.010 General Welding Requirements**

- A. Make groove and butt welds complete joint penetration and continuous unless specified otherwise by the engineer. Backwelding of groove welds is acceptable. Do not make welds smaller or shorter than specified by design requirements and indicated on drawings, and do not make them substantially larger or longer than specified without the approval of the engineer. Do not change the location of welds without the approval of the engineer.
- B. Pipe Welding (Section 15146)
1. Weld piping systems in accordance with ASME B31.3.
    - a. Use the gas tungsten arc process for welds in the following materials:
      - 1) butt welds in piping 1 1/2-in. nominal pipe size and smaller,
      - 2) the root pass of stainless steel piping,
    - b. Purge the back side of the weld with Argon for stainless steel materials until a minimum of 3/16-in. material thickness separates the weld from the back side of the weld. Analyze the purge with an oxygen analyzer to assure that oxygen does not exceed 1%. Purging the weld root is not required flux coated GTAW weld filler wire is used.
    - c. Do not use copper or aluminum as temporary backing for pipe welding.
    - d. Do not use backing rings unless permitted on the drawing or in the piping specification.
    - e. Do not use the SMAW, FCAW, or SAW process for root pass welding of stainless steel piping welds.
    - f. GMAW with short circuiting transfer is prohibited for pipe welding.

### **3.011 ON-SITE WELDING**

#### **A. Operational Control**

- 1. Division 18, Welding, implements the method of accomplishment for on-site welding and therefore is the Government's on-site welding specification which applies unless otherwise approved by the Facilities Manager. To be in full compliance with the references in Part 1, welding must be within the operational control of each organization using it. This may be achieved by each organization describing in their quality control program or adopting by reference to this section the following elements.**
  - a. Each organization using Div. 18, Welding, may request the Facilities Manager's Facility Design Systems Staff to make changes. Identify the section number and the suggested change. General comments that the specification is unacceptable will be returned for specific changes.**
  - b. The Facilities Manager, CM, and each contractor reviews and concurs with Div 18.**
  - c. The CM and each Contractor records acceptance of each WPS to be used by signing a copy of the example form included in Attachment C. These forms are available at the X-10 weld test shop and must be completed prior to testing welders or performing production welding. The weld test shop keeps a permanent record of these completed forms.**

#### **B. General Responsibilities**

##### **1. Facilities Manager**

- a. The Facilities Manager manages and operates welder qualification facilities for the Government.**
- b. The Facilities Manager maintains a comprehensive set of qualified on-site WPSs and PQRs for on-site welding.**
- c. The Facilities Manager manages welding activities of its forces and the work of its vendors.**
- d. The Facilities Manager provides inspection/examination and surveillance activities for welds made on-site.**

##### **2. CM**

- a. The CM provides management of CM and Contractor welding activities and coordinates the Contractor interface with the Facilities Manager for: weld procedure requalification, welder qualifications, and weld examinations.**

3. Contractor

- a. The Contractor is responsible for providing welding services in full compliance with the applicable code, contract, technical specifications, design drawings, and all other specified design documents.
- b. The Contractor is responsible for requalification of on-site weld procedures when required by the applicable codes.

C. Welding Procedures

1. The elements necessary to achieve qualified welding procedures are summarized below. Comprehensive sets of on-site WPSs are provided in other sections as follows:
  - a. 18350, Piping Welding Procedure Specifications (Div. 18B).
2. General
  - a. Use Div. 18B WPSs for on-site welding unless otherwise approved by the Facilities Manager.
  - b. The following documents located in Div. 18B, used in appropriate combination, constitute a qualified welding procedure.
    - 1) WPS (Sect. 18350).
    - 2) General Welding Requirements referenced by the WPS (Sect. 18310).
    - 3) The PQRs referenced on the WPS.
3. Facilities Manager and CM
  - a. Accomplish on-site welding using Div. 18B weld procedures. These procedures will be qualified in advance by the Facilities Manager and CM as required to be compliant with the applicable construction/welding codes. The Facilities Manager will provide copies of the PQRs to the CM and/or the Contractor as is necessary for their acceptance of the WPS.
4. Contractor
  - a. When possible, uses the prequalified (shared) on-site welding procedures as allowed by ASME B31.3, para. 328.2.2. The Contractor's signature on Attachment C asserts that he accepts the procedure without requalification. For ASME B31.3 shared procedures, the Contractor must identify at all times one welder whose qualification was tested by

bend tests.

