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PLANT 1 PAD CONTINUING RELEASE REMOVAL ACTION WORK PLAN JUNE 1991

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PLANT 1 PAD CONTINUING RELEASE

REMOVAL ACTION WORK PLAN

FERNALD SITE OFFICE
FERNALD, OHIO

June 1991

U. S. DEPARTMENT OF ENERGY

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PLANT 1 PAD

CONTINUING RELEASE

REMOVAL ACTION

WORK PLAN

MAY 1991

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EXECUTIVE SUMMARY

The Department of Energy (DOE) has conducted a Removal Site Evaluation (RSE) under authorities delegated to the agency under Section 104 of the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA), through Executive Order 12580. The RSE was performed to determine whether the conditions present at the Plant 1 Pad warrant a removal action under CERCLA, consistent with Section 300.410 of the National Contingency Plan (NCP). Based upon the information in the RSE, DOE has determined that a removal action is appropriate and has issued an Action Memorandum. The objective of the removal action is to implement interim actions to mitigate the continuing release of contaminants from the Plant 1 Pad until final remediation.

This document provides a work plan for United States Environmental Protection Agency (USEPA) review and comment which describes the removal action and is consistent with the 1990 CERCLA Consent Agreement between DOE and USEPA. In addition, the work plan partially fulfills the intent of the commitment made by DOE to supply the Ohio Environmental Protection Agency (OEPA) with a submittal for the Plant 1 Pad setting forth the closure plan information, data and schedules for review, comment and approval. A subsequent submittal to OEPA describing closure plan information, data and schedules as set forth under OAC 3745-66-10 through OAC 3745-66-20 and consistent with 1990 CERCLA Consent Agreement schedules for Operable Unit 3 will complete DOE's commitment to OEPA under the Proposed Amended Consent Decree.

The proposed removal action involves three major stages of activity which involve: (I) interim run-off control, (II) soil removal, new pad, and covered controlled storage construction, and (III) installation of sealed concrete over existing contaminated concrete and covered controlled storage construction.

The proposed removal action, coupled with the ongoing operational improvements described in this plan will significantly mitigate contaminated runoff from the Plant 1 Pad, provide an additional storage facility which meets 40 CFR 264 requirements for hazardous/mixed waste storage and provide a modern facility that will contribute to the efficient performance for long-term remedial actions for the Fernald Site.

1.0 INTRODUCTION

This document provides a work plan describing a proposed removal action for the Plant 1 Pad. The objective of the removal action is to mitigate the continuing release of contaminants from the Plant 1 Pad until final remediation is performed under Operable Unit 3. The proposed action is initiated by DOE under authorities delegated to it under Section 104 of CERCLA, through Executive Order 12580. As required by the 1990 CERCLA Consent Agreement between USEPA and DOE, this work plan, outlining the proposed removal action, is being submitted to USEPA to allow an opportunity for review and comment. This work plan is also being submitted to OEPA for review, comment, and approval consistent with and in partial fulfillment of the commitment made by DOE in the Proposed Amended Consent Decree to supply OEPA with a submittal for the Plant 1 Pad setting forth the closure plan information, data and schedules.

The Fernald Site is not intending to perform closure of the Plant 1 Pad at this time; final closure of the Plant 1 Pad will occur with the final remedial action. The proposed removal action is protective of human health and the environment and will be conducted consistent with all CERCLA and Resource Conservation Recovery Act (RCRA) requirements.

The proposed removal action work plan details three stages of activity. Stage I involves the installation of a membrane on the west edge of Plant 1 Pad extending into the adjacent grassy area where contaminated runoff has occurred. The membrane will provide a clean surface for rainwater runoff to the storm sewer system and provide run-on control during construction in this area. Stage II involves removal of soils from the area until a level of 35 pCi/gram of total uranium contamination is attained in the grassy area west of the existing Plant 1 Pad. The activity level of 35 pCi/gram for uranium was adopted from the NRC Branch Technical Position (BTP)[1]. A new 100,000 square foot pad will be constructed including two 40,000 square foot covered controlled storage structures. Stage III of activity involves installation of a clean layer of concrete, sealed between two impermeable barriers, over the 375,000 square feet of existing Plant 1 Pad. A 22,500 square foot covered storage area and new curbing will also be erected on the new concrete.

Each stage of the proposed removal action will greatly minimize the potential for continuing release of contamination from the Plant 1 Pad. Stage I, involving installation of the membrane and partial perimeter curb, will prevent continued contaminated runoff onto the adjacent grassy areas west of the pad and prevent contamination on the west edge of the pad and the grassy area from being transported to the storm sewer. Stage II, involving the construction of a new sealed concrete pad and covered storage, will significantly reduce the deterioration of drums through covered storage and prevent rainwater from providing a pathway for transport of contamination to the environment. Construction of curbs and control sumps within the covered structures will prevent the migration of

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[1] Disposal or On-site Storage of Thorium and Uranium Wastes from Past Operations, U.S. Nuclear Regulatory Commission, FR 46 205, October 23, 1981.

contamination from leaking drums or spills to the environment. Stage III, involving the installation of sealed concrete over the existing pad concrete, will immobilize the contamination under the sealed concrete and mitigate the potential for transport into the environment. In addition, by resurfacing the existing pad with new sealed concrete, curbing of the pad perimeter, and adjusting grades for stormwater control, the continuing release from the surface of the pad and through the pad to adjacent and underlying soils will be mitigated.

The three stages of the proposed removal action also contribute to the efficient performance of long-term remedial actions anticipated for the Fernald Site. By mitigating the continuing release of contamination from the Plant 1 Pad, this will reduce the total amount of contaminated soil that will need to be addressed under the final remedy. The removal of contaminated soil from the grassy area west of the Plant 1 Pad will eliminate the need for this action under the final remediation; ***additional actions may be necessary dependent upon the selection of final remedies and cleanup levels.*** The installation of sealed concrete over the existing contaminated, deteriorated Plant 1 Pad will mitigate further migration of this contamination, thus reducing the magnitude of future cleanup under the remediation. Finally, most of the currently conceived final remedy options for some of the other Operable Units will require large staging areas for containers holding exhumed waste materials. The construction upgrade of the Plant 1 Pad provides a significant staging area that will contribute to the efficient performance of final remedial actions.

2.0 FERNALD SITE BACKGROUND

The Feed Materials Production Center (FMPC) was the name of the uranium production facility owned by the U.S. Department of Energy, now called Fernald Site (FS). The location of the 1050 acre site is shown in Attachment 1, Figure 1. The FS was placed on the National Priorities List (NPL) in 1989. The DOE is conducting a Remedial Investigation and Feasibility Study (RI/FS) and other response actions under a 1990 CERCLA Consent Agreement with the USEPA.

Since the early 1950's, various chemical and metallurgical processes have been used to manufacture uranium products for the defense complex. The FS ceased these operations in July 1989. Substantial quantities and varieties of waste materials were generated during production operations. Some of the current waste inventory contains radioactive materials and some contains both radioactive and hazardous constituents, as defined under the Resource Conservation and Recovery Act (RCRA). It is expected that a large part of the waste materials handled during the remedial phase will also contain similar constituents.

Since July of 1989, uranium production has been halted at the FS, and restart of uranium production activities in the future is unlikely. As of October 1, 1990, responsibility for the FS is administratively transferred from the Defense Programs Division to the Environmental Restoration and Waste Management Division of the DOE in order to better manage the activities of the site.

3.0 PLANT 1 PAD BACKGROUND

3.1 MATERIAL STORAGE

Plant 1 is the "sampling plant" for the FS and is, therefore, the location for sampling of large amounts of uranium metal process residues and waste materials. The concrete storage pad associated with Plant 1, which has been designated as a Hazardous Waste Management Unit (HWMU), has been used as a drum storage location to support these operations since 1952. The Plant 1 Pad and adjacent unpaved area comprises approximately 12 acres on the northwest side of the process area as shown in Attachment 1, Figure 2.

The material types stored in the past, currently stored, and intended for future storage on the Plant 1 Pad are detailed in the Table 3-1.

TABLE 3-1

PAST, CURRENT, AND FUTURE PLANT 1 PAD USE

MATERIAL TYPE	PAST	CURRENT	FUTURE
Low Level Waste	X	X	X
Unevaluated Waste	X	X	
Copper Scrap	X	X	X
Construction Rubble	X	X	X
Recoverable Material	X	X	X
Mixed/RCRA Waste	X		X
CERCLA Waste		X	X

Low level wastes (LLW) include scrap pallets, drummed uranium residues, and miscellaneous drummed materials such as dirt, concrete, and asbestos. The low level wastes are intended to be stored on the pad until planned processing and disposal actions are completed.

The approximate 45,000 drums of unevaluated waste stored on the Plant 1 Pad will fall into one of three categories once a RCRA evaluation is completed per the schedules set forth in the Proposed Amended Consent Decree. The wastes will either be classified as RCRA wastes, mixed RCRA wastes or LLW. The majority of these containers are drums which contain various uranium residues from FS processes. The final completion date for the RCRA evaluation, as detailed in the Proposed Amended Consent Decree is September 1992, with interim completion dates for specified material categories. The plan is to move the drums/containers, which are evaluated

to be RCRA, into FS RCRA storage units as identified in the Part A Permit Application within 60 days after identification as a RCRA waste.

If storage space which meets RCRA and Ohio hazardous waste storage requirements is not available, DOE will store such wastes in a manner as protective of human health and the environment as possible. Also, DOE will perform daily leakage inspections on all such containers that are not located under cover, and shall, within sixty (60) days of a determination that sufficient RCRA storage space is not available, submit a plan and schedule for OEPA approval for short-term storage of such wastes. DOE will perform weekly inspection in accordance with 40 CFR 265.15 and 265.174, and OAC 3745-65-15 and 3745-66-74 on all such containers.

The 1,375 tons of copper scrap stored on the Plant 1 Pad are included as part of the DOE Oak Ridge Metals Management Program. The copper scrap is planned to be removed from the Plant 1 Pad at some future date, when the implementation phase of the program is finalized.

Construction rubble containers, including sea/land, boxes, and drums, are staged on the Plant 1 Pad prior to disposal. The containers primarily contain dirt, concrete, metal, and asbestos. This practice will continue as it minimizes handling/transportation of the waste on-site prior to disposal.

Recoverable materials, such as enriched residues with high uranium content and solid uranium metal, are also stored on the Plant 1 Pad. The FS is currently evaluating off-site shipment or indoor long-term storage of this material.

Mixed/RCRA wastes have been stored on the Plant 1 Pad in the past and subsequently moved to RCRA storage upon evaluation. Once the Phase A/B construction is complete and the Part A Permit Application is revised to include the Plant 1 Pad, mixed/RCRA wastes are planned to be stored in the Phase A/B structures. The earliest date for mixed/RCRA waste storage is estimated to be August of 1992 pending a June 1991 start of the Phase A/B construction. Storage of evaluated RCRA/mixed waste on the Plant 1 Pad is not planned prior to completion of the Phase A/B construction unless existing FS storage facilities become filled. In this case, the actions as outlined under the unevaluated waste paragraph will be implemented.

CERCLA waste currently stored on the Plant 1 Pad includes drums of soil cuttings from RI/FS well borings that have been determined not to be hazardous wastes. The inventoried CERCLA well cuttings will be dispositioned pending receipt of representative analytical data as to their radionuclide concentration. In the future, the upgraded Plant 1 Pad will provide a staging area for any CERCLA related wastes, as necessary.

3.2 PAD CONDITION AND RELEASES

Materials containing varying amounts of uranium (U metal, UO_3, UF_4, and UO_2), thorium, and other hazardous substances are stored on the Plant 1 Pad. Some of the carbon steel drums used to store wastes on the pad have

deteriorated as a result of extended exposure to the elements, thereby increasing the risk of release of hazardous material to the environment. Sections of the pad have no curbs for containment and therefore, some portion of the pad drains onto the adjacent grassed area, nor are there sumps for collecting and controlling the stormwater runoff from the pad. In addition, a portion of the drums are being evaluated for RCRA constituents and are undergoing characterization ***using TCLP procedures as outlined in 40 CFR 261 Appendix II (as amended by 55 FR 11798).*** RCRA materials identified so far include drums of barium salts and drums of waste oils contaminated with 1,1,1-trichloroethane and lead. Materials containing quantities of solvents (1,1,1-trichloroethane, tetrachloroethylene, methylene chloride, and xylene) have also been identified on the pad.

On February 12, 1990, during the movement of material to RCRA storage, 200 drums were identified as having an accumulative inventory loss of 4,261 pounds. These materials have reportable quantity limits ranging from one pound to one thousand pounds, e.g. material codes, D004 and D005, and because some of the drums were in a deteriorated condition, a potential release above the reportable quantity may have occurred. The initial verbal report was made by DOE to all appropriate agencies on February 13, 1990 with a written report issued to the state and local emergency planning agencies on March 13, 1990.

On May 8, 1990, the FS reported a potential release of a hazardous waste from the Plant 1 Pad as the result of weight discrepancies discovered during the overpacking and movement of 319 containers stored on this pad. Pursuant to 40 CFR 355.40(b) and OAC 3750.06(D), a written follow-up report was submitted within 30 days of the occurrence of the event. The report was submitted on June 6, 1990, to the OEPA, the State Emergency Response Commission (SERC), and various local emergency planning committees.

Additionally, the pad has a number of cracks and control joints which may serve as a route of contamination release. On July 17, 1990, a minor event occurred on the Plant 1 Pad related to drum movements. A fork truck, which was routinely moving drums, drove over a deteriorated section of the pad and a drum shifted causing a spill. The material was cleaned up and operations were ceased until the conditions of the pad were improved. The rough surface of the pad has also been the subject of numerous complaints from Waste Operations personnel related to potential back injuries. The final report for this expedited maintenance is included for information in Attachment 4.

3.3 WATER DRAINAGE

The Plant 1 Pad is currently not covered and therefore, is exposed to any precipitation that may fall onto it. The majority of the runoff from the pad drains to approximately 14 storm sewer catch basins and manholes which feed directly into the storm sewer system. From the storm sewer system, collected water is pumped to Manhole 175.

Prior to 1988, the runoff from the north and west side of the Plant 1 Pad flowed west through a culvert and into the Waste Storage Area where it eventually drained into Paddy's Run Creek. The detail of the water drainage from the Plant 1 Pad prior to October 1988 is shown in Figure 3-1.

Currently, stormwater draining from the pad area onto the adjacent soils has been rerouted to discharge to the existing process area storm sewer system. This water previously flowed through the Waste Pit Storage Area and discharged to Paddy's Run. The drainage ditch which redirected the flow to the storm sewer system was completed in 1988 and resulted in a reduced uranium discharge level to Paddy's Run. Two work items were completed to accomplish the rerouting of these flows. These items are as follows:

1. Integral curbs were provided along the southwest corner perimeter of the Plant 1 Pad. The runoff water collected, along with the existing localized storm sewer flow which previously discharged to Paddy's Run, was routed easterly via a new storm sewer to discharge into the existing process area stormwater collection system.

2. A previously existing drainage outlet culvert leading from the drainage area north and west of the Plant 1 Pad was plugged. The culvert is located under the west plant perimeter gravel roadway at the northwest corner of the Plant 1 Pad. The slope of the drainage ditch upstream of the culvert was reversed to flow east toward an existing plant storm sewer. A new inlet to the existing storm sewer line was constructed to collect this rerouted runoff and convey it to the existing Storm Water Retention Basin (SWRB). The current water drainage from the Plant 1 Pad is shown in Figure 3-2.

3.4 RCRA STATUS

The Plant 1 Pad had been listed as an inactive unit in the FS's modified Part A Permit Application submitted to USEPA/OEPA in March 1989. At that time, a RCRA Storage Permit was not sought, based upon the previous projected RCRA storage requirements of the facility. Since a storage permit was not located in the March 1989, Part A Application, no design capacity was listed on Form 3 of the Part A. The FS modified and resubmitted to OEPA its Part A Application in September 1990. The September 1990, modified Part A Application includes the TCLP hazardous waste numbers and includes the Plant 1 Pad intended storage design capacity. The June 1991, modified Part A Application resubmittal will include all of the FS HWMUs and include EPA waste codes/quantities consistent with the waste/material evaluations being conducted in accordance with the Proposed Amended Consent Decree. The FS will submit a modified Part B Application to USEPA/OEPA in September 1991, which will modify the appropriate sections to include the Plant 1 Pad as a RCRA storage facility.

Because the FS is seeking a RCRA Storage Permit for the Plant 1 Pad, including the construction upgrade, a closure plan must be included in the facilities RCRA Permit Application meeting the requirements of OAC 3745-66-12 and 40 CFR 264.*178*. In addition, a submittal for the Plant 1 Pad setting forth the closure plan information and data, including a schedule, set forth under OAC 3745-66-10 through OAC 3745-66-20, must be provided to OEPA by the FS for review, comment, and approval within 60 days of the entry of the Proposed Amended Consent Decree. It is DOE's intention that the information, data, and schedules in the Proposed Amended Consent Decree Closure information submittal, be consistent with the information, data, and schedules developed pursuant to the 1990 CERCLA Consent Agreement. The submittal of this proposed Removal Action Work Plan, along with the closure plan information is intended to meet the Proposed Amended Consent Decree information commitment.

The intent of the Plant 1 Pad Closure requirements is to minimize the need for further maintenance of the facility after closure and to protect human health and the environment. The Plant 1 Pad Closure information to be included in the modified Part B Application and the Amended Consent Decree submittal will describe the following actions:

* Remove all stored material from the pad.
* Clean pad surface by high pressure washing.
* Collect and analyze wash water to determine proper disposition (Hazardous waste vs. nonhazardous waste).
* Collect and analyze rinseate samples to determine if the pad has been decontaminated.
* Repeat high pressure washing and rinseate analysis up to a total of three times, if needed, to achieve cleanup to regulatory levels.
* Certify closure.

It is important to note that the final remediation under Operable Unit 3, which includes the existing Plant 1 Pad and affected contiguous soils, will address any soil and perched water contamination.

3.5 STORED DRUM MANAGEMENT

In order to supplement the three stage removal action described in this work plan, the FS has set forth a program to minimize environmental impact of stored, drummed materials at the FS. The actions listed below are being or have been implemented to mitigate spills/leaks from drums on the Plant 1 Pad.

- Overpacking of deteriorated drums on the Plant 1 Pad.
- Daily drum leakage inspections.
- Weekly inspection consistent with 40 CFR 265.15 and 265.174 and OAC 3745-65-15 and 3745-66-74.
- Operation of a lined staging area for deteriorated drums prior to overpacking.
- Relocation of a lined staging area for deteriorated drums prior to overpacking.
- Completed rearrangement of remaining Plant 1 Pad drums to provide adequate aisle spacing for leakage inspections.
- Completed expedited repair of pad deterioration that would permit safe movement of the drums to achieve adequate aisle spacing. The repair consisted of filling in deteriorated sections of the pad and cutting away severely cracked areas with subsequent replacement of the needed concrete. This repair was conducted in concert with the drum movements. Controls were used during the repair to minimize the spread of contamination and to drum the waste for subsequent evaluation.
- Completed erection of a 6,226 square foot tension support structure on the Plant 1 Pad as a demonstration project for storage/staging of contaminated materials/containers.

All of the above actions, as detailed in the "FMPC Drum Management Plan" are consistent with the Proposed Amended Consent Decree commitments and will result in a substantial environmental improvement at the FS. ***The drum management plan which is in compliance with the Amended Consent Decree is currently being used to manage operational activities at Plant 1 Pad.***

4.0 SUMMARY OF EXISTING SAMPLING DATA

Extensive sampling has been completed in the Plant 1 Pad area in support of the proposed removal action, the FS Environmental Monitoring program, and the ongoing RI/FS Study. These samples were collected to characterize the existing environmental conditions and to assess the nature and extent of any chemical or radiological contaminants present at that location. The sampling focused on the surface and subsurface soils adjacent to and under the Plant 1 concrete pad and the groundwater present in the glacial till and the regional aquifer in the vicinity of the pad. The following presents a brief summarization of the results of these characterization efforts: The RSE, as presented in Attachment 1, presents a summarization of available data collected in the vicinity of the pad. The final report on the Plant 1 Pad Expedited Maintenance, as presented in Attachment 4, summarizes data collected under the pad in the areas of work. Off-site laboratories included Oak Ridge National Laboratory (ORNL) and International Technology Corporation (IT) in Oak Ridge, Tennessee and Enwright Labs in Greenville, South Carolina.

4.1 SOILS

Soil sampling has been completed both adjacent to and under the existing Plant 1 Pad. This sampling included:

* Collection of surface soil samples at 21 locations at discrete depth intervals immediately off the western edge of the pad in support of the proposed removal action. Samples were collected in accordance with FMPC Environmental Monitoring Procedures with radiochemical, inorganic and EP Toxicity analysis performed at the FS Laboratories and volatile organic analysis at off-site laboratories.

* Collection of surface soil samples at 7 locations beneath the concrete on the western edge of the pad in support of the proposed removal action. Samples were collected in accordance with FMPC Environmental Monitoring procedures, with radiochemical, inorganic and EP Toxicity analysis at the FS Laboratories and volatile organic analysis at off-site laboratories.

* Collection of surface soil samples from 47 locations in the grassy area west of the pad in support of the proposed removal action. Samples were collected in accordance with FMPC Environmental Monitoring procedures, with radiochemical analysis performed at the FS Laboratories.

* Collection of 21 surface soil samples from directly beneath the concrete pad, in support of the FS Environmental Monitoring Program. Samples were collected in accordance with Environmental Monitoring procedures, with radiochemical analysis performed at the FS Laboratories and inorganic and organic analysis performed at off-site laboratories.

- Collection of subsurface soil samples during the completion of 6 borings through the pad and 17 borings adjacent to the pad as part of the ongoing FS RI/FS. Samples were collected and analyzed in accordance with protocols defined within the FS RI/FS Work Plan Rev. 3.

Available analytical results for the noted samples, with the exception of the 21 surface soils samples beneath the pad, are presented in Attachment 1. The 21 surface soil samples, the results of which were just recently obtained, are reported as part of the Plant 1 Pad Expedited Maintenance final report.

4.1.1 SURFACE SOIL SAMPLES

As identified above, surface soil samples were collected from 28 locations along the western edge of the pad, 21 locations under the pad and from 47 locations in the grassy area to the west of the pad. Surface soil samples were analyzed for a range of radiological and chemical parameters. The collected samples were analyzed for one or more of the following:

- Total Thorium
- Total Uranium
- Total Metals (Eight Primary)
- EP Toxicity (Metals)
- Volatile Organics
- Hazardous Substance List (HSL)

As identified in Attachment 1, analysis for total metals was completed on a series of surface soil samples along and under the western edge of the concrete pad. As depicted in Appendix A, analytical results from the soil samples indicated a range of concentrations for barium and lead. No significant variation occurred between the samples collected beneath the pad and those collected adjacent to the pad. Two samples located under the western edge of the pad (locations 22 and 23) exhibited the highest concentrations of barium (236 and 1080 ppm) in the uppermost depth samples. The maximum total lead concentrations were typically found in samples collected adjacent to the pad as compared to under the pad. No significant concentrations of the remaining six primary metals were identified in the collected samples.

An EP Toxicity analysis for the eight primary metals was also completed on the surface soil samples adjacent to the western edge of the pad. The results of this analysis indicated no individual samples exceeding the regulatory threshold in 40 CFR 261. More significantly, the results of the EP Toxicity analysis provides an indication of the relative immobility

of the metals within the clay rich till matrix underlying the Plant 1 Pad area.

Volatile organic analysis was performed on samples collected from the 28 locations adjacent to the western edge of the pad. This analysis included the target organic compounds of xylene, acetone, methylene chloride and carbon disulfide. As summarized in Attachment 1, these target organics were identified in low concentrations (less than 40 ppb) in several discrete samples. These concentrations typically showed significant reductions with depth. As previously mentioned, 21 supplemental samples collected from beneath the concrete are included in the Plant 1 Pad Expedited Maintenance final report. Additionally, full Hazardous Substance List analysis was completed on 2 individual samples collected from immediately below the concrete in two RI/FS borings as identified and reported in Section 4.1.2.

A radiochemical analysis was completed on all collected surface soil samples as shown in Attachment 1. Radiochemical analysis of the samples collected adjacent to and under the western edge of the pad and in the grassy area west of the pad indicated the existence of above background concentrations of uranium in surface soils across the area proposed to be impacted by the removal action. As expected, these concentrations showed significant reductions with depth, being generally limited to the upper two feet of soil. Available surface soil sampling data from beneath the pad (not at the western edge) detected significantly lower concentrations than those collected adjacent to the pad. Concentrations from surface soil samples beneath the pad typically exhibited concentrations less than 30 ppm of total uranium, with an arithmetic mean of 25 ppm of total uranium. These concentrations are consistent with those identified in the uppermost samples from the RI/FS subsurface borings, as presented in Section 4.1.2.

Above background concentrations of other naturally occurring radionuclides were also detected in discrete surface soil samples. No general area of contamination or trend could be established from this data. In general, no individual soil sample exhibited the presence of a naturally occurring radionuclide in concentrations significantly above background without the presence of elevated total uranium concentrations in the same sample.

4.1.2 SUBSURFACE SOIL SAMPLES

As part of the ongoing RI/FS at the FS, 6 borings were completed through the Plant 1 Pad, 4 borings immediately adjacent to the pad, and an additional 13 borings in the vicinity of the pad area. Analytical results from these samples are presented in Attachment 1. These borings were completed in a manner consistent with the protocols defined within the RI/FS Work Plan and the Production and Additional Suspect Area Addenda to the Work Plan. The borings were advanced to a maximum depth of 20 feet or until significant water was encountered within the glacial till. In the event significant water was encountered, a two inch diameter PVC piezometer was set to support groundwater quality and flow

characterization. Water quality information collected from these piezometers is discussed in Section 4.2.

Subsurface soil samples collected during drilling were typically analyzed for total uranium and total thorium. More extensive analysis was completed on samples from two borings through the pad (1345 and 1346), including analysis for the parameters on the HSL. Radiochemical results from the samples from the borings through the pad indicated above background concentrations of uranium residing in the upper two feet of soils beneath the pad. These concentrations were typically localized to the upper foot of soils with concentrations averaging less than 35 ppm of total uranium. Uranium concentrations decrease sharply with depth, consistent with the surface soil samples collected adjacent to the pad. This significant decrease in concentration with depth is consistent with the hypothesis that the uranium was typically introduced into the environment in an insoluble form. Vertical migration within the soil matrix has been limited due to the impermeability of the underlying clays and the natural affinity of uranium and other metals for clays and other soil particles.

Subsurface soil samples collected from RI/FS borings off the edge of the Plant 1 Pad and those completed in the vicinity of the pad exhibited above background concentrations of total uranium in the uppermost samples. These concentrations, which averaged less than 50 ppm of total uranium, decreased sharply with depth and typically were within the range of background in samples collected from greater than two feet in depth. Analytical results from these borings were generally consistent with the surface soil samples collected from the same areas.

Soils samples collected from borings 1345 and 1346, located on the Plant 1 Pad, were analyzed for the substances on the HSL including volatile and semi-volatile organics, inorganics, pesticides and PCBs. Of the parameters on the HSL, only one organic parameter, trichloroethane, was detected in measurable concentrations (10 *ug*/kg) in one of the samples from 1346. No pesticides or PCBs were detected in the samples collected from the borings. As identified in Attachment 1, inorganic parameters on the HSL were identified in the samples in varying concentrations. As identified in Section 4.2, none of the listed inorganic parameters or trichloroethane were detected in collected groundwater samples. Surface soil samples collected from 21 locations beneath the concrete on the pad will provide additional data to assess the statistical significance of the inorganic analytical data from borings 1345 and 1346. ***RI/FS Work Plan Addenda will be issued as required to support additional RI/FS field programs in the Plant 1 Pad area.***

4.2 GROUNDWATER

Significant quantities of groundwater were encountered during the drilling of five of the six borings through the Plant 1 Pad. As identified in Attachment 1, piezometers were set in each of these borings for purposes of withdrawing representative groundwater quality samples. The highest

concentration of total uranium in groundwater from the piezometers on the Plant 1 Pad was 441 ppb in well 1339. The remaining piezometers exhibited concentrations significantly less than 1339, with the maximum concentration less than 45 ppb. Based upon the available information (i.e. lithologic data, depth to groundwater, etc.), there is no evidence to support the potential interconnection between 1339 and the other piezometers on the pad. Additionally, as defined below, samples withdrawn from wells screened within the sand and gravel aquifer hydraulically downgradient of the pad have not exhibited the presence of significant concentrations of radiological constituents.

Borings completed along the edge of the Plant 1 Pad exhibited concentrations of uranium in groundwater consistent with the samples collected from piezometers on the pad. The maximum concentration of total uranium in these piezometers was 40 ppb. Concentrations of total uranium in the 17 piezometers completed in the vicinity of the pad were significantly higher than those on or off the edge of the pad. The maximum concentration of total uranium in the piezometers installed in the vicinity of the Plant 1 Pad was 748 ppb, with an average concentration of 207 ppb. Only one of the borings in the vicinity of the Plant 1 Pad was located within the boundaries of the proposed pad expansion portion of the removal action. This boring, 1341, exhibited a total uranium concentration of 28 ppb.

As depicted in Attachment 1, a three well cluster (Location 55) resides immediately to the east of the Plant 1 Pad. This well cluster includes wells of 1000, 2000, and 3000 series. The 2000 and 3000 series wells are screened within the regional groundwater aquifer and are located hydraulically downgradient of the pad. Numerous samples have been collected from these wells as part of the ongoing RI/FS and FS Environmental Monitoring Program. This data, which is summarized in Attachment 1, exhibits wells 2055 and 3055 to be within the range of background for all naturally occurring parameters including the radionuclides and inorganic constituents. No above background concentrations of organic constituents were identified in the samples collected from these wells. The excellent water quality found in the Location 55 well cluster immediately downgradient of the Plant 1 Pad strongly supports the hypothesis that the low concentration of contaminants in the soils under and in the vicinity of the pad are being bound by the clay rich soils. Data collected from these wells strongly support the proposed Plant 1 Pad removal action.

5.0 NEED FOR REMOVAL

Consistent with Section 40 CFR 310.410 of the NCP, the DOE shall determine the appropriateness of a removal action (interim response). Section 40 CFR 300.415 (b) (2) of the NCP defines eight factors that should be considered in determining the appropriateness of a removal action. Five of these factors, listed below, are specifically applicable to this assessment.

40 CFR 300.415 (b) (2) (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

40 CFR 300.415 (b) (2) (ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems.

40 CFR 300.415 (b) (2) (iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

40 CFR 300.415 (b) (2) (v) Weather conditions that may cause hazardous substance or pollutants or contaminants to migrate or be released.

40 CFR 300.415 (b) (2) (vi) Threat of fire or explosion.

The DOE has determined that an interim response is appropriate, due to the current and ongoing potential for release of contaminants from the Plant 1 Pad area. The released contamination has the potential to migrate into the environment, where it may result in human exposure or contamination of drinking water supplies. An interim response to control stormwater runoff from this area and deter the further releases of contaminants from leaking drums should be undertaken. The RSE is included in Attachment 1.

6.0 PROPOSED PLANT 1 PAD REMOVAL ACTION

The objective of the removal action is to implement interim actions to mitigate the continuing release of contaminants from the Plant 1 Pad until final remediation. *A listing of Applicable or Relevant and Appropriate Requirements (ARARs) is included as Attachment 6 to the work plan and will be implemented to the extent practicable.*

The existing permanent boundary air sampling stations are adequate for normal pad activities. Portable temporary air samplers will be used adjacent to construction activities to measure fugitive dust emissions. The pad is swept routinely, however, additional control measures such as the following will be implemented as required during the removal action:

- *Emplacement of portable temporary air samplers at the perimeter of construction areas to measure localized fugitive dust emissions*
- *Periodic wetting of excavation and stockpiling activities*
- *Use of wet sawing of concrete and wetting of jack hammering areas*
- *Tarping of all vehicles transporting the soils to the stockpile*
- *Compaction of stockpiled materials, emplacement of erosion control fabric over the stockpile, and seeding of the stockpile*

6.1 STAGE I - INSTALLATION OF A MEMBRANE AND PARTIAL PERIMETER CURB

The first stage of the proposed removal action involves the installation of a membrane and partial perimeter curb on the northwest side of the Plant 1 Pad and continuing into the grassy area west of the pad as shown in Figure 6-1. The purpose of the membrane (herculite or similar material) is to provide a means of preventing stormwater runoff from coming into contact with the existing concentrations of hazardous substances residing in the surface soils along the western edge of the pad. The installation of the curb will clearly define the existing drainage divide and provide a mechanism for the membrane to be anchored. The membrane will provide run-on control for Stage II of the removal action by acting as a clean surface to channel rain water runoff. After the contaminated soils are removed from the Stage II area, the membrane will continue to control run-on in the excavation area until the placement of concrete for the new pad sections. During the Stage III removal action, both the membrane and partial perimeter curb will be removed in preparation of the new surface.

During the same time period as Stage I, the FS is planning to install two temporary tension support structures which will be used to provide covered storage for 18,000 drums. These two structures are planned to be leased for 16 to 18 months and will occupy approximately 27,000 square feet each as shown in Figure 6-4. Upon the completion of Stage II, these drums will be moved to these structures.

6.2 STAGE II - SOIL REMOVAL AND PHASE A/B CONSTRUCTION

Stage II of the removal action involves removal of contaminated soil down to an average activity concentration of 35 pCi/gram of total uranium followed by the Phase A/B pad construction. Phase A/B is new pad construction and will provide 80,000 square feet of covered controlled storage with the erection of two 40,000 square foot structures. Final construction drawings and specifications are provided in Attachment 7 for information. These construction plans provide a detailed description of the proposed construction activities. These structures will be erected on curbs for containment and will be internally subdivided into four discrete quadrants. Each quadrant will be provided with a centrally located trench drain which will lead to a sump. These drains and sumps have no connection to site drainage systems and serve only to collect rinseate in the event of a leak or spill. The trench drains and sumps will be sealed with a chemically resistant epoxy coating. Similarly, the new concrete pad storage surface will be sealed with an 86 mil chemically resistant polyurethane wear surface. The area involved includes approximately 86,000 square feet of grassed area and 7,000 square feet of overlap on the existing pad's west side. Water drainage after completion of Stage II action is shown in Figure 6-2.

Stage II of the removal action will involve the excavation of approximately 3,300 cubic yards of material (soil and concrete) based upon the sampling and analysis results of the area. Approximately 15% or 495 cubic yards of the material is estimated to exceed 100 pCi/g of total uranium contamination and will be containerized and staged on the existing Plant 1 Pad. ***Additionally, soils exhibiting elevated constituents of HSL, as defined in Section 8.0, Sampling and Analysis Plan (SAP), which were identified during pre-excavation sampling or excavation phase monitoring will similarly be containerized. The containerized soil and rubble will then be sampled and analyzed per Section 8.0 of the Work Plan and if determined to be non-RCRA will be placed in inventory as low level waste pending final disposition.*** If the containers are determined to contain RCRA constituents, the containers will be properly labeled and placed into proper HWMU storage.

The remaining 85% of the material removed during Stage II excavation is estimated to contain between 35 and 100 pCi/g of total uranium. ***These soils will be transported to a contaminated soil stockpile north of the Plant 1 Pad. At this location, soils will be placed on grade, stabilized, covered with erosion control fabric, and seeded. The erosion control fabric will be maintained on the stockpile until a good vegetative cover is developed. Routine surveillance will be conducted on the Soils and Rubble Pile North of Plant 1 Pad to determine if additional controls are required to minimize erosion. These materials will remain on site until final disposition under the remedial actions of Operable Unit 3.***

The excavated area described in the Stage II removal will be covered with the membrane liner as described in Stage I until analytical verification of radiological content is received. Backfill of the excavated areas will be performed following analytical verification that the build-over

criteria of an average activity concentration of 35 pCi/gram of total uranium has been achieved. Experience to date on other site construction actions support the usage of total uranium concentrations as an indicator of the presence of concentrations of other hazardous substances. The usage of total uranium analytical results as the decision factor for initiating backfill activities allows construction to proceed in several days versus a week or more for other types of analyses. All of the soil excavations described in Stage II of the removal action will be based on the existing analytical data and verified by follow-up sampling as detailed in Section 8.0. Based on previous experience, it is anticipated that this method will conservatively achieve the build-over criteria and provide for protection of the human health and environment.

Upon achieving the proper subgrade and after post-excavation verification sampling, clean granular fill will be placed and compacted and a 12 mil polyethylene film vapor barrier will overlay the granular base fill material. Reinforcing steel will then be set prior to the placement of an 8" structural slab. Trench drains and sumps will be formed and placed concurrent with the concrete pad with coatings being subsequently applied. The erection of the permanent tent structures represents the final construction activities of Stage II.

It is planned to initiate excavation at the south end of the jobsite as existing grades form a central swale which runs northward. Therefore, stormwater runoff will flow away from the new, clean excavation based upon existing contours. (See Sheet C-2 of the project plans, Attachment 7.) This method will effectively control contaminated runoff from entering the newly excavated jobsite.

All earthwork and excavation operations shall be performed as described in the contract specifications, Division 2, Subsection 02100.05, Attachment 7. Adjacent and contiguous grades shall be cut and/or diked as necessary to prevent surface runoff from these areas into the newly excavated area. In addition, all diking shall be performed utilizing clean fill and all dikes shall be covered with a membrane as described in Section 6.1. The membrane shall extend over the dike and approximately 20 feet into unexcavated areas. All joints shall be overlapped a minimum of one foot and taped to form a seal. This method of diking and covering will essentially maintain a dry condition surrounding excavated areas and prevent contaminated surface runoff into new excavated areas. ***It is not anticipated that perched water will be encountered during this removal action. If perched water is encountered, it will be sampled and analyzed for contaminants for determination of proper disposition.*** Prompt and timely backfill of the excavated areas with clean bank-run gravel will prevent jobsite erosion. Any decontamination of excavation equipment will be conducted at the FS decontamination facility prior to off-site release.

The covered controlled storage area provided in Phase A/B will allow for the immediate transfer of drums currently stored on the existing pad and clear those areas for the Stage III construction activities. As space is limited and multiple handling of drums is an unfavorable action which increases the likelihood of potential spills, the completion of Stage II

construction activities prior to starting Stage III is essential to effectively reduce this threat.

6.3 STAGE III - PHASE C, D, AND E CONSTRUCTION

Stage III of the removal action consists of construction of the remaining pad upgrade. Phases C, D, and E primarily involve the resurfacing and curbing of the existing pad and the construction of an additional 22,500 square feet of covered controlled storage in Phase D. The new concrete surface and the controlled storage area in Phase D will be sealed and coated as described in Phase A/B. Improved lighting and drainage control are additional facets of Phases C, D, and E.

After construction completion and turnover of Stage II work, the following activities will occur during Stage III:

- *Relocation of drums from the next construction section to Phase A/B covered structures*
- *Removal and containerization of concrete, soil, or other materials from Phase C, D, and E areas*
- *Installation of new materials per drawings and specifications as shown in Attachment 7*
- *Progressive relocation of drums from next construction section to the completed section (ie., D to C, E to D)*

Stage III work will include removal and disposal of contaminated soils and concrete for the purpose of installing spill retention areas within the structure, upgrading the existing catch basins, and the capping of the old pad surface. The surface will be prepared by sweeping of the existing pad surface which may generate an estimated ten cubic yards of material from the concrete area. This portion of the pad upgrade will generate approximately 100 cubic yards of soil and rubble. *These materials will be containerized, sampled for TCLP constituents, and staged on a HWMU pending final disposition.*

After preparation of the existing pad, a polyethylene barrier will be placed prior to installing the new layer of concrete. In addition, all new wearing surfaces will be covered with 86 mils of chemically resistant polyurethane. The trenches and sumps in the controlled areas will be coated with epoxy. Water drainage after completion of Stage III action is shown in Figure 6-3.

Detailed construction drawings of the Phase C, D, and E construction will be prepared during that phase of the work per the schedule in Section 7.2.

7.0 PROGRAM MANAGEMENT

7.1 RESPONSIBILITIES

The DOE has been the lead agency for this removal action and will coordinate and execute continuation of this removal action. As stated in the Consent Agreement under CERCLA 120 and 106(a), if the DOE determines under Section 104 that any activities or work being implemented under this Consent Agreement may create an imminent threat to human health or the environment from the release or threat of release of hazardous substance, pollutant, contaminant, or hazardous constituent, it may stop any work or activities for such period of time as needed to respond and take whatever action is necessary to abate the danger. By reporting to the USEPA, this will be in accordance with Section XXIII of the Consent Agreement.

The USEPA and OEPA shall review, comment and approve the work plan and follow progress through meetings and the Consent Agreement and Amended Consent Decree progress reports.

Westinghouse Materials Company of Ohio (WMCO), the Maintenance and Operations Contractor at the FS, will coordinate, manage, implement, monitor activities and prepare all reports associated with the removal actions in a manner consistent with DOE and regulatory guidance.

This removal action shall be managed by the WMCO/DOE Operable Unit 3 team, to ensure compatibility with the final remedial action(s) selected for Operable Unit 3. Data and results from this removal action will be used to evaluate the final remedial options for Operable Unit 3. FS site personnel will manage the project using FMPC-2201 Topical Manual, Project Management Procedures.

All personnel involved will be trained in accordance with 29 CFR 1910.120, the standard operating procedures for the work involved, and with the requirements of the approved work plans. The effectiveness and integrity of these installations will be assessed on a periodic basis. This will be accomplished by personnel normally assigned those duties. Environmental Compliance will monitor and report to WMCO management on runoff samples outside the controlled area, and Maintenance will inspect and repair the facility.

7.2 SCHEDULES

An overall integrated schedule for the three stages of the proposed removal action is shown in Figure 7-1. Detailed schedules of each of the Stages, I, II, and III, will be provided in future deliverables during the removal action.

8.0 SAMPLING AND ANALYSIS PLAN

Sampling Objectives

As identified in Section 4.0, extensive soil and groundwater sampling has been previously conducted in the vicinity of the Plant 1 Pad. Additional sampling is proposed to be conducted to support the Plant 1 Pad Removal Action to achieve the following objectives:

- Characterize the concentrations of HSL constituents in the soils to be excavated to the west of the Plant 1 Pad.
- Complete a hazardous waste determination of soils west of the Plant 1 Pad.
- Complete a hazardous waste determination on containerized waste materials generated incidental to completing the construction activities associated with the Removal Action.
- Ensure defined soil concentration based build-over concentrations are identified during the Removal Action.
- Ensure continued protection of human health and the environment through long-term monitoring of the Removal Action system during the period until final remediation under Operable Unit 3.

To achieve the sampling objective, samples are proposed to be collected prior to and during the construction phase of the Removal Action, and as a part of a long-term monitoring program.

Pre-excavation Soil Sampling

To determine the possible presence of HSL constituents in the soils proposed to be excavated, 18 additional soil sampling locations have been selected within the area west of the Plant 1 Pad to provide additional radiological data and to determine the possible presence of any HSL contaminants. These locations are on a 75 x 100 foot matrix over the 150 x 500 foot area. The sampling locations are shown on Figure 8-1 of Attachment 2. Each location will be sampled in four depth increments: 0-6, 6-12, 12-18, and 18-24 inches. A total of 72 samples will be collected from the 18 locations.

The surface fraction will be analyzed for specific radionuclides and full metals (including TCLP). Samples will be analyzed for organic compounds if HNu measurements are positive. If no HNu measurements are positive, then the 18-24 inch fractions will be analyzed for organic compounds. Intermediate fractions will be saved for possible analysis based upon the results of the first round of surface fraction analyses.

If excess concentrations as determined by hand held meter are present in the surface fraction (0 - 6 in.), then the next fraction (6 - 12 in.) will

also be analyzed. If the analytical results show any HSL analyte is present in concentrations greater than background, the data will be statistically assessed. Excess concentrations for naturally occurring HSL's are those above background[2,3]. If the mean plus two standard deviations are less than the regulatory threshold, no further analyses are required. These values will be presented in the final project report. If the 95% confidence interval exceeds the regulatory threshold, then the reserved samples are submitted for analysis for the specific analytes. Subsequent depths will be analyzed in the same way.

Additional sample locations will be designated in relation to those showing excess concentrations. Four additional samples will be collected at a distance of 25 ft. north, south, east, and west of the original location or as limited by the work area boundary. If organic compounds are indicated, each of the four samples will be analyzed for the problem analyte. If metals or radionuclides are indicated, the samples will be composited to a single sample for analysis for the problem analytes.

Following completion of all analyses, the concentrations of any positive analytes will be summarized, with the mean and 95% confidence level, and presented in the final project report.

Construction-Related Sampling

Instrument Measurements During Excavation

During excavation, portable instrument measurements will be taken for organic vapors and for radiological contaminants. Any measurable organic vapor concentrations and/or radiological indications of greater that 100 pCi/g of uranium, will be cause for associated soils to be containerized and managed consistent with pertinent ARARs. Soils will continue to be excavated and containerized until there is no indication of organic compounds and radiation measurements are indicative of less than 100 pCi/g.

When the base of the excavation is established, a walk-over survey will be performed with a 2x2 NaI(Tl) scintillation detector. The probe will be moved in a serpentine manner over the area with the detector close to the surface. Any indications of activity greater than 15 percent above

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2 Shacklette, H.T., and Boerngen, J.A., "Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States", U.S. Geological Survey Professional Paper 1270, 1984.

3 Logan, T.J., and Miller, R.H., "Background Levels of Heavy Metals in Ohio Farm Soils", Research Circular 275, Ohio State University, February, 1983.

background will be excavated until measurements indicate that the residual soils in the area are at background levels.

Soil Sampling After Excavation

From previous sampling data, it is unlikely that contaminants will be present beneath the 12 inches of soil to be removed. When the base elevations of the excavation are reached, a ten meter grid will be established and four soil samples will be collected from each grid. Six-inch core samples will be collected using the procedures and requirements of the RI/FS QAPP. Samples will be composited at the FS laboratory to provide one composite for each 100 square meters. For this area (estimate up to 120 grids), four samples per grid will be composited. Aliquots of each of the composites will be analyzed for total uranium and thorium at the FS laboratory. Thirty (25 percent) will be randomly selected and sent to the RI/FS QAPP laboratory for full radiological analyses. Thirty random samples of the potential 120 grids will be randomly selected and sent to the RI/FS QAPP Laboratory for full HSL analysis. All remaining samples will be archived for potential future analysis.

Build-over will be initiated when the average total uranium and thorium concentrations indicate concentrations below the NRC Branch Technical Position [4] (BTP) criteria. These are further described in the following paragraph. If necessary, additional soil will be removed and the location resampled for total uranium and thorium until the BTP criteria are indicated. Upon receipt of the analytical results from the RI/FS QAPP laboratory, a complete assessment of the built over conditions will be made and reported in a Removal Action completion report.

Branch Technical Position Criteria

The Nuclear Regulatory Commission established soil concentrations based upon EPA criteria. Concentrations were modeled so that no member of the public would be expected to receive a radiation dose of one millirad per year to the lung or three millirads per year to the bone due to inhalation or ingestion. Plant 1 Pad is a controlled area and there is no public contact however this goal would be consistent with RI/FS objectives.

Soil sample analytical results will be compared to the BTP concentrations which are:

Depleted Uranium	U-238	35 pCi/g
Enriched Uranium	U-234,235	30
Natural Thorium	Th-232	10
Natural Uranium Ores	Th-228,230	10
Radium	Ra-228	10

[4] Disposal or On-site Storage of Thorium and Uranium Wastes from Past Operations, U.S. Nuclear Regulatory Commission, FR 46 205, October 23, 1981.

Depleted uranium has been the principle form of uranium at the FS and the goal of 35 pCi/g is expected to be appropriate. Upon receipt of complete analytical results, a complete assessment of all radionuclides present will be made.

Available sampling data indicate the average isotopic ratio for the soils in the vicinity of the Plant 1 Pad to be in the depleted range. The 35 pCi/g criteria is considered a conservative interim cleanup level as a result of the existing institutional controls in place at the Plant 1 Pad to limit exposure to these materials.

Construction Rubble Sampling

In preparation of interim storage of excavated soils exhibiting an in-situ activity concentration between 35 and 100 pCi/g of total uranium, the contaminated soil stockpile north of the Plant 1 Pad will be further characterized with four additional sample locations to analyzed as described in Pre-excavation Soil Sampling.

Excavated soils exhibiting an in-situ activity concentration in excess of 100 pCi/g of total uranium or where organic vapors are detected, including removed concrete, collected sweepings, and soils deemed to contain elevated concentrations of HSLs will be containerized for storage and/or off-site shipment.

Representative samples will be collected from the containers to characterize the stored waste materials for purposes of Determining the radiological properties of the materials and to complete a hazardous waste determination. Samples shall be collected and analyzed in a manner consistent with the protocols defined in the RI/FS QAPP and as supplemented by Part III of SW-846, 3rd Edition, Test Methods for Evaluating Solid Waste pertaining to the sampling of containerized materials.

Collected samples shall be analyzed for full TCLP, HSL constituents and full radiological parameters at the RI/FS QAPP laboratory unless there is prior concurrence for an alternate laboratory by USEPA and OEPA.

Environmental Monitoring

To ensure the continued protection of human health and the environment, a long-term environmental monitoring program will continue in the vicinity of the Plant 1 Pad. This program will be enhanced to focus more appropriately on the environmental conditions present at the Plant 1 Pad. The program will essentially have three key components, air, surface water and groundwater monitoring.

Monitoring for Fugitive Dust Emissions

Portable air samplers will be placed at the perimeter of the open excavation and the soil stockpile to measure airborne particulate concentrations. Samples will be collected weekly and analyzed for gross alpha and gross beta concentrations at the FS laboratory. Engineering controls and additional health and safety measures will be instituted if elevated concentrations are detected.

Surface Water Monitoring Program

During construction, water samples will be taken of the stormwater runoff at the entrance to the storm sewer system (MH 200) on a monthly basis[5].

Following construction activities, and during operations on the pad, the following water samples will be taken of the stormwater runoff on an approximate monthly basis depending on precipitation events until sample results indicate that quarterly sampling is sufficient.

- at the inlet to the storm sewer system (MH 200)
- at the storm sewer MH 11

All samples of the stormwater runoff will be analyzed at the FS laboratory for total uranium and total thorium. Samples will be collected in a manner consistent with the RI/FS QAPP. Collected samples will be transferred to the FS Laboratory for analysis in accordance with the Analytical Laboratories Quality Assurance Plan, October 1987.

Groundwater Monitoring Program

The existing groundwater monitoring program will be enhanced to provide additional monitoring in the vicinity of the Plant 1 Pad to identify any changes in groundwater quality so as to ensure the continued protection of human health and the environment. Groundwater monitoring will be performed in both the perched water and the regional aquifer underlying the Plant 1 Pad.

Groundwater quality sampling and water level data collected at the indicated frequency from following wells will provide a comprehensive monitoring program for the continued operation of the Plant 1 Pad.

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[5]All water samples will need to be taken consistent with the weather conditions. If there has not been a storm event during the given time frame, no sample will be taken due to the lack of stormwater runoff.

Glacial Overburden

Quarterly

*1055**	*1334*	*1340*	*1347*	*1350*
1303	*1335*	*1341*	*1348*	*1361*
1305	*1336*	*1342**	*1349*	
	1337	*1343*		
	1338	*1344*		
	*1339**	*1345**		

Semi-annual

1351 through 1360

Sand and Gravel Aquifer

Quarterly

Upgradient	*Downgradient*
2010	*2055**
3010	*3055*

** Wells to be sampled prior to any construction activities.*

Data obtained from wells which are sampled quarterly will be used to establish baseline seasonal variations. Once seasonal variations have been established, the frequency may decrease to semi-annual. Any change in frequency will be supported by data and communicated to USEPA and OEPA.

As previously indicated, extensive sampling has been performed to date in these wells. To augment this baseline data, one round of samples will be withdrawn from the listed wells (noted with asterisks above) prior to construction activities for full Hazardous Substance List (HSL) analysis. These samples will be analyzed in a manner consistent with the FS RI/FS Quality Assurance Project Plan (QAPP).

Routine samples will be analyzed for the parameters listed in Table 8-1. Any additional constituents in significant concentrations from in the HSL analysis will be added to the list in Table 8-1 for both that well and for vicinity wells.

All groundwater samples will be collected in a manner consistent with the protocols and procedures defined in the RI/FS QAPP.

Analysis of semi-annual and quarterly samples will be completed in the FS Analytical Laboratory in accordance with the Analytical Laboratory Quality Assurance Plan, October 1987. In the event organic compounds are added to Table 8-1 as a result of the HSL sampling event, these analyses will be performed at a laboratory as defined in the RI/FS QAPP.

TABLE 8-1
GROUNDWATER ANALYTICAL PARAMETERS

Total Uranium	Nitrate
Isotopic Uranium	Selenium
Total Thorium	Silver
Isotopic Thorium	Arsenic
Barium	Cadmium
pH	Chromium (total)
Specific Conductance	Fluoride
TOX	Lead
TOC	Sulfide
	Mercury

This monitoring and sampling program will be performed in conjunction with sampling and analysis activities under Operable Unit 3 of the ongoing RI/FS and resultant final remedial actions. The scope of this monitoring and sampling program will not interfere with any activity in this area.

As stated in the Consent Agreement, if the DOE determines that any activities or work being implemented under this Consent Agreement may create an imminent threat to human health or the environment from the release or threat of release of a hazardous substance, pollutant, contaminant, or hazardous constituent, it may stop any work or activities for such period of time as needed to respond and take whatever action is necessary to abate the danger.

9.0 HEALTH & SAFETY PLAN

The work will be performed consistent with the Health and Safety Plan prepared for the removal actions. A copy of the plan for the continuing release is provided as Attachment 5 of this work plan. The plan identifies, evaluates, and controls all safety and health hazards. In addition, it provides for emergency response for hazardous operations. The plan is consistent with 29 CFR 1910.120 and the FMPC Site Health and Safety Plan.

Additional safety documentation will be prepared as necessary according to FMPC-2116 Topical Manual "Implementing FMPC Policies and Procedures for System Safety Analysis." FMPC-2116 has been prepared to implement DOE Order 5481.1B - Safety Analysis and Review System and DOE/OR-901 - Guidance for Preparation of Safety Analysis Reports.

10.0 QUALITY ASSURANCE PLAN

This Removal Action will be conducted according to the overall quality assurance program at the FS as described in the site Quality Assurance Plan, FMPC 2139. The Quality Assurance Plan is based on the criteria specified in ASME NQA-1, Federal EPA Guideline QAMS-005/80 and DOE Orders 5700.6 and 5400.1. Detailed requirements are implemented by the WMCO Site Policies and Procedures Manual, FMPC-2054, by WMCO Departmental procedures, and Topical Manuals. Specific quality assurance requirements will be incorporated into written and approved procedures and during personnel training. The Quality Department will conduct periodic surveillances to verify compliance.

ATTACHMENT 1

Plant 1 Pad

Continuing Release

REMOVAL SITE EVALUATION

REMOVAL SITE EVALUATION

PLANT 1 PAD CONTINUING RELEASE

Feed Materials Production Center

U. S. Department of Energy

November 1990

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REMOVAL SITE EVALUATION

PLANT 1 PAD CONTINUING RELEASE

INTRODUCTION

The Feed Materials Production Center (FMPC) is a uranium processing complex owned by the U.S. Department of Energy (DOE). The location of the 1050 acre site is shown in Figure 1. The FMPC was placed on the National Priorities List (NPL) in 1989. The DOE is conducting a Remedial Investigation and Feasibility Study (RI/FS) together with other response actions under a 1990 CERCLA Consent Agreement with the U.S. Environmental Protection Agency (EPA).

Since the early 1950's various chemical and metallurgical processes have been used to manufacture uranium products for the defense complex. The FMPC suspended these operations in July, 1989. A substantial quantity and variety of waste materials were generated during production operations, and more will be generated during the remedial phase. Some of the current waste inventory contains radioactive materials, and some contains both radioactive and hazardous constituents, as defined under the Resource Conservation and Recovery Act (RCRA), as amended. It is expected that part of the waste materials generated during the remedial phase will also contain similar constituents.

The Plant 1 Pad and adjacent area comprises approximately 12 acres on the northwest side of the process area as shown in Figure 2. Plant 1 is the "sampling plant" for the FMPC and is therefore the location for sampling of large amounts of uranium metal process residues and waste materials. The concrete storage pad associated with Plant 1 has been used as a drum storage location to support these operations since 1952.

The current inventory of the pad is approximately 45,000 drums. A waste characterization study is underway to complete a hazardous waste determination on the contents of these individual drums. Drums known to contain hazardous wastes are being moved to more appropriate storage facilities.

As detailed later in this document, above background concentrations of uranium and thorium have been found in the Plant 1 Pad area, and surrounding soils. In addition, various hazardous constituents have also been detected. Some of the data included in this document is undergoing a quality review. The data package will be updated with the results of this review as appropriate.

This Removal Site Evaluation (RSE) was initiated by the DOE under authorities delegated to it under Section 104 of CERCLA, through Executive Order 12580. It is being conducted to determine whether the conditions present at the Plant 1 Pad warrant a removal action under CERCLA, consistent with Section 300.410 of the National Contingency Plan (NCP). Any response action taken will incorporate the substantive requirements of CERCLA, RCRA, and NEPA.

If a removal action is appropriate, the evaluation of response alternatives will take into consideration the long-term remedial action objectives for the Plant 1 Pad, which is part of Operable Unit 3 under the RI/FS. The removal action alternative chosen will contribute to the efficient performance of any anticipated long-term remedial action, to the extent practicable.

At present, the DOE is also taking actions on Plant 1 Pad area that are designed to comply with a Proposed Amended Consent Decree for RCRA, negotiated between the DOE and the State of Ohio. These activities include waste/material characterization, drum movements to achieve adequate aisle spacing, and daily/weekly drum inspections.

SOURCE TERM

General

There are existing areas of contamination on and around the Plant 1 Pad. The origin of this contamination includes the potential historical release of material from drums stored on the pad. Most of the carbon steel drums used to store materials on the pad have deteriorated as a result of exposure to the weather. There is a risk for continued releases from materials stored on the pad to the surrounding environment.

Materials containing varying amounts of uranium metal (ingots and scrap), UO_3 (reactor recycle tails), UF_4, U_3O_8 and thorium (ThF_4 and ThO_2 high fluoride), as well as drums of barium salts, waste oils contaminated with 1,1,1 trichloroethane, and lead have been stored on the pad.

Presently, there are several ways contaminants can enter the environment from releases from the Plant 1 Pad: rain water runoff penetrating cracks in the pad and entering the soils below; runoff that flows directly into the storm sewer system; and runoff which flows from the northwest side of the pad onto the adjacent soils. In addition, airborne releases of dried material can reach the environment.

The assumptions for exposure pathways include, but are not limited to, resuspension of radionuclides in the soils (inhalation), surface water runoff (the receptor could be wildlife) and

infiltration to an underlying aquifer. This "buried valley" aquifer has been designated to be a "sole source aquifer" by the U.S.EPA under Section 1424(e) of the Safe Drinking Water Act. Migration/transportation of contaminants (from the Plant 1 Pad) into the aquifer has not been established, however, the possibility for vertical migration exists. Exposure to contaminants would occur only if the ground water reaches the surface and is used by individuals and/or wildlife (ingestion or irrigation).

Source Specific

Sampling on, through, and around the pad area is on-going. Available data indicate that elevated levels of thorium and uranium isotopes exist under the pad and in the surrounding soils, as well as above background levels of barium and lead. Discrete samples have also indicated the presence of target organics such as acetone, methylene chloride, carbon disulfide, and xylene in soils adjacent to the pad.

A) Runoff from the Pad

Limited sampling of the rainwater runoff from the Plant 1 Pad has been performed in the past. These data demonstrate that the Plant 1 Pad runoff contains elevated levels of uranium.

B) Contamination on the Pad

There has also been sampling of the pad materials in association with expedited repairs made to the pad (discussed under Controls in Place to Address Potential Threats). Complete analytical results of this sampling are not yet available. It is anticipated that the analytical results of these samples will be consistent with other sampling done in the area.

C) Surrounding Environment

Sampling of the soils and perched water both around and under the pad also shows contamination. These results are presented in Appendix A.

Near the pad, the average radionuclide concentrations from Table A-4 at and near the soil surface are 298 ppm uranium and 27 ppm thorium. The average barium concentration from Table A-1 found in this area was 79 ppm. Above background concentrations of lead were also detected. Analysis for targeted organics found up to isolated incidences of 40 ppb for methylene chloride, 18 ppb for xylene, 12 ppb for carbon disulfide. The concentrations of acetone were unclear due to its presence in the blanks and the extreme ranges at the same sample locations.

The concentrations of radionuclides just under the pad are an average of 410 ppm uranium and 30 ppm thorium. The sampling effort also found elevated levels of barium and lead. The results from the analysis for targeted organics are not available.

The results from the perched water samples near the pad showed a maximum of 689 ppm total U and the results from under the pad showed a maximum of 441 ppm total U.

D) Groundwater

A cluster of groundwater monitoring wells is located just east of the Plant 1 Pad, at Location 055. Wells 1055, 2055, and 3055 have been placed in the till, the upper portion of the sand and gravel aquifer, and in the mid-portion of the aquifer, respectively. The groundwater flow in the regional aquifer in this area is to the east. Wells 2055 and 3055 are hydraulically downgradient of the Plant 1 Pad.

Results from sampling and analysis of these wells are presented in Tables 9 and 10. The groundwater in this area contains relatively low levels of metals and radionuclides and no target organics have been detected. Some of these data are undergoing quality review, as stated in the introduction to this document.

EVALUATION OF THE MAGNITUDE OF THE THREAT

Controls in Place to Address Potential Threats

Several programs are in place that will provide a reduction in the risk of further releases and contamination from the pad. These programs are described below.

A) Drum Management Plan

The FMPC drum management plan is a comprehensive, phased plan designed to facilitate the proper management of waste drums stored at the FMPC. This plan includes:

- Characterization of waste materials in the drums;
- Prioritization of leaking containers, with overpacking of the most severely deteriorated drums first;
- Movement of drums containing hazardous waste to indoor storage (as space is available);
- Daily leak inspections on the Pad.

B) Drum Transport

There are safety and spill concerns associated with the movement of drums on the pad due to the poor condition of the surface of the pad in some places. Expedited repairs of the concrete surface, a maintenance operation, has been completed. This project involved the resurfacing (with removal of broken surface) of severely damaged concrete, and patching of less severely deteriorated areas. The broken concrete and cutting water has been drummed and sampled. This material is being stored on the Plant 1 Pad until analytical results are received.

These expedited repairs were initiated before the preparation of this RSE. Any additional (updated) data will be maintained with this record.

C) Temporary Cover

Another action taken was the erection of a temporary cover over a portion of the Plant 1 Pad. This project involved the installation of a 5,226 square foot tension support structure as a demonstration project at the FMPC. The purpose of the project is to evaluate the viability of using similar additional structures for covered storage of drums and other materials, and to demonstrate the ease of construction and mobility of these types of structures.

The demonstration will last six months to one year. During this period, approximately 1500 to 2500 drums will be stored under the cover.

Remaining Threat

The above programs will facilitate more controlled operation and management of the pad area, but will not abate the current contamination levels of the pad nor eliminate the potential for additional releases. These remaining threats are discussed below.

A) Continuing Release

In the past, drums in various states of deterioration were stored on the pad. Material leaking or seeping from these containers was washed off onto the pad during periods of rainfall. This material, along with contaminants present on the pad from previous releases, may be carried by runoff to the grassy area on the west side of the pad and to the storm sewer system (and ultimately to the Great Miami River).

While it is recognized that the pad will be included within the Record of Decision for Operable Unit 3, current and near term plans require its use as a staging and enhanced storage area. Therefore, the potential for a continuing release exists.

B) Soils Around the Pad

The potential threat posed by the above background levels of uranium and thorium found in the surface soils near the Plant 1 Pad is the potential for human and environmental exposure to the contaminants as a result of suspension of the soil particles in the atmosphere and/or the potential migration of the contaminants through wind and water erosion. The average concentration of the contaminants in the soil are 298 ppm total uranium and 27 ppm total thorium. It is very likely that these concentrations will exceed clean-up levels for remediation of the FMPC soils. Several recent remedial projects have adopted residual soil activity concentrations for final cleanup actions consistent with the 1981 NRC Branch Technical Position Paper (BTP) on the disposal or on site storage of uranium and thorium materials. Concentrations discussed in this BTP included 35 pCi/g (approx. 50 ppm) for depleted uranium in soils (Aerojet 1984; Colonie, NY 1986) and 10 pCi/g for natural thorium (Th-232 plus Th-228 and other daughters in equilibrium).

Also, the migration of the contaminated soil to previously clean areas could result in more extensive soils cleanup as part of final remedial action.

ASSESSMENT OF THE NEED FOR AN INTERIM RESPONSE

Consistent with section 40 CFR 310.410 of the National Contingency Plan (NCP), the DOE shall determine the appropriateness of a removal action (interim response). Section 40 CFR 300.415 (b)(2) of the NCP defines eight factors that should be considered in determining the appropriateness of a removal action. Five of these factors, listed below, are specifically applicable to this assessment.

<u>40 CFR 300.415 (b)(2)(i)</u> Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

<u>40 CFR 300.415 (b)(2)(ii)</u> Actual or potential contamination of drinking water supplies or sensitive ecosystems.

40 CFR 300.415 (b)(2)(iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

40 CFR 300.415 (b)(2)(v) Weather conditions that may cause hazardous substance or pollutants or contaminants to migrate or be released.

40 CFR 300.415 (b)(2)(vi) Threat of fire or explosion

APPROPRIATENESS OF A RESPONSE

If a planning period of less than six months exists prior to initiation of a response, DOE will prepare an EA-FONSI, Interim Response Action Memorandum. The Action Memorandum will describe the selected response and supporting documentation for the decision. This will serve as the decision document for the RI/FS Administrative Record.

If it is determined that there will be planning period greater than six months before an action is initiated, DOE will prepare an EA-FONSI, Interim Response, Engineering Evaluation/ Cost Analysis (EE/CA) Approval Memorandum. This memorandum is to be used to document the threat to public health and the environment. It would then serve as the decision document for the Administrative Record File.

The DOE has determined that a time critical removal action is appropriate, due to the current and on going potential for release of contaminants from the Plant 1 Pad area. The released contamination has the potential to migrate into the environment, where it may result in human exposure or contamination of drinking water supplies. A removal action to control stormwater runoff from this area and deter the further releases of contaminants from leaking drums should be undertaken.

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Figure 1
FSO SITE AND VICINITY

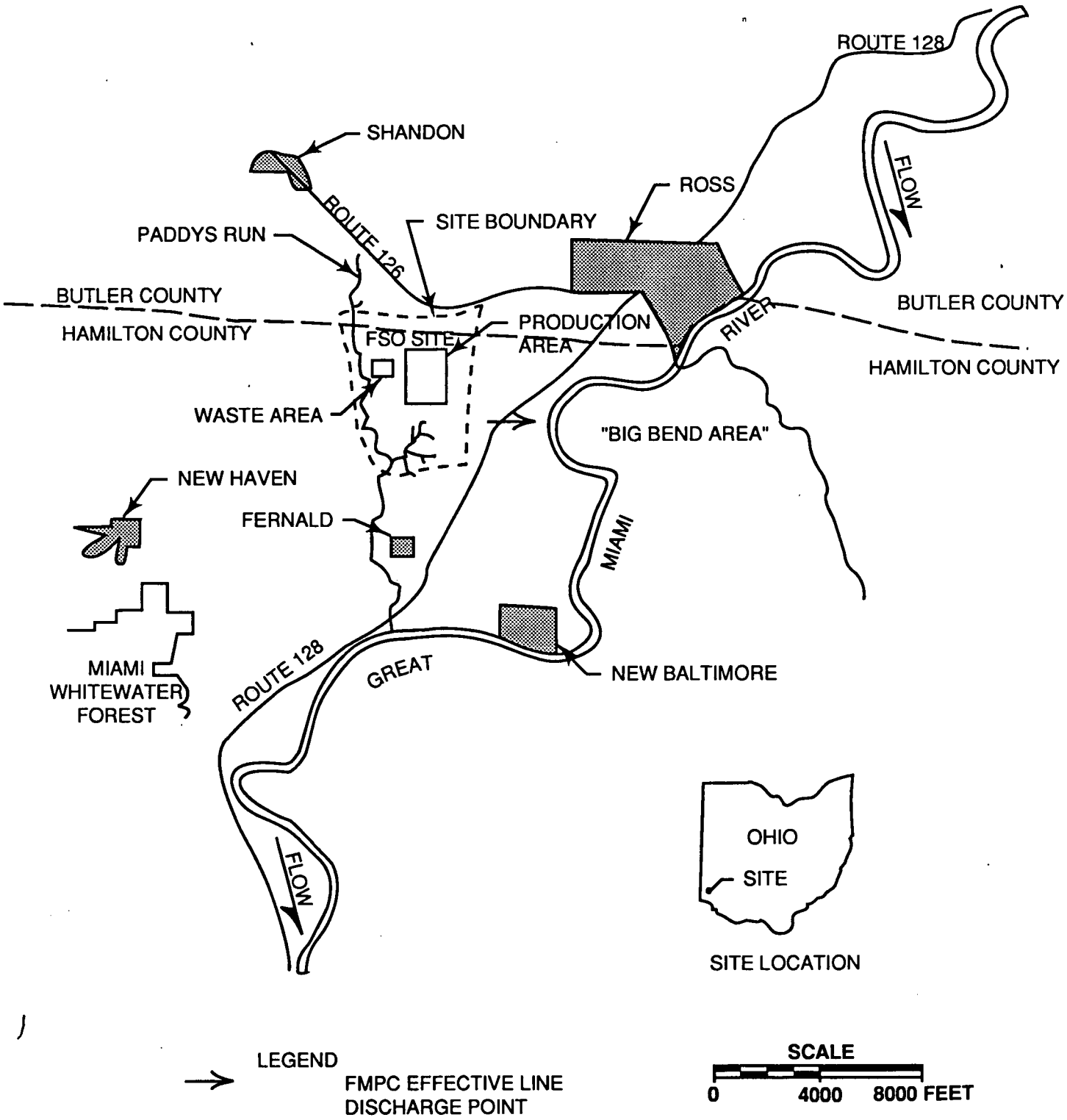
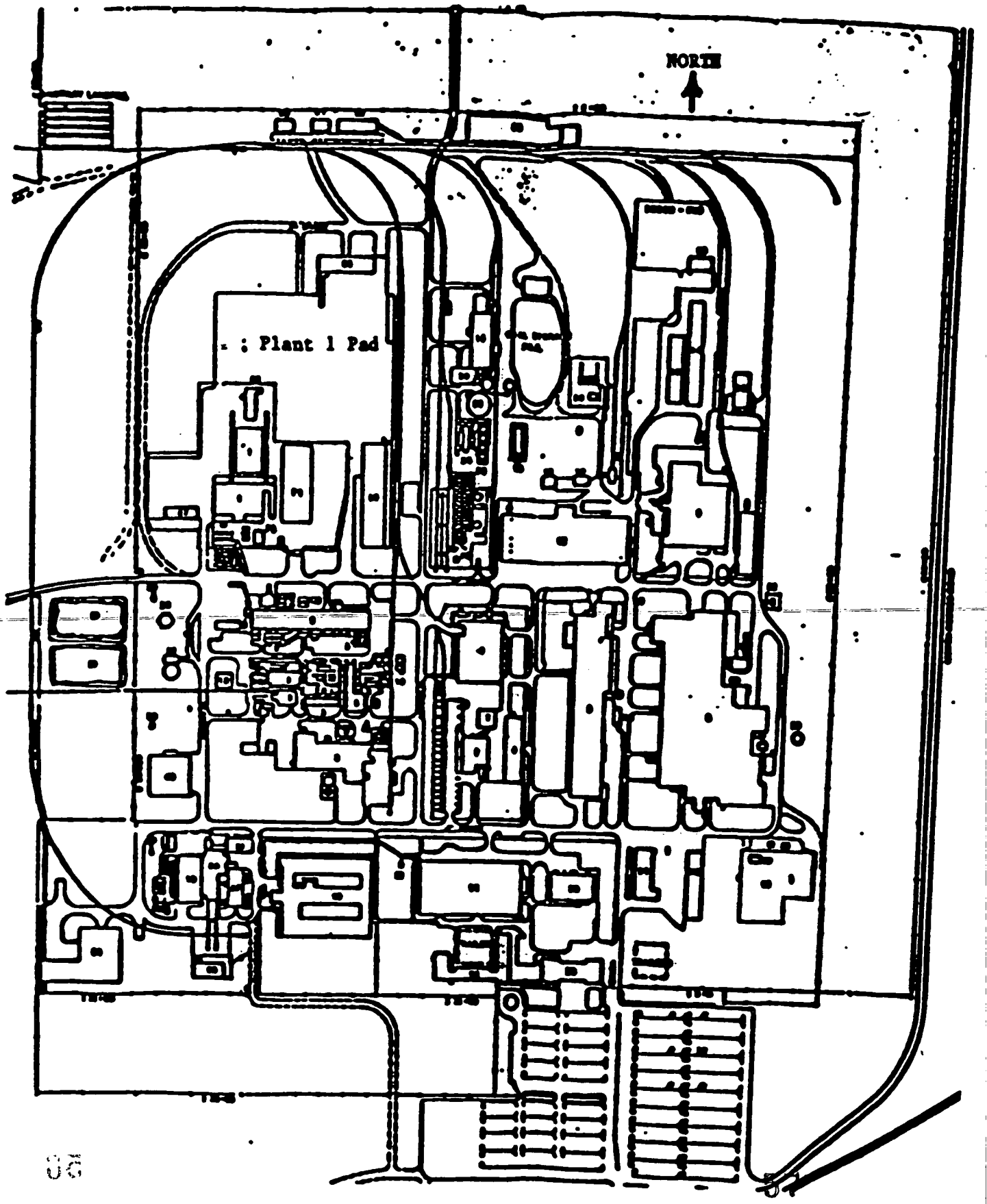


FIGURE 2

FMPC SITE



APPENDIX A

SAMPLING AND ANALYSES

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APPENDIX A

PLANT 1 PAD SAMPLING AND ANALYSIS

INTRODUCTION

The Plant 1 Pad area is illustrated in Figure 1. In order to characterize conditions at the Plant 1 Pad, surface and subsurface soil and groundwater samples were collected and analyzed for radioactive and chemical constituents. This information was obtained through three programs of sampling. Some of these data are undergoing quality review as stated in the introduction to the RSE document.

1) Simple Core Soil Sampling

Initial Samples

Surface soil samples were collected at 21 locations just off the western edge of the pad. Soil samples beneath the concrete, at the western edge were also collected at 7 locations. (These locations can be seen in Figure 2). The samples were collected from three distinct increments within each location, as indicated in Table A-1: Surface (0 ft), 1 ft, and 2 ft depths. The samples were collected by FMPC personnel in accordance with FMPC Environmental Monitoring sampling protocols. Analysis of the samples included Primary Total Metals (Table A-1), E.P. Toxicity Metals (Table A-2), Target Volatile Organic (Table A-3), and Radiochemical Metals (Table A-4). The Primary Total Metals, E.P. Toxicity Metals, and radiochemical metals analysis were completed in the FMPC laboratory. The Target Volatile Organic analysis was completed at off-site laboratories.

Secondary Samples

The soil sampling program was supplemented with the collection of additional soil samples at an 47 locations in the grassy area west of the pad and 23 locations (Figure 4) beneath the pad.

The 47 soil samples taken in the grassy area, shown in Figure 3, were take from two types of sampling locations. One type of sample location had two samples taken from it: one at the surface and one at a depth of 1 ft. The other type of sample location had only surface soil samples taken. These differences are also reflected in Figure 3. All samples were taken by FMPC personnel, utilizing FMPC Environmental Monitoring sampling protocols. The samples taken from this area were only tested for radionuclides, as reflected in Table A-5. The analysis for these samples were performed at the FMPC laboratory.

Under Pad Samples

Finally, another 23 locations were sampled beneath the pad with the distribution noted in Figure 4. Samples were taken from the surface soil directly beneath the pad and at a depth of one foot.

The samples were taken by FMPC personnel in accordance with FMPC Environmental Monitoring sampling protocols. The fraction of samples immediately beneath the pad were sent to the International Technologies (IT) Laboratory in Oak Ridge, Tennessee. Analytical results are expected by the end of November, 1990. The samples, sent to IT, are being analyzed for:

Tot U	Tot Th	U-234	U-235	U-238
Tot Pu	Pu-238	Pu-239	Ru-106	TCLP Metals
Np-237	Tc-99	Sr-90	Total Metals	

Isotopic U if Tot U > 45 ppm
Isotopic Th if Tot Th > 15 ppm

The samples from one foot below the pad were analyzed at the FMPC for total thorium and total uranium only. No measurable thorium was noted and the 16 of 20 samples with measurable uranium averaged 25 ± 22 ppm; analytical sensitivity was 11 ppm. Table A-6 shows the radiological results.

2) Boring Core Soil Sampling

The samples identified below were collected during the Remedial Investigation/Feasibility Study (RI/FS), by Pennsylvania Drilling and Advanced Sciences Inc. contract personnel in accordance with the protocols set forth in RI/FS work plan. The samples were analyzed in the IT laboratory in Oak Ridge, Tennessee, in accordance with Certified Laboratory Protocols. The identified boring locations can be found on Figure 5, and all of the boring data can be found in Table A-7 and A-8.

The information presented on the borings is all that is currently available. Some of the water samples taken from some of the borings, as with the soil samples taken beneath Plant 1 Pad, are being analyzed for additional parameters, including TCLP Metals, Isotopic U, Isotopic Th, etc. These results have not been received yet.

Borings through the Pad

Borings through the concrete pad permitted collection of soil and liquid at six sampling locations, as shown in Figure 5. The crossectional diagrams and relative locations of the seven borings are as follows:

	Boring No.	Location
Fig. 6	1339	NE quadrant
Fig. 7	1342	Center toward west (NNE of Plant 1)
Fig. 8	1343	Center toward east (ENE of Plant 1)
Fig. 9	1345	Center toward west (West of 1342)
Fig. 10	1346	Near shot blaster (N of Plant 1)
Fig. 11	1348	South central (East of Building)
Fig. 12	1361	Under Plant 1 (smaller building)

Locations 1345 and 1346 were more extensively analyzed for potentially hazardous substances than for radioactivity. A brief rundown of the analysis performed at these two locations is given below.

Non-radiological Analyses

The following analyses were performed for non-radiological concentrations:

Analysis	Results
Volatile organic by GCMS	One positive result. No other compounds detected (10 ug/kg trichloroethane in 1346)
Semi-volatile organic by GCMS	None detected
Pesticides and PCBs	None detected
Total Cyanide	None detected
ICP Metals	See Table A-8
Furnace AA Metals	See Table A-8
Cold Vapor AA Hg	See Table A-8
Flame AA for K	See Table A-8

Table A-8 shows the values for those non-radioactive potentially hazardous substances with concentrations in excess of the analytical sensitivity.

Radiological Analyses

Samples from Location 1345 were also analyzed for additional radioactive materials. The following table summarizes the values where results exceeded analytical sensitivity:

Radionuclides at Boring 1345 (pCi/g)

Sr-90	0.8	U-234	4.6
Tc-99	1.4 (single value)	U-238	5.5
		Tot U	13.3 ug/g
Ra-228	0.8		
Th-228	0.8		
Th-232	0.7		
Ra-226	0.8		
Th-230	1.2		

Borings immediately adjacent to the Pad

Three borings were made into soil just off the pad surface (Figure 5). The crossectional diagrams for the three drawings are as follows:

	Boring No.	Location
Fig. 13	1338	North central
Fig. 14	1347	West toward south
Fig. 15	1349	South toward east

Borings in the vicinity of the Pad

Seventeen borings permitted sampling in a ring around the pad at a distance of roughly 100 feet in various directions (Figure 5). These borings were also completed as part of the "Production and Additional Suspect Areas Investigation" section of the Remedial Investigation/Feasibility Study. The borings numbers are as follows:

1333	1334	1335	1336	1337	1340
1341	1344	1350	1351	1352	1353
1354	1356	1357	1358	1359	

Crossectional diagrams for these borings were not prepared because they are outside the area of direct concern, and information gained in boring geology would not add value to the findings presented.

3) Monitor Wells

Monitor well location 55 is located approximately 30 feet east of the pad (Figure 5). Soil and liquid samples were analyzed from wells 1055, 2055, and 3055. The soils samples were taken as part of the RI/FS, as with the other borings, indicated above. The water samples were taken by FMPC personnel in accordance with FMPC Environmental Monitoring Protocols. Laboratory analysis for radionuclides was done at the FMPC Laboratory. Analysis for volatile and non-volatile organic, metals, etc. was done at off-site laboratories. Tables A-9 and A-10 present the most recent data from these monitoring wells.

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ATTACHMENT 1
to
APPENDIX A

Tables and Figures

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FIGURE 1

PLANT 1 STORAGE PAD

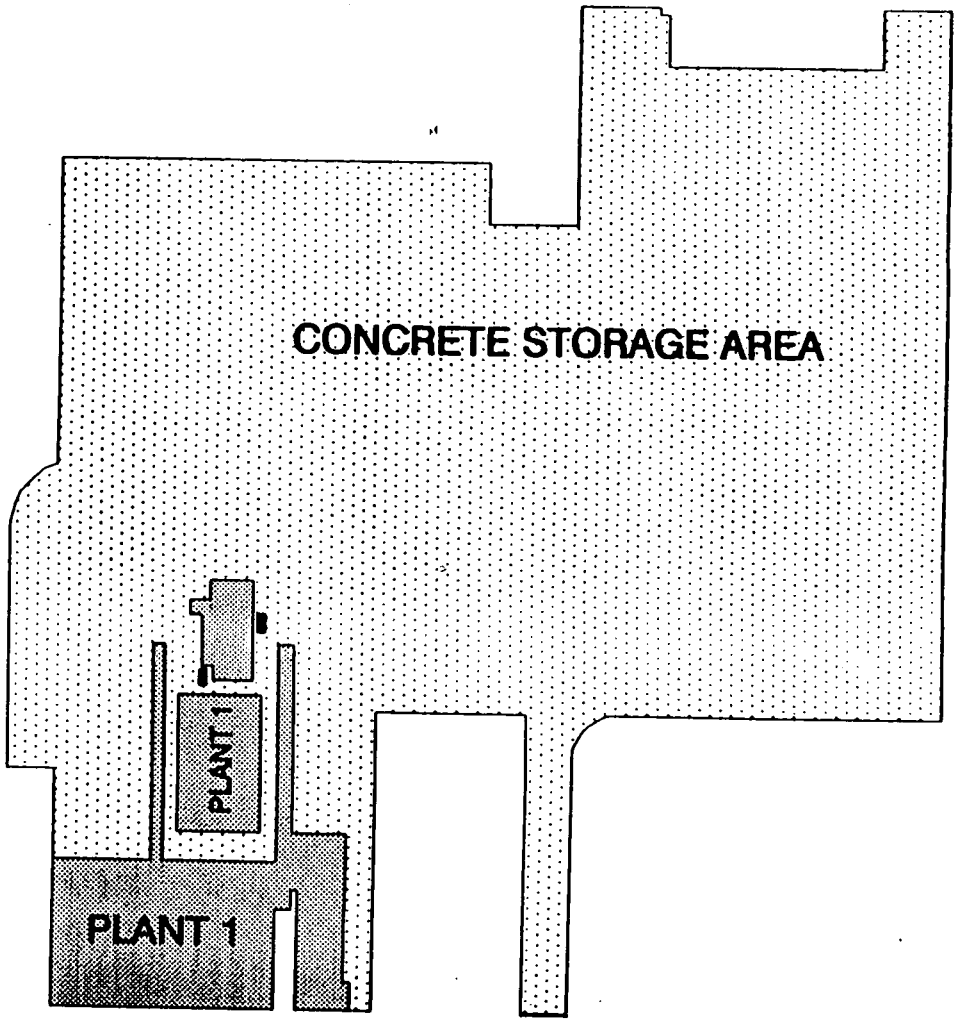


FIGURE 2

PLANT 1 STORAGE PAD

SOIL SAMPLING

ADDITIONAL SOIL SAMPLING
PERFORMED IN THIS AREA
(SEE FIGURE 3)

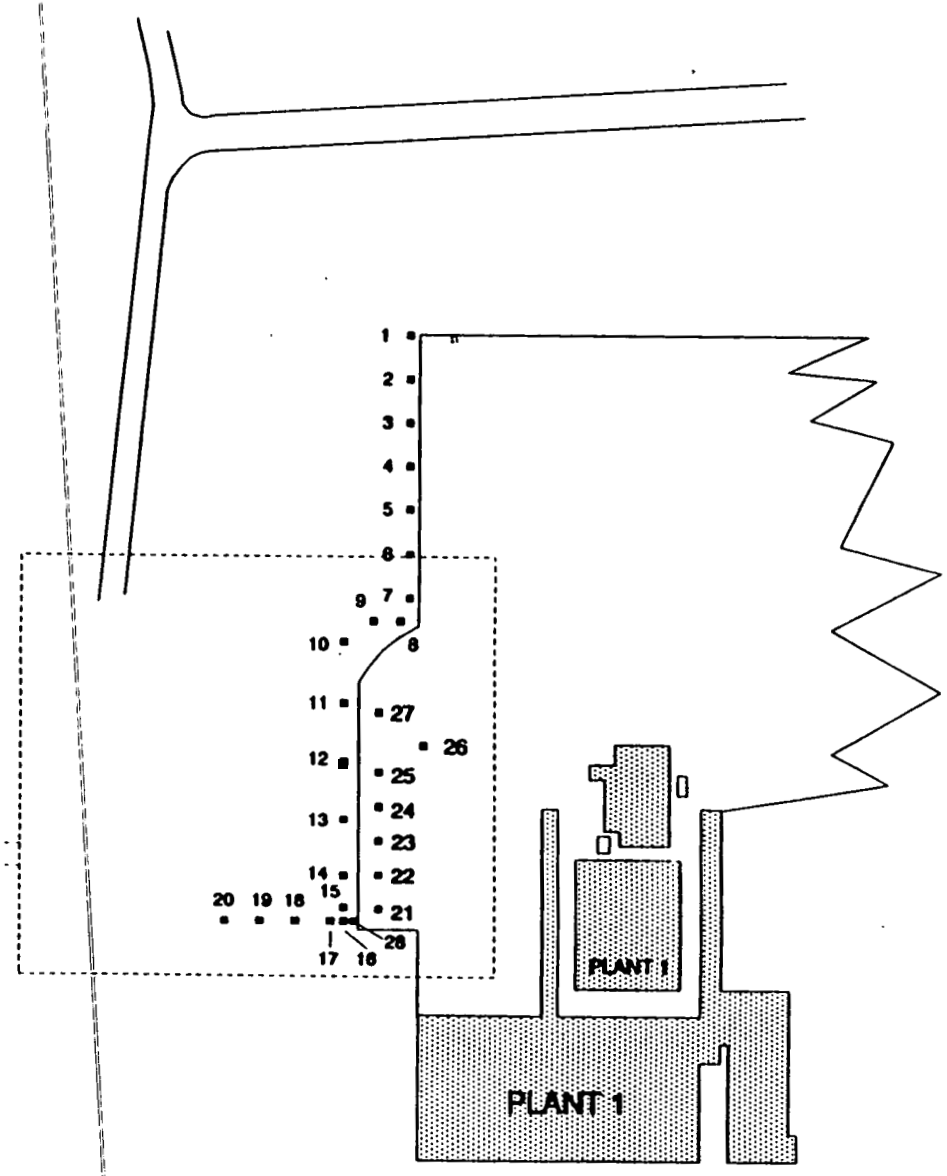


TABLE A-1
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

RCRA METALS

----- Sample ------ Location	Depth	Total Ag (ug/g)	Total As (ug/g)	Total Ba (ug/g)	Total Cd (ug/g)	Total Cr (ug/g)	Total Hg (ug/g)	Total Pb (ug/g)	Total Se (ug/g)
1	0	I	I	I	I	I	I	22.80	I
	1	I	I	I	I	I	I	22.10	I
	2	I	I	I	I	I	I	57.00	I
2	0	< 1	5.00	55.00	< 0.2	7.20	< 0.1	61.30	< 0.1
	1	< 1	4.50	55.50	< 0.2	7.30	< 0.1	39.30	< 0.1
	2	< 1	4.50	75.50	< 0.2	7.70	< 0.1	120.00	< 0.1
3	0	< 1	6.20	69.50	< 0.2	12.30	< 0.1	55.40	< 0.1
	1	< 1	6.50	79.50	< 0.2	9.30	< 0.1	49.60	< 0.1
	2	< 1	4.40	59.00	< 0.2	7.20	< 0.1	8.85	< 0.1
4	0	< 1	4.84	88.10	0.75	11.90	< 0.1	41.80	R
	1	< 1	1.94	84.80	0.30	8.73	< 0.1	15.30	R
	2	< 1	5.72	58.40	< 0.2	8.74	< 0.1	11.50	R
5	0	< 1	5.11	80.00	0.20	8.70	< 0.1	21.40	R
	1	< 1	4.66	55.70	0.20	7.17	< 0.1	10.50	R
	2	< 1	4.36	59.40	< 0.2	7.83	< 0.1	9.90	R
6	0	< 1	6.15	102.00	0.25	11.20	< 0.1	109.70	< 0.1
	1	< 1	7.02	70.40	1.15	7.94	< 0.1	16.10	R
	2	< 1	4.51	117.90	0.80	11.70	< 0.1	12.00	R
7	0	< 1	7.19	104.50	0.55	10.00	< 0.1	22.60	R
	1	< 1	8.09	84.90	0.45	9.39	< 0.1	12.30	R
	2	< 1	6.23	78.20	0.30	6.38	< 0.1	11.50	R
8	0	< 1	8.46	127.60	0.35	6.83	< 0.1	32.50	R
	1	< 1	6.88	115.60	< 0.2	5.53	< 0.1	16.60	R
	2	< 1	4.65	94.20	0.25	6.18	< 0.1	13.80	R
9	0	< 1	6.78	42.90	0.20	2.75	< 0.1	20.90	R
	1	< 1	5.81	93.60	0.30	5.68	< 0.1	14.60	R
	2	< 1	5.58	67.40	< 0.20	4.54	< 0.1	126.70	< 0.1
10	0	< 1	4.41	51.30	0.25	3.29	< 0.1	7.97	R
	1	< 1	6.79	82.90	0.20	6.40	< 0.1	12.70	R
	2	< 1	0.76	39.00	< 0.20	1.45	< 0.1	6.69	R
11	0	< 1	4.04	87.40	1.10	9.64	< 0.1	22.20	< 0.10
	1	< 1	5.55	124.30	0.25	12.00	< 0.1	26.00	< 0.10
	2	< 1	4.14	82.80	0.30	10.70	< 0.1	18.00	< 0.10
12	0	< 1	3.38	46.10	0.40	7.49	< 0.1	21.00	< 0.10
	1	< 1	5.39	85.00	0.20	10.40	0.10	21.90	< 0.10
	2	< 1	4.78	174.60	0.60	12.20	< 0.1	16.90	< 0.10
13	0	< 1	4.35	68.90	0.45	9.59	< 0.1	31.90	< 0.10
	1	< 1	4.14	98.10	0.25	10.90	< 0.1	15.50	< 0.10
	2	< 1	4.84	85.40	< 0.20	10.30	< 0.1	17.30	< 0.10
14	0	< 1	3.04	73.90	< 0.20	6.05	< 0.1	33.30	< 0.10
	1	< 1	5.96	170.30	0.50	11.20	< 0.1	18.40	< 0.10
	2	< 1	5.44	102.20	0.75	12.60	< 0.1	21.20	< 0.10
15	0	< 1	6.75	136.00	0.45	8.55	< 0.1	24.80	< 0.10
	1	< 1	8.12	120.00	0.20	10.00	< 0.1	15.80	< 0.10
	2	< 1	4.84	98.00	0.20	8.25	< 0.1	13.70	< 0.10

TABLE A-1
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

RCRA METALS

Sample Location	Sample Depth	Total Ag (ug/g)	Total As (ug/g)	Total Ba (ug/g)	Total Cd (ug/g)	Total Cr (ug/g)	Total Hg (ug/g)	Total Pb (ug/g)	Total Se (ug/g)
16	0	< 1	5.82	67.50	< 0.20	6.95	< 0.1	18.80	< 0.10
	1	< 1	7.00	73.50	2.40	9.30	< 0.1	15.40	0.16
	2	< 1	7.20	84.00	2.20	11.20	< 0.1	14.40	0.10
17	0	< 1	6.20	81.00	1.55	14.30	< 0.1	72.00	0.25
	1	< 1	7.02	73.00	1.10	9.95	< 0.1	16.20	< 0.10
	2	5.80	6.96	100.50	0.95	10.30	< 0.1	13.40	0.10
18	0	< 1	6.49	87.50	1.25	10.60	< 0.1	71.50	0.19
	1	I	I	I	I	I	I	I	I
	2	I	I	I	I	I	I	I	I
19	0	< 1	4.72	71.50	0.60	7.00	< 0.1	43.60	< 0.10
	1	< 1	5.46	75.50	0.45	7.35	< 0.1	42.60	< 0.10
	2	< 1	3.42	130.00	0.20	9.40	< 0.1	14.40	< 0.10
20	0	< 1	3.20	52.00	0.30	8.05	< 0.1	42.00	< 0.10
	1	< 1	3.89	57.50	0.40	9.00	< 0.1	41.60	< 0.10
	2	< 1	8.93	43.60	0.30	6.35	< 0.1	25.60	< 0.10
21	0	< 1	6.46	74.50	0.35	5.75	< 0.1	53.50	0.29
	1	< 1	6.37	101.00	0.25	8.40	< 0.1	53.50	0.10
	2	< 1	4.34	71.00	0.20	7.30	< 0.1	9.45	< 0.10
22	0	< 1	6.26	236.00	0.20	6.65	< 0.1	14.40	< 0.10
	1	< 1	4.99	108.00	0.20	7.50	< 0.1	11.60	0.13
	2	< 1	3.25	75.00	0.25	7.95	< 0.1	13.80	0.16
23	0	< 1	4.32	1080.00	0.30	6.70	< 0.1	9.30	< 0.10
	1	< 1	4.95	186.00	0.20	7.40	< 0.1	17.80	0.14
	2	< 1	4.49	74.00	<.20	7.20	< 0.1	14.40	< 0.10
24	0	< 1	3.65	114.50	<.20	8.60	< 0.1	11.20	< 0.10
	1	< 1	4.34	61.50	0.35	9.55	< 0.1	9.90	< 0.10
	2	< 1	3.76	45.80	<.20	8.10	< 0.1	9.15	< 0.10
25	0	< 1	4.19	83.00	<.20	11.30	< 0.1	9.25	< 0.10
	1	< 1	7.64	92.50	0.20	12.10	< 0.1	15.00	< 0.10
	2	< 1	4.80	32.40	<.20	7.70	< 0.1	12.20	< 0.10
26	0	< 1	4.92	103.50	<.20	8.45	< 0.1	11.50	< 0.10
	1	< 1	5.40	67.50	<.20	9.70	< 0.1	11.10	< 0.10
	2	< 1	4.82	74.00	<.20	11.40	< 0.1	11.10	< 0.10
27	0	< 1	3.62	124.50	<.20	20.00	< 0.1	32.00	< 0.10
	1	< 1	5.68	101.00	<.20	14.10	< 0.1	15.10	< 0.10
	2	< 1	5.20	97.00	<.20	12.10	< 0.1	13.40	< 0.10
28	0	< 1	< 1	91.50	0.90	14.70	< 0.1	83.00	< 0.10
	1	< 1	< 1	103.00	0.40	12.00	< 0.1	69.80	0.14
	2	< 1	5.86	76.50	0.20	8.60	0.10	10.13	0.10

I = Analysis Incomplete
N = Not Analyzed
R = Instrumentation problem - will have to be resampled and reanalyzed.

TABLE A-2
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

Sample Location	Depth	E. P. TOXICITY E.P. Tox. Ag (mg/l)	E.P. Tox. As (mg/l)	E.P. Tox. Ba (mg/l)	E.P. Tox. Cd (mg/l)	E.P. Tox. Cr (mg/l)	E.P. Tox. Hg (mg/l)	E.P. Tox. Pb (mg/l)	E.P. Tox. Se (mg/l)
1	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
2	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
3	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
6	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
11	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
12	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
13	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
14	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
15	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
16	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
17	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
18	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
19	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
20	0	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	1	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1
	2	<1	<1	<25	<0.2	<1	<0.1	<1	<0.1

TABLE A-3
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

ORGANICS

SAMPLE Loctn	Depth	Acetone (ug/Kg)	Qual	Methylene Chloride (ug/Kg)	Qual	Xylene (ug/Kg)	Qual	Carbon Disulfide (ug/Kg)	Qual	UNKNOWNS
1	0 --	A		A		A		A		
	1 --	A		A		A		A		
	2 --	A		A		A		A		
4	0 --	13	U	7	U	7	U	7	U	
	1 --	4	J	38		6	U	6	U	
	2 --	12	U	20		6	U	6	U	
5	0 --	8	J	26		7	U	7	U	
	1 --	36	B	5	U	1	J	5	U	2 ? 7J,9J
	2 --	54	B	5	U	2	J	5	U	4 ? 15J,8J,8J,7J
6	0 --	57	B	5	U	4	J	5	U	
	1 --	24	B	5	U	0.9	J	5	U	2 ? 10J,13J
	2 --	29	B	5	U	1	J	5	U	
7	0 --	28	B	5	U	2	J	2	J	2 ? 12J,15J
	1 --	95	B	5	U	2	J	5	U	2 ? 8J,38J
	2 --	27	B	5	U	2	J	5	U	
8	0 --	57	B	5	U	1	J	5	U	
	1 --	12	B	2	JB	5	U	5	U	
	2 --	14	B	5	U	5	U	5	U	
9	0 --	21	B	3	JB	5	U	5	U	
	1 --	16	B	3	JB	5	U	5	U	
	2 --	18	B	3	JB	5	U	5	U	3 ? 5J,14J,23J
10	0 --	32	B	4	JB	5	U	12		
	1 --	31	B	7	B	5	U	5	U	
	2 --	20	B	7	B	5	U	5	U	
11	0 --	41	B	3	JB	1	JB	5	U	
	1 --	160	B	3	JB	12	B	5	U	
	2 --	52	B	3	JB	20	B	5	U	
12	0 --	5	JB	3	JB	55	B	5	U	
	1 --	140	B	3	JB	7	B	5	U	
	2 --	950	BE	4	JB	27	B	5	U	
13	0 --	22	B	4	JB	7	B	5	U	ETHANOL 15J
	1 --	150	B	3	JB	5	U	5	U	
	2 --	49	B	2	JB	3	JB	5	U	
14	0 --	62	B	1	JB	7	B	5	U	
	1 --	12	B	2	JB	5	U	5	U	
	2 --	8	JB	3	JB	8		5	U	
15	0 --	40	B	3	JB	15		5	U	
	1 --	19	B	5	U	18		5	U	
	2 --	22	B	3	JB	10		5	U	
16	0 --	120	B	3	JB	6		5	U	
	1 --	7	JB	3	JB	3	J	5	U	
	2 --	18	B	26		4	JB	5	U	
17	0 --	57	B	4	JB	2	JB	5	U	4 ? 12J,4J,10J,10J
	1 --	24	B	9		3	JB	5	U	
	2 --	22	B	40		5	JB	5	U	
18	0 --	26	B	15		3	JB	5	U	1? 17J
	1 --	22	B	9		3	JB	11		2 ? 120J,18J
	2 --	7	JB	7		3	JB	5	J	1 ? 10J
19	0 --	8	JB	2	JB	5	U	5	U	
	1 --	18	B	2	JB	5	U	5	U	
	2 --	14	B	5	U	5	U	5	U	

TABLE A-3
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

ORGANICS

SAMPLE Loctn	Depth	Acetone (ug/Kg)	Qual	Methylene Chloride (ug/Kg)	Qual	Xylene (ug/Kg)	Qual	Carbon Disulfide (ug/Kg)	Qual	UNKNOWNS
20	0 --	13	B	2	B	18		5	U	
	1 --	28	B	2	JB	5	U	5	U	
	2 --	14	B	2	JB	10		5	U	
21	0 --	R		R		R		R		
	1 --	R		R		R		R		
	2 --	R		R		R		R		
22	0 --	R		R		R		R		
	1 --	R		R		R		R		
	2 --	R		R		R		R		
23	0 --	R		R		R		R		
	1 --	R		R		R		R		
	2 --	R		R		R		R		
24	0 --									
	1 --									
	2 --									
25	0 --									
	1 --									
	2 --									
26	0 --									
	1 --									
	2 --									
27	0 --									
	1 --									
	2 --									
28	0 --									
	1 --									
	2 --									

U = Not detected. Quantitation limit is listed.

J = Estimated value below quantitation limit.

B = Compound was detected in both the sample and it's associated blank

E = Concentration of the compound exceeded the calibration range of of the instrument.

R = Has been resampled. Original samples analyzed by Enwright Labs reported low limits 125x

A = Has been resampled. Initial samples analyzed by Oak Ridge National Labs reported low

TABLE A-4
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

Sample Location	Depth	RADIONUCLIDES Pu-238 (pCi/g)	Pu-239 (pCi/g)	Ra-226 (pCi/g)	Ra-228 (pCi/g)	Total Th (ppm)	Calc. Th (pCi/g)	Th-228 (pCi/g)	Total U (ppm)	Calc. U (pCi/g)	U-235 (wt. %)
1	0	N	N	N	N	I	I	I	I	I	I
	1	N	N	N	N	I	I	I	I	I	I
	2	N	N	N	N	I	I	I	I	I	I
2	0	N	N	N	N	<18	9.9	3.8	138	83	0.53
	1	N	N	N	N	<18	13.0	6.9	66	38	0.47
	2	N	N	N	N	<18	6.0	3.3	36	21	0.50
3	0	N	N	N	N	<18	23.0	7.0	1220	920	0.92
	1	N	N	N	N	<18	18.0	5.3	338	220	0.64
	2	N	N	N	N	<18	12.0	6.2	61	37	0.56
4	0	<.3	<.2	3.7	<.92	<18	17.0	3.3	364	200	0.39
	1	I	I	N	N	<18	25.0	6.5	157	87	0.41
	2	I	I	N	N	<18	9.4	5.4	28	15	0.38
5	0	N	N	N	N	21	49.0	6.6	435	250	0.47
	1	N	N	N	N	<23	7.3	2.3	25	15	0.56
	2	N	N	N	N	<23	3.4	1.3	<11	<7.0	0.62
6	0	N	N	N	N	44	100.0	7.3	606	410	0.71
	1	N	N	N	N	<23	<9.5	<2.4	39	16	0.70
	2	N	N	N	N	<23	<9.0	<2.3	15	10	0.69
7	0	N	N	N	N	26	<9.4	<2.3	164	110	0.70
	1	N	N	N	N	<23	11.0	2.2	118	79	0.70
	2	N	N	N	N	<23	<9.4	<2.4	11	7.1	0.65
8	0	0.66	<0.20	3.3	1.9	<23	7.9	2.8	70	45	0.63
	1	0.61	<0.20	N	N	<23	7.9	4.1	26	16	0.57
	2	<0.30	<0.20	N	N	<23	9.5	5.1	<11	<7.0	0.61
9	0	N	N	N	N	<23	16.0	6.4	40	26	0.64
	1	N	N	N	N	<23	9.9	5.3	34	23	0.73
	2	N	N	N	N	<23	8.4	3.5	13	8.8	0.73
10	0	N	N	N	N	29	17.0	4.8	184	120	0.68
	1	N	N	N	N	<23	12.0	7.2	24	17	0.75
	2	N	N	N	N	<23	9.4	6.2	<11	<7.4	0.72
11	0	N	N	N	N	<23	18.0	7.4	274	180	0.64
	1	N	N	N	N	<18	12.0	6.4	23	15	0.68
	2	N	N	N	N	<18	5.0	2.3	<11	7.3	0.69
12	0	<0.30	0.35	3.0	2.4	<18	15.0	4.1	133	88	0.68
	1	<.0.30	<0.20	N	N	<18	5.2	2.5	58	40	0.74
	2	<0.30	<0.20	N	N	<18	5.4	2.8	37	25	0.71
13	0	N	N	N	N	<18	20.0	5.5	323	190	0.51
	1	N	N	N	N	<18	10.0	3.7	132	83	0.60
	2	N	N	N	N	<18	5.9	2.8	44	27	0.57
14	0	N	N	N	N	27	20.0	6.5	419	270	0.63
	1	N	N	N	N	<18	14.0	3.3	110	74	0.71
	2	N	N	N	N	<18	9.3	4.6	26	17	0.67
15	0	N	N	N	N	94	18.0	5.4	345	210	0.54
	1	N	N	N	N	25	19.0	7.4	122	81	0.69
	2	N	N	N	N	<18	10.0	4.6	24	16	0.71
16	0	0.48	0.23	1.1	1.7	<18	9.3	3.8	34	34	0.74
	1	0.76	0.33	N	N	<18	14.0	6.0	70	49	0.78
	2	<.3	<.2	N	N	<18	9.5	5.1	25	18	0.79
17	0	N	N	N	N	37	240.0	9.7	375	270	0.85
	1	N	N	N	N	<18	17.0	7.4	86	59	0.74
	2	N	N	N	N	<18	7.6	3.5	12	8.2	0.75
18	0	N	N	N	N	31	75.0	6.0	414	310	0.90
	1	N	N	N	N	<18	14.0	4.0	123	91	0.88
	2	N	N	N	N	<18	11.0	4.1	32	24	0.88
19	0	N	N	N	N	18	48.0	4.8	294	230	0.96
	1	N	N	N	N	<18	21.0	4.2	122	89	0.87
	2	N	N	N	N	<18	8.6	4.2	16	12	0.85
20	0	<.3	<.2	16	2.2	<18	40.0	4.4	152	120	0.99
	1	<.3	<.2	N	N	<18	28.0	4.5	115	88	0.95
	2	<.3	<.2	N	N	<18	12.0	5.6	19	14	0.85
21	0	N	N	N	N	<18	23.0	3.2	553	380	0.73
	1	N	N	N	N	<18	8.1	3.8	68	46	0.72
	2	N	N	N	N	<18	8.0	4.6	11	7.4	0.72

TABLE A-4
SUMMARY OF ANALYSES
PLANT 1 PAD PHASE A/B CONSTRUCTION AREA

Sample Location	Depth	RADIONUCLIDES Pu-238 (pCi/g)	Pu-239 (pCi/g)	Ra-226 (pCi/g)	Ra-228 (pCi/g)	Total Th (ppm)	Calc. Th (pCi/g)	Th-228 (pCi/g)	Total U (ppm)	Calc. U (pCi/g)	U-235 (wt. %)
22	0	N	N	N	N	18	8.2	4.4	187	130	0.83
	1	N	N	N	N	<18	11.0	5.0	18	11	0.58
	2	N	N	N	N	<18	5.6	3.2	<11	<7.5	0.73
23	0	N	N	N	N	<18	8.3	4.0	91	57	0.58
	1	N	N	N	N	<18	9.7	5.0	20	14	0.72
	2	N	N	N	N	<18	10.0	5.2	<11	<7.6	0.76
24	0	<.3	<.2	0.39	3.1	<18	6.5	1.6	318	210	0.67
	1	<0.14	0.11	N	N	<18	6.2	2.3	<11	<7.6	0.76
	2	<0.14	<0.10	N	N	<18	5.1	1.9	<11	<7.3	0.70
25	0	N	N	N	N	<18	9.2	5.2	209	140	0.66
	1	N	N	N	N	<18	7.8	3.9	29	19	0.66
	2	N	N	N	N	<18	9.9	5.3	11	7.3	0.69
26	0	N	N	N	N	18	16.0	6.2	152	100	0.67
	1	N	N	N	N	<18	8.8	4.0	15	10	0.72
	2	N	N	N	N	<18	12.0	5.8	<11	<7.4	0.71
27	0	N	N	N	N	<18	9.9	5.1	959	630	0.66
	1	N	N	N	N	<18	12.0	6.7	25	17	0.69
	2	N	N	N	N	<18	7.4	2.6	<11	<8.4	0.94
28	0	1.5	0.49	75	11	113	160.0	15.0	813	560	0.76
	1	0.28	<0.14	N	N	27	37.0	6.3	210	140	0.69
	2	<0.23	<0.14	N	N	<18	6.6	3.4	11	7.3	0.73

FIGURE 3

ADDITIONAL SOIL SAMPLING

● SURFACE SAMPLE + 1ft DEPTH SAMPLE

XXX / YYY = SURFACE SAMPLE NO / 1ft DEPTH SAMPLE NO.

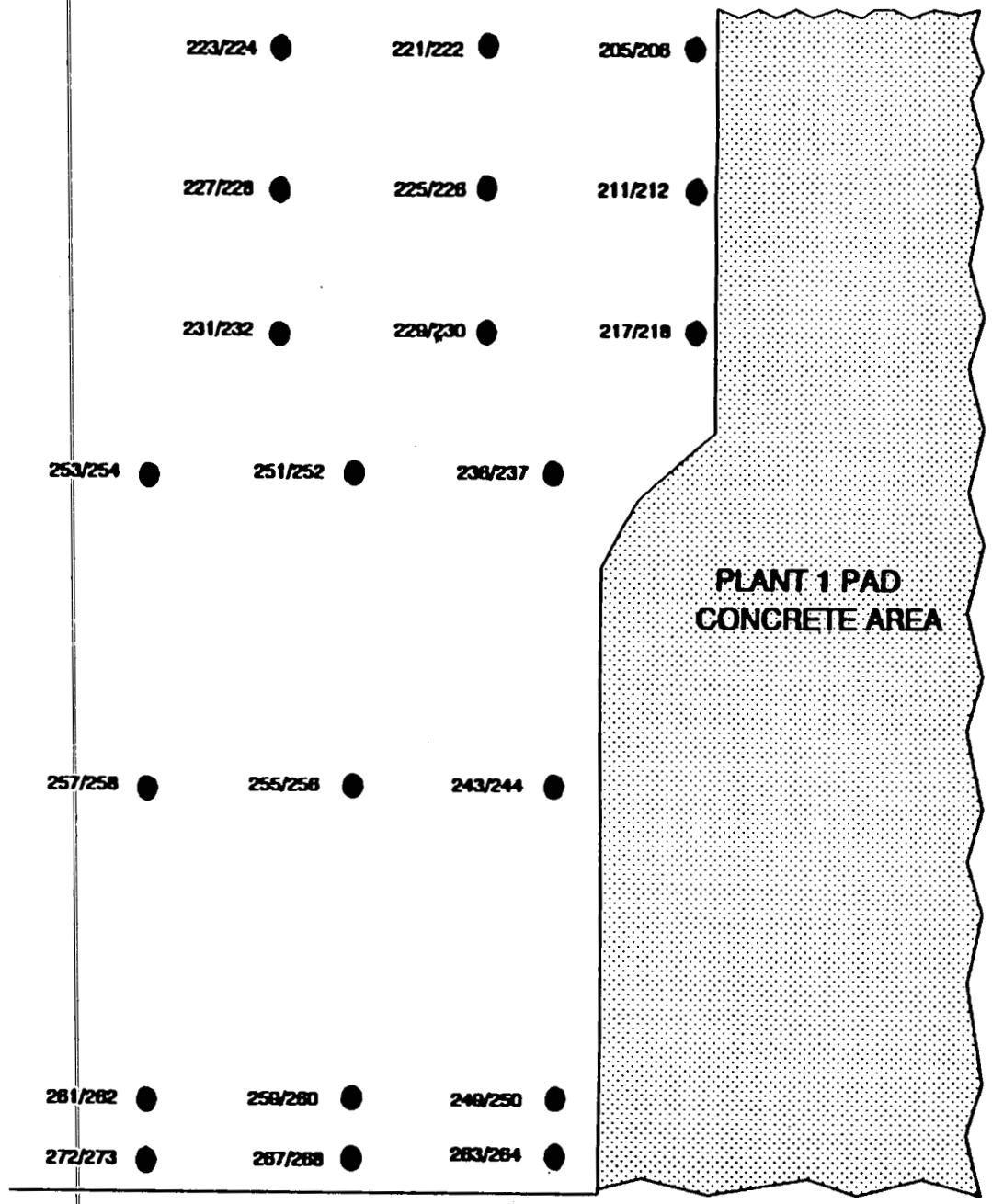


TABLE A-5

CONTROLLED STORAGE PAD, PLANT 1
ANALYTICAL RESULTS

SAMPLE NUMBER	TOTAL U(ppm)	TOTAL Th(ppm)	U pCi/g	Th pCi/g	Th-228 pCi/g	WEIGHT % (U) U-234	U-235	U-236	U-238
205	46	<23	28.0	<3.5	1.0	0.004	0.52	0.005	99.47
206	30	<23							
207	51	<23	31.0	<4.5	2.0	0.002	0.55	0.001	99.45
208	115	<23	69.0	<6.4	3.9	0.001	0.52	0.005	99.47
209	278	29	160.0	4.9	1.8	0.002	0.45	0.005	99.54
210	751	32	530.0	5.7	2.3	0.005	0.80	0.014	99.18
211	751	26	380.0	6.3	3.5	0.005	0.29	0.005	99.70
212	305	<45							
213	2460	25	1400.0	<7.9	3.1	0.007	0.45	0.005	99.54
214	238	28	140.0	6.5	3.8	0.004	0.48	0.008	99.51
215	245	28	160.0	7.2	4.2	0.001	0.60	0.001	99.40
216	216	45	140.0	5.7	2.7	0.007	0.68	0.006	99.31
217	649	<23	440.0	8.2	3.4	0.002	0.72	0.004	99.27
218	83	29							
219	326	32	220.0	6.1	3.0	0.005	0.70	0.004	99.29
220	471	40	300.0	5.9	2.5	0.004	0.62	0.004	99.37
221	596	<23	430.0	7.2	2.9	0.005	0.82	0.005	99.17
222	39	<23							
223	49	<23	33.0	<3.8	1.3	0.008	0.70	0.013	99.28
224	45	<23							
225	57	<23	35.0	<4.1	1.6	0.004	0.55	0.007	99.44
226	20	<23							
227	60	<23	41.0	<4.3	1.8	0.008	0.59	0.010	99.39
228	31	<23							
229	86	<23	50.0	<3.9	1.4	0.002	0.47	0.005	99.52
230	19	<23							
231	40	<23	26.0	<3.4	0.9	0.008	0.65	0.009	99.33
232	15	<23							
233	71	<23	44.0	<3.7	1.2	0.001	0.59	0.005	99.40
234	133	23	87.0	4.4	1.9	0.004	0.66	0.005	99.33
235	101	<23	66.0	<4.1	1.6	0.004	0.65	0.008	99.34
236	150	39	98.0	8.6	4.4	0.008	0.66	0.011	99.32
237	35	<23							
238									
239	3840	<45	2500.0	<7.9	3.1	0.005	0.65	0.007	99.34
240	72	<23	48.0	3.9	0.9	0.010	0.71	0.010	99.27
241	39	<23	25.0	4.4	0.9	0.002	0.63	0.005	99.36
242	204	24	150.0	7.0	2.1	0.005	0.87	0.007	99.12
243	130	24	86.0	10.2	1.4	0.003	0.69	0.003	99.30
244	106	<23							
245	83	<23	58.0	7.3	1.5	0.001	0.68	0.003	99.32
246	250	35	150.0	11.7	3.4	0.002	0.49	0.007	99.50
247	404	325	240.0	90.3	30.4	0.002	0.52	0.006	99.47
248	278	184	170.0	36.3	14.2	0.007	0.60	0.011	99.38
249	316	42	230.0	14.6	2.8	0.006	0.86	0.007	99.13
250	63	24							
251	88	24	53.0	9.8	1.1	0.005	0.54	0.005	99.45
252	16	<23							
253	87	<23	55.0	8.0	1.1	0.005	0.61	0.005	99.38
254	41	<23							
255	43	<23	28.0	5.1	1.1	0.005	0.68	0.007	99.31
256	16	<23							
257	65	<23	43.0	<2.1	<.7	2.000	0.70	0.007	97.29
258	29	<23							
259	182	26	130.0	16.1	1.4	0.007	0.85	0.008	99.14
260	48	<23							
261	133	<23	100.0	15.5	1.7	0.005	0.92	0.007	99.07
262	24	<23							
263	358	41	260.0	33.1	3.2	0.005	0.82	0.006	99.17
264	107	24							
265	347	35	260.0	30.3	2.8	0.008	0.91	0.004	99.08
266	467	39	350.0	49.1	2.9	0.007	0.91	0.007	99.08
267									
268	365	30	270.0	26.5	1.9	0.005	0.92	0.005	99.07
269	102	<23							
270	266	<23	210.0	29.9	1.4	0.009	0.99	0.006	99.00
271	89	<23	67.0	<4.0	1.5	0.002	0.93	0.003	99.06
272	219	25	170.0	5.1	2.4	0.008	0.93	0.006	99.06
273	53	<23							

PLANT 1 STORAGE PAD

UNDER-PAD SAMPLING LOCATIONS

PT.	FT - IN EAST	FT - IN NORTH
1	234	25 - 6
2	245 - 9	25 - 6
3	257 - 4	25 - 6
4	270	25 - 6
5	281 - 9	25 - 6
6	306 - 3	25 - 6
7	331 - 3	25 - 6
8	200	54 - 7
9	200	31 - 6
10	200	23 - 6
11	331 - 3	5 - 6
PT.	**FT - IN EAST**	**FT - IN SOUTH**
12	175	7
13	151	12 - 5
14	140	30 - 5
15	116	33
16	116	16 - 6
17	90	24
18	77	22
19	60	13 - 6
20	60	18 - 4
21	50	36 - 7
22	35	34 - 6
23	36	54 - 6

FIGURE 4

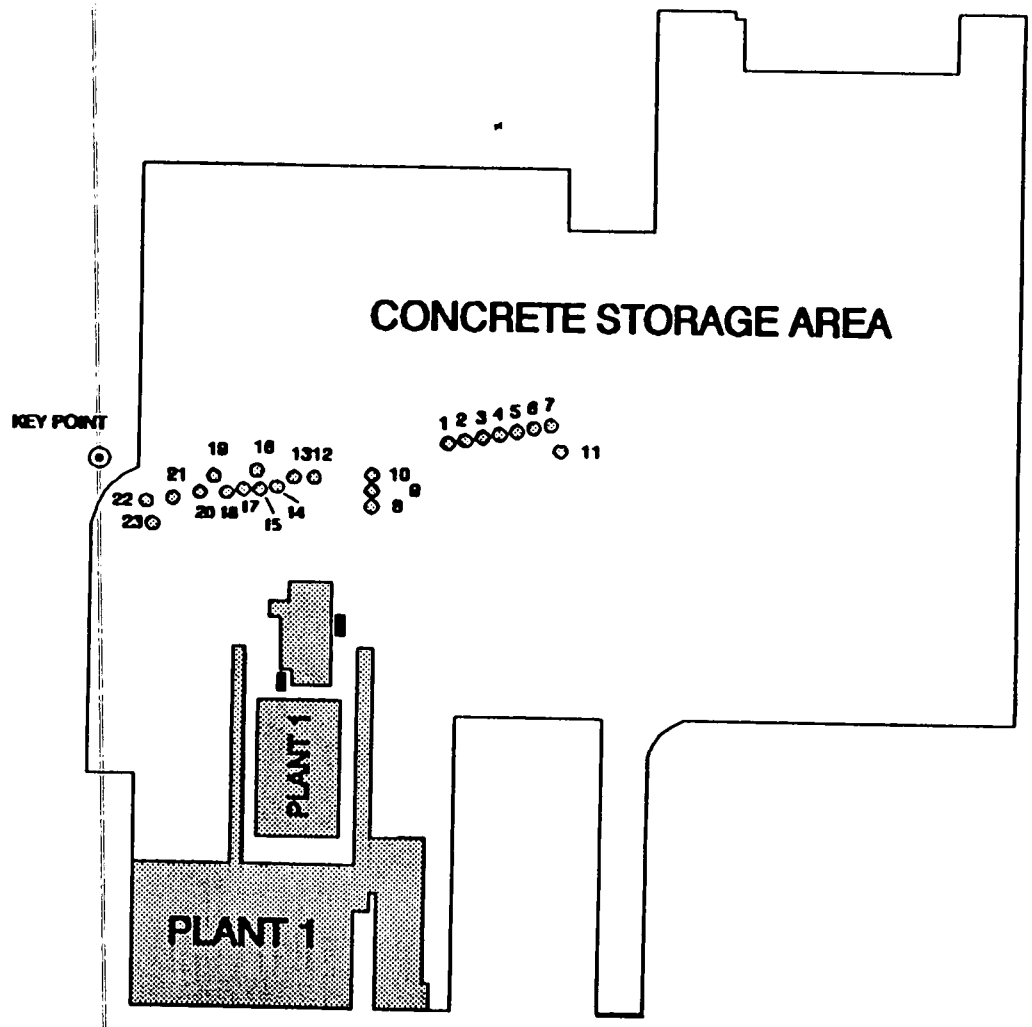
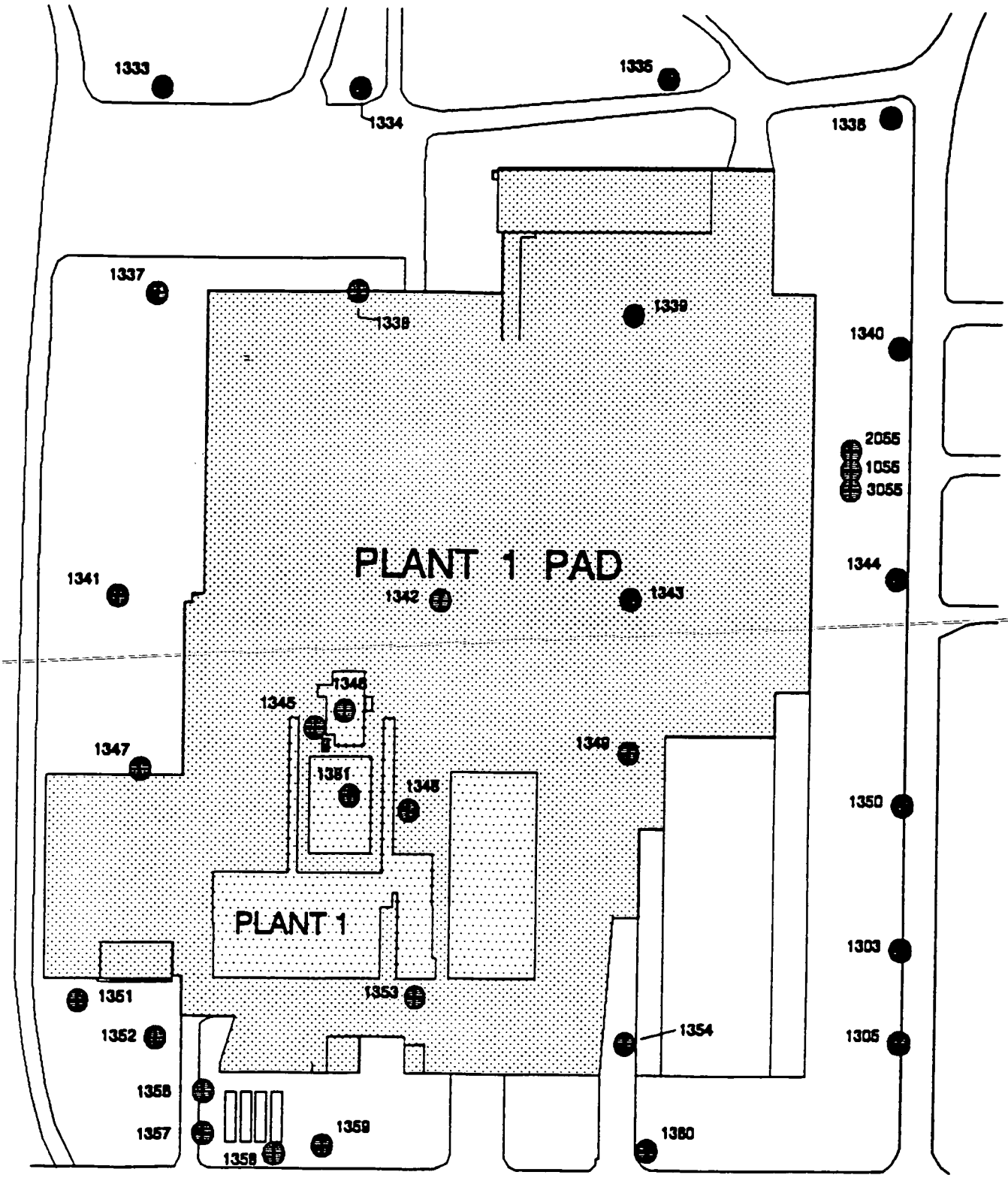


Table A-6

Thorium and Uranium Measurements
at 23 Additional Sampling Locations
Directly Under Plant 1 Pad

Fig. 4 Sample Location	Beneath Pad Surface Soil		Soil at 1 ft. Depth Beneath Surface	
	Th (ppm)	U (ppm)	Th (ppm)	U (ppm)
1			< 18	16
2			< 18	13
3			< 18	15
4			< 18	13
5			< 18	11
6			< 18	25
7			< 18	< 11
8			< 18	18
9			< 18	< 11
10				
11			< 18	97
12			< 18	< 11
13			< 18	18
14			< 18	11
15			< 18	14
16				
17				
18			< 18	30
19			< 18	17
20			< 18	19
21			< 18	31
22			< 18	47
23			< 18	11

FIGURE 5
BORINGS AT PLANT 1 PAD



● = BORING SITE

TABLE A-7

PLANT 1 PAD BORING DATA

BORINGS THROUGH PLANT 1 PAD

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)
1339	1.0 TO 1.5	26.2	5.0
----	2.0 TO 2.5	< 3.1	8.6
	4.5 TO 5.0	6.6	< 4.4
	10.5 TO 11.0	2.4	< 4.0
	GROUNDWATER	441.0 ug/l @ 5 ft	
	NITRATES	0.1 & 0.12 mg/l	
1342	1.0 TO 1.5	15.0	7.8
----	4.0 TO 4.5	4.0	< 4.0
	5.0 TO 5.5	3.0	12.0
	10.5 TO 11.0	4.0	7.4
	16.5 TO 17.0	4.0	< 4.1
	GROUNDWATER	26.0 ug/l @ 13.5 ft	
	NITRATES	< 0.1 mg/l	
1343	1.0 TO 1.5	75.1	< 4.6
----	3.0 TO 3.5	2.6	< 5.4
	6.0 TO 6.5	2.8	< 3.0
	10.0 TO 10.5	2.3	3.7
	GROUNDWATER	40.6 ug/l @ 8.0 ft	
	NITRATES	< 0.1 mg/l	
1345	1.0 TO 1.5	27.5	10.3
----	2.0 TO 2.5	3.7	--
	3.5 TO 4.0	2.9	< 3.5
	5.0 TO 5.5	4.5	10.8
	10.5 TO 11.0	13.7	8.3
	GROUNDWATER	2.0 ug/l @ 13.5 ft	
1346	0.0 TO 0.5	28.9	7.0
----	3.0 TO 3.5	10.2	6.7
	5.0 TO 5.5	4.5	8.7
	10.0 TO 10.5	5.2	4.2
	15.0 TO 15.5	6.1	6.6
	GROUNDWATER	ug/l @ 15.0 ft	

BORINGS OFF THE PAD'S EDGE

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)
1338	0.0 TO 0.5	211.0	25.0
----	3.0 TO 3.5	49.0	23.0
	5.0 TO 5.5	73.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	GROUNDWATER	40.0 ug/l @ 6.5 ft	
	NITRATES	0.1 mg/l	
1347	RESULTS NOT RECEIVED		
1349	0.0 TO 0.5	7.0	7.0
----	2.0 TO 2.5	5.0	14.0
	5.0 TO 5.5	4.0	14.0
	10.0 TO 10.5	3.0	4.0
	15.0 TO 15.5	5.0	< 8.0
	GROUNDWATER	NONE	

BORINGS IN THE VICINITY OF THE PAD

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)
1333	0.0 TO 0.5	82.0	<23.0
----	2.0 TO 2.5	< 11.0	<23.0
	5.0 TO 5.5	11.0	<23.0
	10.0 TO 10.5	20.0	<23.0
	15.0 TO 15.5	< 11.0	<23.0
1334	0.0 TO 0.5	< 11.0	<23.0
----	1.5 TO 2.0	< 11.0	<23.0
	5.0 TO 5.5	11.0	<23.0
1335	0.0 TO 0.5	27.0	<23.0
----	2.0 TO 2.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	15.0 TO 15.5	< 11.0	<23.0
1336	0.0 TO 0.5	< 11.0	<23.0
----	3.0 TO 3.5	< 11.0	<23.0
	6.0 TO 6.5	< 11.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	15.0 TO 15.5	< 11.0	<23.0
	GROUNDWATER	127.0 ug/l	
1337	0.0 TO 0.5	33.0	<23.0
----	3.0 TO 3.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	10.0 TO 10.5	16.0	<23.0
	GROUNDWATER	689.0 ug/l	
1340	0.0 TO 0.5	98.0	24.0
----	3.0 TO 3.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	GROUNDWATER	32.0 ug/l	
1341	0.0 TO 0.5	30.8	7.6
----	3.0 TO 3.5	6.9	8.0
	5.0 TO 5.5	5.0	9.9
	10.0 TO 10.5	3.7	11.8
	GROUNDWATER	28.0 ug/l	
1344	0.0 TO 0.5	28.0	<23.0
----	3.0 TO 3.5	17.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	5.0 TO 5.5	5.0	9.9
	10.0 TO 10.5	3.7	11.8
	GROUNDWATER	28.0 ug/l	
1350	0.0 TO 0.5	15.0	<23.0
----	3.0 TO 3.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	GROUNDWATER	40.9 ug/l	
1351	0.0 TO 0.5	25.0	<23.0
----	2.0 TO 2.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	10.5 TO 11.0	< 11.0	<23.0
	15.0 TO 15.5	< 11.0	<23.0
	GROUNDWATER	11.0 ug/l	
1352	0.0 TO 0.5	29.0	<23.0
----	3.0 TO 3.5	13.0	<23.0
	6.0 TO 6.5	< 11.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	15.0 TO 15.5	12.0	<23.0
	GROUNDWATER	226.0 ug/l	
1353	1.0 TO 1.5	< 11.0	--
----	2.0 TO 2.5	< 11.0	--
	5.0 TO 5.5	< 11.0	--
	10.5 TO 11.0	< 11.0	--
	15.0 TO 15.5	< 11.0	--
	GROUNDWATER	24.0 ug/l	
1354	1.0 TO 1.5	< 11.0	--
----	3.0 TO 3.5	21.0	--
	5.0 TO 5.5	< 11.0	--
	10.0 TO 10.5	12.0	--
	15.0 TO 15.5	< 11.0	--
	GROUNDWATER	93.0 ug/l	

TABLE A-7 (cont'd)

PLANT 1 PAD BORING DATA

BORINGS THROUGH PLANT 1 PAD

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)
1348	0.0 TO 0.5	28.0	4.0
----	1.5 TO 2.0	11.0	6.0
	4.5 TO 5.0	3.0	12.0
	10.0 TO 10.5	6.0	9.0
	14.5 TO 15.0	3.0	7.0
	GROUNDWATER	20.5 ug/l @ 16.0 ft	
	NITRATES	< 0.1 mg/l	
1361	1.0 TO 1.5	22.7	2.9
----	2.0 TO 2.5	49.4	1.9
	3.0 TO 3.5	6.8	7.6
	6.0 TO 6.5	3.1	8.8
	7.0 TO 7.5	3.1	4.9
	GROUNDWATER	38.6 ug/l @ 13.5 ft	
	NITRATES	< 0.1 mg/l	

BORINGS OFF THE PAD'S EDGE

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)

BORINGS IN THE VICINITY OF THE PAD

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)
1356	0.0 TO 0.5	46.0	<23.0
----	2.0 TO 2.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	10.5 TO 11.0	119.0	30.0
	15.0 TO 15.5	14.0	<23.0
	GROUNDWATER	240.0 ug/l	
1357	0.0 TO 0.5	41.0	<23.0
----	3.0 TO 3.5	20.0	<23.0
	5.0 TO 5.5	22.0	<23.0
	10.5 TO 11.0	29.0	<23.0
	15.0 TO 15.5	17.0	<23.0
	GROUNDWATER	748.0 ug/l	

BORING NUMBER	DEPTH (ft)	TOTAL u (ppm)	TOTAL Th (ppm)
1358	0.0 TO 0.5	78.0	<23.0
----	2.0 TO 2.5	< 11.0	<23.0
	5.0 TO 5.5	13.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	GROUNDWATER	205.0 ug/l	
1359	0.0 TO 0.5	57.0	<23.0
----	2.0 TO 2.5	< 11.0	<23.0
	5.0 TO 5.5	< 11.0	<23.0
	10.0 TO 10.5	< 11.0	<23.0
	14.5 TO 15.0	< 11.0	<23.0
	GROUNDWATER	405.0 ug/l	

FIGURE 6

CROSSECTIONAL OF BORING NUMBER 1339 ON PLANT 1 PAD

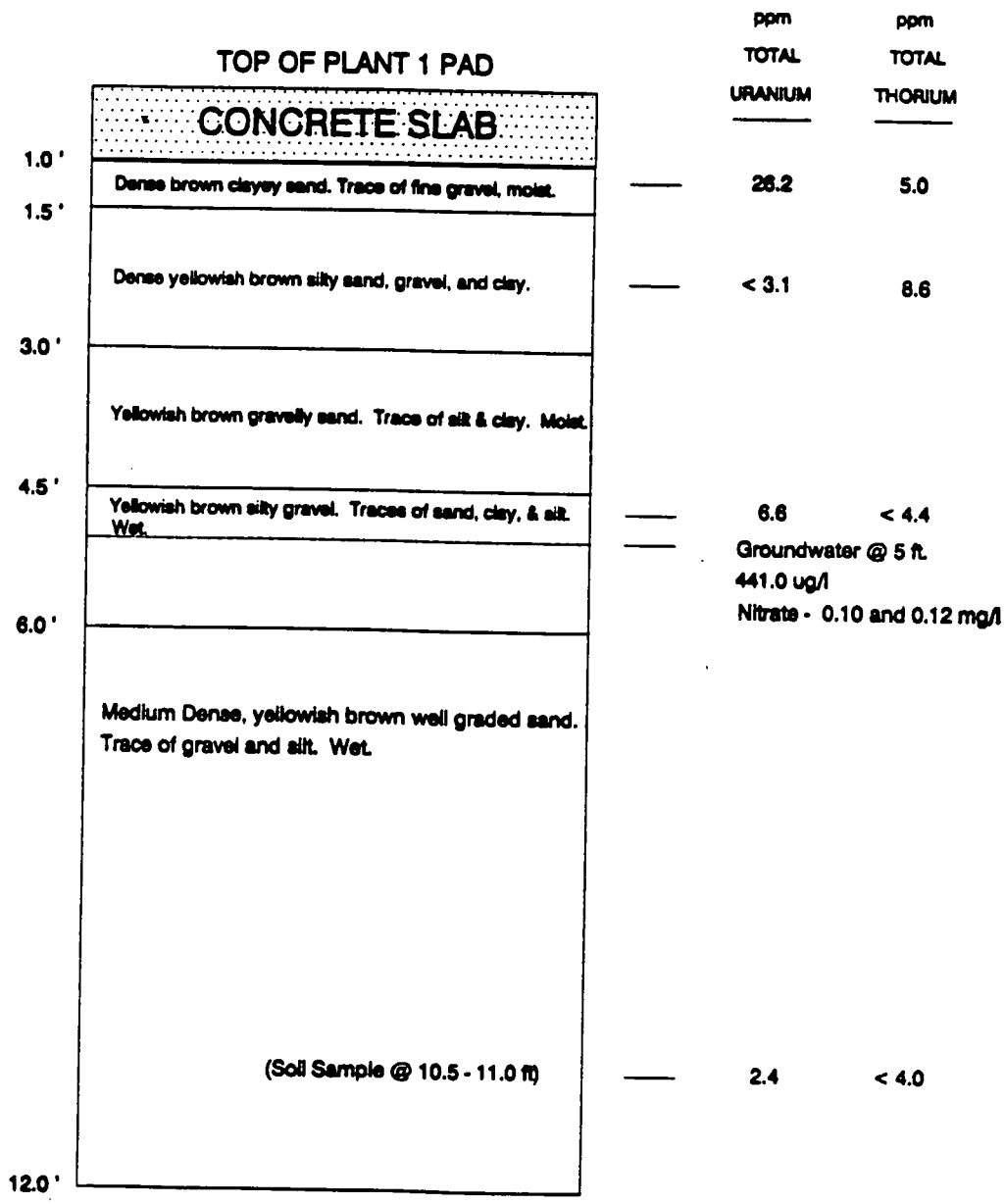


FIGURE 7

CROSSECTIONAL OF BORING NUMBER 1342 ON PLANT 1 PAD

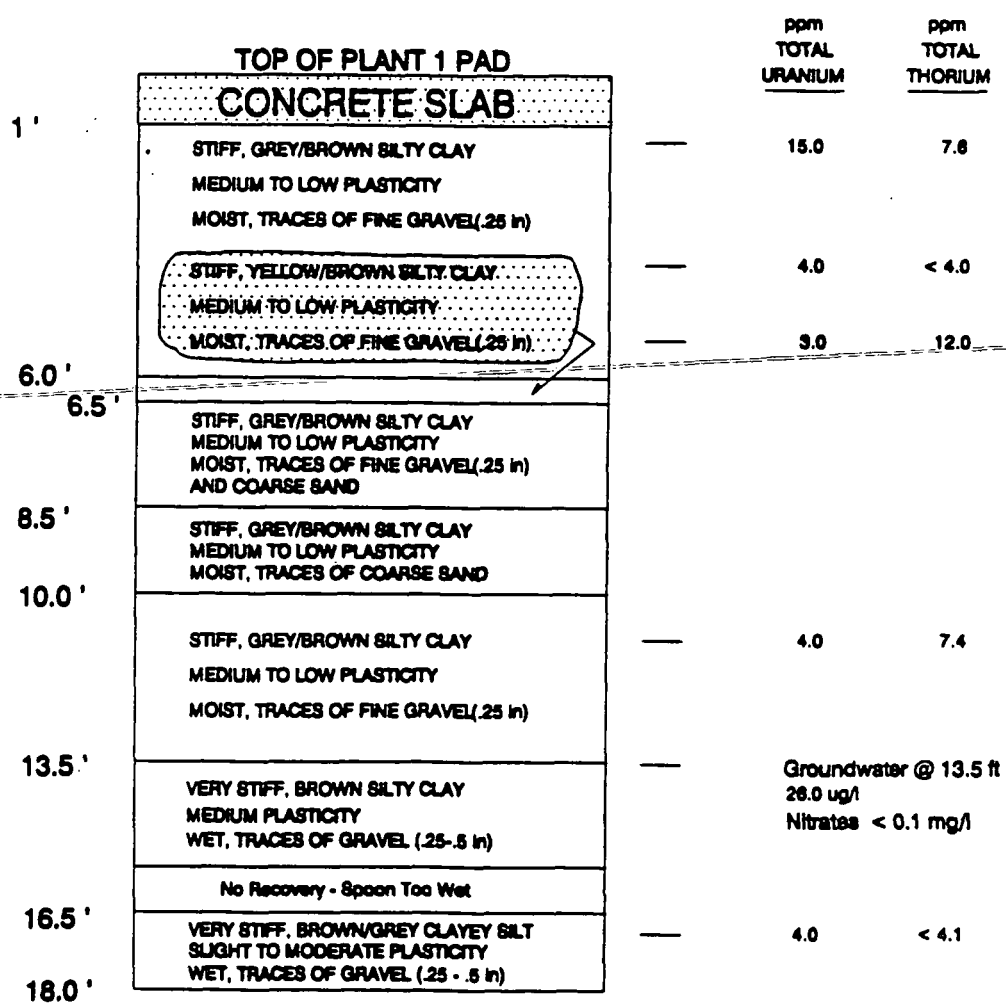


FIGURE 8

CROSSECTIONAL OF BORING NUMBER 1343 ON PLANT 1 PAD

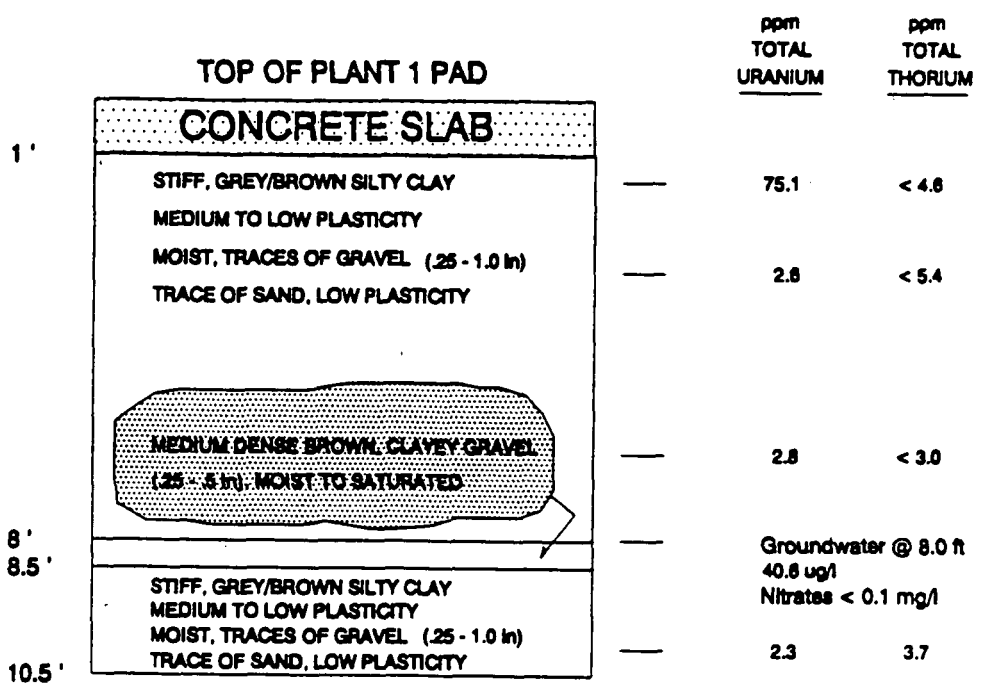


FIGURE 9

CROSSECTIONAL OF BORING NUMBER 1345 ON PLANT 1 PAD

TOP OF PLANT 1 PAD

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
	CONCRETE SLAB		
1.0'	Stiff, yellow/brown silty clay, with sand and trace of fine gravel. Plastic & moist.	27.5	10.3
1.5'	Stiff dark gray clay. Some silt, low plasticity, moist.	3.7	—
3.0'	Soft olive gray silty clay. Medium plasticity, moist.	2.9	< 3.5
4.5'	Dark olive to black clay. Some silt and sand. Fine to medium gravel, medium plasticity, moist.	4.5	10.8
6.0'	Very soft yellowish brown silty clay. Medium plasticity, moist.		
6.5'	Stiff black clay, some silt. Medium plasticity, moist.		
7.5'	Very soft, olive brown sandy clay. Traces of fine gravel Low plasticity, very moist.		
9.0'	Very soft dark grayish brown sandy clay. Trace of fine gravel, medium plasticity. very moist.		
10.5'	Very soft yellowish brown sandy clay, very moist.	13.7	8.3
11.0'	Dark gray clay, trace of silt, medium plasticity, moist.		
12.0'	Stiff light gray clay, trace of silt and sand. Medium plasticity, moist.		
13.5'	Light olive brown clayey silt with sand and gravel. Moist	Groundwater @ 13.5 ft. 2.0 ug/l	
14.0'	Light gray silty clay. Trace of fine gravel. Medium plasticity, moist.		
16.0'			

** Average of two samples plus one duplicate

FIGURE 10

CROSSECTIONAL OF BORING NUMBER 1346 ON PLANT 1 PAD

TOP OF PLANT 1 PAD

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
	CONCRETE SLAB		
1.0'	Stiff olive brown clay, with trace of sand & fine gravel. Low Plasticity, moist.	28.9	7.0
1.5'	NO RECOVERY		
3.0'	Stiff olive gray silty clay with a trace of sand Low plasticity, moist.	10.2	6.7
4.0'	Soft to stiff olive brown silty clay with trace of sand. Medium plasticity, moist.		
5.0'	Med. stiff olive silty clay/trace sand. Med Plas. moist.	4.5	8.7
5.5'	NO RECOVERY		
6.0'	Med. stiff olive silty clay/trace sand. Med Plas. moist.		
6.5'	NO RECOVERY		
7.5'	Stiff light olive brown silth clay, trace sand/fine gravel. Medium Plasticity, moist.		
8.5'	NO RECOVERY		
9.0'	Med stiff yellow brown silty clay, trace sand/fine gravel. Medium plasticity, moist.		
10.0'	Stiff dark gray silty clay, trace sand. Low plasticity, moist.	5.2	4.2
10.5'	Stiff dark gray silty clay, trace sand. Low plasticity, moist.		
12.5'	Med stiff yellow brown silty clay, trace sand/fine gravel. Medium plasticity, moist.		
14.5'	Very soft olive gray clay, trace silt, med. plast., moist.		
15.0'	Dense light brown silt and sand. Very wet.	Groundwater @ 15.00 ft.	
		8.1	6.6
19.5'	Medium dense olive gray sandy silt. Moist.		
20.0'			

FIGURE 11

CROSSECTIONAL OF BORING NUMBER 1348 OFF PLANT 1 PAD

TOP OF PLANT 1 PAD

CONCRETE SLAB

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
1.0'	Stiff gray gravelly clay. Low Plasticity. Moist	28.0	4.0
1.5'	Stiff dark gray clay. Low plasticity. Moist	11.0	6.0
3.0'	Medium stiff brown gray silty clay. Trace of sand. Moist.		
4.5'	Stiff dark brown silty clay. Low plasticity. Moist.	3.0	12.0
6.0'	Stiff grayish brown silty clay. Low plasticity. Moist.		
7.5'	Medium stiff gray silty clay. Low plasticity. Moist.		
9.5'	Stiff dark gray clay. Trace of sand. Low plasticity. Moist.	6.0	9.0
12.0'	Stiff gray clay. Trace of gravel. Medium plasticity. Moist.		
14.5'	Grayish brown clay. Trace of gravel. Medium plasticity. Moist.	3.0	7.0
16.0'	Gray clayey silt. Trace of gravel. Wet	Groundwater @ 16 ft. 20.5 ug/l Nitrate < 0.1 mg/l	
	Gray brown clayey sand. Non Cohesive. Wet		
19.0'	Gray clay. Medium Plasticity. Moist.		
20.0'			

FIGURE 12

CROSSECTIONAL OF BORING NUMBER 1361 ON PLANT 1 PAD

TOP OF PLANT 1 PAD

CONCRETE SLAB

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
1.0'	Medium dense, live brown clayey sand. Trace of fine to medium gravel.	22.7	2.9
	(2 ft)	49.4	1.9
	(3 ft)	6.8	7.6
4.5'	Brown gravelled sand. Wet.		
5.0'	Brown silty clay. Trace of sand and fine gravel. Medium plasticity. Moist.		
6.0'	Loose olive brown clayey sand. Trace of fine to medium gravel. Wet.	3.1	8.8
6.5'	Olive silty clay. Trace of sand and fine gravel. Wet.	3.1	4.9
7.5'	Grayish brown to dark silty clay. Low plasticity. Moist.		
9.0'	Dark gray silty clay. Medium Plasticity. Moist.		
10.0'	Dark gray clay, trace of silt, medium plasticity, moist.		
10.5'	Olive silty clay. Low plasticity. Moist.		
11.0'	Stiff olive silty clay. Low plasticity. Moist.		
12.0'	Olive brown clayey silt. Very moist.		
13.0'	Olive brown silty sand and clayey gravel. Wet.		
13.5'	Olive brown silty clay. Trace of sand & gravel. Medium Plasticity. Moist		
14.0'	Olive brown gravelly clay. Wet.		
15.0'			

Groundwater @ 13.5 ft.
38.6 ug/l
Nitrates - <0.1 mg/l

Table A-8

Metals Concentrations

Constituent	1345 mg/kg	1346 mg/kg
Aluminum	13300	9730
Arsenic	5.6	3.9 (single value)
Barium	115	96
Beryllium	1.1	1.4
Cadmium	4.0	4.4
Calcium	35115	67170
Chromium	20.0	23.2
Cobalt	15.9	17.4
Copper	18.3	20.6
Iron	25375	26940
Lead	16.3	16.2
Magnesium	8860	18060
Manganese	683	984
Mercury	<0.062	1.5
Nickel	37.3	48.1
Potassium	1390	870
Silver	2.8	<2.4
Sodium	108	340
Vanadium	22.1	23.5
Zinc	61.9	58.9

FIGURE 13

CROSSECTIONAL OF BORING NUMBER 1338 AT THE EDGE OF PLANT 1 PAD (OFF-PAD)

TOP OF PLANT 1 PAD

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
	CONCRETE SLAB		
1.0'	Dark brown silt. Some clay. Trace of gravel. Moist to dry.	211.0	25.0
1.5'	Brown silt. Trace of clay Moist. (3.0 - 3.5')	49.0	23.0
3.0'	Soft yellowish brown, silty clay. Some fine sand. Low plasticity Moist to saturated. (5.0 - 5.5')	73.0	<23.0
5.0'	Very loose dark brown clayey sand. Moist to saturated.		
7.0'	Medium dense, brown, poorly graded sand. Trace of fine gravel. Saturated.	Groundwater @ 6.5 ft 40.0 ug/l Nitrates - 0.10 mg/l	
9.5'	Very stiff gray clay. Medium p;asticity. Moist.		
10.5'		<11.0	<23.0

FIGURE 14

CROSSECTIONAL OF BORING NUMBER 1347 OFF PLANT 1 PAD

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel & some rootlets. Damp.		
1.0'			
	NO RECOVERY		
1.5'			
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel. Damp.		
2.5'			
	NO RECOVERY		
3.0'			
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel. Damp.		
4.0'			
	NO RECOVERY		
4.5'			
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel. Damp.		
5.5'			
	NO RECOVERY		
7.5'			
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel. Damp.		
8.0'			
	NO RECOVERY		
9.0'			
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel. Damp.		
10.0'			
	NO RECOVERY		
10.5'			
	Very stiff, brown silty clay, with trace of .25 - .50 in gravel. Damp.		
12.0'			
	Very stiff, gray silty clay, with trace of .25 - .50 in gravel. Damp.		
13.0'			
	NO RECOVERY		
13.5'			
	Very stiff, gray silty clay, with trace of .25 - .50 in gravel. Damp.		
14.5'			
	NO RECOVERY		
15.0'			
	Very stiff, gray silty clay, with trace of .25 - .50 in gravel. Damp.		
16.0'			
	NO RECOVERY		
16.5'			Groundwater @ 16.25 ft.
	Very stiff, gray sand-clay mixture, with trace of .25 - .50 in grave. WET.		
20.0'			Piezometer installed @ 20 ft.

FIGURE 15

CROSSECTIONAL OF BORING NUMBER 1349
AT THE EDGE OF PLANT 1 PAD
(OFF-PAD)

TOP OF PLANT 1 PAD

CONCRETE SLAB

		ppm TOTAL URANIUM	ppm TOTAL THORIUM
	Stiff olive silty clay. Trace of gravel. Low plasticity. Moist. (2.0 - 2.5 ')	7.0	7.0
2.5 '	Olive silty clay. Some sand. Low plasticity. Moist. (5.0 - 5.5 ')	5.0	14.0
		4.0	14.0
6.0 '	Gray brown silty clay. Medium plasticity. Moist.		
7.5 '	Stiff, grayish brown clay. Low plasticity. Moist (10.0 - 10.5 ')	3.0	4.0
12.0 '	Soft brown silty clay. Low plasticity. Moist to Wet.		
14.5 '	Grayish brown clayey sand. Trace of fine gravel. Moist. (15.0 - 15.5 ')	5.0	< 8.0
16.5 '	Clay. Trace of fine gravel and coarse sand. Medium plasticity. Moist	NO GROUNDWATER AVAILABLE	
20.0 '			

Table A-9

NON-ORGANICS & METALS in Groundwater from Monitor Wells 1055,2055, and 3055

Concentrations (mg/l)

Analyte	1055 (5/18/88)	1055 (2/26/89)	2055 (6/1/89)	2055 (6/28/89)	3055 (5/18/88)	3055 (8/3/88)	3055 (11/2/88)	3055 (3/1/89)
Aluminum			0.227	0.132				
Ammonia	0.01	0.01	1.48	0.48	<0.05	4.80	5.06	4.70
Arsenic	<0.002	<0.003	<0.002	<0.002	<0.002	<0.010	<0.002	<0.003
Barium	0.043	0.040	0.969	0.098	0.067	0.200	0.076	0.087
Cadmium	<0.002	<0.005	0.045	0.004	<0.002	<0.005	<0.002	<0.005
Calcium	118.000	130.000	110.000	123.000	104.000	160.000	197.000	200.000
Chloride	9.60	5.10	32.00	26.70	51.50	58.00	54.80	56.00
Chromium	<0.020	0.030	0.038	0.040	<0.020	<0.010	<0.020	0.030
Copper	<0.010	<0.010	<0.010	<0.010	<0.010	<0.030	<0.010	<0.010
Fluoride	0.65	0.30	0.20	0.17	0.53	<0.10	0.11	0.10
Iron	0.083	0.050	2.590	2.630	1.870	5.500	7.730	7.300
Kjeldahl N		0.70	7.18	0.58			5.71	3.90
Lead	0.002	<0.002	0.002	<.002	0.002	<0.005	<0.002	<0.002
Magnesium	36.200	38.000	27.500	29.400	29.600	28.000	34.400	34.000
Manganese	0.079	0.012	0.208	0.259	0.078	0.230	0.325	0.330
Mercury	<0.0002	0.000	0.000	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	0.033	0.010	<0.01	0.010	0.033	<0.050	<0.020	<0.010
Nickle	<0.02	<0.03	<0.02	<0.020	<0.020	<0.040	<0.020	<0.030
Nitrate	0.10	0.42	<0.10	<0.1	0.10	<2.50	<0.10	0.05
Organic Carbon			<1.00	0.45				
Organic Halides			0.02	<0.01			<0.05	
Organic N		0.60	5.70	0.10	5.95	1.80	0.65	
Phenol	0.01	0.01	0.02	<0.01	0.02	<0.01	<0.01	0.17
Phosphorous	7.40	0.13	18.90	0.09	0.13	0.03	<0.02	0.08
Potassium	1.360	1.700	4.270	3.300	53.200	3.500	17.800	24.000
Selenium	0.019	<0.005	<0.002	<0.002	<0.002	<0.005	<0.002	<0.005
Silicon			4.853	4.950				
Silver	<0.01	<0.001	0.013	0.011	<0.010	<0.010	<0.001	<0.010
Sodium	15.100	30.000	13.600	13.400	56.800	53.000	38.700	43.000
SulfateS	259.00	250.00	123.00	133.00	159.00	340.00	217.00	360.00
SulfideS			30.20	<0.5				
Vanadium			0.019	0.018				

Table A-10

Radionuclides in Water & Core Samples
at Well Monitoring Station 55

Analyte	1055 Water (pCi/L)	2055 Water (pCi/L)	2055 Core (pCi/g)	3055 Water (pCi/L)
Strontium-90	<5.00	<5.00	<0.50	<5.00
Technetium-99	<30.00	<30.00	<0.90	<30.00
Radium-228	<3.00	<3.00	<0.80	<3.00
Thorium-228	3.70	<1.00	0.70	<1.00
	1.20			
	1.90			
Thorium-232	1.80	<1.00	<0.60	1.00
	1.00			
	1.50			
Radium-226	1.50	<1.00	0.60	1.30
Thorium-230	3.10	<1.00	1.30	1.10
			0.70	1.60
Uranium-234	9.20	1.10	0.70	<1.00
	5.90	1.50		
	4.70	0.79		
	4.80	0.71		
	4.70			
Uranium-235	<1.00	<1.00	<0.60	<1.00
	0.32			
Uranium-238	4.90	1.20	0.90	<1.00
	3.70	1.40		
	3.50	0.46		
	8.60			
	4.60			
	ug/l	ug/l	ug/l	ug/l
Total Uranium	13.00	5.00		<1.00
	22.00	2.00		
	9.00	4.00		
	9.00	3.00		
	13.80	3.00		
		2.60		
Total Thorium	7.00	<5.00		<5.00
	1.40			
	9.00			

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ATTACHMENT 2
to
APPENDIX A

Analytical Sensitivities

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ATTACHMENT 2
APPENDIX A
Analytical Sensitivities for Analyses Performed on Boring Samples

1,1,1 - Trichloroethane	<0.006 mg/kg
1,1,2,2 - Tetrachloroethane	<0.006 mg/kg
1,1,2 - Trichloroethane	<0.006 mg/kg
1,1 - Dichloroethane	<0.006 mg/kg
	<0.005 mg/L
1,2,4 - Trichlorobenzene	<0.42 mg/kg
1,2 - Dichlorbenzene	<0.42 mg/kg
1,2 - Dichloroethylene	<0.006 mg/kg
1,2 - Dichloroethane	<0.006 mg/kg
1,2 - Dichloroethylene	<0.006 mg/kg
1,2 - Dichloropropane	<0.006 mg/kg
1,3 - Dichlorobenzene	<0.41 mg/kg
1,4 - Dichlorobenzene	<0.42 mg/kg
2,4,6 - Trichlorophenol	<2.0 mg/kg
2,4 - Dichlorophenol	<0.42 mg/kg
2,4 - Dimethylphenol	<0.37 mg/kg
2,4 - Dinitrophenyl	<2.0 mg/kg
2,4 - Dinitrotoluene	<0.41 mg/kg
2,6 - Dinitrotoluene	<0.42 mg/kg
2 - Butanone	<0.01 mg/kg
2 - Chloronapththalene	<0.42 mg/kg
2 - Chlorophenol	<0.42 mg/kg
2 - Hexanone	<0.013 mg/kg
2 - Methylnapthalene	<0.42 mg/kg
2 - Nitroanaline	<2.0 mg/kg
2 - Nitrophenol	<2.0 mg/kg
2 - Propanone	<0.017 mg/kg
	<0.035 mg/L
3,3′ - Dichlorobenzidine	<0.84 mg/kg
3 - Nitroanaline	<2.0 mg/kg
4,4′ - DDD	<0.09 mg/kg
4,4′ - DDE	<0.09 mg/kg
4,4′ - DDT	<0.09 mg/kg

4 - Bromophenyl phenyl ether	<0.42 mg/kg
4 - Chloro-3-methylphenol	<0.42 mg/kg
4 - Chlorophenyl phenyl ether	<0.42 mg/kg
4 - Methyl-2-pentanone	0.013 mg/kg
4 - Nitrophenol	<2.0 mg/kg
Acenaphthalene	<0.42 mg/kg
Aldrin	<0.045 mg/kg
Anthracene	<0.42 mg/kg
Antimony	<7.3 mg/kg
Benzamine, 4-chloro-	<0.42 mg/kg
Benzene	<0.006 mg/kg
Benzo(a)anthracene	<0.42 mg/kg
Benzo(a)pyrene	<0.42 mg/kg
Benzo(b)fluoranthene	<0.42 mg/kg
Benzo(ghi)perylene	<0.42 mg/kg
Benzo(k)fluorantheen	<0.42 mg/kg
Benzoic Acid	<2.0 mg/kg
Benzyl Alcohol	<0.42 mg/kg
Bromodichloromethane	<0.006 mg/kg
Bromomethane	<0.013 mg/kg
Butyl benzyl phthalate	<0.42 mg/kg
Carbon Disulfide	<0.006 mg/kg
Chlorobenzene	<0.006 mg/kg
Chloroethane	<0.013 mg/kg
Chloroform	<0.006 mg/kg
Chloromethane	<0.013 mg/kg
Chrysene	<0.042 mg/kg
Cyanides	<0.32 mg/kg
Di-n-butyl phthalate/dibutyl	<0.042 mg/kg
Di-n-octyl phthalate	<0.042 mg/kg
Di-n-propylnitrosamine	<0.42 mg/kg
Dibenzo (a,h) anthracene	<0.42 mg/kg
Dibenzofuran	<0.42 mg/kg
Dibromochloromethane	<0.006 mg/kg
Dieldrin	<0.04 mg/kg

Diethylphthalate	<0.42 mg/kg
Dimethyl phthalate	<0.42 mg/kg
Endosulfan sulfate	<0.09 mg/kg
Endosulfan-I	<0.05 mg/kg
Eudosulfan-II	<0.09 mg/kg
Endrin	<0.09 mg/kg
Endrin ketone	<0.09 mg/kg
Ethylbenzene	<0.006 mg/kg
Fluoranthene	<0.42 mg/kg
Fluorene	<0.42 mg/kg
Heptachlor	<0.05 mg/kg
Heptachlor epoxide	<0.05 mg/kg
Hexachlorobutadiene	<0.42 mg/kg
Hexachlorocyclopentadiene/HC	<0.42 mg/kg
Hexachloroethane	<0.42 mg/kg
Indeno (1,2,3-cd) pyrene	<0.42 mg/kg
Isophorne	<0.42 mg/kg
Lindane\gamma-BttC\Hexachlo	<0.045 mg/kg
Methoxychlor	<0.45 mg/kg
Methylene Chloride	<0.05 mg/kg
	<0.01 mg/L
N-nitrosodiphenylamine	<0.42 mg/kg
Naphthalane	<0.42 mg/kg
Nitrobenzene	<0.42 mg/kg
PCB-1016	<0.45 mg/kg
PCB-1221	<0.45 mg/kg
PCB-1232	<0.45 mg/kg
PCB-1242	<0.45 mg/kg
PCB-1248	<0.45 mg/kg
PCB-1254	<0.90 mg/kg
PCB-1260	<0.90 mg/kg
Pentachlorophenol	<2.0 mg/kg
Phenanthrene	<0.42 mg/kg
Phenol	<0.42 mg/kg
Phenol, 2-methyl-4,6 dinitro	<2.0 mg/kg

ATTACHMENT 2
APPENDIX A (cont.)

Pyrene	<0.42 mg/kg
Styrene	<0.006 mg/kg
Tetrachloroethane	<0.006 mg/kg
	<0.005 mg/L
Tetrachloromethane	<0.006 mg/kg
Thallium	<0.84 mg/kg
Toluene	<0.007 mg/kg
	<0.005 mg/L
Total Xylenes	<0.006 mg/kg
Toxaphene	<0.9 mg/kg
Tribomomethane	<0.006 mg/kg
Vinyl Acetate	<0.013 mg/kg
Vinyl Chloride	<0.013 mg/kg
Alpha - BHC	<0.045 mg/kg
Alpha - Chlordane	<0.45 mg/kg
Beta - BHC	<0.02 mg/kg
bis (2-Chloroethyl) ether	<0.42 mg/kg
bis (2-Chloroethoxy) methane	<0.42 mg/kg
bis (2-Chloroisopropyl) ether	<0.42 mg/kg
bis (2-ethylhexyl) phthalate	<0.42 mg/kg
cis - 1,3 - dichloropropene	<0.006 mg/kg
delta - BHC	<0.018 mg/kg
gamma chlordane	<0.45 mg/kg
o-cresol	<0.42 mg/kg
p-cresol	<0.42 mg/kg
p-nitroanaline	<2.0 mg/kg
trans-1,3-dichloropropene	<0.006 mg/kg

ATTACHMENT 3
to
APPENDIX A

RI Analytical Detection

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Table 1
RI Analytical Detection
(Water Samples)

Chemical Contaminant	Detection Limit	Background Concentrations
	(mg/l)	(mg/l)
Aluminum	0.04	< 0.001
Arsenic	0.002	< 0.002–0.55 (0.04)
Barium	0.5	0.034–0.71 (0.13)
Cadmium	0.02	<.002–.01 (0.0022)
Chromium	0.02	<0.02–0.03 (0.02)
Copper	0.02	<.01–.27 (.035)
Lead	0.084	<.002–.07 (.0069)
Manganese	0.02	<.0001–.48 (.07)
Mercury	0.1	<.0002–.0004(.0002)
Molybdenum	0.05	0.01–0.092 (.021)
Nickel	0.03	<.02–.026(.020)
Selenium	0.103	<.002
Silver	0.008	<.01–.11 (.01)
Vanadium	0.01	<.01
Zinc	0.005	0.01–4.3 (0.06)

Table 1
RI Analytical Detection
(Water Samples)

Radionuclide Contaminant	Detection Limit	Background Concentrations
	(ug/l)	(ug/l)
Total U	1.0	<0.1-2.7 (0.8)
Isotope	(pCi/l)	(pCi/l)
Ra228	3	<3
Ra226	1	<1
Th228	1	<1
Th230	1	<1
U234	1	<1
U235	1	<1
U235/236	1	<1
U238	1	<1

Table 2
RI Analytical Detection
(Soil Samples)

Chemical Contaminant	Detection Limit	Background Concentrations
	(mg/kg)	(mg/kg)
Aluminum	40	7000->100k(57000)
Arsenic	2	<1.0 - 73 (7.4)
Barium	40	10 - 1500 (420)
Beryllium	1	<1.0-7.0 (0.85)
Cadmium	0.2	1 - 4 (1.7)
Chromium	2	1 - 1000 (52)
Cobalt	10	<0.3-70 (9.2)
Copper	2.09	<1-700 (22)
Lead	0.35	<10-300 (17)
Manganese	0.18	<2-7000 (640)
Mercury	.04	0.01-3.4 (.12)
Nickel	4	<5-700 (18)
Vanadium	2	<7-300 (66)
Zinc	1	<5-2900 (52)

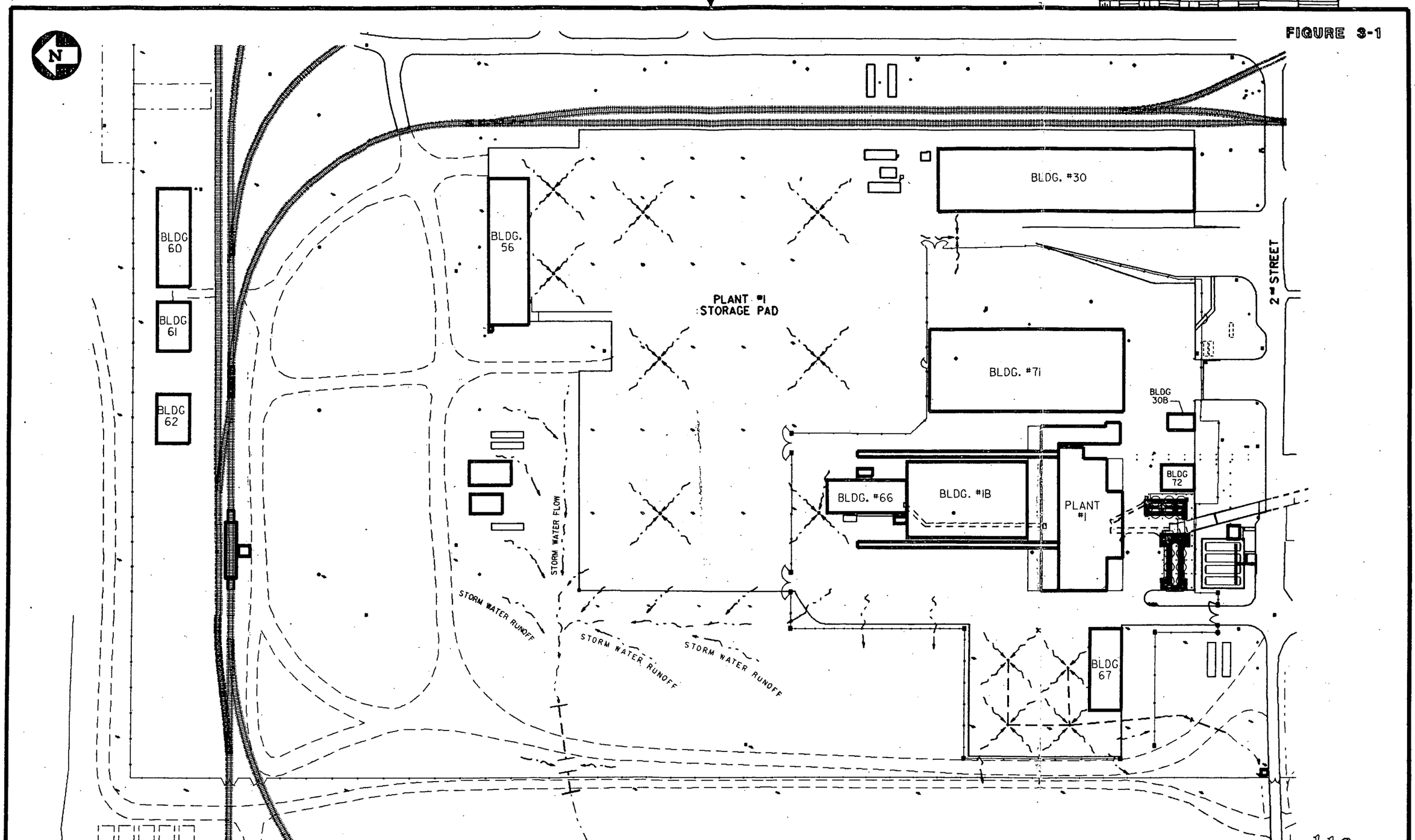
Table 2
RI Analytical Detection
(Soil Samples)

Radionuclide Contaminant	Detection Limit	Background Concentrations
	(mg/kg)	(mg/kg)
Total U	1	0.29–11 (2.7)
Isotope	(pCi/g)	(pCi/g)
Cs137	<1.0	<1
Pb210	<1.0	<2.5
Pu238	<0.1	<0.1
Ra226	<1.0	<1.5
Ra228	<4	<4
Sr90	<.5	<0.5
Th228	1	<1
Th230	<.1	<0.1
Th232	<11	<11
U234	1	0.1–4.0 (0.9)
U235	1	<1
U235/236	1	<1
U238	1	0.1–4.0 (0.9)

ATTACHMENT 2

FIGURES

FIGURE 3-1



112

NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

APPROVALS

CHEMICAL			LR.S. & T.
CIVIL & STR.			MAINTENANCE
ELECTRICAL			NU. SAFETY
ENGINEER			Q.A.
INSTRUMENT			PRODUCTION
MECHANICAL			FIRE & SAFETY
			WASTE MANAGE
CHECKED	[signature]	10-8-90	D.O.E.
APPROVED	[signature]	10-8-90	SECURITY

WESTINGHOUSE MAT'LS. CO. OF OHIO
FERNALD, OHIO
FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

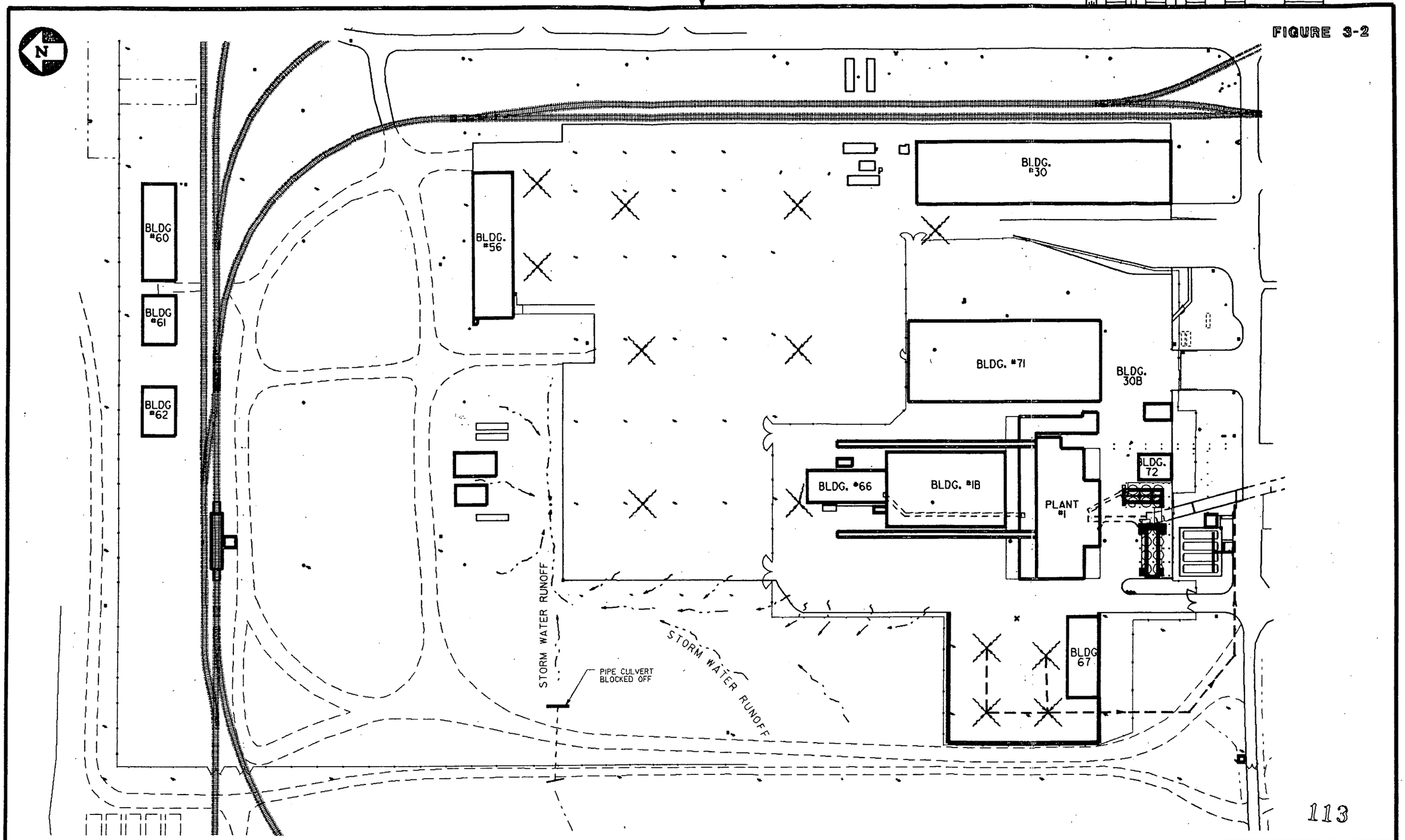
PLANT #1 STORAGE AREA
STORAGE PAD LAYOUT
STORM WATER FLOW, PAST
SCALE - 1" = 50'-0"

RES #1460
DATE 9-27-90
DRAWN MILE LOOKE

01X-5500-G-01331 0

FILE NAME: STORM.DGN

FIGURE 3-2



113

NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

APPROVALS					
CHEMICAL			LR.S. & Y.		
CIVIL & STR.			MAINTENANCE		
ELECTRICAL			NU. SAFETY		
ENGINEER			Q.A.		
INSTRUMENT			PRODUCTION		
MECHANICAL			FIRE & SAFETY		
			WASTE MANAGE		
CHECKED			D.O.E.		
APPROVED			SECURITY		

WESTINGHOUSE MAT'LS. CO. OF OHIO

FERNALD, OHIO

FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

PLANT #1 STORAGE AREA

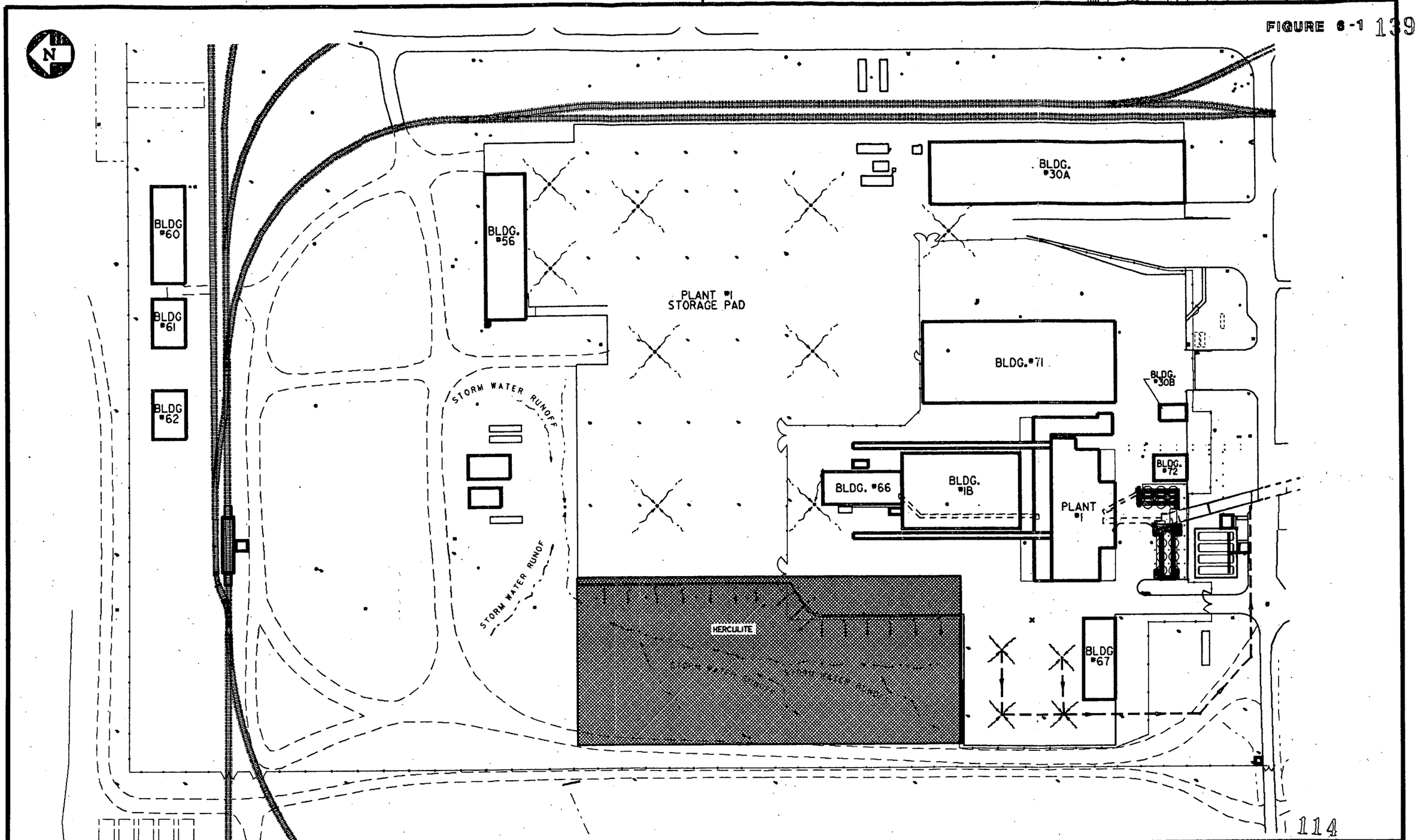
STORAGE PAD LAYOUT
STORMWATER FLOW, CURRENT
SCALE - 1" = 50'-0"

DES #1460
DATE 9-29-90
DRAWN MIKE LOOKE

01X-5500-G-01332 0

FILE NAME: STORMI.DGN

FIGURE 6-1 1393



NO.	REVISIONS	DATE	DWN. BY	APPD.
1	REVISED AREA COVERED BY HERCULITE			

NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

APPROVALS

CHEMICAL			I.R.S. & T.
CIVIL & STR.			MAINTENANCE
ELECTRICAL			NU. SAFETY
ENGINEER			O.A.
INSTRUMENT			PRODUCTION
MECHANICAL			FIRE & SAFETY
			WASTE MANAGE
CHECKED			D.O.E.
APPROVED			SECURITY

WESTINGHOUSE MAT'LS. CO. OF OHIO
FERNALD, OHIO
FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

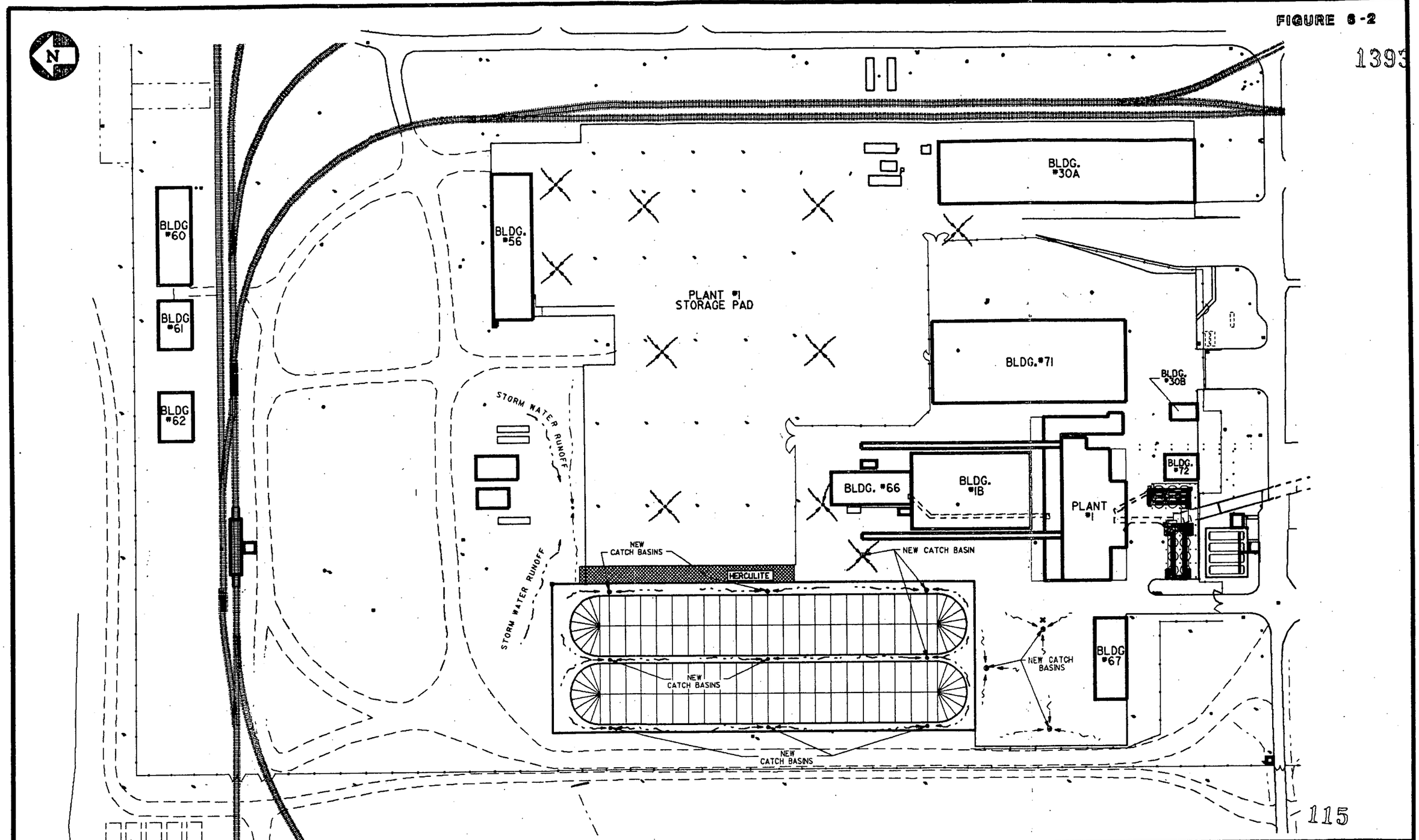
PLANT #1 STORAGE AREA
STORAGE PAD LAYOUT
STORMWATER FLOW DURING A/B
SCALE - 1" = 50'-0"