- b. For all other procedures, the Contractor requalifies the existing weld procedure at the Facilities Manager weld test shop or submits PQRs which support the full range of the WPS in Div. 18. The Contractor's PQRs are entered on Attachment C. The Contractor signs the form accepting the WPSs and PQRs. Notify the CM 48 h in advance for qualification testing.
- c. If a weld is identified not covered by this specification, notify the Facilities Manager/CM so that procedures can be provided.

5. Exception

- a. When specifically approved by the Facilities Manger, the Contractor submits its own written weld procedures and PQRs for approval to be used for on-site welding.

D. Weld Joint Details

1. Use the piping weld joint details specified on the welding procedure specification unless otherwise specified on the construction drawings. For on-site welding, weld joint details are provided in Sect. 18370 of Div. 18B.

E. Welder Qualifications

1. The key elements necessary to achieve qualified welders and welding operators are summarized below. The detailed administrative requirements necessary to achieve compliance with the applicable codes are provided in Sect. 18360 of Div. 18B. Each organization performing welding is responsible for instructing their welders in the appropriate general welding requirements in Sects. 18310 and 18600.

2. Facilities Manager

- a. Provides welder qualification services to the CM and the Contractor at the X-10 weld test shop.
- b. Provides welder qualification records to the CM and Contractor and assigns a unique identification number to each qualified welder.
- c. Maintains a central data base of welders qualified to perform on-site welding and issues a listing of currently qualified welders on a monthly basis to the CM.
- d. Performs independent laboratory test functions such as guided bend tests for the CM and Contractors qualifying welders to the requirements of this program, and enters the results on a welder qualification test record.
- e. Performs the visual inspection/examination required by the PQT, documents the results on the welder qualification test record, and signs the record as the inspector for the visual.

**3. CM and Contractor**

- a. Responsible for coordinating the welder qualification tests for their welders with the X-10 weld test shop as follows:
  - 1) Notify the Facilities Manager 48 h in advance for qualification tests of individual welders by submitting for information one copy of the form in Attachment A to the CM.
  - 2) Positively identify each welder or welding operator.
  - 3) Accept in writing the qualification records of their welders qualified at the X-10 weld test shop.
  - 4) Provide the Facilities Manager with a record of welder process usage by filling out Attachment B and submitting for information one copy to the X-10 weld test shop.
- b. May designate a responsible individual to oversee the qualification of their welders and cosign test and inspection results.

**4. Exception**

- a. When specifically approved by the Facilities Manager to use their procedures, the Contractor submits welder certification records for approval for welders to be used for on-site welding.

**F. Weld Execution**

- 1. Each organization performing welding on-site is responsible for the following:
  - a. Providing welding services in full compliance with the applicable code, contract, technical specifications, design drawings, and other specified design documents.
  - b. Ensuring that the specified weld procedure is qualified for the application and that the welder(s) are currently qualified for the procedure and for the specific range of welds to be made.
    - 1) The Facilities Manager will specify welding procedures to be used. Notify the Facilities Manager for resolution any situations in which weld procedures are not qualified for the full range of welding, or if materials are required for which a procedure does not currently exist.
  - c. Requesting weld inspection/examination services from the Facilities Manager at least 24 h, whenever possible, in advance of the needed service.
  - d. Maintaining project records required by the specification for base materials and filler materials used in construction until completion of the project, at which time the records will be delivered to the Facilities Manager for storage.

e. Identifying completed welds using welder identification numbers assigned by the Facilities Manager.

f. Repairing welds that fail acceptance standards.

**G. Pipe Welding Procedures**

1. Select a welding procedure specification from Table 18100-1. The WPSs are provided in Sect. 18350 which is available upon request.
2. GT88-1(PP), GT88-2(PP), and SM88-1(PP) may be used (shared) by the CM or Contractor, without requalification, as allowed by ANSI B31.3. The remaining WPSs in Sect. 18350 require qualification by the CM and/or the Contractor prior to use. Once qualified by a Contractor, the procedure may be used on-site by that Contractor indefinitely without further requalification.
3. Weld pipe supports using one of the pipe welding WPSs from Sect. 18350 for the materials specified in the technical specification.

**Table 18100-1**

<b>Welding procedure</b>	<b>Application</b>
<u>Stainless Steel Piping/Tubing</u> (Sect. 15146)	
GT88-1(PP) GT88-2(PP) (See note)	All sizes
GT88-1(PP) GT88-2(PP) (See note) SM88-1(PP) (See para. 3.01.B.1)	Butt welds greater than 1 1/2 NPS
Note: This WPS uses a flux-coated wire with restrictions noted on the WPS	

**H. Inspection/Examination**

1. The Facilities Manager will provide the following:
  - a. Weld inspection/examination services required by the specifications. This does not relieve the Contractor from complying with other requirements of the code.
  - b. Select welds to inspect/examine as required by this specification.

- c. Interpret the results of weld inspections/examinations and accept or reject inspected/examined welds.
- d. Prepare and file inspection/examination reports.

### 3.012 EXAMINATION PERSONNEL CERTIFICATION REQUIREMENTS

- A. Personnel performing visual examination of welds shall be currently certified either as an AWS CWI or in accordance with the requirements of SNT-TC-1A, or work under the direct supervision of an SNT-TC-1A Level II, III, or CWI. If certified to SNT-TC-1A, satisfy the training and experience requirements entirely by time spent in weld examination related work.

### 3.013 EXAMINATION OF PIPING WELDS

#### A. Required Examinations

##### 1. Perform the following visual examinations:

- a. Perform a fit-up visual examination of all welds to assure, at a minimum, that markings and certifications are in accordance with specified requirements, the base metals are of specified thicknesses and types, materials are free from contaminants, fit-up meets the joint detail for the welding procedure specification, the weld purge when required by the WPS is set up properly and exit gas is being analyzed with calibrated equipment, and the welder is qualified to make the weld.
- b. variables specified by the joining procedure, including filler material, position, electrode, etc.;
- c. condition of the root pass after cleaning—external and, where accessible internal—aided by liquid penetrant if determined necessary by the inspector;
- d. Perform a final visual examination of all welds in accordance with ASME B31.3, para. 341.4.1(a).

#### B. Acceptance

- 1. The acceptance criteria of ASME B31.3, para. 341.3.2, and Table 341.3.2A for normal fluid service apply for visual examination. Incomplete penetration when complete penetration is required is unacceptable.

### 3.014 REPAIR

- A. The Contractor is responsible for the repair or replacement and reexamination of rejected welds.

END OF SECTION

**WELDER QUALIFICATION REQUEST REQUIREMENTS**

LMES, MK-Ferguson, and Contractors request welder or welding operator qualifications on this form.

1. The welder's supervisor fills out and signs the form.

**CONTRACTOR**

Sends the form to MK-Ferguson's Welding Engineer 48 h in advance (when practical) of the need for qualification testing.

MK-Ferguson's Welding Engineer or his designee signs the form and sends it to the X-10 Weld Test Shop at least 24 h in advance (when practical) of the welder.

The welder reports to the weld test shop. The supervisor or company designee signs the Welder Qualification Test Record form at the completion of the test. If the contractor will be sharing Weld Procedure Specifications as allowed by Sect. 18310, the supervisor or company designee designates a welder to be qualified by bend tests.

**MK-FERGUSON**

MK-Ferguson's welding engineer or his designee signs the form and sends to the X-10 Weld Test Shop at least 24 h in advance (when practical) of the welder.

Welder reports to the weld test shop. MK-Ferguson's welding engineer or designee will witness the test and sign the Welder Qualification Test Record form. If the CM will be sharing Weld Procedure Specifications as allowed by Sect. 18310, designates a welder to be qualified by bend tests.