01X-5500-G-01333 1

FILE NAME: ZFA1(100,4)01XG01333.DGN

FIGURE 6-2

1393



115

NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

APPROVALS				
CHEMICAL			U.S. & T.	
CIVIL & STR.			MAINTENANCE	
ELECTRICAL			N.U. SAFETY	
ENGINEER			Q.A.	
INSTRUMENT			PRODUCTION	
MECHANICAL			FIRE & SAFETY	
			WASTE MANAGE	
CHECKED			D.O.E.	
APPROVED			SECURITY	

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FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

PLANT #1 STORAGE AREA

STORAGE PAD AREA LAYOUT
STORMWATER FLOW AFTER A/B
SCALE - 1" = 50'-0"

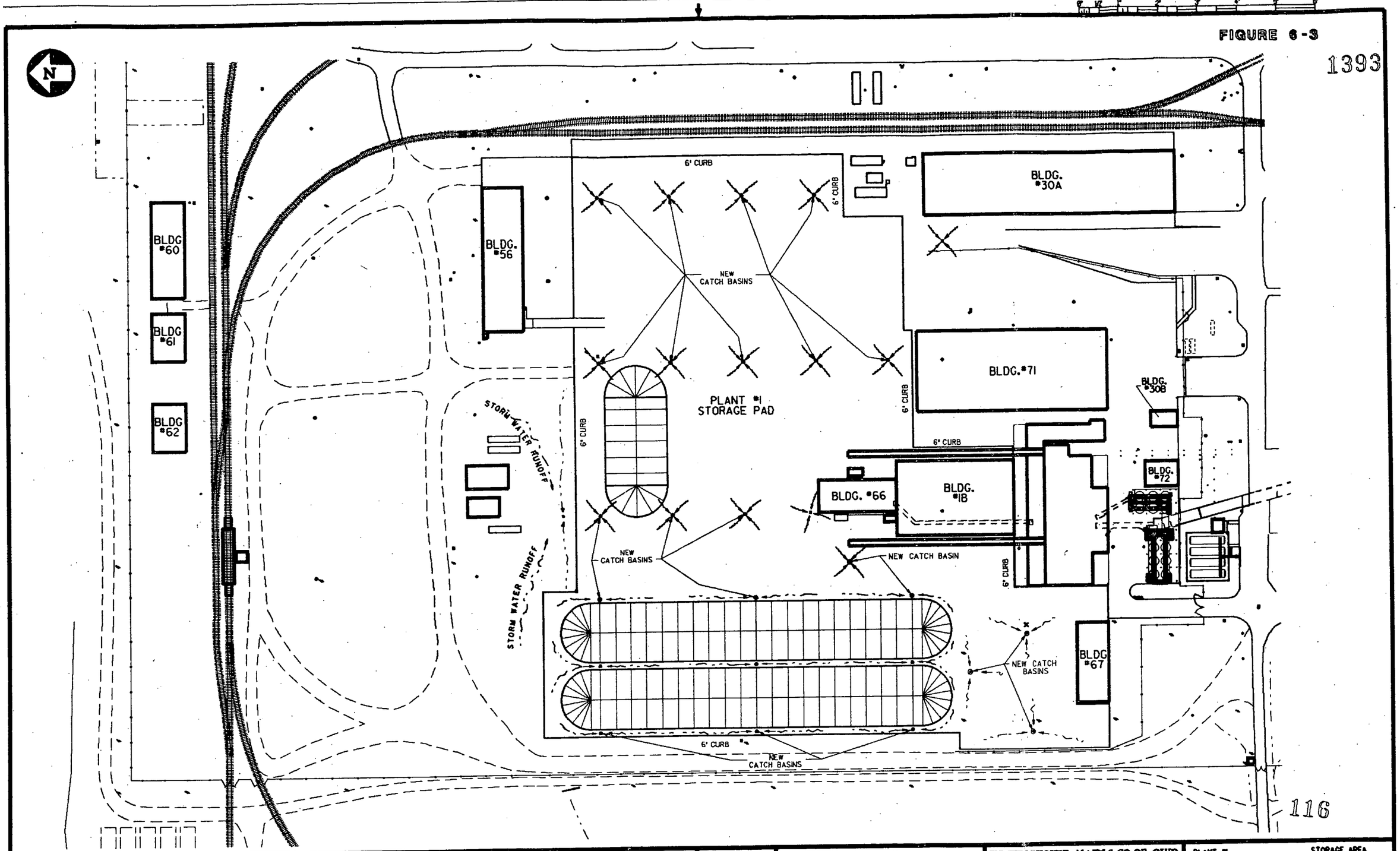
DATE 9-28-90

01X-5500-G-01334 | 0

FILE NAME: ZFAN100,410XG01334.DGN

FIGURE 6-3

1393



NO.	REVISIONS	DATE	DWN. BY	APPD.
1	REVISED FLOW ARROWS & NEW PAD OUTLINE	[illegible]	[illegible]	

REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

APPROVALS

CHEMICAL			U.R.S. & T.
CIVIL & STR.			MAINTENANCE
ELECTRICAL			NU. SAFETY
ENGINEER			Q.A.
INSTRUMENT			PRODUCTION
MECHANICAL			FIRE & SAFETY
			WASTE MANAGE
CHECKED	[illegible]	[illegible]	D.O.E.
APPROVED	[illegible]	[illegible]	SECURITY

WESTINGHOUSE MAT'LS. CO. OF OHIO

FERNALD, OHIO

FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

PLANT #1 STORAGE AREA

STORAGE PAD AREA LAYOUT
STORM WATER FLOW, AFTER C, D, & E
SCALE - 1" = 50'-0"

RES #1460
DATE 2-28-90
DRAWN MEF LOGUE

01X-5500-G-01335 | 1

FILE NAME: ZFA6(100,4)01XG01335.DGN

Figure 6-4

TENSION SUPPORT STRUCTURES

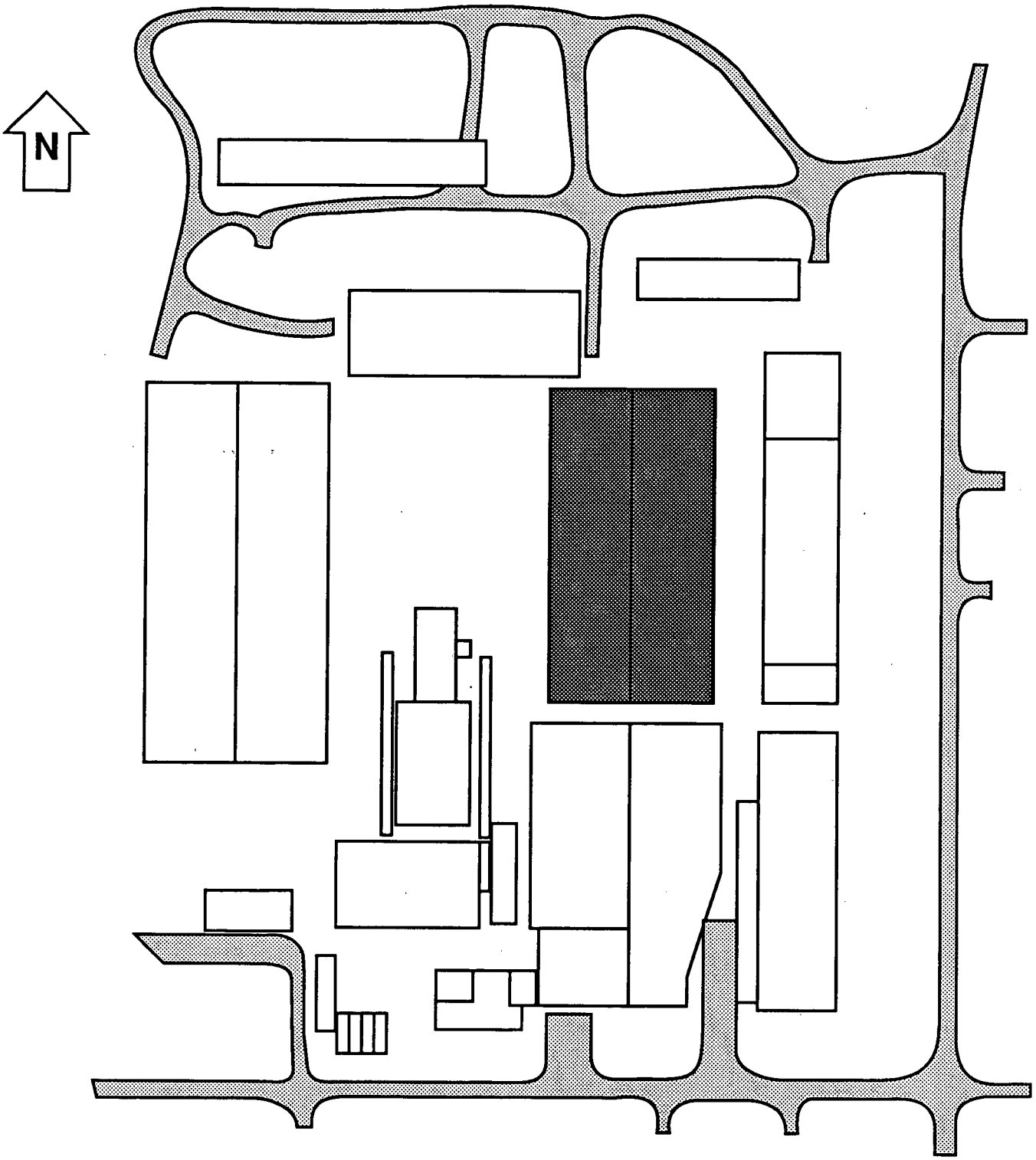


FIGURE 8-1

TABLE 1
PLANT 1 PAD CONTINUING RELEASE
Additional Sampling for Phase A/B

Location	Sample No.	FMPC Coordinates South	FMPC Coordinates East	State Coordinates North	State Coordinates East	Analyses Requested	Analyses Actual testing
Reference	Plt 1 SW	1734.00	3531.04	480954.720	1380060.840		
45-0		1531.60	3481.83	481158.391	1380017.186	A	
45-1		1531.60	3481.83	481158.391	1380017.186	B	
46-0		1531.60	3406.83	481160.443	1379942.214	A	
46-1		1531.60	3406.83	481160.443	1379942.214	B	
47-0		1531.60	3331.83	481162.495	1379867.242	A	
47-1		1531.60	3331.83	481162.495	1379867.242	B	
48-0		1431.60	3481.83	481258.353	1380019.922	A	
48-1		1431.60	3481.83	481258.353	1380019.922	B	
49-0		1431.60	3406.83	481260.405	1379944.950	A	
49-1		1431.60	3406.83	481260.405	1379944.950	B	
50-0		1431.60	3331.83	481262.457	1379869.978	A	
50-1		1431.60	3331.83	481262.457	1379869.978	B	
Rns		-	-	-	-	A	
51-0		1331.60	3481.83	481358.316	1380022.658	A	
51-1		1331.60	3481.83	481358.316	1380022.658	B	
52-0		1331.60	3406.83	481360.368	1379947.686	A	
52-1		1331.60	3406.83	481360.368	1379947.686	B	
53-0		1331.60	3331.83	481362.420	1379872.714	A	
53-1		1331.60	3331.83	481362.420	1379872.714	B	
Rns		-	-	-	-	A	
54-0		1231.60	3514.00	481457.398	1380057.552	A	
54-1		1231.60	3514.00	481457.398	1380057.552	B	
55-0		1231.60	3439.00	481459.450	1379982.580	A	
55-1		1231.60	3439.00	481459.450	1379982.580	B	
56-0		1231.60	3364.00	481461.502	1379907.608	A	
56-1		1231.60	3364.00	481461.502	1379907.608	B	
Rns		-	-	-	-	A	
57-0		1131.60	3514.00	481557.361	1380060.288	A	
57-1		1131.60	3514.00	481557.361	1380060.288	B	
58-0		1131.60	3439.00	481559.413	1379985.316	A	
58-1		1131.60	3439.00	481559.413	1379985.316	B	
59-0		1131.60	3364.00	481561.465	1379910.344	A	
59-1		1131.60	3364.00	481561.465	1379910.344	B	
60-0		1031.60	3514.00	481657.324	1380063.024	A	
60-1		1031.60	3514.00	481657.324	1380063.024	B	
61-0		1031.60	3439.00	481659.376	1379988.052	A	
61-1		1031.60	3439.00	481659.376	1379988.052	B	
62-0		1031.60	3364.00	481661.427	1379913.080	A	
62-1		1031.60	3364.00	481661.427	1379913.080	B	
63-0		829.43	3481.83	481860.298	1380036.397	A	
63-1		829.43	3481.83	481860.298	1380036.397	B	
64-0		829.43	3417.83	481862.049	1379972.421	A	
64-1		829.43	3417.83	481862.049	1379972.421	B	
Rns		-	-	-	-	A	
65-0		714.43	3481.83	481975.255	1380039.543	A	
65-1		714.43	3481.83	481975.255	1380039.543	B	
66-0		714.43	3417.83	481977.006	1379975.567	A	
66-1		714.43	3417.83	481977.006	1379975.567	B	
Rns		-	-	-	-	A	

A = Samples at 0-6"
Isotopic Th
Isotopic U
Ra-228
Ra-226
Full HSL

B = Samples will be taken at 6-12", 12-18", and 18-24" VOCs at 18-24" unless field instrumentation indicates presence of contamination at another depth

ATTACHMENT 3

Plant 1 Pad

Removal Action

WORK PLAN SCHEDULE

Plant 1 Pad / Master Schedule

- Work Plan Approval by EPA — Aug 90 | Time 0
- Stage 1. Installation of Membrane & Partial Perimeter Curb — Start 1 month after T=0 + 120 Days
- Stage 2. Phase A/B Construction — Start 1 month after T=0 + 15 Months
- Stage 3. Phase C, D, & E Construction — Start 2 months after End Stage 2 + 24 Months

ATTACHMENT 4

RELATED WORK

EXPEDITED MAINTENANCE - PLANT 1 PAD

FINAL REPORT

CONTAMINATED SOIL STOCKPILE NORTH OF PLANT 1 PAD

DRAFT WORK PLAN

FINAL REPORT

PLANT 1 PAD EXPEDITED MAINTENANCE WORK

Feed Materials Production Center

U. S. Department of Energy

MARCH 1991

PLANT 1 PAD
EXPEDITED MAINTENANCE

Introduction

Plant 1 is the "Sampling Plant" for the FMPC and is therefore involved in the sampling of large amounts of uranium metal process residues and waste materials. The Plant 1 concrete storage pad, which covers approximately 8 acres near the plant, has been used as a drum storage location for low level wastes and recoverable uranium residues to support Plant 1 operations since 1952. The current inventory of the Plant 1 Pad is approximately 45,000 total drums. The inventoried waste materials and process materials contain varying quantities of radionuclides including uranium and thorium. In addition, the drums are undergoing characterization consistent with the requirements of Subtitle C of the Resource Conservation and Recovery Act (RCRA). RCRA hazardous constituents or characteristics have been identified in a small portion of the wastes stored on the Plant 1 Pad which subsequently were removed and placed in RCRA storage. The balance of the drums are being evaluated for appropriate disposition.

Materials containing varying amounts of uranium (U metal, UO_3, UF_2, and UO_2), thorium, and other hazardous substances are stored on the Plant 1 Pad. Some of the carbon steel drums used to store wastes on the pad have deteriorated as a result of extended exposure to the elements, thereby increasing the risk of release of hazardous material to the environment. Additionally, the pad has a number of cracks and control joints which may serve as a route for the migration of released contaminants to the underlying soils. On July 17, 1990 a minor event occurred on Plant 1 Pad related to drum movements. A fork truck, which was routinely moving drums, drove over a deteriorated section of the pad which jolted the drum causing a spill. The material was cleaned up and pad operations were suspended until the conditions of the pad were rectified. The rough surface of the pad has also been the subject of numerous complaints from Waste Operations personnel related to potential back injuries.

Performed Actions

The Proposed Amended Consent Decree, recently negotiated with the State of Ohio, requires that all of the drums on the Plant 1 Pad be arranged to provide adequate aisle space for inspection by September 30, 1990. This commitment required extensive fork truck movement on all areas of the Plant 1 Pad including the transport of drums off the pad to indoor storage. Extensive overpacking of the drums was also required, increasing fork truck traffic on the pad. Due to the fact that the Plant 1 Pad surface was significantly deteriorated, the amount of fork truck traffic required for the work presented a safety hazard. Therefore, an expedited maintenance action to repair the deteriorated concrete areas of Plant 1 Pad was initiated to mitigate potential injury to fork truck drivers caused by jarring or exposure to spilled uranium residues.

The work was broken down as shown in Figure 1 into the following four areas:

Area 1	East Main Aisle on Plant 1 Pad
Area 2A	North of Building 66
Area 2B	West Access Road to Plant 1 Pad
Area 2C	East Access Road to Plant 1 Pad

The work in these areas consisted of removing approximately 4 inches of concrete down to the reinforcing bars, placing the removed concrete/rubble in drums for sampling, and replacing with new concrete.

The following Table 1 shows the quantities involved in each section:

TABLE 1

Section	New Concrete, yd^3	Estimated* Rubble, drums
1	13	98
2A	5	38
2B	19	144
2C	9	68
Total	46	348

* The estimate is based on the replacement concrete volume times an approximately 100% bulking factor which would fit in the available drum volume. This correlates very well with the actual quantity of 348 drums of rubble.

Control Measures

Incidental to doing the work, there are several release pathways to the environment such as:

1) Air - Fugitive dust emissions
2) Surface water - Particles of contamination being carried to the storm sewer
3) Groundwater - Particles of contamination being driven into the soils beneath the pad

Fugitive dust from the maintenance activities was controlled by tent-like containments for "jack-hammering" and periodic sprinkling. The water resulting from the controls was collected in drums for sampling. The potential for material to be carried from the pad by runoff to the surrounding soil and/or the storm sewer system was mitigated by collecting the loose materials and saw cutting water in drums. The potential for groundwater contamination was minimal since only the upper portion of the pad was addressed and the surface water control methods are in place.

During the repairs of the deteriorated pad areas, access to the deteriorated areas was restricted and only balloon tire fork trucks were utilized on the pad to mitigate safety concerns until the repairs were completed. Sampling will be performed on the drummed materials from the pad repairs. All materials removed during the repair were containerized and stored on Plant 1 Pad pending their evaluation for disposition.

The potential threat associated with the existing configuration and waste inventory on the Plant 1 Pad arises from the potential spillage of material during transport or fugitive emissions from the Plant 1 Pad activities. These threats were appropriately minimized through the use of administrative controls for storage and handling of waste material and the implementation of focused maintenance actions to ensure safety in the operation of the pad.

Sampling

Extensive sampling has been completed in the Plant 1 Pad area in support of the proposed Plant 1 Pad Continuing Release removal action, the FMPC Environmental Monitoring program, and the ongoing Remedial Investigation/Feasibility Study. These samples were collected to characterize the existing environmental conditions and to assess the nature and extent of any chemical or radiological contaminants present at that location. This sampling focused on the surface and subsurface soils adjacent to and under the Plant 1 Pad and the groundwater present in the glacial till and the regional aquifer in the vicinity of the pad.

The sampling performed as part of this maintenance action focused only the soils beneath the areas where the pad was repaired. The maintenance project exposed soils beneath the pad and provided an opportunity to collect and analyze samples. Figure 1 shows the sampling locations and the relationship to the Sections of the maintenance. Soil samples were collected at the surface (beneath the pad), and at a depth of one foot, at each location as shown in Table 4. Sequence numbers 10, 16, and 17 were planned for sampling, but without the opportunity for collection. In addition, five rinseate samples, from the sampling tools, were also collected. The drums containing the rubble were not sampled as indicated in the commitment due to schedule constraints in sampling requirements for the Proposed Amended Consent Decree.

The surface soils were extensively analyzed. Soil was analyzed for trace metals including:

Arsenic	Lead
Barium	Selenium
Cadmium	Silver
Chromium	Mercury

In addition, each of these samples was tested for TCLP concentrations for each of these metals. Each surface soil sample was also analyzed for

Total Uranium	Plutonium-238
Total Thorium	Plutonium-239,40
Isotopic Uranium	Cesium-137

Isotopic Thorium	Neptunium-237
Radium-226	Ruthenium-106
Radium-228	Technetium-99
Strontium-90	

The soil samples collected at a depth of one foot were analyzed for total uranium and total thorium.

The old concrete which was removed from the pad is now stored in containers, on the pad, and is identified as Lot. No. W050-100-P003-5434. Analytical results of samples from these drums will identify the contaminants present for proper final disposition of the removed material.

Analytical Results

Table 2 shows the summary results for the trace metals analyses and the TCLP extraction concentrations. None of the metals concentrations are outside of the range of expected background concentrations [1,2]. None of the TCLP concentrations exceeded the limits. The higher metals concentrations are shown only to aid comparison. Table 5 and Table 6 show the individual results for the trace metals analyses and the TCLP extraction concentrations.

Table 3 summarizes the surface soil radionuclide concentration results. The principle contaminant found is uranium. Ten of the 20 samples had uranium concentrations in excess of the NRC Branch Technical Position guidance for uncontrolled land use (35 pCi/g for depleted uranium). A greater fraction of the locations could exceed the BTP criteria; samples were not analyzed for uranium 234 and 235 concentrations. All locations exceeded typical and expected background concentrations. At one foot depth, however, only Location 24 exceeded the BTP concentrations. Table 7 lists the individual surface soil radionuclide concentrations.

Thorium-230 and radium-226 results were in the background range with one exception for each isotope. These were:

Thorium-230	8.62 $\pm$ 1.32 pCi/g at Location 19
Radium-226	5.31 $\pm$ 0.48 pCi/g at Location 21

The radium-226 concentration at Location 21 is essentially equal to the guidance for uncontrolled land use (5 pCi/g). The similar limit for thorium is 10 pCi/g.

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1 Shacklette, H.T., and Boerngen, J.A., "Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States", U.S. Geological Survey Professional Paper 1270, 1984.

2 Logan, T.J., and Miller, R.H., "Background Levels of Heavy Metals in Ohio Farm Soils", Research Circular 275, Ohio State University, February, 1983.

Other than in the two exceptions, thorium-230 and radium-226 were present in statistically equivalent concentrations. This demonstrated secular equilibrium is evidence that the two radionuclides are present as daughters of background concentrations of the uranium-238 series. The data imply an ambient background concentration of approximately 2 pCi/g of uranium-238.

Thoriums 232, 228, and radium-228 concentrations are within the range of expected background for the thorium series. Within the statistics of the analyses, secular equilibrium is demonstrated and provides evidence of natural occurrence. Concentrations are within the limits for uncontrolled land use.

Concentrations of plutonium-239,40, plutonium-238, and neptunium-237 in the soil samples are nearly equivalent to the analytical sensitivity for each radionuclide. There is low-level world-wide distribution of these man-made isotopes. There is non-uniform distribution because of the very low concentrations and, along with the analytical sensitivity, there is no distinction possible of any FMPC contribution. The concentrations are, however, low in relation to potential radiation dose and risk.

Similarly, it is not possible to distinguish any FMPC contribution compared to world-wide fallout levels of cesium-137, ruthenium-106, and strontium-90.

Gaseous diffusion separation of reprocessed uranium can enhance concentrations of technetium-99. The concentrations present beneath the pad are likely due to FMPC activities. The concentration ranges are not of concern because of the relatively low potential dose commitment at those levels.

Beyond the previous discussions, there are no additional conclusions to be made through a focus on the sample locations and the attendant radionuclide concentrations. For example, Locations 20 and 21 had more consistently elevated concentrations of the various isotopes. However, the thorium-232 series (with radium-228 and thorium-228) concentrations are not distinct from background. The man made radionuclide concentrations cannot be differentiated from the world-wide distribution of these isotopes.

Conclusion

The repairs were successfully completed and the threat was minimized. An evaluation of the analytical results would indicate that similar concentrations could be expected in other areas under the pad, although the repaired areas probably would have had the greatest potential for prior releases to the soils beneath. The completion of drum sampling for characterization and final disposition will complete the work.

CONTAMINATED SOIL AND RUBBLE

NORTH OF PLANT 1 PAD

REMOVAL ACTION

WORK PLAN

MAY 1991

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EXECUTIVE SUMMARY

The Department of Energy (DOE) has conducted a Removal Site Evaluation (RSE) under authorities delegated to the agency under Section 104 of the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA), through Executive Order 12580. The RSE was performed to determine whether the conditions present at the Contaminated Soil and Rubble Pile North of Plant 1 Pad warrant a removal action under CERCLA, consistent with Section 300.410 of the National Contingency Plan (NCP). Based upon the information in the RSE, DOE has determined that a removal action is appropriate and has issued an Action Memorandum. The objective of the removal action is to implement interim actions to mitigate the potential for release of contaminants from the area until final remediation.

This document provides a work plan for United States Environmental Protection Agency (USEPA) review and comment which describes the removal action and is consistent with the 1990 CERCLA Consent Agreement between DOE and USEPA. A subsequent submittal to OEPA describing the plan information, data and schedules is consistent with 1990 CERCLA Consent Agreement schedules for Operable Unit No. 3 will complete DOE's commitment to OEPA under the Proposed Amended Consent Decree.

The proposed removal action involves three major stages of activity which involve: (I) incorporation of the soils/rubble generated from the Plant 1 Pad Upgrade Removal Action to the stockpile (II) construction activities including the installation of vegetative cover, liners, tension support structure, and fencing, (III) operations and maintenance of the stockpile.

The proposed removal action, coupled with the ongoing operational improvements described in this plan will significantly mitigate contaminated runoff from the area, provide an additional storage facility which meets 40 CFR 264 requirements for waste storage and enhance efficient performance of FMPC's long term remedial actions.

1.0 INTRODUCTION

This document provides a Work Plan describing the removal action for the contaminated soils and rubble pile located North of Plant 1 at the Feed Materials Production Center (FMPC). The current volume of the soils and rubble stockpile is estimated to be approximately 22,000 cubic yards of materials. The soils and rubble were stockpiled in this location for potential reuse as backfill material for construction projects in the Production Area. The concentration of uranium in the soils and rubble pile is elevated. The concentration of total uranium in the soils and rubble pile ranges from 11 to 941 parts per million. The pile contains loose soil and construction rubble which could potentially allow contaminant migration through surface water runoff or fugitive air emissions.

This removal action is a component of Operable Unit 3. The objective of the removal action is to mitigate the continuing release of contaminants from the soils and rubble pile until final remediation is performed under Operable Unit No. 3. The proposed action is initiated by DOE under authorities delegated to it under Section 104 of CERCLA, through Executive Order 12580. As required by the 1990 CERCLA Consent Agreement between USEPA and DOE, this work plan, outlining the proposed removal action, is being submitted to USEPA and OEPA to allow an opportunity for review and comment.

The proposed removal action work plan details three stages of activity. Stage I involves the placement of soils from the Plant 1 Pad Continuing Release Removal Action which contain radioactive activity levels from 35 to 100 pCi/gram of total uranium contamination on the western area of the soil pile. The activity level of 35 Pci/gram for uranium was adopted from the NRC Branch Technical Position (BTP)[1]. Samples will be collected from the western area of the soil pile prior to placing soil from the Plant 1 Pad Action on the stockpile. Stage II involves the construction activities which must be performed to the stockpile such as installing a vegetative cover over the western section of the stockpile after the Plant 1 Pad soils are deposited. Other construction activities include installation of a sprung structure to contain construction rubble and installation of a removable liner on the Northeast section of the pad to accommodate future category II soils (total uranium concentrations between 35 and 100 pCi/gram) generated at the FMPC. Security fencing will be installed to prevent any unauthorized deposition of material on the stockpile and to establish administrative control of the stockpile. Stage III involves the operating and maintenance portion during which potential releases from the existing inventory will be mitigated through the use of several control measures such as, periodic inspections, access control, temporary covers, and new soil characterization before placement. Each

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[1] Disposal or On-site Storage of Thorium and Uranium Wastes from Past Operations, U.S. Nuclear Regulatory Commission, FR 46 205, October 23, 1981.

stage of the proposed removal action will greatly minimize the potential for continuing release of contamination from the stockpile.

2.0 FMPC BACKGROUND

The Feed Materials Production Center (FMPC) is a uranium production facility owned by the U.S. Department of Energy. The FMPC was placed on the National Priorities List (NPL) in 1989. The DOE is conducting a Remedial Investigation and Feasibility Study (RI/FS) and other response actions under a 1990 CERCLA Consent Agreement with the USEPA.

Since the early 1950's, various chemical and metallurgical processes have been used to manufacture uranium products for the defense complex. The FMPC ceased these operations in July 1989. Substantial quantities and varieties of waste materials were generated during production operations. Some of the current waste inventory contains radioactive materials and some contains both radioactive and hazardous constituents, as defined under the Resource Conservation and Recovery Act (RCRA). It is expected that a large part of the waste materials handled during the remedial phase will also contain similar constituents.

Since July of 1989, uranium production has been halted at the FMPC, and restart of uranium production activities in the future is unlikely. As of October 1, 1990, responsibility for the FMPC is administratively transferred from the Defense Programs Division to the Environmental Restoration and Waste Management Division of the DOE in order to better manage the activities of the site.

3.0 CONTAMINATED SOILS AND RUBBLE PILE BACKGROUND

3.1 Summary of the Potential Threat

Field investigations, including surface and subsurface soil sampling, confirmed that the soils and rubble in the pile North of Plant 1 Pad contain elevated levels of total uranium. The potential threat is the potential exposure as a result of suspension of the soil particles in the atmosphere and the potential migration of contaminants through wind and water erosion. Results from the Removal Site Evaluation sampling provided in Appendix 1 indicate that the mass concentration range for uranium is 11 to 941 ppm which corresponds to an activity level ranging from 7 to 637 Pci/gram (assuming a natural isotopic activity distribution for total uranium). The stockpiled soils and rubble are stored as loose uncompacted materials. A diagram of the existing stockpile is provided in Figure 1.

The concentrations of total uranium in the soils and rubble stockpile North of Plant 1 Pad are considered low level. However, these concentrations may be in excess of possible final remediation soil cleanup standards for the FMPC. Several recent remedial programs have adopted residual soil activity concentrations for final cleanup actions consistent with the 1981 NRC Branch Technical Position Paper of 35 Pci/g

(approximately 50 ppm) for depleted uranium in soils (Aerojet 1984; Colonie, NY 1986). This removal action is being implemented to mitigate the potential for release and because the migration of these materials could result in more extensive soils cleanup in the final remedial action.

Construction rubble containers, including sea/land, boxes, and drums, have been staged on the rubble pile prior to disposal. The containers primarily contain dirt, concrete, metal, and asbestos. This practice will no longer continue after this removal action is implemented.

3.2 Stockpile Condition and Releases

Excess construction materials containing varying amounts of soil and rubble contaminated with uranium are stored on the stockpile. The stockpile currently is not covered, thereby increasing the risk of release of hazardous material to the environment.

3.3 Water Drainage

Sections of the pile have no containment and therefore, some portion of the area drains onto the adjacent grassed and/or graveled areas, nor are there systems for collecting and controlling the stormwater runoff from the pile. The majority of the runoff from the area drains to local storm sewer catch basins and manholes which feed directly into the storm sewer system. From the storm sewer system, collected water is pumped to Manhole 175.

4.0 SUMMARY OF EXISTING SAMPLING DATA

Some sampling has been completed in the stockpile area in support of the proposed removal action, the FMPC Environmental Monitoring program, and the ongoing Remedial Investigation/Feasibility Study. These samples were collected to characterize the existing radiological levels.

4.1 Soils

As part of the characterization sampling for the Removal Site Evaluation (RSE) addressing this stockpile, 44 borings were completed through the stockpile, 24 borings in the west pile, and an additional 20 borings in the east pile area. Analytical results from these samples are presented in Appendix 1. These soil samples were collected from subsurface borings which were advanced to a maximum depth of 20 feet below the stockpile surface. Radiochemical analysis of the samples collected from the existing pile indicated the existence of concentrations of uranium in the range of 11 to 941 ppm. As expected, these concentrations showed significant variations with depth.

4.2 Groundwater

No groundwater was encountered during the drilling.

5.0 NEED FOR REMOVAL

Consistent with Section 40 CFR 310.410 of the NCP, the DOE shall determine the appropriateness of a removal action (interim response). Section 40 CFR 300.415 (b) (2) of the NCP defines eight factors that should be considered in determining the appropriateness of a removal action. Three of these factors, listed below, are specifically applicable to this assessment.

40 CFR 300.415 (b) (2) (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

40 CFR 300.415 (b) (2) (ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems.

40 CFR 300.415 (b) (2) (v) Weather conditions that may cause hazardous substance or pollutants or contaminants to migrate or be released.

The DOE has determined that an interim response is appropriate, due to the current and on going potential for release of contaminants from the area. The released contamination has the potential to migrate into the environment, where it may result in human exposure or contamination of drinking water supplies. An interim response to control stormwater runoff from this area and deter the further releases of contaminants from uncontrolled releases should be undertaken.

6.0 PROPOSED REMOVAL ACTION

The objective of the removal action is to implement interim actions to mitigate the potential for release of contaminants from the Contaminated Soil and Rubble Pile North of Plant 1 Pad until final remediation. This removal action will implement control measures to eliminate the potential erosion of the soils and rubble stockpile by wind or rain. The proposed removal action shall be implemented in 3 stages. A diagram indicating the proposed modifications to the stockpile is provided in Figure 2. Excavated category II soils from the Plant 1 Pad Removal Action shall be placed on the west end of the stockpile during stage 1. During Stage 2 activities the exposed and accessible construction rubble in the soils and rubble stockpile shall be separated from the pile and a tension support structure shall be erected over the separated rubble. The remaining soils on the west end of the stockpile will be graded as necessary to support a vegetative cover. A removable membrane will be utilized to cover the northeast portion of the stockpile to facilitate continued use of the pile for soil placements from future construction projects. Stage 3 activities include the operation and maintenance of the stockpile.

The existing permanent boundary air sampling stations are adequate for normal activities. Portable temporary air samplers will be used during construction activities to measure fugitive dust emissions. Additional control measures such as the following will be implemented as required during the removal action:

* Emplacement of portable temporary air samplers at the perimeter of construction areas to measure localized fugitive dust emissions

* Periodic wetting of excavation and stockpiling activities

* Tarping of all vehicles transporting the soils to the stockpile

* Compaction of stockpiled materials, emplacement of erosion control fabric over the stockpile, and seeding of the stockpile

6.1 Stage I - Soils from Plant 1 Pad

Stage I involves the placement of soils from the Plant 1 Pad Continuing Release Removal Action which contain radioactive activity levels from 35 to 100 Pci/gram of total uranium contamination on the western area of the soil pile. Four additional soil samples have been collected from the west area of the soil pile which shall receive the Plant 1 Pad soils. The samples were collected in accordance with the existing RI/FS Quality Assurance Project Plan (QAPP) at the FMPC. The results of these four samples have not been received to date. After the Plant 1 Pad soil has been placed, the west portion of the stockpile will then be graded and covered with an erosion control fabric. A fog spray system shall be used to control fugitive dust generation during the grading activities of this removal action. This erosion control fabric will provide temporary containment of surface soils for rainwater runoff and wind erosion control until a permanent vegetative cover is established.

6.2 Stage II - Construction Activities

This field action shall include the physical separation of the exposed construction rubble from the stockpile. It is estimated that the volume and surface area of the soils and rubble pile can be reduced by approximately 25% by removing the construction rubble from the pile. This volume reduction of the stockpile will reduce the amount of vegetative and synthetic cover required for the remaining pile. Backhoes and front end loaders shall be used to consolidate the separated rubble into a uniform pile near the existing pile. This activity also includes the erection of a tension support structure to be installed over the uniform rubble pile to prevent wind or water erosion of this material. This tension support structure shall be similar to the demonstration structure erected on the Plant 1 Pad (described in the Plant 1 Pad Continuing Release Removal

Action Work Plan). Initial analysis estimates that the dimension of the tension support structure will need to be 60 feet wide by 300 feet in length. The handling of construction rubble shall be done in accordance with the applicable Site Policy and Procedure FMPC-720.

Stage II activities also include the installation of a removable synthetic membrane covered work area for future soil placements to the stockpile. Future placements of soil will be strictly controlled and covered with the membrane until stabilized. Security fencing will be installed to provide the required administrative controls of the stockpile. The handling of soils and rubble shall be done in accordance with the applicable Site Policy and Procedure FMPC-720. This procedure regulates site excavation and handling of excavated materials at the FMPC. Standard Operating Procedures will be made available to the U.S. EPA upon request for reference only.

Any remaining soils which were not addressed in Stage I will be graded, stabilized, and covered with an erosion control fabric until a vegetative cover is established. A fog spray system shall be used to control fugitive dust generation during the grading activities of this removal action. The vegetative species used to supply cover to the pile shall be capable of producing a well developed root system. Commercial grass seed and erosion control plants such as crown vetch are being considered for the vegetative cover over the stockpile. The soils in the stockpile are capable of supporting vegetative growth as evidenced by the abundance of weeds presently growing on the soils and rubble stockpile. Stormwater drainage enhancements and site access control will be included. Silt barriers and straw bales shall be used to control surface water erosion of the pile during the implementation of this removal action.

6.3 Stage III - Operations and Maintenance

The normal operation of the stockpile shall provide an appropriate method of receiving and documenting future soil placements to the stockpile. As previously described, new soil placements shall be temporarily covered under a removable membrane. These new soils shall be graded and a vegetative cover established as required. This active part of the stockpile shall be operated similarly to a municipal landfill.

Normal maintenance including mowing, watering, fertilizing, etc.) shall be performed on the vegetative system to ensure a healthy and uniform root system over the graded pile.

7.0 PROGRAM MANAGEMENT

7.1 Responsibilities

The DOE has been the lead agency for this removal action and will coordinate and execute continuation of this removal action. As stated in the Consent Agreement under CERCLA 120 and 106(a), if the DOE determines

under Section 104 that any activities or work being implemented under this Consent Agreement may create an imminent threat to human health or the environment from the release or threat of release of hazardous substance, pollutant, contaminant, or hazardous constituent, it may stop any work or activities for such period of time as needed to respond and take whatever action is necessary to abate the danger. Reporting to the USEPA will be in accordance with Section XXIII of the Consent Agreement.

USEPA and OEPA shall review, comment and approve the work plan and follow progress through meetings and the Consent Agreement and Amended Consent Decree progress reports.

Westinghouse Materials Company of Ohio (WMCO), the Maintenance and Operations Contractor at the FMPC, will coordinate, manage, implement, monitor activities and prepare all reports associated with the removal actions in a manner consistent with DOE and regulatory guidance.

This removal action shall be managed by the WMCO/DOE Operable Unit 3 team, to ensure compatibility with the final remedial action(s) selected for Operable Unit 3. Data and results from this removal action will be used to evaluate the final remedial options for Operable Unit 3. FMPC site personnel will manage the project using FMPC-2201 Topical Manual, Project Management Procedures.

All personnel involved will be trained in accordance with 29 CFR 1910.120, the standard operating procedures for the work involved, and with the requirements of the approved work plans. The effectiveness and integrity of these installations will be assessed on a periodic basis. This will be accomplished by personnel normally assigned those duties. Environmental Compliance will monitor and report to WMCO management on runoff samples outside the controlled area and Maintenance will inspect and repair the facility.

7.2 Schedules

An overall integrated schedule for the three stages of the proposed removal action will be provided in the final draft. Detailed schedules of each of the Stages, I, II, and III, will be provided in future deliverables during the removal action.

8.0 SAMPLING AND ANALYSIS PLAN

Sampling Objectives

Additional sampling is proposed to be conducted to support the Removal Action to achieve the following objectives:

Ensure defined soil concentrations are identified during the Removal Action.

Ensure continued protection of human health and the environment through long-term monitoring of the Removal Action system during the period until final remediation under Operable Unit 3.

To achieve the sampling objective, samples are proposed to be collected prior to the construction stage of the Removal Action, and as a part of a monitoring program.

Pre-excavation Soil Sampling

In preparation of interim storage of excavated soils exhibiting an in-situ activity concentration between 35 and 100 Pci/g of total uranium from the Plant 1 Pad Continuing Release Removal Action, the contaminated soil stockpile north of the Plant 1 Pad has been further characterized with 4 additional sample locations to be analyzed. To determine the possible presence of HSL constituents in the soils proposed to be covered, four soil sampling locations were selected within the west area of the stockpile to provide additional radiological data and to determine the possible presence of any HSL contaminants. These locations are on a 64 x 115 foot matrix over the area. Each location will be sampled in four depth increments: 0-6, 6-12, 12-18, and 18-24 inches. A total of 16 samples will be collected from the 4 locations.

The surface fraction will be analyzed for specific radionuclides and full metals (including TCLP). Samples will be analyzed for organic compounds if HNu measurements are positive. If no Hnu measurements are positive, then the 18-24 inch fractions will be analyzed for organic compounds. Intermediate fractions will be saved for possible analysis based upon the results of the first round of surface fraction analyses.

Following completion of all analyses, the concentrations of any positive analytes will be summarized, with the mean and 95% confidence level, and presented in the final project report.

Construction-Related Environmental Monitoring

Instrument Measurements During Excavation

During excavation of rubble portable instrument measurements will be taken for organic vapors and for radiological contaminants. Any measurable organic vapor concentrations and/or radiological indications of greater that 100 Pci/g of uranium, will be cause for associated soils to be containerized and managed consistent with pertinent ARARs.

Construction Rubble Monitoring

In preparation of interim storage of excavated rubble, the contaminated soil stockpile north of the Plant 1 Pad will be further characterized with hand held meters as described previously.

Branch Technical Position Criteria

The Nuclear Regulatory Commission established soil concentrations based upon EPA criteria. Concentrations were modeled so that no member of the public would be expected to receive a radiation dose of one millirad per year to the lung or three millirads per year to the bone due to inhalation or ingestion. This stockpile is a controlled area and there is no public contact however this goal would be consistent with RI/FS objectives.

Monitoring for Fugitive Dust Emissions

Portable air samplers will be placed at the perimeter of the open excavation of the soil stockpile to measure airborne particulate concentrations. Samples will be collected weekly and analyzed for gross alpha and gross beta concentrations at the FMPC laboratory. Engineering controls and additional health and safety measures will be instituted if elevated concentrations are detected.

Monitoring for Surface Water Releases

During construction water samples will be taken of the stormwater run-off at the entrance to the storm sewer system (MH 4) on a monthly basis[2].

Long Term Environmental Monitoring

To ensure the continued protection of human health and the environment, a long term environmental monitoring program will continue in the vicinity of the stockpile. This program will be enhanced to focus more appropriately on the environmental conditions present.

Surface Water Monitoring Program

Following construction activities, and during operation of the stockpile, the following water samples will be taken of the stormwater run-off on an approximately monthly basis depending on precipitation events until sample results indicate that quarterly sampling is sufficient.

- at the inlet to the storm sewer system (MH 4)
- at the storm sewer MH 11

All samples of the stormwater run-off will be analyzed at the FMPC laboratory for total uranium and total thorium. Samples will be collected in a manner consistent with the RI/FS QAPP. Collected samples will be transferred to the FMPC Laboratory for analysis in accordance with the Analytical Laboratories Quality Assurance Plan, October 1987.

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[2]All water samples will need to be taken consistent with the weather conditions. If there has not been a storm event during the given time frame, no sample will be taken due to the lack of stormwater runoff.

Groundwater Monitoring Program

The wells and piezometers in the area of the stockpile do not intersect the local groundwater table.

This monitoring and sampling program will be performed in conjunction with sampling and analysis activities under Operable Unit 3 of the ongoing RI/FS and resultant final remedial actions. The scope of this monitoring and sampling program will not interfere with any activity in this area.

As stated in the Consent Agreement, if the DOE determines that any activities or work being implemented under this Consent Agreement may create an imminent threat to human health or the environment from the release or threat of release of a hazardous substance, pollutant, contaminant, or hazardous constituent, it may stop any work or activities for such period of time as needed to respond and take whatever action is necessary to abate the danger.

9.0 HEALTH & SAFETY PLAN

The work will be performed consistent with the Health and Safety Plan prepared for the removal actions. A copy of the plan for the continuing release is to be provided as Attachment 5 of this work plan. The plan identifies, evaluates, and controls all safety and health hazards. In addition, it provides for emergency response for hazardous operations. The plan is consistent with 29 CFR 1910.120 and the FMPC Site Health and Safety Plan.

Additional safety documentation will be prepared as necessary according to FMPC-2116 Topical Manual "Implementing FMPC Policies and Procedures for System Safety Analysis." FMPC-2116 has been prepared to implement DOE Order 5481.1B - Safety Analysis and Review System and DOE/OR-901 - Guidance for Preparation of Safety Analysis Reports.

10.0 QUALITY ASSURANCE PLAN

This Removal Action will be conducted according to the overall quality assurance program at the FMPC as described in the site Quality Assurance Plan, FMPC 2139. The Quality Assurance Plan is based on the criteria specified in ASME NQA-1, Federal EPA Guideline QAMS-005/80 and DOE Orders 5700.6 and 5400.1. Detailed requirements are implemented by the WMCO Site Policies and Procedures Manual, FMPC-2054, by WMCO Departmental procedures, and Topical Manuals. Specific quality assurance requirements will be incorporated into written and approved procedures and during personnel training. The Quality Department will conduct periodic surveillances to verify compliance.

ATTACHMENT 5

HEALTH AND SAFETY PLAN
FOR
PLANT 1 PAD
CONTINUING RELEASE

ATTACHMENT 5

HEALTH AND SAFETY PLAN

For The

PLANT 1 PAD

CONTINUING RELEASE

REMOVAL ACTION

November 1990

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11/16/90

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HEALTH AND SAFETY PLAN
for
PLANT 1 PAD

1.0 TASKS TO BE PERFORMED

The work to be performed involves providing temporary sealed curbing for stormwater runoff control at the north and west edges of Plant 1 Pad, upgrade of the pad, installation of control structures, and the operation and maintenance of the pad and control measure.

Task 1: Site Survey - Soil and concrete pad sampling for uranium or other constituents and mapping of pad elevations. This task involves movement of loose or contained materials for the purpose of obtaining samples of water or soils for characterization or certification.

Task 2: Temporary Controls - Install temporary curb along north and west areas of the pad to hold down the polymeric cover over the adjacent soil which will prevent stormwater from entraining soil contaminants. This will involve site clearing and removal and replacement of the cover during the progress of construction.

Task 3: Pad Modifications - Cut, break, or remove concrete, and remove soil. Install utilities and new concrete pad. This involves the use of heavy construction equipment for placing contaminated material in either containers or stockpiles. Trenching and sampling will also be required.

Task 4: Control Structures - Install control structures over pad. This involves the erection of fabric covered structures on portions of the newly constructed pad modifications.

Task 5: Operations and Maintenance - Perform periodic sampling of runoff, adjacent soils, and groundwater. Perform maintenance of the pad, structures, and controls. Perform routine waste management operations.

2.0 SITE HISTORY

Plant 1 is the "sampling plant" for the FMPC and is therefore the location for sampling of large amounts of uranium metal process residues and waste materials. The concrete storage pad associated with Plant 1, which has been designated as a Hazardous Waste Management Unit (HWMU), has been used as a drum storage location to support these operations since 1952. The Plant 1 Pad and adjacent unpaved area comprises approximately 12 acres on the northwest side of the process area as shown in Figure 1.

Low level wastes (LLW) include drummed uranium residues, miscellaneous drummed materials such as dirt, concrete and asbestos and scrap pallets. The low level wastes are intended to be stored on the pad until planned processing and disposal actions are completed.

The approximately 45,000 drums of unevaluated waste stored on the Plant 1 Pad will fall into one of three categories once a RCRA evaluation is completed per the schedules set forth in the proposed Amended Consent Decree. The wastes will either be classified as RCRA wastes, mixed RCRA wastes or LLW. The majority of these containers are drums which contain various uranium residues from FMPC processes.

The 1,375 tons of copper scrap stored on the Plant 1 Pad are included as part of the DOE Oak Ridge Metals Management Program. The copper scrap is planned to be removed from the Plant 1 Pad at some future date, when the implementation phase of the vendor contract is finalized.

Construction rubble containers, including sea/land, boxes, and drums, are staged on the Plant 1 Pad prior to disposal. The containers primarily contain dirt, concrete, metal, and asbestos. This practice will continue as it minimizes handling/transportation of the waste on-site prior to disposal.

Recoverable materials, such as enriched residues with high uranium content and solid uranium metal, are primarily stored on the Plant 1 Pad. The FMPC is currently evaluating off-site shipment or indoor long term storage of this material.

CERCLA waste currently stored on the Plant 1 Pad includes drums of soil cuttings from RI/FS well borings that have been determined not to be hazardous wastes.

Drummed materials containing varying amounts of uranium (U-metal, UO_3, UF_4, and UO_2), thorium, and other hazardous substances are stored on the Plant 1 Pad. Some of the carbon steel drums used to store wastes on the pad have deteriorated as a result of extended exposure to the elements, thereby increasing the risk of release of hazardous material to the environment. Sections of the pad have no curbs for containment and; therefore, some portion of the pad drains onto the adjacent grassed area, nor are there sumps for collecting and controlling the stormwater runoff from the pad. In addition, a portion of the drums are being evaluated for containing RCRA constituents and are undergoing characterization pursuant to 40 CFR 261. RCRA materials identified so far include drums of barium salts and drums of waste oils contaminated with 1,1,1-trichloroethane and lead. Drummed materials containing quantities of solvents (1,1,1-trichloroethane, tetrachloroethylene, methylene chloride, and xylene) have also been identified on the pad.

3.0 TASK SPECIFIC HAZARD ASSESSMENT

A preliminary review of the pad area in Plant 1 indicated the potential hazards identified below. Prior to the initiation of the activities, a formal walk-through survey of the conditions in the proposed work area in the Plant 1 complex will be conducted to ensure that conditions are such that a safe working environment can be provided for personnel within the defined exclusion area. All identified hazards will be addressed with the Industrial, Radiological, Safety and Training (IRS&T) representative(s) to determine the degree of hazard and if any additional requirements need to be included in the safety plan.

3.1 Physical Hazards

- Noise
- Heat/cold stress
- Overhead (Construction only)

3.2 Radiation Hazards

The soil data from the Plant 1 Pad area indicates areas where uranium is being introduced into the environment through surface deposition. The surface deposition does not appear to be contributing to the subsurface contamination as the uranium concentration decreases significantly below the depth of 1.5 feet.

The potential radiation hazards are from uranium (ranging from depleted to 2% enriched in U-235) and short lived decay products. Direct radiation measurements have been observed at less than 2 mrem/hr. Uranium is the controlling element and was observed at concentrations up to 1220 ppm. Gross activity levels will be referred to uranium. Thorium was also found at concentrations up to 113 ppm total in the soil.

Uranium has an exposure route through inhalation or ingestion. The background level in ambient air is less than 2×10^{-12} uCi/cc. Action levels are further described in Notes 4 and 5 under Section 3.3.

3.3 Chemical Hazards

Contaminant	Primary Hazard	Limit	Action Level	Background Level in Ambient Air
Asbestos[1]	Inhalation	0.2 f/cc [2]	0.1 f/cc	ND[3]
Volatile Organic Compounds (VOC's)	Inhalation	Varies[6]	1.0 ppm	ND[7]
Magnesium Fluoride	Inhalation	2.5 mg F/M^3	1.3 mg/M^3	ND[7]
Inorganic Lead[8]	Inhalation/ Ingestion	50 ug/M^3	30 ug/M^3	ND[7]
Methyl ethyl ketone (MEK)[9]	Inhalation	TWA 200 ppm STEL 300 ppm	100 ppm	ND[7]
Xylenes[10]	Inhalation	100 ppm	50 ppm	ND[7]
Stoddard Solvent[11]	Inhalation	100 ppm	50 ppm	ND[7]
Calcium Carbonate[12]	Inhalation	15 mg/M^3 total 5 mg/M^3 respirable	5 mg/M^3 2.5 mg/M^3	ND[7]
Crystalline silica[12]	Inhalation	0.1 mg/M^3	0.05 mg/M^3	ND[7]
Barium, soluble compounds[13]	Inhalation	0.5 mg/M^3	0.25 mg/M^3	ND[7]

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3.3 Chemical Hazards (cont.)

Information on health risks, exposure routes, and first aid is given in Section 7.0 of the Health and Safety Plan.

1) These requirements include personal protective equipment and training. Asbestos hazard present if insulation, insulated lines or transite is damaged or disturbed such as that in the scrap copper pile (special permit required for asbestos work).

2) Based on 8 hour time weighted average.

3) Not detectable, <0.01 fibers per cubic centimeter (f/cc).

4) The action level for uranium is 5×10^{-12} uCi/ml which is based on the DOE derived air concentration limit of 2×10^{-11} uCi/ml.

5) Not expected to be present at levels exceeding 10% of DOE limit.

6) Limit will vary depending on which, if any, VOC is found. At the present, none exist on the Plant 1 Pad above detection levels.

7) Not detectable per methods described in Section 4.0.

8) If grit blast material is encountered, it should be considered potentially lead contaminated. A Chemical/Hazardous Material Work Permit shall be obtained from IH&S and the indicated requirements followed.

9) This is 80% of the rubber cement used to seal herculite panels.

10) This is a major component of the polyurethane concrete sealant and possibly the epoxy sealant.

11) This is a component in the naphtha solvent of the polyurethane concrete sealant.

12) This is produced when jack hammering out old concrete.

13) This is stored in some of the drums on the Plant 1 Pad.

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4.0 MONITORING

4.1 Goals

During the site survey task, air monitoring will be performed as determined to be necessary at the time of issuance of the work permit(s) to ensure that exposure levels do not exceed established exposure limits.

4.2 Monitoring Equipment and Frequency of Monitoring

4.2.1 Airborne Radioactivity

During the site survey and installation of the control measure tasks, Breathing zone (BZ) and/or general area (GA) air samples will be collected as necessary with filters which will be counted for long-lived alpha activity. Radioactive surface contamination shall be monitored whenever soil is disturbed by drilling or digging.

4.2.2 Radioactive Surface Contamination

During the site survey and installation of the temporary control measure tasks and the pad upgrade tasks, weekly surveys for removable radioactive surface contamination will be performed in Plant 1 Pad area. Contamination surveys will be performed on potentially contaminated surfaces to ensure that adequate protective clothing is being worn and to verify radiological postings.

4.2.3 Radiation Surveys

Area radiation surveys will be monthly.

4.2.4 Chemical Hazard

An MIE RAM-1 forward light metering photometer, calibrated by the factory to Arizona road dust, or similar instrument shall be used to monitor for the following particulate contamination if necessary:

Contaminant	Concentration Range(mg/M^3)	MDA Conc.(mg/M^3)
Magnesium Fluoride Calcium Carbonate Barium, soluble compounds	0-2, 0-20, 0-200	0.1

Breathing zone filter samples analyzed by specific ion electrode (NIOSH-7902) may also be collected to quantify TWA employee exposures to MgF_2.

If asbestos containing materials (e.g. Copper scrap pile) will be disturbed, then supervision will obtain an Asbestos Work Permit.

Among other things, this permit will specify that BZ filter samples will be collected and optically counted for fibers by NIOSH-7400 to determine TWA employee exposures to asbestos fibers.

As part of the Chemical/Hazardous Material Work Permit for the lead mentioned in Section 3.3, BZ filter samples for inorganic lead may be collected, if it is felt that TWA employee exposures while performing the work will be different than similar situations previously sampled.

4.2.5 Thermoluminescent Dosimetry (TLD)

TLDs will be worn by all workers.

4.2.6 Volatile Organic Vapors

An HNU-101 broad spectrum photoionization instrument will be used periodically to test for volatile organic compounds using a 10.2 eV lamp and an active sampling probe. If organic vapors are detected, they will be treated as unknowns. The Breathing Zone action levels are listed in Section 4.3.

Contaminant	Concentration Range(ppm)	MDA Conc.(ppm)
Volatile Organic Compounds	0-600	1

Note: The HNu response may be reduced if high levels of methane of humidity are present, such as sewers or wet sumps.

Colorimetric indicating detector tubes (i.e., Drager) may also be used to measure the levels of specific organic vapors. Monitoring will be provided by IRS&T as needed.

4.2.7 Noise

A Type 1 sound level meter, calibrated acoustically before each use, shall be used if necessary to measure noise levels. For jobs exceeding 85 dBA for any length of time, e.g., concrete breaking, hearing protection shall be used.

4.2.8 Heat/Cold Stress

Supervision will observe workers for signs and symptoms of heat/cold stress and adjust work schedules as required. Monitoring for heat (wet bulb globe temperature) and cold stress will be performed by IRS&T as needed to ensure compliance with American Conference of Governmental Industrial Hygienists limits established in the most recent edition of the TLV booklet.

4.3 Action Levels

Measurement	Level	Action
Removable contamination on open surfaces	20,000 dpm/100 cm^2 (average)	Note 1
Airborne radioactivity (long lived)	5×10^{-12} uCi/ml	Note 1
HNU Meter (Breathing Zone)	Detection to 10 ppm (Note 2)	Note 3
	10-25 ppm	Supplied Air Respirator(SAR)
	25 ppm	Withdraw
MIE RAM-1 dust photometer[4]	0.25 mg/M^3 10.0 mg/M^3	Note 1 SAR
Soil being disturbed	2,000 cpm Beta-Gamma	Note 1 (Workers in close prox.)
Soil being disturbed	10,000 cpm Beta-Gamma	Note 5

Notes

1 Full-face air purifying respirators with magenta HEPA filter cartridges.

2 1 ppm above background is considered detection.

3 Full-face air purifying respirators with magenta and yellow combination cartridges for dusts, mists, fumes, and acid gases and organic vapors.

4 This would be used to measure Magnesium Fluoride, Calcium Carbonate, and Barium dust. Respiratory protection is specified based on barium.

5 Anti-contamination clothing to be worn over controlled area clothing. Full set of clothing or less if specified by IRS&T representative overseeing work.

5.0 PERSONAL PROTECTIVE EQUIPMENT

All employees in the task exclusion area will wear the following personal protective equipment while performing the required tasks. See Note 1 in Section 3.3 for additional requirements.

5.1 Site Survey

ITEM	NEED	JUSTIFICATION
Air Purifying Respirator	No (yes)	Required if action levels are exceeded or during concrete cutting/coring or as specified by IRS&T representative.
Cartridges: Magenta HEPA or Magenta and yellow if volatile organic compounds are detected	No (yes)	Required if action levels are exceeded or during concrete cutting/coring or as specified by IRS&T representative.(see 4.3 HNu meter)
Hard Hat	No	
Hearing Protection	No (yes)	Required during concrete cutting/coring/breaking and whenever operations produce continuous noise levels over 85 dBA.
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shields	No (yes)	As needed to prevent contact with splash or particulates
Inner Gloves	No (yes)	PVC inner gloves shall be used beneath leather palm gloves as needed to prevent contact with liquids.
Leather-Palm Gloves	Yes	As needed for physical hand protection.
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids.
PVC Gloves	No	
Anti-contamination Coveralls	No	

5.1 Site Survey (cont.)

ITEM	NEED	JUSTIFICATION
Process Coveralls	Yes	Minimum Site Requirement
Chemically Resistant Anti-contamination Coveralls	No (yes)	As shown in Section 3.1, current airborne levels of contaminants are well below PEL and action levels. Periodic monitoring, as described in Section 4.0, will allow a check on contaminant levels as work proceeds and allow switching to Saranex or equivalent coated disposable clothing if warranted.
PVC Rain Suit	No (yes)	For operations where splashing or skin contact with wet materials is probable, face shields, PVC splash suits, rubber gloves, and boots shall be used.
SAR	No	
Safety Shoes	Yes	Minimum Requirement
Shoe Covers	No	
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids.

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5.2 Installation of Temporary Curbing and Herculite

ITEM	NEED	JUSTIFICATION
Air Purifying Respirator	No (yes)	Required if action levels are exceeded or as specified by IRS&T representative.
Cartridges: Magenta HEPA or Magenta and yellow if volatile organic compounds are detected	No (yes)	Required for MEK or if action levels are exceeded or as specified by IRS&T representative.(see 4.3 HNu meter)
Hard Hat	Yes	
Hearing Protection	No (yes)	Whenever operations produce continuous noise levels over 85 dBA.
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shields	No (yes)	As needed to prevent contact with splash or particulates
Inner Gloves	No (yes)	PVC inner gloves shall be used beneath leather palm gloves as needed to prevent contact with liquids.
Leather-Palm Gloves	Yes	As needed for physical hand protection.
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids.
PVC Gloves	No	
Anti-contamination Coveralls	No	

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5.2 Installation of Temporary Curbing and Herculite (cont.)

ITEM	NEED	JUSTIFICATION
Process Coveralls	Yes	Minimum Site Requirement
Chemically Resistant Anti-contamination Coveralls	No (yes)	As shown in Section 3.1, current airborne levels of contaminants are well below PEL and action levels. Periodic monitoring, as described in Section 4.0, will allow a check on contaminant levels as work proceeds and allow switching to Saranex or equivalent coated disposable clothing if warranted.
PVC Rain Suit	No (yes)	For operations where splashing or skin contact with wet materials is probable, face shields, PVC splash suits, rubber gloves, and boots shall be used.
SAR	No	
Safety Shoes	Yes	Minimum Requirement
Shoe Covers	No	
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids.

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5.3 Installation of the Pad Modifications

ITEM	NEED	JUSTIFICATION
Air Purifying Respirator	No (yes)	Required if action levels are exceeded or during concrete cutting/coring/breaking or as specified by IRS&T representative.
Cartridges: Magenta HEPA or Magenta and yellow if volatile organic compounds are detected	No (yes)	Required during concrete cutting/coring/breaking or for sealants containing naphtha or xylene or if action levels are exceeded or as specified by IRS&T representative.(see 4.3 HNu meter)
Hard Hat	Yes	
Hearing Protection	No (yes)	Required during concrete cutting/coring/breaking and whenever operations produce continuous noise levels over 85 dBA.
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shields	No (yes)	As needed to prevent contact with splash or particulates.
Inner Gloves	No (yes)	PVC inner gloves shall be used beneath leather palm gloves as needed to prevent contact with liquids.
Leather-Palm Gloves	Yes	As needed for physical hand protection.
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids.
PVC Gloves	No	
Anti-contamination Coveralls	No	

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5.3 Installation of the Pad Modifications (cont.)

ITEM	NEED	JUSTIFICATION
Process Coveralls	Yes	Minimum Site Requirement
Chemically Resistant Anti-contamination Coveralls	No (yes)	As shown in Section 3.1, current airborne levels of contaminants are well below PEL and action levels. Periodic monitoring, as described in Section 4.0, will allow a check on contaminant levels as work proceeds and allow switching to Saranex or equivalent coated disposable clothing if warranted.
PVC Rain Suit	No (yes)	For operations where splashing or skin contact with wet materials is probable, face shields, PVC splash suits, rubber gloves, and boots shall be used.
SAR	No	
Safety Shoes	Yes	Minimum Requirement
Shoe Covers	No	
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids.

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5.4 Installation of Control Structure

ITEM	NEED	JUSTIFICATION
Air Purifying Respirator	No (yes)	Required during drilling of concrete or if action levels are exceeded or as specified by IRS&T representative.
Cartridges: Magenta HEPA or Magenta and yellow if volatile organic compounds are detected	No (yes)	Required for concrete drilling or for epoxy cements or if action levels are exceeded or as specified by IRS&T representative.(see 4.3 HNu meter)
Hard Hat	Yes	
Hearing Protection	No (yes)	Required during drilling of concrete and whenever operations produce continuous noise levels over 85 dBA.
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shields	No (yes)	As needed to prevent contact with splash or particulates.
Inner Gloves	No (yes)	PVC inner gloves shall be used beneath leather palm gloves as needed to prevent contact with liquids.
Leather-Palm Gloves	Yes	As needed for physical hand protection.
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids.
PVC Gloves	No	
Anti-contamination Coveralls	No	

5.4 Installation of Control Structure (cont.)

ITEM	NEED	JUSTIFICATION
Process Coveralls	Yes	Minimum Site Requirement
Chemically Resistant Anti-contamination Coveralls	No (yes)	As shown in Section 3.1, current airborne levels of contaminants are well below PEL and action levels. Periodic monitoring, as described in Section 4.0, will allow a check on contaminant levels as work proceeds and allow switching to Saranex or equivalent coated disposable clothing if warranted.
PVC Rain Suit	No (yes)	For operations where splashing or skin contact with wet materials is probable, face shields, PVC splash suits, rubber gloves, and boots shall be used.
SAR	No	
Safety Shoes	Yes	Minimum Requirement
Shoe Covers	No	
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids.

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5.5 Operation/Maintenance of the Pad and Control Structures

ITEM	NEED	JUSTIFICATION
Air Purifying Respirator	No (yes)	Required if action levels are exceeded or as specified by IRS&T representative.
Cartridges: Magenta HEPA or Magenta and yellow if volatile organic compounds are detected	No (yes)	Required if action levels are exceeded or as specified by IRS&T representative.(see 4.3 HNu meter)
Hard Hat	No	
Hearing Protection	No (yes)	Whenever operations produce continuous noise levels over 85 dBA.
Safety Glasses	Yes	Minimum Requirement
Safety Goggles or Face Shields	No (yes)	As needed to prevent contact with splash or particulates.
Inner Gloves	No (yes)	PVC inner gloves shall be used beneath leather palm gloves as needed to prevent contact with liquids.
Leather-Palm Gloves	Yes	As needed for physical hand protection.
Rubber/Nitrile Gloves	Yes	As needed to prevent contact with liquids.
PVC Gloves	No	
Anti-contamination Coveralls	No	

5.5 Operation/Maintenance of the Pad and Control Structures (cont.)

ITEM	NEED	JUSTIFICATION
Process Coveralls	Yes	Minimum Site Requirement
Chemically Resistant Anti-contamination Coveralls	No (yes)	As shown in Section 3.1, current airborne levels of contaminants are well below PEL and action levels. Periodic monitoring, as described in Section 4.0, will allow a check on contaminant levels as work proceeds and allow switching to Saranex or equivalent coated disposable clothing if warranted.
PVC Rain Suit	No (yes)	For operations where splashing or skin contact with wet materials is probable, face shields, PVC splash suits, rubber gloves, and boots shall be used.
SAR	No	
Safety Shoes	Yes	Minimum Requirement
Shoe Covers	No	
Rubber/Latex Boots	Yes	As needed to prevent contact with liquids.

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6.0 SITE CONTROL

6.1 Key Personnel

Project Manager
Supervisor-in-charge
FMPC Site Safety and Health Officer

The Project Manager is responsible for assuring that the project documents for safe implementation of the project are approved and available.

The Supervisor-in-charge is responsible for compliance with all elements of this Health and Safety Plan.

The FMPC Site Safety and Health Officer is the Manager of Industrial, Radiological, Safety and Training (IRS&T). The Manager of IRS&T is responsible for verifying compliance with this Health and Safety Plan through the performance of inspections during the conduct of this project. These inspection duties are carried out by IRS&T personnel from the Industrial Hygiene, Radiological Safety, and Safety and Fire Protection Services groups. IRS&T personnel are also involved in work permit issuance and various monitoring tasks as identified in this Health and Safety Plan.

6.2 Access

The work associated with this removal action will be within the FMPC controlled area. In addition, the work area related to this removal action will be posted as "RWP Required for Entry". The Exclusion and Contamination Reduction zones are shown on Figure 1 for each distinct phase of the planned work.

The Exclusion Zone is the zone of high potential hazard due to physical or chemical dangers. Access to the Exclusion Zone will be restricted by Radiological Safety to trained and certified personnel, who are required to enter in order to perform their job functions. There will be different Exclusion Zones for the various tasks. The Exclusion Zone will be marked with easily recognizable devices. The zone may be expanded if airborne hazards are detected. All areas requiring the use of respiratory protection are included in the Exclusion Zone. Entrance shall be limited to one area and controlled by the supervisor in charge.

Radiological Safety will established a Contamination Reduction Zone, consisting of step-off pads, at the exit to the Exclusion Zone. This zone will be used for removal of disposable personal protective equipment and for cleaning of contaminated equipment.

6.2.1 Radiological Postings

Radiological areas will be posted in accordance with DOE Order 5480.11. The following is a brief summary of posting requirements based on uranium:

Regulated Area	> 1000 dpm/100 cm^2 removable > 5000 dpm/100 cm^2 fixed and removable
Contaminated Area	> 10,000 dpm/100 cm^2 removable > 50,000 dpm/100 cm^2 fixed and removable
Airborne Radioactivity Area	> 2×10^{-12} uCi/ml
Respirator Area	> 5×10^{-12} uCi/ml

In addition, special postings may be added for access to areas: "RWP Required for Entry".

6.3 Medical Monitoring

In accordance with 29 CFR 1910.120 OSHA requirements, all WMCO and WMCO subcontractor personnel are required to participate in a medical monitoring program which includes:

- o A baseline medical examination
- o Annual medical examination
- o Medical examinations may be required after potential exposures.
- o Annual WMCO respirator medical approval of users or offsite medical approval validated by WMCO Industrial Hygiene.

Prior to start of work, personnel involved in this project shall be identified by name and badge number. Each individual shall be subject to a medical surveillance approval by the Director, Medical Services. The approval statement shall certify that each individual is medically qualified to perform the work and is physically fit to wear PPE.

6.4 Bioassay Samples

WMCO personnel involved in this project are required to participate in a monthly urinalysis program for uranium. In addition to this routine bioassay program, any circumstance which could have resulted in any intake of radioactive materials of fluoride chemicals by inhalation, ingestion, or skin absorption requires the affected employee to immediately report it to his/her supervisor, and then to Medical at the end of that shift in order to submit an incident type urine sample and fill out an Incident Investigation Report. The involved employee shall also submit another followup sample at the start of the next shift. Employees exposed to

fluoride chemicals shall check "fluoride analysis" on their urine sample request card.

6.5 Training Requirements

All WMCO and WMCO subcontractor personnel assigned to the tasks will, as a minimum, meet the following Hazardous Waste Operations training requirements:

- o Documented safety meeting to review this health & safety plan including site specific hazards and procedures
- o WMCO radiation safety training
- o Annual WMCO respiratory training and quantitative fit-test or off-site equivalent approved by WMCO Industrial Hygiene
- o 40-hour OSHA training
- o 8-hour annual refresher training
- o 8-hour supervisory training (for supervisors)
- o 24-hour supervised field experience

6.6 Safety Meetings

A safety meeting, which must be documented, shall be conducted prior to the start of each day's work during the site survey, the installation of the temporary curbing, and the construction work on the pad tasks. The meeting will cover the following applicable subjects:

- [] review of this health and safety plan
- [] work operations
- [] review of all physical and chemical hazards inherent in this job including MSDS's for chemicals used
- [] personnel protective equipment
- [] all monitoring data
- [] monitoring tests and results
- [] decontamination
- [] task organization
- [] physical stress
- [] emergency procedures including spill procedures
- [] communications
- [] general safety
- [] housekeeping

7.0 EXPOSURE SYMPTOMS

Exposure to low levels of radioactivity do not produce acute exposure symptoms. Such exposures may cause delayed effects such as cancer. Exposures are to be kept as low as reasonably achievable. No treatment is anticipated for the predicted contaminants and concentrations. See Section 11 for contingency plans.

Exposure symptoms for chemical hazards are described as follows:

Uranium

Health Risks:

High level exposures to soluble uranium compounds causes respiratory irritation and temporary kidney dysfunction. Lower level chronic exposure is believed to increase the risk of cancer of the lungs, lymph system, and hemopoietic system.

Exposure Routes: Broken skin and respiratory tract

First Aid:

Inhalation - Remove person to fresh air. If trouble breathing, give oxygen, or if exposed to soluble compounds. Start bioassay urinalysis surveillance program to quantify dose.

Skin Contamination - Call RST's, perform decontamination per FMPC SOP.

Broken Skin - Report to FMPC Medical.

Asbestos:

Health Risks:

Has no acute adverse health effects. Chronic exposures to high dust levels causes a pneumoconiosis called asbestosis. Chronic exposures to low levels (especially in smokers) increases the risk of lung cancer. A rare cancer of the lung lining, mesothelioma, is also increased in incidence in asbestos workers.

Exposure Route: Inhalation

First Aid: None.

Magnesium Fluoride:

Health Risks:

A moderately soluble fluoride material which is moderately toxic by ingestion. Acute effects from large doses include nausea, vomiting, diarrhea, abdominal burning and cramps. Irritating to eyes and mucous membranes. Chronic intake of low levels can cause fluorosis of bones and ligaments and mottling of teeth in the young.

Exposure Route: Inhalation, Ingestion.

First Aid:

Remove victim to fresh air. Administer oxygen if victim has breathing difficulty. Remove dusty clothing, being careful not to resuspend dust. Wash skin and eyes.

Inorganic Lead:

Health Risks:

Chronic exposure during pregnancy may increase risk of birth defects (teratogenesis). Acute exposures to high levels causes tumors, paralysis, hallucinations, unconsciousness, and death. Chronic low level exposure can cause loss of appetite, malaise,

tremor, insomnia, headache, anemia, and dark line on gums (lead line). Suspected lung and kidney carcinogen.

Exposure Route: Inhalation, Ingestion.

First Aid:
Remove person to fresh air and provide oxygen if has difficulty in breathing. Remove contaminated clothing using care not to resuspend dust. Wash hands and face when done to prevent lead ingestion.

Volatile Organic Compounds:
Health Risks:
Will vary depending on the identity of the chemical. At present, none have been detected on the Plant 1 Pad. If any are found, the expected level may barely exceed the odor threshold and would not pose any acute or chronic adverse health effects.

Exposure Route: Inhalation, Ingestion.

First Aid:
Remove person to fresh air if inhaled. Flush eyes with water, then treat for irritation. Wash skin with soap and water after removing chemically contaminated clothing.

Methyl Ethyl Ketone
Health Risks:
Repeated skin contact causes a dry, scaly, and fissured dermatitis. Vapor concentrations > 350 ppm irritate the conjunctiva of the eyes and mucous membranes of the nose and throat. High concentrations produce narcotic effects on the arterial nervous system, including: headache, nausea, light headedness, incoordination, and unconsciousness.

Exposure Route: Skin, eyes, inhalation

First Aid:
For skin, remove solvent soaked clothing and dry the skin. For inhalation, remove person to fresh air and provide oxygen if breathing is difficult.

Xylenes
Health Risks:
Acute high exposure to the vapor causes irritation to the eyes, nose, and throat. Acute inhalation of high vapor levels causes central nervous system depression including dizziness, staggering, drowsiness, and unconsciousness. Repeated or prolonged skin contact causes drying and defatting of the skin which may lead to dermatitis.

Exposure Route: Skin, eyes, inhalation

First Aid:
For skin, remove solvent soaked clothing and wash with soap and water. For inhalation, remove person to fresh air and provide oxygen if breathing is difficult.

Stoddard Solvent
Health Risks:
Acute inhalation of high concentrations of vapor causes arterialnervous system depression. Lower concentrations are irritating to the eyes and respiratory tract. Liquid contact with skin or eyes causes irritation. No listed chronic effects.
Exposure Route: Skin, eyes, inhalation

First Aid:
For skin, remove solvent soaked clothing and wash with soap and water. For inhalation, remove person to fresh air and provide oxygen if breathing is difficult.

Calcium Carbonate
Health Risks:
This is a very low toxicity nuisance dust having no reported acute or chronic adverse health effect.

Exposure Route: Inhalation

First Aid:
For inhalation, remove person to fresh air.

Crystalline Silica
Health Risks:
Chronic inhalation of silica flour over 2 to 30 years causes silicosis of lungs, which is the chief cause of pulmonary dust diseases.

Exposure Route: Inhalation

First Aid:
For inhalation, remove person to fresh air.

Barium, soluble compounds
Health Risks:
High level acute exposures by inhalation or ingestion of soluble barium causes an increase in contractility of all muscles including smooth muscles. This results in increased peristalsis of intestines, vascular constriction, bladder contraction, and increased voluntary muscle tension. The heart rate is slowed and may stop. Low level chronic inhalation of insoluble barium may result in "baritosis", a benign darkening of the lungs when X-Rayed.

Exposure Routes: Inhalation.

First Aid:

Remove person to fresh air. If trouble breathing, give oxygen. If symptoms of acute poisoning are evident, get medical attention.

8.0 SITE ENTRY PROCEDURES

During the site survey and installation of control measure tasks, the following procedures apply:

- o Identify exclusion zone, contamination reduction zone, and break area.
- o Only personnel on the approved roster to be admitted to exclusion zone.
- o Perform daily safety meeting to familiarize team with site specific hazards.
- o Discuss alternate communications signals (if applicable).
- o Perform respirator inspection and negative/positive pressure fit check prior to use.
- o Use buddy system. Teams of at least two individuals will be used for all activities within and exclusion zone.

Prior to the initiation of these work tasks, the following permits are required:

[] Radiation Work Permit
[] Penetration Permit
[] Flame Permit prior to cutting or welding
[] Chemical/Hazardous Material Permit
[] Work Permit
[] Asbestos Work Permit for work around scrap copper pile

All personnel entering the Exclusion Zone shall be trained and certified to perform their assigned task as defined by 29 CFR 1910.120. Entrance to the Exclusion Zone shall be controlled and at the approval of the supervisor in charge.

9.0 DECONTAMINATION

Equipment for decontamination of radiological or chemical hazards shall be kept available in the area surrounding the Exclusion Zone (or Contamination Reduction Zone). Upon leaving Exclusion Zone covered by Radiation Work Permits (see Section 6.1), workers are told by posted signs how to remove disposable clothing, how to frisk, in which containers to place disposable and reconditionable equipment, and what to do if personal radioactive contamination is detected.

Review of MSDS information on the materials given in Section 3.0 did not reveal the need for any chemical decontamination solutions besides soap

and water. Safety showers and restrooms in Plant 1 shall be used for removing any contamination which gets through disposable clothing, gloves, rainsuit, and coveralls to the skin. Portable eyewashes filled with a saline and preservative solution shall be kept near the on-going work on the Plant 1 Pad. The eyewash solution shall have been changed within the last 6 months. Any contamination on worker's coveralls will be discarded when worker showers and changes to street clothes in the Services Building prior to going to lunch or home.

10.0 WASTES

Wastes include, but are not limited to:

- o Disposable PPE
- o Excess materials such as soil or concrete

All potentially contaminated waste materials resulting from site activities will be collected and placed in drums or other containers. Disposable protective clothing will be placed in plastic bags and disposed of as compactible, potentially contaminated waste.

Drums or containers shall meet DOE 49 CFR Parts 171-178, EPA, 40 CFR Parts 264-265 and 300, and OSHA requirements. Hazard warning shall be immediately applied to all drums as specified by WMCO management/supervisors and WMCO Solid Waste Compliance.

11.0 CONTINGENCY PLANS

11.1 Incidents or Injuries

Incidents or injuries involving potential intake of any hazardous substances shall be reported to supervisor and the WMCO Medical Section by the involved employee and an Incident Investigation Report completed by the involved employee. See Section 6.2 for details on bioassay procedure.

11.2 Pre-Emergency Planning

During the training and pre-work safety meetings, all employees involved in this task shall be trained and reminded of the provisions of the plant emergency procedure, alarm signals and communications, evacuation routes (See Figure 2) and emergency reporting.

11.3 Lines of Authority

The supervisor in charge has the primary responsibility for the prevention of emergency conditions. In the event that an emergency does occur, the individual involved or observing the condition shall immediately notify a supervisor, the communications center or the WMCO Assistant Emergency Duty Officer (AEDO). The AEDO is responsible for ensuring that corrective actions have been

implemented, the appropriate personnel notified, and initial reports completed as required.

11.4 Spill Containment

Methods shall be employed to minimize the potential for and consequences of spills during the course of the project. All assigned workers shall be trained as appropriate in the existing procedures for handling spills connected with this project.

11.5 Evacuation

In the event of an emergency which necessitates an evacuation of an exclusion area, the 2-2, 2-2 shall be sounded over the plant alarm system; a voice message will follow over the Emergency Message System and radios instructing employees to go to their designated Rally Point. Personnel shall immediately proceed to the Rally Point and participate in the accountability process. Personnel will follow instructions given by the Rally Point Coordinator. When an all-clear condition has been achieved, personnel will be released from the Rally Point.

11.6 Emergency Equipment

The following safety equipment, locations to be identified at safety meetings, is available for employee usage:

[] fire extinguisher (required for flame cutting or welding)
[] manual fire alarm (locations in Plant 1, Bldg 66, Bldg 71)
[] portable eye wash (near on-going work)
[] two-way radio (supervisor equipment)
[] telephone (located in Plant 1, Bldg 66)
[] local evacuation alarm (located in Plant 1)
[] respirators (located in cabinets in Plant 1, Bldg 66)
[] safety shower (located in Plant 1, Bldg 66)
[] emergency SCBA units (located in Plant 1)
[] spill drums (to be available at Plant 1 Pad)
[] clean-up materials (to be available in Plant 1)
[] absorbent (to be available in Plant 1)

11.7 Emergency Notification

All emergencies shall be reported immediately. Emergencies can be reported by telephone dialing extension (ext.) 6511; by contacting the communications center via two-way radio; or by pulling a manual fire alarm.

11.8 Fire, Explosion, or Medical Emergency

In the event of a fire, explosion or medical emergency, the communication center shall be notified immediately by manual fire

alarm, two-way radio, or by calling ext. 6511. The communication center operator will activate the emergency response team and dispatch them to the appropriate location. Personnel in the immediate area should evacuate to a safe position and await instructions if a hazardous condition exists. The route from the project area to the WMCO Medical Facility is shown in Figure 2.

11.9 Additional Information

11.9.1 Hospitals

The WMCO Medical Facility (Building 53) is the primary choice for on-site injuries. The WMCO ambulance will transport the injured to the nearest hospital if necessary. WMCO maintains an emergency response capability which includes an ambulance and Emergency Medical Technicians.

11.9.2 Emergency Telephone Numbers

Ambulance: ext. 6511
Hospital: ext. 6511
Fire: ext. 6511

Name	Work	Radio
EMERGENCY RESPONSE	6511 or 6295	
Industrial Hygiene	6207	357
Radiation Safety	6889	355
Fire Services	6235	303
Assistant Emergency Duty Officer (AEDO)	6431 or 6295	202

12.0 CONFINED SPACE ENTRY

There are no confined spaces on Plant 1 Pad nor will any be created by installation of the control measures.

13.0 AMENDMENTS

A. This Project/Task Specific Health and Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise which require reassessment of safety procedures. It is important that personnel protective measures be thoroughly assessed by the supervisor in charge and IRS&T representative prior to and during the planned task activities. Unplanned activities and/or changes in the hazard status shall require a review of and may require changes in this plan.

B. Changes in the anticipated hazard status or unplanned activities are to be submitted as an amendment to this Project/Task Specific Health and Safety Plan.

C. Amendments must be approved by the plan author and IRS&T prior to implementation of the amendment.

14.0 APPROVAL AND COMPLIANCE STATEMENT

This Health and Safety Plan was produced for the use of WMCO employees and WMCO subcontractors. It was intended for the FMPC and specifically for the following activities related to the Plant 1 Pad removal action:

Site Survey
Construction Modifications to the Pad (3 phases)
Operations/Maintenance of Control Structures and Pad

The undersigned personnel have read and understood this Health and Safety plan and agree to follow its provisions[1]:

Name (lettered)	Signature	Date
SUPERVISOR-IN-CHARGE		

1. Compliance with the provisions of the Health and Safety Plan may be audited through announced or unannounced site visits. Be sure that the provisions of this safety plan are implemented and document the reasons for field actions/changes when they are necessary. Site visits may be performed by the DOE or WMCO personnel.

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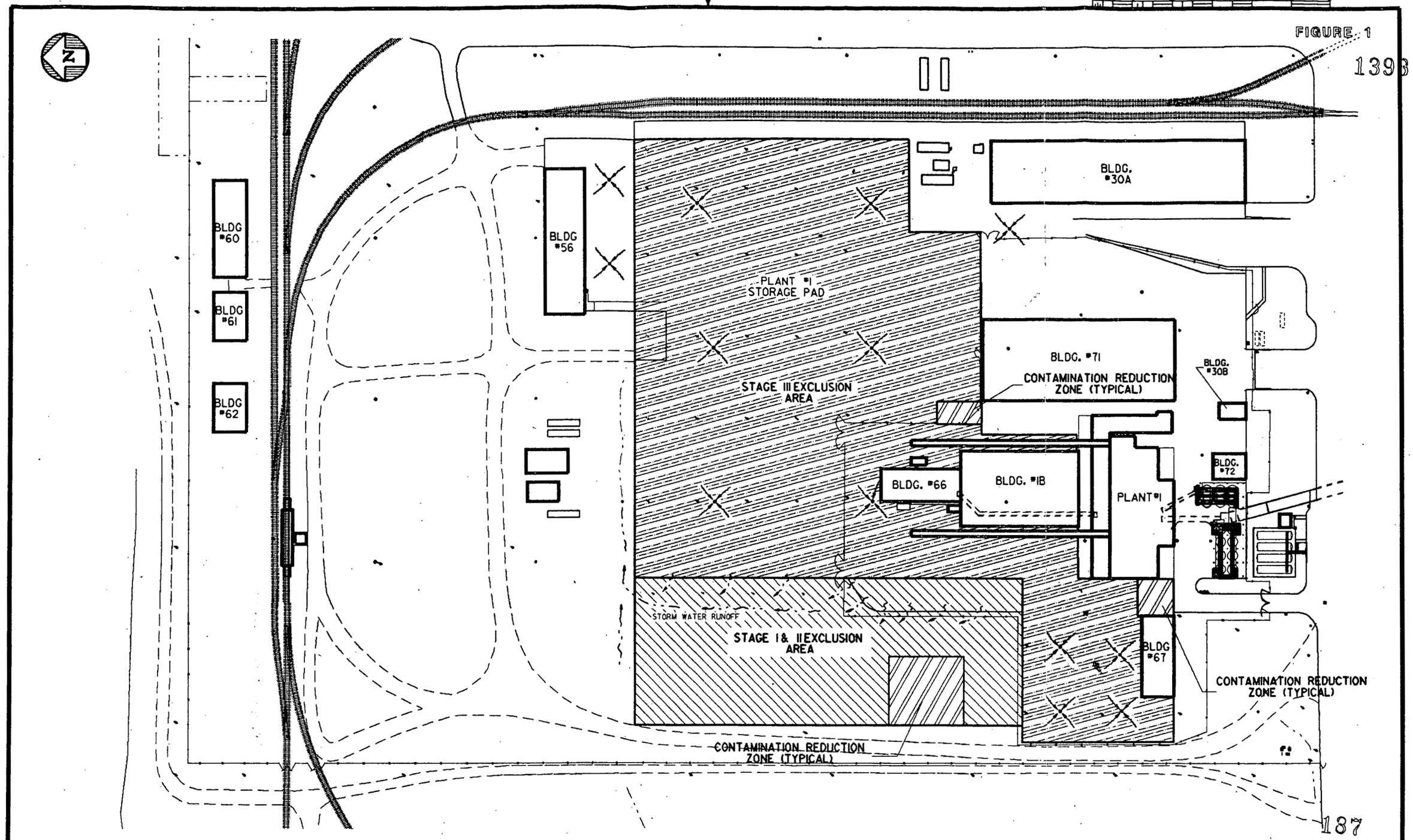
FIGURE 1

1393



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NO.	REVISIONS	DATE	DWN. BY	APPD.	NO.	REVISIONS	DATE	DWN. BY	APPD.	REF. DWG. NO.

NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY

APPROVALS

CHEMICAL			I.R.S. & T.
CIVIL & STR.			MAINTENANCE
ELECTRICAL			NU. SAFETY
ENGINEER			Q.A.
INSTRUMENT			PRODUCTION
MECHANICAL			FIRE & SAFETY
			WASTE MANAGE
CHECKED			D.O.E.
APPROVED			SECURITY

WESTINGHOUSE MAT'LS. CO. OF OHIO

FERNALD, OHIO

FEED MATERIALS PRODUCTION CENTER
U.S. DEPARTMENT OF ENERGY

PLANT #1 STORAGE AREA

STORAGE PAD LAYOUT
EXCLUSION AREA (TYP.)
SCALE - 1" = 50'-0"

DATE 10-18-90
DRAWN MIKE LOCKE

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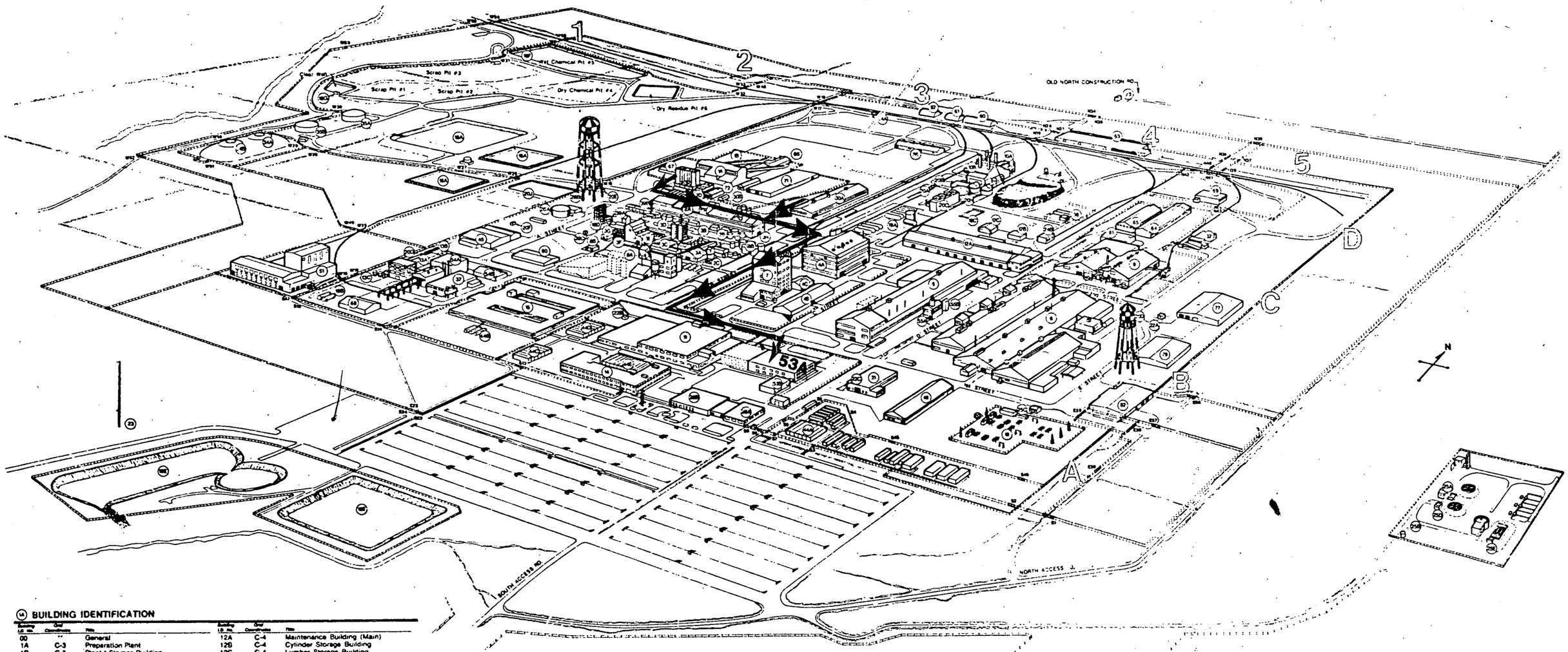
FILE NAME: ZFA1(100,4)01XG01336.DGN

FMPC SITE

FIGURE 2



(34) BUILDING IDENTIFICATION

Building I.D. No.	Grid Coordinates	Title	Building I.D. No.	Grid Coordinates	Title
00	**	General	12A	C-4	Maintenance Building (Main)
1A	C-3	Preparation Plant	12B	C-4	Cylinder Storage Building
1B	C-3	Plant 1 Storage Building	12C	C-4	Lumber Storage Building
2A	B-3	Ore Refinery Plant	13A	A-3	Pilot Plant Wet Side
2B	B-3	Lime Handling Building	13B	A-3	Pilot Plant Maintenance Building
2C	B-3	Bulk Lime Handling Building	13C	A-3	Sump Pump House
2D	C-3	Metal Dissolver Building	14	A-4	Administration Building
2E	C-3	NFS Storage and Pump House	15	A-3	Laboratories
3A	B-3	Maintenance Building	16	A-5	Main Electrical Substation
3B	B-3	Ozone Building	18A	C-2	Surge Lagoon
3C	B-3	Control House	18B	B-3	General Sump
3D	B-3	NAR Towers	18C	C-4	Coal Pile Runoff Basin
3E	B-3	Hot Raffinate Building	18D	B-3	Biodenitification Towers
3F	B-3	Digestion Fume Recovery	18E	*	Storm Water Retention Basin
3G	B-3	Refrigeration Building	18F	D-1	Pit 5 Sluice Gate
3H	B-3	Refinery Sump	18G	C-1	Clearwell-Pump House
4A	B-4	Green Salt Plant	19A	C-4	Metal Tank Farm
4B	B-4	Plant 4 Warehouse	19B	A-3	Pilot Plant Ammonia Tank Farm
4C	B-4	Plant 4 Maintenance Building	20A	C-4	Valve/Control Building
5	B-4	Metals Production Plant	20B	D-4	Filter/Chemical Building
6	B-5	Metals Fabricating Plant	20C	C-4	Cooling Towers
7	B-4	Plant 7	20D	B-5	Elevated Storage Tank (Potable H_2O)
8A	B-3	Recovery Plant	20E	B-3	Well House
8B	B-3	Maintenance Building	20F	B-3	Well House
9	C-5	Special Products Plant	20G	A-2	Well House
10A	D-4	Boiler Plant	20H	D-4	Process Water Storage Tank
10B	D-4	Boiler House Maintenance Building	20J	B-2	Lime Slurry Pits
11	A-4	Service Building	22A	B-5	Gas Meter Building

Building I.D. No.	Grid Coordinates	Title	Building I.D. No.	Grid Coordinates	Title
22B	A-3	Storm Sewer Lift Station	35B	B-1	Metal Oxide Storage Tank - South
22C	A-5	Truck Scale	37	A-3	Pilot Plant Annex
23	*	Meteorological Tower	38	D-4	Propane Storage
24A	D-3	Railroad Scale House	39A	B-3	Incinerator Building
24B	C-4	Railroad Engine Building	39B	B-3	Warehouse
25A	*	Chlorination House	39C	B-3	Incinerator Building Sprinkler Riser House
25B	*	MH #175	44A	A-5	Trailer Complex - 6-Plex - East
25C	A-5	Sewage Lift Station Building	44B	A-3	Trailer Complex - 3-Plex
25D	*	U.V. Disinfection Building	44C	A-3	Trailer Complex - 7-Plex - South
25E	*	Digester Control House	44D	A-3	Trailer Complex - 7-Plex - North
26A	B-3	Pump House - H.P. Fire Protection	44E	A-4	Trailer Complex - 10-Plex
26B	B-3	Fire Protection Storage Tank	45	B-3	Building 45
26A	A-4	Security Building	46	A-5	Heavy Equipment Garage
26B	A-4	Human Resources Building	51	A-2	UF_6 to UF_4 Reduction Facility II
30A	C-3	Chemical Warehouse	53A	A-4	Health, Safety & Production Control Building
30B	C-3	Drum Storage Warehouse	53B	A-4	In-Vivo Building
31	A-5	Engine House - Garage	54A	A-3	UF_6 to UF_4 Reduction Facility I
32	D-5	Magnesium Storage	54B	A-3	Warehouse/Weather Shelter
34A	B-1	K-65 Storage Tank - North	55A	B-4	Slag Recycling Plant
34B	B-1	K-65 Storage Tank - South	55B	B-4	Slag Recycling Pit/Elevator
35A	C-1	Metal Oxide Storage Tank - North	56	D-3	CP Storage Warehouse

Building I.D. No.	Grid Coordinates	Title
60	D-3	Quonset Number 1
61	D-3	Quonset Number 2
62	D-3	Quonset Number 3
63	D-4	KC-2 Warehouse
64	D-5	Plant 9 Warehouse
65	D-5	Plant 5 Warehouse
66	C-3	Drum Reconditioning Building
67	C-3	Plant 1 Storage Building
68	A-3	Pilot Plant Warehouse
69	D-5	Decontamination Building
71	C-3	General In-Process Storage Warehouse
72	C-3	Drum Storage Building
73	*	Fire Brigade Training Center Building
77	C-5	Finished Products Warehouse
78	*	New D&D Facility (On Hold)
79	B-5	Plant 6 Warehouse
80	B-3	Plant 8 Warehouse
81	C-5	Plant 9 Warehouse
82	B-5	Receiving & Incoming Materials Inspection Area

* Outside of Perimeter Security Fence

NOTE: Any Unidentified Area is Referred to as 00 General

June 1989

ATTACHMENT 6

ARARs
FOR
PLANT 1 PAD
CONTINUING RELEASE

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Radionuclide Emissions (Except Airborne Radon-222)	40 CFR 61, Subpart H Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem per year.	Applicable	Controls will be implemented which will minimize the potential for fugitive emissions during and after the removal action. These shall include placement of a flexible membrane over part of the pad area, repair of the pad, and removal of soils consistent with the provisions of the work plan.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Radon-222 Emissions	40 CFR 61, Subpart Q No source at a DOE facility shall emit more than 20 pCi/m^2-s of Radon-222 as an average for the entire source during periods of storage and disposal.	Applicable	Pre-excavation sampling has identified no significant concentrations of radium in the proposed excavation area or underlying the Plant 1 Pad capable of producing any consequential concentrations of Radon-222.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Prevention of Air Pollution Nuisance	OAC 3745-15-07 The emission or escape into open air from any source whatsoever in such a manner or in such amounts as to endanger the health, safety, or welfare of the public or to cause unreasonable injury or damage to property shall be declared a public nuisance and is prohibited.	Applicable	During the process of removal, some potential exists for emissions of radionuclides and toxic chemicals to the air, which could endanger individuals or damage property. Controls will be in place during the removal action to effectively minimize fugitive emissions including: • wetting of dry excavation and stock piling operations, • emplacement of an erosion-control cloth over stockpile and soils, and • development of a vegetative cover over stockpile and materials.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Control of Fugitive Dust	OAC 3745-17-08 Requires the minimization or elimination of visible emissions of fugitive dust generated during grading, loading, or construction operations and other practices which emit fugitive dust.	Applicable	During the process of removal, some potential exists for emissions of radionuclides and toxic chemicals to the air, which could endanger individuals or damage property. Controls will be in place during the removal action to effectively minimize fugitive emissions including: • wetting of dry excavation and stockpiling operations, • emplacement of an erosion-control cloth over stockpile and soils, and • development of a vegetative cover over stockpile and materials.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Radiation Doses, Levels, and Concentrations in Restricted and Unrestricted Areas	10 CFR 20.101-20.105 OAC 3701-38 Radiation doses, levels, and concentrations for restricted and unrestricted areas shall not exceed specified limits.	Relevant and Appropriate	Radioactive materials can contribute radiation doses, levels, and concentrations to individuals in restricted and unrestricted areas, which could exceed the specified limits. The Health and Safety Plan outlines control procedures in place to minimize exposure to radiation.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
National Ambient Air Quality Standard for Particulate Matter	40 CFR 50.7 OAC 3745-17 Particulate emissions from a major stationary source shall not exceed 60 $\mu g/m^3$ annually or 150 $\mu g/m^3$ per 24- hour period.	Applicable	During the process of materials handling, some potential exists for fugitive emissions to open air. Controls will be in place to dampen exposed and excavated soils.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Hazardous Waste Determinations	40 CFR 260, Appendix I Outlines the procedure to be followed under: • 40 CFR 261.2 to identify whether a particular material of concern is a "solid waste"; • 40 CFR 261.4 (a) to identify whether a particular exclusion applies to the material eliminating it from definition as a "solid waste"; • 40 CFR 261.3 to identify whether a particular solid waste may be classified as a hazardous waste under Subpart C or Subpart D of 40 CFR 261; and,	Applicable	Removed or excavated materials generated will be characterized in accordance with RCRA regulations and the FMPC Waste Determination Plan.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Hazardous Waste Determinations (Continued)	• 40 CFR 261.4 (b), 40 CFR 260.20, and 40 CFR 260.22 to determine if a material, otherwise classified as a "hazardous waste" under Subpart C or Subpart D, may be excluded from RCRA jurisdiction.	Applicable	Removed or excavated materials generated will be characterized in accordance with RCRA regulations and the FMPC Waste Determination Plan.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Empty Containers	40 CFR 261.7 Containers that have held hazardous wastes are "empty" and exempt from further RCRA regulations if: • no more than 2.5 cm (one inch) of residue remains on bottom of inner liner; or • less than 3% by weight of total capacity remains (less than 110 gallon container); or • less than 0.3% by weight of total capacity remains (greater than 110 gallon container).	Applicable	Containers used to store hazardous waste from this action may contain hazardous waste residues which must be removed before the containers may be reused or disposed of.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Empty Containers (continued)	Containers that have held acutely hazardous ("p" listed) wastes are "empty" and exempt from further RCRA regulation if: • they or their inner liners have been triple rinsed with an adequate solvent and the inner liner has been removed from the container.	Applicable	Containers used to store hazardous waste from this action may contain hazardous waste residues which must be removed before the containers may be reused or disposed of.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Generators Who Treat, Store, or Dispose of Hazardous Waste On-Site	40 CFR 262.1 Any "generator", as defined by 40 CFR 260.10, who treats, stores, or disposes of hazardous wastes must do the following: - determine, in accordance with 40 CFR 262.11, whether or not the waste is hazardous; and - obtain a U.S. EPA identification number in accordance with 40 CFR 262.12 for the purposes of hazardous waste accumulation, recordkeeping, and additional reporting.	Applicable	Hazardous waste removed under this action will be stored at a HWMU listed on the latest FMPC Part A Permit application submitted.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Generators Who Transport Hazardous Waste for Off-Site Treatment, Storage or Disposal	40 CFR 262.20 - 262.23 Any generator who transports hazardous waste for offsite treatment, storage or disposal must originate and followup the manifest for offsite shipments. 40 CFR 262.30 - 262.33 Before transporting a hazardous waste the generator must package, label, mark and placard the shipment in accordance with U.S. DOT regulations.	Applicable	Hazardous waste removed under this action will be stored at a HWMU listed on the latest FMPC Part A Permit application submitted.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Waste Accumulation On-Site by Generator	40 CFR 262.34 Generators may accumulate hazardous waste on-site for 90 days or less (without meeting permitting standards for storage facilities) provided that they: • use appropriate U.S. DOT containers; • mark accumulation beginning date on tanks/containers; • label and mark tanks/ containers in accordance with U.S. DOT requirements; • placard transport vehicle or offer appropriate placards to transporter; • Follow interim status standards for less than 90 days storage including:	Applicable	Hazardous waste removed under this action, if stored prior to placement in a HWMU, will be placed in and stored in appropriate containers with the proper labels and markings.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Waste Accumulation On-Site by Generator (continued)	- weekly container and storage areas inspections - maintenance of aisle space between containers wide enough for person to walk carrying emergency equipment - maintain enough space between containers to allow for visual inspection from top and one side of all containers - put in place appropriate emergency preparedness procedures and equipment - conduct RCRA response training for personnel - put in place a written contingency plan - avoid storage of incompatible wastes in same containment area	Applicable	Hazardous waste removed under this action if stored prior to placement in a HWMU will be placed in and stored in appropriate containers with the proper labels and markings.

FEED MATERIALS PRODUCTION CENTER
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POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Generator Recordkeeping and Reporting	40 CFR 262, Subpart D 40 CFR 262.40 • Generators must keep copies for three years of the following documents: - Manifests - Biennial and exception reports - Test results, waste analyses or other determination made in accordance with 40 CFR 262.11 • Generators must submit biennial reports by March 1, of each even numbered year. • Generators must submit exception reports within 35 days of shipment.	Applicable	Hazardous waste removed under this action will be handled in a manner consistent with the RCRA requirements including appropriate information for waste determinations and preparation of reports.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment Storage, or Disposal Facility Standards	40 CFR 264, Subpart B, General Standards • Waste Analysis (40 CFR 264.13)-Operators of a facility must obtain a detailed chemical and physical analysis of a representative sample of each hazardous waste to be treated, stored, or disposed of at the facility <u>prior</u> to treatment, storage, or disposal. • Security (40 CFR 264.14)-Operators of a facility must prevent the unknowing or unauthorized entry of persons or livestock into the active portions of the facility, maintain a 24-hour surveillance system, or surround the facility with a controlled access barrier and appropriate warning signs to facility approaches.	Applicable	Hazardous waste removed under this action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment Storage, or Disposal Facility Standards (continued)	• Inspections (40 CFR 264.15)-Operators of a facility must develop a schedule and regularly inspect monitoring equipment, safety and emergency equipment, security devices and operating and structural equipment that are important to preventing, detecting or responding to environmental or human health hazards, promptly or immediately or immediately remedy defects, and maintain an inspection log. • Training (40 CFR 264.16)- Operators must train personnel within 6 months of their assumption of duties at a facility in hazardous waste management procedures relevant to their positions including emergency response training.	Applicable	Hazardous waste removed under this action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
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POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment, Storage, or Disposal Facility Preparedness and Prevention	40 CFR 264, Subpart C 40 CFR 264.31 TSD operators must design, construct, maintain and operate facilities to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste to air, soil, or surface water which could threaten human health or the environment. 40 CFR 264.32 All facilities must be equipped with an internal communications or alarm system, a telephone, or a two-way radio for calling outside emergency assistance, fire control, spill control, and decontamination equipment and water at an adequate volume and pressure to supply water hose streams,	Applicable	Hazardous waste removed under this removal action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
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POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment Storage, or Disposal Facility Preparedness and Prevention (continued)	foam producing equipment, automatic sprinklers, or water spray systems. 40 CFR 264.33 All fire and spill control and decontamination equipment must be tested and maintained as necessary to assure proper emergency operation. 40 CFR 264.34 All personnel must have immediate access to emergency communication or alarm systems whenever hazardous waste is being handled at the facility. 40 CFR 264.35 Aisle space must be sufficient to allow unobstructed movement of personnel, fire and spill control, and	Applicable	Hazardous waste removed under this removal action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment, Storage, or Disposal Facility Preparedness and Prevention (continued)	deconamination equipment. 40 CFR 264.37 Operators must attempt to make arrangements, appropriate to the waste handled, for emergency response by local and state fire, police and medical personnel.	Applicable	Hazardous waste removed under this removal action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
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PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment Storage, or Disposal Facility Contingency Plan and Emergency Procedures	40 CFR 264, Subpart D 40 CFR 264.51 Each facility operator must have a contingency plan designed to minimize hazards to human health or the environment due to fires, explosions, or any unplanned releases of hazardous waste constituents to the air, soil, or surface/groundwater. 40 CFR 264.52 - 264.53 Contingency plans should address procedures to implement a response to hazardous substance incidents, internal and external communications, arrangements with local emergency authorities, an emergency coordinator list, a facility emergency equipment list indicating equipment descriptions and	Applicable	Hazardous waste removed under this removal action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
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PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment Storage, or Disposal Facility Contingency Plan and Emergency Procedures (continued)	site as well as submitted to appropriate emergency agencies. 40 CFR 264.55 and 264.56 Each facility must have an emergency coordinator who has responsibility for coordinating all emergency response measures, is on the premises or on call at all times, is thoroughly familiar with all aspects of the contingency plan, facility operations, location and characteristics of waste handled, location of pertinent records, and facility layout, and who has the authority to commit the resources necessary to implement the contingency plan. In the event of an emergency situation, the emergency coordinator must implement emergency procedures.	Applicable	Hazardous waste removed under this removal action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

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Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment Storage, or Disposal Facility Operating Record	40 CFR 264, Subpart E 40 CFR 264.73-Operating Record requirements Operators must maintain a written operating record at the facility which contains the following: - description and quantity of each hazardous waste received; - method(s) and date(s) of treatment as required by Appendix I; - location of each hazardous waste received and quantity at each location (including a location map of disposal facility); - inspection and monitoring records; and - other records and reports as specified.	Applicable	Records on hazardous wastes resulting from this removal action which are stored will be maintained in accordance with TSD facility standards at a HWMU as designated on the latest FMPC Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

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Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Treatment, Storage, or Disposal Facility Reporting	40 CFR 264.75-.77 Facilities must submit to the appropriate authorities the following report: - Biennial reports - Reports of unmanifested wastes - Reports of releases, fires, and explosions - Groundwater monitoring data when contamination is discovered (within 7 days) - Notice of facility closure.	Applicable	Hazardous waste removed under this action will be stored (if more than 90 days) in accordance with TSD facility standards at a HWMU as designated on the latest FMPC Part A Permit application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

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PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Container Storage	Containers of RCRA hazardous waste must be: 40 CFR 264.171 OAC 3745-55-70 through -78 • Maintained in good condition; 40 CFR 264.172 • Compatible with hazardous waste to be stored; 40 CFR 264.173 • Closed during storage (except to add or remove waste); 40 CFR 264.174 • Storage areas inspected weekly for leaking and deteriorated containers and containment systems.	Applicable	Hazardous waste generated under this action will be staged and stored in containers. Storage will be at a HWMU as designated on the latest FMPC Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

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PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Container Storage (continued)	40 CFR 264.175 Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system. 40 CFR 264.177 Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier. 40 CFR 264.178 At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers, liners, bases and soils.	Applicable	Hazardous waste generated under this action will be staged and stored in containers. Storage will be at a HWMU as designated on the latest FMPC Part A Permit Application submitted and under the requirements as outlined in the Consent Decree with the State of Ohio and the proposed amendments to the Consent Decree.

FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO
POTENTIAL ARARs
PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Storage or Treatment in a Waste Pile	40 CFR 264 Subpart L Outlines the following requirements: 40 CFR 264.231, Design and operating requirements. The waste pile must be lined to prevent migration of waste out of the pile. Liner construction should be of material resistant to the waste in the pile. A base capable of supporting the waste must be provided run-on/run-off and wind dispersal must be controlled. 40 CFR 264.254, Monitoring and inspections. Inspection requirements must be outlined and include deterioration malfunctions or improper operation. Inspections must be weekly.	Applicable	This requirement would be applicable to any soil piles generated from areas characterized under the Sampling and Analysis plan as containing RCRA constituents. Implementation will include usage of an appropriate surface with a liner and berm placed on the liner. The soil pile will be covered and the cover will be anchored to control wind dispersal and run-on/run-off.

FEED MATERIALS PRODUCTION CENTER
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PLANT 1 PAD REMOVAL ACTION

Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Storage or Treatment in a Waste Pile (continued)	40 CFR 264.256, Requirements for ignitable or reactive waste. Reactive or ignitable waste will be rendered non-ignitable or unreactive prior to placement in the pile. 40 CFR 264.257, Incompatible waste will not be stored in the same pile. 40 CFR 264.258, Closure - all waste residues, contaminated containment system components, contaminated subsoils, structures and equipment will be decontaminated or removed.	Applicable	

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Chemical, Location, or Action	Requirement	ARAR/TBC	Strategy for Compliance
Radionuclide Concentrations in Restricted and Unrestricted Areas	NRC Branch Technical Position Radionuclide concentrations for restricted and unrestricted areas shall not exceed specified limits.	To Be Considered	Radioactive materials can contribute radiation doses, levels, and concentrations to individuals in restricted and unrestricted areas, which could exceed the specified limits. The BTP outlines control procedures in place to minimize radionuclide concentrations.

ATTACHMENT 7

CONSTRUCTION SPECIFICATIONS

COVERED CONTROLLED STORAGE PAD - PLANT 1
PHASES A & B
PHASES C, D, & E

COMMENTS
TO
CONSTRUCTION SPECIFICATIONS

The following constructions plans and specifications are provided for information only and are subject to change without EPA approval. The deletions and additions listed below do not alter the design criteria of the Plant 1 Pad modifications. These construction changes were driven by economic and schedule enhancements.

Deletions and Additions

Phase A/B -	Delete scabbling Delete road relocation Delete formed storm drains Replace with reinforced concrete pipe and area drain inlets
Phase C, D, E -	Delete scabbling Delete demolition of conveyor galleries

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SPECIFICATION NO. 02892-4301

CERTIFIED FOR CONSTRUCTION

SPECIFICATIONS FOR

CONSTRUCTION OF

COVERED CONTROLLED STORAGE PAD - PLANT 1

PHASES A AND B

(WBS 1.1.2.1.01)

Prepared for:

Westinghouse Materials Company of Ohio
Feed Materials Production Center
Fernald, Ohio

Contract No. N-77207

July 14, 1989

Prepared by

A. M. KINNEY, INC.
CONSULTING ENGINEERS
CINCINNATI, OHIO

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SPECIFICATION NO. 02892-4301

A. M. KINNEY, INC.

PREPARED BY L. M. Pockras - Project Engineer DATE 7-14-89

CHECKED BY J. F. Bartley - Specifications DATE 7-14-89

APPROVED BY J. H. K. Yuan - Project Manager DATE 7-14-89

WESTINGHOUSE MATERIALS COMPANY OF OHIO

APPROVED BY R. J. Skalka - Project Engineer DATE 7/18/89

APPROVED BY R. J. Skalka - Project Manager DATE 7/18/89

APPROVED BY J. E. King - Manager, Environmental Project Engineering DATE 7/18/89

DEPARTMENT OF ENERGY

APPROVED BY W. E. Pasko - Project Manager DATE 7/18/89

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SPECIFICATION NO. 02892-4301

CERTIFIED FOR CONSTRUCTION

SPECIFICATIONS FOR

CONSTRUCTION OF

COVERED CONTROLLED STORAGE PAD - PLANT 1

PHASES A AND B

(WBS 1.1.2.1.01)

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09870	EPOXY COATING - METAL SURFACES	4
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DIVISION 1

01100 - GENERAL REQUIREMENTS

01100.01 GENERAL

THESE GENERAL REQUIREMENTS FORM A PART OF ALL THE TECHNICAL DIVISIONS OF THESE SPECIFICATIONS.

A. M. KINNEY, INC. HAS PREPARED THESE SPECIFICATIONS. IN ALL CASES WHERE THE WORD "ENGINEERS" APPEARS IN THESE SPECIFICATIONS, IT SHALL BE UNDERSTOOD TO REFER TO A. M. KINNEY, INC., OR TO SUCH OTHER INDIVIDUALS OR ORGANIZATIONS ACTING WITHIN THE SCOPE OF THE SPECIFIC DUTIES ENTRUSTED TO THEM.

IN ALL CASES WHERE THE WORDS "OPERATING CONTRACTOR" APPEAR, THEY SHALL BE UNDERSTOOD TO REFER TO THE FMPC OPERATING CONTRACTOR, THE WESTINGHOUSE MATERIALS COMPANY OF OHIO.

IN ALL CASES WHERE THE WORDS "CONSTRUCTION MANAGER" APPEAR, THEY SHALL BE UNDERSTOOD TO REFER TO THE FMPC CONSTRUCTION MANAGER, THE RUST ENGINEERING COMPANY.

THE SUBCONTRACTOR SHALL PERFORM ALL CONSTRUCTION ACCEPTANCE TESTS AS COORDINATED AND SUPERVISED BY THE CONSTRUCTION MANAGER AND WITNESSED BY THE OPERATING CONTRACTOR. IN ADDITION, BEFORE THE FINAL ACCEPTANCE OF THE WORK, THE SUBCONTRACTOR SHALL PERFORM AN INTEGRATED SYSTEM CONSTRUCTION ACCEPTANCE TEST AS COORDINATED AND SUPERVISED BY THE CONSTRUCTION MANAGER AND WITNESSED BY THE OPERATING CONTRACTOR.

THE SUBCONTRACTOR SHALL PROVIDE WRITTEN PROCEDURES FOR THE CONSTRUCTION MANAGER'S REVIEW AND APPROVAL OF ALL TESTS TO BE PERFORMED AS IDENTIFIED IN THE DRAWINGS AND SPECIFICATIONS. THESE PROCEDURES SHALL PROVIDE DETAILED STEP BY STEP OPERATIONS WITH SIGN-OFF COLUMNS AND SHALL BE SUBMITTED AND APPROVED AT LEAST 30 DAYS PRIOR TO TESTING.

ALL FIELD TEST INSTRUMENTS SHALL HAVE BEEN CALIBRATED WITHIN THE LAST 12 MONTHS PRIOR TO USE ON THIS SUBCONTRACT BY A CALIBRATION LABORATORY WHOSE CALIBRATION EQUIPMENT AND INSTRUMENTS ARE FULLY TRACEABLE TO NIST STANDARDS. THE SUBCONTRACTOR SHALL PROVIDE INDIVIDUAL CERTIFICATION OF CALIBRATION AND NIST STANDARDS TRACEABILITY FOR ALL FIELD TEST INSTRUMENTS USED ON THIS SUBCONTRACT.

PROVIDE ALL FIELD LABOR AND OTHER ASSISTANCE REQUIRED BY THE ENGINEERS DURING ANY ON-SITE FIELD SERVICES BEING PERFORMED BY THE ENGINEERS.

ALL WORK SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE REQUIREMENTS OF THE OHIO BASIC BUILDING CODE, THE UNIFORM BUILDING CODE, INCLUDING REQUIREMENTS FOR SEISMIC CONSTRUCTION, ZONE 2, AND IN ACCORDANCE WITH THE REQUIREMENTS OF 29 CFR 1926 (OSHA).

01100.02 SITE AND SCOPE OF WORK

THE INTENT OF THESE SPECIFICATIONS IS TO PROVIDE ALL WORK REQUIRED AND NECESSARY TO PROVIDE THE CONSTRUCTION OF THE COVERED CONTROLLED STORAGE PAD FOR PLANT 1, PHASES A AND B, AND RELATED SYSTEMS.

THE SUBCONTRACTOR SHALL PROVIDE ALL LABOR, SERVICES, MATERIALS, AND EQUIPMENT, AND SHALL DO ALL WORK NECESSARY TO ACCOMPLISH THIS END WITHIN THE LIMITS OF WORK AS DEFINED IN THE ACCEPTED BID AND/OR CONTRACT.

01100.03 CONSTRUCTION PHASES

CONSTRUCTION OF THE COVERED CONTROLLED STORAGE PAD - PLANT 1 (A/B) SHALL BE ACCOMPLISHED IN 2 PHASES - PHASES A AND B.

PHASE A REFERS TO THE CONSTRUCTION OF A NEW PAD AS INDICATED ON DRAWING C-1, RENOVATING AND OVERLAYING A PORTION OF EXISTING PAD, AND ALL RELATED EXCAVATION, SITE WORK, TRENCH DRAINS, SUMPS, CURBS AND RAMPS, ETC.

PHASE B REFERS TO THE FURNISHING OF THREE FRAME SUPPORTED FABRIC STRUCTURES LOCATED AS SHOWN ON DRAWING C-1.

THE TWO LARGER STRUCTURES SHALL BE ERECTED IN PHASE A, WHILE THE SMALLER STRUCTURE SHALL BE ERECTED IN PHASE D AFTER COMPLETION OF PHASE D WORK UNDER OTHER SPECIFICATIONS.

THE SUBCONTRACTOR SHALL COORDINATE HIS SCHEDULES WITH THE CONSTRUCTION MANAGER FOR PHASES A AND B.

01100.04 CONTAMINATED MATERIALS

ALL CONTAMINATED MATERIALS RESULTING FROM THE DEMOLITION OPERATIONS OR CUTTING AND PATCHING OPERATIONS UNDER THIS SPECIFICATION ARE TO BE CONTAINED AS SPECIFIED IN FMPC-720.

FOR HEAVY WASTE MATERIALS SUCH AS SOIL AND CONCRETE, THE OPERATING CONTRACTOR WILL FURNISH 38 INCH HIGH BY 52 INCH WIDE BY 76 INCH LONG (INSIDE DIMENSION) CONTAINERS AT THE CONSTRUCTION SITE AND WILL REMOVE SUCH CONTAINERS FROM THE CONSTRUCTION SITE AFTER THEY HAVE BEEN FILLED TO A MAXIMUM OF 5,340 POUNDS IN ACCORDANCE WITH OPERATING CONTRACTOR'S STANDARD OPERATING PROCEDURE.

FOR LIGHTER WASTE MATERIALS SUCH AS WOOD AND SCRAP METAL, THE OPERATING CONTRACTOR WILL FURNISH "LAND/SEA CONTAINERS," AT THE CONSTRUCTION SITE WITH NOMINAL INSIDE DIMENSION OF 7-1/2 FEET BY 7-1/2 FEET BY 19, AND WILL REMOVE SUCH CONTAINERS FROM THE CONSTRUCTION SITE AFTER THEY HAVE BEEN FILLED BY THE SUBCONTRACTOR TO A MAXIMUM OF 37,000 POUNDS IN ACCORDANCE WITH OPERATING CONTRACTOR'S STANDARD OPERATING PROCEDURE.

THE SUBCONTRACTOR SHALL SIZE REDUCE WASTE MATERIALS AS REQUIRED TO FIT IN SUCH CONTAINERS.

01100.05 ASBESTOS ABATEMENT

REMOVAL AND ABATEMENT OF ASBESTOS TO CONFORM TO FMPC STANDARDS AND TO THE FOLLOWING STANDARDS:

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION - RECOMMENDATIONS FOR ASBESTOS ABATEMENT PROJECTS
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION STANDARDS 1926.58
ENVIRONMENTAL PROTECTION AGENCY - NATIONAL EMISSION STANDARDS FOR ASBESTOS

SUB-SUBCONTRACTORS, TESTING LABORATORIES AND INDUSTRIAL HYGIENISTS FOR ASBESTOS REMOVAL WORK SHALL BE LICENSED FOR ASBESTOS REMOVAL IN ACCORDANCE WITH THE LAWS OF THE STATE OF OHIO.

THE OPERATING CONTRACTOR WILL OBTAIN ALL LICENSES, PERMITS AND INSPECTIONS, AND PAY ALL FEES THEREFOR, FROM ALL FEDERAL, STATE OR LOCAL AGENCIES INVOLVED WITH THE CONTROL OF ASBESTOS MATERIALS. THE SUBCONTRACTOR SHALL OBTAIN ALL REQUIRED ASBESTOS WORK PERMITS FROM THE FMPC OPERATING CONTRACTOR.

PRIOR TO COMMENCING ANY ASBESTOS ABATEMENT WORK, THE SUBCONTRACTOR SHALL SUBMIT FOR APPROVAL A PROPOSED ASBESTOS WORK PLAN. INCLUDED IN THIS WORK PLAN SHALL BE THE SCOPE OF THE ASBESTOS WORK, THE SUBCONTRACTOR'S ABATEMENT METHODS, AIR MONITORING PROCEDURES, PROTECTION EQUIPMENT INCLUDING RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING, DOCUMENTATION OF EMPLOYEE TRAINING FOR ASBESTOS AND RESPIRATORS, AND ASBESTOS AND RESPIRATOR MEDICAL CERTIFICATION.

THE TYPE OF CONTAINMENT REQUIRED FOR THE WORK AREA SHALL BE DETERMINED BY THE SUBCONTRACTOR AND APPROVED BY THE OPERATING CONTRACTOR. CONTAINMENTS MAY REQUIRE A NEGATIVE PRESSURE VENTILATION SYSTEM WITH HEPA FILTRATION. ALL POWER TOOLS WHICH MAY RELEASE ASBESTOS FIBERS IN EXCESS OF THE PERMISSIBLE EXPOSURE CONCENTRATION SHALL BE USED IN CONJUNCTION WITH AN ASBESTOS APPROVED HEPA FILTERED EXHAUST SYSTEM TO CAPTURE GENERATED DUST.

TRANSITE REMOVAL WORK PRACTICES AND REQUIRED PROTECTIVE CLOTHING WILL BE DETERMINED ON A CASE BY CASE BASIS BY THE OPERATING CONTRACTOR. THE TRANSITE WILL BE REMOVED IN WHOLE SECTIONS (I.E. NOT BROKEN) BY UNSCREWING EACH PANEL. BEFORE REMOVING EACH SCREW, THE SCREW AREA WILL BE WET WITH WATER. EACH PANEL SHALL BE DOUBLE WRAPPED WITH 6 MIL PLASTIC AND LABELED APPROPRIATELY. PANELS MAY REQUIRE TO BE BROKEN TO FIT INTO THE WOODEN BOXES; THE BREAKING PROCEDURE SHALL TAKE PLACE ONLY AFTER THE PANEL HAS BEEN DOUBLE WRAPPED WITH 6 MIL PLASTIC.

THE OPERATING CONTRACTOR'S INDUSTRIAL HYGIENE PERSONNEL WILL PERIODICALLY MONITOR THE JOBSITE DURING THE ASBESTOS ABATEMENT WORK.

ASBESTOS REMOVED DURING CONSTRUCTION WORK TO BE ENCAPSULATED IN PLASTIC BAGS AND PLACED IN WHITE BARRELS AND BOXES FURNISHED BY THE OPERATING CONTRACTOR. THE OPERATING CONTRACTOR WILL REMOVE SUCH BARRELS AND BOXES FROM THE CONSTRUCTION SITE TO AN APPROVED ON-SITE DISPOSAL AREA.

01100.06 RESPIRATORY PROTECTION

ALL SUBCONTRACTOR PERSONNEL UTILIZING ANY FORM OF RESPIRATORY PROTECTION EQUIPMENT AT THE FMPC MUST BE PROPERLY MEDICALLY CERTIFIED, TRAINED AND FIT-TESTED BEFORE THEY MAY USE SUCH EQUIPMENT AT THE FMPC.

DOCUMENTATION OF THE RESPIRATOR TRAINING, RESPIRATOR MEDICAL CERTIFICATION, SIZE, TYPE AND MANUFACTURER OF THE RESPIRATOR FIT-TESTED MUST BE SUBMITTED BY THE SUBCONTRACTOR AND APPROVED PRIOR TO THE USE OF SUCH RESPIRATORY EQUIPMENT. THE SUBCONTRACTOR SHALL MAKE ALL ARRANGEMENTS, AND PAY ALL COSTS, TO HAVE HIS PERSONNEL EVALUATED, TRAINED, CERTIFIED AND FIT TESTED AT AN OFF-FMPC FACILITY. PERSONNEL MUST BE CERTIFIED FOR AND FIT-TESTED WITH THE SAME EQUIPMENT THEY WILL BE UTILIZING AT FMPC.

ALL RESPIRATORY EQUIPMENT USED ON THE PROJECT MUST BE NIOSH APPROVED, PROPERLY MAINTAINED, AND ADEQUATE SUPPLIES OF THE EQUIPMENT AND ALL NECESSARY SPARE PARTS MUST BE KEPT AT THE FMPC SITE.

01100.07 UTILITY OUTAGES

ALL DEMOLITION WORK OR NEW INSTALLATION WORK REQUIRING UTILITY OUTAGES OR SYSTEM SHUTDOWNS SHALL BE PERFORMED ON WEEKENDS.

01100.08 SUBMITTALS - SHOP DRAWINGS, SAMPLES AND OTHER DATA

A. GENERAL

ARTICLE SC-24 OF THE RUST SPECIAL TERMS AND CONDITIONS SHALL BE SUPPLEMENTED BY THE FOLLOWING (ANY SUBMITTALS NOT IN CONFORMANCE WITH THESE REQUIREMENTS WILL BE RETURNED WITHOUT DETAILED REVIEW FOR CORRECTION AND RESUBMITTAL):

SUBMITTALS FOR UNRELATED ITEMS SHALL NOT BE INCLUDED IN THE SAME TRANSMITTAL AND EACH SEPARATE SUBMITTAL SHALL BE COORDINATED AND SHALL INCLUDE ALL DRAWINGS AND DATA REQUIRED FOR THE ITEM OR SYSTEM COVERED.

SUBMITTALS SHALL INDICATE PROJECT NAME AND ENGINEERS' SPECIFICATION NUMBER (IF PAGES ARE SECURELY BOUND IN A BROCHURE, THIS IS NEEDED ON THE COVER ONLY) AND IDENTIFICATION BY SPECIFICATION DIVISION, SECTION, SUBSECTION, AND ARTICLE UNDER WHICH EQUIPMENT OR MATERIAL IS DESCRIBED, AND BY NAME, NUMBER AND INTENDED USE AS DESIGNATED BY CONTRACT DRAWINGS AND SPECIFICATIONS.

WHEN MORE THAN ONE ITEM OF EQUIPMENT IS INCLUDED ON A SINGLE DRAWING OR CATALOG CUT, EACH PROJECT EQUIPMENT ITEM MUST BE SEPARATELY IDENTIFIED THEREON, WITH CLEAR DELINEATION AS TO WHICH MODEL OR CATALOG NUMBER OR PERFORMANCE DATA APPLIES TO EACH PROJECT ITEM.

ASSEMBLE AND SUBMIT, IN LOGICALLY ARRANGED FOLDERS, ALL INSTRUCTION BULLETINS, DIAGRAMS, LUBRICATION SCHEDULES, OPERATING INSTRUCTIONS, PARTS LISTS AND PAMPHLETS FOR EQUIPMENT AND APPARATUS FURNISHED, INCLUDING VENDOR'S OR MANUFACTURER'S RECOMMENDED PROCEDURE FOR LIFTING, HANDLING AND INSTALLING EQUIPMENT.

SUBMITTALS FOR EQUIPMENT TO INCLUDE MANUFACTURER'S MODEL NUMBER OR CATALOG NUMBER, RATINGS, SIZE, AND PERFORMANCE CURVES AND DATA. INDICATE OPERATING POINT ON CURVES AND TABULAR DATA FOR EACH PIECE OF EQUIPMENT THAT CURVES OR DATA REPRESENT.

SUBMIT WIRING DIAGRAMS OR CONNECTION DIAGRAMS FOR EQUIPMENT ITEMS, ACCOMPANIED BY ADEQUATELY DEFINED SYMBOLS LIST. SCHEMATIC AND WIRING DIAGRAMS MUST BE PREPARED IN ACCORDANCE WITH ANSI/IEEE PUBLICATION Y32E, "ELECTRICAL AND ELECTRONICS GRAPHIC SYMBOLS AND REFERENCE DESIGNATIONS." INDIVIDUAL 8-1/2 INCH BY 11 INCH ELEMENTARY AND WIRING DRAWINGS ARE NOT ACCEPTABLE.

INDICATE ALL PERFORMANCE DATA, CONSTRUCTION MATERIAL FINISHES AND MODIFICATIONS TO MANUFACTURER'S STANDARD DESIGN SPECIFIED.

LOCATE TERMINATION POINTS FOR ALL REQUIRED EXTERNAL WIRING.

INDICATE ROUGHING-IN, FOUNDATION AND SUPPORT POINT DIMENSIONS.

THE ENGINEERS' REVIEW OF SUCH SUBMITTALS SHALL NOT RELIEVE THE SUBCONTRACTOR FROM ANY RESPONSIBILITY FOR DEVIATIONS FROM CONTRACT DOCUMENTS, UNLESS THE SUBCONTRACTOR HAS IN WRITING CALLED THE ENGINEERS' ATTENTION TO SUCH DEVIATIONS AT THE TIME OF SUBMISSION, NOR SHALL IT RELIEVE THE SUBCONTRACTOR FROM RESPONSIBILITY FOR ERRORS OF ANY SORT IN THE SUBMITTALS NOR FROM RESPONSIBILITY FOR THE PROPER FITTING AND CONSTRUCTION OF THE WORK.

SUBMITTALS WILL BE REVIEWED WITH RESPECT TO SUCH FACTORS AS QUALITY OF DRAFTSMANSHIP, LEGIBILITY, AND EVIDENCE THAT THE SUBCONTRACTOR IS AWARE OF THE NECESSITY AND IMPORTANCE OF ADEQUATELY DETAILING AND ILLUSTRATING SPECIAL FEATURES AND CONDITIONS RELATING TO THE WORK. IF THE ENGINEERS DETERMINE THAT THE DATA SUBMITTED, IN

PART OR IN WHOLE, IS NOT WITHIN THE PURVIEW OF THEIR REVIEW, SUCH SUBMITTAL, OR PART THEREOF, WILL BE RETURNED UNCHECKED. DIMENSIONS, SIZES, CONSTRUCTION DETAILS, AND DIRECTIVE NOTES SHOWN WILL BE REVIEWED FOR ACCURACY, COMPLIANCE WITH THE SPECIFICATIONS, ADEQUACY, INTERFERENCES, ETC., ON A SPOT CHECK OR INCOMPLETE BASIS TO ESTABLISH THAT THE SUBCONTRACTOR HAS GIVEN SUCH FACTORS CAREFUL ATTENTION.

ANY CHANGES MARKED ON SUBMITTALS DURING REVIEW WILL BE FOR THE PURPOSE OF INDICATING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND NO CHANGE IN THE CONTRACT AMOUNT IS AUTHORIZED BY SUCH MARKINGS.

WHEN SUBMITTALS ARE FOUND TO BE SATISFACTORY WITH RESPECT TO THE ABOVE FACTORS AND WITHIN THE SCOPE OF THE REVIEW OUTLINED ABOVE, THEY WILL BE RETURNED TO THE SUBCONTRACTOR BEARING CERTIFICATE ATTACHMENT PERMITTING THE SUBCONTRACTOR TO EMPLOY THEM IN THE FURTHERANCE OF WORK UNDER THE CONTRACT, BUT ONLY WITH THE EXPRESS UNDERSTANDING THAT SUCH PERMISSION SHALL NOT RELIEVE THE SUBCONTRACTOR OF RESPONSIBILITIES FOR THE FULL PERFORMANCE OF THE WORK REQUIRED UNDER THE CONTRACT IN CONFORMANCE WITH THE CONTRACT DOCUMENTS GOVERNING SUCH PERFORMANCE, NOR FOR ANY OTHER DEFICIENCIES IN THE SUBMITTALS SUCH AS INACCURACIES, DISCREPANCIES, OMISSIONS, INTERFERENCES IN THE WORK ITSELF, OR WITH THE WORK OF OTHER SUBCONTRACTORS WHETHER OR NOT SUCH DEFICIENCIES WERE OBSERVED OR NOTED IN THE COURSE OF THE REVIEW OF THE SHOP DRAWINGS.

THE SUBCONTRACTOR SHALL VERIFY ALL FIELD DIMENSIONS REQUIRED FOR SHOP DRAWINGS.

B. SUBMITTALS REQUIRED

SUBMITTALS REQUIRED INCLUDE DRAWINGS AND/OR DATA FOR ALL ITEMS AS LISTED. REFER TO THE VARIOUS TECHNICAL DIVISIONS FOR ADDITIONAL REQUIREMENTS:

"A" DESIGNATES SHOP DRAWINGS AND PERTINENT PERFORMANCE DATA AND CURVES ARE REQUIRED.

"B" DESIGNATES CATALOG DATA AND PERTINENT PERFORMANCE DATA AND CURVES ARE REQUIRED.

"C" DESIGNATES THAT THESE ITEMS ARE TO BE INCLUDED ON A LISTING GIVING MANUFACTURER AND BRIEF TYPE DESCRIPTION FOR EACH ITEM. SUCH LISTING SHALL BE SUBMITTED NOT LATER THAN 30 DAYS AFTER NOTICE TO PROCEED. NOTE THAT SHOP DRAWINGS OR CATALOG DATA MAY ALSO BE REQUIRED FOR ITEMS INCLUDED ON THIS LIST.

"D" DESIGNATES SAMPLES OF FINISHES ARE REQUIRED WITH FULL RANGE OF COLOR CHOICES AND/OR PATTERNS SUBMITTED.

"E" DESIGNATES PHYSICAL SAMPLES OF MATERIALS ARE REQUIRED.

"F" DESIGNATES INDIVIDUAL CERTIFICATIONS FOR CONFORMITY TO QUALIFICATIONS AND STANDARDS SPECIFIED ARE REQUIRED. FOR EQUIPMENT ITEMS, THIS INDICATES CERTIFIED EQUIPMENT DRAWINGS ARE TO BE SUBMITTED.

"G" DESIGNATES THAT THE TECHNICAL SPECIFICATIONS CONTAIN SPECIFIC SUBMITTAL REQUIREMENTS.

"H" DESIGNATES ENGINEERING CALCULATIONS ARE REQUIRED.

"I" DESIGNATES SPARE PARTS LIST IS REQUIRED.

"J" DESIGNATES INSTALLATION, OPERATION AND MAINTENANCE MANUAL IS REQUIRED.

"K" INDICATES THAT MANUFACTURER'S MATERIAL SAFETY DATA SHEETS ARE REQUIRED.

"L" INDICATES THAT TEST REPORTS ARE REQUIRED FOR TESTS NOTED IN THE TECHNICAL SPECIFICATIONS. SUCH REPORTS MUST BE RECEIVED BY THE CONSTRUCTION MANAGER WITHIN ONE WEEK OF THE TEST.

"M" INDICATES THAT WIRING DIAGRAMS FOR POWER SIGNAL, AND CONTROL WIRING ARE REQUIRED.

"N" INDICATES THAT SCHEMATIC PIPING DIAGRAMS, WITH SIZES AND COMPONENTS SHOWN, ARE REQUIRED.

PROVIDE ALL SUBMITTALS TABULATED IN ATTACHMENT NO. 1 TO THIS SECTION.

01100.09 SPECIFICATION EXPLANATION

A. GENERAL

THE TECHNICAL SPECIFICATIONS ARE OF THE ABBREVIATED, SIMPLIFIED OR STREAMLINED TYPE AND INCLUDE INCOMPLETE SENTENCES. OMISSIONS OF WORDS OR PHRASES SUCH AS "THE SUBCONTRACTOR SHALL," "IN CONFORMITY THEREWITH," "SHALL BE," "AS NOTED ON THE DRAWINGS," "ACCORDING TO THE PLANS," "A," "THE," AND "ALL" ARE INTENTIONAL. OMITTED WORDS OR PHRASES SHALL BE SUPPLIED BY INFERENCE IN THE SAME MANNER AS THEY ARE WHEN A "NOTE" OCCURS ON THE DRAWINGS.

THE SUBCONTRACTOR SHALL PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS OR METHODS LISTED, MENTIONED, OR SCHEDULED EITHER ON THE DRAWINGS, OR SPECIFIED HEREIN, OR BOTH, INCLUDING ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS NECESSARY AND REQUIRED FOR THEIR COMPLETION AND INSTALLATION.

FOR CONVENIENCE OF REFERENCE AND TO FACILITATE THE LETTING OF CONTRACTS, THE SPECIFICATIONS MAY BE SEPARATED INTO TITLED DIVISIONS. SUCH SEPARATIONS, HOWEVER, SHALL NOT OPERATE TO MAKE THE ENGINEERS ARBITRATORS TO ESTABLISH THE LIMITS OF SUB-SUBCONTRACTS IN ANY MANNER. THE FOLLOWING DEFINES THE SEPARATIONS REFERRED TO IN THE SPECIFICATIONS:

DIVISION	-	SEPARATE NUMBERED DIVISION OF SPECIFICATIONS (E.G., DIVISION 16)
SECTION	-	SEPARATE NUMBERED SECTION OF A DIVISION (E.G., SECTION 16020)
SUBSECTION	-	SEPARATE NUMBERED SUBSECTION OF A SECTION (E.G., SUBSECTION 16020.01)
ARTICLE	-	SEPARATE LETTERED ARTICLE OF A SUBSECTION (E.G., ARTICLE A)

B. DEFINITIONS

CERTAIN TERMS AND WORDS AS USED THROUGHOUT THE SPECIFICATIONS SHALL BE DEFINED AS FOLLOWS, UNLESS OTHERWISE PARTICULARLY SPECIFIED:

"PROVIDE." FURNISH AND INSTALL, COMPLETE, IN PLACE.
"INDICATED." AS SHOWN ON THE DRAWINGS AND/OR SPECIFIED.
"DIRECTED," "AUTHORIZED," "PERMITTED." SHALL BE AS DIRECTED, AUTHORIZED, OR PERMITTED BY THE CONSTRUCTION MANAGER.
"SELECTED." SHALL BE AS SELECTED BY THE CONSTRUCTION MANAGER.
"SATISFACTORY," "ACCEPTABLE." SATISFACTORY OR ACCEPTABLE TO THE CONSTRUCTION MANAGER.
"NECESSARY," "REQUIRED," "SUITABLE." AS NECESSARY, REQUIRED, OR SUITABLE FOR THE INTENDED PURPOSE AS DETERMINED BY THE CONSTRUCTION MANAGER.
"SUBMIT." SUBMIT TO THE CONSTRUCTION MANAGER UNLESS OTHERWISE SPECIFIED.

IN ALL CASES WHERE THE WORDS "OR EQUAL" APPEAR IN THESE SPECIFICATIONS, THEY SHALL BE UNDERSTOOD TO MEAN "OR APPROVED EQUAL."

01100.10 ABBREVIATIONS FOR REFERENCED STANDARDS AND SPECIFICATIONS

THE FOLLOWING LIST DENOTES ABBREVIATIONS USED IN THE TECHNICAL PORTIONS OF THESE SPECIFICATIONS:

ABBREVIATIONS	AUTHORITY
ACI	AMERICAN CONCRETE INSTITUTE
ACPA	AMERICAN CONCRETE PIPE ASSOCIATION
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ABBREVIATIONS	AUTHORITY
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
CRSI	CONCRETE REINFORCING STEEL INSTITUTE
FM	FACTORY MUTUAL SYSTEM
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NESC	NATIONAL ELECTRICAL SAFETY CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIST	NATIONAL INSTITUTE FOR STANDARDS AND TECHNOLOGY (FORMERLY NATIONAL BUREAU OF STANDARDS)
OBBC	OHIO BASIC BUILDING CODE
ODOT	STATE OF OHIO, DEPARTMENT OF TRANSPORTATION
OSHA	FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS
PCA	PORTLAND CEMENT ASSOCIATION
SSPC	STEEL STRUCTURES PAINTING COUNCIL
UL	UNDERWRITERS LABORATORIES INC.

01100.11 MAINTENANCE OF TRAFFIC

ARTICLE SC-19 OF THE RUST "SPECIAL TERMS AND CONDITIONS" SHALL BE SUPPLEMENTED BY THE FOLLOWING:

ANY EXISTING STREETS AND ROADWAYS BEING CUT OR BRIDGED BY THESE CONSTRUCTION OPERATIONS MUST HAVE AT LEAST ONE LANE OF TRAFFIC MAINTAINED AT ALL TIMES DURING REGULAR FIRST-SHIFT WORKING HOURS. FOR SECOND AND THIRD SHIFT HOURS, ANY TRENCHES OR EXCAVATIONS SHALL BE COVERED WITH A SUITABLY SIZED STEEL PLATE(S) TO MAINTAIN TRAFFIC IN BOTH DIRECTIONS.

01100.12 CLEANING UP

ARTICLE A-26 OF THE RUST "GENERAL TERMS AND CONDITIONS" SHALL BE SUPPLEMENTED BY THE FOLLOWING:

THE SUBCONTRACTOR SHALL, UPON COMPLETION AND ACCEPTANCE OF THE WORK, TURN OVER TO THE OPERATING CONTRACTOR ALL PERMANENT WORK FURNISHED AND PREFORMED UNDER THIS SUBCONTRACT IN A THOROUGHLY CLEANED AND WORKMANLIKE CONDITION, FREE FROM ANY DIRT, GRIT, OIL, PAINT, AND OTHER FORMS OF SOILAGE, AND READY FOR THE OPERATING CONTRACTOR'S USE IN EVERY RESPECT.

01100.13 COST BREAKDOWN

AS PART OF THE SUBCONTRACTOR'S RESPONSIBILITIES UNDER ARTICLE A.14 OF THE RUST "GENERAL TERMS AND CONDITIONS," THE SUBCONTRACTOR SHALL, WITHIN 10 DAYS AFTER NOTICE TO PROCEED, SUBMIT A COST BREAKDOWN ALLOCATING THE TOTAL CONTRACT AMOUNT INTO THE VARIOUS CATEGORIES SHOWN ON ATTACHMENT NO. 2 TO THIS SECTION. THIS COST BREAKDOWN IS FOR THE USE OF THE OPERATING CONTRACTOR, AND IS IN ADDITION TO ANY COST BREAKDOWN REQUESTED BY THE CONSTRUCTION MANAGER FOR PAYMENT REQUEST PURPOSES. ATTACHMENT NO. 2 SHALL NOT BE USED FOR INVOICING PURPOSES.

SUBMITTAL LISTING

MATERIAL/EQUIP'T/ITEM DESCRIPTION	SHOP DWGS A	CAT./ CURVES B	LIST ONLY C	FIN. SMPL D	PHYS SMPL E	MAT/PER CERTIF. F	TECH SPECS G	ENG'G CALCS H	PARTS LIST I	IOM MNLS J	M.S. D.S. K	TEST REPT L	WIRING DIAGRM M	PIPING DIAGRM N
SECTION NO.:02050														
DEMOLITION PLAN							G							
SECTION NO.:02100														
CHEMICALS											K			
FENCING	A													
MATERIALS AND ACCESSORIES		B												
TESTS												L		
SECTION NO.:03300														
CONCRETE WORK (COMPLETED)						F								
MATERIALS						F								
MIX DESIGN							G							
REINFORCING STEEL	A													
TESTS												L		
SECTION NO.:05500														
BOLLARDS & POSTS	A													
GRATING	A													
SHOP PRIMER						F								
SECTION NO.:09701														
APPLICATION INSTRUCTIONS							G							
BASE SLAB MOISTURE CONDITIONS						F	G							
INSTALLATION CONDITIONS						F	G							
INSTALLATION LIST							G							
MANUFACTURER'S SPECIFICATIONS		B					G							
PRE-INSTAL. INSPECTION REPORT							G							
PRODUCT SAFETY INFORMATION											K			
SAMPLE PANELS							G							
SPECIAL WARRANTY							G							
TESTS												L		
SECTION NO.:09702														
APPLICATION INSTRUCTIONS							G							
BASE SLAB MOISTURE CONDITIONS						F	G							
INSTALLATION CONDITIONS						F	G							
INSTALLATION LIST							G							
MANUFACTURER'S SPECIFICATIONS		B					G							
PRE-INSTAL. INSPECTION REPORT							G							
PRODUCT SAFETY INFORMATION											K			
SAMPLE PANELS							G							

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.BMITTAL LISTING

MATERIAL/EQUIP'T/ITEM DESCRIPTION	SHOP DWGS A	CAT./ CURVES B	LIST ONLY C	FIN. SMPL D	PHYS SMPL E	MAT/PER CERTIF. F	TECH SPECS G	ENG'G CALCS H	PARTS LIST I	IOM MNLS J	M.S. D.S. K	TEST REPT L	WIRING DIAGRM M	PIPING DIAGRM N
SECTION NO.:09702														
SPECIAL WARRANTY							G							
TESTS												L		
SECTION NO.:09870														
EPOXY COATING MATERIALS		B		D							K			
SECTION NO.:09900														
PAINTING		B		D			G				K			
SECTION NO.:10400														
BUILDING SIGN	A	B												
DOOR SIGNS			C											
SECTION NO.:13120														
STRUCTURES & ALL COMPONENTS	A	B		D	E		G	H						
SECTION NO.:16010														
TESTS							G					L		
SECTION NO.:16307														
MOLDED CASE CIRCUIT BREAKERS		B												
PANELBOARD		B												
TRANSFORMER - L. V. DRY TYPE		B												
SECTION NO.:16400														
CONDUIT FITTINGS						F								
CONDUIT, RIGID STEEL						F								
GROUNDING MATERIALS						F								
LIQUIDTIGHT FLEX. STL CONDUIT						F								
WIRE & CABLE 600 VOLTS & BELOW						F								
WIRING DEVICES		B												
SECTION NO.:16500														
BALLASTS						F								
LAMPS						F								
LUMINAIRES (EACH TYPE)		B				F								

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SPEC. 02892-4301
JULY 14, 1989

ATTACHMENT NO. 2 TO SECTION 01100

COST BREAKDOWN FOR ESTIMATE RECONCILIATION

COVERED CONTROLLED STORAGE PAD, PLANT 1

PHASES A AND B

ITEM NO.	COST/CONTRACT ITEM	LABOR AND MATERIALS, TOTAL PER ITEM
1.	GENERAL - PRIME AND GEN. CONDITIONS	$_____
2.	CONCRETE RESTORATION	$_____
3.	FRAME SUPPORTED STRUCTURE	$_____
4.	ELECTRICAL	$_____
		_____
	TOTAL CONTRACT AMOUNT	$_____

1. BREAKDOWN MUST EQUAL THE SUBCONTRACTOR'S TOTAL CONTRACT AMOUNT. CONTINGENCY, ESCALATION, OVERHEAD, PROFIT AND BONDING SHALL BE PROPORTIONATELY SPREAD AMONG THE ITEMS.

2. ITEMS 2 THROUGH 4 ARE CONSIDERED AS SUB-SUBCONTRACTS UNDER ITEM 1. ANY ADDITIONAL SUB-SUBCONTRACTS NOT SHOWN ARE TO BE INCLUDED WITH ITEM 1. ANY ADDITIONAL LEVELS OF SUB-SUBCONTRACTING NOT SHOWN ARE TO BE INCLUDED WITH THE LEVEL IMMEDIATELY ABOVE.

DIVISION 1

01101 - SCHEDULE OF DRAWINGS

01101.01 DRAWINGS

THE FOLLOWING DRAWINGS ARE HEREBY MADE A PART OF THIS CONTRACT:

FMPC DWG. NO.	AMK SHEET NO.	TITLE	REV.	DATE
74B-4445-X-00063	X-1	COVER SHEET	0	7-14-89
74B-4445-C-00064	C-1	CONSTRUCTION PHASING	0	7-14-89
74B-4445-C-00065	C-2	PHASE A - PAD EXTENSION	0	7-14-89
74B-4445-C-00066	C-3	PHASE B - FABRIC STRUCTURES	0	7-14-89
74B-4445-C-00068	C-5	SITE DETAILS	0	7-14-89
74B-4445-E-00069	E-1	ELECTRICAL SITE PLAN	0	7-14-89
74B-4445-E-00070	E-2	ELECTRICAL DEMOLITION PLAN	0	7-14-89
74B-4445-E-00071	E-3	ELECTRICAL DETAILS	0	7-14-89
74B-4445-P-00072	P-1	SITE DRAINAGE	0	7-14-89

DIVISION 2

02050 - DEMOLITION

02050.01 SCOPE OF WORK

A. WORK SPECIFIED UNDER THIS SECTION

PROVIDE ALL NECESSARY LABOR, MATERIALS, TOOLS, DEVICES AND EQUIPMENT, REQUIRED TO COMPLETE THE FOLLOWING DEMOLITION WORK:

COORDINATE REMOVAL OF EXISTING CONCRETE PAD AND CURBS, REMOVAL OF EXISTING FENCING, AND REMOVAL OF EXISTING UTILITY POLES

PROVIDE DEMOLITION PLAN AND SCHEDULE GIVING SPECIAL ATTENTION TO RELOCATION OF EXISTING STORED ITEMS BY OPERATING CONTRACTOR

ALL DEMOLITION WORK SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT FMPC OPERATING PROCEDURES, INCLUDING THOSE FOR DEMOLITION OF CONTAMINATED MATERIALS.

A WRITTEN PLAN FOR THE DEMOLITION OF THE EXISTING FACILITIES SHALL BE SUBMITTED TO AND APPROVED BY THE CONSTRUCTION MANAGER PRIOR TO THE INITIATION OF ANY SUCH OPERATIONS. SUCH PLAN SHALL INCLUDE ABATEMENT METHODS, AIR MONITORING PROCEDURES, PROTECTION EQUIPMENT INCLUDING RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING, AND A TRAINING PROGRAM FOR SUBCONTRACTOR'S EMPLOYEES.

B. RELATED WORK INCLUDED UNDER OTHER SECTIONS

PAINTING OF NEW WORK
REMOVAL OF FENCING AND UTILITY POLES

02050.02 PROTECTION FROM DEMOLITION OPERATIONS

A. FIRE PROTECTION

WHENEVER A CUTTING TORCH OR OTHER EQUIPMENT THAT MIGHT CAUSE A FIRE IS USED, PROVIDE AND MAINTAIN FIRE EXTINGUISHERS AND OTHER FIRE FIGHTING EQUIPMENT AS REQUIRED BY THE CONSTRUCTION MANAGER AND THE FMPC OPERATING CONTRACTOR.

AN FMPC WORK PERMIT IS REQUIRED PRIOR TO ANY FLAME CUTTING OR WELDING OPERATION.

B. BARRIERS

PROVIDE SAFEGUARDS, INCLUDING WARNING SIGNS, BARRICADES AND PROTECTION REQUIRED TO PROTECT EXISTING CONSTRUCTION AND EQUIPMENT, AND TO PROTECT PEDESTRIANS AND VEHICULAR TRAFFIC FROM FALLING MATERIAL. PROTECT FMPC PROPERTY AT ALL TIMES.

02050.03 COORDINATION

A. OTHER SUBCONTRACTORS

COORDINATE WORK WITH OTHER SUBCONTRACTORS AND AFFORD THEM REASONABLE OPPORTUNITY TO COMPLETE THEIR WORK.

B. FMPC OPERATIONS

CONDUCT ALL WORK SO AS NOT TO INTERFERE WITH NORMAL OPERATIONS OF THE FMPC. ACCESS TO THE ENTRANCES OF EXISTING BUILDINGS MUST BE MAINTAINED AT ALL TIMES.

02050.04 WORKMANSHIP

CAREFULLY REMOVE ALL MATERIALS.

PROVIDE ALL REQUIRED BRACING, SHORING AND SUPPORTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR THE STRUCTURAL ADEQUACY OF ALL WORK.

BURNING OF WASTE MATERIALS IS PROHIBITED.

EXERCISE EXTREME CARE IN DEMOLITION AND REMOVAL WORK FOR SAFETY OF PERSONNEL AND SO AS NOT TO DAMAGE ADJACENT CONSTRUCTION. REPAIR ALL DAMAGE TO FMPC PROPERTY, MATERIALS OR EQUIPMENT AS REQUIRED.

THE SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ANY AUXILIARY STRUCTURAL STEEL REQUIRED TO SUPPORT EXISTING COMPONENTS DURING DEMOLITION OPERATIONS. THE DESIGN OF ENCLOSURES NECESSARY TO CONTROL OR CONTAIN EMISSIONS, OR AFFORD WEATHER PROTECTION, IS ALSO THE RESPONSIBILITY OF THIS SUBCONTRACTOR.

SEGREGATION AND HANDLING OF DEMOLISHED MATERIALS SHALL BE PERFORMED IN ACCORDANCE WITH FMPC-720, CONTROL OF CONSTRUCTION WASTE.

REMOVE AND CAREFULLY LOWER HEAVY ITEMS, IN ACCORDANCE WITH OSHA REQUIREMENTS FOR CRANE AND HOIST OPERATIONS.

02050.05 DISPOSITION OF MATERIALS

ALL MATERIALS AND ITEMS REMOVED SHALL BE DISPOSED OF ON THE FMPC RESERVATION AS DIRECTED BY THE CONSTRUCTION MANAGER.

02050.06 CLEANUP

PROMPTLY REMOVE FROM THE SITE, ON A DAILY BASIS, ALL DEBRIS RESULTING FROM OPERATIONS UNDER THIS SPECIFICATION.

AT THE CONCLUSION OF ALL WRECKING AND REMOVAL WORK, REMOVE FROM THE PREMISES ANY REMAINING DEBRIS AND ALL EQUIPMENT USED FOR WRECKING AND REMOVAL WORK, AND LEAVE THE PREMISES CLEAN.

DIVISION 2

02100 - SITE PREPARATION, EARTHWORK AND APPURTENANT WORK

02100.01 SCOPE OF WORK

A. WORK SPECIFIED UNDER THIS SECTION

PERFORM ALL WORK SPECIFIED HEREIN AS INDICATED. THIS WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

REMOVAL OF EXISTING FENCING
STRIPPING
EXCAVATING TO GRADE
EXCAVATING AND BACKFILLING FOR FOUNDATIONS
PROVIDING FINISH LOAD-BEARING SUBGRADES FOR FOUNDATIONS, AND PAVEMENTS
DISPOSAL OF REMOVED MATERIALS
LABORATORY DENSITY TESTING
FINISH SITE GRADING
STONE TOPPING
GRAVEL PAVEMENT

DRAWINGS INDICATE APPROXIMATE LOCATION OF KNOWN UNDERGROUND UTILITIES AND SERVICES. WHERE ANY INTERFERENCE IS ENCOUNTERED, WHETHER OR NOT SHOWN, REPORT TO CONSTRUCTION MANAGER AND PROCEED AS DIRECTED. WHERE DAMAGED, RESTORE FACILITIES TO THEIR ORIGINAL UNDAMAGED CONDITION.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

EARTHWORK FOR ELECTRICAL AND MECHANICAL WORK

02100.02 DENSITY CONTROL

A. TESTS

WHERE DENSITY OR DEGREE OF COMPACTION OF A SOIL IS HEREINAFTER SPECIFIED AS A PERCENTAGE, IT REFERS TO PERCENTAGE OF MAXIMUM DENSITY OF THAT SOIL, AS DETERMINED BY TESTS THEREON PERFORMED IN THE LABORATORY, IN ACCORDANCE WITH AASHTO STANDARD METHOD T-99 OR ASTM D 698, METHOD A OR D AS APPLICABLE.

TESTS FOR DENSITY AND MOISTURE OF SOIL IN PLACE TO CONFORM TO EITHER ASTM D 2922, ASTM D 3017, AASHTO T-191 OR AASHTO T-205.

THE DENSITIES SPECIFIED ARE TO HAVE MOISTURE CONTENT WITHIN PLUS OR MINUS 3 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE LABORATORY.

B. LABORATORY

THE CONSTRUCTION MANAGER WILL ARRANGE AND PAY FOR SERVICES OF AN INDEPENDENT LABORATORY, HEREINAFTER REFERRED TO AS THE LABORATORY, TO PERFORM NECESSARY QUALITY CONTROL TESTING FOR EARTHWORK.

C. MATERIAL SAMPLES

COOPERATE WITH LABORATORY PERSONNEL IN OBTAINING SAMPLES, AND DURING QUALITY CONTROL TESTING.

02100.03 HAUL AND ACCESS ROADS

MAINTAIN EXISTING ROADS, USED DURING CONSTRUCTION, IN A CLEAN CONDITION, FREE OF MUD AND DEBRIS. LEAVE ALL ROADS IN CONDITION FOUND AT BEGINNING OF CONTRACT.

02100.04 SITE CONDITIONS

A. INTERFERENCES - UNDERGROUND

EXISTING SERVICES ARE OF VITAL IMPORTANCE TO THE EXISTING FACILITY. IN PROVIDING PROTECTION, TAKE EVERY PRECAUTION TO ENSURE AGAINST DAMAGE TO SUCH SERVICES BY OPERATIONS UNDER THIS SECTION.

WHERE WORK IS REQUIRED IN VICINITY OF EXISTING UNDERGROUND SERVICES, THE USE OF POWER EXCAVATING EQUIPMENT BELOW 6 INCHES ABOVE TOP OF SUCH SERVICES WILL NOT BE PERMITTED. PERFORM WORK OF EXCAVATION AND BACKFILL SO AS TO AVOID DAMAGE TO SUCH SERVICES.

B. SPECIAL PRECAUTIONS

PROVIDE ALL BARRICADES AND PROTECTION REQUIRED TO PROTECT EXISTING UTILITIES, CONSTRUCTION, AND EQUIPMENT, AND TO PROTECT PEDESTRIAN AND VEHICULAR TRAFFIC. PROTECT OPERATING CONTRACTOR'S PROPERTY AT ALL TIMES. MAINTAIN VEHICLE ACCESS, WHEN TRENCHING ACROSS PAVEMENT, AS SPECIFIED IN SECTION 01100.

C. PATCHING

REPAIR OR REPLACE ALL EXISTING SERVICES OR OTHER ITEMS OF PROPERTY REMOVED, DISTURBED, OR INJURED DURING OPERATIONS UNDER THIS SECTION AND NOT SPECIFIED OR SHOWN TO BE REMOVED OR OCCUPIED BY NEW STRUCTURES. THESE ARE TO MATCH IN MATERIAL, QUALITY, DIMENSIONS AND APPEARANCE, REMAINING ADJACENT INSTALLATION OR THE ORIGINAL INSTALLATION PRIOR TO DAMAGE.

02100.05 WATER CONTROL

CONDUCT EARTHWORK OPERATIONS UNDER THIS DIVISION TO ENSURE AGAINST RAINWASH AND THE SILTING OF ADJOINING AREA PROPERTY RESULTING THEREFROM. PROVIDE SILT FENCES AROUND INLETS. SHOULD SUCH SILTING OCCUR, RESTORE SUCH AREA TO LINES, GRADES, AND CONDITIONS SHOWN AND SPECIFIED.

PERFORM ALL EARTHWORK IN THE DRY. PRIOR TO INITIATING ANY EXCAVATION, PROVIDE DEWATERING EQUIPMENT AT SITE OF ACCEPTABLE TYPE, CONDITION AND CAPACITY, AND MAINTAIN IN CONDITION FOR IMMEDIATE USE WHEN CONDITIONS WARRANT.

KEEP EXCAVATIONS DRY BY PUMPING OR OTHER ACCEPTABLE MEANS AND METHODS. PLACE DEWATERING FACILITIES IN OPERATION AS SOON AS CONDITIONS WARRANT, OR WHEN DIRECTED. MAINTAIN IN OPERATION ON A 24 HOUR BASIS IF NECESSARY, INCLUDING WEEKENDS AND HOLIDAYS, UNTIL DANGER OF PONDING WATER IN THE AFFECTED AREA IS PAST.

SHOULD THE SUBCONTRACTOR FAIL TO PROMPTLY INITIATE DEWATERING PROCEDURES WHEN DIRECTED, THE RIGHT IS RESERVED TO HAVE THE WORK PERFORMED BY OTHERS AT SUBCONTRACTOR'S EXPENSE.

CONTROL GRADES IN VICINITY OF EXCAVATIONS TO PREVENT SURFACE WATER RUNNING INTO EXCAVATED AREAS.

02100.06 SOIL MATERIALS

A. SUITABLE MATERIALS

SUITABILITY OF MATERIALS FOR PROVIDING SUBGRADES OR FOR USE IN CONSTRUCTING SUBGRADES AND FILL SHALL BE DETERMINED BY THE LABORATORY.

B. UNSUITABLE MATERIALS

DO NOT USE ANY OF THE FOLLOWING MATERIALS FOR LOAD-BEARING SUBGRADES OR FOR CONSTRUCTION OF SUBGRADES, OR FILLS, UNLESS SPECIFICALLY AUTHORIZED:

ROCK AND/OR CONCRETE PIECES LARGER THAN 2 INCHES IN MAJOR DIMENSIONS
MATERIALS THAT ARE FROZEN
MATERIALS CONTAINING MORE MOISTURE THAN WILL PERMIT SPECIFIED DEGREE OF COMPACTION AS DETERMINED BY LABORATORY
MATERIALS CONTAINING DEBRIS OR UNACCEPTABLE PROPORTIONS OF ORGANIC MATERIALS AS DETERMINED BY LABORATORY
MATERIALS CLASSIFIED BY ASTM D 2487 AS CH, MH, ML, OH, OL OR PT

C. GRANULAR MATERIALS

WHERE A MATERIAL IS HEREINAFTER REFERRED TO AS "GRANULAR," IT DESIGNATES A MATERIAL CLASSIFIED AS GW, GP, SW, GM, GC OR SP, AS DEFINED IN ASTM D 2487.

D. BANK RUN GRAVEL

WHERE BANK RUN GRAVEL IS HEREINAFTER REFERRED TO, IT MEANS A NATURAL GRAVEL, 100 PERCENT PASSING THE 2 INCH SIEVE, NOT LESS THAN 70 PERCENT RETAINED ON THE NO. 8 SIEVE, AND NOT MORE THAN 5 PERCENT PASSING THE 200 MESH SIEVE.

E. GRANULAR BASE MATERIAL

NATURAL GRAVEL OR CRUSHED STONE CONFORMING TO FOLLOWING GRADATION:

SIEVE SIZE	PERCENT PASSING
1-1/2 INCH	100
3/4 INCH	55-100
NO. 4	20-65
NO. 10	10-40
NO. 40	0-15
NO. 200	0-5

F. TOPSOIL

LOOSE, FRIABLE AND LOAMY MATERIAL WITHOUT ADMIXTURES OF SUBSOIL, REFUSE OR ANY FOREIGN MATERIALS, CONTAINING AT LEAST 5 PERCENT, BUT NOT MORE THAN 20 PERCENT ORGANIC MATTER, FREE FROM STUMPS, ROOTS, HARD DIRT, STIFF CLAY, LARGE ROCKS, WEEDS, BRUSH AND SIMILAR MATERIALS.

02100.07 DISPOSAL OF MATERIAL

A. DEBRIS

REMOVED DEBRIS, VEGETATION, UNSUITABLE SOIL AND TRASH SHALL BE DISPOSED OF AS DIRECTED BY THE CONSTRUCTION MANAGER.

B. TOPSOIL

DEPOSIT REMOVED MATERIALS SUITABLE FOR TOPSOIL IN TEMPORARY STOCKPILES ON SITE IN LOCATIONS AS AUTHORIZED OR DIRECTED.

C. SUITABLE MATERIALS

DEPOSIT REMOVED SUITABLE MATERIALS NOT IN EXCESS OF REQUIREMENTS EITHER DIRECTLY ON SUBGRADES PREPARED TO RECEIVE FILL OR IN TEMPORARY STOCKPILES ON SITE WHERE AUTHORIZED OR DIRECTED.

D. STOCKPILES

DEPOSIT MATERIALS STOCKPILED FOR REUSE IN AUTHORIZED LOCATIONS ON SITE AND NOT ABOVE ELEVATIONS AUTHORIZED. SPREAD MATERIALS IN A MANNER WHICH WILL PERMIT REUSE. SLOPE AND COMPACT AS NECESSARY TO ENSURE AGAINST RAINWASH.

E. UNAUTHORIZED PLACEMENT

WHEN SO DIRECTED, PROMPTLY REMOVE ANY SPOIL OR STOCKPILE MATERIALS PLACED IN UNAUTHORIZED LOCATIONS OR TO UNAUTHORIZED ELEVATIONS. SHOULD THE SUBCONTRACTOR FAIL TO REMOVE SUCH MATERIALS WITH REASONABLE PROMPTNESS, THE CONSTRUCTION MANAGER RESERVES THE RIGHT TO HAVE SUCH MATERIALS REMOVED AT SUBCONTRACTOR'S EXPENSE.

02100.08 CLEARING AND GRUBBING

A. MISCELLANEOUS MATERIAL

REMOVE ALL EXISTING MISCELLANEOUS MATERIALS ENCOUNTERED, INCLUDING, BUT NOT LIMITED TO:

EXPOSED OR BURIED DEBRIS
FOUNDATIONS
SIMILAR MATERIALS NOT OTHERWISE SHOWN OR SPECIFIED TO BE REMOVED OR RETAINED

B. VEGETATION

REMOVE FROM WITHIN THE GRADING AREA ANY EXISTING VEGETATION. GRUB THE AREA, REMOVING STUMPS AND ROOTS LARGER THAN 2 INCHES IN DIAMETER TO A DEPTH OF 2 FEET BELOW FINISH GRADES.

C. PAVEMENTS

REMOVE PAVING MATERIALS FROM AREAS INDICATED, OR ELSEWHERE AS NECESSARY FOR NEW WORK.

WHERE PORTIONS OF EXISTING PAVEMENTS ARE SHOWN TO REMAIN OR TO FORM BASE OF OVERLAYS, CUT LIMIT LINES WITH ACCEPTABLE POWER-DRIVEN SAWS TO A DEPTH NOT LESS THAN 2 INCHES AND IN STRAIGHT LINES BEFORE STARTING DEMOLITION AND/OR REMOVAL.

02100.09 REMOVAL OF EXISTING FENCING

PRIOR TO INITIATING ANY WORK IN VICINITY OF EXISTING FENCING TO BE REMOVED, REMOVE EXISTING FENCING, WIRE FABRIC, CAPS AND ACCESSORIES.

REMOVE POSTS AND FOOTINGS IN THEIR ENTIRETY. ALLOW 15 MINUTES FOR EACH FOOTING TO BE RADIOLOGICALLY MONITORED PRIOR TO DISPOSITION/DISPOSAL. PROVIDE THREE DAYS NOTICE TO THE CONSTRUCTION MANAGER PRIOR TO REMOVING CONCRETE FOOTINGS.

ALL MATERIALS REMAIN THE PROPERTY OF FMPC. STORE AS DIRECTED BY THE CONSTRUCTION MANAGER.

02100.10 STRIPPING

STRIP GROUND SURFACES WITHIN GRADING AREA TO DEPTHS AS NECESSARY TO REMOVE EXISTING TOPSOIL OR STONE TOPPING, AS DETERMINED BY THE CONSTRUCTION MANAGER, BUT IN NO EVENT LESS THAN 8 INCHES.

02100.11 EXCAVATION

A. GENERAL

PERFORM EXCAVATION FOR ROUGH SUBGRADES AND FOR LINE CUTS REMOVING WHATEVER SUBSTANCES ENCOUNTERED WITHIN GRADING AREA.

UNLESS ELSEWHERE SPECIFIED OTHERWISE, OPENCUT METHODS ARE PERMITTED FOR EXCAVATION PROVIDED RESULTING BANKS WILL BE STABLE AT ALL TIMES. SHOULD IT APPEAR THAT EXPOSED SLOPES MAY BECOME UNSTABLE OR WHERE OPEN CUTS SUBJECT TO THE ABOVE RESTRICTION ARE IMPRACTICABLE, BRACE AND SHEET SUCH SLOPES.

B. EXCAVATION FOR LOAD-BEARING SUBGRADES

IN ADDITION TO REQUIREMENTS LISTED ABOVE, EXCAVATE AS FOLLOWS FOR LOAD-BEARING SUBGRADES:

LEAVE AMPLE ROOM WHERE NECESSARY FOR CONSTRUCTION, INSPECTION AND REMOVAL OF FORMS.

WHERE UNSUITABLE MATERIALS INCLUDING EXCESSIVELY WET MATERIALS, ARE ENCOUNTERED WITHIN THE LINES AND BELOW LOAD-BEARING SUBGRADES, EXCAVATE TO DEPTHS AS NECESSARY OR DIRECTED TO REACH SUITABLE MATERIALS. BACKFILL WITH SUITABLE MATERIAL AS SPECIFIED FOR BACKFILL TO THE SUBGRADES INDICATED.

WHERE POWER EQUIPMENT OTHER THAN BLADE GRADER OR SCRAPER IS USED FOR EXCAVATION, STOP EXCAVATION 6 INCHES ABOVE SUBGRADE AND HAND EXCAVATE TO PROPER LEVELS LEAVING BEARING SURFACE SMOOTH AND LEVEL.

WHERE EXCAVATION IS PERFORMED WITH A BLADE GRADER OR SCRAPER, EXCAVATE TO SUBGRADE AND PROOFROLL TO UNCOVER SOFT SPOTS WITH A NONVIBRATING SMOOTH WHEELED ROLLER IMPARTING A MINIMAL 150 POUNDS PER INCH CONTACT PRESSURE, A NONVIBRATING 2,500 POUND PER TIRE PNEUMATIC TIRE ROLLER WITH A TIRE PRESSURE OF 36 POUNDS PER SQUARE INCH, OR OTHER ACCEPTABLE ROLLERS CAPABLE OF A MINIMAL EQUIVALENT CONTACT PRESSURE. WHERE SOFT SPOTS ARE ENCOUNTERED, EITHER SCARIFY AND RECOMPACT AS SPECIFIED FOR FINISH LOAD-BEARING SUBGRADES OR EXCAVATE AS DIRECTED AND REPLACE WITH COMPACTED FILL.

02100.11 FILL AND BACKFILL

A. GENERAL FILL

FILL WITH SUITABLE MATERIALS TO SUBGRADES IN CONFORMANCE WITH REQUIREMENTS FOR FILLING, AS SPECIFIED BELOW, EXISTING DEPRESSIONS AND HOLES, AND THOSE LEFT BY GRUBBING, STRIPPING, OR EXCAVATION.

DO NOT USE UNSUITABLE MATERIALS IN FILL NOR PLACE FILL ON OR AGAINST FROZEN SURFACES, UNSUITABLE MATERIAL OR SUITABLE MATERIAL OF IMPROPER DENSITY. LEAVE WORK AREAS IN CLEAN CONDITION WITH SLOPES AS REQUIRED FOR NATURAL DRAINAGE.

PRIOR TO PLACING FILL ON AREAS TO RECEIVE FILL, ARRANGE FOR LABORATORY TO TEST SURFACES TO DETERMINE IN-PLACE DENSITY AND MOISTURE CONTENT AND WHETHER EXPOSED MATERIALS ARE SUITABLE. WHERE THE DENSITY IS LESS THAN 95 PERCENT, SCARIFY SUBGRADE TO A DEPTH OF 6 INCHES, SEMIPULVERIZE MATERIAL IN PLACE BY DISCING, AND RECOMPACT TO DENSITY OF 95 PERCENT.

ON IN SITU SUBGRADES WHICH ARE OVERCOMPACTED, AS DETERMINED BY THE LABORATORY, SCARIFY SURFACES AS SPECIFIED ABOVE SO THAT FILL MATERIAL WILL BOND WITH EXISTING SURFACES.

ACCOMPLISH COMPACTION EMPLOYING EQUIPMENT SUITABLE AND SATISFACTORY FOR THE COMPACTION OF THE SPECIFIC MATERIAL USED.

PLACE FILL IN 8 INCH LAYERS OF COMPACTED THICKNESS AND COMPACT TO A DENSITY OF 95 PERCENT IN AREAS BELOW STRUCTURES AND PAVEMENT AND TO A DENSITY OF 95 PERCENT, MINIMUM, BELOW AREAS TO BE COVERED WITH STONE TOPPING.

B. BACKFILL

AFTER FOUNDATIONS ARE COMPLETED TO ELEVATIONS ABOVE SUBGRADES FOR FILL, BACKFILL WITH SUITABLE EXCAVATED MATERIAL OR BORROWED GRANULAR MATERIAL. BEFORE BACKFILLING, REMOVE ALL FORMS AND DEBRIS. BACKFILL IN HORIZONTAL LAYERS NOT IN EXCESS OF 4 INCHES IN THICKNESS, LOOSE MEASUREMENT, AND WITH MOISTURE CONTENT SUCH THAT THE REQUIRED DEGREE OF COMPACTION MAY BE OBTAINED. BACKFILL WITHIN CURBS TO SUBGRADE ELEVATIONS. BACKFILL OUTSIDE OF CURBS TO FINISH SITE GRADES AND SO THAT DRAINAGE IS AWAY FROM PAD.

COMPACT EACH LAYER TO DENSITY OF 95 PERCENT BY HAND OR MECHANICAL TAMPERS OR BY OTHER SUITABLE EQUIPMENT. DO NOT COMPACT MATERIAL BY PUDDLING, JETTING OR ANY OTHER COMPACTING PROCESS USING ONLY WATER.

BACKFILL SIMULTANEOUSLY ON BOTH SIDES OF VERTICAL STRUCTURAL ELEMENTS, SO THAT LEVELS OF BACKFILLS ARE AT ALL TIMES EQUAL ON EACH SIDE OF SUCH VERTICAL ELEMENTS. WHERE THIS IS IMPRACTICABLE, OR OTHERWISE INDICATED, MAKE SURE THAT AFFECTED STRUCTURAL ELEMENT IS PROPERLY BRACED AGAINST POSSIBLE LOADS IMPOSED BY WEDGING ACTION OF FILLING OPERATIONS.

02100.12 FINISH LOAD-BEARING SUBGRADES

IMMEDIATELY PRIOR TO PLACING FOUNDATIONS, BASE, OR GRAVEL PAVEMENT ON A SUBGRADE, HAVE SURFACE DENSITY CHECKED BY LABORATORY. WHERE DENSITY IS LESS THAN 95 PERCENT OR WHERE ADDITIONAL FILL IS NECESSARY, SCARIFY AND SEMIPULVERIZE TOP SURFACE OF AREA TO DEPTH OF 12 INCHES AND RECOMPACT TOGETHER WITH NECESSARY FILL TO A DENSITY OF 95 PERCENT. BRING SUBGRADE TO FINISHED SURFACE, REASONABLY SMOOTH AND COMPACTED, FREE FROM IRREGULAR SURFACE CHANGES, AND NOT ABOVE THE REQUIRED FINISH GRADE OR SUBGRADE ELEVATIONS. TEST AGAIN PRIOR TO PLACING BASE OR FOUNDATION.

02100.13 FINISH SITE GRADING

BRING AREAS TO BE FINISH GRADED TO FINISHED SURFACES REASONABLY SMOOTH, COMPACTED, AND FREE FROM IRREGULAR SURFACE CHANGES. THE DEGREE OF FINISH AND COMPACTION IS THAT ORDINARILY OBTAINABLE FROM EITHER BLADE GRADER OR SCRAPER OPERATIONS.

FINISH GRADE THE AREAS TO RECEIVE TOPPING TO FINISHED SURFACES NOT MORE THAN 1.5 INCHES ABOVE OR BELOW THE REQUIRED ELEVATIONS OR ACCEPTABLE CROSS SECTION TO RECEIVE THE TOPPING.

PROVIDE FINISH SURFACES IN DITCHES AND SWALES.

02100.14 STONE TOPPING

A. MATERIALS

STONE TOPPING - CRUSHED LIMESTONE AGGREGATE, ASTM C 33 SIZE NO. 57.

B. GRADE PREPARATION

BRING SUBGRADE TO GRADE AND CROSS SECTION NOT ABOVE THE REQUIRED ELEVATION FOR BASE OF TOPPING AND COMPACTED TO A DENSITY OF 95 PERCENT.

AFTER SUBGRADES HAVE BEEN BROUGHT TO PROPER GRADE, THOROUGHLY TILL TO A DEPTH OF 6 INCHES AND APPLY A SUITABLE PLANT POISON IN QUANTITIES SUFFICIENT TO ENSURE AGAINST GERMINATION AND/OR GROWTH OF ANY PLANTS IN AREAS TREATED. TREAT EARTH IN STRICT ACCORDANCE WITH INSTRUCTIONS OF MANUFACTURER OF THE POISON. USE ONLY UNITED STATES ENVIRONMENTAL PROTECTION AGENCY APPROVED POISONS. SUBMIT MATERIAL SAFETY DATA SHEET. AFTER SURFACES HAVE BEEN TREATED, RECOMPACT AND SMOOTH GRADE AS SPECIFIED ABOVE FOR FINISH SITE GRADING.

C. PLACING TOPPING

SPREAD MATERIAL ON SUBGRADE TO A DEPTH OF 3 INCHES, AND RAKE TO PROVIDE A RELATIVELY SMOOTH TOP SURFACE NOT BELOW REQUIRED FINISH ELEVATIONS.

02100.15 GRAVEL PAVEMENT

PROVIDE GRAVEL PAVEMENT OF SOUND CRUSHED LIMESTONE, CRUSHED GRAVEL OR OTHER ACCEPTABLE MATERIAL.

MATERIALS, GRADATION AND CONSTRUCTION TO CONFORM TO OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS, ITEM 411.