**LMES**

The supervisor sends the form to the Weld Test Shop 24 h in advance (when practical) of the need for qualification testing.

2. The welder performs the Performance Qualification Tests requested. These tests will be witnessed by the Weld Test Shop test supervisor/welding inspector. The responsibilities are described in Div. 18, Welding, Sect. 18100 and Sect. 18260, 18360, or 18460 as appropriate.
3. The test supervisor/welding inspector fills out the Welder Qualification Test Record form at the conclusion of the tests.
4. The test supervisor/welding inspector signs the form for LMES welders. The company representative signs the record for their welders.
5. The original records are filed at the Weld Test Shop for LMES welders. For MK-Ferguson and Contractor welders, the original is sent to the employer and a copy is filed at the X-10 Weld Test Shop.
6. The welder's qualification information is added to the welder qualification data base which is distributed a minimum of once each month.

ATTACHMENT A  
REQUEST FOR WELDER OR WELDING OPERATOR QUALIFICATION

X-10    K-25    Y-12

FILL OUT FORM IN BLACK INK

Name	Employee No.	Stencil No.
Dept.	Employer	Test Date
<p>List Standard Test Numbers from Div. 18, Welding, Sect. 18260, 18360, or 18460. If you don't know the Standard Test Numbers, skip and fill out the next section below.</p>		
1.	2.	3.
4.	5.	6.
<p>If you don't know the standard test numbers, describe the welding you expect the welder to do.</p>		
Code:	Structural AWS D1.1, D1.2, D1.3	Piping ASME B31.3
		Ductwork AWS D9.1
		Other _____
Process:	SMAW      GTAW      FCAW      GMAW-SA      GMAW      OTHER _____	
Base Material 1	CS    SS    Ni    Cu    NiCu    CuNi    Alum      Other _____	
Base Material 2	CS    SS    Ni    Cu    NiCu    CuNi    Alum      Other _____	
Form	Pipe (Smallest Diameter _____)	Plate
Thickness	Minimum _____	Maximum _____
Filler Material	_____	
Other	_____	
<p>If B31.3, should welder be qualified by bend tests?      Yes      No</p>		
Signature-Supervisor		Date
Signature-MK-F Welding Engineer (1)		Date

Note 1: Not required for LMES welders.

## WELDER QUALIFICATION UPDATE REQUIREMENTS

All Lockheed Martin Energy Systems (LMES), MK-Ferguson (MK-F), and Contractor welders whose qualifications are maintained by the X-10 Weld Test Shop use this form to update.

Either of the following activities will update a welder's qualifications in the welding process used:

1. The welder using the process or procedure on a job observed by a welding inspector or supervisor, and that observation is documented.
2. The welder welding a sample coupon observed by a welding inspector or supervisor, and that observation is documented.
3. The welder welding an update test at the X-10 Weld Test Shop.

The "Record of Welder or Welding Operator Process Usage" Form UCN-18983 is available from the X-10 Weld Test Shop and is designed for documenting this activity. Fill out the form in black ink.

The following procedure is required:

1. The welder signs the form acknowledging use of the procedure.
2. The welding inspector, or the welder's supervisor who observed the welding verifies this information for each procedure/process (GTAW, SMAW, GMAW, etc.) usage entry on the form.
3. The welder's supervisor signs at the bottom of the form verifying the accuracy and completeness of the form. The supervisor is responsible for the welder properly updating each qualification.
4. After a welding update test has been completed at the Weld Test Shop, the inspector administering the test signs as the person verifying use of the process and as the supervisor.

LMES

The LMES supervisors send the original form to the Weld Test Shop.

MK-F and Contractors

1. MK-F and Contractors keep the original form for their records and send a copy to the Weld Test Shop.
2. For MK-F and Contractor welders updating their qualifications at the Weld Test Shop, a copy of the form is retained by the Weld Test Shop and the original sent to the contractor.

The Weld Test Shop retains all records as necessary for audit purposes.



ATTACHMENT C

FORM FOR CONTRACTOR ACCEPTANCE OF WPS

Original on File at the X-10 Weld Test Shop

<b>X-10 K-25 Y-12</b>			
WELDING PROCEDURE SPECIFICATION (WPS)		NUMBER:	
STRUCTURAL PIPE DUCTWORK		REVISION:	
CONTRACTOR	AUTHORIZED SIGNATURE	DATE	PQR(S)

NOTE 1: For shared procedures as allowed by ASME B31.3, para. 328.2.2; procedures prequalified per AWS D1.1; or procedures qualified by the Facilities Manager per AWS D9.1, the PQRs are those listed on the WPS. The contractor's signature asserts that he has reviewed and approves the WPS, the PQRs listed on the WPS, and the specifications referenced on the WPS. For ASME B31.3 shared procedures, the contractor must identify at all times one welder whose qualification was tested by bend tests.

## ATTACHMENT D

### WELDING MACHINE REQUIREMENTS FOR FIELD WELDING

#### 1.0 SCOPE

These welding equipment requirements apply to construction, fabrication, or installation of metallic systems such as piping, duct work, and structures in locations where the system is in direct contact with the ground (earth) or with low-resistance materials which are in contact with the ground.

#### 2.0 GENERAL REQUIREMENTS

The purpose of this procedure is to prevent stray welding currents from passing through the earth and contributing to accelerated corrosion of components in contact with the earth. These requirements are in addition to requirements imposed by the Welding Procedure Specification.

#### 3.0 EQUIPMENT REQUIREMENTS

- 3.1 Use welding machines with no less than 1-megohm electrical resistance between the welding machine output and the machine enclosure.
- 3.2 Use welding cables with a voltage rating of at least 600 V and electrical resistance to ground of the insulation (welding cable and cable connectors) of no less than 1 megohm.
- 3.3 Provide footswitches, when used, which cut off voltage to the electrode holder when released.
- 3.4 For testing equipment, use a motor-driven megger with output voltage of at least 500 V dc.

#### 4.0 OPERATING PRACTICE

- 4.1 Locate the welding machine as near the point of welding as possible, and support both cables (positive and negative) off the ground by methods which will provide electrical isolation from the ground during machine operation. Make both cables as short as practical.
- 4.2 Firmly clamp the grounding cable for good electrical contact at a location which will provide a low resistance path to the weld and not permit stray currents through the earth. Attach the ground as near the weld as possible, preferably on the material being welded (within 10 ft when possible).
- 4.3 Turn the welding machine off during extended periods of nonuse such as lunch breaks, end of shift, or other welding delays.
- 4.4 The Facilities Manager inspector approves the initial setup at a job site and any significant changes in welding equipment arrangements when the work is on material in direct physical contact with the earth.
- 4.5 Do not allow the welding torch and "hot" connectors to contact wet earth while the welding voltage is on.

#### 5.0 EQUIPMENT TESTING

- 5.1 The equipment owner/operator is responsible for assuring that the welding machine and welding cables meet the requirements of Sect. 3.0 prior to their installation at the job site.

- 5.2 Prior to use, have a qualified person test the welding equipment and/or allow the inspector to approve the equipment arrangement. No initial testing is required if sufficient information is provided as to the adequacy of the equipment. If the inspector questions any equipment, have the insulation tested in accordance with 5.3 or 5.4 by a qualified person.
- 5.3 Check the welding machine insulation resistance between the output terminals and the machine enclosure with the megger (Sects. 3.1 and 3.4) at 500 V dc applied for a minimum of 15 s. CAUTION: If the inverse peak (I.P.V) rating of the rectifier is less than 500 V, either short out the rectifier or use lower megger voltage.
- 5.4 Check the welding cable insulation integrity between the cable conductor and ground, with the cable arranged as for welding, with the megger at 500 V dc applied for a minimum of 15 s for compliance with Sect. 3.2. If the initial test is made on a dry ground surface, repeat this test at the first opportunity following a rain while the cable and ground surfaces are wet. Follow this requirement for subsequent retests.
- 5.5 Install a 0 to 150-V-dc voltmeter on the welding machine and connect to indicate welding machine output voltage. Check this meter daily to confirm proper operation of foot pedal control. If the output voltage does not return to zero when the foot pedal is released, perform maintenance or have the pedal replaced.
- 5.6 Repeat the resistance test of 5.3 and 5.4 at the request of the Facilities Manager inspector at intervals depending upon weather, site conditions, equipment handling care, etc. When machines or cables are being used in a wet or muddy environment, repeat the test at least once each month.
- 5.7 Document the equipment checks of 5.3 and 5.4. Attach a check-off card (see Fig. 1 for an example) to each welding machine.
- 5.8 When a foot switch is not required for welding control, use a nonconductive support approved by the Facilities Manager inspector for holding the welding electrode and clamp when not in use. Include this support in the test of 5.4 with the electrode connected to the cable and resting on the support.