DIVISION 2

02400 - STORM DRAINAGE

02400.01 SCOPE OF WORK

A. WORK SPECIFIED UNDER THIS SECTION

PERFORM ALL WORK AS SPECIFIED OR INDICATED TO COMPLETE STORM DRAINAGE WORK AND ALL RELATED WORK AS SHOWN AND SPECIFIED. THIS WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

RAISING EXISTING CATCH BASINS
PLUGGING EXISTING CATCH BASINS
CONSTRUCTING CATCH BASINS AND INLETS
CONNECTING INTO EXISTING DRAINAGE STRUCTURE
PROVIDING SLOTTED VANE DRAIN

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

EARTHWORK FOR FOUNDATIONS
SITE CLEARANCE
FINISH SITE GRADING

C. ITEMS DEFINED AND SPECIFIED IN SECTION 02100

PERFORM ALL WORK IN ACCORDANCE WITH THE FOLLOWING APPLICABLE REQUIREMENTS OF SECTION 02100:

PATCHING
DENSITY CONTROL
DISPOSAL OF MATERIALS

02400.02 APPLICABLE STANDARDS

THE APPLICABLE RECOMMENDATIONS IN THE LATEST ISSUE OF THE LISTED PUBLICATIONS OF THE FOLLOWING AUTHORITIES ARE INCORPORATED HEREIN BY REFERENCE:

AISI "HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS", HEREINAFTER REFERRED TO AS "AISI HANDBOOK"
AMERICAN CONCRETE PIPE ASSOCIATION (ACPA) "CONCRETE PIPE HANDBOOK", HEREINAFTER REFERRED TO AS "ACPA HANDBOOK"
CLAY SEWER PIPE ASSOCIATION (CSPA) "CLAY PIPE ENGINEERING MANUAL," HEREINAFTER REFERRED TO AS "CSPA MANUAL"

02400.03 MATERIALS

A. SOIL MATERIALS

SOIL MATERIALS ARE AS SPECIFIED IN SECTION 02100 AND AS FOLLOWS:

BANK RUN GRAVEL - A NATURAL GRAVEL, 100 PERCENT PASSING THE 2 INCH SIEVE NOT LESS THAN 70 PERCENT RETAINED ON THE NO. 8 SIEVE, AND NOT MORE THAN 5 PERCENT PASSING THE 200 MESH SIEVE.

COARSE AGGREGATE - ASTM C 33, SIZE NO. 7 OR NO. 8.

FINE AGGREGATE - A NATURAL SAND GRADED IN ACCORDANCE WITH ASTM C 33.

B. PIPE

ALL PIPING 12 INCHES AND LARGER (EXCEPT FOR SLOTTED VANE DRAIN):

REINFORCED CONCRETE PIPE - ASTM C 76, SIZES AND CLASS AS SHOWN, OR CLASS IV WHERE CLASS IS NOT SHOWN. PROVIDE WITH JOINTS CONFORMING TO ASTM C 443.

ALL PIPING 10 INCHES AND SMALLER:

CLAY PIPE - PIPE, ASTM C 700, JOINTS, ASTM C 425.

SLOTTED VANE DRAIN PIPING:

~~PVC PLASTIC PIPE - ASTM D 3034-SDR 35~~

USE RING - TITE JOINT, OR APPROVED EQUAL, TO MEET ASTM D 3212, FOR PLASTIC TO PLASTIC AND ACCEPTABLE OTHER TYPES FOR PLASTIC TO METAL, CONTROL, OR TILE.

C. SLOTTED VANE DRAIN

PROVIDE SLOTTED VANE DRAIN ASSEMBLY COMPRISED OF PVC PIPE, AS SPECIFIED HEREINBEFORE, AND NEENAH MODEL R-3599 OR APPROVED EQUAL, CAST-IRON SLOTTED VANE DRAIN SECTIONS. ENTIRE ASSEMBLY TO BE CAST IN CONCRETE. INSTALLATION TO BE PER MANUFACTURER'S RECOMMENDATIONS.

D. CONCRETE

PROVIDE CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 3,000 POUNDS PER SQUARE INCH IN 28 DAYS AND WITH 3 TO 6 PERCENT ENTRAINED AIR. PROVIDE DEFORMED REINFORCING STEEL CONFORMING TO ASTM A 615 OR A 616, GRADE 40 MINIMUM. PROVIDE SMOOTH RUBBED FINISH ON EXPOSED CONCRETE SURFACES.

PROVIDE MATERIALS, FORMS, AND WORKMANSHIP CONFORMING WITH APPLICABLE PROVISIONS OF SECTION 03300.

E. CASTINGS

CAST IRON, AS MANUFACTURED BY NEENAH FOUNDRY COMPANY OR APPROVED EQUAL. CAST-IRON FRAMES, GRATES, LIDS, AND OTHER CASTINGS.

F. SURFACE DRAIN/CLEANOUT

PROVIDE NEENAH, MODEL R-4350, OR APPROVED EQUAL, CAST-IRON BEEHIVE GRATE-MOUNTED IN BELL END OF 18 INCH DIAMETER CONCRETE PIPE PER DRAWINGS.

02400.04 EXCAVATION AND TRENCHING

EXCAVATE TO A MINIMUM 6 INCHES BELOW BOTTOM OF PIPE AS SPECIFIED HEREINBEFORE, AND AS FOLLOWS. MAINTAIN TRENCH BANKS AS NEARLY VERTICAL AS POSSIBLE. REMOVE EXCESS EARTH. KEEP EXCAVATIONS DRY. MAKE WIDTH OF VERTICALLY WALLED TRENCHES NO LARGER THAN 8 INCHES ON EITHER SIDE OF PIPE BARREL FROM BOTTOM TO SPRING LINE, AND NO WIDER THAN NECESSARY ABOVE SPRING LINE FOR PROPER PERFORMANCE OF WORK. WHERE WET OR UNSUITABLE MATERIAL FOR PROPER SUPPORT OF PIPE IS ENCOUNTERED, REMOVE SUCH MATERIAL TO DEPTH REQUIRED. OVERDEPTH EXCAVATION MUST BE PERFORMED FOR FULL WIDTH OF TRENCH AND THEN BACKFILLED WITH BANK RUN GRAVEL TO THE PROPER GRADE AND COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS FOR BEDDING AS SPECIFIED BELOW.

WHERE PIPES ARE PLACED IN FILL, PLACE FILL TO NOT LOWER THAN 1 FOOT ABOVE THE PIPE AS SPECIFIED IN SECTION 02100 FOR FILL AND EXCAVATE INTO COMPACTED FILL AS SPECIFIED ABOVE.

IN LIEU OF VERTICAL-SIDED TRENCHES, THE CONTRACTOR MAY, AT HIS OPTION, USE OPENCUT METHODS FOR EXCAVATION, PROVIDED THAT SIDES OF TRENCHES ARE KEPT VERTICAL TO 1 FOOT ABOVE TOP OF PIPES.

02400.05 BEDDING

PROVIDE BEDDING IN CONFORMANCE WITH APPLICABLE RECOMMENDATIONS OF THE FOLLOWING STANDARDS.

FOR CONCRETE PIPE - CLASS B (FIRST CLASS) BEDDING AS DEFINED IN THE ACPA HANDBOOK, WITH A 6 INCH MINIMUM BED OF GRANULAR MATERIAL.

FOR CLAY PIPE - ASTM C 12 FOR CLASS C BEDDING.

BACKFILL TO ELEVATION ABOVE BOTTOM QUADRANT WITH BANK RUN GRAVEL COMPACTED TO 95 PERCENT DENSITY. IMMEDIATELY BEFORE LAYING PIPE, ROUND PIPE BED TO ACCOMMODATE BOTTOM QUADRANT OF PIPE AND EXCAVATE AT JOINTS SO THAT PIPE WILL BE UNIFORMLY SUPPORTED FOR ITS ENTIRE LENGTH.

02400.06 ENTRANCES TO EXISTING DRAINAGE STRUCTURES

WHERE NECESSARY, CUT HOLES INTO EXISTING DRAINAGE STRUCTURES BY METHODS WHICH WILL NOT RESULT IN DAMAGE THERETO AND WILL RESULT IN CLEAN CUT WALLS OF PROPER SIZE. CALK AROUND OPENING BETWEEN STRUCTURE WALL AND PIPE BY PACKING SOLID WITH OAKUM TO WITHIN 1 INCH OF WALL SURFACE ON EACH SIDE, AND CALKING REMAINING SPACE ON EACH SIDE FULL WITH CELOTEX THERMOTEX B, OR APPROVED EQUAL.

02400.07 PIPE LAYING

THOROUGHLY INSPECT AND FIT PIPES BEFORE PLACING INTO TRENCHES. LAY LINES TO UNIFORM GRADE BETWEEN ELEVATIONS INDICATED OR AT GRADE SPECIFIED. USE ENGINEER'S LEVEL FOR ESTABLISHING GRADES AND SLOPES. USE GRADE BOARDS, GRADE CORD, PLUMB BOB AND MEASURING STICK TO TRANSFER GRADES FROM BENCH MARKS TO FLOW LINE OF PIPE. MAKE ALL JOINTS IN CONFORMANCE WITH RECOMMENDATIONS OF MANUFACTURER AND AS FURTHER SPECIFIED BELOW.

LAY PIPE IN CONFORMANCE WITH APPLICABLE RECOMMENDATIONS AND PROVISIONS OF FOLLOWING STANDARDS AND AS FURTHER SPECIFIED BELOW:

FOR CONCRETE PIPE - ACPA HANDBOOK
[illegible]LAY PIPE - ASTM C 12
[illegible]ASTIC PIPE - ASTM D 2321

[illegible]ST INSTRUCTIONS FROM CONSTRUCTION MANAGER BEFORE [illegible]ING ANY WORK ON GROUND PROVIDING QUESTIONABLE SUPPORT. [illegible]OVIDE FIRM BED FOR BARREL OF PIPE. PIPE MUST NOT REST ON JOINT WHEN BROUGHT TO GRADE. SET EACH LENGTH TO GRADE AND LINE BEFORE MAKING JOINT.

KEEP WATER OUT OF PIPES UNTIL JOINTS HAVE BEEN MADE. CLOSE ALL OPEN ENDS OF PIPING DURING CONSTRUCTION TO PREVENT EARTH ENTERING LINES. CLEAN SURFACES OF JOINTS AND INTERIOR OF ALL PIPE BEFORE MAKING JOINTS.

02400.08 BACKFILLING

AFTER PIPE IS INSTALLED, BACKFILL TO 1 FOOT ABOVE TOP OF PIPE WITH BANK RUN GRAVEL.

BACKFILL IN LAYERS NOT MORE THAN 4 INCHES THICK, USING CARE TO AVOID DISPLACING PIPE. POWER TAMP EACH LAYER TO A DENSITY OF 95 PERCENT.

FOR FILL ABOVE 1 FOOT ABOVE TOP OF PIPE, PROCEED AS FOLLOWS.

IN AREAS TO BE COVERED BY SUBGRADES FOR PAVEMENTS OR STRUCTURES, COMPLETE BACKFILL TO ELEVATION AND DENSITY OF FINISH SUBGRADE AS SPECIFIED HEREINBEFORE FOR FILL.

DIVISION 3

03300 - CONCRETE WORK

03300.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY TO COMPLETE ALL CAST-IN-PLACE CONCRETE WORK, INCLUDING FORMWORK, REINFORCING STEEL AND ALL RELATED WORK AS SHOWN AND SPECIFIED, EXCEPT AS SPECIFICALLY EXCLUDED HEREINAFTER.

IN ADDITION TO CONSTRUCTION OF CAST-IN-PLACE CONCRETE WORK, THE WORK INCLUDES THE ITEMS LISTED BELOW:

SETTING ANCHOR BOLTS AND OTHER ITEMS INDICATED TO BE EMBEDDED IN CONCRETE (PHASE A)
VAPOR BARRIER
LABORATORY FIELD TESTING SERVICES
REMOVING SURFACE OF EXISTING CONCRETE PAD AND CURBS
RENOVATION OF EXISTING CONTAMINATED JOINTS AND CRACKS

COOPERATE WITH AFFECTED PERSONNEL IN SETTING AND/OR FASTENING ANCHOR BOLTS, SLEEVES, PIPING, CONDUITS, AND SIMILAR ITEMS IN THE FORMS, WHERE SUCH ITEMS ARE TO BE FURNISHED AND INSTALLED UNDER OTHER DIVISIONS.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

FURNISHING ANCHOR BOLTS FOR STRUCTURES
GROUTING OF BASEPLATES
POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY FLOOR COATING
EPOXY COATING

03300.02 APPLICABLE STANDARDS

PROVIDE ALL MATERIALS AND PERFORM ALL WORK IN ACCORDANCE WITH ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND THE REFERENCE SPECIFICATIONS LISTED THEREIN.

03300.03 HOT AND COLD WEATHER CONDITIONS

PLACEMENT AND CURING OF CONCRETE UNDER THE REQUIREMENTS SPECIFIED HEREIN IS LIMITED TO AMBIENT TEMPERATURES BETWEEN 40F AND 90F. WHEN TEMPERATURES ARE TO BE OUTSIDE THESE TEMPERATURE LIMITATIONS, SUBMIT PROPOSED PROCEDURES FOR PROTECTION OF CONCRETE DURING PLACEMENT AND CURING.

USE OF CALCIUM CHLORIDE IS PROHIBITED.

03300.04 CONCRETE MATERIALS

READY-MIXED CONCRETE CONFORMING TO ASTM C 94, HAVING PROPERTIES SPECIFIED UNDER PROPORTIONING, AND USING MATERIALS SPECIFIED UNDER THIS SUBSECTION.

PORTLAND CEMENT -ASTM C 150, TYPE I EXCEPT THAT FOR AIR-ENTRAINED CONCRETE, TYPE IA MAY BE USED.

AIR-ENTRAINING ADMIXTURES - ASTM C 260.

WATER-REDUCING ADMIXTURES - ASTM C 494, TYPE A.

NO ACCELERATORS OR ADMIXTURES CONTAINING CHLORIDES WILL BE PERMITTED.

USE FRESH, CLEAN AND DRINKABLE WATER FOR CONCRETE.

COARSE AND FINE AGGREGATE TO CONFORM TO ASTM C 33. FOR COARSE AGGREGATES, USE SIZE 57.

03300.05 PROPORTIONING

PROVIDE CONCRETE HAVING THE MIX SPECIFIED FOR EACH CLASS OF CONCRETE IN THE FOLLOWING LIST.

NORMAL WEIGHT TYPE I CEMENT CONCRETE

FOUNDATION CONCRETE NOT EXPOSED TO WEATHER: (PHASE A)

MIX NO:	FMPC #1
SPECIFIED STRENGTH (28 DAYS)	3000 PSI
TOTAL AIR CONTENT:	N/A
SPECIFIED SLUMP:	4" ± 1"
MAXIMUM AGGREGATE SIZE:	1"
MAXIMUM WATER/CEMENT RATIO:	0.68
MINIMUM CEMENT CONTENT:	470#

* WATER REDUCING AND RETARDING ADMIXTURES AS REQUIRED.

MISCELLANEOUS CONCRETE EXPOSED TO WEATHER:

MIX NO:	FMPC #2
SPECIFIED STRENGTH (28 DAYS):	3000 PSI
TOTAL AIR CONTENT:	5% ± 1-1/2%
SPECIFIED SLUMP:	4" ± 1"
MAXIMUM AGGREGATE SIZE:	1"
MAXIMUM WATER/CEMENT RATIO:	0.45
MINIMUM CEMENT CONTENT:	517#

* WATER REDUCING AND RETARDING ADMIXTURES AS REQUIRED.

EXTERIOR PAD AND PAVEMENT/4000 PSI STRUCTURAL CONCRETE EXPOSED TO WEATHER:

MIX NO:	FMPC #4
SPECIFIED STRENGTH (28 DAYS):	4000 PSI
TOTAL AIR CONTENT:	5% ± 1-1/2%
SPECIFIED SLUMP:	4" ± 1"
MAXIMUM AGGREGATE SIZE:	1"
MAXIMUM WATER/CEMENT RATIO:	0.45
MINIMUM CEMENT CONTENT:	564#

* WATER REDUCING AND RETARDING ADMIXTURES AS REQUIRED.

PROVIDE CONCRETE HAVING ENTRAINED AIR CONTENTS WITHIN THE LIMITS SPECIFIED FOR EACH CLASS OF CONCRETE AS DETERMINED BY ASTM C 231.

03300.06 PRODUCTION OF CONCRETE

PROVIDE SITE DELIVERY TICKETS FOR EACH BATCH OF CONCRETE SHOWING FOLLOWING:

BATCH NUMBER, VOLUME, AND DATE
TIME OF LOADING
DESIGN 28 DAY COMPRESSIVE STRENGTH
APPROVED DESIGN MIX NUMBER

DO NOT ADD WATER TO MIX ON JOB PRIOR TO PLACEMENT, UNLESS AUTHORIZED IN WRITING BY THE CONSTRUCTION MANAGER'S REPRESENTATIVE. NOTE ON DELIVERY TICKET AMOUNT OF WATER ADDED AND NAME OF PERSON AUTHORIZING.

03300.07 PLACING CONCRETE

A. GENERAL

TIE REINFORCING BARS IN PROPER POSITION PRIOR TO PLACING CONCRETE.

PROVIDE SUFFICIENT TIME FOR INSPECTION OF PREPARATORY WORK BEFORE PROCEEDING WITH PLACING OF CONCRETE.

IMMEDIATELY PRIOR TO PLACING CONCRETE PAD OR FOUNDATION, LIGHTLY SPRINKLE SEMIPOROUS SUBGRADE SUFFICIENTLY TO ELIMINATE SUCTION.

DO NOT PLACE CONCRETE ON FROZEN GROUND.

B. CONSOLIDATION

PROVIDE INTERNAL VIBRATORS HAVING A MINIMUM FREQUENCY OF 8,000 VIBRATIONS PER MINUTE AND SUFFICIENT AMPLITUDE TO CONSOLIDATE THE CONCRETE AS DESCRIBED IN TABLE 5.1.4 OF ACI 309.

DO NOT USE VIBRATORS TO TRANSPORT CONCRETE WITHIN FORMS.

VIBRATE FULL DEPTH FOR PERIODS AND AT INTERVALS TO ENSURE CONSOLIDATION AND ELIMINATE AIR POCKETS BUT NOT SUFFICIENT TO CAUSE SEGREGATION OR LOSS OF AIR ENTRAINMENT.

C. FINISHING

FINISH CONCRETE PAD AND PAVEMENT IN ACCORDANCE WITH THE FOLLOWING FINISH AND TOLERANCE. FINISH AND TOLERANCE ARE AS SPECIFIED IN ACI 301. SURFACE OF CONCRETE TO RECEIVE POLYURETHANE ELASTOMER/WEARING SURFACE SHALL BE AS RECOMMENDED BY THE MANUFACTURER OF THE WEARING SURFACE.

DUSTING OF PAD OR PAVEMENT WITH CEMENT OR OTHER MATERIALS TO ABSORB EXCESS BLEED WATER IS STRICTLY PROHIBITED.

ITEM	TOLERANCE CLASS	FINISH
EXTERIOR PAD AND PAVEMENT	B	TROWELED

03300.08 REINFORCEMENT

A. GENERAL

DETAILS OF CONCRETE REINFORCEMENT AND ACCESSORIES NOT COVERED HEREIN OR SHOWN ON DRAWINGS TO BE IN ACCORDANCE WITH ACI 315.

SECURE REINFORCEMENT IN PROPER POSITION AND THOROUGHLY CLEAN OF ICE, LOOSE RUST, SCALE, GREASE OR OTHER COATINGS.

B. REINFORCING MATERIALS

FOR REINFORCING SHOWN PROVIDE DEFORMED BARS CONFORMING TO ASTM A 615, OR A 616 GRADE 60, EXCEPT THAT NO. 3 AND NO. 4 RODS USED FOR TIES MAY BE GRADE 40, YIELD STRENGTH NOT LESS THAN 40,000 PSI.

WELDED WIRE FABRIC - ASTM A 185 PLAIN WIRE FABRIC IN FLAT SHEETS. WELDED WIRE FABRIC IN ROLLS IS NOT ACCEPTABLE.
SMOOTH DOWELS - ASTM A 615 AND A 616, PLAIN BARS, MINIMUM YIELD STRENGTH OF 40,000 PSI.

ACCESSORIES TO CONFORM TO ACI SP-66.

WHERE REINFORCING RODS ARE USED AS SUPPORTS, USE RODS NO LIGHTER THAN NO. 5.

WHERE CONCRETE SURFACES ARE EXPOSED, MAKE THOSE PORTIONS OF ALL ACCESSORIES IN CONTACT WITH THE CONCRETE SURFACE OR WITHIN 1/2 INCH THEREOF, OF PLASTIC OR STAINLESS STEEL.

C. PLACING

PLACE REINFORCING IN CONFORMANCE WITH THE REQUIREMENTS OF CRSI. PLACE REINFORCEMENT IN PROPER POSITION PRIOR TO PLACING CONCRETE. PLACING REINFORCEMENT DURING CONCRETE PLACEMENT WILL NOT BE PERMITTED.

UNLESS OTHERWISE SHOWN OR INDICATED, PROVIDE MINIMUM CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT AS FOLLOWS:

CONCRETE DEPOSITED AGAINST THE GROUND, 3 INCHES
FORMED SURFACES EXPOSED TO WEATHER OR IN CONTACT WITH THE GROUND, 2 INCHES FOR REINFORCING BARS NO. 6 OR LARGER, AND 1-1/2 INCHES FOR REINFORCING BARS NO. 5 OR SMALLER

SUPPORT REINFORCING FOR PAD AND PAVEMENT ON STAGGERED CONCRETE BRICKS OR METAL OR PLASTIC BAR CHAIRS AND SPACERS WITH METAL PLATES.

UNLESS SPECIFICALLY AUTHORIZED, DO NOT BEND REINFORCEMENT PARTIALLY EMBEDDED IN HARDENED CONCRETE.

SUPPORT AND FASTEN DOWELS IN THE FORMWORK PRIOR TO PLACING CONCRETE. DO NOT PLACE DOWELS AFTER CONCRETE IS IN PLACE.

03300.09 JOINTS

A. GENERAL

CONSTRUCT JOINTS AS INDICATED. SAW CONTROL JOINTS WITHIN 4 TO 12 HOURS AFTER SLAB HAS BEEN PLACED AND FINISHED CONFORMING TO ACI 302.

LOCATION OF ANY CONSTRUCTION JOINT NOT SHOWN IS SUBJECT TO REVIEW AND ACCEPTANCE.

WHERE REINFORCING IS CONTINUOUS THROUGH A JOINT, PROVIDE SPLICE LENGTHS REQUIRED BY ACI 315.

B. JOINT MATERIALS

HORIZONTAL JOINT SEALER - TWO-COMPONENT SELF-LEVELING URETHANE CONFORMING TO FEDERAL SPECIFICATION TT-S-227E, TYPE I, CLASS A. COLOR TO MATCH CONCRETE. ACCEPTABLE PRODUCTS ARE:

TYPE	MANUFACTURER
DARASEAL-U	A. C. HORN
SONOLASTIC PAVING JOINT SEALER	SONNEBORN
POURTHANE	W. R. MEADOWS
OR APPROVED EQUAL	

EPOXY BOND - 2-COMPONENT 100 PERCENT SOLIDS EPOXY RESIN, AMINE CURED. ACCEPTABLE MATERIALS ARE EUCLID CHEMICAL COMPANY NO. 463 EPOXY, GENERAL POLYMERS SBA 3574, AND SIKA CORPORATION SIKADURHIMOD.

EPOXY GROUT - EPOXY BOND FILLED WITH SUITABLE MINERAL FILLER, 100 PERCENT PASSING THE NO. 100 SIEVE, IN RATIO TO ENSURE THIXOTROPIC ACTION WITHOUT IMPAIRMENT OF ADHESIVE PROPERTIES.

C. DOWELED SLIP JOINTS

USE COMPLETELY SMOOTH ROUND BARS FOR DOWELS.

FOR CONSTRUCTION JOINTS, PAINT HALF OF BAR WITH ALKYD-OIL PAINT. WHEN DRY, COAT PAINTED END WITH SATISFACTORY GREASE TO ENSURE AGAINST BOND WITH CONCRETE.

PLACE IN FORMS TO ENSURE THAT BARS ARE PERPENDICULAR TO JOINT FACE. STOP REINFORCEMENT AT DOWELED SLIP JOINTS SO THAT IT WILL NOT EXTEND THROUGH JOINT.

D. BONDED JOINTS

WHERE SPECIFIED OR REQUIRED, BOND CONSTRUCTION JOINTS USING EPOXY BOND AS SPECIFIED ABOVE UNDER ARTICLE "JOINT MATERIALS." CONFORM TO APPLICABLE REQUIREMENTS AND RECOMMENDATIONS OF ACI 503.2 CONTINUE ALL REINFORCING THROUGH BONDED CONSTRUCTION JOINTS.

E. PLACING DOWELS IN EXISTING CONCRETE

USE SMOOTH ROUND BARS AS DOWELS UNLESS OTHERWISE SHOWN. DRILL HOLES IN EXISTING CONCRETE OF SIZE 1/2 INCH LARGER IN DIAMETER THAN THE DOWEL USING POWER-DRIVEN DRILL WITH TUNGSTEN-CARBIDE TIPPED BIT GROUND TO ENSURE AGAINST OVERSIZE HOLE. CLEAN OUT HOLES WITH AIR. THOROUGHLY SWAB SURFACES OF HOLE AND EMBEDDED PORTION OF DOWEL WITH EPOXY BOND. WHILE SURFACES ARE STILL WET, FILL HOLE 3/4 FULL OF EPOXY GROUT. FORCE DOWEL INTO PLACE. WIPE OFF EXCESS GROUT AND LET SET FOR NOT LESS THAN 12 HOURS AT A TEMPERATURE ABOVE 60F.

03300.10 FORMWORK

A. GENERAL

OBSERVE AND CHECK FORMWORK CONTINUOUSLY WHILE CONCRETE IS BEING PLACED TO DETERMINE THAT THERE ARE NO EVIDENCES OF CHANGES OF ELEVATIONS, PLUMBNESS, OR CAMBER. IF, DURING CONSTRUCTION, ANY SUCH EVIDENCE OR OTHER DEFECT APPEARS, STOP THE WORK, REMOVE CONCRETE PLACED, IF NECESSARY, AND REPAIR FORMWORK OR SUPPORTS BEFORE PROCEEDING.

EARTH CUTS MAY BE USED AS FORMS FOR FOOTINGS IF SIDES ARE SHARP AND TRUE, IF CONCRETE IS NOT EXPOSED IN FINISHED STRUCTURE, AND IF CONCRETE IS NOT REQUIRED TO HAVE SURFACE TREATMENT OF ANY KIND.

B. FORMWORK MATERIALS

MAKE FORMS OF LUMBER, PLYWOOD, METAL OR OTHER MATERIALS SUITABLE TO PROVIDE THE STRENGTH AND TOLERANCES SPECIFIED HEREINBEFORE AND THE SURFACE FINISHES SPECIFIED HEREINAFTER.

FOR FORMING EXPOSED SURFACES USE ANY OF THE FOLLOWING MATERIALS AS SUITABLE FOR THE SPECIFIED FINISH, AND TO PRODUCE SMOOTH UNIFORM SURFACES, TRUE-TO-LINE, IN ORDER THAT SURFACES PRODUCED WILL REQUIRE LITTLE FINISHING:

NEW PLASTIC-BONDED NATURAL PLYWOOD, AMERICAN PLYWOOD ASSOCIATION, HD OVERLAY PLYFORM CLASS I, EXT-APA, OR EQUAL
TEMPERED CONCRETE-FORM-GRADE HARDBOARD
METAL FREE FROM IRREGULARITIES, DENTS AND SAGS

C. PREPARATION OF FORM SURFACES

WHERE JOINTS IN WOODEN FORMS HAVE BEEN OPENED BY SHRINKAGE OF WOOD, WET DOWN SUCH FORMS IMMEDIATELY PRIOR TO PLACING CONCRETE UNTIL JOINTS ARE CLOSED BY SWELLING.

FORMS ARE TO BE SECURED IN PROPER POSITION AND ALIGNMENT, CLEANED, THOROUGHLY WET (EXCEPT USE OIL IN FREEZING WEATHER), AND FREE OF ALL DEBRIS, SNOW AND ICE.

D. REMOVAL OF FORMS

FORMWORK IS TO REMAIN IN PLACE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN SUBSECTION "CURING AND PROTECTION," HOWEVER, PROVIDE AT LEAST THREE FULL CURING DAYS.

FULL CURING DAYS WILL BE DETERMINED BY CUMULATIVE NUMBER OF DAYS OR FRACTIONS THEREOF DURING WHICH THE TEMPERATURE OF THE AIR IN CONTACT WITH THE CONCRETE IS ABOVE 50F.

WHENEVER FORMWORK IS REMOVED DURING CURING PERIOD, CONTINUE CURING OF BOTH UNEXPOSED AND EXPOSED CONCRETE AS SPECIFIED IN SUBSECTION "CURING AND PROTECTION."

03300.11 REPAIR OF SURFACE DEFECTS

A. GENERAL

PATCH ALL TIE HOLES AND REPAIR ALL HONEYCOMBED AND DEFECTIVE AREAS IMMEDIATELY AFTER FORM REMOVAL.

FOR SURFACES OTHER THAN THOSE TO BE BACKFILLED AGAINST, USE PATCHING MORTAR.

FOR SURFACES TO BE BACKFILLED AGAINST, USE MASTIC DAMPPROOFING COMPOUND, EXCEPT THAT WHERE REINFORCING IS EXPOSED, USE PATCHING MORTAR.

REMOVE ALL HONEYCOMBED AND DEFECTIVE CONCRETE DOWN TO SOUND CONCRETE PRIOR TO PATCHING. THOROUGHLY CLEAN TIE HOLES OF DIRT AND DEBRIS.

B. PATCHING MORTAR

CUT EDGES OF HONEYCOMBED AND DEFECTIVE CONCRETE TO FORM DOVE-TAIL (UNDERCUT) JOINTS. NO FEATHEREDGES WILL BE PERMITTED.

PATCH WITH CEMENT MORTAR AS SPECIFIED IN ACI 301, OR WITH PROPRIETARY PATCHING COMPOUNDS, EXCEPT THAT PROPRIETARY PATCHING MIXTURES MAY NOT BE USED ON EXPOSED SURFACES.

ACCEPTABLE PROPRIETARY PATCHING MIXTURES ARE:

L&M CONSTRUCTION CHEMICALS - EVERBOND
EUCLID CHEMICAL CORPORATION - POLY PATCH
SIKA - SIKASET MORTAR
OR APPROVED EQUAL

C. MASTIC DAMPPROOFING COMPOUND

PATCH FULL DEPTH OF HOLE, FLUSH WITH SURFACE, WITH EMULSIFIED ASPHALT MASTIC HEAVY VISCOSITY FOR TROWEL APPLICATION. PREPARE AND PLACE IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. ACCEPTABLE PRODUCTS ARE:

W. R. MEADOWS - SEALMASTIC TROWEL MASTIC
EUCLID CHEMICAL COMPANY - DAMPPROOFING ASPHALT COATINGS
SONNEBORN - HYDROCIDE 700 MASTIC
OR APPROVED EQUAL

03300.12 FINISHING OF FORMED SURFACES - GENERAL

AFTER REMOVAL OF FORMS, GIVE SURFACES OF CONCRETE THE FOLLOWING FINISHES AS SPECIFIED IN ACI 301.

SURFACE	FINISH
UNEXPOSED	ROUGH FORM
EXPOSED TO PUBLIC VIEW	SMOOTH FORM

03300.13 CURING AND PROTECTION

A. GENERAL

CURE PAD AND PAVEMENT FOR THE FIRST 72 HOURS BY THE USE OF FOG SPRAYING, SPRINKLING OR CONTINUOUSLY WET ABSORPTIVE MATS OR FABRIC. CONTINUE CURING BY USE OF MOISTURE RETAINING COVER UNTIL CONCRETE HAS OBTAINED ITS SPECIFIED 28 DAY COMPRESSIVE STRENGTH.

FOR ALL CAST-IN-PLACE CONCRETE, CONCRETE FORMWORK IS TO BE MAINTAINED IN A MOIST CONDITION UNTIL RESULTS OF COMPRESSIVE STRENGTH TESTS ARE OBTAINED AND ARE SATISFACTORY. ALL FORMED SURFACES MUST BE PROTECTED AGAINST LOSS OF MOISTURE FOR A MINIMUM OF 7 DAYS FOLLOWING THE PLACING OF THE CONCRETE BY USE OF A WATER SPRAY, WATER SATURATED FABRIC OR LIQUID MEMBRANE CURING COMPOUND. MAINTAIN FORMS AND CONCRETE IN MOIST CONDITION UNTIL 28 DAY COMPRESSIVE STRENGTH IS OBTAINED.

B. MATERIALS

WHERE MOISTURE RETAINING MEMBRANES ARE USED FOR CURING, PROVIDE ONLY MATERIALS CONFORMING TO THE FOLLOWING REQUIREMENTS:

POLYETHYLENE FILM - ASTM C 171, TYPE II
WATERPROOF PAPER - ASTM C 171, TYPE I
ABSORPTIVE COVER - AASHTO M 182, CLASS 3, BURLAP CLOTH MADE FROM JUTE OR KENAF OR ASTM C 440 COTTON MATS

DO NOT USE MOISTURE RETAINING CURING COMPOUNDS FOR CURING SURFACES TO RECEIVE THE FOLLOWING COVERINGS, UNLESS IT HAS BEEN DEMONSTRATED THAT SUCH COMPOUNDS WILL NOT PREVENT BOND OF:

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY GROUT OR BONDING MATERIAL
EPOXY COATINGS

C. TEMPERATURE, WIND AND HUMIDITY

DO NOT PERMIT CONCRETE NOT FULLY CURED TO BE EXPOSED TO EXCESSIVE TEMPERATURE CHANGES, OR HIGH WINDS.

03300.14 VAPOR BARRIER

APPLY ON SUBGRADE UNDER NEW CONCRETE SLAB-ON-GRADE, AND ON SCABBLED SURFACE OF EXISTING CONCRETE PAD, A VAPOR BARRIER CONSISTING OF HIGH DENSITY POLYETHYLENE FILM NOT THINNER THAN 12 MILS, CONFORMING TO ASTM D 2103 AND MEETING WATER RETENTION REQUIREMENTS OF ASTM C 171.

PROVIDE FILM IN WIDTH AND LENGTH NOT LESS THAN 1 FOOT LARGER THAN DIMENSIONS OF SCABBLED SURFACE UNLESS PATENTLY IMPRACTICABLE. WHERE JOINTS ARE NECESSARY, LAP EDGES NOT LESS THAN 4 INCHES. TAKE CARE TO AVOID PUNCTURING FILM. TAPESEAL ALL SEAMS, JOINTS, TEARS, CUTS AND HOLES.

03300.15 CHEMICAL RESISTANT COATING - TRENCHES AND SUMPS

COAT THE ENTIRE INTERIOR SURFACE OF NEW TRENCHES AND SUMPS AND EXISTING INLETS WITH EPOXY FLOOR COATING AS SPECIFIED IN SECTION 09702.

03300.16 RENOVATION OF CONCRETE PAD

A. REMOVING CONCRETE SURFACE

SCABBLE OR MECHANICALLY ABRADE ENTIRE SURFACE OF EXISTING CONCRETE PAD TO REMOVE A MINIMUM OF 1/4 INCH OF SURFACE INCLUDING ALL LOOSE CONCRETE, LAITANCE, DIRT, GREASE, EXISTING COATINGS AND OTHER CONTAMINATING MATERIALS. EQUIPMENT TO BE FITTED WITH DUST COLLECTORS AND MEPA/HEPA FILTERS.

B. RESURFACING CONCRETE

AFTER REMOVING EXISTING SURFACE, PRIME THE EXISTING CONCRETE AND RESURFACE AREAS ROUGH IN TEXTURE OR WITH ABRUPT CHANGE IN SURFACE WITH SUITABLE LATEX CONCRETE. PROVIDE TROWELED FINISH MEETING SLOPES AND ELEVATIONS OF ADJACENT, CONTIGUOUS SURFACES.

03300.17 RENOVATION OF JOINTS AND CRACKS IN EXISTING SLABS

AFTER THE SURFACE OF THE EXISTING PAD HAS BEEN REMOVED AS SPECIFIED HEREINBEFORE, AND BEFORE ANY RESURFACING WORK BEGINS, THE OPERATING CONTRACTOR WILL RADIOLOGICALLY SURVEY ALL EXISTING JOINTS AND CRACKS TO DETERMINE LEVELS OF CONTAMINATION, IF ANY, IN SUCH JOINTS AND CRACKS.

ANY JOINTS OR CRACKS DETERMINED TO BE CONTAMINATED ARE TO BE CUT OUT AND REPLACED IN ACCORDANCE WITH THE DETAILS OR THE DRAWINGS, USING MATERIALS SPECIFIED HEREINBEFORE IN THIS SECTION.

THE SUBCONTRACTOR IS TO INCLUDE IN HIS BID ALL REQUIRED COSTS FOR THE RENOVATION OF 600 LINEAR FEET OF CONTAMINATED JOINTS AND CRACKS, INCLUDING THE TIME ALLOWANCE FOR THE OPERATING CONTRACTOR'S RADIOLOGICAL SURVEY OF SUCH JOINTS AND CRACKS.

03300.18 EMBEDDED ITEMS

PRIOR TO CONCRETING, PLACE EMBEDDED ITEMS TO BE PROVIDED UNDER THIS SECTION OR TO BE FURNISHED UNDER OTHER SECTIONS FOR INSTALLATION UNDER THIS SECTION.

GIVE ALL SUBCONTRACTORS WHOSE WORK IS RELATED TO THE CONCRETE OR MUST BE SUPPORTED BY IT, AMPLE NOTICE AND OPPORTUNITY TO INTRODUCE AND/OR FURNISH EMBEDDED ITEMS BEFORE THE CONCRETE IS PLACED.

SET ANCHOR BOLTS FOR THE FRAMED STRUCTURES AND LIGHT POLES IN ACCORDANCE WITH SETTING DRAWINGS OR TEMPLATES, FURNISHED BY THE VENDOR, WHICH HAVE BEEN REVIEWED AND FOUND SATISFACTORY.

WHERE HOLES IN CONCRETE FOR SUCH PURPOSES AS PASSAGEWAYS FOR PIPES AND THE LIKE ARE SHOWN FORMED BY SLEEVES, THE SUBCONTRACTOR MAY, AT HIS OPTION, PROVIDE SUCH HOLES BY DRILLING WITH ACCEPTABLE DIAMOND OR TUNGSTEN CARBIDE TIPPED DRILL BITS.

03300.19 TESTING

A. GENERAL

THE CONSTRUCTION MANAGER WILL MAKE ARRANGEMENTS WITH AND PAY FOR SERVICES OF TESTING AGENCY FOR OBTAINING TEST SPECIMENS AND PERFORMING ROUTINE TESTING OF MATERIALS OF PROPOSED MIX DESIGNS AND OF RESULTING CONCRETE FOR COMPLIANCE WITH TECHNICAL REQUIREMENTS OF SPECIFICATIONS.

TESTING OF FIELD-CURED TEST CYLINDERS, OR TESTING REQUIRED BECAUSE OF CHANGES REQUESTED BY SUBCONTRACTOR IN MATERIALS OR PROPORTIONS OF THE MIX, AS WELL AS ANY EXTRA TESTING OF CONCRETE OR MATERIALS OCCASIONED BY FAILURE TO MEET SPECIFICATION REQUIREMENTS, TO BE AT SUBCONTRACTOR'S EXPENSE.

FAILURE OF THE TESTING LABORATORY TO DETECT ANY DEFECTIVE WORK OR MATERIALS IS NOT IN ANY WAY TO PREVENT LATER REJECTION WHEN SUCH DEFECT IS DISCOVERED, NOR IS IT TO OBLIGATE THE CONSTRUCTION MANAGER FOR FINAL ACCEPTANCE.

THE TESTING AGENCY AND/OR ITS REPRESENTATIVES ARE NOT AUTHORIZED TO REVOKE, ALTER, RELAX, ENLARGE OR RELEASE ANY REQUIREMENT OF THE SPECIFICATIONS, NOR TO APPROVE OR ACCEPT ANY PORTION OF THE WORK, NOR TO ACT AS SUPERVISOR OR PERFORM OTHER DUTIES FOR SUBCONTRACTOR.

B. SERVICES PROVIDED BY THE TESTING AGENCY

FIELD SAMPLING - SECURE FROM DIFFERENT BATCHES, ON A TRULY RANDOM BASIS, COMPOSITE SAMPLES FOR ALL FIELD TESTING REQUIRED BELOW IN ACCORDANCE WITH ASTM C 172 WHERE APPLICABLE. TAKE ALL SAMPLES AT DISCHARGE END OF CONVEYING SYSTEM. CLEARLY MARK EACH TEST SPECIMEN MASTER AS TO EXACT PART OF THE STRUCTURE REPRESENTED, CLASS OF CONCRETE, CURING CONDITIONS, TEMPERATURE OF CONCRETE, AND TIME AND DATE OF SAMPLE.

COMPRESSIVE STRENGTH TEST - MOLD AND CURE TEST CYLINDERS IN ACCORDANCE WITH ASTM C 31 AND TEST EACH CYLINDER FOR STRENGTH IN ACCORDANCE WITH ASTM C 39. TAKE ONE "TEST SET" CONSISTING OF THREE CYLINDERS FOR EACH DAY'S POUR OF 50 CUBIC YARDS OR LESS, AND ONE ADDITIONAL TEST SET FOR EVERY 50 CUBIC YARDS, OR PART THEREOF, THEREAFTER. TEST ONE CYLINDER AT 7 DAYS AND TWO AT 28 DAYS.

SLUMP TESTS - DETERMINE SLUMP RANGE FOR EACH "TEST SET" IN CONFORMANCE WITH ASTM C 143. PERFORM ADDITIONAL SLUMP TESTS WHEN DIRECTED BY THE CONSTRUCTION MANAGER.

AIR CONTENT TEST - DETERMINE AIR CONTENT FOR EACH "TEST SET" FOR AIR-ENTRAINED CONCRETE IN ACCORDANCE WITH ASTM C 231.

SUBMIT ONE COPY OF THE RESULTS OF EACH OF THE ABOVE TESTS AND INSPECTIONS TO THE SUBCONTRACTOR AND THE CONSTRUCTION MANAGER REPRESENTATIVE.

SHOULD ANY OF THE TEST RESULTS FAIL TO MEET THE REQUIREMENTS SPECIFIED, MAKE AN IMMEDIATE TELEPHONE REPORT TO THE SUBCONTRACTOR AND THE CONSTRUCTION MANAGER.

FURNISH EVALUATION REPORTS OF COMPRESSION TESTS AS RECOMMENDED BY ACI 214 WHEN ANY COMPRESSION TEST FAILS TO MEET THE SPECIFIED STRENGTH.

03300.20 ACCEPTANCE OF CONCRETE WORK

A. GENERAL

ACCEPTANCE OF CONCRETE WORK WILL BE MADE IN CONFORMANCE WITH ACI 301, EXCEPT THAT SUBCONTRACTOR MUST PAY ALL COSTS INCURRED FOR PROVIDING ANY ADDITIONAL TESTING OR ANALYSIS REQUIRED WHEN STRENGTH OF STRUCTURE IS CONSIDERED POTENTIALLY DEFICIENT.

B. CRACKS

THE SUBCONTRACTOR WILL BE REQUIRED TO RESTORE, WITHOUT ADDITIONAL CONTRACT COST, ANY CONCRETE OR SURFACING WHICH DEVELOPS CRACKS WITHIN A PERIOD OF ONE YEAR AFTER PLACEMENT WHICH HAS NOT BEEN CAUSED BY ACTION OF OTHERS IN OVERSTRESSING THE CONCRETE.

REPAIR THE CRACKS BY MEANS THAT WILL RESTORE THE CRACKED AREA TO THE DESIGNED INTEGRITY AND APPEARANCE AND WHICH WILL NOT IMPAIR THE APPEARANCE OF THE AFFECTED SURFACES, IF EXPOSED. SUCH REPAIRS MUST BE PERFORMED BY AN ORGANIZATION HAVING SATISFACTORILY DEMONSTRATED ABILITY IN THE TECHNIQUES NECESSARY TO EFFECT SUCH REPAIRS. REPAIR WORK TO INCLUDE REPAIRS TO ALL COATINGS, TOPPINGS OR WEARING SURFACES.

DIVISION 5

05500 - MISCELLANEOUS METAL

05500.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE MISCELLANEOUS METALWORK, INCLUDING:

BOLLARDS AND PIPE POSTS FOR DOOR CONTROLS
TRENCH AND SUMP GRATING

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

FRAME SUPPORTED FABRIC STRUCTURES
FINISH PAINT, EXCEPT AS SPECIFIED

05500.02 SUBMITTALS

A. SHOP DRAWINGS

COORDINATE MISCELLANEOUS METALWORK WITH WORK OF GENERAL CONSTRUCTION, MECHANICAL AND ELECTRICAL TRADES PRIOR TO SUBMISSION OF COMPLETE SHOP DRAWINGS FOR REVIEW.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

B. FIELD MEASUREMENTS

TAKE FIELD MEASUREMENTS AT JOBSITE TO VERIFY SHOP DRAWINGS. SUBMIT WRITTEN NOTIFICATION OF DISCREPANCIES BETWEEN FIELD CONDITIONS, SHOP DRAWINGS AND OTHER CONTRACT DOCUMENTS, TO CONSTRUCTION MANAGER.

05500.03 APPLICABLE STANDARDS

PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH APPLICABLE PROVISIONS OF LATEST EDITION OF FOLLOWING PUBLICATIONS.

A. AMERICAN WELDING SOCIETY (AWS)

STRUCTURAL WELDING CODE (AWS D1.1), LATEST EDITION, INCLUDING SUPPLEMENTS.

AN FMPC WELDING PERMIT IS REQUIRED PRIOR TO ANY FLAME CUTTING OR WELDING.

B. STEEL STRUCTURES PAINTING COUNCIL (SSPC)

STEEL STRUCTURES PAINTING MANUAL

05500.04 FABRICATION, DELIVERY AND ERECTION

A. GENERAL

FABRICATE AND ERECT ACCORDING TO AISC CODE OF GENERAL PRACTICE. FIT WORK TOGETHER AT SHOP AS FAR AS POSSIBLE AND DELIVER TO JOB COMPLETE AND READY FOR ERECTION. MAKE PROVISIONS FOR SECURELY ANCHORING MISCELLANEOUS METALWORK. FABRICATE TO MEET REQUIREMENTS OF WORK UNDER OTHER SECTIONS OR SPECIFICATIONS AND SECURED TO MISCELLANEOUS METALWORK.

PROVIDE PROTECTION, PLANKING, COVERING, ETC., REQUIRED BY LAWS HAVING JURISDICTION. AT COMPLETION, REMOVE EQUIPMENT PROMPTLY.

B. FABRICATION

INSOFAR AS POSSIBLE, FIT AND SHOP ASSEMBLE ALL WORK. EXECUTE WORK IN STRICT ACCORDANCE WITH CONTRACT DOCUMENTS. WELDING TO BE DONE BY CERTIFIED WELDERS WITH EXPOSED JOINTS DRESSED FLUSH AND SMOOTH.

C. DELIVERY

PROVIDE WORK IN AMPLE TIME TO PREVENT DELAYS IN JOB PROGRESS. DELIVER ITEMS TO JOBSITE AT SUCH TIME AS REQUIRED FOR PROPER COORDINATION.

D. STORAGE

STACK AND SUPPORT MATERIALS WITH BLOCKING. STORE MATERIALS IN DRY AND CLEAN AREA AND REMOVE EARTH, GREASE AND OTHER FOREIGN MATTER FROM METAL SURFACES BEFORE ERECTING.

E. SHOP PAINTING

UNLESS OTHERWISE SPECIFIED, PAINT SURFACES OF MISCELLANEOUS METALWORK WITH ONE SHOP COAT OF METAL PROTECTIVE PRIMER. PREPARE SURFACES IN ACCORDANCE WITH STANDARDS OF STEEL STRUCTURES PAINTING COUNCIL SPECIFICATION SP-3 FOR POWER TOOL CLEANING, AND APPLY PAINT IN ACCORDANCE WITH SPECIFICATION PA-1, PAINT APPLICATION SPECIFICATIONS. DO NOT PAINT CONTACT SURFACES OF MEMBERS TO BE FIELD CONNECTED BY WELDS OR HIGH TENSILE BOLTS.

APPLY TWO COATS OF PRIMER TO SURFACES WHICH ARE INACCESSIBLE AFTER ASSEMBLY OR ERECTION.

APPLY PRIMER TO PROVIDE MINIMUM 2 MIL DRY THICKNESS PER COAT AT ALL POINTS.

PREPARE SURFACES AND PAINT ABRADED OR DAMAGED PAINT SURFACES OF STEEL, WELDS, AND HEADS AND NUTS OF FIELD BOLTS AFTER ERECTION WITH SAME SURFACE PREPARATION AND PAINT SPECIFIED FOR SHOP PAINTING.

PAINT AS MANUFACTURED BY:

SHERWIN-WILLIAMS - KEM KROMIK
PORTER PAINT CO. - NO. 298 GRAY PRIMER
PRATT & LAMBERT - NO. C-107 GRAY PRIMER, OR EQUAL

F. ERECTION

PROVIDE AND SET HANGERS, RODS, BARS, PLATES, BOLTS, BUTTS, SCREWS, ANCHORS, BRACKETS, RIVETS, WELDS, LUGS, ETC., AS MAY BE REQUIRED TO COMPLETE THIS WORK AND TO JOIN WORK OF OTHERS. WHEN EXPOSED, PROVIDE MATERIALS AND FINISHES IDENTICAL TO ADJACENT WORK.

PROVIDE BRACING, BLOCKING, CUTTING, FITTING, DRILLING, TAPPING, LEADING, ETC., AS REQUIRED TO COMPLETE THIS WORK AND JOIN TO WORK OF OTHERS.

ERECT WORK SQUARE, PLUMB, STRAIGHT AND TRUE, ACCURATELY FITTED WITH TIGHT JOINTS AND INTERSECTIONS ADEQUATELY REINFORCED AND ANCHORED IN PLACE. FINISH EXPOSED WORK TO BE SMOOTH WITH EVEN, CLOSE JOINTS AND NEAT CONNECTIONS.

05500.05 MATERIALS - GENERAL

A. MACHINE SCREWS

FEDERAL SPECIFICATION FF-S-92.

B. STEEL PIPE

ASTM A 53, TYPE E OR S, GRADE A. STANDARD WEIGHT (SCHEDULE 40).

C. STRUCTURAL STEEL SHAPES, PLATES AND BARS

ASTM A 36, UNLESS OTHERWISE INDICATED.

D. WELDING RODS

GAS WELDING RODS AND ARC WELDING ELECTRODES MUST MEET REQUIREMENTS OF AWS SPECIFICATIONS FOR IRON AND STEEL ARC WELDING ELECTRODES.

05500.06 ANCHORAGE AND SUPPORT ITEMS

PROVIDE MACHINE BOLTS, NUTS AND WASHERS AS REQUIRED. BOLTS LESS THAN 3/4 INCH DIAMETER TO COMPLY WITH ASTM A 307, GRADE A, OR EQUAL, AS CERTIFIED BY SUBCONTRACTOR.

FOR BOLTS 3/4 INCH DIAMETER AND LARGER PROVIDE HIGH STRENGTH BOLTS, HEX HEADS AND WASHERS AS REQUIRED AND TO COMPLY WITH ASTM A 325.

05500.07 TRENCH GRATING

NEENAH R-4990 HEAVY DUTY DUCTILE IRON, CLASS A, TRENCH GRATING, OR EQUAL, 1-1/2 INCHES THICK. COVER: GRATED TYPE A. FRAME: TYPE X.

AT EACH SUMP PROVIDE SAME GRATING 2 INCHES THICK.

05500.08 MISCELLANEOUS STRUCTURAL STEEL

PROVIDE CONCRETE FILLED STANDARD WEIGHT PIPE BOLLARDS, AND SIMILAR PIPE POSTS FOR MOUNTING OF VEHICLE DOOR CONTROL PUSHBUTTONS. PROVIDE BOLLARDS AND CONTROL POSTS BOTH INDOORS AND OUTDOORS OF VEHICLE DOORS

LOCATION OF EACH SUCH BOLLARD AND POST MUST BE CAREFULLY LOCATED WITH FULL CONSIDERATION OF CLEARANCES AND OPERATION OF VEHICLES.

DIVISION 9

09701 - POLYURETHANE ELASTOMER/WEARING SURFACE

09701.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES AND DO ALL WORK NECESSARY TO PROVIDE COMPLETE EXTERIOR POLYURETHANE ELASTOMER/WEARING SURFACE WORK.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

CONCRETE
JOINT SEALANTS
EPOXY FLOOR COATING
EPOXY COATING
FINISH PAINTING

09701.02 SUBMITTALS

A. GENERAL

SUBMIT LIST OF SIMILAR EXTERIOR POLYURETHANE ELASTOMER/WEARING SURFACE INSTALLATIONS DEMONSTRATING SUCCESSFUL USAGE AND DURABILITY.

SUBMIT MANUFACTURER'S SPECIFICATIONS, MSDS DATA SHEETS, AND SPECIFIC APPLICATION INSTRUCTIONS FOR WORK UNDER THIS SECTION.

MANUFACTURER'S SPECIFICATIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

ULTIMATE DIRECT TENSILE STRENGTH
TENSILE YOUNG'S MODULUS OF ELASTICITY
FLEXURAL YOUNG'S MODULUS OF ELASTICITY
ULTIMATE COMPRESSIVE STRENGTH
MOISTURE ABSORPTION
TEMPERATURE RESISTANCE, MAXIMUM ALLOWABLE TEMPERATURE, CONTINUOUS AND INTERMITTENT
ASTM D 696 TEST DATA VERIFYING COEFFICIENT OF THERMAL EXPANSION
CHEMICAL RESISTANCE TABLES

APPLICATION INSTRUCTIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE PREPARATION
DETAILED APPLICATION PROCEDURES
MINIMUM AND MAXIMUM APPLICATION LIMITS OF HUMIDITY AND TEMPERATURES

CURING TIMES REQUIRED FOR EACH COMPONENT
MAXIMUM PERMISSIBLE MOISTURE CONTENT OF CONCRETE SLAB PRIOR TO APPLICATION

SUBMIT THE NAME OF MANUFACTURER'S REPRESENTATIVE WHO WILL BE RESPONSIBLE FOR INSPECTION OF AREAS TO RECEIVE THE POLYURETHANE ELASTOMER/WEARING SURFACE AND FOR CERTIFICATION THAT CONCRETE BASE SLAB MOISTURE CONTENT IS BELOW THE MANUFACTURER'S MAXIMUM PERMISSIBLE MOISTURE CONTENT.

B. SAMPLES

SUBMIT TWO 12 INCH BY 12 INCH SAMPLE PANELS OF MATERIAL SPECIFIED, WITH TEXTURE TO SIMULATE ACTUAL CONDITIONS, INCLUDING ABRASIVE AGGREGATE.

ALL FINISHED WORK MUST CONFORM TO ACCEPTED SAMPLES.

C. ADDITIONAL REQUIREMENTS

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

09701.03 DELIVERY AND STORAGE

DELIVER MATERIALS TO THE JOBSITE IN ORIGINAL, NEW AND UNOPENED PACKAGES AND WITH CONTAINERS BEARING MANUFACTURER'S NAME AND LABEL.

PROVIDE LABELS ON EACH CONTAINER INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING INFORMATION.

NAME OR TITLE OF MATERIAL
MANUFACTURER'S STOCK NUMBER
MANUFACTURER'S NAME
CONTENTS BY VOLUME, FOR MAJOR ELEMENTS
BATCHING DATE
BATCHING NUMBER
APPLICATION INSTRUCTIONS
COLOR

STORE MATERIALS USED ON JOB IN A SINGLE AREA PROTECTED FROM WEATHER. KEEP STORAGE AREA NEAT AND CLEAN. PROTECT FLOOR AND OTHER SURFACES WITH DROP CLOTHS OR BUILDING PAPER. TAKE NECESSARY PRECAUTIONS TO PREVENT FIRE. COMPLY WITH OSHA REQUIREMENTS FOR AMBIENT AIR CONDITIONS.

09701.04 HEAT AND RELATIVE HUMIDITY

BEFORE, DURING AND AFTER INSTALLATION, INSURE THAT AMBIENT TEMPERATURE AND RELATIVE HUMIDITY WILL BE AT VALUES REQUIRED BY THE MANUFACTURER FOR PROPER INSTALLATION.

SUBCONTRACTOR INSTALLING POLYURETHANE ELASTOMER/WEARING SURFACE UNDER THIS SECTION IS RESPONSIBLE FOR PROVIDING ANY ADDITIONAL PROTECTION REQUIRED FOR PROPER INSTALLATION AND MUST PROVIDE ALL REQUIRED FACILITIES TO INSURE INSTALLATION DURING PERIODS OF REQUIRED RELATIVE HUMIDITY CONDITIONS.

09701.05 MATERIALS, PRODUCTS AND MANUFACTURERS

PROVIDE A HEAVY DUTY CHEMICAL AND ABRASION RESISTANT NON-SKID SURFACE CONSISTING OF THE FOLLOWING:

A. TWO COATS OF POLYURETHANE ELASTOMER AS MANUFACTURED BY NEOGARD, URETHANE PLASTICS, GENERAL POLYMERS, PETERSON CHEMICAL, OR AMERICAN COLLOID CO., EACH COAT A MINIMUM OF 25 MILS DRY.

B. THIRD COAT OF POLYURETHANE ELASTOMER, FINISHED THICKNESS A MINIMUM OF 10 MILS DRY. WHILE STILL WET, BROADCAST 20-24 GRIT ALUMINUM OXIDE OR EQUIVALENT HARD AGGREGATE OVER THE SURFACE IN EXCESS. AFTER HARDENING, SWEEP OFF EXCESS AGGREGATE.

C. SEMI-FLEXIBLE, LOW MODULUS EPOXY (100% SOLID) HAVING A MINIMUM TENSILE ELONGATION OF 15%, AT A SPREAD RATE OF 70-80 SQ. FT./GAL. (APPROXIMATELY 20 MILS). WHILE STILL WET, BROADCAST 20-24 GRIT ALUMINUM OXIDE OR EQUIVALENT HARD AGGREGATE OVER THE SURFACE IN EXCESS. AFTER HARDENING, SWEEP OFF EXCESS AGGREGATE.

   ACCEPTABLE SUPPLIERS ARE AMERICAN COLLOID CO., EUCLID CHEMICAL, GENERAL POLYMERS, SIKA CHEMICALS OR ADHESIVE ENGINEERING.

D. AFTER PROPER CURING, SEAL NON-SKID SURFACE WITH TWO COATS OF CHEMICAL RESISTANT, ALIPHATIC POLYURETHANE COATING. THICKNESS OF EACH APPLIED COAT TO BE A MINIMUM OF 3 MILS DRY. SUPPLIERS OF ACCEPTABLE MATERIALS INCLUDE AMERICAN COLLOID CO., ADVANCE CHEMICAL, GENERAL POLYMERS, LORD CHEMICAL, OR TENNENT COMPANY.

09701.06 JOB CONDITIONS AND STANDARDS

SUBCONTRACTOR, POLYURETHANE ELASTOMER/WEARING SURFACE INSTALLER AND MATERIAL MANUFACTURER'S REPRESENTATIVE TO JOINTLY INSPECT AREAS TO BE COVERED, IN THE PRESENCE OF THE CONSTRUCTION MANAGER'S REPRESENTATIVE. INSPECTION TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE QUALITY AND REQUIRED SLOPE OF CONCRETE BASE SLABS
CONCRETE BASE SLAB CONSTRUCTION DETAILS, INCLUDING RAMPS AND CURBS
CONCRETE BASE SLAB JOINT LAYOUT
CONCRETE BASE SLAB SUBGRADE AND VAPOR RETARDER MEMBRANE
CALKING OF ALL FLOOR JOINTS

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SUBCONTRACTOR, INSTALLER AND MATERIAL MANUFACTURER ARE TO REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK TO THE CONSTRUCTION MANAGER'S REPRESENTATIVE.

DO NOT PROCEED WITH THIS WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED AND ALL CONDITIONS ARE CERTIFIED AS ACCEPTABLE BY THE SUBCONTRACTOR, INSTALLER AND MATERIAL MANUFACTURER.

STARTING OF WORK CONSTITUTES ACCEPTANCE OF SURFACES BY THE SUBCONTRACTOR, INSTALLER AND MATERIAL MANUFACTURER AND ANY REPLACEMENT REQUIRED TO CORRECT DEFECTS IS TO BE MADE AT THE SUBCONTRACTOR'S EXPENSE.

09701.07 INSTALLATION

A. GENERAL

ALLOW NEW CONCRETE TO CURE A MINIMUM OF 30 DAYS. REMOVE ALL SOLVENT, GREASE, OIL, DUST OR FOREIGN MATERIAL PRIOR TO APPLICATION OF POLYURETHANE ELASTOMER/WEARING SURFACE.

IF CLEANING OF BASE SLABS WITH COMMERCIAL CLEANERS IS REQUIRED, PERMIT SLABS TO DRY FOR AT LEAST 1 WEEK PRIOR TO MOISTURE TESTING AND SUBSEQUENT APPLICATION OF POLYURETHANE ELASTOMER/WEARING SURFACE.

B. SURFACE PREPARATION

SANDBLAST CONCRETE SLAB WITH SELF-CONTAINED NON-SILICONE BLASTING EQUIPMENT TO REMOVE GREASE, DIRT, DUST, LOOSE CONCRETE AND OTHER CONTAMINATING MATERIALS.

C. MOISTURE TESTING

BEFORE COMMENCING INSTALLATION OF POLYURETHANE ELASTOMER/WEARING SURFACE, SUBCONTRACTOR TO CERTIFY THAT CONCRETE BASE SLAB HAS DRIED OUT SUFFICIENTLY TO SATISFY SPECIFICATION REQUIREMENTS OF THE POLYURETHANE ELASTOMER/WEARING SURFACE MANUFACTURER.

SUBCONTRACTOR TO SUBMIT WRITTEN CERTIFICATION OF ACCEPTANCE OF BASE SLAB CONDITIONS, SIGNED BY THE SUBCONTRACTOR, THE INSTALLER AND MATERIAL MANUFACTURER'S REPRESENTATIVE. AFTER NOTIFICATION OF RECEIPT AND APPROVAL OF CERTIFICATION BY THE CONSTRUCTION MANAGER'S REPRESENTATIVE, INSTALLATION MAY BE STARTED.

D. JOINTS AND CRACKS

PROVIDE ELASTOMERIC CRACK BRIDGING MEMBRANE, 40 MILS THICK, MINIMUM 36 INCHES WIDE, SELF-BONDING, AS MANUFACTURED BY N.A.C. PRODUCTS, INC. OR EQUAL. JOINTS TO BE TREATED AND INSTALLED BELOW THE POLYURETHANE ELASTOMER/WEARING SURFACE IN ACCORDANCE WITH THE ELASTOMERIC CRACK BRIDGING MEMBRANE MANUFACTURER'S PRINTED INSTRUCTIONS.

E. CURING

CURE THE POLYURETHANE ELASTOMER/WEARING SURFACE IN ACCORDANCE WITH THE PRINTED RECOMMENDATIONS OF THE MANUFACTURER. DO NOT ALLOW TRAFFIC ON THE SURFACE BEFORE MANUFACTURER'S MINIMUM RECOMMENDED NUMBER OF HOURS.

F. FINAL TESTING

UPON COMPLETION OF INSTALLATION AND CURING OF THE POLYURETHANE ELASTOMER/WEARING SURFACE THE SUBCONTRACTOR SHALL BEGIN TESTING BY WET FILM GAGE, TOOKE GAGE OR CUTTING CORES, AT LEAST ONE TEST SAMPLE PER 1,000 SQUARE FEET, AND ONE ON EACH RAMP SLOPE, PREPARING A LOG OF ALL SUCH SAMPLES TAKEN, RECORDING TIME, DATE, TEST METHOD AND MIL THICKNESS MEASUREMENT OBSERVED. THE LOG RECORDS SHALL COVER THE ENTIRE SURFACE INSTALLED UNDER THIS PROJECT, AND THE SUBCONTRACTOR SHALL SUBMIT WRITTEN CERTIFICATION AND COPY OF LOG, SIGNED BY THE SUBCONTRACTOR, THE INSTALLER, AND THE MATERIAL MANUFACTURER. AFTER NOTIFICATION OF RECEIPT AND APPROVAL OF CERTIFICATION BY THE CONSTRUCTION MANAGER, THE SUBCONTRACTOR MUST REPAIR ALL TEST SAMPLE LOCATIONS AND RESTORE THE POLYURETHANE ELASTOMER/WEARING SURFACE TO ITS ORIGINAL CONDITION.

G. CLEANUP AND PROTECTION

AT THE COMPLETION OF THE POLYURETHANE ELASTOMER/WEARING SURFACE WORK, CLEAN OFF ALL MISPLACED MATERIAL AND OTHER BLEMISHES CAUSED BY THE WORK FROM ALL FINISHED SURFACES AND RESTORE THEM TO THEIR ORIGINAL CONDITION.

ON A DAILY BASIS, REMOVE ALL DISCARDED MATERIALS, DEBRIS, CANS AND RAGS.

PROTECT WORK OF OTHER TRADES FROM DAMAGE. CORRECT ANY DAMAGES BY CLEANING, REPAIRING OR REPLACING AS DIRECTED.

09701.08 GUARANTEE

PROVIDE 2 YEAR WRITTEN GUARANTEE FOR ALL WORK PERFORMED UNDER THIS SECTION FROM DATE OF FINAL ACCEPTANCE.

UNDER THE GUARANTEE, THE SUBCONTRACTOR, THE INSTALLER AND THE MATERIAL MANUFACTURER MUST AGREE TO REPAIR OR REPLACE ANY OF THE POLYURETHANE ELASTOMER/WEARING SURFACE WHICH FAILS TO BE FREE FROM DEFECTS IN MATERIALS, ADHESION, WEARING QUALITY, AND WORKMANSHIP.

DIVISION 9

09702 - EPOXY FLOOR COATING

09702.01 GENERAL

A. WORK SPECIFIED IN THIS SECTION

PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES TO COMPLETE CHEMICAL RESISTANT EXTERIOR EPOXY FLOOR COATING WORK, COVERING ALL CONCRETE SURFACES OF NEW AND EXISTING CONCRETE TRENCHES AND SUMPS.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY COATING - METAL SURFACES
PAINTING
CONCRETE

09702.02 SUBMITTALS

SUBMIT LIST OF SIMILAR EXTERIOR EPOXY FLOOR COATING INSTALLATIONS DEMONSTRATING SUCCESSFUL USAGE AND INSTALLATION.

SUBMIT MANUFACTURER'S SPECIFICATIONS, MSDS DATA SHEETS, AND SPECIFIC APPLICATION INSTRUCTIONS FOR WORK UNDER THIS SECTION.

MANUFACTURER'S SPECIFICATIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

MOISTURE ABSORPTION
TEMPERATURE RESISTANCE, MAXIMUM ALLOWABLE TEMPERATURE, CONTINUOUS AND INTERMITTENT
CHEMICAL RESISTANCE TABLES

APPLICATION INSTRUCTIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE PREPARATION
DETAILED APPLICATION PROCEDURES
MINIMUM AND MAXIMUM APPLICATION LIMITS OF HUMIDITY AND TEMPERATURES
CURING TIMES REQUIRED FOR EACH COMPONENT
MAXIMUM PERMISSIBLE MOISTURE CONTENT OF CONCRETE SLAB PRIOR TO APPLICATION

SUBMIT THE NAME OF MANUFACTURER'S REPRESENTATIVE WHO WILL BE RESPONSIBLE FOR INSPECTION OF AREAS TO RECEIVE THE EPOXY FLOOR COATING AND FOR CERTIFICATION THAT CONCRETE BASE MOISTURE CONTENT IS BELOW THE MANUFACTURER'S MAXIMUM PERMISSIBLE MOISTURE CONTENT.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

09702.03 HEAT AND RELATIVE HUMIDITY

BEFORE, DURING AND AFTER EPOXY FLOOR COATING INSTALLATION, INSURE THAT AMBIENT TEMPERATURE AND RELATIVE HUMIDITY WILL BE AT VALUES REQUIRED BY THE MANUFACTURER FOR PROPER INSTALLATION.

SUBCONTRACTOR INSTALLING EPOXY FLOOR COATING UNDER THIS SECTION IS RESPONSIBLE FOR PROVIDING ANY ADDITIONAL PROTECTION REQUIRED FOR PROPER INSTALLATION OF THE FLOOR COATING, AND ALL REQUIRED FACILITIES TO INSURE INSTALLATION DURING PERIOD OF REQUIRED RELATIVE HUMIDITY.

09702.04 MATERIALS

A. GENERAL

CURED EPOXY FLOOR COATING TO MEET THE FOLLOWING PHYSICAL PROPERTIES.

MOISTURE ABSORPTION	0.20 PERCENT, MAXIMUM
TEMPERATURE RESISTANCE	140F CONTINUOUS, 175F INTERMITTENT

B. EPOXY FLOOR COATING

TNEMEC HIBUILD EPOXILINE NO. 66 FLOORING SYSTEM, PORTER PAINT CO. MCR 4361/MCR 65, GENERAL POLYMER DE 3549/3543 OR EQUAL.

COLOR TO BE CLEAR OR GRAY.

C. PRIMER

PRIMER TO BE OF TYPE RECOMMENDED BY FLOOR COATING MANUFACTURER.

D. PATCHING COMPOUND

ACRYLIC POLYMER CONCRETE PATCHING COMPOUND RECOMMENDED BY EPOXY COATING MANUFACTURER.

E. CALKING

TWO-COMPONENT POLYURETHANE ELASTOMERIC BASE SEALANT CONFORMING TO FEDERAL SPECIFICATION TT-S-00227E, CLASS A, TYPE I (SELF-LEVELING).

F. JOINT BACKING

COMPRESSIBLE JOINT BACKING, NONSTAINING, NONABSORBENT, IN ROUND FORM. PROVIDE SIZE AS REQUIRED. USE CLOSED CELL POLYETHYLENE.

09702.05 JOB CONDITIONS AND STANDARDS

SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER TO JOINTLY INSPECT AREAS THAT RECEIVE EPOXY FLOOR COATING IN THE PRESENCE OF THE CONSTRUCTION MANAGER'S REPRESENTATIVE. INSPECTION TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE QUALITY OF CONCRETE TRENCH
CONCRETE JOINTS REQUIRING CALKING
CONCRETE SURFACE DEFICIENCIES REQUIRING PATCHING

SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER TO REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK TO THE CONSTRUCTION MANAGER'S REPRESENTATIVE.

DO NOT PROCEED WITH THIS WORK UNTIL UNSATISFACTORY CONDITIONS ARE CERTIFIED AS ACCEPTABLE BY THE SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER.

STARTING OF WORK CONSTITUTES ACCEPTANCE OF SURFACES BY THE SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER AND ANY REPLACEMENT REQUIRED TO CORRECT DEFECTS IS TO BE MADE AT THE SUBCONTRACTOR'S EXPENSE.

09702.06 INSTALLATION

A. GENERAL

REMOVE ALL SOLVENT, GREASE, OIL, DUST OR FOREIGN MATERIAL PRIOR TO APPLICATION OF EPOXY FLOOR COATING.

IF CLEANING OF CONCRETE TRENCH AND SUMP WITH COMMERCIAL CLEANERS IS REQUIRED, PERMIT CONCRETE TO DRY PRIOR TO MOISTURE TESTING AND SUBSEQUENT APPLICATION OF EPOXY FLOOR COATING.

B. SURFACE PREPARATION

IF NECESSARY SANDBLAST CONCRETE TRENCH AND SUMP WITH SELF-CONTAINED NON-SILICONE BLASTING EQUIPMENT TO REMOVE GREASE, DIRT, DUST, LOOSE CONCRETE AND OTHER CONTAMINATING MATERIALS. OBTAIN CONSTRUCTION MANAGER'S AND FMPC APPROVAL OF SANDBLASTING PROCEDURE.

C. MOISTURE TESTING

BEFORE COMMENCING INSTALLATION OF EPOXY FLOOR COATING, SUBCONTRACTOR TO CERTIFY THAT CONCRETE SURFACES WHICH ARE TO RECEIVE COATING HAVE DRIED SUFFICIENTLY TO SATISFY SPECIFICATION REQUIREMENTS OF THE EPOXY FLOOR COATING MANUFACTURER.

SUBCONTRACTOR TO SUBMIT WRITTEN CERTIFICATION OF THE ACCEPTANCE OF CONCRETE CONDITIONS, SIGNED BY THE SUBCONTRACTOR, THE EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER'S REPRESENTATIVE. AFTER NOTIFICATION OF RECEIPT AND APPROVAL OF SUCH CERTIFICATION BY THE CONSTRUCTION MANAGER'S REPRESENTATIVE, INSTALLATION OF FLOOR COATING MAY BE STARTED.

D. PRIMING

APPLY PRIMER ON AREA TO RECEIVE EPOXY FLOOR COATING. INSPECT SURFACE TO ENSURE THERE IS NO PUDDLING OR VOIDS.

FOLLOW MANUFACTURER'S PRINTED INSTRUCTIONS FOR MIXING AND APPLICATION OF PRIMER. SUBCONTRACTOR TO CERTIFY PROPER DEGREE OF ADHESION FOR START OF COATING APPLICATION.

E. COATING APPLICATION

APPLY COATING OVER THE PRIMER.

MINIMUM THICKNESS OF EPOXY FLOOR COATING TO BE 5 MILS DFT.

FOLLOW MANUFACTURER'S PRINTED INSTRUCTIONS FOR MIXING AND APPLICATION OF EPOXY FLOOR COATING.

F. CURING

CURE THE EPOXY FLOOR COATING IN ACCORDANCE WITH THE PRINTED RECOMMENDATIONS OF THE MANUFACTURER. DO NOT ALLOW TRAFFIC ON FLOOR COATING BEFORE MANUFACTURER'S MINIMUM RECOMMENDED NUMBER OF HOURS.

G. FINAL TESTING

UPON COMPLETION OF INSTALLATION AND CURING OF THE EPOXY FLOOR COATING SURFACE THE SUBCONTRACTOR SHALL BEGIN TESTING BY WET FILM GAGE, TOOKE GAGE OR CUTTING CORES, AT LEAST ONE TEST SAMPLE PER 1,000 SQUARE FEET, AND ONE ON EACH RAMP SLOPE, PREPARING A LOG OF ALL SUCH SAMPLES TAKEN, RECORDING TIME, DATE, TEST METHOD AND MIL THICKNESS MEASUREMENT OBSERVED. THE LOG RECORDS SHALL COVER THE ENTIRE SURFACE INSTALLED UNDER THIS PROJECT, AND THE SUBCONTRACTOR SHALL SUBMIT WRITTEN CERTIFICATION AND COPY OF LOG, SIGNED BY THE SUBCONTRACTOR, THE INSTALLER, AND THE MATERIAL MANUFACTURER. AFTER NOTIFICATION OF RECEIPT AND APPROVAL OF CERTIFICATION BY THE CONSTRUCTION MANAGER, THE SUBCONTRACTOR MUST REPAIR ALL TEST SAMPLE LOCATIONS AND RESTORE THE EPOXY FLOOR COATING SURFACE TO ITS ORIGINAL CONDITION.

H. CLEANUP AND PROTECTION

AT THE COMPLETION OF THE EPOXY FLOOR COATING WORK, CLEAN OFF ALL MISPLACED COATING, CALKING, AND OTHER BLEMISHES CAUSED BY THE WORK FROM ALL FINISHED SURFACES AND RESTORE THEM TO THEIR ORIGINAL CONDITION.

ON A DAILY BASIS, REMOVE ALL DISCARDED FLOOR COATING MATERIALS, DEBRIS, CANS AND RAGS.

PROTECT WORK OF OTHER TRADES FROM DAMAGE BY EPOXY FLOOR COATING WORK. CORRECT ANY DAMAGES BY CLEANING, REPAIRING OR REPLACING AS DIRECTED.

09702.07 GUARANTEE

PROVIDE 2 YEAR WRITTEN GUARANTEE FOR ALL WORK PERFORMED UNDER THIS SUBDIVISION FROM DATE OF FINAL ACCEPTANCE.

UNDER THE GUARANTEE, THE SUBCONTRACTOR, THE EPOXY FLOOR COATING INSTALLER AND THE COATING MANUFACTURER MUST AGREE TO REPAIR OR REPLACE EPOXY COATING WHICH FAILS TO BE FREE FROM DEFECTS IN MATERIALS, ADHESION, AND WORKMANSHIP.

DIVISION 9

09870 - EPOXY COATING - METAL SURFACES

09870.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE EPOXY COATING FOR NEW METAL TRENCH AND SUMP GRATING, NEW GRATING FRAMES, MANHOLE COVERS, AND OTHER METAL FLOOR SURFACES.

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY FLOOR COATING IN TRENCHES
FINISH PAINTING

09870.02 GENERAL

A. EQUIPMENT

PROVIDE STAGING, SPRAYING, BRUSHES AND OTHER EQUIPMENT AS NECESSARY FOR PROPER CONDUCT OF WORK. PLACE STAGING, AND OTHER EQUIPMENT TO INTERFERE AS LITTLE AS POSSIBLE WITH OTHER WORK.

B. STORAGE

STORE MATERIALS USED ON JOB IN A SINGLE PLACE AS DIRECTED. PROTECT FROM WEATHER. KEEP STORAGE PLACE NEAT AND CLEAN. PROTECT FLOOR WITH DROP CLOTHS OR BUILDING PAPER. REPAIR DAMAGE TO STORAGE AREAS AS DIRECTED. TAKE NECESSARY PRECAUTIONS TO PREVENT FIRE, AND PREVENT MATERIALS FROM FREEZING. COMPLY WITH OSHA REQUIREMENTS FOR AMBIENT AIR CONDITIONS.

C. PROTECTION OF WORK

PROTECT WORK AND MATERIALS INSTALLED. REMOVE SOILED RAGS AND WASTE EVERY NIGHT. REMOVE TRENCH GRATING AND SIMILAR ITEMS WHEREVER PRACTICABLE TO COAT BOTH SIDES, EDGES, AND FRAMES, AND REPLACE AFTER COMPLETION OF COATING. ADEQUATELY PROTECT ITEMS WHICH ARE IN PLACE DURING COATING OPERATIONS. PROTECT ALL WORK OF OTHER TRADES AGAINST DAMAGE.

D. DELIVERY

DELIVER MATERIALS TO SITE IN ORIGINAL CONTAINERS WITH LABELS INTACT AND SEALS UNBROKEN. PROVIDE LABELS ON EACH CONTAINER WITH NAME OR TITLE OF MATERIAL, FEDERAL SPECIFICATION NUMBER, IF APPLICABLE, MANUFACTURER'S STOCK NUMBER, MANUFACTURER'S NAME, THINNING AND MIXING INSTRUCTION (FOR 2 OR 3 COMPONENT COMPOUNDS), APPLICATION INSTRUCTIONS.

E. SUBMITTALS

SUBMIT COPIES OF MANUFACTURER'S SPECIFICATIONS, INCLUDING MATERIAL LABEL ANALYSIS, AND APPLICATION INSTRUCTIONS FOR EACH MATERIAL SPECIFIED, INCLUDING PERCENTAGE OF SOLIDS, AND MSDS DATA SHEETS.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

F. COLORS

COLORS TO BE AS SELECTED.

TINT AND MATCH ALL COLORS AS DIRECTED.

G. MANUFACTURERS

THE GLIDDEN COMPANY
PPG INDUSTRIES, INC.
PORTER PAINT CO.
PRATT & LAMBERT INC.
CARBOLINE
THE SHERWIN-WILLIAMS COMPANY
MOBIL CHEMICAL COMPANY, OR EQUAL

09870.03 JOB CONDITIONS

INSPECT SURFACES TO RECEIVE EPOXY COATING. REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK. STARTING OF APPLICATION CONSTITUTES ACCEPTANCE OF SURFACES BY COATING APPLICATOR.

BEFORE STARTING APPLICATION, SUBCONTRACTOR TO CERTIFY THAT SHOP OR PRIME COATS ON SURFACES TO RECEIVE EPOXY COATING ARE COMPATIBLE WITH THE COATINGS SPECIFIED HEREIN.

09870.04 SURFACE PREPARATION

A. GENERAL

PERFORM PREPARATION AND CLEANING PROCEDURES IN COMPLIANCE WITH THE COATING MANUFACTURER'S INSTRUCTIONS FOR THE PARTICULAR SUBSTRATE CONDITIONS, AND AS HEREIN SPECIFIED.

CLEAN SURFACES TO BE COATED BEFORE APPLYING COATINGS OR SURFACE TREATMENTS. REMOVE OIL AND GREASE WITH CLEAN CLOTHS AND CLEANING SOLVENTS PRIOR TO MECHANICAL CLEANING. PROGRAM THE CLEANING AND APPLICATION SO THAT DUST AND OTHER CONTAMINANTS FROM THE CLEANING PROCESS WILL NOT FALL ON WET, NEWLY COATED SURFACES. REMOVE ALL DUST AND DIRT. SURFACES TO BE FREE OF OIL, GRIT, FROST AND IN A CONDITION TO RECEIVE THE SPECIFIED COATING.

DO NOT PAINT OVER SURFACES WHERE THE MOISTURE CONTENT EXCEEDS THAT PERMITTED IN THE MANUFACTURER'S PRINTED DIRECTIONS.

B. FERROUS METAL SURFACES

TOUCH UP SHOP-APPLIED PRIME COATS WHICH HAVE BEEN DAMAGED. USE THE SAME PRIMER AS THE SHOP COAT.

CLEAN NONGALVANIZED, FERROUS SURFACES, WHICH HAVE NOT BEEN SHOP COATED, OF OIL, GREASE, DIRT, LOOSE MILL SCALE AND OTHER FOREIGN SUBSTANCES BY SOLVENT OR MECHANICAL CLEANING, COMPLYING WITH STEEL STRUCTURES PAINTING COUNCIL (SSPC) RECOMMENDATIONS.

09870.05 COATING TYPES

COATING TYPES SPECIFIED ARE FROM THE CATALOG OF PORTER PAINT CO. OTHER MANUFACTURERS' MATERIAL MUST BE EQUAL TO THE KIND AND QUALITY LISTED:

TYPE	MATERIAL IDENTIFICATION
1	TWO COMPONENT, POLYAMIDE CURED, RUST INHIBITIVE EPOXY PRIMER, 2 MILS DFT, 48 PERCENT SOLIDS BY VOLUME
2	TWO COMPONENT, HIGH-BUILD, POLYAMIDE CURED HIGH-BUILD GLOSS EPOXY, 2 MILS DFT, 49 PERCENT SOLIDS BY VOLUME

09870.06 COATING SCHEDULE

SURFACE	TYPE FIRST COAT	TYPE SECOND COAT
FERROUS METAL	1	2

09870.07 EPOXY COATING APPLICATION

COATING TO BE APPLIED BY AUTHORIZED APPLICATOR IN STRICT ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS, RECOMMENDATIONS AND SPECIFICATIONS AS SET OUT IN APPROVED APPLICATOR'S MANUAL. WORKMEN TO BE EXPERIENCED AND SKILLED IN THE INSTALLATION OF THE MATERIAL AND TO PRODUCE A FINE, WORKMANLIKE AND DURABLE INSTALLATION. VENTILATION IN ALL SPACES IN WHICH COATINGS ARE BEING APPLIED TO BE RESPONSIBILITY OF SUBCONTRACTOR.

APPLY COATINGS TO SURFACES AFTER ALL CONSTRUCTION WORK IS COMPLETE, SURFACES HAVE BEEN PROPERLY PREPARED. APPLY COATINGS PRIOR TO CALKING OF JOINTS.

ALL SURFACES TO RECEIVE SPECIFIED COATINGS MUST BE CLEAN, DRY AND FREE OF FOREIGN MATTER. SURFACE AND AIR TEMPERATURE, MINIMUM 60F, PREFERRED 70F.

09870.08 CLEANUP

UPON COMPLETION OF WORK, CLEAN ALL PAINT-SPATTERED SURFACES, USING PROPER METHODS. REMOVE ALL DISCARDED COATING MATERIALS, RUBBISH, CANS AND RAGS RESULTING FROM THE WORK.

DIVISION 9

09900 - PAINTING

09900.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PAINTING WORK INCLUDES PAINTING AND FINISHING OF NEW INTERIOR AND EXTERIOR SURFACES AND ITEMS THROUGHOUT THE PROJECT, USUALLY PAINTED OR FINISHED TO MAKE A COMPLETE JOB IN EVERY RESPECT, EXCEPT AS SPECIFIED OR SCHEDULED OTHERWISE.

WHEN AN ITEM OR AREA IS NOT MENTIONED OR PARTICULARLY SCHEDULED, PAINT OR FINISH TO MATCH WORK IN SIMILAR LOCATIONS, OR AS DIRECTED.

SURFACE PREPARATION, PRIMING AND COATS OF PAINT SPECIFIED ARE IN ADDITION TO SHOP PRIMING AND SURFACE TREATMENT SPECIFIED IN OTHER SECTIONS, EXCEPT AS OTHERWISE SPECIFIED.

THE TERMS "PAINT" AND "PAINTING" AS USED HEREIN MEAN ALL COATING SYSTEM MATERIALS, INCLUDING PRIMERS, EMULSIONS, ENAMELS, STAINS, SEALERS AND FILLERS, AND OTHER APPLIED MATERIALS WHETHER USED AS PRIME, INTERMEDIATE OR FINISH COATS AND THE APPLICATION OF THESE MATERIALS. MINIMUM DRY FILM THICKNESS 2 MILS PER COAT.

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY FLOOR COATING
EPOXY COATING - METAL SURFACES

C. SURFACES NOT INCLUDED

DO NOT PAINT THE FOLLOWING SURFACES:

POLYURETHANE ELASTOMER/WEARING SURFACE
ALUMINUM, STAINLESS STEEL, COPPER, BRONZE, CHROMIUM PLATE
PLASTIC FABRIC COVERS
EPOXY-COATED TRENCHES AND METAL SURFACES
MACHINED SURFACES
FACTORY FINISHED EQUIPMENT
LIGHTING FIXTURES

09900.02 SUBMITTALS

A. MANUFACTURERS' LITERATURE

SUBMIT TWO COPIES OF MANUFACTURERS' SPECIFICATIONS, INCLUDING PAINT LABEL ANALYSIS AND APPLICATION INSTRUCTIONS FOR EACH MATERIAL SPECIFIED, INCLUDING PERCENTAGE OF SOLIDS AND MSDS DATA SHEETS.

B. SAMPLES

SUBMIT SAMPLES OF EACH COLOR SELECTED AND MATERIAL SPECIFIED.

ALL FINISHED WORK MUST CONFORM TO ACCEPTED SAMPLES.

AFTER SAMPLES HAVE BEEN REVIEWED, A JOB MEETING IS TO BE HELD BETWEEN THE PAINTING SUBCONTRACTOR, THE PAINT MANUFACTURER'S REPRESENTATIVE, AND THE CONSTRUCTION MANAGER'S REPRESENTATIVE TO DISCUSS PAINT APPLICATION AND WORKMANSHIP. DO NOT START PAINTING WORK UNTIL THIS MEETING HAS BEEN HELD, DOCUMENTED, AND THE MEETING NOTES APPROVED.

C. OTHER REQUIREMENTS

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

09900.03 GENERAL

A. DELIVERY AND STORAGE

DELIVER ALL MATERIALS TO THE JOBSITE IN ORIGINAL, NEW AND UNOPENED PACKAGES AND CONTAINERS BEARING MANUFACTURER'S NAME AND LABEL.

PROVIDE LABELS ON EACH CONTAINER WITH THE FOLLOWING INFORMATION:

NAME OR TITLE OF MATERIAL
FEDERAL SPECIFICATION NUMBER, IF APPLICABLE
MANUFACTURER'S STOCK NUMBER
MANUFACTURER'S NAME
CONTENTS BY VOLUME, FOR MAJOR PIGMENT AND VEHICLE ELEMENTS
THINNING INSTRUCTIONS
APPLICATION INSTRUCTIONS

STORE MATERIALS USED ON JOB IN A SINGLE AREA. PROTECT FROM WEATHER. KEEP STORAGE AREA NEAT AND CLEAN. PROTECT FLOOR AND OTHER SURFACES WITH DROP CLOTHS OR BUILDING PAPER. TAKE NECESSARY PRECAUTIONS TO PREVENT FIRE. STORAGE PROCEDURES TO BE SUCH THAT THE STORAGE SPACE AMBIENT AIR CONDITIONS DO NOT EXCEED OSHA STANDARDS.

B. JOB CONDITIONS

INSPECT SURFACE TO BE PAINTED. STARTING OF WORK CONSTITUTES ACCEPTANCE OF THE SURFACES.

C. CLEANUP AND PROTECTION

AT THE COMPLETION OF THE PAINTING WORK, CLEAN OFF MISPLACED PAINT AND OTHER BLEMISHES CAUSED BY THIS WORK FROM FINISHED SURFACES AND RESTORE THEM TO THEIR ORIGINAL CONDITION.

ON A DAILY BASIS REMOVE ALL DISCARDED PAINT MATERIALS, DEBRIS, CANS AND RAGS.

PROTECT WORK OF OTHER TRADES, WHETHER TO BE PAINTED OR NOT, FROM DAMAGE BY PAINTING WORK. CORRECT DAMAGES BY CLEANING, REPAIRING OR REPLACING, AND REPAINTING AS DIRECTED.

REMOVE HARDWARE AND SIMILAR ITEMS BEFORE PAINTING AND REPLACE AFTER COMPLETION OF PAINTING. DO NOT DISPOSE OF PAINT MATERIALS IN ANY PLUMBING FIXTURE, OPEN WASTE OR VENT PIPE, OR OTHER PIPE OF ANY KIND. DO NOT USE WATER CLOSETS OR OTHER PLUMBING FIXTURES AS SUPPORTS FOR PLANKING.

D. COLORS

EXCEPT AS OTHERWISE INDICATED, FURNISH COLORS AS SELECTED.

PAINT BOLLARDS YELLOW.

09900.04 MATERIALS

A. PAINT MATERIALS

PROVIDE PAINTING MATERIALS OF TYPES AND BRANDS SPECIFIED, INCLUDING HIGHEST QUALITY BASIC PAINTING MATERIALS SUCH AS LINSEED OIL, SHELLAC, TURPENTINE AND THINNERS.

SPECIFIC PRODUCTS DESIGNATED HEREIN BY MANUFACTURER'S NAME AND NUMBER OR SIMILAR IDENTIFICATION ARE USED ONLY TO ESTABLISH STANDARDS OF QUALITY AND TYPE.

EQUIVALENT PRODUCTS OF THE FOLLOWING MANUFACTURERS, OR APPROVED EQUAL, MAY BE SUBMITTED, SUBJECT TO REVIEW FOR SPECIFICATION COMPLIANCE.

DU PONT
THE GLIDDEN COMPANY
DEVOE PAINT DIVISION OF CELANESE COATING COMPANY
PPG INDUSTRIES, INC.
PORTER PAINT COMPANY
PRATT AND LAMBERT, INC.
THE SHERWIN-WILLIAMS COMPANY
BENJAMIN MOORE AND COMPANY

B. PAINT TYPES

PROVIDE PAINTS OF FOLLOWING TYPES. NAMES AND NUMBERS ARE FROM CATALOG OF PORTER PAINT COMPANY.