**WELDING EQUIPMENT RESISTANCE CHECK**

WELDING ORGANIZATION \_\_\_\_\_  
 JOB LOCATION \_\_\_\_\_  
 JOB TITLE \_\_\_\_\_  
 WORK ORDER \_\_\_\_\_

(Check appropriate column each day check is made)

MONTH \_\_\_\_\_ YEAR \_\_\_\_\_

DAY	FOOT SWITCH	CABLE	MACHINE	DAY	FOOT SWITCH	CABLE	MACHINE
1				17			
2				18			
3				19			
4				20			
5				21			
6				22			
7				23			
8				24			
9				25			
10				26			
11				27			
12				28			
13				29			
14				30			
15				31			
16							

SIGN AT END OF MONTH OR END OF JOB

<b>DESIGNEE</b>	<b>INSPECTOR</b>

Fig. 1. Test Check Card.



# CPRS, SUBMITTALS

## SECTION TITLE

SECTION NUMBER 18100

GENERAL WELDING REQUIREMENTS

DESCRIPTION OF ITEM REQUIRING SUBMITTAL	TYPE AND/OR NATURE OF SUBMITTAL	CONSTRUCTION SPECIFICATION ARTICLE	SUBMITTAL TO BE PERFORMED BY	REQUIRED DISPOSITION	RECORD COPY	
					YES	NO
<b>OFF-SITE WELDING</b>						
Welder Qualification Records	Record	18100,1.05 A	Contractor	Approval	X	
Weld Procedure Specifications	Procedure	18100,1.05 A	Contractor	Approval	X	
Weld Procedure Qualification Records	Record	18100,1.05 A	Contractor	Approval	X	
Visual and NDE Procedure	Procedure	18100,1.05 A	Contractor	Approval	X	
NDE Personnel Certifications	Record	18100,1.05 A	Contractor	Approval	X	
Records of Inspections	Record	18100,1.05 A	Contractor	Approval	X	
<b>ON-SITE WELDING</b>						
Welder Qualification Request	Record	18100,1.05 B 2 & Att. A	Contractor	Information	X	
Welder Process Usage	Record	18100,1.05 B 2 & Att. B	Contractor	Information	X	
Contractor Acceptance of WPS	Record	18100,3.02 A 1 & Att. C	Contractor	Information	X	
<b>ON-SITE WELDING USING CONTRACTOR PROCEDURES PER PARA. 1.01 D</b>						
Welder Qualification Records	Record	18100,1.05 B 1	Contractor	Approval	X	
Weld Procedure Specifications	Procedure	18100,1.05 B 1	Contractor	Approval	X	
Weld Procedure Qualification Records	Record	18100,1.05 B 1	Contractor	Approval	X	

**ATTACHMENT C - CPRS, SUBMITTALS ACCEPTED  
& INDIVIDUAL SUBMITTALS ACCEPTED:**

**TITLE III REP.** \_\_\_\_\_ **DATE:** \_\_\_\_\_  
**RED:** \_\_\_\_\_ **DATE:** \_\_\_\_\_  
**RED:** \_\_\_\_\_ **DATE:** \_\_\_\_\_  
**RED:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**DISTRIBUTION**

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