TYPE 1	298N ALKYD CHROMATE PRIMER
TYPE 2	2400 SERIES INDUSTRIAL ALKYD GLOSS
TYPE 3	2481 ALKYD EGGSHELL
TYPE 4	290 GALVANIZED METAL PRIMER

C. PAINT FINISH SCHEDULE

		PAINT TYPES		
	SURFACE PREPARATION	FIRST COAT	SECOND COAT	THIRD COAT
EXTERIOR:				
FERROUS METAL, PRIMED	*	2	2	-
INTERIOR:				
FERROUS METAL, UNPRIMED	*	1	3	3
FERROUS METAL, PRIMED	*	3	3	-
GALVANIZED METAL, UNPRIMED	*	4	3	3
FACTORY PRIMED METAL SURFACES	**	3	3	-
ELECTRICAL OR MECHANICAL ITEMS NOT FACTORY FINISHED	*	1	3	3

* AS SPECIFIED

**TOUCH UP WITH SHOP OR FACTORY PRIMER

09900.05 PREPARATION OF SURFACES

A. GENERAL

PERFORM SURFACE PREPARATION IN STRICT ACCORDANCE WITH PAINT MANUFACTURER'S INSTRUCTIONS AND AS SPECIFIED HEREIN, FOR EACH PARTICULAR SURFACE.

REMOVE HARDWARE, HARDWARE ACCESSORIES, PLATES, LIGHTING FIXTURES, AND SIMILAR ITEMS IN PLACE AND NOT TO BE FINISH PAINTED, OR PROVIDE SURFACE APPLIED PROTECTION PRIOR TO SURFACE PREPARATION AND PAINTING OPERATIONS. AT COMPLETION OF PAINTING OF EACH AREA, REINSTALL REMOVED ITEMS BY WORKMEN SKILLED IN TRADES INVOLVED.

BRUSH SURFACES CLEAN OF DUST AND DIRT. PREPARED SURFACES TO BE SMOOTH, DRY, FREE OF OIL, GREASE, SCALE, GRIT, FROST, AND IN CONDITION SUITABLE TO RECEIVE PAINT OR OTHER SPECIFIED MATERIALS.

B. FERROUS METAL

CLEAN FERROUS SURFACES, WHICH ARE NOT GALVANIZED OR SHOP-PRIMED, OF OIL, GREASE, DIRT, LOOSE MILL SCALE AND OTHER FOREIGN MATERIAL BY SOLVENT OR MECHANICAL CLEANING.

C. GALVANIZED METAL

REMOVE ALL GREASE, OIL, DIRT OR OTHER FOREIGN MATERIAL BY SOLVENT OR DETERGENT CLEANING. APPLY ZINC PHOSPHATE TREATMENT EQUAL TO PORTER PAINT COMPANY NO. 45 GALVAPREP IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, RINSE WITH CLEAR WATER AND ALLOW TO DRY. DO NOT USE VINEGAR OR ACETIC ACID.

D. EXISTING SURFACES

REMOVE GREASE, OIL, DUST, DIRT OR OTHER FOREIGN MATERIALS BY SOLVENT OR DETERGENT CLEANING. REMOVE CHIPPED, PEELING OR BLISTERED PAINT BY HAND TOOL OR POWER TOOL CLEANING, OR AS RECOMMENDED BY THE COATING MANUFACTURER. DULL HARD OR GLOSSY OLD PAINT BY LIGHT SANDING, SANDBLASTING OR OTHER ABRASIVE METHODS, WITH SELF-CONTAINED NON-SILICONE BLASTING EQUIPMENT.

09900.06 TOUCH-UP AND PRIMING

TOUCH UP SHOP PRIMER WHEREVER DAMAGED OR BARE. CLEAN, AS SPECIFIED ABOVE, AND TOUCH UP WITH SAME TYPE PAINT AS SHOP-APPLIED PRIMER. APPLY PRIME COAT OR COATS TO ANY SURFACE NOT SHOP PRIMED.

09900.07 PATCH PAINTING

PAINT AREAS DISTURBED OR DAMAGED TO MATCH ADJOINING SURFACES. PAINT SURFACES BEYOND DAMAGED OR PATCHED AREAS TO NEAREST EXTERNAL OR INTERNAL CORNER, OR TO BOTH ENDS (AND TOP TO BOTTOM) OF ANY BAY, COLUMN TO COLUMN, HORIZONTALLY AND VERTICALLY IN ALL DIRECTIONS.

09900.08 APPLICATION

APPLY COATINGS IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. USE EQUIPMENT AND APPLICATION METHODS BEST SUITED FOR THE TYPE MATERIAL BEING APPLIED. APPLY EACH COAT AT COATING MANUFACTURER'S RECOMMENDED RATE OF COVERAGE SO CORRECT MINIMUM DRY FILM THICKNESS IS ACHIEVED, PER COAT.

DO NOT PAINT WHILE SURFACE IS DAMP, DURING COLD, RAINY OR MISTY WEATHER OR WHEN WINDS CARRY DUST OR DIRT AND EMBED IT IN PAINT.

DO NOT APPLY PAINT WHEN AMBIENT OR SURFACE TEMPERATURE IS BELOW 50F OR ABOVE 100F. DO NOT APPLY PAINT UNLESS SURFACE TEMPERATURE IS 5F ABOVE DEW POINT. DO NOT APPLY PAINT TO SURFACES EXPOSED TO HOT SUN.

APPLY MATERIALS UNDER ADEQUATE ILLUMINATION, SPREAD EVENLY AND FLOW ON SMOOTHLY WITHOUT RUNS OR SAGS. ALLOW EACH COAT TO DRY THOROUGHLY BEFORE APPLYING THE SUCCEEDING COAT.

HAVE EACH COAT OF MATERIAL INSPECTED BEFORE APPLYING SUCCEEDING COATS; CREDITS FOR CONCEALED COAT WILL NOT BE GIVEN. GIVE NOTIFICATION WHEN EACH COAT IS READY FOR INSPECTION.

DO NOT THIN COATINGS MORE THAN RECOMMENDED BY PAINT MANUFACTURER AND USE ONLY WITHIN RECOMMENDED LIMITS. THOROUGHLY STIR COATINGS AND MAINTAIN AT A UNIFORM CONSISTENCY DURING APPLICATION.

SAND LIGHTLY BETWEEN EACH COAT OF ENAMEL.

WHENEVER SPRAY APPLICATION IS USED, EACH SPRAY-APPLIED COAT MUST BE EQUIVALENT IN ALL RESPECTS TO THE SAME COAT, BRUSH APPLIED BY HIGH QUALITY BRUSH APPLICATION. THE NUMBER OF COATS REQUIRED IS THE SAME, REGARDLESS OF APPLICATION METHOD. DOUBLING BACK WITH SPRAY EQUIPMENT FOR PURPOSE OF BUILDING UP FILM THICKNESS OF TWO COATS IN ONE OPERATION IS PROHIBITED.

DIVISION 10

10400 - SIGNS

10400.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE LABOR, MATERIALS AND EQUIPMENT TO COMPLETE SIGNS AS SPECIFIED.

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

FRAME SUPPORTED FABRIC STRUCTURE
HOLLOW METAL DOORS AND FRAMES

10400.02 GENERAL

A. APPLICABLE PUBLICATIONS

NAAMM FINISHES MANUAL
APPLICABLE ASTM, ALUMINUM ASSOCIATION, AISC AND AISI SPECIFICATIONS

B. SUBMITTALS

LIST OF DOOR NUMBER AND DOOR DESIGNATION SIGNS
ILLUSTRATION OF PROPOSED BUILDING IDENTIFICATION SIGN

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

10400.03 DOOR NUMBER AND DOOR DESIGNATION SIGN

PLASTIC SIGNS TO BE 1/8 INCH THICK, BLACK, WITH INCISED WHITE LETTERS, PLAIN BLOCK LETTERS, 3/4 INCH HIGH. SIGNS TO BE 1-1/2 BY 8 INCHES FOR DOORS, WITH SPACE FOR SIX NUMBERS. DOOR DESIGNATION SIGNS TO BE SIMILAR, LENGTHS TO VARY FROM 8 TO 12 INCHES, TO SUIT SPACE DESIGNATIONS.

10400.04 BUILDING IDENTIFICATION SIGNS (3 REQUIRED)

A. SIGN TYPES

NONILLUMINATED
EXTERIOR
SINGLE-FACED
POST-MOUNTED

B. MANUFACTURERS

ANDCO
ARCHITECTURAL GRAPHICS, INC.
MATTHEWS

SPANJER
SUPERSINE
VOMAR
OR EQUAL

C. SIGN FRAMING AND PANELS

ANDCO 33 SERIES POST AND PANEL FREESTANDING SIGN SYSTEM, WITH 3 INCH SQUARE.

EXTRUDED ALUMINUM PERIMETER FRAMING, MITERED AND HELIARC WELDED FLAT PANELS WITH 2 METAL FACES, FRONT AND BACK. SIZE TO BE 72 INCHES WIDE BY 36 INCHES HIGH EACH.

PROVIDE 10 FOOT LONG POSTS, ENCASED IN CONCRETE, AND DESIGNED PER ANDO GM-1-Y DETAIL, REMOVABLE PLATE.

SIGN DESIGNATION:

TO BE DETERMINED BY OPERATING CONTRACTOR

D. SIGN FINISHES

CATALYZED POLYURETHANE, WHITE FRONT, BLACK FRAME
GENERAL APPEARANCE OF SIGN TO COMPLEMENT OTHER EXISTING SIMILAR SIGNS

E. SIGN LETTERING

SIZE OF LETTERS AS REQUIRED.

LETTER TYPE: PAINTED, BLACK

F. INSTALLATION

PROVIDE MOUNTING ACCESSORIES AND INSTALL SECURELY, AS REQUIRED.

COORDINATE LOCATION OF BUILDING SIGNS WITH CONSTRUCTION MANAGER'S REPRESENTATIVE.

ROOM NUMBER AND ROOM DESIGNATION SIGNS TO BE FASTENED TO EXTERIOR DOORS WITH STAINLESS STEEL SCREWS.

DIVISION 13

13120 - FRAME SUPPORTED FABRIC STRUCTURES

13120.01 SCOPE OF WORK

PROVIDE DESIGN AND ENGINEERING FOR STRUCTURES AND FOUNDATIONS, FABRICATION AND DELIVERY TO PROJECT SITE, SUPERVISION, ERECTION IN TWO PHASES.

PROVIDE FRAME SUPPORTED FABRIC STRUCTURES COMPLETE AND WEATHERTIGHT WITH MISCELLANEOUS ITEMS AND ALL REQUIRED ACCESSORIES AS SHOWN ON DRAWINGS AND SPECIFIED HEREIN. THE SMALLER OF THE THREE STRUCTURES IS TO BE BUILT IN PHASE D, THE TWO LARGER UNITS IN PHASE A.

A. BUILDING TYPE

FREE SPAN ARCH FRAMED BUILDING SYSTEM, WITH EXTRUDED ALUMINUM ARCHES WITHOUT CENTER COLUMNS, AND WITH SPECIAL FABRIC COVER.

B. WORK INCLUDED

WORK INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, FURNISHING AND ERECTING THE STRUCTURES, COMPLETE WITH COMPONENTS, AS FOLLOWS:

- STRUCTURAL FRAMING INCLUDING WIND BRACING
- PVC FABRIC WALL AND ROOF COVER
- CALKING AND SEALANTS
- REINFORCED CONCRETE PIERS FOR ARCH SUPPORT AND CONTINUOUS CONCRETE WALL FOOTING OR CURB BETWEEN ALL PIERS
- ARCH BASEPLATES AND GROUTING
- MISCELLANEOUS ACCESSORIES AS HEREINAFTER SPECIFIED
- RIDGE VENTILATORS
- HOLLOW METAL DOORS, FRAMES AND HARDWARE
- ROLLING STEEL DOORS OR HORIZONTAL SLIDING DOORS
- ADJUSTABLE EXTRUDED ALUMINUM LOUVERS
- FLASHINGS AND CLOSURES, INCLUDING HORIZONTAL BASE FLASHING, ROOF PENETRATIONS AND DOORS
- METAL PASS DOORS AND FRAMES; MOTOR OPERATED VEHICLE ACCESS DOORS
- ELECTRIC LIGHTING AND POWER

FURNISH ANCHOR BOLTS FOR INSTALLATION UNDER ANOTHER SECTION.

C. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

- EXCAVATION FOR CONCRETE FLOOR SLABS AND EXTERIOR PAVEMENT
- BACKFILLING, DRAINAGE FILL, AND VAPOR BARRIER
- CONCRETE FILLED PIPE POSTS AT EACH SIDE OF VEHICLE DOORS AND SIMILAR POSTS FOR MOUNTING OF DOOR CONTROL PUSHBUTTONS
- INSTALLATION OF ANCHOR BOLTS
- BUILDING SIGNS
- FINISH PAINTING OF MISCELLANEOUS METAL, METAL DOORS AND FRAMES
- EXCAVATION FOR FOUNDATION SYSTEM

13120.02 SUBMITTALS

FURNISH COMPLETE DESCRIPTIVE DATA COVERING THE SPECIFIED STRUCTURES. INDICATE ANY AND ALL DEVIATIONS OR EXCEPTIONS TAKEN TO THIS SECTION. EXCEPTIONS TO MINIMUM CLEAR INTERIOR HEIGHTS, OR DESIGN LOADS, WILL NOT BE ALLOWED.

SUBMIT COMPLETE SHOP DRAWINGS, INCLUDING ANCHOR BOLT SETTING PLAN, OF THE FRAME SUPPORTED FABRIC STRUCTURES, CONCRETE FOUNDATIONS, AND ALL FABRICATED ITEMS FOR REVIEW, INCLUDING ALL OPENING AND SPECIAL FRAMES, RIDGE VENTILATORS, SIDEWALL LOUVERS, DOORS, AND LIGHTS.

SUBMIT CATALOG SAMPLES AND PERFORMANCE DATA OF FABRIC COVER AND FINISH, INCLUDING STRUCTURAL, THERMAL, FIRE RESISTANCE, WIND AND SNOW LOAD LIMITS.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

13120.03 STRUCTURAL REQUIREMENTS

THE DESIGN AND FABRICATION OF THE COMPLETE STRUCTURAL SYSTEM INCLUDING COLUMNS, BEAMS, PURLINS, GIRTS, ROOF PANELS, WALL PANELS, CONNECTIONS AND ATTACHMENTS MUST CONFORM TO STATE, LOCAL AND OTHER APPLICABLE BUILDING CODE REQUIREMENTS AND ORDINANCES.

13120.04 DELIVERY, STORAGE AND HANDLING

DELIVER, STORE AND HANDLE MATERIALS TO PREVENT DAMAGE AND DEFORMATION. STORE ARCHES AND OTHER SPECIFIED BUILDING COMPONENTS ON PLATFORMS OR PALLETS WITH ONE END ELEVATED FOR DRAINAGE. PROTECT MATERIALS FROM THE WEATHER WITH TARPAULINS OR OTHER SUITABLE COVERING. STORE FABRIC COVER MATERIAL IN A TEMPERATURE CONTROLLED WEATHERPROOF SHELTER.

13120.05 BUILDING CRITERIA

A. DESIGN AND FABRICATION SPECIFICATIONS

PRIMARY AND SECONDARY STRUCTURAL FRAMING TO COMPLY WITH CURRENT ISSUES OF AISC, AISI, NEMA AND ASTM SPECIFICATIONS, AS APPLICABLE.

WELDING TO COMPLY WITH AMERICAN WELDING SOCIETY "STRUCTURAL WELDING CODE D1.1" INCLUDING SUPPLEMENT.

ALL STRUCTURAL FRAMING, IF NOT ALUMINUM, TO BE PAINTED WITH MANUFACTURER'S STANDARD SHOP COAT, 2 MILS MINIMUM DRY THICKNESS, LIGHTEST COLOR AVAILABLE.

B. BUILDING DESIGN CRITERIA

DESIGN TO MEET APPLICABLE REQUIREMENTS OF BOCA NATIONAL BUILDING CODE, NFPA AND UL REQUIREMENTS, AND OSHA
LIVE LOAD ON ROOF - 20 POUNDS PER SQUARE FOOT, PLUS 5 POUNDS PER SQUARE FOOT FOR SUSPENDED MECHANICAL AND ELECTRICAL ITEMS
MAXIMUM WIND VELOCITIES ON BUILDING WALLS - 134 MPH
SEISMIC LOADING - ZONE 2 PER LATEST EDITION, BUILDING CODE
UPLIFT ON ROOF - 20 POUNDS PER SQUARE FOOT
ROOF SLOPE SHALL BE NOT LESS THAN 27 PERCENT

PROVIDE ROOF AND WALL BRACING TO SATISFY DESIGN LOADS ABOVE.

PROVIDE STRUCTURAL FRAMING ADEQUATE TO SUPPORT LIGHT FIXTURES AND RELATED ACCESSORIES.

C. FABRIC COVER

THE OPAQUE TEDLAR-TREATED FABRIC SHALL BE PVC COATED POLYESTER SCRIM, TREATED WITH INHIBITORS TO PREVENT ULTRAVIOLET DEGENERATION, SELF-EXTINGUISHING PER NFPA 701.

D. BASE FLASHING

PROVIDE MANUFACTURER'S STANDARD ALUMINUM BASE FLASHING AT BOTTOM OF FABRIC COVER, TO PERMIT ADEQUATE ATTACHMENT TO THE CONCRETE FOUNDATION. PROVIDE STAINLESS STEEL FASTENERS, AS REQUIRED.

E. FLASHINGS, CLOSURES AND TRIM

PROVIDE FLASHINGS AT ROOF PENETRATIONS, TRIM AT DOORS AND LOUVERS. THE BUILDING MANUFACTURER TO DESIGN FLASHINGS AND CLOSURES SO AS TO PRODUCE A COMPLETELY WEATHERTIGHT INSTALLATION. PROVIDE ALL FLASHINGS REQUIRED FOR THE COMPLETE BUILDING, INCLUDING ALL PENETRATIONS.

PROVIDE ALL NECESSARY TAPES, FOAM CLOSURES, GASKETS, SEALANT MATERIALS, METAL FLASHING AND OTHER METHODS OF SEALING AS REQUIRED TO PROVIDE WEATHERTIGHT JOINTS BETWEEN EXTERIOR BUILDING COMPONENTS. COLOR OF SEALING MATERIALS MUST MATCH ADJACENT METAL BUILDING COMPONENTS.

F. FASTENERS

FASTENERS OF ARCHES AND FABRIC WALL SYSTEMS MAY BE CONCEALED OR EXPOSED. EXPOSED FASTENERS TO BE NEOPRENE-GASKETED STAINLESS STEEL, SELF-TAPPING, WITH PLASTIC OR COLOR COATED HEADS TO MATCH SIDING AND ROOFING.
ANCHOR BOLTS - BLACK STEEL MINIMUM YIELD POINT OF 43,300 PSI UNPAINTED
HIGH STRENGTH BOLTS - BLACK STEEL, UNPAINTED, ASTM A 325
ALL OTHER BOLTS AND NUTS - GALVANIZED, ASTM A 307, OR EQUAL AS CERTIFIED BY SUBCONTRACTOR
ALL SCREWS - STAINLESS STEEL

13120.06 ELECTRICAL CRITERIA

A. STANDARDS

ALL WORK TO BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF DIV 16.

B. POWER SUPPLY

UNDER DIV 16, A SINGLE SOURCE OF 480 VOLTS, 3-PHASE, 3-WIRE POWER (WITHOUT NEUTRAL WIRE BUT DERIVED FROM A GROUNDED NEUTRAL SOURCE), PROTECTED AT 70 AMPERES, WILL BE EXTENDED OVERHEAD TO A SERVICE TERMINAL POLE AT STRUCTURE B AS INDICATED, AND TERMINATED IN A JUNCTION BOX NEAR THE TOP OF THE POLE. EMPTY UNDERSLAB CONDUITS WILL ALSO BE PROVIDED UNDER DIV 16, AS INDICATED, TO FACILITATE INTERCONNECTIONS BETWEEN STRUCTURES UNDER THIS SECTION.

C. SCOPE

UNDER THIS SECTION, PROVIDE ALL NECESSARY ELECTRICAL WORK, INCLUDING BUT NOT NECESSARILY LIMITED TO THAT SPECIFIED IN THIS SECTION BUT NOT OTHERWISE PROVIDED UNDER DIV 16, SO AS TO PROVIDE COMPLETE FUNCTIONAL STRUCTURES.

D. PANELBOARDS

PROVIDE AN INDIVIDUAL 480 VOLT CIRCUIT BREAKER PANELBOARD, WITH MAIN BREAKER, IN EACH STRUCTURE. LOCATE ADJACENT TO THE SOUTH PERSONNEL DOOR IN STRUCTURES A AND B, AND TO THE WEST PERSONNEL DOOR IN STRUCTURE C. DO NOT SUBFEED STRUCTURES ONE FROM ANOTHER, SUCH THAT OPERATION OF A MAIN BREAKER WOULD SHUT DOWN MORE THAN ONE STRUCTURE.

E. LIGHTING

PROVIDE HIGH PRESSURE SODIUM (HPS) LIGHTING (LUMINAIRES AS FURTHER DESCRIBED UNDER DIV 16) TO PROVIDE MINIMUM MAINTAINED ILLUMINANCE ON THE FLOOR IN AN ASSUMED UNOBSTRUCTED, UNOCCUPIED SPACE OF 10 FOOT-CANDLES, SUBJECT TO THE FOLLOWING DESIGN AND INSTALLATION REQUIREMENTS:

1. TOTAL LIGHT LOSS FACTOR (LLF): 0.75 MAXIMUM.

2. REFLECTANCES

(a) CEILING (SURFACES MORE THAN 13 FEET ABOVE FLOOR): 30 PERCENT

(b) WALL (SURFACES 13 FEET AND LESS ABOVE FLOOR): 10 PERCENT

(c) FLOOR: 10 PERCENT

3. MAXIMUM LUMINAIRE SPACING:

(a) ACROSS (NARROW) WIDTH: 30 FEET

(b) ALONG (LONG) LENGTH: 25 FEET

4. MOUNTING: 13 FEET MINIMUM HEIGHT TO BOTTOM OF LUMINAIRES. MOUNT LUMINAIRES WITH SWIVEL HANGERS TIGHT TO STRUCTURAL FRAMING,USING CLOSE NIPPLES AT HANGERS. DO NOT SUSPEND WITH STEMS (I.E., HANGING ALL LONGITUDINAL ROWS OF LUMINAIRES AT A HEIGHT COMMON TO EACH OTHER IS NEITHER NECESSARY NOR DESIRED).

5. HOT RESTRIKE PROTECTION: PROVIDE A SUFFICIENT QUANTITY OF THE LUMINAIRES, UNIFORMLY DISTRIBUTED, WITH AN AUXILIARY QUARTZ INCANDESCENT LAMP TO PRODUCE APPROXIMATELY 0.1 FOOTCANDLE AVERAGE DURING THE RESTRIKE PERIOD.

6. CONTROL: PANEL SWITCH ALL LIGHTS. CIRCUIT AND DISTRIBUTE SUCH THAT FULL ILLUMINANCE (10 FOOTCANDLES) OR APPROXIMATELY UNIFORM HALF-ILLUMINANCE (5 FOOTCANDLES) MAY BE SELECTED. WIRE ONE LUMINAIRE (WHICH IS TO INCLUDE AUXILIARY QUARTZ LAMP) NEAREST THE LIGHTING PANEL IN EACH STRUCTURE TO BURN CONTINUOUSLY AS A NIGHT LIGHT.

7. VOLTAGE: ANY STANDARD VOLTAGE FROM 120 VOLTS TO 480 VOLTS, AS SELECTED UNDER THIS SECTION (PARTICULAR ATTENTION IS DIRECTED TO LIMITING VOLTAGE DROPS TO ACCEPTABLE VALUES). PROVIDE ALL NECESSARY TRANSFORMATION, OVERCURRENT PROTECTION, ETC., AS REQUIRED BY THE SELECTED SCHEME.

8. EMERGENCY: PROVIDE INCANDESCENT EXIT SIGN (GREEN LETTERS ON OPAQUE WHITE), MOUNTED APPROXIMATELY 13 FEET ABOVE FLOOR AT EACH PERSONNEL DOOR. SIGNS TO BE SELF-CONTAINED STYLE, WITH NICKEL-CADMIUM BATTERY SUITABLE FOR 55C OPERATION. PROVIDE UNIT TYPE EMERGENCY LIGHTS ADEQUATE FOR SAFE EGRESS FROM STRUCTURE, WITH NICKEL-CADMIUM BATTERY SUITABLE FOR 55C OPERATION.

F. SMALL POWER

PROVIDE ONE GROUND FAULT CIRCUIT INTERRUPTER (GFCI) STYLE 120 VOLT DUPLEX CONVENIENCE RECEPTACLE IN EACH STRUCTURE, LOCATED ADJACENT TO THE LIGHTING AND POWER PANELBOARD(S).

G. MOTOR OPERATOR DOORS

TO OPERATE AT 480 VOLTS, 3-PHASE. PROVIDE A LOCAL FUSED DISCONNECT AT EACH DOOR OPERATOR.

H. STRUCTURE GROUNDING AND BONDING

GROUND THE METAL FRAMING OF EACH STRUCTURE AROUND ITS PERIPHERY, AT INTERVALS AS RECOMMENDED IN CHAPTER 3 OF NFPA 78. ASSURE THAT ALL METAL FRAMING MEMBERS FOR THE STRUCTURE, DOOR FRAMES, ELECTRICAL CONDUITS, ETC., ARE ELECTRICALLY CONTINUOUS WITH ONE ANOTHER.

I. SURGE PROTECTION

PROVIDE LOW VOLTAGE SURGE (LIGHTING) ARRESTERS FOR THE INCOMING OVERHEAD ELECTRICAL SERVICE TO STRUCTURE B IN ACCORDANCE WITH NEC ARTICLE 280.

13120.07 FRAMED OPENINGS FOR DOORS, ROOF VENTILATORS AND LOUVERS

PROVIDE REINFORCING AND FRAMES FOR ROOF AND WALL OPENINGS FOR HOLLOW METAL DOORS, OR SLIDING FABRIC DOORS OR ROLLING STEEL DOORS, AND LOUVERS, CONSISTING OF FRAMING MEMBERS SO CONSTRUCTED TO STRUCTURALLY REPLACE THE WALL AND/OR FRAMING DISPLACED AND TO SUPPORT APPURTENANCES TO BE INSTALLED.

13120.08 HOLLOW METAL DOORS AND FRAMES

PROVIDE 18 GAGE HOLLOW METAL DOORS AND 16 GAGE FRAMES, SHOP COATED, REINFORCED AND MORTISED FOR HARDWARE, AS MANUFACTURED BY THE FOLLOWING:

AMERICAN STEEL PRODUCTS CORPORATION
SUPERIOR FIREPROOF DOOR COMPANY
WILLIAMSBURG STEEL PRODUCTS COMPANY
PIONEER INDUSTRIES
TRUSSBILT, INC.
CURRIES MANUFACTURING, INC.
EMERSON ENGINEERING, INC.
STEELCRAFT MANUFACTURING COMPANY
THE CECO COMPANY
AMWELD BUILDING PRODUCTS
MESKER INDUSTRIES, INC., OR EQUAL

CUT, REINFORCE, DRILL AND TAP FOR MORTISE TYPE HARDWARE AT THE FACTORY, FROM TEMPLATES FURNISHED BY HARDWARE SUPPLIER IN ACCORDANCE WITH ANSI A115.

PROVIDE BOLTS, ANCHORS, CONNECTING MEMBERS AND CLIPS FOR PROPER ANCHORAGE AND SUPPORT OF FRAMES. PROVIDE GALVANIZED OR CADMIUM-PLATED STEEL SCREWS AND BOLTS IN CONCEALED LOCATIONS.

PROVIDE FLOOR ANCHORS AT EACH JAMB AND MULLION. 14 GAGE STEEL MINIMUM, WITH 2 HOLES PER ANCHOR TO RECEIVE FASTENERS.

WHERE REQUIRED, PROVIDE APPROPRIATE ANCHORS FOR EXTERIOR FRAMES ATTACHED TO PREFABRICATED METAL BUILDING WALLS.

BONDERIZE DOORS AND FRAMES AND APPLY SHOP PRIME COAT, INSIDE AND OUTSIDE, OF RUST-INHIBITIVE PRIMER, BAKED ON, MANUFACTURER'S STANDARD.

EXTERIOR AND PASSAGE DOORS TO HAVE 10 BY 10 INCH OPENINGS, GLAZED WITH 1/4 INCH THICK CLEAR WIRE GLASS.

FURNISH AND INSTALL ALL FINISH HARDWARE FOR ALL HOLLOW METAL DOORS, TO BE COMPATIBLE IN STYLE AND SIZE TO SIMILAR DOORS IN ADJACENT FMPC CONSTRUCTION, WHICH USE "BEST" CYLINDERS AND BE CAPABLE OF BEING MASTERKEYED, ACCORDINGLY.

13120.09 HARDWARE FOR PEDESTRIAN DOORS

PROVIDE ALL WROUGHT OR CAST MORTISE TYPE, FINISH HARDWARE OF 32D FINISH FOR ALL DOORS. ITEMS NOT AVAILABLE IN 32D FINISH, MAY BE 26D FINISH.

HINGES TO BE FIVE-KNUCKLES, BALL BEARING, 4-1/2 BY 4-1/2 INCHES, 1-1/2 PAIRS PER DOOR.

LOCKSETS TO BE STORAGE TYPE. PROVIDE CONSTRUCTION CORES, THEN PERMANENT CYLINDERS FOR FINAL INSTALLATION.

CLOSERS TO BE FULL FEATURE TYPE, WITH HOLD-OPEN FEATURE, ADJUSTABLE SPRING POWER, ADJUSTABLE BACK CHECK, NONHANDED, SWEEP SPEED CONTROL, AND LATCH SPEED CONTROL. PROVIDE CAST ALUMINUM WEATHER-TIGHT HOUSING.

EACH DOOR TO HAVE KICK PLATES, 16 GAGE, NO. 4 FINISH, STAINLESS STEEL, 8 INCHES HIGH.

PROVIDE THREE SILENCERS PER DOOR FRAME.

DELIVER KEYS, PROPERLY IDENTIFIED, AS DIRECTED.

13120.10 EXTERIOR FRAMED SLIDING FABRIC DOORS OR ROLLING STEEL DOOR OPENINGS

PROVIDE FRAMING AND BRACING FOR DOOR OPENINGS, SIZE AS SCHEDULED.

COORDINATE LOCATION OF TRACKS, CONTROLS, HARDWARE AND RELATED WORK.

13120.11 VEHICLE ACCESS DOORS

AT SUBCONTRACTORS OPTION PROVIDE HORIZONTAL ROLLING DOORS OR PROVIDE VERTICAL ROLLING METAL DOORS COMPLETE WITH ACCESSORIES AS REQUIRED FOR SUPPORT OF DOOR, MOTOR, CONTROLS AND OTHER DOOR ITEMS.

PROVIDE PULL CORD CONTROL ON INSIDE OF EACH DOOR, SUPPORTED ON FRAMING AND HANGERS, AS REQUIRED.

EXTEND ELECTRICAL POWER FROM PANELBOARD TO EACH DOOR LOCATION.

STEEL PIPE POSTS FOR MOUNTING OF DOOR CONTROL PUSHBUTTONS ON OUTSIDE OF DOORS ARE SPECIFIED IN SECTION 05500.

SUBMIT COMPLETE SHOP DRAWINGS SHOWING FABRICATION AND ERECTION DETAILS, MOTOR OPERATION, WIRING DIAGRAMS, AND RECOMMENDED SPARE PARTS LIST.

PROVIDE DOORS OF ONE OF THE FOLLOWING MANUFACTURERS:

KINNEAR
MAHON ROLLING DOOR
THE COOKSON COMPANY
CORNELL IRON WORKS, INC.
J. G. WILSON CORPORATION
JIM WALTER DOORS/NORTH AMERICAN
OVERHEAD DOOR CORP., OR EQUAL

FABRICATE SLATS FROM 22 GAGE HOT-DIPPED GALVANIZED STEEL WITH 2 ROWS OF FULL WIDTH VISION PANELS OF CLEAR ACRYLIC PLASTIC. PANELS TO BE WEATHER RESISTANT AND DUST-TIGHT.

PROVIDE A REPLACEABLE, CONTINUOUS NEOPRENE, VINYL OR RUBBER JAMB WEATHER STRIPPING, A CONTINUOUS RUBBER, VINYL OR NEOPRENE BOTTOM GASKET AND A FULL WIDTH RUBBER BAFFLE WITHIN THE HOOD.

PROVIDE GUIDES OF STEEL ANGLES AND COUNTERBALANCING OIL TEMPERED STEEL HELICAL TORSION SPRINGS AND ACCESSORIES.

PROVIDE GALVANIZED HAND CHAIN EMERGENCY OPERATOR.

PROVIDE 460 VOLT, 3-PHASE, 60 HZ HIGH-STARTING TORQUE, REVERSIBLE, CONSTANT DUTY, CLASS A INSULATED ELECTRIC MOTOR WITH OVERLOAD PROTECTION, AND 3 BUTTON POST-MOUNTED CONTROL UNITS WITH PUSH-BUTTONS LABELED "OPEN," "CLOSE" AND "STOP." MOMENTARY PRESSURE REQUIRED TO OPERATE "CLOSE" BUTTON.

COORDINATE LOCATION OF PROTECTIVE STEEL PIPE BOLLARDS AND PIPE POSTS FOR DOOR CONTROL BUTTONS GIVING CAREFUL CONSIDERATION TO DESIGN OF STRUCTURE FRAMING, DOOR OPENING AND VEHICLE OPERATION. CONCRETE FILLED BOLLARDS AND PIPE POSTS ARE SPECIFIED IN SECTION 05500.

PROVIDE COMBINATION WEATHERSEAL AND ELECTRIC SAFETY STRIP MOUNTED ALONG BOTTOM EDGE OF THE DOOR TO OPERATE IN CONJUNCTION WITH DOOR OPERATOR TO STOP AND REVERSE DOOR TO OPEN POSITION IF AN OBSTRUCTION IS IN THE DOOR OPENING.

13120.12 LOUVERS

PROVIDE STORMPROOF LOUVERS, AS MANUFACTURED BY INDUSTRIAL LOUVERS, MODEL 470, OR EQUAL, ADJUSTABLE EXTRUDED ALUMINUM LOUVERS. PROVIDE 1/2 INCH MESH ALUMINUM BIRD SCREEN FOR EACH LOUVER SECTION. BEARINGS TO BE STAINLESS STEEL BALL BEARINGS IN CORROSION RESISTANT RACES.

13120.13 ERECTION

ERECTION OF THE FRAME SUPPORTED FABRIC STRUCTURES, ITS COMPONENTS, AND MISCELLANEOUS ITEMS TO BE BY THE BUILDING MANUFACTURER OR HIS AUTHORIZED REPRESENTATIVE, USING CERTIFIED SHOP AND ERECTION DRAWINGS. WHERE WELDING IS REQUIRED, PERFORM ALL WELDING IN ACCORDANCE WITH AMERICAN WELDING SOCIETY'S "STRUCTURAL WELDING CODE" AWS D1.1, INCLUDING SUPPLEMENT. QUALIFY WELDERS AS PRESCRIBED IN "THE STANDARD QUALIFICATION PROCEDURE" OF THE AMERICAN WELDING SOCIETY. OBTAIN FMPC WORK PERMIT PRIOR TO START OF CONSTRUCTION.

IMMEDIATELY FOLLOWING ERECTION, CLEAN ALL SURFACES OF ALL COMPONENTS OF DIRT OR IMPERFECTIONS AND REPAIR FINISHES WITH THE SAME FABRIC MATERIALS TO THE CONSTRUCTION MANAGER'S SATISFACTION.

13120.14 SPECIAL GUARANTEES

A. BUILDING GUARANTEE

PROVIDE A 5 YEAR PRO RATA WEATHERTIGHTNESS GUARANTEE AGAINST RUPTURE, STRUCTURAL FAILURE, PEELING, CRACKING, OR BLISTERING OF FABRIC FINISH AND 10 YEAR GUARANTEE AGAINST LEAKING.

DIVISION 16

16010 - ELECTRICAL WORK - GENERAL

16010.01 GENERAL

FURNISH MATERIALS AND EQUIPMENT WHICH ARE NEW, PRODUCTS OF REPUTABLE MANUFACTURERS CONFORMING TO THE REQUIREMENTS OF APPLICABLE STANDARDS AND RECOMMENDED PRACTICES OF AUTHORITIES LISTED BELOW AND WHICH CONFORM TO THOSE STANDARDS AND RECOMMENDED PRACTICES IN DESIGN, MANUFACTURE, RATINGS AND TEST.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
INSULATED CABLE ENGINEERS ASSOCATION (ICEA)
NATIONAL ELECTRICAL MANUFACTURERS ASSOCATION (NEMA)
UNDERWRITERS LABORATORIES INC. (UL), INCLUDING PRODUCT DIRECTORIES
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
AMERICAN WOOD PRESERVERS ASSOCIATION (AWPA)
FACTORY MUTUAL (FM) "APPROVAL GUIDE" AND "LOSS PREVENTION DATA"
ELECTRICAL AND ELECTRONICS GRAPHIC SYMBOLS AND REFERENCE DESIGNATIONS, ANSI/IEEE Y32E
GENERAL SERVICES ADMINISTRATION, FEDERAL SUPPLY SERVICE, "FEDERAL STANDARDS" AND "FEDERAL SPECIFICATIONS"

ALL WORK TO COMPLY WITH THE FOLLOWING:

DEPARTMENT OF LABOR "OCCUPATIONAL SAFETY AND HEALTH STANDARDS," TITLE 29, CODE OF FEDERAL REGULATIONS (CFR), PART 1910 (OSHA) AND PART 1926 (SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION)
NATIONAL ELECTRICAL CODE (NEC)
NATIONAL ELECTRICAL SAFETY CODE (NESC)
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
OHIO BASIC BUILDING CODE (OBBC)
FEDERAL, STATE AND LOCAL CODES
DOE 6430.1A, "GENERAL DESIGN CRITERIA MANUAL"
UNIFORM BUILDING CODE (UBC), SECTION 2312 "EARTHQUAKE REGULATIONS"
AMERICAN WELDING SOCIETY (AWS), STRUCTURAL WELDING CODE (AWS D1.1)

OBTAIN REQUIRED PERMITS AND, AT COMPLETION OF WORK, CERTIFICATES OF FINAL INSPECTION BY OPERATING CONTRACTOR.

PROVIDE EQUIPMENT AND MATERIALS HAVING FEATURES AND CHARACTERISTICS AS REQUIRED SO THAT THE COMPLETED FACILITIES COMPLY WITH ALL APPLICABLE SAFETY REQUIREMENTS.

ALL WORK AND MATERIALS TO BE SUCH THAT THE COMPLETED FACILITIES COMPLY WITH ALL APPLICABLE REQUIREMENTS OF SEISMIC ZONE 2 (OBBC).

16010.02 MANUFACTURERS' NAMES

LISTING OF A MANUFACTURER'S NAME FOR ANY MATERIAL OR EQUIPMENT DOES NOT NECESSARILY IMPLY ACCEPTANCE OF THAT MANUFACTURER'S PRODUCT UNLESS IT COMPLIES WITH STANDARDS AND DETAIL SPECIFICATIONS RELATING THERETO.

16010.03 EQUIPMENT RATINGS

VOLTAGE, AMPERE, INTERRUPTING AND OTHER RATINGS FOR EQUIPMENT ARE SHOWN ON DRAWINGS, UNLESS OTHERWISE INDICATED.

16010.04 NAMEPLATES

PROVIDE NAMEPLATE FOR EACH OF THE FOLLOWING ITEMS OF EQUIPMENT, AND AS ADDITIONALLY INDICATED, TO INDICATE DESIGNATION OR PURPOSE.

MOTOR CONTROL CENTER COMPARTMENT
CONTROL DEVICE
PANELBOARD
TRANSFORMER
DISCONNECT

NAMEPLATE TO BE ENGRAVED LAMINATED PHENOLIC, BLACK LETTERS ON WHITE BACKGROUND, 1 INCH HIGH BY 3 INCHES WIDE, OR OTHER ACCEPTABLE SMALLER SIZE, FASTENED BY MEANS OTHER THAN ADHESIVES, SUCH AS SUITABLY SIZED SELF-TAPPING SCREWS OR RIVETS.

PROVIDE SUITABLE STEEL MOUNTING PLATE ADJACENT TO EQUIPMENT AND FASTEN NAMEPLATE THERETO WHEN SIZE, CONTOUR, OR NEMA CLASSIFICATION OF THE ENCLOSURE PROHIBITS FASTENING NAMEPLATE TO EQUIPMENT.

ALL ELECTRICAL UTILIZATION EQUIPMENT AND RECEPTACLES TO HAVE THEIR SOURCES OF POWER IDENTIFIED USING NAMEPLATES AS HEREINBEFORE SPECIFIED. FASTEN NAMEPLATE TO EQUIPMENT, RECEPTACLE OR DEVICE PLATE AS APPROPRIATE, AND TO ITS DISCONNECTING MEANS. COORDINATE NOMENCLATURE WITH CONSTRUCTION MANAGER SO AS TO BE CONSISTENT WITH PLANTWIDE IDENTIFICATION METHODS.

NAMEPLATE REQUIREMENTS WILL NOT BE FURTHER SPECIFIED UNDER INDIVIDUAL HEADINGS.

16010.05 APPEARANCE

GIVE SPECIAL ATTENTION TO THE APPEARANCE OF ALL FACILITIES EXPOSED TO VIEW, AND INSTALL MATERIAL AND DEVICES AS REQUIRED TO GIVE A NEAT AND ORDERLY APPEARANCE.

WHERE EXPOSED TO VIEW, INSTALL RACEWAYS, MATERIALS AND DEVICES PARALLEL OR PERPENDICULAR TO STRUCTURE LINES. INSTALL DEVICES AND PANELS ON INTERIOR AND EXTERIOR WALLS IN ALIGNMENT WITH ONE ANOTHER, WITH CONSTRUCTION INSTALLED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS AND, WHERE APPROPRIATE, WITH EXISTING DEVICES, PANELS AND CONSTRUCTION.

WHERE INSTALLATION HEIGHT FOR DEVICES IS NOT INDICATED OR WHERE THERE IS ANY QUESTION AS TO THE APPEARANCE OF THE INSTALLATION, LOCATE DEVICES AS DIRECTED BY THE CONSTRUCTION MANAGER.

16010.06 SUPPORTS FOR EQUIPMENT

PROVIDE ALL NECESSARY SUPPORTS FOR EQUIPMENT PROVIDED OR INSTALLED UNDER THIS DIVISION. SUPPORTS TO CONSIST OF STEEL FRAMES, PLATES, BRACKETS, RACKS AND OTHER SHAPES OF ADEQUATE SIZE AND FASTENED WITH BOLTS, SCREWS OR BY WELDING, TO PROVIDE RIGID SUPPORT OF SUFFICIENT STRENGTH. WELDS TO BE CONTINUOUS AND REASONABLY SMOOTH. SURFACES TO BE SUITABLY PROTECTED FROM THE ENVIRONMENT. ACCEPTABLE METHODS INCLUDE FULL GALVANIZING AFTER FABRICATION OR COVERING WITH ZINC RICH PAINT AS SPECIFIED HEREINAFTER. WHERE PAINT IS USED, MAINTAIN TIGHT CONTROL ON EACH STEP OF THE OPERATION FROM SURFACE PREPARATION, THROUGH PRIMER AND TO FINAL FINISH COATS.

16010.07 FIELD CONDITIONS

COORDINATE WORK WITH THE VARIOUS TRADES INVOLVED IN THE PROJECT TO FIT AVAILABLE SPACE. IF THERE IS ANY QUESTION AS TO WHERE ELECTRICAL SYSTEM COMPONENTS SHOULD BE LOCATED SO THAT THE WORK OF OTHER TRADES CAN BE PROPERLY INSTALLED, MEET AND DISCUSS SUCH QUESTIONS WITH THE OTHER TRADES INVOLVED, JOINTLY PREPARE SKETCHES OR COORDINATION DRAWINGS IF NECESSARY, AND OTHERWISE COORDINATE THE WORK. ANY WORK INSTALLED IN SUCH LOCATIONS AS TO PREVENT OTHER TRADES FROM INSTALLING THEIR WORK WITH REASONABLE CONVENIENCE MUST BE RELOCATED AT NO ADDITIONAL CONTRACT COST.

DRAWINGS INDICATE DESIRED POSITION OF EQUIPMENT. UNLESS DIMENSIONED, RACEWAY ROUTING IS SHOWING SCHEMATICALLY. DO NOT INSTALL RACEWAYS IN LOCATIONS WHICH WOULD MAKE IMPOSSIBLE THE WORK OF OTHER TRADES. COORDINATE WORK WITH OTHER TRADES TO AVOID INTERFERENCES. IF CONDITIONS ARE ENCOUNTERED WHICH MAKE INDICATED ARRANGEMENTS IMPOSSIBLE OR IMPRACTICAL, SUBMIT REQUEST FOR DEVIATION WITH DRAWINGS AS REQUIRED TO CLARIFY THE REQUEST.

16010.08 OPENINGS, PENETRATIONS AND SEALS FOR CONDUIT OR CABLE

PROVIDE A SCHEDULE 40 PIPE SLEEVE FOR EACH SINGLE CONDUIT WHICH PENETRATES PARTITIONS OR WALLS IN EXISTING BUILDINGS. USE PIPE TWO SIZES LARGER THAN CONDUIT. PACK VOID BETWEEN CONDUITS AND PIPE SLEEVE WITH OAKUM WHERE CONDUIT PASSES THROUGH SLEEVE IN EXTERIOR WALLS ABOVE OR BELOW GRADE. FILL ENDS OF SLEEVES WITH GENERAL ELECTRIC SILICONE FOAM RTV 851, OR APPROVED EQUAL, AND TROWEL NEATLY TO MAKE SEAL. PIPE SLEEVES IN WALLS TO BE FLUSH WITH WALL SURFACES AND PIPE SLEEVES IN FLOORS TO BE EXTENDED 1-1/2 INCHES ABOVE FINISHED FLOOR. PROVIDE SPLIT PLATES TO CLOSE AROUND EXPOSED CONDUITS PASSING THROUGH WALLS AND AROUND EXPOSED SLEEVES EXTENDING ABOVE FLOORS.

PENETRATIONS OF BUILDINGS A, B AND C TO BE MADE IN STRICT ACCORDANCE WITH BUILDING MANUFACTURER'S INSTRUCTIONS.

16010.09 ACCESS

PROVIDE ACCESS FOR ALL ITEMS REQUIRING INSPECTION OR MAINTENANCE, SUCH AS JUNCTION, PULL AND OUTLET BOXES AND SEALING FITTINGS.

16010.10 PROTECTION OF PROPERTY

PROTECT EQUIPMENT AND MATERIALS FROM INTRUSION OF ALL FOREIGN MATERIALS. DO NOT INSTALL SENSITIVE ELECTRICAL EQUIPMENT UNTIL MAJOR CONSTRUCTION WORK IS COMPLETED. DURING AND AFTER INSTALLATION, PROTECT EQUIPMENT FROM DAMAGE BY WATER, DUST, PAINT, WET CONCRETE, IMPACT, ETC.

16010.11 CUTTING AND PATCHING

WHERE SLEEVES, FRAMING OR FORMING HAVE NOT BEEN PLACED FOR PROPER INSTALLATION OF WORK, OBTAIN FROM THE CONSTRUCTION MANAGER THE LOCATIONS NECESSARY TO CONTINUE WITH CONSTRUCTION OPERATION.

PATCH SUCH OPENINGS IN ACCORDANCE WITH APPLICABLE REQUIREMENTS SPECIFIED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS BY WORKERS SKILLED IN THE TRADE INVOLVED.

NEATLY BAND HOLES CUT IN GRATINGS. WHERE GRATINGS ARE GALVANIZED, IMMEDIATELY COAT THE BANDING AND ANY ABRADED SURFACES WITH TWO COATS OF ZINC RICH PAINT AS SPECIFIED HEREINAFTER.

INSOFAR AS POSSIBLE, AVOID MAKING HOLES IN EXISTING OR NEW STRUCTURAL STEEL. IF HOLES ARE REQUIRED, OBTAIN CONSTRUCTION MANAGER'S PERMISSION AND DRILL OR PUNCH HOLES. DO NOT CUT WITH TORCH.

16010.12 WELDING

NO WELDING OR OPEN FLAME WORK WILL BE PERMITTED IN THE CONSTRUCTION AREA UNLESS PERMITTED BY, PREARRANGED WITH, AND COORDINATED WITH THE CONSTRUCTION MANAGER, AND AN FMPC WELDING PERMIT OBTAINED.

WELDING MUST BE DONE BY ACCEPTABLE CERTIFIED WELDERS AND IN ACCORDANCE WITH FMPC APPROVED WELDING STANDARDS AND COMPLYING WITH THE LATEST AWS D1.1 CODE OR WITH ANY STATE OR LOCAL CODE REQUIREMENTS WHICH SUPERSEDE IT.

BEFORE WELDING, SUBMIT CERTIFICATION OF COMPLIANCE FORMS FOR EACH WELDER. ALL WELDING AND MATERIALS TO BE SUITABLE FOR USE IN SEISMIC ZONE 2.

16010.13 PAINTING

A. GENERAL

UNLESS FACTORY FINISH IS SPECIFIED, OR PRIOR PAINTING IS PART OF MANUFACTURER'S STANDARD PROCEDURE, PRIME PAINT FABRICATED OR MANUFACTURED EQUIPMENT AND MATERIAL PRIOR TO, OR IMMEDIATELY AFTER, INSTALLATION AS HEREINAFTER SPECIFIED.

ITEMS NOT INCLUDED:

GALVANIZED OR SIMILAR TREATED SURFACES. INSOFAR AS POSSIBLE, AVOID FIELD CUTTING, BURNING OR WELDING OF GALVANIZED HARDWARE. WHERE SUCH OPERATIONS ARE NECESSARY, SPOT PRIME AND PAINT INVOLVED SURFACES WITH HIGH ZINC DUST CONTENT PAINT FOR REGALVANIZING GALVANIZED STEEL, AS MANUFACTURED BY AMERON, CARBOLINE, PORTER, TNEMEC, OR APPROVED EQUAL
NONFERROUS SURFACES
NONMETALLIC SURFACES
PLATED SURFACES
STAINLESS STEEL SURFACES
INSIDE OF CONDUITS AND DEVICES
WEARING SURFACES

THOROUGHLY CLEAN AND REPRIME SHOP COATED MATERIALS OR EQUIPMENT WHICH SHOW EVIDENCE OF CORROSION.

FIELD FINISH PAINTING IS SPECIFIED UNDER SECTION 09900 EXCEPT AS INDICATED FOR TOUCH-UP OF DAMAGED GALVANIZED SURFACES.

B. PAINTING

CLEAN ALL SURFACES TO REMOVE DIRT, OIL, GREASE, DUST, SCALE, RUST AND FOREIGN MATTER BEFORE APPLYING PAINT. PREPARE SURFACES AND APPLY PAINT IN ACCORDANCE WITH PAINT MANUFACTURER'S RECOMMENDATIONS.

PAINT WITH ONE COAT OF PRIMER. USE PORTER NO. 298 GRAY ALKYD PRIMER, OR EQUIVALENT PPG, SHERWIN-WILLIAMS, DUPONT, PRATT AND LAMBERT, DEVOE, GLIDDEN, BENJAMIN MOORE, OR APPROVED EQUAL.

16010.14 TESTS AND REPORTS

MAKE TESTS AND ARRANGE FOR INSPECTIONS NECESSARY TO DETERMINE THAT WIRING AND EQUIPMENT INSTALLED UNDER THESE SPECIFICATIONS ARE IN SATISFACTORY CONDITION TO BE ENERGIZED. SCHEDULE TESTS AND INSPECTIONS AT TIMES SATISFACTORY TO THE CONSTRUCTION MANAGER'S REPRESENTATIVE TO ENABLE THEM TO BE PRESENT. ALL PARTS OF THE INSTALLATION, WHEN TESTED, TO MEET APPLICABLE STANDARDS.

KEEP A COMPLETE AND ACCURATE RECORD OF ALL TESTS AND INSPECTIONS AND SUBMIT ONE COPY FOR REVIEW.

FURNISHING AND SETTING UP OF REQUIRED TEST EQUIPMENT AND PERFORMANCE OF WORK INCIDENTAL TO MAKING TESTS IS A PART OF WORK UNDER THIS DIVISION.

REPLACE ANY WORK AND EQUIPMENT PROVIDED UNDER THIS DIVISION AND FOUND FAULTY OR DEFECTIVE UNDER TEST. SHOULD THE CONSTRUCTION MANAGER AGREE, FAULTY OR DEFECTIVE WORK AND EQUIPMENT MAY BE REPAIRED RATHER THAN REPLACED. AFTER REPLACEMENT OR REPAIR, TEST WORK AGAIN. FINAL ACCEPTANCE OF WORK DEPENDS ON SUCCESSFUL COMPLETION OF OPERATIONAL TESTS ON ALL EQUIPMENT TO SHOW THAT THE EQUIPMENT WILL PERFORM THE FUNCTIONS FOR WHICH IT IS SPECIFIED.

UPON RECEIPT OF EQUIPMENT FURNISHED FOR INSTALLATION UNDER THIS DIVISION, IMMEDIATELY INSPECT EQUIPMENT FOR DAMAGE, DEFECTS AND MISSING COMPONENTS. IF SUCH CONDITIONS ARE FOUND WHICH MAKE THE EQUIPMENT UNSUITABLE FOR INSTALLATION, IMMEDIATELY NOTIFY CONSTRUCTION MANAGER FOR DISPOSITION.

PRIOR TO MAKING ALTERATIONS OR ADDITIONS TO EXISTING EQUIPMENT OR SYSTEMS, CHECK SUCH EXISTING EQUIPMENT OR SYSTEMS FOR PROPER OPERATION. IF EQUIPMENT OR SYSTEMS ARE FOUND TO BE FAULTY, DAMAGED, OR INOPERATIVE SO AS TO BE UNSUITABLE FOR ALTERATION OR ADDITION, IMMEDIATELY NOTIFY CONSTRUCTION MANAGER FOR DISPOSITION.

INSTRUMENTS USED FOR TESTS ARE TO BE MAINTAINED UNDER A DOCUMENTED CALIBRATION PROGRAM AS SPECIFIED IN SECTION 01100.

PERFORM CONTINUITY AND OPERATIONAL TESTS ON ALL LIGHTING, RECEPTACLE, POWER AND CONTROL CIRCUITS.

TEST ALL 125 VOLT, 3-WIRE GROUNDING RECEPTACLES, INCLUDING THOSE PROVIDED FOR TEMPORARY POWER, FOR CORRECT WIRING AND FOR CORRECT OPERATION OF GFCI (IF RECEPTACLE IS SO PROTECTED), BY USE OF A RECEPTACLE CIRCUIT TESTER SUCH AS GENERAL ELECTRIC MODEL TRC2-3 OR APPROVED EQUAL.

CHECK ALL CONTROL AND INTERLOCKING WIRING FOR PROPER OPERATION. PERFORM OPERATIONAL TESTS WITH CONSTRUCTION MANAGER TO ASSURE THAT CONTROL WIRING HAS BEEN PROPERLY INSTALLED.

PERFORM INSULATION RESISTANCE TEST ON 480 VOLT CIRCUITS AFTER INSTALLATION AND BEFORE ENERGIZATION USING A 1,000 VOLT BIDDLE MEGGER TEST SET, OR APPROVED EQUAL. MAINTAIN TEST UNTIL READINGS ARE STEADY. INVESTIGATE CAUSES AND TAKE APPROPRIATE REMEDIAL ACTION WHEN INSULATION RESISTANCE TESTS LESS THAN 5 MEGOHMS, OR WHEN MULTIPLE TESTS INDICATE A SIGNIFICANT DOWNWARD TREND IN THE RESISTANCE READINGS. SIMILARLY TEST CIRCUITS FOR LOWER VOLTAGES USING A 500 VOLT TEST SET.

DO NOT PERFORM INSULATION RESISTANCE TEST ON CIRCUITS OPERATED BELOW 120 VOLTS NOR ON SOLID-STATE EQUIPMENT OR STATIC GROUND FAULT DEVICES, INCLUDING GROUND FAULT CIRCUIT INTERRUPTERS, NOR ON ANY CIRCUIT CONNECTED TO EQUIPMENT CONTAINING SOLID-STATE DEVICES, UNLESS SUCH TEST IS AUTHORIZED BY, AND IS PERFORMED IN STRICT ACCORDANCE WITH, EQUIPMENT MANUFACTURER'S RECOMMENDATIONS, OR IN LIEU THEREOF, DISCONNECT EQUIPMENT FROM THE CIRCUIT.

INSPECT ALL GROUND CONNECTIONS FOR CONTINUITY AND TIGHT ELECTRICAL AND MECHANICAL CONNECTIONS. TEST RESISTANCE AT VARIOUS POINTS ON GROUNDING SYSTEM, USING BIDDLE GROUND OHMER, OR APPROVED EQUAL, OR OTHER STANDARD METHOD. MAXIMUM PERMISSIBLE GROUNDING SYSTEM RESISTANCE IS 5 OHMS.

TEST ALL EMERGENCY LIGHTING SYSTEMS FOR SATISFACTORY OPERATION AND PERFORMANCE AT EACH OUTLET AND EQUIPMENT LOCATION.

16010.15 PHASE ROTATION AND IDENTIFICATION

MAINTAIN NEMA PHASE POSITIONS IN ALL ELECTRICAL EQUIPMENT CONNECTIONS.

TAG EACH TERMINAL OF EQUIPMENT WITH PHASE MARKINGS AS AN AID IN MAKING PROPER WIRING CONNECTIONS.

16010.16 WORK ON ENERGIZED CIRCUITS AND EQUIPMENT

CERTAIN EXISTING FACILITIES WILL REMAIN IN SERVICE THROUGHOUT CONSTRUCTION WITH ONLY BRIEF SHUTDOWN PERIODS PERMITTED FOR MODIFICATIONS AND TIE-IN CONNECTIONS. SCHEDULE SHUTDOWN PERIODS TO CONFORM TO OPERATING CONTRACTOR'S AND CONSTRUCTION MANAGER'S REQUIREMENTS, AND ONLY WITH WRITTEN AUTHORIZATION FROM THE CONSTRUCTION MANAGER.

WHEN IT IS NECESSARY TO PERFORM PORTIONS OF WORK ON OR ADJACENT TO ENERGIZED EQUIPMENT, USE ONLY PERSONNEL QUALIFIED AND EXPERIENCED IN SUCH OPERATIONS, AND TAKE PROPER SAFETY MEASURES TO PROTECT PERSONNEL AND EQUIPMENT.

FOLLOW FMPC LOCK AND TAG PROCEDURES.

16010.17 CODES, PERMITS AND INSPECTIONS

CONTRACT DOCUMENTS GOVERN WHERE MORE STRICT THAN LAWS, ORDINANCES, APPLICABLE STANDARDS OF UL, NFPA, AND NEC, EVEN THOUGH SUCH ADDITIONAL WORK IS NOT STATUATORILY REQUIRED BY ANY LAW OR ORDINANCES.

PROVIDE MATERIALS AND EQUIPMENT BEARING CERTIFICATION OF UL WHERE SUCH LABELS OR STAMPS ARE CUSTOMARY, REQUIRED, OR SPECIFIED.

WITHIN 30 DAYS AFTER AWARD OF CONTRACT, SUBMIT TO OPERATING CONTRACTOR SUCH WORKING AND LAYOUT DRAWINGS AS MAY BE REQUIRED. PROVIDE SERVICES OF A QUALIFIED ENGINEER, IF REQUIRED BY THE OPERATING CONTRACTOR, TO PREPARE DRAWINGS. OBTAIN APPROVAL BEFORE PROCEEDING.

16010.18 SHOP DRAWINGS

SUBMIT WIRING DIAGRAMS OR CONNECTION DIAGRAMS ACCOMPANIED BY ADEQUATELY DEFINED SYMBOLS LIST. PREPARE SCHEMATIC AND WIRING DIAGRAMS IN ACCORDANCE WITH ANSI/IEEE PUBLICATION Y32E, "ELECTRICAL AND ELECTRONICS GRAPHIC SYMBOLS AND REFERENCE DESIGNATIONS."

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND SHOP DRAWING SUBMITTAL REQUIREMENTS.

DIVISION 16

16020 - SCOPE OF ELECTRICAL WORK

16020.01 SCOPE OF WORK

FURNISH ALL EQUIPMENT AND MATERIALS, ALL LABOR AND SERVICES, AND DO ALL WORK SHOWN OR SPECIFIED, TOGETHER WITH ALL NECESSARY APPURTENANCES, TO PROVIDE COMPLETE AND OPERABLE ELECTRICAL SYSTEMS.

NOTE THAT CERTAIN WORK AND EQUIPMENT SPECIFIED IN DIVISION 16 OF THESE SPECIFICATIONS ARE INCLUDED ONLY FOR THE PURPOSE OF ESTABLISHING DESIGN REQUIREMENTS FOR ELECTRICAL WORK IN SECTION 13120, AND ARE NOT APPLICABLE TO THIS SCOPE OF WORK UNDER DIVISION 16.

IN GENERAL, WORK UNDER THIS DIVISION INCLUDES, BUT IS NOT NECESSARILY LIMITED TO:

EMPTY UNDERGROUND CONDUIT
MODIFICATION OF EXISTING MOTOR CONTROL CENTER
GROUNDING
CONDUIT AND WIRING SYSTEM FOR POWER TO POLE AT BULDING B
DEMOLITION
TEMPORARY POWER AND LIGHT WIRING FOR CONSTRUCTION

16020.02 DEMOLITION OF ELECTRICAL WORK

ALL DEMOLITION WORK TO BE PERFORMED IN ACCORDANCE WITH CURRENT FMPC OPERATING PROCEDURES. REFER TO SECTION 02050 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING DEMOLITION.

PROVIDE ALL NECESSARY LABOR, MATERIALS, TOOLS, DEVICES AND EQUIPMENT AS REQUIRED TO COMPLETE THE FOLLOWING DEMOLITION WORK:

REMOVE EXISTING WOOD ELECTRICAL POLES AND ASSOCIATED LUMINAIRES FROM CONSTRUCTION PHASE A/B AREAS AS INDICATED ON THE DRAWINGS. POLES ARE TO BE REMOVED COMPLETELY INCLUDING ALL UNDERGROUND PORTIONS. BACKFILLING AND RESURFACING IS PROVIDED UNDER DIVISIONS 2 AND 3.

CUT OFF CONDUIT AND WIRE FEEDING POLES BELOW TOP OF EXISTING PAD AS INDICATED. TAPE AND ABANDON WIRES IN PLACE. SEALING OF CONDUIT IS PROVIDED UNDER DIVISION 3. DISCONNECT SECONDARY OF CONSTANT CURRENT TRANSFORMER NEAR PLANT 1 WHICH FEEDS LIGHTING CIRCUITS IN CONSTRUCTION PHASE A AND B AREAS.

CIRCUITRY TO BE MAINTAINED AS REQUIRED TO MAINTAIN PAD ILLUMINATION IN AREAS NOT BEING DEMOLISHED DUE TO PHASING OF WORK.

16020.04 RESTORATION OF EXISTING FACILITIES

REPLACE OR RESTORE TO THEIR ORIGINAL UNDAMAGED CONDITION ALL FACILITIES DAMAGED DURING PROGRESS OF WORK EXCEPT AS OTHERWISE INDICATED FOR DEMOLITION OF LIGHT POLES AND FOR WORK ASSOCIATED WITH UNDERGROUND CONDUIT. SUCH REPLACEMENT OR RESTORATION APPLIES TO BOTH SURFACE AND SUBSURFACE INSTALLATIONS AND MATERIALS. USE MATERIALS AND INSTALLATION METHODS TO MATCH EXISTING INSTALLATIONS. PERFORM SITE WORK IN ACCORDANCE WITH THE REQUIREMENTS OF DIVISION 2.

16020.05 TEMPORARY WIRING

PROVIDE AND MAINTAIN DURING PERIOD OF CONSTRUCTION, TEMPORARY ELECTRIC SERVICE FOR GENERAL LIGHTING AND SMALL POWER TOOLS AT CONSTRUCTION AREAS.

MAKE SUPPLY CONNECTIONS TO OPERATING CONTRACTOR'S POWER DISTRIBUTION SYSTEM AS DIRECTED BY THE CONSTRUCTION MANAGER. THE OPERATING CONTRACTOR WILL PAY FOR ALL ENERGY USED FOR TEMPORARY POWER, PROVIDED REASONABLE CARE IS EXERCISED IN ITS USE.

ERECT TEMPORARY DISTRIBUTION PANELS AT POINTS SATISFACTORY TO THE CONSTRUCTION MANAGER, CONVENIENT TO CONSTRUCTION AREA.

PROVIDE DISTRIBUTION SYSTEM AND TRANSFORMERS AS REQUIRED TO PRODUCE IN-SERVICE VOLTAGE AT LAMP HOLDERS AND RECEPTACLES OF NOT LESS THAN 95 PERCENT OF THE VOLTAGES SPECIFIED FOR TEMPORARY POWER.

CHARACTERISTICS FOR TEMPORARY POWER - 120/240 VOLTS, SINGLE PHASE, OR 120/208 VOLTS, 3-PHASE.

EXTEND 120 VOLT CIRCUITS FOR LIGHTING AND SMALL POWER, PROPERLY PROTECTED AGAINST OVERCURRENT, THE FULL LENGTH OF CONSTRUCTION AREA. PROVIDE KEYLESS LAMPHOLDERS WITH 200 WATT INCANDESCENT LAMPS FOR EACH 400 SQUARE FEET OF AREA.

PROVIDE GUARDS OR REFLECTORS TO PREVENT ACCIDENTAL CONTACT WITH LAMPS.

FOR 120 VOLT POWER, PROVIDE GROUNDING TYPE, SINGLE PHASE RECEPTACLES OR CORD CONNECTORS, NOT MORE THAN 4 ON EACH RECEPTACLE CIRCUIT. PROVIDE AS MANY CIRCUITS AS REQUIRED TO LIMIT EACH CIRCUIT TO 1,600 WATTS. PROTECT RECEPTACLE CIRCUITS WITH GROUND FAULT CIRCUIT INTERRUPTERS.

WHERE NECESSARY FOR COMPLIANCE WITH THE NEC, PROVIDE GROUND RODS AT DISTRIBUTION PANELS AND ELSEWHERE AS REQUIRED, TO PROVIDE ADEQUATE GROUNDING FOR NEUTRAL CONDUCTOR OF THE WIRING SYSTEM, METAL ENCLOSURES AND PORTABLE POWER TOOLS. IF THE RESISTANCE OF A ROD TO EARTH IS GREATER THAN 25 OHMS, DRIVE ADDITIONAL RODS UNTIL SATISFACTORY LOW GROUND RESISTANCE IS OBTAINED. PROVIDE A SEPARATE GROUNDING CONDUCTOR PARALLELING THE RECEPTACLE CIRCUITS.

DO NOT CONNECT ADDITIONAL GROUND RODS OR OTHER FORM OF GROUNDING ELECTRODE TO EXTENDED EXISTING NEUTRAL CONDUCTORS GROUNDED ELSEWHERE ON THE FMPC SITE.

ADDITIONAL EXTENSIONS REQUIRED FOR SMALL POWER OR LIGHTING ARE TO BE PROVIDED BY THE SUBCONTRACTOR OR SUB-SUBCONTRACTOR REQUIRING THE EXTENSION.

MAINTAIN TEMPORARY WIRING IN A SAFE AND SATISFACTORY WORKING CONDITION, INCLUDING THE REPLACEMENT OF FUSES AND LAMPS. AT CONCLUSION OF THE WORK, REMOVE ALL TRACES OF TEMPORARY WIRING FROM THE PREMISES.

IN THE EVENT THAT POWER WITH OTHER CHARACTERISTICS IS REQUIRED, THE SUBCONTRACTOR OR SUB-SUBCONTRACTOR REQUIRING SUCH SERVICE IS TO MAKE ALL ARRANGEMENTS FOR OBTAINING SUCH SERVICE (INCLUDING PROVISION OF GENERATORS WHERE NECESSARY), PROVIDE THE NECESSARY DISTRIBUTION FACILITIES, PAY ALL CHARGES FOR INSTALLATION AND MAINTENANCE OF THE SERVICE, AND AT CONCLUSION OF THE WORK, REMOVE ALL TRACES OF THIS SERVICE FROM THE PREMISES.

DIVISION 16

16307 - ELECTRICAL SWITCHING AND CONTROLS - LOW VOLTAGE (1,000 VOLTS AND BELOW)

16307.01 TRANSFORMER - LOW VOLTAGE DRY TYPE

MANUFACTURERS (OR APPROVED EQUAL):

GENERAL ELECTRIC
I-T-E
SQUARE D
WESTINGHOUSE

GENERAL PURPOSE INDOOR TRANSFORMER, 2 WINDING WITH NEMA STANDARD FULL CAPACITY HIGH VOLTAGE TAPS, MAXIMUM 220C INSULATION SYSTEM, 150C RISE.

INDICATE IMPEDANCE ON NAMEPLATE.

AUDIBLE SOUND LEVEL TO BE NEMA/ANSI STANDARD.

16307.02 PANELBOARD

MANUFACTURERS (OR APPROVED EQUAL):

GENERAL ELECTRIC
SQUARE D
WESTINGHOUSE

A. GENERAL

COMPLETELY FACTORY-BUILT AND -TESTED, TOTALLY ENCLOSED, DEAD FRONT, WALL MOUNTING NEMA 1 TYPE PANELBOARD. LOAD CENTER WILL NOT BE ACCEPTABLE.

CABINET CONSTRUCTED OF CODE GAGE GALVANIZED STEEL, WITH WIRING GUTTERS OF ADEQUATE SIZE TO MEET NEC/UL WIRE BENDING SPACE REQUIREMENTS. FINISH WITH PRIME COAT, OVER A RUST INHIBITOR, WITH A FINISH COAT OF THE MANUFACTURER'S STANDARD ENAMEL OVERALL.

PROVIDE DOOR FOR PANELBOARD. DOOR AND TRIM OF CODE GAGE STEEL, RABBETED, WITH ADJUSTABLE INDICATING TRIP CLAMPS, CONCEALED HINGES, AND LOCK AND CATCH COMBINATION. KEY ALL LOCKS ALIKE. NEATLY TYPED DIRECTORY, WITH A CLEAR PLASTIC COVER, IN FRAME ON TRIM OR INSIDE PANELBOARD DOOR AS APPLICABLE.

PROVIDE FULL LENGTH COPPER BUS AND EQUIP ALL SPACES, WHETHER OR NOT SPECIFIED FOR FUTURE USE, WITH HARDWARE AND BUSES TO RECEIVE FUTURE UNITS.

WHERE NEUTRAL IS REQUIRED PROVIDE FULL-CAPACITY INSULATED COPPER SOLID NEUTRAL BUS WITH REQUIRED TERMINALS.

PROVIDE SEPARATE COPPER GROUND BUS WITH REQUIRED TERMINALS.

PROVIDE BREAKER HANDLE LOCKING CLIPS OR PADLOCKING DEVICE AND OTHER ACCESSORIES AND FEATURES AS REQUIRED.

16307.03 CIRCUIT BREAKERS

PROVIDE A MOLDED CASE 480 VOLT BREAKER IN MOTOR CONTROL CENTER MCC N2-2 IN FIRST FLOOR OF PLANT 1. BREAKER TO HAVE MINIMUM 25,000 AMPERES INTERRUPTING RATING. BREAKER TO HAVE CHARACTERISTICS AS REQUIRED TO MAKE IT COMPATIBLE WITH THE EXISTING MOTOR CONTROL CENTER AND THESE SPECIFICTIONS.

MOLDED CASE CIRCUIT BREAKERS, AMBIENT COMPENSATED OR FACTORY-CALIBRATED WHEN USED FOR PANELBOARD INSTALLATION IN STRUCTURES. CIRCUIT BREAKERS IN PANELBOARD TO BE BOLT-IN TYPE ONLY, USING A FULL SPACE MODULE PER POLE MINIMUM. PLUG-IN BREAKERS WILL NOT BE ACCEPTED.

BREAKERS ELECTRICALLY AND MECHANICALLY TRIP-FREE, QUICK-MAKE, QUICK-BREAK, TRIP INDICATING WITH THE TRIPPED POSITION OF THE BREAKER HANDLE MIDWAY BETWEEN THE ON AND OFF POSITION.

TRIP UNITS TO BE THERMAL MAGNETIC TYPE. FOR FRAME SIZES LESS THAN 225 AMPERES, PROVIDE NONINTERCHANGEABLE TRIP UNITS, CALIBRATED AND SEALED AT THE FACTORY AT MANUFACTURER'S STANDARD TRIP CURRENT RATING UNLESS OTHERWISE INDICATED.

480 VOLT MOLDED CASE CIRCUIT BREAKERS IN PANELBOARDS TO HAVE MINIMUM 14,000 AMPERES INTERRUPTING RATING. MOLDED CASE CIRCUIT BREAKERS 240 VOLT, AND BELOW, IN PANELBOARDS TO HAVE MINIMUM 10,000 AMPERES INTERRUPTING RATING.

PROVIDE CLASS A GROUND FAULT CIRCUIT INTERRUPTER (GFCI) TYPE BREAKERS WHERE REQUIRED, AND WIRE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

16307.04 SWITCHING AND CONTROL EQUIPMENT

SWITCHING AND CONTROL MANUFACTURERS (OR APPROVED EQUAL) UNLESS OTHERWISE INDICATED:

GENERAL ELECTRIC
SQUARE D
WESTINGHOUSE

ENCLOSURE TYPES TO BE NEMA 1 INDOORS.

A. SAFETY AND DISCONNECT SWITCHES

FRONT-OPERATED, TYPE HD, SINGLE THROW, QUICK-MAKE, QUICK-BREAK, HORSEPOWER RATED, VISIBLE BLADE SWITCHING UNIT. INTERLOCK OPERATING HANDLE TO PREVENT OPENING DOOR UNLESS SWITCH IS IN OPEN POSITION. FUSIBLE TYPES TO BE PROVIDED WITH FUSE TERMINALS TO ACCOMMODATE TYPE OF FUSES INDICATED. INCLUDE PROVISION FOR PADLOCKS TO LOCK THE SWITCH IN OPEN POSITION.

SWITCHES TO HAVE LOAD TERMINALS AT BOTTOM AND TO BE CLOSED WHEN HANDLE IS IN UP POSITION.

B. FUSES

ALL FUSES IN EACH RESPECTIVE VOLTAGE CLASS TO BE SAME MANUFACTURER.

ALL REJECTION TYPE FUSES TO BE INSTALLED IN REJECTION TYPE FUSEHOLDERS.

FUSES, 600 VOLTS AND LOWER:

UL CLASS RKI, 200,000 AIC SYMMETRICAL, REJECTION TYPE
BUSS LPS-RK LOW PEAK, DUAL ELEMENT, 600 VOLT RATING, AND
BUSS LPN-RK LOW PEAK, DUAL ELEMENT, 250 VOLT RATING,
OR APPROVED EQUAL.

DIVISION 16

16400 - ELECTRICAL WIRING

16400.01 ELECTRIC SERVICE SYSTEMS

A. POWER DISTRIBUTION

120/240 VOLTS, SINGLE PHASE, 3-WIRE, 60 HZ, GROUNDED NEUTRAL.

208Y/120 VOLTS, 3-PHASE, 4-WIRE, 60 HZ, GROUNDED NEUTRAL.

240 VOLTS, 3-PHASE, 3-WIRE, 60 HZ.

480 VOLTS, 3-PHASE, 3-WIRE, 60 HZ.

480Y/277 VOLTS, 3-PHASE, 4-WIRE, 60 HZ, GROUNDED NEUTRAL.

B. LIGHTING DISTRIBUTION SYSTEM VOLTAGES

480Y/277 VOLTS, 3-PHASE, 4-WIRE, 60 HZ, WITH 277 VOLT SINGLE PHASE BRANCH CIRCUITS FOR LIGHTING. NOT MORE THAN 3 CIRCUITS ON SEPARATE PHASES HAVING COMMON NEUTRAL.

208Y/120 VOLTS, 3-PHASE, 4-WIRE, 60 HZ, WITH 120 VOLT SINGLE PHASE BRANCH CIRCUITS. NOT MORE THAN 3 CIRCUITS ON SEPARATE PHASES HAVING COMMON NEUTRAL.

120/240 VOLTS, SINGLE PHASE, 3-WIRE, 60 HZ, WITH 120 VOLTS SINGLE PHASE, BRANCH CIRCUITS. NOT MORE THAN 2 CIRCUITS ON SEPARATE LEGS HAVING COMMON NEUTRAL.

C. SMALL POWER

240 VOLTS, SINGLE PHASE, 60 HZ.

208 VOLTS, SINGLE PHASE, 60 HZ.

120 VOLTS, SINGLE PHASE, 60 HZ.

208 VOLTS, 3-PHASE, 3-WIRE, 60 HZ.

240 VOLTS, 3-PHASE, 3-WIRE, 60 HZ.

480 VOLTS, 3-PHASE, 3-WIRE, 60 HZ.

16400.02 WIRING

GENERAL:

INSTALL ALL WIRING, EXCEPT AERIAL DISTRIBUTION IN CONDUIT OR OTHER ACCEPTABLE RACEWAY.

PULL NO WIRE UNTIL THE CONDUIT SYSTEM IS COMPLETELY AND THOROUGHLY SWABBED. USE INERT PULLING COMPOUNDS FREE OF INGREDIENTS HARMFUL TO INSULATION. DO NOT USE GREASE OR OIL. PLACE ALL WIRES OF A CIRCUIT IN SAME RACEWAY.

LABEL AND COLOR CODE WIRE AND CABLE IN ACCORDANCE WITH NEC AND IN ACCORDANCE WITH OPERATING CONTRACTOR'S CRITERIA, AS FOLLOWS:

HANDWRITTEN OR WRAPAROUND LABELS ARE NOT ACCEPTABLE FOR USE AT THE FMPC. LABEL ALL CABLES PROPERLY USING A RAYCHEM TYPE TMS, OR APPROVED EQUAL, RECTANGULAR, FLAT, NONHEAT-SHRINKABLE TAG WITH 1/8 INCH HIGH LETTERING, FASTENED BY NYLON "TIE-WRAPS" PASSED THROUGH PREPUNCHED HOLES. FOR SINGLE CONDUCTORS AND INDIVIDUAL CABLE WIRES, PROVIDE SLIP-ON, HEAT-SHRINKABLE SLEEVE MARKERS, WITH BLACK LETTERING ON A WHITE BACKGROUND, W. H. BRADY COMPUTER-PRINTABLE "BRADY-SLEEVE," OR APPROVED EQUAL. MARK ALL SPARE WIRES AND CABLES "SP" AT BOTH ENDS. MARK CABLES WITH A CIRCUIT OR CABLE NUMBER. MARK ALL SINGLE CONDUCTOR WIRE AND CONDUCTORS OF CABLES WITH A WIRE NUMBER AND CIRCUIT NUMBER. IF SEVERAL CIRCUITS ARE CONTAINED WITHIN THE CABLE, ALSO MARK EACH CONDUCTOR WITH A CIRCUIT NUMBER.

WITH THE EXCEPTIONS NOTED BELOW, LOCATE MARKERS AT ORIGIN AND DESTINATION, AND AT ALL INTERVENING ACCESSIBLE SPLICE OR JUNCTION BOXES. MARK ALL WIRE AND CABLE WITH A CABLE OR CIRCUIT NUMBER ONLY.

LOCATE WIRE MARKERS WITHIN 3 INCHES OF A TERMINATION OR SPLICE. LOCATE CABLE MARKERS WITHIN 3 INCHES OF THE SPREAD, CABLE END, PENETRATION, OR BOX EXIT.

FOR BRANCH CIRCUITS AND ALL INTERIOR SUPPLY SIDE CIRCUITS, COLOR CODE AS FOLLOWS:

<u>FOR 120/240 VAC SYSTEMS</u>

HOT - BLACK
HOT - RED
NEUTRAL - WHITE
GROUND - GREEN

<u>FOR 480/277 VAC SYSTEM</u>

PHASE A - YELLOW
PHASE B - ORANGE
PHASE C - BROWN
NEUTRAL - GRAY
GROUND - GREEN

FOR 208/120 VAC SYSTEM

PHASE A - BLACK
PHASE B - RED
PHASE C - BLUE
NEUTRAL - WHITE
GROUND - GREEN

COLOR CODE UNGROUNDED ("PHASE" OR "HOT") CONDUCTORS IN SIZES NO. 8 AWG AND SMALLER BY MEANS OF COLORED INSULATION OR JACKET. WHERE COLORED INSULATIONS OR JACKETS ARE ONLY AVAILABLE ON SPECIAL ORDER, ALTERNATE METHODS FOR COLOR CODING UNGROUNDED CONDUCTORS MAY BE APPROVED UPON REQUEST TO THE CONSTRUCTION MANAGER.

COLOR CODE UNGROUNDED ("PHASE" OR "HOT") CIRCUIT CONDUCTORS IN SIZES NO. 6 AWG AND LARGER BY MEANS OF COLORED INSULATION OR JACKET, OR BY USE OF COLORED TAPE AT TERMINALS AND AT ALL POINTS WHERE ACCESSIBLE AFTER INSTALLATION.

YELLOW TAPE TO CONSIST OF TWO SEPARATE BANDS AT EACH APPLICATION POINT IN ORDER TO AVOID CONFUSION WITH WHITE, GRAY, OR ORANGE AFTER AGING.

FOR ALL CONDUCTOR SIZES, GREEN, GRAY OR WHITE COLORS ARE RESERVED EXCLUSIVELY FOR GROUNDING AND GROUNDED CONDUCTORS RESPECTIVELY. DO NOT USE THESE COLORS IN ANY WAY TO IDENTIFY AN UNGROUNDED CONDUCTOR. USE GRAY OR WHITE, AS REQUIRED BY THE APPROPRIATE COLOR CODE, ONLY FOR THE GROUNDED OR NEUTRAL CONDUCTOR IDENTIFICATION.

COLOR CODE GROUNDED ("NEUTRAL") CIRCUIT CONDUCTORS AND EQUIPMENT GROUNDING ("GROUND WIRE") CONDUCTORS IN SIZES NO. 6 AWG AND SMALLER ONLY BY MEANS OF COLORED INSULATION OR JACKET. COLOR CODE THESE CONDUCTORS IN SIZES NO. 4 AWG AND LARGER BY MEANS OF COLORED INSULATION OR JACKET OR BY MEANS OF COLORED TAPE AT TERMINALS AND AT ALL POINTS WHERE ACCESSIBLE AFTER INSTALLATION.

PAINTING, TAPING, OR OTHER ALTERATION OF THE COLOR OF A GREEN, WHITE, OR GRAY COLORED CONDUCTOR IS PROHIBITED.

CONTROL WIRE TO BE INDIVIDUALLY COLOR CODED AND NUMBERED, AND TAGGED AT LOCATIONS INDICATED HEREINABOVE. TAG CONTROL WIRES WITH NUMBERS AS SHOWN ON CONTROL DRAWINGS OR MANUFACTURER'S DRAWINGS.

INSTALL WIRING CONTINUOUS FROM OUTLET TO OUTLET, WITHOUT SPLICES, EXCEPT IN OUTLET BOXES, ACCESSIBLE JUNCTION BOXES, OR ACCESSIBLE RACEWAYS.

ROUTE EQUIPMENT GROUNDING CONDUCTORS WITH SUPPLY CONDUCTORS BACK TO THE SOURCE.

TRAIN AND LACE WIRING INSIDE EQUIPMENT AND PANELBOARDS WITH PLASTIC WRAP FOR WORKMANLIKE NEATNESS. DO NOT LACE OR STRAP TIGHTLY ANY CURRENT CARRYING LIGHTING OR POWER WIRING.

INSULATE ENDS OF PULL WIRES WHICH TERMINATE IN CABINETS, PANELS OR OTHER ELECTRICAL DEVICE ENCLOSURES TO PREVENT CONTACT WITH "LIVE" TERMINATIONS.

SUPPORT CONDUCTORS IN VERTICAL RACEWAYS WITH O-Z/GEDNEY, RUSSELL AND STOLL OR APPROVED EQUAL, SUPPORTS IN JUNCTION BOXES.

16400.03 TAPS, SPLICES AND CONNECTIONS

THOROUGHLY CLEAN WIRES BEFORE INSTALLING LUGS AND CONNECTORS SO THAT JOINT WILL CARRY FULL CAPACITY OF CONDUCTORS WITHOUT PERCEPTIBLE TEMPERATURE RISE ABOVE CONDUCTOR TEMPERATURE.

SOLDERED JOINTS WILL NOT BE PERMITTED, EXCEPT WHEN PART OF VENDOR-FURNISHED EQUIPMENT WHERE SOLDERING IS STANDARD PRACTICE.

FOR WIRE NO. 10 AWG OR SMALLER, USE INSULATED SPRING PRESSURE CONNECTORS UTILIZING AN EXPANDABLE CONE-SHAPED COIL SPRING, SUCH AS 3M COMPANY SCOTCHLOKS, IDEAL INDUSTRIES INC. WING NUTS, THOMAS & BETTS PIGGY CONNECTORS, BUCHANAN B-CAPS, OR APPROVED EQUAL. INSULATED SPRING PRESSURE CONNECTORS UTILIZING A NONEXPANDABLE FULLY SEATED COIL SPRING, SUCH AS IDEAL "WIRE-NUT," ARE NOT ACCEPTABLE. ALSO ACCEPTABLE ARE CRIMP-TYPE CAPS APPLIED WITH PROPER INDENTOR TOOL, WHICH PROVIDES DEFORMATION OF THE CAP IN TWO DIRECTIONS AT RIGHT ANGLES TO EACH OTHER, AS MANUFACTURED BY AMP, BURNDY, THOMAS & BETTS, OR APPROVED EQUAL.

FOR NO. 8 AWG AND LARGER WIRE, SPLICE OR TERMINATE WITH INDENTOR, CRIMP-TYPE CONNECTORS AND COMPRESSION TOOLS OR WITH BOLTED CLAMP-TYPE CONNECTORS, AS MANUFACTURED BY AMP, BURNDY, THOMAS & BETTS, OR APPROVED EQUAL.

UNLESS PROPERLY INSULATED BY THE CONNECTOR, INSULATE ALL JOINTS AT LEAST EQUAL TO THE CONDUCTOR INSULATION. INSTALL SELF-FUSING RUBBER-BASED INSULATING COMPOUND, MOLDED AROUND SHARP EDGES AND/OR DIFFICULT SHAPES, TO PROVIDE SMOOTH SURFACE FOR APPLYING ELECTRICAL TAPE. INSULATING COMPOUND TO BE 3M COMPANY SCOTCH NO. 2200 PADS OR NO. 2210 ROLLS, OR APPROVED EQUAL. ELECTRICAL TAPE, 3M COMPANY NO. 33+ SCOTCH TAPE, OR APPROVED EQUAL.

16400.04 LOCATION OF OUTLETS

A. GENERAL

SECURELY ANCHOR ALL OUTLET BOXES, INDEPENDENT OF CONDUIT SUPPORTS.

B. LUMINAIRE OUTLETS

SPACE OUTLETS EVENLY AND IN ALIGNMENT.

C. MOUNTING HEIGHTS

UNLESS OTHERWISE INDICATED, THE FOLLOWING OUTLET HEIGHTS APPLY.

OUTLET	ELEVATION TO CENTER LINE
RECEPTACLE OUTLETS	4 FT. 6 IN. ABOVE FINISHED FLOOR
PANELBOARDS	6 FT. 8 IN. FROM TOP OF PANELBOARD TO FINISHED FLOOR

16400.05 HANGERS AND SUPPORTS

A. EQUIPMENT SUPPORTS

UNLESS OTHERWISE INDICATED, PROVIDE EQUIPMENT SUPPORTS FABRICATED WITH STRUCTURAL STEEL, RIGIDLY WELDED OR BOLTED TO PRESENT WORKMANLIKE APPEARANCE, AND SUITABLE FOR THE SEISMIC ZONE 2 REQUIREMENTS SPECIFIED. USE HEXAGON HEAD BOLTS WITH SPRING LOCK WASHERS UNDER ALL NUTS.

B. CONDUIT SUPPORTS

ARRANGE CONDUIT SUPPORTS TO PREVENT DISTORTION OF ALIGNMENT BY WIRE PULLING OPERATIONS. PROVIDE GALVANIZED STEEL HANGERS, CLAMPS AND MALLEABLE IRON GALVANIZED CONDUIT STRAPS. PERFORATED PIPE STRAPS WILL NOT BE ACCEPTED. UNLESS OTHERWISE INDICATED, FASTEN HANGERS TO BUILDING STEEL WITH MECHANICAL BEAM CLAMPS. USE TOGGLE BOLTS IN HOLLOW MASONRY WALLS, AND EXPANSION SHIELDS IN CONCRETE OR BRICK WALLS. TRAPEZE HANGERS WITH CONDUIT CLAMPS MAY BE USED WHERE GROUPS OF CONDUITS RUN PARALLEL. DO NOT SUPPORT CONDUITS FROM PIPING, DUCTWORK, OR OTHER SUCH FACILITIES. UNLESS OTHERWISE INDICATED, SUPPORT CONDUITS ONLY FROM STRUCTURE. PROVIDE A SUPPORT AT EACH ELBOW OR CONDUIT BODY.

C. LUMINAIRE SUPPORTS

FOR LUMINAIRE SUPPORTS, EMPLOY MATERIALS WHICH ARE SUITABLE FOR USE IN SEISMIC ZONE 2 AND CAPABLE OF SUPPORTING THE WEIGHT OF THE LUMINAIRE.

SUPPORT LUMINAIRES AS INDICATED IN SECTION 13120.

16400.06 CONDUIT SYSTEMS

A. GENERAL

USE RIGID, GALVANIZED THREADED STEEL CONDUIT WITH ALL CAST FERROUS METAL CONDUIT BODIES, EXCEPT AS OTHERWISE INDICATED.

EXCEPT FOR UNDERGROUND WORK, INTERMEDIATE METAL CONDUIT MAY BE SUBSTITUTED FOR RIGID STEEL CONDUIT.

CUT CONDUITS SQUARE AND CAREFULLY REAM ENDS. BRING JOINTS TO A SHOULDER. SECURELY FASTEN CONDUITS TO SHEET METAL BOXES AND ENCLOSURES WITH GALVANIZED DOUBLE LOCKNUTS AND INSULATING BUSHINGS, EXCEPT PROVIDE SUITABLE BONDING FITTINGS WHERE REQUIRED BY THE NEC. PROVIDE MYERS, OR APPROVED EQUAL, WATERTIGHT TYPE HUBS FOR CONDUIT CONNECTIONS TO SHEET METAL ENCLOSED DEVICES IN WET LOCATIONS. USE CARE SO THAT SUFFICIENT THREADS PROJECT THROUGH TO PERMIT BUSHING TO BE DRAWN TIGHTLY AGAINST END OF CONDUIT. DO NOT INSTALL CONDUIT WITH RUSTY THREADS.

WHERE CONDUIT SYSTEMS CANNOT OTHERWISE BE CONSTRUCTED, USE ERICKSON TYPE UNIONS, OR THREADED SPLIT COUPLINGS. WHERE SPLIT COUPLINGS ARE USED, ENSURE THREADS OF CONDUITS AND COUPLINGS ARE MATCHED PRIOR TO FINAL TIGHTENING.

RUN EXPOSED CONDUIT PARALLEL WITH, OR PERPENDICULAR TO, MEMBERS OF THE STRUCTURE.

RING, PIPE OR TRAPEZE HANGERS MAY BE USED TO SUPPORT CONDUITS EXCEPT FOR THE FIRST AND LAST HANGERS OF THE CONDUIT RUN OR WHERE A VERTICAL OR HORIZONTAL DIRECTION CHANGE OCCURS. IN THESE CASES, RIGIDLY BRACE CONDUIT SUPPORTS SO THAT WIRE MAY BE PULLED WITHOUT DAMAGE TO THE CONDUIT SYSTEM. STUD WELDS MAY BE USED FOR FASTENING CLAMPS TO STEEL. DO NOT USE FLAT STRAPS TO SUPPORT CONDUIT OR BOXES.

SEAL CONDUITS STUBBED UP OR TERMINATING IN CABINETS, OUTLETS AND SIMILAR EQUIPMENT AGAINST ENTRANCE OF FOREIGN MATTER INTO SYSTEM BY USE OF APPROPRIATE CONDUIT PENNIES AND RETAINING BUSHINGS PRIOR TO SWABBING AND PULLING IN WIRE.

PROVIDE NYLON PULLING LINE IN ALL EMPTY CONDUITS PROVIDED UNDER THESE SPECIFICATIONS.

AVOID MOISTURE TRAPS WHERE POSSIBLE. WHERE UNAVOIDABLE, PROVIDE DRAIN FITTINGS AT LOW POINTS.

ELECTRICAL METALLIC TUBING MAY BE USED FOR BRANCH CIRCUIT WORK IN BUILDINGS A, B AND C ABOVE 13 FEET ABOVE FINISHED FLOOR.

CONDUITS INSTALLED BELOW PADS OR IN GROUND BELOW THE BUILDINGS SHALL BE COATED RIGID STEEL. CONCRETE ENCASEMENT OF RIGID STEEL CONDUIT IS NOT REQUIRED.

ALL STEEL CONDUITS INSTALLED IN THE GROUND SHALL BE FIELD WRAPPED WITH 0.010 INCH THICK PIPE WRAPPING PLASTIC TAPE APPLIED WITH A 50 PERCENT OVERLAP OR SHALL HAVE A FACTORY APPLIED COATING WITH MINIMUM THICKNESS NOT LESS THAN ONE OF THE FOLLOWING:

HIGH-LOW DENSITY POLYETHYLENE, TAPE WITH NO CHLORIDES, KENDALL CO. POLYKEN NO. 930 WITH NO. 927 PRIMER, OR APPROVED EQUAL - 0.020 INCH

EPOXY RESIN - 0.008 INCH

COAT-TAR ENAMEL - 0.063 INCH

ZINC COATING MAY BE OMITTED FROM STEEL CONDUIT WHICH HAS A FACTORY APPLIED EPOXY RESIN COATING. FIELD-MADE JOINTS, FITTINGS, ABRASIONS, AND COATING HOLIDAYS SHALL BE COATED WITH MATERIAL EQUIVALENT TO MATERIAL SPECIFIED ABOVE.

UNDERGROUND CONDUIT INSTALLATIONS ARE FURTHER SPECIFIED IN SECTION 16480.

INSTALL CROUSE-HINDS TYPE EZS SEAL FITTINGS, OR EQUIVALENT APPLETON, OR APPROVED EQUAL, AT ALL POINTS WHERE CONDUITS PASS FROM HOT TO COLD LOCATIONS AND FROM INSIDE TO OUTSIDE OF BUILDING WALLS. PACK SEAL FITTINGS IN NONHAZARDOUS AREAS WITH NONHARDENING DUCT SEALING COMPOUND, GRAYBAR PERMAGUM, OR EQUAL.

DO NOT INSTALL CONDUITS CLOSER THAN 6 INCHES TO PARALLEL RUNS OF FLUES, STEAM LINES, HOT WATER PIPES OR OTHER PIPES CARRYING MATERIALS HOTTER THAN 200F.

LIQUIDTIGHT FLEXIBLE METAL CONDUIT WHERE FLEXIBILITY IS REQUIRED AND FOR ALL TRANSFORMER CONNECTIONS.

STANDARD FLEXIBLE METAL CONDUIT IN DRY LOCATIONS WHERE FLEXIBILITY IS REQUIRED, EXCEPT FOR TRANSFORMER CONNECTIONS.

MINIMUM CONDUIT SIZE 1/2 INCH.

B. <u>RIGID STEEL CONDUIT</u>

MANUFACTURERS (OR APPROVED EQUAL):

ALLIED TUBE AND CONDUIT
STEELDUCT
TRIANGLE - PWC
WHEATLAND TUBE

HOT-DIP GALVANIZED, THREADED, RIGID STEEL IN ACCORDANCE WITH UL 6 AND ANSI C80.1.

C. INTERMEDIATE CONDUIT

MANUFACTURERS:

ALLIED TUBE AND CONDUIT
TRIANGLE - PWC

HOT-DIP GALVANIZED, THREADED RIGID-TYPE STEEL IN ACCORDANCE WITH UL 1242.

ELECTRICAL METALLIC TUBING

MANUFACTURERS (OR APPROVED EQUAL):

ALLIED TUBE AND CONDUIT
TRIANGLE - PWC
WHEATLAND TUBE

HOT-DIP GALVANIZED OR ELECTRO-GALVANIZED STEEL IN ACCORDANCE WITH UL 797 AND ANSI C80.3.

STANDARD FLEXIBLE STEEL

MANUFACTURERS (OR APPROVED EQUAL):

TRIANGLE - PWC
AMERICAN FLEXIBLE CONDUIT

CONCAVE SINGLE STRIP, HELICALLY WOUND GALVANIZED STEEL STRIP INTERLOCKED AND TIGHTLY JOINTED IN ACCORDANCE WITH UL 1.

D. LIQUIDTIGHT FLEXIBLE CONDUIT

MANUFACTURERS (OR APPROVED EQUAL):

ANACONDA INDUSTRIES - SEALTITE TYPE UA
ELECTRI-FLEX LA
LIQUATITE LA
O-Z/GEDNEY FLEXI-GUARD TYPE UAG

UL LISTED, CONCAVE SINGLE STRIP, HELICALLY WOUND GALVANIZED STEEL STRIP INTERLOCKED AND TIGHTLY JOINTED, THE WHOLE COVERED WITH A CONTINUOUS LIQUIDTIGHT PVC JACKET. EXTRA-FLEXIBLE NON UL-LISTED TYPES WILL NOT BE ACCEPTABLE.

E. CONDUIT BODIES

MANUFACTURERS (OR APPROVED EQUAL):

APPLETON
CROUSE-HINDS
PYLE-NATIONAL
RACO

UNLESS OTHERWISE INDICATED, ALL CONDUIT BODIES FOR RIGID STEEL AND INTERMEDIATE METAL CONDUIT TO BE CAST FERROUS, THREADED. NEOPRENE GASKETED COVERS WITH BLIND TYPE CAPTIVE SCREWS. COVERS TO BE CAST TYPE IN WET OR DAMP LOCATIONS. COVERS MAY BE SHEET STEEL IN DRY LOCATIONS.

F. COUPLINGS, FITTINGS AND CONNECTORS

MANUFACTURERS (OR APPROVED EQUAL):

APPLETON
EFCOR
O-Z/GEDNEY
PYLE-NATIONAL
RACO
STEEL CITY
THOMAS & BETTS

FOR LIQUIDTIGHT FLEXIBLE METAL CONDUIT, USE O-Z/GEDNEY "GROUND-TIGHT" TYPE 4QLT, OR APPROVED EQUAL, GROUNDING LIQUIDTIGHT CONNECTORS WITH INSULATED THROATS.

FOR ELECTRICAL METALLIC TUBING, USE STEEL OR MALLEABLE IRON GLAND COMPRESSION TYPE CONNECTORS WITH INSULATED THROATS, UL LISTED AS RAINTIGHT AND CONCRETETIGHT.

16400.07 RACEWAY MARKING

MARK RACEWAYS CONTAINING CIRCUITS OPERATING IN EXCESS OF 120V TO GROUND OR IN EXCESS OF 240V LINE-TO-LINE, ON GROUNDED OR UNGROUNDED SYSTEMS, AS FOLLOWS:

LOCATE RACEWAY MARKERS AT ORIGIN AND DESTINATION OF BRANCHES, AT INTERVENING ACCESSIBLE BOXES, FITTINGS WITH REMOVABLE COVERS, AT LEAST ONE IN EACH ROOM, COMPARTMENT OR VAULT, BOTH SIDES OF AND WITHIN 2 FEET OF THE WALL, FLOOR, OR CEILING PENETRATIONS, AND EVERY 20 FEET. MARK RACEWAYS PRIOR TO CABLE INSTALLATION. JUDICIOUS SELECTION OF MARKING LOCATIONS MAY SATISFY SEVERAL OF THE ABOVE REQUIREMENTS SIMULTANEOUSLY.

AS GENERAL EXCEPTIONS TO THE PRECEDING PARAGRAPH, EXPOSED RACEWAYS 20 FEET OR LESS IN LENGTH MAY BE MARKED IN ONLY ONE LOCATION.

IN SMALL BUILDINGS, ROOMS, ETC., WHERE VERY FEW RACEWAYS EXIST AND THE FUNCTION, ORIGINATION AND DESTINATION OF THE RACEWAY IS OBVIOUS, NO MARKING IS REQUIRED EXCEPT A VOLTAGE MARKING AT ACCESSIBLE TERMINAL, JUNCTION, OR SPLICE BOXES WITH REMOVABLE COVERS. EMBEDDED OR BURIED RACEWAYS NEED NOT BE MARKED WHERE BURIED OR EMBEDDED.

MARK RACEWAYS ENTERING SWITCH BOXES WITHIN 2 FEET OF THE BOX. WHERE THE RACEWAY IS NOT EXPOSED, MARK THE BOX COVER IN LIEU OF THE RACEWAY.

MARK WITH SELF-STICKING VINYL CLOTH LABELS, BLACK IDENTIFICATION ON AN ORANGE BACKGROUND, AS MANUFACTURED BY W. H. BRADY CO., OR APPROVED EQUAL, WITH LENGTH AS INDICATED BELOW, ENCIRCLING A MAJORITY OF THE VISIBLE PART OF THE RACEWAY.

IDENTIFICATION LETTER/NUMBER AND LABEL SIZE IN ACCORDANCE WITH THE FOLLOWING (NEAREST SIZE IS ACCEPTABLE):

CONDUIT TRADE SIZE OR LARGEST DIMENSION, EXCEPT LENGTH OF OTHER RACEWAY	BAND LENGTH	LEGEND LETTER/ NUMBER SIZE
1/2 TO 1-1/4	8	1/2
1-1/2 TO 2	8	3/4
2-1/2 TO 6	12	1-1/4
8 TO 10	24	2-1/2
OVER 10	32	3-1/2

(ALL DIMENSIONS IN INCHES)

LOCATE LABELS AND LETTERING IN THE MOST LEGIBLE AND PROMINENT POSITION. AFTER INSTALLATION, BRUSH COAT LABELS WITH CLEAR LACQUER, COVERING EDGES WELL. IN LIEU OF THE LABELS, A STENCILED IDENTIFICATION BAND IS PERMISSIBLE IF CONDUIT IS TREATED TO ACCEPT PAINT.

IDENTIFICATION TO INCLUDE CONDUIT NUMBERS, WHERE DESIGNATED, CABLE OR CIRCUIT NUMBER ON AN ORANGE BACKGROUND BAND, SUCH AS "R-50," "F4-67," OR "LP-6-15."

MARK SPARE RACEWAYS WITH A RACEWAY NUMBER SUCH AS "R-50" OR "C-109." WHERE SUCH RACEWAYS ARE NOT EXPOSED, MARK WITH ETCHED OR STAMPED NUMBERS ON ACCESSIBLE PLUGS OR CAPS OR ON METAL TAGS ATTACHED TO THE STUBS, CAPS, OR PLUGS.

16400.08 LUMINAIRE OUTLETS AND JUNCTION BOXES

PROVIDE IN ACCORDANCE WITH MOUNTING METHOD SPECIFIED IN SECTION 13120.

16400.09 RECEPTACLE AND SPECIAL BOXES

CROUSE-HINDS, APPLETON, OR APPROVED EQUAL, FS OR FD SERIES BODIES. FOR EXPOSED WORK. BOXES THREADED FOR RIGID CONDUIT.

16400.10 PULL BOXES AND JUNCTION BOXES

PULL BOXES AND JUNCTION BOXES FOR INTERIOR WORK, 6 INCHES BY 6 INCHES BY 4 INCHES DEEP MINIMUM, CODE GAGE GALVANIZED STEEL, COVERS FASTENED WITH BRASS SCREWS. SUPPORT BOXES INDEPENDENTOF RACEWAY SYSTEMS.

16400.11 EXPANSION FITTINGS

O-Z/GEDNEY TYPE AX, CROUSE-HINDS TYPE XD, APPLETON TYPE XJ, OR APPROVED EQUAL, WEATHERTIGHT EXPANSION FITTING AT BUILDING EXPANSION JOINTS AND AT MIDPOINT IN LONG, STRAIGHT RUNS IN EXCESS OF 150 FEET. PROVIDE FITTING WITH FLAT, BRAIDED BONDING JUMPER, COMPLETE WITH CLAMPS FOR ATTACHMENT TO CONDUITS AT EACH END OF FITTING.

16400.12 WIRE AND CABLE

A. 600 VOLTS OR LESS

USE NO WIRE SMALLER THAN NO. 12 AWG, RATED AT 600 VOLTS, FOR POWER AND LIGHTING CIRCUITS AND NO SMALLER THAN NO. 14 FOR CONTROL WIRING, UNLESS OTHERWISE SPECIFIED OR INDICATED.

ALL WIRE, REGARDLESS OF SIZE, TO BE STRANDED COPPER.

NO REDUCTION IN WIRE SIZES BASED ON AMPACITY OR OTHER REASON WILL BE PERMITTED.

DETERMINE, FOR EACH ITEM OF EQUIPMENT FURNISHED, WHETHER SPECIAL WIRING IS REQUIRED, AND PROVIDE THAT TYPE OF WIRING.

PROVIDE UL LISTED COPPER BUILDING WIRE AND CABLE AS MANUFACTURED BY AMERICAN, ANIXTER, ESSEX, ROYAL, PHELPS-DODGE, PIRELLI, ROME, TRIANGLE - PWC, OR APPROVED EQUAL, TYPES AS INDICATED BELOW.

FOR LIGHTING, POWER AND CONTROL:

FOR ALL SIZES, TYPE THHN/THWN.

DO NOT INSTALL CONDUCTORS OF MORE THAN 4 WIRE GAGE DIFFERENCES IN THE SAME CONDUIT.

B. PREASSEMBLED AERIAL CABLE

BRAND-REX TYPE VN-TC, OR APPROVED EQUAL, 3-CONDUCTOR, 600 VOLT, ROUND CABLE WITH TYPE THHN/THWN STRANDED COPPER CONDUCTORS, BLACK PVC, HYPALON OR NEOPRENE JACKET MEETING UL 1277 REQUIREMENTS FOR FLAME RETARDANCE, COLD BEND AND SUNLIGHT RESISTANCE.

PREASSEMBLE CABLE TO NO. 8A COPPERWELD/COPPER (3-STRAND) MESSENGER WITH POLYETHYLENE-COATED COPPER BINDING STRIP. CABLE ASSEMBLY TO MEET NEC REQUIREMENTS FOR TYPE TC CABLES, OUTDOOR USE.

16400.13 GROUNDING

A. GENERAL

GROUNDING MATERIALS AND HARDWARE - BURNDY, CHANCE, ITT BLACKBURN, ITT WEAVER, JOSLYN, MCGRAW EDISON, O-Z/GEDNEY, THOMAS AND BETTS, OR APPROVED EQUAL.

EXOTHERMIC WELDING - HEAVY-DUTY CADWELD OR HEAVY-DUTY THERMOWELD, OR APPROVED EQUAL.

GROUND THE FOLLOWING AS REQUIRED BY THE NEC AND AS SPECIFIED:

DERIVED SYSTEM NEUTRALS
ALL EQUIPMENT ENCLOSURES
RECEPTACLES
LUMINAIRES
OTHER ELECTRICAL DEVICES AS INDICATED OR REQUIRED BY NEC

PROVIDE NEW BUILDING GROUNDING SYSTEM FOR BUILDINGS A, B AND C AS SPECIFIED IN SECTION 13120.

CLEAN SURFACES TO BRIGHT METAL BEFORE MAKING GROUND CONNECTIONS AND RESTORE ORIGINAL FINISH AFTER MAKING CONNECTIONS.

INSTALL A SEPARATE INSULATED METALLIC GROUND CONDUCTOR IN ALL CONDUITS CONTAINING CIRCUITS OPERATING AT 120 VOLTS OR HIGHER. SIZE GROUND CONDUCTOR IN ACCORDANCE WITH NEC TABLE 290-95.

B. GROUNDING SYSTEM

COPPER-CLAD STEEL GROUND RODS IF REQUIRED, WITH COPPER GROUND CONDUCTORS. MAKE UNDERGROUND GROUND GRID CONNECTIONS AND CONNECTIONS TO GROUND RODS BY AN EXOTHERMIC WELD PROCESS. MAKE ABOVEGROUND CONNECTIONS BY AN EXOTHERMIC WELD PROCESS OR WITH NONTURNING PRESSURE TYPE GROUNDING CONNECTORS.

16400.14 WIRING DEVICES AND PLATES

A. GENERAL

PROVIDE SPECIFICATION GRADE UL LISTED DEVICES AS INDICATED, OR EQUIVALENT ARROW-HART, BRYANT, GENERAL ELECTRIC, HUBBELL, LEVITON, PASS AND SEYMOUR, SLATER, OR APPROVED EQUAL. ALL WIRING DEVICES TO HAVE SELF-GROUNDING FEATURE.

ALL CONVENIENCE RECEPTACLES IN BROWN FINISH.

B. RECEPTACLES

DUPLEX TYPE - HUBBELL NO. 5362, OR APPROVED EQUAL, 20 AMPERES, 125 VOLTS, 2-POLE, 3-WIRE, GROUNDING TYPE, NEMA CONFIGURATION 5-20R.

C. PLATES

PROVIDE CAST METAL PLATES FOR RECEPTACLES.

DIVISION 16

16480 - EXTERIOR ELECTRICAL WORK

16480.01 OVERHEAD ELECTRICAL SYSTEM

A. POLE

SOUTHERN YELLOW PINE POLE, TREATED FULL LENGTH WITH CREOSOTE CONFORMING TO ANSI STANDARD 05.1, OF CLASS AND LENGTH SHOWN.

METHOD OF TREATMENT, PRESERVATIVE AND TREATMENT TESTS TO CONFORM TO FEDERAL SPECIFICATION TT-W-571G AND AMERICAN WOOD PRESERVERS ASSOCIATION SPECIFICATIONS. PRESSURE TREAT FOR FINAL RETENTION OF TREATMENT MATERIAL.

BEFORE TREATMENT, PERMANENTLY AND LEGIBLY BRAND ALL POLES WITH MANUFACTURER'S NAME OR SYMBOL, CLASS, LENGTH, AND YEAR OF TREATMENT ON BUTT OF POLE AND 5 FEET ABOVE STANDARD GROUND LINE. CUT FIELD GAINS WITH POLE LYING ON THE GROUND BEFORE SETTING. THOROUGHLY TREAT HOLES BORED AND GAINS CUT IN FIELD WITH HOT CREOSOTE BEFORE HARDWARE IS INSTALLED. PLACE POLE STORED FOR MORE THAN 2 WEEKS ON CREOSOTED OR DECAY-RESISTING SKIDS ARRANGED TO SUPPORT POLE WITHOUT PRODUCING NOTICEABLE DISTORTION, AND TO PERMIT FREE CIRCULATION OF AIR.

DO NOT DRAG TREATED POLE ALONG GROUND. IN HANDLING POLE USE NO TONGS, CANT HOOKS, OR OTHER POINTED TOOLS CAPABLE OF PRODUCING INDENTATIONS OF MORE THAN 1 INCH IN DEPTH. DO NOT APPLY TOOLS TO GROUND LINE SECTION OF POLE BETWEEN 1 FOOT ABOVE AND 2 FEET BELOW GROUND LINE.

SET POLE TO THE DEPTH INDICATED. SET POLE PLUMB. WHERE POLE IS CURVED, SET POLE SO THAT CURVATURE IS IN LINE OF THE SPAN. DIG HOLE OF AMPLE SIZE TO PERMIT ALIGNMENT OF POLE AND TO PROVIDE FOR TAMPING ALL THE WAY AROUND POLE. USE MINIMUM OF 3 TAMPERS TO EACH SHOVELER WHEN BACKFILLING HOLES TO INSURE PROPER COMPACTION. THROW EARTH NO DEEPER THAN 6 INCHES WITHOUT TAMPING HARD BEFORE NEXT LAYER.

ALL EXCAVATION, BACKFILLING AND RESURFACING TO BE PROVIDED UNDER DIVISIONS 2 AND 3.

B. HARDWARE

ALL POLE LINE HARDWARE, HOT DIP GALVANIZED. INSTALL SUITABLE WASHERS UNDER BOLT HEADS AND NUTS ON WOOD SURFACES. WASHERS ON THROUGH-BOLTS PROPERLY SIZED WITH CURVED WASHERS ON THROUGH-BOLTS FITTING AGAINST POLE. DIAMETER OF HOLES IN WASHERS OF STANDARD SIZE FOR BOLT ON WHICH THEY ARE TO BE INSTALLED.

C. CONDUCTORS

AERIAL CABLE AS SPECIFIED IN ARTICLE 16400.12.B.

16480.02 CONDUCTOR INSTALLATION

USE EQUIPMENT AND METHODS SUCH THAT SAFETY OF ALL PERSONNEL IS MAINTAINED AND THAT MATERIAL USED IN CONSTRUCTION IS NOT DAMAGED. TAKE CARE THAT CONDUCTORS ARE NOT SCRATCHED, ABRADED, KINKED OR TWISTED DURING INSTALLATION. EMPLOY FREE-TURNING STRINGING BLOCKS OF SUFFICIENT SIZE AND DIAMETER FOR THE CONDUCTORS. IN NO CASE ARE STRINGING BLOCKS TO HAVE SMALLER RADII THAN CABLE MANUFACTURER'S MINIMUM ALLOWABLE BEND RADIUS.

16480.03 UNDERGROUND ELECTRICAL SYSTEMS

A. GENERAL

PROVIDE EMPTY UNDERGROUND CONDUIT SYSTEMS CONNECTING BUILDINGS A, B AND C AS INDICATED.

PROVIDE RIGID STEEL CONDUIT AS SPECIFIED IN SECTION 16400. PROTECT CONDUIT PENDING INSTALLATION TO PREVENT DAMAGE. DO NOT INSTALL DAMAGED CONDUIT.

CONDUIT TO BE THROROUGHLY CLEANED AND ENDS CAPPED DURING CONSTRUCTION AND AFTER INSTALLATION IS COMPLETE.

DIRECT BURY CONDUIT ON A BED OF SAND 3 INCHES DEEP MINIMUM. TOP OF CONDUIT TO BE NOT LESS THAN 30 INCHES BELOW THE ESTABLISHED GRADE OR CONCRETE SLAB.

PROVIDE A NYLON CORD IN EACH EMPTY CONDUIT TO FACILITATE FUTURE WIRE INSTALLATION.

B. EXCAVATION, BACKFILLING AND RESURFACING

ALL NECESSARY EXCAVATING, BACKFILLING AND RESURFACING REQUIRED FOR WORK WILL BE PROVIDED UNDER DIVISIONS 2 AND 3.

DIVISION 16

16500 - LUMINAIRES AND LIGHTING

16500.01 LUMINAIRES - GENERAL

LUMINAIRES ARE TO BE OF THE TYPE INDICATED BELOW IN QUANTITIES AND AT LOCATIONS AS REQUIRED TO MEET DESIGN REQUIREMENTS SPECIFIED IN SECTION 13120.

16500.02 HIGH PRESSURE SODIUM PENDANT REFLECTOR LUMINAIRE

THE LUMINAIRE SHALL BE EQUAL TO THE HOLOPHANE "BANTAM PRISMPACK" INDUSTRIAL HID SERIES AND SHALL CONSIST OF TWO SUBASSEMBLIES; THE OPTICAL ASSEMBLY AND THE BALLAST HOUSING CONTAINING THE ELECTRICAL COMPONENTS.

THE BALLAST ASSEMBLY SHALL BE COMPLETE WITH DIE CAST ALUMINUM HOUSING AND INTEGRAL SPLICE CHAMBER WITH DETACHABLE ACCESS COVER AND AN ADJUSTABLE HUB ENTRY ADAPTOR ASSURING PLUMB ALIGHMENT. THE HOUSING SHALL HAVE AN INTEGRAL MOUNTING PLATE FOR ATTACHING OPTICAL ASSEMBLY. THE SOCKET SHALL BE AN INTEGRAL PART OF THE BALLAST ASSEMBLY. THE BALLAST SHALL BE HPS, FUSED HIGH POWER FACTOR AUTOTRANSFORMER TYPE, SUITABLE FOR -20F STARTING. INDICATED LUMINAIRES SHALL BE EQUIPPED WITH AN INTERNAL RELAY AND QUARTZ TUNGSTEN HALOGEN LAMP FOR HOT RESTRIKE PROTECTION.

THE OPTICAL ASSEMBLY SHALL BE A SPUN PRISMATIC BOROSILICATE GLASS OPEN BOTTOM REFLECTOR WITH 1/8 INCH MINIMUM WALL THICKNESS AND WITH AN ALUMINUM COVER. THE REFLECTOR SHALL BE ATTACHED TO THE BALLAST ASSEMBLY BY ROTATING ONTO THE MOUNTING PLATE AND "SPRINGLOCK" SNAPPING INTO PLACE. THE LIGHT OUTPUT SHALL BE NO LESS THAN 65.1 IN THE 0 DEGREE TO 60 DEGREE ZONE AND NOT MORE THAN 5.1 IN THE 60 DEGREE TO 90 DEGREE ZONE AND PRODUCE A 1.9 SPACING CRITERIA DISTRIBUTION.

THE COMPLETE LUMINAIRE SHALL BE LISTED BY UL "SUITABLE FOR DAMP LOCATIONS" AND FOR 55C AMBIENT TEMPERATURE. THE LUMINAIRE SHALL NOT EXCEED 14 INCHES HEIGHT OR 24-1/2 POUNDS WEIGHT.

Amendment No. 1 Dated November 26, 1990

to

COVERED CONTROLLED STORAGE PAD - PLANT 1
PHASES A AND B
WBS 1.1.2.1.01

issued by:

The RUST Engineering Company
Acting Under Contract No. S-1182
With Westinghouse Materials Company of Ohio
P.O. Box 368
Ross, Ohio 45061

ITEM 1

Reference: Specification 02892-4301, Division 1, Section 01101 - SCHEDULE OF DRAWINGS.

Revision: The following drawings are hereby revised and reissued:

FMPC DWG. NO.	AMK SHEET NO.	TITLE	REV.	DATE
74B-4445-X-00063	X-1	COVER SHEET	1	11-26-90
74B-4445-C-00064	C-1	CONSTRUCTION PHASING	1	11-26-90
74B-4445-C-00065	C-2	PHASE A - PAD EXTENSION	1	11-26-90
74B-4445-C-00066	C-3	PHASE B - FABRIC STRUCTURES	1	11-26-90
74B-4445-C-00068	C-5	SITE DETAILS	1	11-26-90
74B-4445-E-00069	E-1	ELECTRICAL SITE PLAN	1	11-26-90
74B-4445-E-00070	E-2	ELECTRICAL DEMOLITION PLAN	1	11-26-90
74B-4445-P-00072	P-1	SITE DRAINAGE	1	11-26-90

ITEM 2

Reference: Division 2 Section 02400 Subsection 02400.03 Article B. Pipe.

Revision: Delete "Slotted Vane Drain Pipe:"
Delete "PVC Plastic Pipe - ASTM D 3034."
Delete Last paragrah

ITEM 3

Reference: Division 2 Section 02400 Subsection 02400.03 Article C. Slotted Vane Drain.

Revision: Delete this article and its heading.

SPECIFICATION NO. 02892-4302

100% REVIEW

SPECIFICATIONS FOR

CONSTRUCTION OF

COVERED CONTROLLED STORAGE PAD - PLANT 1

PHASES C, D AND E

(WBS 1.1.2.1.01)

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05500	MISCELLANEOUS METAL AND METAL ROOF DECK	4
07420	SIDING ALTERATIONS	2
09701	POLYURETHANE ELASTOMER/WEARING SURFACE	5
09702	EPOXY FLOOR COATING	4
09870	EPOXY COATING - METAL SURFACES	4
09900	PAINTING	7
16010	ELECTRICAL WORK - GENERAL	7
16020	SCOPE OF ELECTRICAL WORK	2
16307	ELECTRICAL SWITCHING AND CONTROLS - LOW VOLTAGE (1,000 VOLTS AND BELOW)	1
16400	ELECTRICAL WIRING	8
16480	EXTERIOR ELECTRICAL WORK	1
16500	LUMINAIRES AND LIGHTING	2

DIVISION 1

01100 - GENERAL REQUIREMENTS

01100.01 GENERAL

THESE GENERAL REQUIREMENTS FORM A PART OF ALL THE TECHNICAL DIVISIONS OF THESE SPECIFICATIONS.

A. M. KINNEY, INC. HAS PREPARED THESE SPECIFICATIONS. IN ALL CASES WHERE THE WORD "ENGINEERS" APPEARS IN THESE SPECIFICATIONS, IT SHALL BE UNDERSTOOD TO REFER TO A. M. KINNEY, INC., OR TO SUCH OTHER INDIVIDUALS OR ORGANIZATIONS ACTING WITHIN THE SCOPE OF THE SPECIFIC DUTIES ENTRUSTED TO THEM.

IN ALL CASES WHERE THE WORDS "OPERATING CONTRACTOR" APPEAR, THEY SHALL BE UNDERSTOOD TO REFER TO THE FMPC OPERATING CONTRACTOR, THE WESTINGHOUSE MATERIALS COMPANY OF OHIO.

IN ALL CASES WHERE THE WORDS "CONSTRUCTION MANAGER" APPEAR, THEY SHALL BE UNDERSTOOD TO REFER TO THE FMPC CONSTRUCTION MANAGER, THE RUST ENGINEERING COMPANY.

THE SUBCONTRACTOR SHALL PERFORM ALL CONSTRUCTION ACCEPTANCE TESTS AS COORDINATED AND SUPERVISED BY THE CONSTRUCTION MANAGER AND WITNESSED BY THE OPERATING CONTRACTOR. IN ADDITION, BEFORE THE FINAL ACCEPTANCE OF THE WORK, THE SUBCONTRACTOR SHALL PERFORM AN INTEGRATED SYSTEM CONSTRUCTION ACCEPTANCE TEST AS COORDINATED AND SUPERVISED BY THE CONSTRUCTION MANAGER AND WITNESSED BY THE OPERATING CONTRACTOR.

THE SUBCONTRACTOR SHALL PROVIDE WRITTEN PROCEDURES FOR THE CONSTRUCTION MANAGER'S REVIEW AND APPROVAL OF ALL TESTS TO BE PERFORMED AS IDENTIFIED IN THE DRAWINGS AND SPECIFICATIONS. THESE PROCEDURES SHALL PROVIDE DETAILED STEP BY STEP OPERATIONS WITH SIGN-OFF COLUMNS AND SHALL BE SUBMITTED AND APPROVED AT LEAST 30 DAYS PRIOR TO TESTING.

ALL FIELD TEST INSTRUMENTS SHALL HAVE BEEN CALIBRATED WITHIN THE LAST 12 MONTHS PRIOR TO USE ON THIS SUBCONTRACT BY A CALIBRATION LABORATORY WHOSE CALIBRATION EQUIPMENT AND INSTRUMENTS ARE FULLY TRACEABLE TO NIST STANDARDS. THE SUBCONTRACTOR SHALL PROVIDE INDIVIDUAL CERTIFICATION OF CALIBRATION AND NIST STANDARDS TRACEABILITY FOR ALL FIELD TEST INSTRUMENTS USED ON THIS SUBCONTRACT.

PROVIDE ALL FIELD LABOR AND OTHER ASSISTANCE REQUIRED BY THE ENGINEERS DURING ANY ON-SITE FIELD SERVICES BEING PERFORMED BY THE ENGINEERS.

ALL WORK SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE REQUIREMENTS OF THE OHIO BASIC BUILDING CODE, THE UNIFROM BUILDING CODE, INCLUDING REQUIREMENTS FOR SEISMIC CONSTRUCTION, ZONE 2, AND IN ACCORDANCE WITH THE REQUIREMENTS OF 29 CFR 1926 (OSHA).

01100.02 SITE AND SCOPE OF WORK

THE INTENT OF THESE SPECIFICATIONS IS TO PROVIDE ALL WORK REQUIRED AND NECESSARY TO PROVIDE THE CONSTRUCTION OF THE COVERED CONTROLLED STORAGE PAD FOR PLANT 1, PHASES C, D AND E, AND RELATED SYSTEMS.

THE SUBCONTRACTOR SHALL PROVIDE ALL LABOR, SERVICES, MATERIALS, AND EQUIPMENT, AND SHALL DO ALL WORK NECESSARY TO ACCOMPLISH THIS END WITHIN THE LIMITS OF WORK AS DEFINED IN THE ACCEPTED BID AND/OR CONTRACT.

01100.03 CONSTRUCTION PHASES

CONSTRUCTION OF THE COVERED CONTROLLED STORAGE PAD - PLANT 1 (C/D/E) SHALL BE ACCOMPLISHED IN 3-PHASES - PHASES C, D AND E, AS DEFINED BY PLAN AREAS INDICATED ON DRAWING C-1.

PHASE C SHALL BE CONSTRUCTED FIRST. PHASE D SHALL BE STARTED _____ DAYS FOLLOWING THE COMPLETION OF PHASE C. PHASE E SHALL BE STARTED _____ DAYS FOLLOWING THE COMPLETION OF PHASE D.

THE SUBCONTRACTOR SHALL COORDINATE HIS SCHEDULES WITH THE CONSTRUCTION MANAGER FOR ALL 3-PHASES.

01100.04 CONTAMINATED MATERIALS

ALL CONTAMINATED MATERIALS RESULTING FROM THE DEMOLITION OPERATIONS OR CUTTING AND PATCHING OPERATIONS UNDER THIS SPECIFICATION ARE TO BE CONTAINED AS SPECIFIED IN FMPC-720.

FOR HEAVY WASTE MATERIALS SUCH AS SOIL AND CONCRETE, THE OPERATING CONTRACTOR WILL FURNISH 38 INCH HIGH BY 52 INCH WIDE BY 76 INCH LONG (INSIDE DIMENSION) CONTAINERS AT THE CONSTRUCTION SITE AND WILL REMOVE SUCH CONTAINERS FROM THE CONSTRUCTION SITE AFTER THEY HAVE BEEN FILLED TO A MAXIMUM OF 5,340 POUNDS AND FASTENED WITH STEEL WIRE BY THE SUBCONTRACTOR.

FOR LIGHTER WASTE MATERIALS SUCH AS WOOD AND SCRAP METAL, THE OPERATING CONTRACTOR WILL FURNISH "LAND/SEA CONTAINERS," AT THE CONSTRUCTION SITE WITH NOMINAL INSIDE DIMENSION OF 7-1/2 FEET BY 7-1/2 FEET BY 19, AND WILL REMOVE SUCH CONTAINERS FROM THE CONSTRUCTION SITE AFTER THEY HAVE BEEN FILLED BY THE SUBCONTRACTOR TO A MAXIMUM OF 37,000 POUNDS.

THE SUBCONTRACTOR SHALL SIZE REDUCE WASTE MATERIALS AS REQUIRED TO FIT IN SUCH CONTAINERS.

01100.05 ASBESTOS ABATEMENT

REMOVAL AND ABATEMENT OF ASBESTOS TO CONFORM TO FMPC STANDARDS AND TO THE FOLLOWING STANDARDS:

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION - RECOMMENDATIONS FOR ASBESTOS ABATEMENT PROJECTS

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION STANDARDS 1926.58

ENVIRONMENTAL PROTECTION AGENCY - NATIONAL EMISSION STANDARDS FOR ASBESTOS

SUB-SUBCONTRACTORS, TESTING LABORATORIES AND INDUSTRIAL HYGIENISTS FOR ASBESTOS REMOVAL WORK SHALL BE LICENSED FOR ASBESTOS REMOVAL IN ACCORDANCE WITH THE LAWS OF THE STATE OF OHIO.

THE OPERATING CONTRACTOR WILL OBTAIN ALL LICENSES, PERMITS AND INSPECTIONS, AND PAY ALL FEES THEREFOR, FROM ALL FEDERAL, STATE OR LOCAL AGENCIES INVOLVED WITH THE CONTROL OF ASBESTOS MATERIALS. THE

SUBCONTRACTOR SHALL OBTAIN ALL REQUIRED ASBESTOS WORK PERMITS FROM THE FMPC OPERATING CONTRACTOR.

PRIOR TO COMMENCING ANY ASBESTOS ABATEMENT WORK, THE SUBCONTRACTOR SHALL SUBMIT FOR APPROVAL A PROPOSED ASBESTOS WORK PLAN. INCLUDED IN THIS WORK PLAN SHALL BE THE SCOPE OF THE ASBESTOS WORK, THE SUBCONTRACTOR'S ABATEMENT METHODS, AIR MONITORING PROCEDURES, PROTECTION EQUIPMENT INCLUDING RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING, DOCUMENTATION OF EMPLOYEE TRAINING FOR ASBESTOS AND RESPIRATORS, AND ASBESTOS AND RESPIRATOR MEDICAL CERTIFICATION.

THE OPERATING CONTRACTOR'S INDUSTRIAL HYGIENE PERSONNEL WILL PERIODICALLY MONITOR THE JOBSITE DURING THE ASBESTOS ABATEMENT WORK.

ASBESTOS REMOVED DURING CONSTRUCTION WORK TO BE ENCAPSULATED IN PLASTIC BAGS AND PLACED IN WHITE BARRELS AND BOXES FURNISHED BY THE OPERATING CONTRACTOR. THE OPERATING CONTRACTOR WILL REMOVE SUCH BARRELS AND BOXES FROM THE CONSTRUCTION SITE TO AN APPROVED ON-SITE DISPOSAL AREA.

01100.06 UTILITY OUTAGES

ALL DEMOLITION WORK OR NEW INSTALLATION WORK REQUIRING UTILITY OUTAGES OR SYSTEM SHUTDOWNS SHALL BE PERFORMED ON WEEKENDS.

01100.07 SUBMITTALS - SHOP DRAWINGS, SAMPLES AND OTHER DATA

A. GENERAL

ARTICLE SC-24 OF THE RUST SPECIAL TERMS AND CONDITIONS SHALL BE SUPPLEMENTED BY THE FOLLOWING (ANY SUBMITTALS NOT IN CONFORMANCE WITH THESE REQUIREMENTS WILL BE RETURNED WITHOUT DETAILED REVIEW FOR CORRECTION AND RESUBMITTAL):

SUBMITTALS FOR UNRELATED ITEMS SHALL NOT BE INCLUDED IN THE SAME TRANSMITTAL AND EACH SEPARATE SUBMITTAL SHALL BE COORDINATED AND SHALL INCLUDE ALL DRAWINGS AND DATA REQUIRED FOR THE ITEM OR SYSTEM COVERED.

SUBMITTALS SHALL INDICATE PROJECT NAME AND ENGINEERS' SPECIFICATION NUMBER (IF PAGES ARE SECURELY BOUND IN A BROCHURE, THIS IS NEEDED ON THE COVER ONLY) AND IDENTIFICATION BY SPECIFICATION DIVISION, SECTION, SUBSECTION, AND ARTICLE UNDER WHICH EQUIPMENT OR MATERIAL IS DESCRIBED, AND BY NAME, NUMBER AND INTENDED USE AS DESIGNATED BY CONTRACT DRAWINGS AND SPECIFICATIONS.

WHEN MORE THAN ONE ITEM OF EQUIPMENT IS INCLUDED ON A SINGLE DRAWING OR CATALOG CUT, EACH PROJECT EQUIPMENT ITEM MUST BE SEPARATELY IDENTIFIED THEREON, WITH CLEAR DELINEATION AS TO WHICH MODEL OR CATALOG NUMBER OR PERFORMANCE DATA APPLIES TO EACH PROJECT ITEM.

ASSEMBLE AND SUBMIT, IN LOGICALLY ARRANGED FOLDERS, ALL INSTRUCTION BULLETINS, DIAGRAMS, LUBRICATION SCHEDULES, OPERATING INSTRUCTIONS, PARTS LISTS AND PAMPHLETS FOR EQUIPMENT AND APPARATUS FURNISHED, INCLUDING VENDOR'S OR MANUFACTURER'S RECOMMENDED PROCEDURE FOR LIFTING, HANDLING AND INSTALLING EQUIPMENT.

SUBMITTALS FOR EQUIPMENT TO INCLUDE MANUFACTURER'S MODEL NUMBER OR CATALOG NUMBER, RATINGS, SIZE, AND PERFORMANCE CURVES AND DATA. INDICATE OPERATING POINT ON CURVES AND TABULAR DATA FOR EACH PIECE OF EQUIPMENT THAT CURVES OR DATA REPRESENT.

SUBMIT WIRING DIAGRAMS OR CONNECTION DIAGRAMS FOR EQUIPMENT ITEMS, ACCOMPANIED BY ADEQUATELY DEFINED SYMBOLS LIST. SCHEMATIC AND WIRING DIAGRAMS MUST BE PREPARED IN ACCORDANCE WITH ANSI/IEEE PUBLICATION Y32E, "ELECTRICAL AND ELECTRONICS GRAPHIC SYMBOLS AND REFERENCE DESIGNATIONS." INDIVIDUAL 8-1/2 INCH BY 11 INCH ELEMENTARY AND WIRING DRAWINGS ARE NOT ACCEPTABLE.

INDICATE ALL PERFORMANCE DATA, CONSTRUCTION MATERIAL FINISHES AND MODIFICATIONS TO MANUFACTURER'S STANDARD DESIGN SPECIFIED.

LOCATE TERMINATION POINTS FOR ALL REQUIRED EXTERNAL WIRING.

INDICATE ROUGHING-IN, FOUNDATION AND SUPPORT POINT DIMENSIONS.

THE ENGINEERS' REVIEW OF SUCH SUBMITTALS SHALL NOT RELIEVE THE SUBCONTRACTOR FROM ANY RESPONSIBILITY FOR DEVIATIONS FROM CONTRACT DOCUMENTS, UNLESS THE SUBCONTRACTOR HAS IN WRITING CALLED THE ENGINEERS' ATTENTION TO SUCH DEVIATIONS AT THE TIME OF SUBMISSION, NOR SHALL IT RELIEVE THE SUBCONTRACTOR FROM RESPONSIBILITY FOR ERRORS OF ANY SORT IN THE SUBMITTALS NOR FROM RESPONSIBILITY FOR THE PROPER FITTING AND CONSTRUCTION OF THE WORK.

SUBMITTALS WILL BE REVIEWED WITH RESPECT TO SUCH FACTORS AS QUALITY OF DRAFTSMANSHIP, LEGIBILITY, AND EVIDENCE THAT THE SUBCONTRACTOR IS AWARE OF THE NECESSITY AND IMPORTANCE OF ADEQUATELY DETAILING AND ILLUSTRATING SPECIAL FEATURES AND CONDITIONS RELATING TO THE WORK. IF THE ENGINEERS DETERMINE THAT THE DATA SUBMITTED, IN PART OR IN WHOLE, IS NOT WITHIN THE PURVIEW OF THEIR REVIEW, SUCH SUBMITTAL, OR PART THEREOF, WILL BE RETURNED UNCHECKED. DIMENSIONS, SIZES, CONSTRUCTION DETAILS, AND DIRECTIVE NOTES SHOWN WILL BE REVIEWED FOR ACCURACY, COMPLIANCE WITH THE SPECIFICATIONS, ADEQUACY, INTERFERENCES, ETC., ON A SPOT CHECK OR INCOMPLETE BASIS TO ESTABLISH THAT THE SUBCONTRACTOR HAS GIVEN SUCH FACTORS CAREFUL ATTENTION.

ANY CHANGES MARKED ON SUBMITTALS DURING REVIEW WILL BE FOR THE PURPOSE OF INDICATING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND NO CHANGE IN THE CONTRACT AMOUNT IS AUTHORIZED BY SUCH MARKINGS.

WHEN SUBMITTALS ARE FOUND TO BE SATISFACTORY WITH RESPECT TO THE ABOVE FACTORS AND WITHIN THE SCOPE OF THE REVIEW OUTLINED ABOVE, THEY WILL BE RETURNED TO THE SUBCONTRACTOR BEARING CERTIFICATE ATTACHMENT PERMITTING THE SUBCONTRACTOR TO EMPLOY THEM IN THE FURTHERANCE OF WORK UNDER THE CONTRACT, BUT ONLY WITH THE EXPRESS UNDERSTANDING THAT SUCH PERMISSION SHALL NOT RELIEVE THE SUBCONTRACTOR OF RESPONSIBILITIES FOR THE FULL PERFORMANCE OF THE WORK REQUIRED UNDER THE CONTRACT IN CONFORMANCE WITH THE CONTRACT DOCUMENTS GOVERNING SUCH PERFORMANCE, NOR FOR ANY OTHER DEFICIENCIES IN THE SUBMITTALS SUCH AS INACCURACIES, DISCREPANCIES, OMISSIONS, INTERFERENCES IN THE WORK ITSELF, OR WITH THE WORK OF OTHER SUBCONTRACTORS WHETHER OR NOT SUCH DEFICIENCIES WERE OBSERVED OR NOTED IN THE COURSE OF THE REVIEW OF THE SHOP DRAWINGS.

THE SUBCONTRACTOR SHALL VERIFY ALL FIELD DIMENSIONS REQUIRED FOR SHOP DRAWINGS.

B. SUBMITTALS REQUIRED

SUBMITTALS REQUIRED INCLUDE DRAWINGS AND/OR DATA FOR ALL ITEMS AS LISTED. REFER TO THE VARIOUS TECHNICAL DIVISIONS FOR ADDITIONAL REQUIREMENTS:

"A" DESIGNATES SHOP DRAWINGS AND PERTINENT PERFORMANCE DATA AND CURVES ARE REQUIRED.

"B" DESIGNATES CATALOG DATA AND PERTINENT PERFORMANCE DATA AND CURVES ARE REQUIRED.

"C" DESIGNATES THAT THESE ITEMS ARE TO BE INCLUDED ON A LISTING GIVING MANUFACTURER AND BRIEF TYPE DESCRIPTION FOR EACH ITEM. SUCH LISTING SHALL BE SUBMITTED NOT LATER THAN 30 DAYS AFTER NOTICE TO PROCEED. NOTE THAT SHOP DRAWINGS OR CATALOG DATA MAY ALSO BE REQUIRED FOR ITEMS INCLUDED ON THIS LIST.

"D" DESIGNATES SAMPLES OF FINISHES ARE REQUIRED WITH FULL RANGE OF COLOR CHOICES AND/OR PATTERNS SUBMITTED.

"E" DESIGNATES PHYSICAL SAMPLES OF MATERIALS ARE REQUIRED.

"F" DESIGNATES INDIVIDUAL CERTIFICATIONS FOR CONFORMITY TO QUALIFICATIONS AND STANDARDS SPECIFIED ARE REQUIRED. FOR EQUIPMENT ITEMS, THIS INDICATES CERTIFIED EQUIPMENT DRAWINGS ARE TO BE SUBMITTED.

"G" DESIGNATES THAT THE TECHNICAL SPECIFICATIONS CONTAIN SPECIFIC SUBMITTAL REQUIREMENTS.

"H" DESIGNATES ENGINEERING CALCULATIONS ARE REQUIRED.

"I" DESIGNATES SPARE PARTS LIST IS REQUIRED.

"J" DESIGNATES INSTALLATION, OPERATION AND MAINTENANCE MANUAL IS REQUIRED.

"K" INDICATES THAT MANUFACTURER'S MATERIAL SAFETY DATA SHEETS ARE REQUIRED.

"L" INDICATES THAT TEST REPORTS ARE REQUIRED FOR TESTS NOTED IN THE TECHNICAL SPECIFICATIONS. SUCH REPORTS MUST BE RECEIVED BY THE CONSTRUCTION MANAGER WITHIN ONE WEEK OF THE TEST.

"M" INDICATES THAT WIRING DIAGRAMS FOR POWER SIGNAL, AND CONTROL WIRING ARE REQUIRED.

"N" INDICATES THAT SCHEMATIC PIPING DIAGRAMS, WITH SIZES AND COMPONENTS SHOWN, ARE REQUIRED.

PROVIDE ALL SUBMITTALS TABULATED IN ATTACHMENT NO. 1 TO THIS SECTION.

01100.08 SPECIFICATION EXPLANATION

A. GENERAL

THE TECHNICAL SPECIFICATIONS ARE OF THE ABBREVIATED, SIMPLIFIED OR STREAMLINED TYPE AND INCLUDE INCOMPLETE SENTENCES. OMISSIONS OF WORDS OR PHRASES SUCH AS "THE SUBCONTRACTOR SHALL," "IN CONFORMITY THEREWITH," "SHALL BE," "AS NOTED ON THE DRAWINGS," "ACCORDING TO THE PLANS," "A," "THE," AND "ALL" ARE INTENTIONAL. OMITTED WORDS OR PHRASES SHALL BE SUPPLIED BY INFERENCE IN THE SAME MANNER AS THEY ARE WHEN A "NOTE" OCCURS ON THE DRAWINGS.

THE SUBCONTRACTOR SHALL PROVIDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS OR METHODS LISTED, MENTIONED, OR SCHEDULED EITHER ON THE DRAWINGS, OR SPECIFIED HEREIN, OR BOTH, INCLUDING ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS NECESSARY AND REQUIRED FOR THEIR COMPLETION AND INSTALLATION.

FOR CONVENIENCE OF REFERENCE AND TO FACILITATE THE LETTING OF CONTRACTS, THE SPECIFICATIONS MAY BE SEPARATED INTO TITLED DIVISIONS. SUCH SEPARATIONS, HOWEVER, SHALL NOT OPERATE TO MAKE THE ENGINEERS ARBITRATORS TO ESTABLISH THE LIMITS OF SUB-SUBCONTRACTS IN ANY MANNER. THE FOLLOWING DEFINES THE SEPARATIONS REFERRED TO IN THE SPECIFICATIONS:

DIVISION	-	SEPARATE NUMBERED DIVISION OF SPECIFICATIONS (E.G., DIVISION 16)
SECTION	-	SEPARATE NUMBERED SECTION OF A DIVISION (E.G., SECTION 16020)
SUBSECTION	-	SEPARATE NUMBERED SUBSECTION OF A SECTION (E.G., SUBSECTION 16020.01)
ARTICLE	-	SEPARATE LETTERED ARTICLE OF A SUBSECTION (E.G., ARTICLE A)

B. DEFINITIONS

CERTAIN TERMS AND WORDS AS USED THROUGHOUT THE SPECIFICATIONS SHALL BE DEFINED AS FOLLOWS, UNLESS OTHERWISE PARTICULARLY SPECIFIED:

"PROVIDE." FURNISH AND INSTALL, COMPLETE, IN PLACE.
"INDICATED." AS SHOWN ON THE DRAWINGS AND/OR SPECIFIED.
"DIRECTED," "AUTHORIZED," "PERMITTED." SHALL BE AS DIRECTED, AUTHORIZED, OR PERMITTED BY THE CONSTRUCTION MANAGER.
"SELECTED." SHALL BE AS SELECTED BY THE CONSTRUCTION MANAGER.
"SATISFACTORY," "ACCEPTABLE." SATISFACTORY OR ACCEPTABLE TO THE CONSTRUCTION MANAGER.
"NECESSARY," "REQUIRED," "SUITABLE." AS NECESSARY, REQUIRED, OR SUITABLE FOR THE INTENDED PURPOSE AS DETERMINED BY THE CONSTRUCTION MANAGER.
"SUBMIT." SUBMIT TO THE CONSTRUCTION MANAGER UNLESS OTHERWISE SPECIFIED.

IN ALL CASES WHERE THE WORDS "OR EQUAL" APPEAR IN THESE SPECIFICATIONS, THEY SHALL BE UNDERSTOOD TO MEAN "OR APPROVED EQUAL."

01100.09 ABBREVIATIONS FOR REFERENCED STANDARDS AND SPECIFICATIONS

THE FOLLOWING LIST DENOTES ABBREVIATIONS USED IN THE TECHNICAL PORTIONS OF THESE SPECIFICATIONS:

ABBREVIATIONS	AUTHORITY
ACI	AMERICAN CONCRETE INSTITUTE
ACPA	AMERICAN CONCRETE PIPE ASSOCIATION
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS

ABBREVIATIONS	AUTHORITY
AWS	AMERICAN WELDING SOCIETY
CRSI	CONCRETE REINFORCING STEEL INSTITUTE
FM	FACTORY MUTUAL SYSTEM
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NESC	NATIONAL ELECTRICAL SAFETY CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIST	NATIONAL INSTITUTE FOR STANDARDS AND TECHNOLOGY (FORMERLY NATIONAL BUREAU OF STANDARDS)
OBBC	OHIO BASIC BUILDING CODE
ODOT	STATE OF OHIO, DEPARTMENT OF TRANSPORTATION
OSHA	FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT STANDARDS
PCA	PORTLAND CEMENT ASSOCIATION
SSPC	STEEL STRUCTURES PAINTING COUNCIL
UL	UNDERWRITERS LABORATORIES INC.

01100.10 MAINTENANCE OF TRAFFIC

ARTICLE SC-19 OF THE RUST "SPECIAL TERMS AND CONDITIONS" SHALL BE SUPPLEMENTED BY THE FOLLOWING:

ANY EXISTING STREETS AND ROADWAYS BEING CUT OR BRIDGED BY THESE CONSTRUCTION OPERATIONS MUST HAVE AT LEAST ONE LANE OF TRAFFIC MAINTAINED AT ALL TIMES DURING REGULAR FIRST-SHIFT WORKING HOURS. FOR SECOND AND THIRD SHIFT HOURS, ANY TRENCHES OR EXCAVATIONS SHALL BE COVERED WITH A SUITABLY SIZED STEEL PLATE(S) TO MAINTAIN TRAFFIC IN BOTH DIRECTIONS.

01100.11 CLEANING UP

ARTICLE A-26 OF THE RUST "GENERAL TERMS AND CONDITIONS" SHALL BE SUPPLEMENTED BY THE FOLLOWING:

THE SUBCONTRACTOR SHALL, UPON COMPLETION AND ACCEPTANCE OF THE WORK, TURN OVER TO THE OPERATING CONTRACTOR ALL PERMANENT WORK FURNISHED AND PREFORMED UNDER THIS SUBCONTRACT IN A THOROUGHLY CLEANED AND WORKMANLIKE CONDITION, FREE FROM ANY DIRT, GRIT, OIL, PAINT, AND OTHER FORMS OF SOILAGE, AND READY FOR THE OPERATING CONTRACTOR'S USE IN EVERY RESPECT.

01100.12 COST BREAKDOWN

AS PART OF THE SUBCONTRACTOR'S RESPONSIBILITIES UNDER ARTICLE A.14 OF THE RUST "GENERAL TERMS AND CONDITIONS," THE SUBCONTRACTOR SHALL, WITHIN 10 DAYS AFTER NOTICE TO PROCEED, SUBMIT A COST BREAKDOWN ALLOCATING THE TOTAL CONTRACT AMOUNT INTO THE VARIOUS CATEGORIES

SHOWN ON ATTACHMENT NO. 2 TO THIS SECTION. THIS COST BREAKDOWN IS FOR THE USE OF THE OPERATING CONTRACTOR, AND IS IN ADDITION TO ANY COST BREAKDOWN REQUESTED BY THE CONSTRUCTION MANAGER FOR PAYMENT REQUEST PURPOSES. ATTACHMENT NO. 2 SHALL NOT BE USED FOR INVOICING PURPOSES.

SUBMITTAL LISTING

MATERIAL/EQUIP'T/ITEM DESCRIPTION	SHOP DWGS A	CAT./ CURVES B	LIST ONLY C	FIN. SMPL D	PHYS SMPL E	MAT/PER CERTIF. F	TECH SPECS G	ENG'G CALCS H	PARTS LIST I	IOM MNLS J	M.S. D.S. K	TEST REPT L	WIRING DIAGRM M	PIPING DIAGRM N
SECTION NO.:02050														
DEMOLITION PLAN							G							
SECTION NO.:02100														
CHEMICALS											K			
FENCING	A													
MATERIALS AND ACCESSORIES		B												
TESTS												L		
SECTION NO.:03300														
CONCRETE WORK (COMPLETED)						F								
MATERIALS						F								
MIX DESIGN							G							
REINFORCING STEEL	A													
TESTS												L		
SECTION NO.:05500														
GRATING	A													
MISC. FRAMING	A													
SHOP PRIMER						F								
SECTION NO.:07420														
FLASHING	A													
SIDING ALTERATIONS	A	B												
SECTION NO.:09701														
APPLICATION INSTRUCTIONS							G							
BASE SLAB MOISTURE CONDITIONS						F	G							
INSTALLATION CONDITIONS						F	G							
INSTALLATION LIST							G							
MANUFACTURER'S SPECIFICATIONS		B					G							
PRE-INSTAL. INSPECTION REPORT							G							
PRODUCT SAFETY INFORMATION											K			
SAMPLE PANELS							G							
SPECIAL WARRANTY							G							
SECTION NO.:09702														
APPLICATION INSTRUCTIONS							G							
BASE SLAB MOISTURE CONDITIONS						F	G							
INSTALLATION CONDITIONS						F	G							
INSTALLATION LIST							G							
MANUFACTURER'S SPECIFICATIONS		B					G							

SUBMITTAL LISTING

MATERIAL/EQUIP'T/ITEM DESCRIPTION	SHOP DWGS A	CAT./ CURVES B	LIST ONLY C	FIN. SMPL D	PHYS SMPL E	MAT/PER CERTIF. F	TECH SPECS G	ENG'G CALCS H	PARTS LIST I	IOM MNLS J	M.S. D.S. K	TEST REPT L	WIRING DIAGRM M	PIPING DIAGRM N
SECTION NO.:09702														
PRODUCT SAFETY INFORMATION											K			
SAMPLE PANELS							G							
SPECIAL WARRANTY							G							
SECTION NO.:09870														
EPOXY COATING MATERIALS		B		D							K			
SECTION NO.:09900														
PAINTING		B		D			G				K			
SECTION NO.:16010														
TESTS							G					L		
SECTION NO.:16307														
MOLDED CASE CIRCUIT BREAKERS		B												
PANELBOARD		B												
TRANSFORMER - L. V. DRY TYPE		B												
SECTION NO.:16400														
CONDUIT FITTINGS						F								
CONDUIT, RIGID STEEL						F								
GROUNDING MATERIALS						F								
LIQUIDTIGHT FLEX. STL CONDUIT						F								
WIRE & CABLE 600 VOLTS & BELOW						F								
WIRING DEVICES		B												
SECTION NO.:16500														
BALLASTS						F								
LAMPS						F								
LUMINAIRES (EACH TYPE)		B				F								

ATTACHMENT NO. 2 TO SECTION 01100

COST BREAKDOWN FOR ESTIMATE RECONCILIATION

COVERED CONTROLLED STORAGE PAD, PLANT 1

PHASES C, D AND E

ITEM NO.	COST/CONTRACT ITEM	LABOR AND MATERIALS, TOTAL PER ITEM
1.	GENERAL - PRIME AND GEN. CONDITIONS	$_____
2.	CONCRETE RESTORATION	$_____
3.	ELECTRICAL	$_____
		_____
	TOTAL CONTRACT AMOUNT	$_____

1. BREAKDOWN MUST EQUAL THE SUBCONTRACTOR'S TOTAL CONTRACT AMOUNT. CONTINGENCY, ESCALATION, OVERHEAD, PROFIT AND BONDING SHALL BE PROPORTIONATELY SPREAD AMONG THE ITEMS.

2. ITEMS 2 THROUGH 3 ARE CONSIDERED AS SUB-SUBCONTRACTS UNDER ITEM 1. ANY ADDITIONAL SUB-SUBCONTRACTS NOT SHOWN ARE TO BE INCLUDED WITH ITEM 1. ANY ADDITIONAL LEVELS OF SUB-SUBCONTRACTING NOT SHOWN ARE TO BE INCLUDED WITH THE LEVEL IMMEDIATELY ABOVE.

DIVISION 1

01101 - SCHEDULE OF DRAWINGS

01101.01 DRAWINGS

THE FOLLOWING DRAWINGS ARE HEREBY MADE A PART OF THIS CONTRACT:

FMPC DWG. NO.	AMK SHEET NO.	TITLE	REV.	DATE
74B-4445-X-00063	X-1	COVER SHEET	B	6-12-89
74B-4445-C-00064	C-1	CONSTRUCTION PHASING	B	6-12-89
74B-4445-C-00067	C-4	PHASE C, D, & E	B	6-12-89
74B-4445-C-00068	C-5	SITE DETAILS	A	6-12-89
74B-4445-E-00069	E-1	ELECTRICAL STIE PLAN	B	6-12-89
74B-4445-E-00070	E-2	ELECTRICAL DEMOLITION PLAN	A	6-12-89
74B-4445-E-00071	E-3	ELECTRICAL DETAILS	A	6-12-89
74B-4445-P-00072	P-1	SITE DRAINAGE	B	6-12-89

THE FOLLOWING DRAWING IS ISSUED FOR REFERENCE:

FMPC DWG. NO.	AMK SHEET NO.	TITLE	REV.	DATE
74B-4445-C-00066	C-3	PHASE B-FABRIC STRUCTURES	B	6-12-89

DIVISION 1

01101 - SCHEDULE OF DRAWINGS

01101.01 DRAWINGS

THE FOLLOWING DRAWINGS ARE HEREBY MADE A PART OF THIS CONTRACT:

FMPC DWG. NO.	AMK SHEET NO.	TITLE	REV.	DATE
74B-4445-X-00063	X-1	COVER SHEET	B	6-12-89
74B-4445-C-00064	C-1	CONSTRUCTION PHASING	B	6-12-89
74B-4445-C-00067	C-4	PHASE C, D, & E	B	6-12-89
74B-4445-C-00068	C-5	SITE DETAILS	A	6-12-89
74B-4445-E-00069	E-1	ELECTRICAL STIE PLAN	B	6-12-89
74B-4445-E-00070	E-2	ELECTRICAL DEMOLITION PLAN	A	6-12-89
74B-4445-E-00071	E-3	ELECTRICAL DETAILS	A	6-12-89
74B-4445-P-00072	P-1	SITE DRAINAGE	B	6-12-89

THE FOLLOWING DRAWING IS ISSUED FOR REFERENCE:

FMPC DWG. NO.	AMK SHEET NO.	TITLE	REV.	DATE
74B-4445-C-00066	C-3	PHASE B-FABRIC STRUCTURES	B	6-12-89

DIVISION 2

02050 - DEMOLITION AND ALTERATIONS

02050.01 SCOPE OF WORK

A. WORK SPECIFIED UNDER THIS SECTION

PROVIDE ALL NECESSARY LABOR, MATERIALS, TOOLS, DEVICES AND EQUIPMENT, INCLUDING SCAFFOLDING, REQUIRED TO COMPLETE THE FOLLOWING DEMOLITION/ALTERATION WORK:

REMOVE PORTIONS OF EXISTING WALL AND CONVEYOR CONSTRUCTION OF PLANT 1 AS NOTED ON THE DRAWINGS
CONSTRUCT AND MAINTAIN WEATHERPROOF PROTECTION AT ALL TEMPORARY OPENINGS IN THE EXTERIOR WALLS OF PLANT 1
PATCH AREAS TO MATCH EXISTING ADJACENT CONSTRUCTION WHERE ITEMS HAVE BEEN REMOVED, INCLUDING WALL CONSTRUCTION AFFECTED BY ALTERATIONS
COORDINATE REMOVAL OF EXISTING CONCRETE PAD AND CURBS, REMOVAL OF EXISTING FENCING, AND REMOVAL OF EXISTING UTILITY POLES
PROVIDE DEMOLITION PLAN AND SCHEDULE GIVING SPECIAL ATTENTION TO RELOCATION OF EXISTING STORED ITEMS BY WMCO

WORK ALSO INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, THE FOLLOWING ITEMS:

AT REMOVAL OF EXISTING CONVEYOR CONSTRUCTION AND CORRUGATED INSULATED CEMENT ASBESTOS PANELS, PATCH EXISTING PANELS, INSULATION, FLASHING AND FASTENERS WITH EQUAL AND COMPLEMENTARY ASBESTOS-FREE MATERIALS.

ALL DEMOLITION WORK SHALL BE PERFORMED IN ACCORDANCE WITH CURRENT FMPC OPERATING PROCEDURES, INCLUDING THOSE FOR ASBESTOS REMOVAL AND DEMOLITION OF CONTAMINATED MATERIALS.

A WRITTEN PLAN FOR THE DEMOLITION AND ALTERATION OF THE EXISTING FACILITIES SHALL BE SUBMITTED TO AND APPROVED BY THE CONSTRUCTION MANAGER PRIOR TO THE INITIATION OF ANY SUCH OPERATIONS. SUCH PLAN SHALL INCLUDE ABATEMENT METHODS, AIR MONITORING PROCEDURES, PROTECTION EQUIPMENT INCLUDING RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING, AND A TRAINING PROGRAM FOR SUBCONTRACTOR'S EMPLOYEES.

B. RELATED WORK INCLUDED UNDER OTHER SECTIONS

PAINTING OF NEW WORK AND PATCHED AREAS
REMOVAL OF FENCING AND UTILITY POLES

02050.02 PROTECTION FROM DEMOLITION OPERATIONS

A. FIRE PROTECTION

WHENEVER A CUTTING TORCH OR OTHER EQUIPMENT THAT MIGHT CAUSE A FIRE IS USED, PROVIDE AND MAINTAIN FIRE EXTINGUISHERS AND OTHER FIRE FIGHTING EQUIPMENT AS REQUIRED BY THE CONSTRUCTION MANAGER AND THE FMPC OPERATING CONTRACTOR.

AN FMPC WORK PERMIT IS REQUIRED PRIOR TO ANY FLAME CUTTING OR WELDING OPERATION.

B. BARRIERS

PROVIDE SAFEGUARDS, INCLUDING WARNING SIGNS, BARRICADES AND PROTECTION REQUIRED TO PROTECT EXISTING CONSTRUCTION AND EQUIPMENT, AND TO PROTECT PEDESTRIANS AND VEHICULAR TRAFFIC FROM FALLING MATERIAL. PROTECT FMPC PROPERTY AT ALL TIMES.

02050.03 COORDINATION

A. OTHER SUBCONTRACTORS

COORDINATE WORK WITH OTHER SUBCONTRACTORS AND AFFORD THEM REASONABLE OPPORTUNITY TO COMPLETE THEIR WORK.

B. FMPC OPERATIONS

CONDUCT ALL WORK SO AS NOT TO INTERFERE WITH NORMAL OPERATIONS OF THE FMPC. ACCESS TO THE ENTRANCE OF EXISTING BUILDING MUST BE MAINTAINED AT ALL TIMES.

02050.04 WORKMANSHIP

CAREFULLY REMOVE ALL MATERIALS.

PROVIDE ALL REQUIRED BRACING, SHORING AND SUPPORTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR THE STRUCTURAL ADEQUACY OF ALL WORK.

BURNING OF WASTE MATERIALS IS PROHIBITED.

EXERCISE EXTREME CARE IN DEMOLITION AND REMOVAL WORK SO AS NOT TO DAMAGE ADJACENT CONSTRUCTION. REPAIR ALL DAMAGE TO FMPC PROPERTY, MATERIALS OR EQUIPMENT AS REQUIRED.

THE SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ANY AUXILIARY STRUCTURAL STEEL REQUIRED TO SUPPORT EXISTING COMPONENTS DURING DEMOLITION OPERATIONS. THE DESIGN OF ENCLOSURES NECESSARY TO CONTROL OR CONTAIN EMISSIONS, OR AFFORD WEATHER PROTECTION, IS ALSO THE RESPONSIBILITY OF THIS SUBCONTRACTOR.

SEGREGATION AND HANDLING OF DEMOLISHED MATERIALS SHALL BE PERFORMED IN ACCORDANCE WITH FMPC-720, CONTROL OF CONSTRUCTION WASTE.

REMOVE AND CAREFULLY LOWER STRUCTURAL STEEL, STEEL AND WOOD FRAMING, COLUMNS, BEAMS, AND OTHER HEAVY ITEMS, IN ACCORDANCE WITH OSHA REQUIREMENTS FOR CRANE AND HOIST OPERATIONS.

REMOVE AND SALVAGE EXISTING METAL PASS DOORS, DOOR FRAMES AND HARDWARE, AT ALL ADJACENT EXISTING BUILDINGS.

02050.05 ASBESTOS ABATEMENT

ASBESTOS MATERIALS WILL BE ENCOUNTERED IN THE EXISTING WALL, CONSTRUCTION AND MAY ALSO BE ENCOUNTERED IN EXISTING INSULATION.

THE SUBCONTRACTOR SHALL PROVIDE ALL REQUIRED LABOR, MATERIALS, EQUIPMENT AND SERVICES TO ABATE ASBESTOS-CONTAINING MATERIALS, INCLUDING ENCAPSULATION AND REMOVAL TO APPROVED DISPOSAL SITE, IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN SECTION 01100.

02050.06 DISPOSITION OF MATERIALS

ALL MATERIALS AND ITEMS REMOVED SHALL BE DISPOSED OF ON THE FMPC RESERVATION AS DIRECTED BY THE CONSTRUCTION MANAGER.

02050.07 CLEANUP

PROMPTLY REMOVE FROM THE SITE, ON A DAILY BASIS, ALL DEBRIS RESULTING FROM OPERATIONS UNDER THIS SPECIFICATION.

AT THE CONCLUSION OF ALL WRECKING AND REMOVAL WORK, REMOVE FROM THE PREMISES ANY REMAINING DEBRIS AND ALL EQUIPMENT USED FOR WRECKING AND REMOVAL WORK, AND LEAVE THE PREMISES CLEAN.

02050.08 TEMPORARY CLOSURES AND PARTITIONS

A. GENERAL

PRIOR TO INITIATING WORK UNDER THIS SECTION, PROVIDE TEMPORARY CLOSURES AND PARTITIONS AS SPECIFIED BELOW. SUCH CLOSURES TO BE MAINTAINED IN PLACE UNTIL REMOVAL IS AUTHORIZED. ALL MATERIALS TO BE FIRE RETARDANT OR FIRE RETARDANT TREATED.

B. TEMPORARY CLOSURES FOR EXTERIOR OPENINGS

PROVIDE WEATHERPROOF PROTECTION USING WOOD FRAMEWORK COVERED WITH PLYWOOD ON EXTERIOR FACE. FRAMEWORK TO BE PROPERLY CONSTRUCTED, CLOSELY FITTED, ACCURATELY SET TO LINES, LEVELS AND DIMENSIONS, RIGIDLY SECURED IN PLACE, AND ADEQUATELY BRACED. CALK AS REQUIRED. MAINTAIN IN A WEATHERTIGHT CONDITION UNTIL PERMANENT CONSTRUCTION IS IN PLACE. PROVIDE ACCESS OPENINGS OR TEMPORARY DOORS WHERE REQUIRED.

DIVISION 2

02100 - SITE PREPARATION, EARTHWORK AND APPURTENANT WORK

02100.01 SCOPE OF WORK

A. WORK SPECIFIED UNDER THIS SECTION

PERFORM ALL WORK SPECIFIED HEREIN AS INDICATED. THIS WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

REMOVAL OF EXISTING FENCING (PHASE D & E)
EXCAVATING AND BACKFILLING FOR FOUNDATIONS
PROVIDING FINISH LOAD-BEARING SUBGRADES FOR FOUNDATIONS
DISPOSAL OF REMOVED MATERIALS
LABORATORY DENSITY TESTING
FINISH SITE GRADING
STONE TOPPING

DRAWINGS INDICATE APPROXIMATE LOCATION OF KNOWN UNDERGROUND UTILITIES AND SERVICES. WHERE ANY INTERFERENCE IS ENCOUNTERED, WHETHER OR NOT SHOWN, REPORT TO CONSTRUCTION MANAGER AND PROCEED AS DIRECTED. WHERE DAMAGED, RESTORE FACILITIES TO THEIR ORIGINAL UNDAMAGED CONDITION.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

EARTHWORK FOR ELECTRICAL AND MECHANICAL WORK

02100.02 DENSITY CONTROL

A. TESTS

WHERE DENSITY OR DEGREE OF COMPACTION OF A SOIL IS HEREINAFTER SPECIFIED AS A PERCENTAGE, IT REFERS TO PERCENTAGE OF MAXIMUM DENSITY OF THAT SOIL, AS DETERMINED BY TESTS THEREON PERFORMED IN THE LABORATORY, IN ACCORDANCE WITH AASHTO STANDARD METHOD T-99 OR ASTM D 698, METHOD A OR D AS APPLICABLE.

TESTS FOR DENSITY AND MOISTURE OF SOIL IN PLACE TO CONFORM TO EITHER ASTM D 2922, ASTM D 3017, AASHTO T-191 OR AASHTO T-205.

THE DENSITIES SPECIFIED ARE TO HAVE MOISTURE CONTENT WITHIN PLUS OR MINUS 3 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE LABORATORY.

B. LABORATORY

THE CONSTRUCTION MANAGER WILL ARRANGE AND PAY FOR SERVICES OF AN INDEPENDENT LABORATORY, HEREINAFTER REFERRED TO AS THE LABORATORY, TO PERFORM NECESSARY QUALITY CONTROL TESTING FOR EARTHWORK.

C. MATERIAL SAMPLES

COOPERATE WITH LABORATORY PERSONNEL IN OBTAINING SAMPLES, AND DURING QUALITY CONTROL TESTING.

02100.03 HAUL AND ACCESS ROADS

MAINTAIN EXISTING ROADS, USED DURING CONSTRUCTION, IN A CLEAN CONDITION, FREE OF MUD AND DEBRIS. LEAVE ALL ROADS IN CONDITION FOUND AT BEGINNING OF CONTRACT.

02100.04 SITE CONDITIONS

A. INTERFERENCES - UNDERGROUND

EXISTING SERVICES ARE OF VITAL IMPORTANCE TO THE EXISTING FACILITY. IN PROVIDING PROTECTION, TAKE EVERY PRECAUTION TO ENSURE AGAINST DAMAGE TO SUCH SERVICES BY OPERATIONS UNDER THIS SECTION.

WHERE WORK IS REQUIRED IN VICINITY OF EXISTING UNDERGROUND SERVICES, THE USE OF POWER EXCAVATING EQUIPMENT BELOW 6 INCHES ABOVE TOP OF SUCH SERVICES WILL NOT BE PERMITTED. PERFORM WORK OF EXCAVATION AND BACKFILL SO AS TO AVOID DAMAGE TO SUCH SERVICES.

B. SPECIAL PRECAUTIONS

PROVIDE ALL BARRICADES AND PROTECTION REQUIRED TO PROTECT EXISTING UTILITIES, CONSTRUCTION, AND EQUIPMENT, AND TO PROTECT PEDESTRIAN AND VEHICULAR TRAFFIC. PROTECT OPERATING CONTRACTOR'S PROPERTY AT ALL TIMES. MAINTAIN VEHICLE ACCESS, WHEN TRENCHING ACROSS PAVEMENT, AS SPECIFIED IN SECTION 01100.

C. PATCHING

REPAIR OR REPLACE ALL EXISTING SERVICES OR OTHER ITEMS OF PROPERTY REMOVED, DISTURBED, OR INJURED DURING OPERATIONS UNDER THIS SECTION AND NOT SPECIFIED OR SHOWN TO BE REMOVED OR OCCUPIED BY NEW STRUCTURES. THESE ARE TO MATCH IN MATERIAL, QUALITY, DIMENSIONS AND APPEARANCE, REMAINING ADJACENT INSTALLATION OR THE ORIGINAL INSTALLATION PRIOR TO DAMAGE.

02100.05 WATER CONTROL

CONDUCT EARTHWORK OPERATIONS UNDER THIS DIVISION TO ENSURE AGAINST RAINWASH AND THE SILTING OF ADJOINING AREA RESULTING THEREFROM. PROVIDE SILT FENCES AROUND INLETS. SHOULD SUCH SILTING OCCUR, RESTORE SUCH AREA TO LINES, GRADES, AND CONDITIONS SHOWN AND SPECIFIED.

PERFORM ALL EARTHWORK IN THE DRY. PRIOR TO INITIATING ANY EXCAVATION, PROVIDE DEWATERING EQUIPMENT AT SITE OF ACCEPTABLE TYPE, CONDITION AND CAPACITY, AND MAINTAIN IN CONDITION FOR IMMEDIATE USE WHEN CONDITIONS WARRANT.

KEEP EXCAVATIONS DRY BY PUMPING OR OTHER ACCEPTABLE MEANS AND METHODS. PLACE DEWATERING FACILITIES IN OPERATION AS SOON AS CONDITIONS WARRANT, OR WHEN DIRECTED. MAINTAIN IN OPERATION ON A 24 HOUR BASIS IF NECESSARY, INCLUDING WEEKENDS AND HOLIDAYS, UNTIL DANGER OF PONDING WATER IN THE AFFECTED AREA IS PAST.

SHOULD THE SUBCONTRACTOR FAIL TO PROMPTLY INITIATE DEWATERING PROCEDURES WHEN DIRECTED, THE RIGHT IS RESERVED TO HAVE THE WORK PERFORMED BY OTHERS AT SUBCONTRACTOR'S EXPENSE.

CONTROL GRADES IN VICINITY OF EXCAVATIONS TO PREVENT SURFACE WATER RUNNING INTO EXCAVATED AREAS.

02100.06 SOIL MATERIALS

A. SUITABLE MATERIALS

SUITABILITY OF MATERIALS FOR PROVIDING SUBGRADES OR FOR USE IN CONSTRUCTING SUBGRADES AND FILL SHALL BE DETERMINED BY THE LABORATORY.

B. UNSUITABLE MATERIALS

DO NOT USE ANY OF THE FOLLOWING MATERIALS FOR LOAD-BEARING SUBGRADES OR FOR CONSTRUCTION OF SUBGRADES, OR FILLS, UNLESS SPECIFICALLY AUTHORIZED:

ROCK AND/OR CONCRETE PIECES LARGER THAN 2 INCHES IN MAJOR DIMENSIONS
MATERIALS THAT ARE FROZEN
MATERIALS CONTAINING MORE MOISTURE THAN WILL PERMIT SPECIFIED DEGREE OF COMPACTION AS DETERMINED BY LABORATORY
MATERIALS CONTAINING DEBRIS OR UNACCEPTABLE PROPORTIONS OF ORGANIC MATERIALS AS DETERMINED BY LABORATORY
MATERIALS CLASSIFIED BY ASTM D 2487 AS CH, MH, ML, OH, OL OR PT

C. GRANULAR MATERIALS

WHERE A MATERIAL IS HEREINAFTER REFERRED TO AS "GRANULAR," IT DESIGNATES A MATERIAL CLASSIFIED AS GW, GP, SW, GM, GC OR SP, AS DEFINED IN ASTM D 2487.

D. BANK RUN GRAVEL

WHERE BANK RUN GRAVEL IS HEREINAFTER REFERRED TO, IT MEANS A NATURAL GRAVEL, 100 PERCENT PASSING THE 2 INCH SIEVE, NOT LESS THAN 70 PERCENT RETAINED ON THE NO. 8 SIEVE, AND NOT MORE THAN 5 PERCENT PASSING THE 200 MESH SIEVE.

02100.07 DISPOSAL OF MATERIAL

A. DEBRIS

REMOVED DEBRIS, VEGETATION, UNSUITABLE SOIL AND TRASH SHALL BE DISPOSED OF AS DIRECTED BY THE CONSTRUCTION MANAGER.

B. SUITABLE MATERIALS

DEPOSIT REMOVED SUITABLE MATERIALS NOT IN EXCESS OF REQUIREMENTS EITHER DIRECTLY ON SUBGRADES PREPARED TO RECEIVE FILL OR IN TEMPORARY STOCKPILES ON SITE WHERE AUTHORIZED OR DIRECTED.

C. STOCKPILES

DEPOSIT MATERIALS STOCKPILED FOR REUSE IN AUTHORIZED LOCATIONS ON SITE AND NOT ABOVE ELEVATIONS AUTHORIZED. SPREAD MATERIALS IN A MANNER WHICH WILL PERMIT REUSE. SLOPE AND COMPACT AS NECESSARY TO ENSURE AGAINST RAINWASH.

D. UNAUTHORIZED PLACEMENT

WHEN SO DIRECTED, PROMPTLY REMOVE ANY SPOIL OR STOCKPILE MATERIALS PLACED IN UNAUTHORIZED LOCATIONS OR TO UNAUTHORIZED ELEVATIONS. SHOULD THE SUBCONTRACTOR FAIL TO REMOVE SUCH MATERIALS WITH REASONABLE PROMPTNESS, THE CONSTRUCTION MANAGER RESERVES THE RIGHT TO HAVE SUCH MATERIALS REMOVED AT SUBCONTRACTOR'S EXPENSE.

02100.08 CLEARING AND GRUBBING

A. MISCELLANEOUS MATERIAL

REMOVE ALL EXISTING MISCELLANEOUS MATERIALS ENCOUNTERED, INCLUDING, BUT NOT LIMITED TO:

EXPOSED OR BURIED DEBRIS
FOUNDATIONS
SIMILAR MATERIALS NOT OTHERWISE SHOWN OR SPECIFIED TO BE REMOVED OR RETAINED

B. PAVEMENTS

REMOVE PAVING MATERIALS FROM AREAS INDICATED, OR ELSEWHERE AS NECESSARY FOR NEW WORK.

WHERE PORTIONS OF EXISTING PAVEMENTS ARE SHOWN TO REMAIN OR TO FORM BASE OF OVERLAYS, CUT LIMIT LINES WITH ACCEPTABLE POWER-DRIVEN SAWS TO A DEPTH NOT LESS THAN 4 INCHES AND IN STRAIGHT LINES BEFORE STARTING DEMOLITION AND/OR REMOVAL.

02100.09 REMOVAL OF EXISTING FENCING

PRIOR TO INITIATING ANY WORK IN VAICINITY OF EXISTING FENCING TO BE REMOVED, REMOVE EXISTING FENCING WIRE FABRIC, CAPS AND ACCESSORIES.

REMOVE POSTS AND FOOTINGS IN THEIR ENTIRETY. ALL 15 MINUTES FOR EACH FOOTING TO BE RADIOLOGICALLY MONITORED PRIOR TO DISPOSITION/DISPOSAL. PROVIDE THREE DAYS NOTICE TO THE CONSTRUCTION MANAGER PRIOR TO REMOVING CONCRETE FOOTINGS.

ALL MATERIALS REMAIN THE PROPERTY OF FMPC. STORE AS DIRECTED BY THE CONSTRUCTION MANAGER.

02100.10 EXCAVATION

A. GENERAL

PERFORM EXCAVATION REMOVING WHATEVER SUBSTANCES ENCOUNTERED WITHIN GRADING AREA.

OPENCUT METHODS ARE PERMITTED FOR EXCAVATION PROVIDED RESULTING BANKS WILL BE STABLE AT ALL TIMES. SHOULD IT APPEAR THAT EXPOSED SLOPES MAY BECOME UNSTABLE OR WHERE OPEN CUTS SUBJECT TO THE ABOVE RESTRICTION ARE IMPRACTICABLE, BRACE AND SHEET SUCH SLOPES.

B. EXCAVATION FOR LOAD-BEARING SUBGRADES

IN ADDITION TO REQUIREMENTS LISTED ABOVE, EXCAVATE AS FOLLOWS FOR LOAD-BEARING SUBGRADES.

LEAVE AMPLE ROOM WHERE NECESSARY FOR CONSTRUCTION, INSPECTION AND REMOVAL OF FORMS.

WHERE UNSUITABLE MATERIALS INCLUDING EXCESSIVELY WET MATERIALS, ARE ENCOUNTERED WITHIN THE LINES AND BELOW LOAD-BEARING SUBGRADES, EXCAVATE TO DEPTHS AS NECESSARY OR DIRECTED TO REACH SUITABLE MATERIALS. BACKFILL WITH SUITABLE MATERIAL AS SPECIFIED FOR BACKFILL TO THE SUBGRADES INDICATED.

WHERE POWER EQUIPMENT OTHER THAN BLADE GRADER OR SCRAPER IS USED FOR EXCAVATION, STOP EXCAVATION 6 INCHES ABOVE SUBGRADE AND HAND EXCAVATE TO PROPER LEVELS LEAVING BEARING SURFACE SMOOTH AND LEVEL.

02100.11 FILL AND BACKFILL

A. GENERAL FILL

FILL WITH SUITABLE MATERIALS TO SUBGRADES IN CONFORMANCE WITH REQUIREMENTS FOR FILLING, AS SPECIFIED BELOW, EXISTING DEPRESSIONS AND HOLES, AND THOSE LEFT BY EXCAVATION.

DO NOT USE UNSUITABLE MATERIALS IN FILL NOR PLACE FILL ON OR AGAINST FROZEN SURFACES, UNSUITABLE MATERIAL OR SUITABLE MATERIAL OF IMPROPER DENSITY. LEAVE WORK AREAS IN CLEAN CONDITION.

PLACE FILL IN 8 INCH LAYERS OF COMPACTED THICKNESS AND COMPACT TO A DENSITY OF 95 PERCENT IN AREAS BELOW STRUCTURES AND PAVEMENT AND TO A DENSITY OF 95 PERCENT, MINIMUM, BELOW AREAS TO BE COVERED WITH STONE TOPPING.

B. BACKFILL

AFTER FOUNDATIONS ARE COMPLETED TO ELEVATIONS ABOVE SUBGRADES FOR FILL, BACKFILL WITH SUITABLE EXCAVATED MATERIAL OR BORROWED GRANULAR MATERIAL. BEFORE BACKFILLING, REMOVE ALL FORMS AND DEBRIS. BACKFILL IN HORIZONTAL LAYERS NOT IN EXCESS OF 4 INCHES IN THICKNESS, LOOSE MEASUREMENT, AND WITH MOISTURE CONTENT SUCH THAT THE REQUIRED DEGREE OF COMPACTION MAY BE OBTAINED. BACKFILL WITHIN CURBS TO SUBGRADE ELEVATIONS. BACKFILL OUTSIDE OF CURBS TO FINISH SITE GRADES AND SO THAT DRAINAGE IS AWAY FROM PAD.

COMPACT EACH LAYER TO DENSITY OF 95 PERCENT BY HAND OR MECHANICAL TAMPERS OR BY OTHER SUITABLE EQUIPMENT. DO NOT COMPACT MATERIAL BY PUDDLING, JETTING OR ANY OTHER COMPACTING PROCESS USING ONLY WATER.

BACKFILL SIMULTANEOUSLY ON BOTH SIDES OF VERTICAL STRUCTURAL ELEMENTS, SO THAT LEVELS OF BACKFILLS ARE AT ALL TIMES EQUAL ON EACH SIDE OF SUCH VERTICAL ELEMENTS. WHERE THIS IS IMPRACTICABLE, OR OTHERWISE INDICATED, MAKE SURE THAT AFFECTED STRUCTURAL ELEMENT IS PROPERLY BRACED AGAINST POSSIBLE LOADS IMPOSED BY WEDGING ACTION OF FILLING OPERATIONS.

02100.12 FINISH LOAD-BEARING SUBGRADES

IMMEDIATELY PRIOR TO PLACING FOUNDATIONS ON A SUBGRADE, HAVE SURFACE DENSITY CHECKED BY LABORATORY. WHERE DENSITY IS LESS THAN 95 PERCENT OR WHERE ADDITIONAL FILL IS NECESSARY, SCARIFY AND SEMIPULVERIZE TOP SURFACE OF AREA TO DEPTH OF 12 INCHES AND RECOMPACT TOGETHER WITH NECESSARY FILL TO A DENSITY OF 95 PERCENT. BRING SUBGRADE TO FINISHED SURFACE, REASONABLY SMOOTH AND COMPACTED, FREE FROM IRREGULAR SURFACE CHANGES, AND NOT ABOVE THE REQUIRED FINISH GRADE OR SUBGRADE ELEVATIONS. TEST AGAIN PRIOR TO PLACING FOUNDATION.

02100.13 FINISH SITE GRADING

BRING AREAS TO BE FINISH GRADED TO FINISHED SURFACES REASONABLY SMOOTH, COMPACTED, AND FREE FROM IRREGULAR SURFACE CHANGES. THE DEGREE OF FINISH AND COMPACTION IS THAT ORDINARILY OBTAINABLE FROM EITHER BLADE GRADER OR SCRAPER OPERATIONS.

FINISH GRADE THE AREAS TO RECEIVE TOPPING TO FINISHED SURFACES NOT MORE THAN 1.5 INCHES ABOVE OR BELOW THE REQUIRED ELEVATIONS OR ACCEPTABLE CROSS SECTION TO RECEIVE THE TOPPING.

PROVIDE FINISH SURFACES IN DITCHES AND SWALES.

02100.14 STONE TOPPING

A. MATERIALS

STONE TOPPING - CRUSHED LIMESTONE AGGREGATE, ASTM C 33 SIZE NO. 57.

B. GRADE PREPARATION

BRING SUBGRADE TO GRADE AND CROSS SECTION NOT ABOVE THE REQUIRED ELEVATION FOR BASE OF TOPPING AND COMPACTED TO A DENSITY OF 95 PERCENT.

AFTER SUBGRADES HAVE BEEN BROUGHT TO PROPER GRADE, THOROUGHLY TILL TO A DEPTH OF 6 INCHES AND APPLY A SUITABLE PLANT POISON IN QUANTITIES SUFFICIENT TO ENSURE AGAINST GERMINATION AND/OR GROWTH OF ANY PLANTS IN AREAS TREATED. TREAT EARTH IN STRICT ACCORDANCE WITH INSTRUCTIONS OF MANUFACTURER OF THE POISON. USE ONLY UNITED STATES ENVIRONMENTAL PROTECTION AGENCY APPROVED POISONS. SUBMIT MSDS MATERIAL SHEET. AFTER SURFACES HAVE BEEN TREATED, RECOMPACT AND SMOOTH GRADE AS SPECIFIED ABOVE FOR FINISH SITE GRADING.

C. PLACING TOPPING

SPREAD MATERIAL ON SUBGRADE TO A DEPTH OF 3 INCHES, AND RAKE TO PROVIDE A RELATIVELY SMOOTH TOP SURFACE NOT BELOW REQUIRED FINISH ELEVATIONS.

DIVISION 2

02400 - STORM DRAINAGE

02400.01 SCOPE OF WORK

A. WORK SPECIFIED UNDER THIS SECTION

PERFORM ALL WORK AS SPECIFIED OR INDICATED TO COMPLETE STORM DRAINAGE WORK AND ALL RELATED WORK AS SHOWN AND SPECIFIED. THIS WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING:

RAISING EXISTING CATCH BASINS
PLUGGING EXISTING CATCH BASINS
CONSTRUCTING CATCH BASINS AND INLETS
CONNECTING INTO EXISTING DRAINAGE STRUCTURE

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

EARTHWORK FOR FOUNDATIONS
SITE CLEARANCE
FINISH SITE GRADING

C. ITEMS DEFINED AND SPECIFIED IN SECTION 02100

PERFORM ALL WORK IN ACCORDANCE WITH THE FOLLOWING APPLICABLE REQUIREMENTS OF SECTION 02100:

PATCHING
DENSITY CONTROL
DISPOSAL OF MATERIALS

02400.02 APPLICABLE STANDARDS

THE APPLICABLE RECOMMENDATIONS IN THE LATEST ISSUE OF THE LISTED PUBLICATIONS OF THE FOLLOWING AUTHORITIES ARE INCORPORATED HEREIN BY REFERENCE:

AISI "HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS", HEREINAFTER REFERRED TO AS "AISI HANDBOOK"
AMERICAN CONCRETE PIPE ASSOCIATION (ACPA) "CONCRETE PIPE HANDBOOK", HEREINAFTER REFERRED TO AS "ACPA HANDBOOK"
CLAY SEWER PIPE ASSOCIATION (CSPA) "CLAY PIPE ENGINEERING MANUAL," HEREINAFTER REFERRED TO AS "CSPA MANUAL"

02400.03 MATERIALS

A. SOIL MATERIALS

SOIL MATERIALS ARE AS SPECIFIED IN SECTION 02100 AND AS FOLLOWS:

BANK RUN GRAVEL - A NATURAL GRAVEL, 100 PERCENT PASSING THE 2 INCH SIEVE NOT LESS THAN 70 PERCENT RETAINED ON THE NO. 8 SIEVE, AND NOT MORE THAN 5 PERCENT PASSING THE 200 MESH SIEVE.

COARSE AGGREGATE - ASTM C 33, SIZE NO. 7 OR NO. 8.

FINE AGGREGATE - A NATURAL SAND GRADED IN ACCORDANCE WITH ASTM C 33.

B. PIPE

ALL PIPING 12 INCHES AND LARGER:

REINFORCED CONCRETE PIPE - ASTM C 76, SIZES AND CLASS AS SHOWN, OR CLASS IV WHERE CLASS IS NOT SHOWN. PROVIDE WITH JOINTS CONFORMING TO ASTM C 443.

ALL PIPING 10 INCHES AN SMALLER:

CLAY PIPE - PIPE, ASTM C 700, JOINTS, ASTM C 425.

C. CONCRETE

PROVIDE CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 3,000 POUNDS PER SQUARE INCH IN 28 DAYS AND WITH 3 TO 6 PERCENT ENTRAINED AIR. PROVIDE DEFORMED REINFORCING STEEL CONFORMING TO ASTM A 615 OR A 616, GRADE 40 MINIMUM. PROVIDE SMOOTH RUBBED FINISH ON EXPOSED CONCRETE SURFACES.

PROVIDE MATERIALS, FORMS, AND WORKMANSHIP CONFORMING WITH APPLICABLE PROVISIONS OF SECTION 03300.

D. CASTINGS

CAST IRON, AS MANUFACTURED BY NEENAH FOUNDRY COMPANY OR APPROVED EQUAL. CAST-IRON FRAMES, GRATES, LIDS, RUNGS, AND OTHER CASTINGS.

02400.04 EXCAVATION AND TRENCHING

EXCAVATE TO A MINIMUM 6 INCHES BELOW BOTTOM OF PIPE AS SPECIFIED HEREINBEFORE, AND AS FOLLOWS. MAINTAIN TRENCH BANKS AS NEARLY VERTICAL AS POSSIBLE. REMOVE EXCESS EARTH. KEEP EXCAVATIONS DRY. MAKE WIDTH OF VERTICALLY WALLED TRENCHES NO LARGER THAN 8 INCHES ON EITHER SIDE OF PIPE BARREL FROM BOTTOM TO SPRING LINE, AND NO WIDER

THAN NECESSARY ABOVE SPRING LINE FOR PROPER PERFORMANCE OF WORK. WHERE WET OR UNSUITABLE MATERIAL FOR PROPER SUPPORT OF PIPE IS ENCOUNTERED, REMOVE SUCH MATERIAL TO DEPTH REQUIRED. OVERDEPTH EXCAVATION MUST BE PERFORMED FOR FULL WIDTH OF TRENCH AND THEN BACKFILLED WITH BANK RUN GRAVEL TO THE PROPER GRADE AND COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS FOR BEDDING AS SPECIFIED BELOW.

WHERE PIPES ARE PLACED IN FILL, PLACE FILL TO NOT LOWER THAN 1 FOOT ABOVE THE PIPE AS SPECIFIED IN SECTION 02100 FOR FILL AND EXCAVATE INTO COMPACTED FILL AS SPECIFIED ABOVE.

IN LIEU OF VERTICAL-SIDED TRENCHES, THE CONTRACTOR MAY, AT HIS OPTION, USE OPENCUT METHODS FOR EXCAVATION, PROVIDED THAT SIDES OF TRENCHES ARE KEPT VERTICAL TO 1 FOOT ABOVE TOP OF PIPES.

02400.05 BEDDING

PROVIDE BEDDING IN CONFORMANCE WITH APPLICABLE RECOMMENDATIONS OF THE FOLLOWING STANDARDS.

FOR CONCRETE PIPE - CLASS B (FIRST CLASS) BEDDING AS DEFINED IN THE ACPA HANDBOOK, WITH A 6 INCH MINIMUM BED OF GRANULAR MATERIAL.

FOR CLAY PIPE - ASTM C 12 FOR CLASS C BEDDING.

BACKFILL TO ELEVATION ABOVE BOTTOM QUADRANT WITH BANK RUN GRAVEL COMPACTED TO 95 PERCENT DENSITY. IMMEDIATELY BEFORE LAYING PIPE, ROUND PIPE BED TO ACCOMMODATE BOTTOM QUADRANT OF PIPE AND EXCAVATE AT JOINTS SO THAT PIPE WILL BE UNIFORMLY SUPPORTED FOR ITS ENTIRE LENGTH.

02400.06 ENTRANCES TO EXISTING DRAINAGE STRUCTURES

WHERE NECESSARY, CUT HOLES INTO EXISTING DRAINAGE STRUCTURES BY METHODS WHICH WILL NOT RESULT IN DAMAGE THERETO AND WILL RESULT IN CLEAN CUT WALLS OF PROPER SIZE. CALK AROUND OPENING BETWEEN STRUCTURE WALL AND PIPE BY PACKING SOLID WITH OAKUM TO WITHIN 1 INCH OF WALL SURFACE ON EACH SIDE, AND CALKING REMAINING SPACE ON EACH SIDE FULL WITH CELOTEX THERMOTEX B, OR APPROVED EQUAL.

02400.07 PIPE LAYING

THOROUGHLY INSPECT AND FIT PIPES BEFORE PLACING INTO TRENCHES. LAY LINES TO UNIFORM GRADE BETWEEN ELEVATIONS INDICATED OR AT GRADE SPECIFIED. USE ENGINEER'S LEVEL FOR ESTABLISHING GRADES AND SLOPES. USE GRADE BOARDS, GRADE CORD, PLUMB BOB AND MEASURING STICK TO TRANSFER GRADES FROM BENCH MARKS TO FLOW LINE OF PIPE. MAKE ALL JOINTS IN CONFORMANCE WITH RECOMMENDATIONS OF MANUFACTURER AND AS FURTHER SPECIFIED BELOW.

LAY PIPE IN CONFORMANCE WITH APPLICABLE RECOMMENDATIONS AND PROVISIONS OF FOLLOWING STANDARDS AND AS FURTHER SPECIFIED BELOW:

FOR CONCRETE PIPE - ACPA HANDBOOK
FOR CLAY PIPE - ASTM C 12

REQUEST INSTRUCTIONS FROM CONSTRUCTION MANAGER BEFORE INSTALLING ANY WORK ON GROUND PROVIDING QUESTIONABLE SUPPORT. PROVIDE FIRM BED FOR BARREL OF PIPE. PIPE MUST NOT REST ON JOINT WHEN BROUGHT TO GRADE. SET EACH LENGTH TO GRADE AND LINE BEFORE MAKING JOINT.

KEEP WATER OUT OF PIPES UNTIL JOINTS HAVE BEEN MADE. CLOSE ALL OPEN ENDS OF PIPING DURING CONSTRUCTION TO PREVENT EARTH ENTERING LINES. CLEAN SURFACES OF JOINTS AND INTERIOR OF ALL PIPE BEFORE MAKING JOINTS.

02400.08 BACKFILLING

AFTER PIPE IS INSTALLED, BACKFILL TO 1 FOOT ABOVE TOP OF PIPE WITH BANK RUN GRAVEL.

BACKFILL IN LAYERS NOT MORE THAN 4 INCHES THICK, USING CARE TO AVOID DISPLACING PIPE. POWER TAMP EACH LAYER TO A DENSITY OF 95 PERCENT.

FOR FILL ABOVE 1 FOOT ABOVE TOP OF PIPE, PROCEED AS FOLLOWS.

IN AREAS TO BE COVERED BY SUBGRADES FOR PAVEMENTS OR STRUCTURES, COMPLETE BACKFILL TO ELEVATION AND DENSITY OF FINISH SUBGRADE AS SPECIFIED HEREINBEFORE FOR FILL.

IN ALL OTHER AREAS COMPLETE BACKFILLING TO DENSITY SPECIFIED HEREINBEFORE FOR SITE FILLING. MOUND TOP OF BACKFILL SLIGHTLY ABOVE FINISHED GRADE. USE ONLY SUITABLE MATERIALS. DO NOT USE MATERIAL WHICH IS UNSUITABLE OR CONTAINS LARGE CLODS, OR LARGE STONES. IF AVAILABLE MATERIAL WHICH WOULD OTHERWISE BE SUITABLE IS FROZEN OR WET AT THE TIME THE TRENCHES MUST BE BACKFILLED, TO AVOID DELAY IN OTHER WORK ON THE PROJECT, BACKFILL WITH BANK RUN GRAVEL OR OTHER ACCEPTABLE GRANULAR MATERIAL.

02400.09 CONCRETE CATCH BASINS

CONSTRUCT PRECAST OR CAST-IN-PLACE CONCRETE CATCH BASINS AS SPECIFIED HEREIN.

SUBMIT SHOP DRAWINGS FOR REVIEW.

FOUNDATION - POURED REINFORCED CONCRETE.

CATCH BASIN - PRECAST OR CAST-IN-PLACE REINFORCED CONCRETE. PROVIDE PRECAST OPENINGS IN SIDE OF CATCH BASIN OF PROPER SIZE FOR PIPE SHOWN.

CALKING - CALK AROUND OPENING BETWEEN CATCH BASIN AND PIPE BY PACKING SOLID WITH OAKUM TO WITHIN 1 INCH OF CATCH BASIN WALL SURFACE ON EACH SIDE, AND CALK REMAINING SPACE ON EACH SIDE FULL WITH CELOTEX THERMOTEX B, OR APPROVED EQUAL.

TOP - CAST-IRON FRAME, SOLID LID OR GRATING, AND OTHER CASTINGS AS SPECIFIED ABOVE OR SHOWN ON DRAWINGS.

DIVISION 3

03300 - CONCRETE

03300.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY TO COMPLETE ALL CAST-IN-PLACE CONCRETE WORK, INCLUDING FORMWORK, REINFORCING STEEL AND ALL RELATED WORK AS SHOWN AND SPECIFIED, EXCEPT AS SPECIFICALLY EXCLUDED HEREINAFTER.

IN ADDITION TO CONSTRUCTION OF CAST-IN-PLACE CONCRETE WORK, THE WORK INCLUDES THE ITEMS LISTED BELOW:

SETTING ANCHOR BOLTS AND OTHER ITEMS INDICATED TO BE EMBEDDED IN CONCRETE (PHASE D)
VAPOR BARRIER
LABORATORY FIELD TESTING SERVICES
REMOVING SURFACE OF EXISTING CONCRETE PAD
REHABILITATING AND RAISING EXISTING CURBS
RENOVATION OF EXISTING CONTAMINATED JOINTS AND CRACKS

COOPERATE WITH AFFECTED PERSONNEL IN SETTING AND/OR FASTENING ANCHOR BOLTS, SLEEVES, PIPING, CONDUITS, AND SIMILAR ITEMS IN THE FORMS, WHERE SUCH ITEMS ARE TO BE FURNISHED AND INSTALLED UNDER OTHER DIVISIONS.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

FURNISHING ANCHOR BOLTS FOR STRUCTURES
GROUTING OF BASEPLATES
POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY FLOOR COATING
EPOXY COATING

03300.02 APPLICABLE STANDARDS

PROVIDE ALL MATERIALS AND PERFORM ALL WORK IN ACCORDANCE WITH ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND THE REFERENCE SPECIFICATIONS LISTED THEREIN.

03300.03 HOT AND COLD WEATHER CONDITIONS

PLACEMENT AND CURING OF CONCRETE UNDER THE REQUIREMENTS SPECIFIED HEREIN IS LIMITED TO AMBIENT TEMPERATURES BETWEEN 40F AND 90F. WHEN TEMPERATURES ARE TO BE OUTSIDE THESE TEMPERATURE LIMITATIONS, SUBMIT PROPOSED PROCEDURES FOR PROTECTION OF CONCRETE DURING PLACEMENT AND CURING.

USE OF CALCIUM CHLORIDE IS PROHIBITED.

03300.04 CONCRETE MATERIALS

READY-MIXED CONCRETE CONFORMING TO ASTM C 94, HAVING PROPERTIES SPECIFIED UNDER PROPORTIONING, AND USING MATERIALS SPECIFIED UNDER THIS SUBSECTION.

PORTLAND CEMENT -ASTM C 150, TYPE I EXCEPT THAT FOR AIR-ENTRAINED CONCRETE, TYPE IA MAY BE USED.

AIR-ENTRAINING ADMIXTURES - ASTM C 260.

WATER-REDUCING ADMIXTURES - ASTM C 494, TYPE A.

NO ACCELERATORS OR ADMIXTURES CONTAINING CHLORIDES WILL BE PERMITTED.

USE FRESH, CLEAN AND DRINKABLE WATER FOR CONCRETE.

COARSE AND FINE AGGREGATE TO CONFORM TO ASTM C 33. FOR COARSE AGGREGATES, USE SIZE 57.

03300.05 PROPORTIONING

PROVIDE CONCRETE HAVING THE MIX SPECIFIED FOR EACH CLASS OF CONCRETE IN THE FOLLOWING LIST.

NORMAL WEIGHT TYPE I CEMENT CONCRETE

FOUNDATION CONCRETE NOT EXPOSED TO WEATHER: (PHASE D)

MIX NO:	FMPC #1
SPECIFIED STRENGTH (28 DAYS)	3000 PSI
TOTAL AIR CONTENT:	N/A
SPECIFIED SLUMP:	4" ± 1"
MAXIMUM AGGREGATE SIZE:	1"
MAXIMUM WATER/CEMENT RATIO:	0.68
MINIMUM CEMENT CONTENT:	470#

* WATER REDUCING AND RETARDING ADMIXTURES AS REQUIRED.

MISCELLANEOUS CONCRETE EXPOSED TO WEATHER:

MIX NO:	FMPC #2
SPECIFIED STRENGTH (28 DAYS):	3000 PSI
TOTAL AIR CONTENT:	5% ± 1-1/2%
SPECIFIED SLUMP:	4" ± 1"
MAXIMUM AGGREGATE SIZE:	1"
MAXIMUM WATER/CEMENT RATIO:	0.45
MINIMUM CEMENT CONTENT:	517#

* WATER REDUCING AND RETARDING ADMIXTURES AS REQUIRED.

EXTERIOR PAD AND PAVEMENT/4000 PSI STRUCTURAL CONCRETE EXPOSED TO WEATHER:

MIX NO:	FMPC #4
SPECIFIED STRENGTH (28 DAYS):	4000 PSI
TOTAL AIR CONTENT:	5% ± 1-1/2%
SPECIFIED SLUMP:	4" ± 1"
MAXIMUM AGGREGATE SIZE:	1"
MAXIMUM WATER/CEMENT RATIO:	0.45
MINIMUM CEMENT CONTENT:	564#

* WATER REDUCING AND RETARDING ADMIXTURES AS REQUIRED.

PROVIDE CONCRETE HAVING ENTRAINED AIR CONTENTS WITHIN THE LIMITS SPECIFIED FOR EACH CLASS OF CONCRETE AS DETERMINED BY ASTM C 231.

03300.06 PRODUCTION OF CONCRETE

PROVIDE SITE DELIVERY TICKETS FOR EACH BATCH OF CONCRETE SHOWING FOLLOWING:

BATCH NUMBER, VOLUME, AND DATE
TIME OF LOADING
DESIGN 28 DAY COMPRESSIVE STRENGTH
APPROVED DESIGN MIX NUMBER

DO NOT ADD WATER TO MIX ON JOB PRIOR TO PLACEMENT, UNLESS AUTHORIZED IN WRITING BY THE CONSTRUCTION MANAGER'S REPRESENTATIVE. NOTE ON DELIVERY TICKET AMOUNT OF WATER ADDED AND NAME OF PERSON AUTHORIZING.

03300.07 PLACING CONCRETE

A. GENERAL

TIE REINFORCING BARS IN PROPER POSITION PRIOR TO PLACING CONCRETE.

PROVIDE SUFFICIENT TIME FOR INSPECTION OF PREPARATORY WORK BEFORE PROCEEDING WITH PLACING OF CONCRETE.

IMMEDIATELY PRIOR TO PLACING CONCRETE PAD OR FOUNDATION, LIGHTLY SPRINKLE SEMIPOROUS SUBGRADE SUFFICIENTLY TO ELIMINATE SUCTION.

DO NOT PLACE CONCRETE ON FROZEN GROUND.

B. CONSOLIDATION

PROVIDE INTERNAL VIBRATORS HAVING A MINIMUM FREQUENCY OF 8,000 VIBRATIONS PER MINUTE AND SUFFICIENT AMPLITUDE TO CONSOLIDATE THE CONCRETE AS DESCRIBED IN TABLE 5.1.4 OF ACI 309.

DO NOT USE VIBRATORS TO TRANSPORT CONCRETE WITHIN FORMS.

VIBRATE FULL DEPTH FOR PERIODS AND AT INTERVALS TO ENSURE CONSOLIDATION AND ELIMINATE AIR POCKETS BUT NOT SUFFICIENT TO CAUSE SEGREGATION OR LOSS OF AIR ENTRAINMENT.

C. FINISHING

FINISH CONCRETE PAVEMENT IN ACCORDANCE WITH THE FOLLOWING FINISH AND TOLERANCE. FINISH AND TOLERANCE ARE AS SPECIFIED IN ACI 301. SURFACE OF CONCRETE TO RECEIVE POLYURETHANE ELASTOMER/WEARING SURFACE SHALL BE AS RECOMMENDED BY THE MANUFACTURER OF THE WEARING SURFACE.

DUSTING OF PAVEMENT WITH CEMENT OR OTHER MATERIALS TO ABSORB EXCESS BLEED WATER IS STRICTLY PROHIBITED.

ITEM	TOLERANCE CLASS	FINISH
EXTERIOR PAVEMENT	B	TROWELED

03300.08 REINFORCEMENT

A. GENERAL

DETAILS OF CONCRETE REINFORCEMENT AND ACCESSORIES NOT COVERED HEREIN OR SHOWN ON DRAWINGS TO BE IN ACCORDANCE WITH ACI 315.

SECURE REINFORCEMENT IN PROPER POSITION AND THOROUGHLY CLEAN OF ICE, LOOSE RUST, SCALE, GREASE OR OTHER COATINGS.

B. REINFORCING MATERIALS

FOR REINFORCING SHOWN PROVIDE DEFORMED BARS CONFORMING TO ASTM A 615, OR A 616 GRADE 60, EXCEPT THAT NO. 3 AND NO. 4 RODS USED FOR TIES MAY BE GRADE 40, YIELD STRENGTH NOT LESS THAN 40,000 PSI.

WELDED WIRE FABRIC - ASTM A 185 PLAIN WIRE FABRIC IN FLAT SHEETS. WELDED WIRE FABRIC IN ROLLS IS NOT ACCEPTABLE.
SMOOTH DOWELS - ASTM A 615 AND A 616, PLAIN BARS, MINIMUM YIELD STRENGTH OF 40,000 PSI.

ACCESSORIES TO CONFORM TO ACI SP-66.

WHERE REINFORCING RODS ARE USED AS SUPPORTS, USE RODS NO LIGHTER THAN NO. 5.

WHERE CONCRETE SURFACES ARE EXPOSED, MAKE THOSE PORTIONS OF ALL ACCESSORIES IN CONTACT WITH THE CONCRETE SURFACE OR WITHIN 1/2 INCH THEREOF, OF PLASTIC OR STAINLESS STEEL.

C. PLACING

PLACE REINFORCING IN CONFORMANCE WITH THE REQUIREMENTS OF CRSI. PLACE REINFORCEMENT IN PROPER POSITION PRIOR TO PLACING CONCRETE. PLACING REINFORCEMENT DURING CONCRETE PLACEMENT WILL NOT BE PERMITTED.

UNLESS OTHERWISE SHOWN OR INDICATED, PROVIDE MINIMUM CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT AS FOLLOWS:

CONCRETE DEPOSITED AGAINST THE GROUND, 3 INCHES
FORMED SURFACES EXPOSED TO WEATHER OR IN CONTACT WITH THE GROUND, 2 INCHES FOR REINFORCING BARS NO. 6 OR LARGER, AND 1-1/2 INCHES FOR REINFORCING BARS NO. 5 OR SMALLER

SUPPORT REINFORCING FOR PAVEMENT ON STAGGERED CONCRETE BRICKS OR METAL OR PLASTIC BAR CHAIRS AND SPACERS WITH METAL PLATES.

UNLESS SPECIFICALLY AUTHORIZED, DO NOT BEND REINFORCEMENT PARTIALLY EMBEDDED IN HARDENED CONCRETE.

SUPPORT AND FASTEN DOWELS IN THE FORMWORK PRIOR TO PLACING CONCRETE. DO NOT PLACE DOWELS AFTER CONCRETE IS IN PLACE.

03300.09 JOINTS

A. GENERAL

CONSTRUCT JOINTS AS INDICATED. SAW CONTROL JOINTS WITHIN 4 TO 12 HOURS AFTER SLAB HAS BEEN PLACED AND FINISHED CONFORMING TO ACI 302.

LOCATION OF ANY CONSTRUCTION JOINT NOT SHOWN IS SUBJECT TO REVIEW AND ACCEPTANCE.

WHERE REINFORCING IS CONTINUOUS THROUGH A JOINT, PROVIDE SPLICE LENGTHS REQUIRED BY ACI 315.

B. JOINT MATERIALS

HORIZONTAL JOINT SEALER - TWO-COMPONENT SELF-LEVELING URETHANE CONFORMING TO FEDERAL SPECIFICATION TT-S-227E, TYPE 1, CLASS A. COLOR TO MATCH CONCRETE. ACCEPTABLE PRODUCTS ARE:

TYPE	MANUFACTURER
DARASEAL-U	A. C. HORN
SONOLASTIC PAVING JOINT SEALER	SONNEBORN
POURTHANE	W. R. MEADOWS
OR APPROVED EQUAL	

EPOXY BOND - 2-COMPONENT 100 PERCENT SOLIDS EPOXY RESIN, AMINE CURED. ACCEPTABLE MATERIALS ARE EUCLID CHEMICAL COMPANY NO. 463 EPOXY, GENERAL POLYMERS SBA 3574, AND SIKA CORPORATION SIKADURHIMOD.

EPOXY GROUT - EPOXY BOND FILLED WITH SUITABLE MINERAL FILLER, 100 PERCENT PASSING THE NO. 100 SIEVE, IN RATIO TO ENSURE THIXOTROPIC ACTION WITHOUT IMPAIRMENT OF ADHESIVE PROPERTIES.

C. DOWELED SLIP JOINTS

USE COMPLETELY SMOOTH ROUND BARS FOR DOWELS.

FOR CONSTRUCTION JOINTS, PAINT HALF OF BAR WITH ALKYD-OIL PAINT. WHEN DRY, COAT PAINTED END WITH SATISFACTORY GREASE TO ENSURE AGAINST BOND WITH CONCRETE.

PLACE IN FORMS TO ENSURE THAT BARS ARE PERPENDICULAR TO JOINT FACE. STOP REINFORCEMENT AT DOWELED SLIP JOINTS SO THAT IT WILL NOT EXTEND THROUGH JOINT.

D. BONDED JOINTS

WHERE SPECIFIED OR REQUIRED, BOND CONSTRUCTION JOINTS USING EPOXY BOND AS SPECIFIED ABOVE UNDER ARTICLE "JOINT MATERIALS." CONFORM TO APPLICABLE REQUIREMENTS AND RECOMMENDATIONS OF ACI 503.2 CONTINUE ALL REINFORCING THROUGH BONDED CONSTRUCTION JOINTS.

E. PLACING DOWELS IN EXISTING CONCRETE

USE DEFORMED REINFORCING BARS AS DOWELS UNLESS OTHERWISE SHOWN. DRILL HOLES IN EXISTING CONCRETE OF SIZE 1/2 INCH LARGER IN DIAMETER THAN THE DOWEL USING POWER-DRIVEN DRILL WITH TUNGSTEN-CARBIDE TIPPED BIT GROUND TO ENSURE AGAINST OVERSIZE HOLE. CLEAN OUT HOLES WITH AIR. THOROUGHLY SWAB SURFACES OF HOLE AND EMBEDDED PORTION OF DOWEL WITH EPOXY BOND. WHILE SURFACES ARE STILL WET, FILL HOLE 3/4 FULL OF EPOXY GROUT. FORCE DOWEL INTO PLACE. WIPE OFF EXCESS GROUT AND LET SET FOR NOT LESS THAN 12 HOURS AT A TEMPERATURE ABOVE 60F.

03300.10 FORMWORK

A. GENERAL

OBSERVE AND CHECK FORMWORK CONTINUOUSLY WHILE CONCRETE IS BEING PLACED TO DETERMINE THAT THERE ARE NO EVIDENCES OF CHANGES OF ELEVATIONS, PLUMBNESS, OR CAMBER. IF, DURING CONSTRUCTION, ANY SUCH EVIDENCE OR OTHER DEFECT APPEARS, STOP THE WORK, REMOVE CONCRETE PLACED, IF NECESSARY, AND REPAIR FORMWORK OR SUPPORTS BEFORE PROCEEDING.

EARTH CUTS MAY BE USED AS FORMS FOR FOOTINGS IF SIDES ARE SHARP AND TRUE, IF CONCRETE IS NOT EXPOSED IN FINISHED STRUCTURE, AND IF CONCRETE IS NOT REQUIRED TO HAVE SURFACE TREATMENT OF ANY KIND.

B. FORMWORK MATERIALS

MAKE FORMS OF LUMBER, PLYWOOD, METAL OR OTHER MATERIALS SUITABLE TO PROVIDE THE STRENGTH AND TOLERANCES SPECIFIED HEREINBEFORE AND THE SURFACE FINISHES SPECIFIED HEREINAFTER.

FOR FORMING EXPOSED SURFACES USE ANY OF THE FOLLOWING MATERIALS AS SUITABLE FOR THE SPECIFIED FINISH, AND TO PRODUCE SMOOTH UNIFORM SURFACES, TRUE-TO-LINE, IN ORDER THAT SURFACES PRODUCED WILL REQUIRE LITTLE FINISHING:

NEW PLASTIC-BONDED NATURAL PLYWOOD, AMERICAN PLYWOOD ASSOCIATION, HD OVERLAY PLYFORM CLASS I, EXT-APA, OR EQUAL
TEMPERED CONCRETE-FORM-GRADE HARDBOARD
METAL FREE FROM IRREGULARITIES, DENTS AND SAGS

C. PREPARATION OF FORM SURFACES

WHERE JOINTS IN WOODEN FORMS HAVE BEEN OPENED BY SHRINKAGE OF WOOD, WET DOWN SUCH FORMS IMMEDIATELY PRIOR TO PLACING CONCRETE UNTIL JOINTS ARE CLOSED BY SWELLING.

FORMS ARE TO BE SECURED IN PROPER POSITION AND ALIGNMENT, CLEANED, THOROUGHLY WET (EXCEPT USE OIL IN FREEZING WEATHER), AND FREE OF ALL DEBRIS, SNOW AND ICE.

D. REMOVAL OF FORMS

FORMWORK IS TO REMAIN IN PLACE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN SUBSECTION "CURING AND PROTECTION," HOWEVER, PROVIDE AT LEAST THREE FULL CURING DAYS.

FULL CURING DAYS WILL BE DETERMINED BY CUMULATIVE NUMBER OF DAYS OR FRACTIONS THEREOF DURING WHICH THE TEMPERATURE OF THE AIR IN CONTACT WITH THE CONCRETE IS ABOVE 50F.

WHENEVER FORMWORK IS REMOVED DURING CURING PERIOD, CONTINUE CURING OF BOTH UNEXPOSED AND EXPOSED CONCRETE AS SPECIFIED IN SUBSECTION "CURING AND PROTECTION."

03300.11 REPAIR OF SURFACE DEFECTS

A. GENERAL

PATCH ALL TIE HOLES AND REPAIR ALL HONEYCOMBED AND DEFECTIVE AREAS IMMEDIATELY AFTER FORM REMOVAL.

FOR SURFACES OTHER THAN THOSE TO BE BACKFILLED AGAINST, USE PATCHING MORTAR.

FOR SURFACES TO BE BACKFILLED AGAINST, USE MASTIC DAMPPROOFING COMPOUND, EXCEPT THAT WHERE REINFORCING IS EXPOSED, USE PATCHING MORTAR.

REMOVE ALL HONEYCOMBED AND DEFECTIVE CONCRETE DOWN TO SOUND CONCRETE PRIOR TO PATCHING. THOROUGHLY CLEAN TIE HOLES OF DIRT AND DEBRIS.

B. PATCHING MORTAR

CUT EDGES OF HONEYCOMBED AND DEFECTIVE CONCRETE TO FORM DOVETAIL (UNDERCUT) JOINTS. NO FEATHEREDGES WILL BE PERMITTED.

PATCH WITH CEMENT MORTAR AS SPECIFIED IN ACI 301, OR WITH PROPRIETARY PATCHING COMPOUNDS, EXCEPT THAT PROPRIETARY PATCHING MIXTURES MAY NOT BE USED ON EXPOSED SURFACES.

ACCEPTABLE PROPRIETARY PATCHING MIXTURES ARE:

L&M CONSTRUCTION CHEMICALS - EVERBOND
EUCLID CHEMICAL CORPORATION - POLY PATCH
SIKA - SIKASET MORTAR
OR APPROVED EQUAL

C. MASTIC DAMPPROOFING COMPOUND

PATCH FULL DEPTH OF HOLE, FLUSH WITH SURFACE, WITH EMULSIFIED ASPHALT MASTIC HEAVY VISCOSITY FOR TROWEL APPLICATION. PREPARE AND PLACE IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. ACCEPTABLE PRODUCTS ARE:

W. R. MEADOWS - SEALMASTIC TROWEL MASTIC
EUCLID CHEMICAL COMPANY - DAMPPROOFING ASPHALT COATINGS
SONNEBORN - HYDROCIDE 700 MASTIC
OR APPROVED EQUAL

03300.12 FINISHING OF FORMED SURFACES - GENERAL

AFTER REMOVAL OF FORMS, GIVE SURFACES OF CONCRETE THE FOLLOWING FINISHES AS SPECIFIED IN ACI 301.

SURFACE	FINISH
UNEXPOSED	ROUGH FORM
EXPOSED TO PUBLIC VIEW	SMOOTH RUBBED

03300.13 CURING AND PROTECTION

A. GENERAL

CURE PAVEMENT FOR THE FIRST 72 HOURS BY THE USE OF FOG SPRAYING, SPRINKLING OR CONTINUOUSLY WET ABSORPTIVE MATS OR FABRIC. CONTINUE CURING BY USE OF MOISTURE RETAINING COVER UNTIL CONCRETE HAS OBTAINED ITS SPECIFIED 28 DAY COMPRESSIVE STRENGTH.

FOR ALL CAST-IN-PLACE CONCRETE, CONCRETE FORMWORK IS TO BE MAINTAINED IN A MOIST CONDITION UNTIL RESULTS OF COMPRESSIVE STRENGTH TESTS ARE OBTAINED AND ARE SATISFACTORY. ALL FORMED SURFACES MUST BE PROTECTED AGAINST LOSS OF MOISTURE FOR A MINIMUM OF 7 DAYS FOLLOWING THE PLACING OF THE CONCRETE BY USE OF A WATER SPRAY, WATER SATURATED FABRIC OR LIQUID MEMBRANE CURING COMPOUND. MAINTAIN FORMS AND CONCRETE IN MOIST CONDITION UNTIL 28 DAY COMPRESSIVE STRENGTH IS OBTAINED.

B. MATERIALS

WHERE MOISTURE RETAINING MEMBRANES ARE USED FOR CURING, PROVIDE ONLY MATERIALS CONFORMING TO THE FOLLOWING REQUIREMENTS:

POLYETHYLENE FILM - ASTM C 171, TYPE II
WATERPROOF PAPER - ASTM C 171, TYPE I
ABSORPTIVE COVER - AASHTO M 182, CLASS 3, BURLAP CLOTH MADE FROM JUTE OR KENAF OR ASTM C 440 COTTON MATS

DO NOT USE MOISTURE RETAINING CURING COMPOUNDS FOR CURING SURFACES TO RECEIVE THE FOLLOWING COVERINGS, UNLESS IT HAS BEEN DEMONSTRATED THAT SUCH COMPOUNDS WILL NOT PREVENT BOND OF:

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY GROUT OR BONDING MATERIAL
EPOXY COATINGS

C. TEMPERATURE, WIND AND HUMIDITY

DO NOT PERMIT CONCRETE NOT FULLY CURED TO BE EXPOSED TO EXCESSIVE TEMPERATURE CHANGES, OR HIGH WINDS.

03300.14 VAPOR BARRIER

APPLY ON SUBGRADE ON SCABBLED SURFACE OF EXISTING CONCRETE PADS, A VAPOR BARRIER CONSISTING OF HIGH DENSITY POLYETHYLENE FILM NOT THINNER THAN 12 MILS, CONFORMING TO ASTM D 2103 AND MEETING WATER RETENTION REQUIREMENTS OF ASTM C 171.

PROVIDE FILM IN WIDTH AND LENGTH NOT LESS THAN 1 FOOT LARGER THAN DIMENSIONS OF SCABBLED SURFACE UNLESS PATENTLY IMPRACTICABLE. WHERE JOINTS ARE NECESSARY, LAP EDGES NOT LESS THAN 4 INCHES. TAKE CARE TO AVOID PUNCTURING FILM. TAPESEAL ALL SEAMS, JOINTS, TEARS, CUTS AND HOLES. COVER VAPOR BARRIER WITH 3 INCHES OF COMPACTED PEA GRAVEL FOR SUBGRADE INSTALLATION.

03300.15 CHEMICAL RESISTANT COATING - TRENCHES AND SUMPS

COAT THE ENTIRE INTERIOR SURFACE OF NEW TRENCHES AND SUMPS AND EXISTING INLETS WITH EPOXY FLOOR COATING AS SPECIFIED IN SECTION 09702.

03300.16 RENOVATION OF CONCRETE PAD

A. REMOVING CONCRETE SURFACE

SCABBLE OR MECHANICALLY ABRADE ENTIRE SURFACE OF EXISTING CONCRETE PAD TO REMOVE A MINIMUM OF 1/4 INCH OF SURFACE INCLUDING ALL LOOSE CONCRETE, LAITANCE, DIRT, GREASE, EXISTING COATINGS AND OTHER CONTAMINATING MATERIALS. EQUIPMENT TO BE FITTED WITH DUST COLLECTORS AND MEPA/HEPA FILTERS.

B. RESURFACING CONCRETE

AFTER REMOVING EXISTING SURFACE, PRIME THE EXISTING CONCRETE AND RESURFACE AREAS ROUGH IN TEXTURE OR WITH ABRUBT CHANGE IN SURFACE WITH SUITABLE LATEX CONCRETE. PROVIDE TROWELED FINISH MEETING SLOPES AND ELEVATIONS OF ADJACENT, CONTIGUOUS SURFACES.

03300.17 RENOVATION OF JOINTS AND CRACKS IN EXISTING SLABS

AFTER THE SURFACE(S) OF THE EXISTING PADS HAVE BEEN REMOVED AS SPECIFIED HEREINBEFORE, AND BEFORE ANY RESURFACING WORK BEGINS, THE OPERATING CONTRACTOR WILL RADIOLOGICALLY SURVEY ALL EXISTING JOINTS AND CRACKS TO DETERMINE LEVELS OF CONTAMINATION, IF ANY, IN SUCH JOINTS AND CRACKS.

ANY JOINTS OR CRACKS DETERMINED TO BE CONTAMINATED ARE TO BE CUT OUT AND REPLACED IN ACCORDANCE WITH THE DETAILS OR THE DRAWINGS, USING MATERIALS SPECIFIED HEREINBEFORE IN THIS SECTION.

THE SUBCONTRACTOR IS TO INCLUDE IN HIS BID ALL REQUIRED COSTS FOR THE RENOVATION OF ____ LINEAL FEET OF CONTAMINATED JOINTS AND CRACKS, INCLUDING THE TIME ALLOWANCE FOR THE OPERATING CONTRACTOR'S RADIOLOGICAL SURVEY OF SUCH JOINTS AND CRACKS.

03300.18 EMBEDDED ITEMS

PRIOR TO CONCRETING, PLACE EMBEDDED ITEMS TO BE PROVIDED UNDER THIS SECTION OR TO BE FURNISHED UNDER OTHER SECTIONS FOR INSTALLATION UNDER THIS SECTION.

GIVE ALL SUBCONTRACTORS WHOSE WORK IS RELATED TO THE CONCRETE OR MUST BE SUPPORTED BY IT, AMPLE NOTICE AND OPPORTUNITY TO INTRODUCE AND/OR FURNISH EMBEDDED ITEMS BEFORE THE CONCRETE IS PLACED.

SET ANCHOR BOLTS FOR STRUCTURE (PHASE D) IN ACCORDANCE WITH SETTING DRAWINGS OR TEMPLATES WHICH HAVE BEEN REVIEWED AND FOUND SATISFACTORY.

WHERE HOLES IN CONCRETE FOR SUCH PURPOSES AS PASSAGEWAYS FOR PIPES AND THE LIKE ARE SHOWN FORMED BY SLEEVES, THE SUBCONTRACTOR MAY, AT HIS OPTION, PROVIDE SUCH HOLES BY DRILLING WITH ACCEPTABLE DIAMOND OR TUNGSTEN CARBIDE TIPPED DRILL BITS.

03300.19 TESTING

A. GENERAL

THE CONSTRUCTION MANAGER WILL MAKE ARRANGEMENTS WITH AND PAY FOR SERVICES OF TESTING AGENCY FOR OBTAINING TEST SPECIMENS AND PERFORMING ROUTINE TESTING OF MATERIALS OF PROPOSED MIX DESIGNS AND OF RESULTING CONCRETE FOR COMPLIANCE WITH TECHNICAL REQUIREMENTS OF SPECIFICATIONS.

TESTING OF FIELD-CURED TEST CYLINDERS, OR TESTING REQUIRED BECAUSE OF CHANGES REQUESTED BY SUBCONTRACTOR IN MATERIALS OR PROPORTIONS OF THE MIX, AS WELL AS ANY EXTRA TESTING OF CONCRETE OR MATERIALS OCCASIONED BY FAILURE TO MEET SPECIFICATION REQUIREMENTS, TO BE AT SUBCONTRACTOR'S EXPENSE.

FAILURE OF THE TESTING LABORATORY TO DETECT ANY DEFECTIVE WORK OR MATERIALS IS NOT IN ANY WAY TO PREVENT LATER REJECTION WHEN SUCH DEFECT IS DISCOVERED, NOR IS IT TO OBLIGATE THE CONSTRUCTION MANAGER FOR FINAL ACCEPTANCE.

THE TESTING AGENCY AND/OR ITS REPRESENTATIVES ARE NOT AUTHORIZED TO REVOKE, ALTER, RELAX, ENLARGE OR RELEASE ANY REQUIREMENT OF THE SPECIFICATIONS, NOR TO APPROVE OR ACCEPT ANY PORTION OF THE WORK, NOR TO ACT AS SUPERVISOR OR PERFORM OTHER DUTIES FOR SUBCONTRACTOR.

B. SERVICES PROVIDED BY THE TESTING AGENCY

FIELD SAMPLING - SECURE FROM DIFFERENT BATCHES, ON A TRULY RANDOM BASIS, COMPOSITE SAMPLES FOR ALL FIELD TESTING REQUIRED BELOW IN ACCORDANCE WITH ASTM C 172 WHERE APPLICABLE. TAKE ALL SAMPLES AT DISCHARGE END OF CONVEYING SYSTEM. CLEARLY MARK EACH TEST SPECIMEN MASTER AS TO EXACT PART OF THE STRUCTURE REPRESENTED, CLASS OF CONCRETE, CURING CONDITIONS, TEMPERATURE OF CONCRETE, AND TIME AND DATE OF SAMPLE.

COMPRESSIVE STRENGTH TEST - MOLD AND CURE TEST CYLINDERS IN ACCORDANCE WITH ASTM C 31 AND TEST EACH CYLINDER FOR STRENGTH IN ACCORDANCE WITH ASTM C 39. TAKE ONE "TEST SET" CONSISTING OF THREE CYLINDERS FOR EACH DAY'S POUR OF 50 CUBIC YARDS OR LESS, AND ONE ADDITIONAL TEST SET FOR EVERY 50 CUBIC YARDS, OR PART THEREOF, THEREAFTER. TEST ONE CYLINDER AT 7 DAYS AND TWO AT 28 DAYS.

SLUMP TESTS - DETERMINE SLUMP RANGE FOR EACH "TEST SET" IN CONFORMANCE WITH ASTM C 143. PERFORM ADDITIONAL SLUMP TESTS WHEN DIRECTED BY THE CONSTRUCTION MANAGER.

AIR CONTENT TEST - DETERMINE AIR CONTENT FOR EACH "TEST SET" FOR AIR-ENTRAINED CONCRETE IN ACCORDANCE WITH ASTM C 231.

SUBMIT ONE COPY OF THE RESULTS OF EACH OF THE ABOVE TESTS AND INSPECTIONS TO THE SUBCONTRACTOR AND THE CONSTRUCTION MANAGER REPRESENTATIVE.

SHOULD ANY OF THE TEST RESULTS FAIL TO MEET THE REQUIREMENTS SPECIFIED, MAKE AN IMMEDIATE TELEPHONE REPORT TO THE SUBCONTRACTOR AND THE CONSTRUCTION MANAGER.

FURNISH EVALUATION REPORTS OF COMPRESSION TESTS AS RECOMMENDED BY ACI 214 WHEN ANY COMPRESSION TEST FAILS TO MEET THE SPECIFIED STRENGTH.

03300.20 ACCEPTANCE OF CONCRETE WORK

A. GENERAL

ACCEPTANCE OF CONCRETE WORK WILL BE MADE IN CONFORMANCE WITH ACI 301, EXCEPT THAT SUBCONTRACTOR MUST PAY ALL COSTS INCURRED FOR PROVIDING ANY ADDITIONAL TESTING OR ANALYSIS REQUIRED WHEN STRENGTH OF STRUCTURE IS CONSIDERED POTENTIALLY DEFICIENT.

B. CRACKS

THE SUBCONTRACTOR WILL BE REQUIRED TO RESTORE, WITHOUT ADDITIONAL CONTRACT COST, ANY CONCRETE OR SURFACING WHICH DEVELOPS CRACKS WITHIN A PERIOD OF ONE YEAR AFTER PLACEMENT WHICH HAS NOT BEEN CAUSED BY ACTION OF OTHERS IN OVERSTRESSING THE CONCRETE.

REPAIR THE CRACKS BY MEANS THAT WILL RESTORE THE CRACKED AREA TO THE DESIGNED INTEGRITY AND APPEARANCE AND WHICH WILL NOT IMPAIR THE APPEARANCE OF THE AFFECTED SURFACES, IF EXPOSED. SUCH REPAIRS MUST BE PERFORMED BY AN ORGANIZATION HAVING SATISFACTORILY DEMONSTRATED ABILITY IN THE TECHNIQUES NECESSARY TO EFFECT SUCH REPAIRS. REPAIR WORK TO INCLUDE REPAIRS TO ALL COATINGS, TOPPINGS OR WEARING SURFACES.

DIVISION 5

05500 - MISCELLANEOUS METAL AND METAL ROOF DECK

05500.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE MISCELLANEOUS METALWORK, INCLUDING:

ANCHORAGE ITEMS, HANGERS AND SUPPORTS
REMOVE AND REINSTALL SALVAGED PASS DOORS AND FRAME ON TOP OF RAISED CONCRETE STOOP
WALL OPENING FRAMING, EXCEPT AS SPECIFIED IN MECHANICAL DIVISIONS
TRENCH GRATING

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

FINISH PAINT, EXCEPT AS SPECIFIED

05500.02 SUBMITTALS

A. SHOP DRAWINGS

COORDINATE MISCELLANEOUS METALWORK WITH WORK OF GENERAL CONSTRUCTION, MECHANICAL AND ELECTRICAL TRADES PRIOR TO SUBMISSION OF COMPLETE SHOP DRAWINGS FOR REVIEW.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

B. FIELD MEASUREMENTS

TAKE FIELD MEASUREMENTS AT JOBSITE TO VERIFY SHOP DRAWINGS. SUBMIT WRITTEN NOTIFICATION OF DISCREPANCIES BETWEEN FIELD CONDITIONS, SHOP DRAWINGS AND OTHER CONTRACT DOCUMENTS, TO CONSTRUCTION MANAGER.

05500.03 APPLICABLE STANDARDS

PROVIDE MATERIALS AND PERFORM WORK IN ACCORDANCE WITH APPLICABLE PROVISIONS OF LATEST EDITION OF FOLLOWING PUBLICATIONS.

A. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS AND THE COMMENTARY ON THAT SPECIFICATION (AISC SPECIFICATION)

CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES (AISC)
SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A 325 OR A 490 BOLTS (AISC JOINT SPECIFICATION)

B. AMERICAN WELDING SOCIETY (AWS)

STRUCTURAL WELDING CODE (AWS D1.1), LATEST EDITION, INCLUDING SUPPLEMENTS.

AN FMPC WELDING PERMIT IS REQUIRED PRIOR TO ANY FLAME CUTTING OR WELDING.

C. STEEL STRUCTURES PAINTING COUNCIL (SSPC)

STEEL STRUCTURES PAINTING MANUAL

05500.04 FABRICATION, DELIVERY AND ERECTION

A. GENERAL

FABRICATE AND ERECT ACCORDING TO AISC CODE OF GENERAL PRACTICE. FIT WORK TOGETHER AT SHOP AS FAR AS POSSIBLE AND DELIVER TO JOB COMPLETE AND READY FOR ERECTION. CLOSELY FIT, JOIN AND REINFORCE WORK IN WORKMANLIKE MANNER. PROVISIONS FOR SECURELY ANCHORING MISCELLANEOUS METALWORK. FABRICATE TO MEET REQUIREMENTS OF WORK UNDER OTHER SECTIONS OR SPECIFICATIONS AND SECURED TO MISCELLANEOUS METALWORK. DRILL OR PUNCH HOLES IN SHOP FOR BOLTED FIELD CONNECTIONS.

PROVIDE PROTECTION, PLANKING, COVERING, ETC., REQUIRED BY LAWS HAVING JURISDICTION. AT COMPLETION, REMOVE EQUIPMENT PROMPTLY.

PROVIDE RIVETED, WELDED AND HIGH STRENGTH BOLTED CONNECTIONS AS REQUIRED.

B. FABRICATION

INSOFAR AS POSSIBLE, FIT AND SHOP ASSEMBLE ALL WORK. EXECUTE WORK IN STRICT ACCORDANCE WITH CONTRACT DOCUMENTS. WELDING TO BE DONE BY CERTIFIED WELDERS WITH EXPOSED JOINTS DRESSED FLUSH AND SMOOTH.

C. DELIVERY

PROVIDE WORK IN AMPLE TIME TO PREVENT DELAYS IN JOB PROGRESS. DELIVER ITEMS TO JOBSITE AT SUCH TIME AS REQUIRED FOR PROPER COORDINATION.

D. STORAGE

STACK AND SUPPORT MATERIALS WITH BLOCKING. STORE MATERIALS IN DRY AND CLEAN AREA AND REMOVE EARTH, GREASE AND OTHER FOREIGN MATTER FROM METAL SURFACES BEFORE ERECTING.

E. SHOP PAINTING

UNLESS OTHERWISE SPECIFIED, PAINT SURFACES OF MISCELLANEOUS METALWORK WITH ONE SHOP COAT OF METAL PROTECTIVE PRIMER. PREPARE SURFACES IN ACCORDANCE WITH STANDARDS OF STEEL STRUCTURES PAINTING COUNCIL SPECIFICATION SP-3 FOR POWER TOOL CLEANING, AND APPLY PAINT IN ACCORDANCE WITH SPECIFICATION PA-1, PAINT APPLICATION SPECIFICATIONS. DO NOT PAINT CONTACT SURFACES OF MEMBERS TO BE FIELD CONNECTED BY WELDS OR HIGH TENSILE BOLTS.

APPLY TWO COATS OF PRIMER TO SURFACES WHICH ARE INACCESSIBLE AFTER ASSEMBLY OR ERECTION.

APPLY PRIMER TO PROVIDE MINIMUM 2 MIL DRY THICKNESS PER COAT AT ALL POINTS.

PREPARE SURFACES AND PAINT ABRADED OR DAMAGED PAINT SURFACES OF STEEL, WELDS, AND HEADS AND NUTS OF FIELD BOLTS AFTER ERECTION WITH SAME SURFACE PREPARATION AND PAINT SPECIFIED FOR SHOP PAINTING.

PAINT AS MANUFACTURED BY:

SHERWIN-WILLIAMS - KEM KROMIK
PORTER PAINT CO. - NO. 298 GRAY PRIMER
PRATT & LAMBERT - NO. C-107 GRAY PRIMER, OR EQUAL

F. ERECTION

WHERE DISSIMILAR METALS ARE IN CONTACT, PROTECT DISSIMILAR SURFACES WITH HEAVY COAT OF BITUMINOUS PAINT, CONFORMING TO FEDERAL SPECIFICATION TT-V-51F, TO PREVENT GALVANIC OR CORROSIVE ACTION.

PROVIDE AND SET HANGERS, RODS, BARS, PLATES, BOLTS, BUTTS, SCREWS, ANCHORS, BRACKETS, RIVETS, WELDS, LUGS, ETC., AS MAY BE REQUIRED TO COMPLETE THIS WORK AND TO JOIN WORK OF OTHERS. WHEN EXPOSED, PROVIDE MATERIALS AND FINISHES IDENTICAL TO ADJACENT WORK.

PROVIDE BRACING, BLOCKING, CUTTING, FITTING, DRILLING, TAPPING, LEADING, ETC., AS REQUIRED TO COMPLETE THIS WORK AND JOIN TO WORK OF OTHERS.

ERECT WORK SQUARE, PLUMB, STRAIGHT AND TRUE, ACCURATELY FITTED WITH TIGHT JOINTS AND INTERSECTIONS ADEQUATELY REINFORCED AND ANCHORED IN PLACE. FINISH EXPOSED WORK TO BE SMOOTH WITH EVEN, CLOSE JOINTS AND NEAT CONNECTIONS.

G. WELDING

PERFORM WELDING IN ACCORDANCE WITH AWS D1.1.

05500.05 MATERIALS - GENERAL

A. MACHINE SCREWS

FEDERAL SPECIFICATION FF-S-92.

B. STEEL PIPE

ASTM A 53, TYPE E OR S, GRADE A. STANDARD WEIGHT (SCHEDULE 40).

C. STRUCTURAL STEEL SHAPES, PLATES AND BARS

ASTM A 36, UNLESS OTHERWISE INDICATED.

D. WELDING RODS

GAS WELDING RODS AND ARC WELDING ELECTRODES MUST MEET REQUIREMENTS OF AWS SPECIFICATIONS FOR IRON AND STEEL ARC WELDING ELECTRODES.

05500.06 ANCHORAGE AND SUPPORT ITEMS

A. BOLTS

PROVIDE MACHINE BOLTS, NUTS AND WASHERS AS REQUIRED. BOLTS LESS THAN 3/4 INCH DIAMETER TO COMPLY WITH ASTM A 307, GRADE A, OR EQUAL, AS CERTIFIED BY SUBCONTRACTOR.

FOR BOLTS 3/4 INCH DIAMETER AND LARGER PROVIDE HIGH STRENGTH BOLTS, HEX HEADS AND WASHERS AS REQUIRED AND TO COMPLY WITH ASTM A 325.

B. ACCESSORIES

PROVIDE RODS, ANCHORS, BOLTS, WELDING MATERIALS AND SIMILAR ITEMS REQUIRED TO COMPLETE INSTALLATION AS REQUIRED.

05500.07 TRENCH GRATING

NEENAH R-4990 HEAVY DUTY DUCTILE IRON, CLASS A, TRENCH GRATING, OR EQUAL, 1-1/2 INCHES THICK. COVER: GRATED TYPE A. FRAME: TYPE X.

AT EACH SUMP PROVIDE SAME GATING 2 INCHES THICK.

05500.08 MISCELLANEOUS STRUCTURAL STEEL, SUPPORTS AND FRAMES

PROVIDE MISCELLANEOUS STEEL, SUCH AS CONCRETE FILLED STANDARD WEIGHT PIPE BOLLARDS, PLATES, ANGLES, CHANNELS, CLIPS, BOLTS, LINTELS, ANGLE FRAMING, AND STRUCTURAL FRAMING AT FORMER CONVEYOR OPENINGS, AND AS REQUIRED TO COMPLETE WORK, AND NOT PROVIDED UNDER MECHANICAL OR ELECTRICAL SECTIONS.

DIVISION 7

07420 - SIDING ALTERATIONS

07420.01 GENERAL

A. SCOPE OF WORK

PROVIDE NONASBESTOS COMPONENTS TO COMPLEMENT EXISTING INSULATED CEMENT ASBESTOS SIDING, INCLUDING INSULATION, CLOSURES AND METAL FLASHINGS AS REQUIRED TO ENSURE WEATHERTIGHT AND AIRTIGHT CONDITIONS AT EXISTING PASS DOOR TO BE RAISED, AND AT PLANT 1 AFTER REMOVAL OF CONVEYOR.

B. RELATED WORK NOT SPECIFIED IN THIS SECTION

FIELD PAINTING
STRUCTURAL STEEL
REMOVAL OF EXISTING CONVEYOR CONSTRUCTION

C. SUBMITTALS

SUBMIT COMPLETE SHOP DRAWINGS FOR REVIEW, SHOWING ALL DETAILS OF FASTENING, SIDING AND FLASHING.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

D. JOB CONDITIONS

INSPECT ALL FRAMING MEMBERS AND OTHER MATERIALS TO WHICH NEW ROOFING OR SIDING IS APPLIED AND REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK. STARTING OF WORK OR ABSENCE OF NOTIFICATION CONSTITUTES ACCEPTANCE OF FRAMING MEMBERS AND OTHER MATERIALS BY THE INSTALLER. MAKE ANY REPLACEMENT TO CORRECT DEFECTS WITHOUT COST TO THE OPERATING CONTRACTOR.

E. FLASHING MATERIALS

PROVIDE MINIMUM 22 GAGE ALUMINUM FLASHING WHERE REQUIRED.

WHERE ALUMINUM FLASHING MATERIALS COME IN CONTACT WITH DISSIMILAR METALS, OR WITH MASONRY OR CONCRETE, PROVIDE A HEAVY COAT OF BITUMINOUS PAINT OR OTHER COATING RECOMMENDED BY THE MANUFACTURER BETWEEN THE ALUMINUM AND THE DISSIMILAR METAL OR MATERIAL.

F. STORAGE AND PROTECTION

STORE MATERIAL IN A SUITABLE LOCATION AT THE SITE, IN A MANNER RECOMMENDED BY THE MANUFACTURER. PROTECT FROM WEATHER AND ANY OTHER DAMAGE. BENT, STAINED OR DAMAGED PANELS MUST BE REPLACED.

07420.02 ERECTION

PERFORM SIDING RENOVATION IN STRICT ACCORDANCE WITH SHOP DRAWINGS AND MANUFACTURER'S INSTRUCTIONS.

PLACE SIDING AND FLASHING TIGHTLY AGAINST STEEL SUPPORTS AND SECURE TO EACH SUPPORT WITH CLIPS AND SELF-TAPPING SCREWS, BY METHODS RECOMMENDED BY THE MANUFACTURER FOR THE TYPE OF INSTALLATION.

PROVIDE RIBBED NEOPRENE CLOSURES WHERE REQUIRED.

CALK ALL JOINTS WITH POLYURETHANE CALKING COMPOUND.

REPAIR EXISTING INSULATION WITH NONASBESTOS MATERIALS RECOMMENDED BY MANUFACTURER, COMPLEMENTARY WITH THE EXISTING CONSTRUCTION.

INSTALL METAL FLASHINGS WITH STAINLESS STEEL SCREWS SPACED MAXIMUM 12 INCHES ON CENTERS.

COORDINATE WITH OTHER TRADES INVOLVED.

07420.03 CLEANING

AFTER ERECTION, CLEAN ALL SURFACES AND LEAVE ALL WORK FREE OF GRIME AND DIRT.

DIVISION 9

09701 - POLYURETHANE ELASTOMER/WEARING SURFACE

09701.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES AND DO ALL WORK NECESSARY TO PROVIDE COMPLETE EXTERIOR POLYURETHANE ELASTOMER/WEARING SURFACE WORK.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

CONCRETE
JOINT SEALANTS
EPOXY FLOOR COATING
EPOXY COATING
FINISH PAINTING

09701.02 SUBMITTALS

A. GENERAL

SUBMIT LIST OF SIMILAR EXTERIOR POLYURETHANE ELASTOMER/WEARING SURFACE INSTALLATIONS DEMONSTRATING SUCCESSFUL USAGE AND DURABILITY.

SUBMIT MANUFACTURER'S SPECIFICATIONS, MSDS DATA SHEETS, AND SPECIFIC APPLICATION INSTRUCTIONS FOR WORK UNDER THIS SECTION.

MANUFACTURER'S SPECIFICATIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

ULTIMATE DIRECT TENSILE STRENGTH
TENSILE YOUNG'S MODULUS OF ELASTICITY
FLEXURAL YOUNG'S MODULUS OF ELASTICITY
ULTIMATE COMPRESSIVE STRENGTH
MOISTURE ABSORPTION
TEMPERATURE RESISTANCE, MAXIMUM ALLOWABLE TEMPERATURE, CONTINUOUS AND INTERMITTENT
ASTM D 696 TEST DATA VERIFYING COEFFICIENT OF THERMAL EXPANSION
CHEMICAL RESISTANCE TABLES

APPLICATION INSTRUCTIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE PREPARATION
DETAILED APPLICATION PROCEDURES
MINIMUM AND MAXIMUM APPLICATION LIMITS OF HUMIDITY AND TEMPERATURES

CURING TIMES REQUIRED FOR EACH COMPONENT
MAXIMUM PERMISSIBLE MOISTURE CONTENT OF CONCRETE SLAB PRIOR TO APPLICATION

SUBMIT THE NAME OF MANUFACTURER'S REPRESENTATIVE WHO WILL BE RESPONSIBLE FOR INSPECTION OF AREAS TO RECEIVE THE POLYURETHANE ELASTOMER/WEARING SURFACE AND FOR CERTIFICATION THAT CONCRETE BASE SLAB MOISTURE CONTENT IS BELOW THE MANUFACTURER'S MAXIMUM PERMISSIBLE MOISTURE CONTENT.

B. SAMPLES

SUBMIT TWO 12 INCH BY 12 INCH SAMPLE PANELS OF MATERIAL SPECIFIED, WITH TEXTURE TO SIMULATE ACTUAL CONDITIONS, INCLUDING ABRASIVE AGGREGATE.

ALL FINISHED WORK MUST CONFORM TO ACCEPTED SAMPLES.

C. ADDITIONAL REQUIREMENTS

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

09701.03 DELIVERY AND STORAGE

DELIVER MATERIALS TO THE JOBSITE IN ORIGINAL, NEW AND UNOPENED PACKAGES AND WITH CONTAINERS BEARING MANUFACTURER'S NAME AND LABEL.

PROVIDE LABELS ON EACH CONTAINER INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING INFORMATION.

NAME OR TITLE OF MATERIAL
MANUFACTURER'S STOCK NUMBER
MANUFACTURER'S NAME
CONTENTS BY VOLUME, FOR MAJOR ELEMENTS
BATCHING DATE
BATCHING NUMBER
APPLICATION INSTRUCTIONS
COLOR

STORE MATERIALS USED ON JOB IN A SINGLE AREA PROTECTED FROM WEATHER. KEEP STORAGE AREA NEAT AND CLEAN. PROTECT FLOOR AND OTHER SURFACES WITH DROP CLOTHS OR BUILDING PAPER. TAKE NECESSARY PRECAUTIONS TO PREVENT FIRE. COMPLY WITH OSHA REQUIREMENTS FOR AMBIENT AIR CONDITIONS.

09701.04 HEAT AND RELATIVE HUMIDITY

BEFORE, DURING AND AFTER FLOOR INSTALLATION, INSURE THAT AMBIENT TEMPERATURE AND RELATIVE HUMIDITY WILL BE AT VALUES REQUIRED BY THE MANUFACTURER FOR PROPER INSTALLATION.

SUBCONTRACTOR INSTALLING POLYURETHANE ELASTOMER/WEARING SURFACE UNDER THIS SECTION IS RESPONSIBLE FOR PROVIDING ANY ADDITIONAL PROTECTION REQUIRED FOR PROPER INSTALLATION AND MUST PROVIDE ALL REQUIRED FACILITIES TO INSURE INSTALLATION DURING PERIODS OF REQUIRED RELATIVE HUMIDITY CONDITIONS.

09701.05 MATERIALS, PRODUCTS AND MANUFACTURERS

PROVIDE A HEAVY DUTY CHEMICAL AND ABRASION RESISTANT NON-SKID SURFACE CONSISTING OF THE FOLLOWING:

A. TWO COATS OF POLYURETHANE ELASTOMER AS MANUFACTURED BY NEOGARD, URETHANE PLASTICS, GENERAL POLYMERS, PETERSON CHEMICAL, OR AMERICAN COLLOID CO., EACH COAT A MINIMUM OF 25 MILS DRY.

B. THIRD COAT OF POLYURETHANE ELASTOMER, FINISHED THICKNESS A MINIMUM OF 10 MILS DRY. WHILE STILL WET, BROADCAST 20-24 GRIT ALUMINUM OXIDE OR EQUIVALENT HARD AGGREGATE OVER THE SURFACE IN EXCESS. AFTER HARDENING, SWEEP OFF EXCESS AGGREGATE.

C. SEMI-FLEXIBLE, LOW MODULUS EPOXY (100% SOLID) HAVING A MINIMUM TENSILE ELONGATION OF 15%, AT A SPREAD RATE OF 70-80 SQ. FT./GAL. (APPROXIMATELY 20 MILS). WHILE STILL WET, BROADCAST 20-24 GRIT ALUMINUM OXIDE OR EQUIVALENT HARD AGGREGATE OVER THE SURFACE IN EXCESS. AFTER HARDENING, SWEEP OFF EXCESS AGGREGATE.

   ACCEPTABLE SUPPLIERS ARE AMERICAN COLLOID CO., EUCLID CHEMICAL, GENERAL POLYMERS, SIKA CHEMICALS OR ADHESIVE ENGINEERING.

D. AFTER PROPER CURING, SEAL NON-SKID SURFACE WITH TWO COATS OF CHEMICAL RESISTANT, ALIPHATIC POLYURETHANE COATING. THICKNESS OF EACH APPLIED COAT TO BE A MINIMUM OF 3 MILS DRY. SUPPLIERS OF ACCEPTABLE MATERIALS INCLUDE AMERICAN COLLOID CO., ADVANCE CHEMICAL, GENERAL POLYMERS, LORD CHEMICAL, OR TENNENT COMPANY.

09701.06 JOB CONDITIONS AND STANDARDS

SUBCONTRACTOR, POLYURETHANE ELASTOMER/WEARING SURFACE INSTALLER AND MATERIAL MANUFACTURER'S REPRESENTATIVE TO JOINTLY INSPECT AREAS TO BE COVERED, IN THE PRESENCE OF THE CONSTRUCTION MANAGER'S REPRESENTATIVE. INSPECTION TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE QUALITY AND REQUIRED SLOPE OF CONCRETE BASE SLABS
CONCRETE BASE SLAB CONSTRUCTION DETAILS, INCLUDING RAMPS AND CURBS
CONCRETE BASE SLAB JOINT LAYOUT
CONCRETE BASE SLAB SUBGRADE AND VAPOR RETARDER MEMBRANE
CALKING OF ALL FLOOR JOINTS

SUBCONTRACTOR, INSTALLER AND MATERIAL MANUFACTURER ARE TO REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK TO THE CONSTRUCTION MANAGER'S REPRESENTATIVE.

DO NOT PROCEED WITH THIS WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED AND ALL CONDITIONS ARE CERTIFIED AS ACCEPTABLE BY THE SUBCONTRACTOR, INSTALLER AND MATERIAL MANUFACTURER.

STARTING OF WORK CONSTITUTES ACCEPTANCE OF SURFACES BY THE SUBCONTRACTOR, INSTALLER AND MATERIAL MANUFACTURER AND ANY REPLACEMENT REQUIRED TO CORRECT DEFECTS IS TO BE MADE AT THE SUBCONTRACTOR'S EXPENSE.

09701.07 INSTALLATION

A. GENERAL

ALLOW NEW CONCRETE FLOORS TO CURE A MINIMUM OF 30 DAYS. REMOVE ALL SOLVENT, GREASE, OIL, DUST OR FOREIGN MATERIAL PRIOR TO APPLICATION OF POLYURETHANE ELASTOMER/WEARING SURFACE.

IF CLEANING OF BASE SLABS WITH COMMERCIAL CLEANERS IS REQUIRED, PERMIT SLABS TO DRY FOR AT LEAST 1 WEEK PRIOR TO MOISTURE TESTING AND SUBSEQUENT APPLICATION OF POLYURETHANE ELASTOMER/WEARING SURFACE.

B. SURFACE PREPARATION

SANDBLAST CONCRETE SLAB TO REMOVE GREASE, DIRT, DUST, LOOSE CONCRETE AND OTHER CONTAMINATING MATERIALS.

C. MOISTURE TESTING

BEFORE COMMENCING INSTALLATION OF POLYURETHANE ELASTOMER/WEARING SURFACE, SUBCONTRACTOR TO CERTIFY THAT CONCRETE BASE SLAB HAS DRIED OUT SUFFICIENTLY TO SATISFY SPECIFICATION REQUIREMENTS OF THE POLYURETHANE ELASTOMER/WEARING SURFACE MANUFACTURER.

SUBCONTRACTOR TO SUBMIT WRITTEN CERTIFICATION OF ACCEPTANCE OF BASE SLAB CONDITIONS, SIGNED BY THE SUBCONTRACTOR, THE INSTALLER AND MATERIAL MANUFACTURER'S REPRESENTATIVE. AFTER NOTIFICATION OF RECEIPT AND APPROVAL OF CERTIFICATION BY THE CONSTRUCTION MANAGER'S REPRESENTATIVE, INSTALLATION MAY BE STARTED.

D. JOINTS AND CRACKS

PROVIDE ELASTOMERIC CRACK BRIDGING MEMBRANE, 40 MILS THICK, MINIMUM 36 INCHES WIDE, SELF-BONDING, AS MANUFACTURED BY N.A.C. PRODUCTS, INC. OR EQUAL. JOINTS TO BE TREATED AND INSTALLED BELOW THE POLYURETHANE ELASTOMER/WEARING SURFACE IN ACCORDANCE WITH THE ECB MEMBRANE MANUFACTURER'S PRINTED INSTRUCTIONS.

E. CURING

CURE THE POLYURETHANE ELASTOMER/WEARING SURFACE IN ACCORDANCE WITH THE PRINTED RECOMMENDATIONS OF THE MANUFACTURER. DO NOT ALLOW TRAFFIC ON THE SURFACE BEFORE MANUFACTURER'S MINIMUM RECOMMENDED NUMBER OF HOURS.

F. CLEANUP AND PROTECTION

AT THE COMPLETION OF THE POLYURETHANE ELASTOMER/WEARING SURFACE WORK, CLEAN OFF ALL MISPLACED MATERIAL AND OTHER BLEMISHES CAUSED BY THE WORK FROM ALL FINISHED SURFACES AND RESTORE THEM TO THEIR ORIGINAL CONDITION.

ON A DAILY BASIS, REMOVE ALL DISCARDED MATERIALS, DEBRIS, CANS AND RAGS.

PROTECT WORK OF OTHER TRADES FROM DAMAGE. CORRECT ANY DAMAGES BY CLEANING, REPAIRING OR REPLACING AS DIRECTED.

09701.08 GUARANTEE

PROVIDE 2 YEAR WRITTEN GUARANTEE FOR ALL WORK PERFORMED UNDER THIS SECTION FROM DATE OF FINAL ACCEPTANCE.

UNDER THE GUARANTEE, THE SUBCONTRACTOR, THE INSTALLER AND THE MATERIAL MANUFACTURER MUST AGREE TO REPAIR OR REPLACE ANY OF THE POLYURETHANE ELASTOMER/WEARING SURFACE WHICH FAILS TO BE FREE FROM DEFECTS IN MATERIALS, ADHESION, WEARING QUALITY, AND WORKMANSHIP.

DIVISION 9

09702 - EPOXY FLOOR COATING

09702.01 GENERAL

A. WORK SPECIFIED IN THIS SECTION

PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES TO COMPLETE CHEMICAL RESISTANT EXTERIOR EPOXY FLOOR COATING WORK, COVERING ALL CONCRETE SURFACES OF CONCRETE TRENCHES AND SUMPS.

B. RELATED WORK SPECIFIED UNDER OTHER SECTIONS

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY COATING
PAINTING
CONCRETE

09702.02 SUBMITTALS

SUBMIT LIST OF SIMILAR EXTERIOR EPOXY FLOOR COATING INSTALLATIONS DEMONSTRATING SUCCESSFUL USAGE AND INSTALLATION.

SUBMIT MANUFACTURER'S SPECIFICATIONS, MSDS DATA SHEETS, AND SPECIFIC APPLICATION INSTRUCTIONS FOR WORK UNDER THIS SECTION.

MANUFACTURER'S SPECIFICATIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

- MOISTURE ABSORPTION
- TEMPERATURE RESISTANCE, MAXIMUM ALLOWABLE TEMPERATURE, CONTINUOUS AND INTERMITTENT
- CHEMICAL RESISTANCE TABLES

APPLICATION INSTRUCTIONS TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

- SURFACE PREPARATION
- DETAILED APPLICATION PROCEDURES
- MINIMUM AND MAXIMUM APPLICATION LIMITS OF HUMIDITY AND TEMPERATURES
- CURING TIMES REQUIRED FOR EACH COMPONENT
- MAXIMUM PERMISSIBLE MOISTURE CONTENT OF CONCRETE SLAB PRIOR TO APPLICATION

SUBMIT THE NAME OF MANUFACTURER'S REPRESENTATIVE WHO WILL BE RESPONSIBLE FOR INSPECTION OF AREAS TO RECEIVE THE EPOXY FLOOR COATING AND FOR CERTIFICATION THAT CONCRETE BASE MOISTURE CONTENT IS BELOW THE MANUFACTURER'S MAXIMUM PERMISSIBLE MOISTURE CONTENT.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

09702.03 HEAT AND RELATIVE HUMIDITY

BEFORE, DURING AND AFTER EPOXY FLOOR COATING INSTALLATION, INSURE THAT AMBIENT TEMPERATURE AND RELATIVE HUMIDITY WILL BE AT VALUES REQUIRED BY THE MANUFACTURER FOR PROPER INSTALLATION.

SUBCONTRACTOR INSTALLING EPOXY FLOOR COATING UNDER THIS SECTION IS RESPONSIBLE FOR PROVIDING ANY ADDITIONAL PROTECTION REQUIRED FOR PROPER INSTALLATION OF THE FLOOR COATING, AND ALL REQUIRED FACILITIES TO INSURE INSTALLATION DURING PERIOD OF REQUIRED RELATIVE HUMIDITY.

09702.04 MATERIALS

A. GENERAL

CURED EPOXY FLOOR COATING TO MEET THE FOLLOWING PHYSICAL PROPERTIES.

MOISTURE ABSORPTION	0.20 PERCENT, MAXIMUM
TEMPERATURE RESISTANCE	140F CONTINUOUS, 175F INTERMITTENT

B. EPOXY FLOOR COATING

TNEMEC HIBUILD EPOXILINE NO. 66 FLOORING SYSTEM, PORTER PAINT CO. MCR 4361/MCR 65, GENERAL POLYMER DE 3549/3543 OR EQUAL.

COLOR TO BE CLEAR OR GRAY.

C. PRIMER

PRIMER TO BE OF TYPE RECOMMENDED BY FLOOR COATING MANUFACTURER.

D. PATCHING COMPOUND

ACRYLIC POLYMER CONCRETE PATCHING COMPOUND RECOMMENDED BY EPOXY COATING MANUFACTURER.

E. CALKING

TWO-COMPONENT POLYURETHANE ELASTOMERIC BASE SEALANT CONFORMING TO FEDERAL SPECIFICATION TT-S-00227E, CLASS A, TYPE I (SELF-LEVELING).

F. JOINT BACKING

COMPRESSIBLE JOINT BACKING, NONSTAINING, NONABSORBENT, IN ROUND FORM. PROVIDE SIZE AS REQUIRED. USE CLOSED CELL POLYETHYLENE.

09702.05 JOB CONDITIONS AND STANDARDS

SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER TO JOINTLY INSPECT AREAS THAT RECEIVE EPOXY FLOOR COATING IN THE PRESENCE OF THE CONSTRUCTION MANAGER'S REPRESENTATIVE. INSPECTION TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, THE FOLLOWING:

SURFACE QUALITY OF CONCRETE TRENCH
CONCRETE JOINTS REQUIRING CALKING
CONCRETE SURFACE DEFICIENCIES REQUIRING PATCHING

SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER TO REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK TO THE CONSTRUCTION MANAGER'S REPRESENTATIVE.

DO NOT PROCEED WITH THIS WORK UNTIL UNSATISFACTORY CONDITIONS ARE CERTIFIED AS ACCEPTABLE BY THE SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER.

STARTING OF WORK CONSTITUTES ACCEPTANCE OF SURFACES BY THE SUBCONTRACTOR, EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER AND ANY REPLACEMENT REQUIRED TO CORRECT DEFECTS IS TO BE MADE AT THE SUBCONTRACTOR'S EXPENSE.

09702.06 INSTALLATION

A. GENERAL

REMOVE ALL SOLVENT, GREASE, OIL, DUST OR FOREIGN MATERIAL PRIOR TO APPLICATION OF EPOXY FLOOR COATING.

IF CLEANING OF CONCRETE TRENCH AND SUMP WITH COMMERCIAL CLEANERS IS REQUIRED, PERMIT CONCRETE TO DRY PRIOR TO MOISTURE TESTING AND SUBSEQUENT APPLICATION OF EPOXY FLOOR COATING.

B. SURFACE PREPARATION

IF NECESSARY SANDBLAST CONCRETE TRENCH AND SUMP TO REMOVE GREASE, DIRT, DUST, LOOSE CONCRETE AND OTHER CONTAMINATING MATERIALS. OBTAIN CONSTRUCTION MANAGER'S AND FMPC APPROVAL OF SANDBLASTING PROCEDURE.

C. MOISTURE TESTING

BEFORE COMMENCING INSTALLATION OF EPOXY FLOOR COATING, SUBCONTRACTOR TO CERTIFY THAT CONCRETE SURFACES WHICH ARE TO RECEIVE COATING HAVE DRIED SUFFICIENTLY TO SATISFY SPECIFICATION REQUIREMENTS OF THE EPOXY FLOOR COATING MANUFACTURER.

SUBCONTRACTOR TO SUBMIT WRITTEN CERTIFICATION OF THE ACCEPTANCE OF CONCRETE CONDITIONS, SIGNED BY THE SUBCONTRACTOR, THE EPOXY FLOOR COATING INSTALLER AND COATING MANUFACTURER'S REPRESENTATIVE. AFTER NOTIFICATION OF RECEIPT AND APPROVAL OF SUCH CERTIFICATION BY THE CONSTRUCTION MANAGER'S REPRESENTATIVE, INSTALLATION OF FLOOR COATING MAY BE STARTED.

D. PRIMING

APPLY PRIMER ON AREA TO RECEIVE EPOXY FLOOR COATING. INSPECT SURFACE TO ENSURE THERE IS NO PUDDLING OR VOIDS.

FOLLOW MANUFACTURER'S PRINTED INSTRUCTIONS FOR MIXING AND APPLICATION OF PRIMER. SUBCONTRACTOR TO CERTIFY PROPER DEGREE OF ADHESION FOR START OF COATING APPLICATION.

E. COATING APPLICATION

APPLY COATING OVER THE PRIMER.

MINIMUM THICKNESS OF EPOXY FLOOR COATING TO BE 5 MILS DFT.

FOLLOW MANUFACTURER'S PRINTED INSTRUCTIONS FOR MIXING AND APPLICATION OF EPOXY FLOOR COATING.

F. CURING

CURE THE EPOXY FLOOR COATING IN ACCORDANCE WITH THE PRINTED RECOMMENDATIONS OF THE MANUFACTURER. DO NOT ALLOW TRAFFIC ON FLOOR COATING BEFORE MANUFACTURER'S MINIMUM RECOMMENDED NUMBER OF HOURS.

G. CLEANUP AND PROTECTION

AT THE COMPLETION OF THE EPOXY FLOOR COATING WORK, CLEAN OFF ALL MISPLACED COATING, CALKING, AND OTHER BLEMISHES CAUSED BY THE WORK FROM ALL FINISHED SURFACES AND RESTORE THEM TO THEIR ORIGINAL CONDITION.

ON A DAILY BASIS, REMOVE ALL DISCARDED FLOOR COATING MATERIALS, DEBRIS, CANS AND RAGS.

PROTECT WORK OF OTHER TRADES FROM DAMAGE BY EPOXY FLOOR COATING WORK. CORRECT ANY DAMAGES BY CLEANING, REPAIRING OR REPLACING AS DIRECTED.

09702.07 GUARANTEE

PROVIDE 2 YEAR WRITTEN GUARANTEE FOR ALL WORK PERFORMED UNDER THIS SUBDIVISION FROM DATE OF FINAL ACCEPTANCE.

UNDER THE GUARANTEE, THE SUBCONTRACTOR, THE EPOXY FLOOR COATING INSTALLER AND THE COATING MANUFACTURER MUST AGREE TO REPAIR OR REPLACE EPOXY COATING WHICH FAILS TO BE FREE FROM DEFECTS IN MATERIALS, ADHESION, AND WORKMANSHIP.

DIVISION 9

09870 - EPOXY COATING - METAL SURFACES

09870.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PROVIDE EPOXY COATING FOR METAL TRENCH AND SUMP GRATING, GRATING FRAMES, MANHOLE COVER, AND OTHER METAL FLOOR SURFACES.

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY FLOOR COATING IN TRENCHES
FINISH PAINTING

09870.02 GENERAL

A. EQUIPMENT

PROVIDE STAGING, SPRAYING, BRUSHES AND OTHER EQUIPMENT AS NECESSARY FOR PROPER CONDUCT OF WORK. PLACE STAGING, AND OTHER EQUIPMENT TO INTERFERE AS LITTLE AS POSSIBLE WITH OTHER WORK.

B. STORAGE

STORE MATERIALS USED ON JOB IN A SINGLE PLACE AS DIRECTED. PROTECT FROM WEATHER. KEEP STORAGE PLACE NEAT AND CLEAN. PROTECT FLOOR WITH DROP CLOTHS OR BUILDING PAPER. REPAIR DAMAGE TO STORAGE AREAS AS DIRECTED. TAKE NECESSARY PRECAUTIONS TO PREVENT FIRE, AND PREVENT MATERIALS FROM FREEZING. COMPLY WITH OSHA REQUIREMENTS FOR AMBIENT AIR CONDITIONS.

C. PROTECTION OF WORK

PROTECT WORK AND MATERIALS INSTALLED. REMOVE SOILED RAGS AND WASTE EVERY NIGHT. REMOVE TRENCH GRATING AND SIMILAR ITEMS WHEREVER PRACTICABLE TO COAT BOTH SIDES, EDGES, AND FRAMES, AND REPLACE AFTER COMPLETION OF COATING. ADEQUATELY PROTECT ITEMS WHICH ARE IN PLACE DURING COATING OPERATIONS. PROTECT ALL WORK OF OTHER TRADES AGAINST DAMAGE.

D. DELIVERY

DELIVER MATERIALS TO SITE IN ORIGINAL CONTAINERS WITH LABELS INTACT AND SEALS UNBROKEN. PROVIDE LABELS ON EACH CONTAINER WITH NAME OR TITLE OF MATERIAL, FEDERAL SPECIFICATION NUMBER, IF APPLICABLE, MANUFACTURER'S STOCK NUMBER, MANUFACTURER'S NAME, THINNING AND MIXING INSTRUCTION (FOR 2 OR 3 COMPONENT COMPOUNDS), APPLICATION INSTRUCTIONS.

E. SUBMITTALS

SUBMIT COPIES OF MANUFACTURER'S SPECIFICATIONS, INCLUDING MATERIAL LABEL ANALYSIS, AND APPLICATION INSTRUCTIONS FOR EACH MATERIAL SPECIFIED, INCLUDING PERCENTAGE OF SOLIDS, AND MSDS DATA SHEETS.

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

F. COLORS

COLORS TO BE AS SELECTED.

TINT AND MATCH ALL COLORS AS DIRECTED.

G. MANUFACTURERS

THE GLIDDEN COMPANY
PPG INDUSTRIES, INC.
PORTER PAINT CO.
PRATT & LAMBERT INC.
CARBOLINE
THE SHERWIN-WILLIAMS COMPANY
MOBIL CHEMICAL COMPANY, OR EQUAL

09870.03 JOB CONDITIONS

INSPECT SURFACES TO RECEIVE EPOXY COATING. REPORT IN WRITING ANY CONDITIONS DETRIMENTAL TO THE PERFORMANCE OF THIS WORK. STARTING OF APPLICATION CONSTITUTES ACCEPTANCE OF SURFACES BY COATING APPLICATOR.

BEFORE STARTING APPLICATION, SUBCONTRACTOR TO CERTIFY THAT SHOP OR PRIME COATS ON SURFACES TO RECEIVE EPOXY COATING ARE COMPATIBLE WITH THE COATINGS SPECIFIED HEREIN.

09870.04 SURFACE PREPARATION

A. GENERAL

PERFORM PREPARATION AND CLEANING PROCEDURES IN COMPLIANCE WITH THE COATING MANUFACTURER'S INSTRUCTIONS FOR THE PARTICULAR SUBSTRATE CONDITIONS, AND AS HEREIN SPECIFIED.

CLEAN SURFACES TO BE COATED BEFORE APPLYING COATINGS OR SURFACE TREATMENTS. REMOVE OIL AND GREASE WITH CLEAN CLOTHS AND CLEANING SOLVENTS PRIOR TO MECHANICAL CLEANING. PROGRAM THE CLEANING AND APPLICATION SO THAT DUST AND OTHER CONTAMINANTS FROM THE CLEANING PROCESS WILL NOT FALL ON WET, NEWLY COATED SURFACES. REMOVE ALL DUST AND DIRT. SURFACES TO BE FREE OF OIL, GRIT, FROST AND IN A CONDITION TO RECEIVE THE SPECIFIED COATING.

DO NOT PAINT OVER SURFACES WHERE THE MOISTURE CONTENT EXCEEDS THAT PERMITTED IN THE MANUFACTURER'S PRINTED DIRECTIONS.

B. FERROUS METAL SURFACES

TOUCH UP SHOP-APPLIED PRIME COATS WHICH HAVE BEEN DAMAGED. USE THE SAME PRIMER AS THE SHOP COAT.

CLEAN NONGALVANIZED, FERROUS SURFACES, WHICH HAVE NOT BEEN SHOP COATED, OF OIL, GREASE, DIRT, LOOSE MILL SCALE AND OTHER FOREIGN SUBSTANCES BY SOLVENT OR MECHANICAL CLEANING, COMPLYING WITH STEEL STRUCTURES PAINTING COUNCIL (SSPC) RECOMMENDATIONS.

09870.05 COATING TYPES

COATING TYPES SPECIFIED ARE FROM THE CATALOG OF PORTER PAINT CO. OTHER MANUFACTURERS' MATERIAL MUST BE EQUAL TO THE KIND AND QUALITY LISTED:

TYPE	MATERIAL IDENTIFICATION
1	TWO COMPONENT, POLYAMIDE CURED, RUST INHIBITIVE EPOXY PRIMER, 2 MILS DFT, 48 PERCENT SOLIDS BY VOLUME
2	TWO COMPONENT, HIGH-BUILD, POLYAMIDE CURED HIGH-BUILD GLOSS EPOXY, 2 MILS DFT, 49 PERCENT SOLIDS BY VOLUME

09870.06 COATING SCHEDULE

SURFACE	TYPE FIRST COAT	TYPE SECOND COAT
FERROUS METAL	1	2

09870.07 EPOXY COATING APPLICATION

COATING TO BE APPLIED BY AUTHORIZED APPLICATOR IN STRICT ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS, RECOMMENDATIONS AND SPECIFICATIONS AS SET OUT IN APPROVED APPLICATOR'S MANUAL. WORKMEN TO BE EXPERIENCED AND SKILLED IN THE INSTALLATION OF THE MATERIAL AND TO PRODUCE A FINE, WORKMANLIKE AND DURABLE INSTALLATION. VENTILATION IN ALL SPACES IN WHICH COATINGS ARE BEING APPLIED TO BE RESPONSIBILITY OF SUBCONTRACTOR.

APPLY COATINGS TO SURFACES AFTER ALL CONSTRUCTION WORK IS COMPLETE, SURFACES HAVE BEEN PROPERLY PREPARED. APPLY COATINGS PRIOR TO CALKING OF JOINTS.

ALL SURFACES TO RECEIVE SPECIFIED COATINGS MUST BE CLEAN, DRY AND FREE OF FOREIGN MATTER. SURFACE AND AIR TEMPERATURE, MINIMUM 60F, PREFERRED 70F.

09870.08 CLEANUP

UPON COMPLETION OF WORK, CLEAN ALL PAINT-SPATTERED SURFACES, USING PROPER METHODS. REMOVE ALL DISCARDED COATING MATERIALS, RUBBISH, CANS AND RAGS RESULTING FROM THE WORK.

DIVISION 9

09900 - PAINTING

09900.01 SCOPE OF WORK

A. WORK SPECIFIED IN THIS SECTION

PAINTING WORK INCLUDES PAINTING AND FINISHING OF EXISTING AND NEW INTERIOR AND EXTERIOR SURFACES AND ITEMS THROUGHOUT THE PROJECT, USUALLY PAINTED OR FINISHED TO MAKE A COMPLETE JOB IN EVERY RESPECT, EXCEPT AS SPECIFIED OR SCHEDULED OTHERWISE. SEE DESCRIPTION OF ALTERATION WORK IN SECTION 02050.

WHEN AN ITEM OR AREA IS NOT MENTIONED OR PARTICULARLY SCHEDULED, PAINT OR FINISH TO MATCH WORK IN SIMILAR LOCATIONS, OR AS DIRECTED.

SURFACE PREPARATION, PRIMING AND COATS OF PAINT SPECIFIED ARE IN ADDITION TO SHOP PRIMING AND SURFACE TREATMENT SPECIFIED IN OTHER SECTIONS, EXCEPT AS OTHERWISE SPECIFIED.

THE TERMS "PAINT" AND "PAINTING" AS USED HEREIN MEAN ALL COATING SYSTEM MATERIALS, INCLUDING PRIMERS, EMULSIONS, ENAMELS, STAINS, SEALERS AND FILLERS, AND OTHER APPLIED MATERIALS WHETHER USED AS PRIME, INTERMEDIATE OR FINISH COATS AND THE APPLICATION OF THESE MATERIALS. MINIMUM DRY FILM THICKNESS 2 MILS PER COAT.

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

POLYURETHANE ELASTOMER/WEARING SURFACE
EPOXY FLOOR COATING
EPOXY COATING - METAL SURFACES

C. SURFACES NOT INCLUDED

DO NOT PAINT THE FOLLOWING SURFACES:

POLYURETHANE ELASTOMER/WEARING SURFACE
ALUMINUM, STAINLESS STEEL, COPPER, BRONZE, CHROMIUM PLATE
GLASS
EPOXY-COATED TRENCHES AND METAL SURFACES
MACHINED SURFACES
FACTORY FINISHED EQUIPMENT
LIGHTING FIXTURES

09900.02 SUBMITTALS

A. MANUFACTURERS' LITERATURE

SUBMIT TWO COPIES OF MANUFACTURERS' SPECIFICATIONS, INCLUDING PAINT LABEL ANALYSIS AND APPLICATION INSTRUCTIONS FOR EACH MATERIAL SPECIFIED, INCLUDING PERCENTAGE OF SOLIDS AND MSDS DATA SHEETS.

B. SAMPLES

SUBMIT SAMPLE PANELS OF EACH COLOR SELECTED AND MATERIAL SPECIFIED.

ALL FINISHED WORK MUST CONFORM TO ACCEPTED SAMPLES.

AFTER SAMPLES HAVE BEEN REVIEWED, A JOB MEETING IS TO BE HELD BETWEEN THE PAINTING SUBCONTRACTOR, THE PAINT MANUFACTURER'S REPRESENTATIVE, AND THE CONSTRUCTION MANAGER'S REPRESENTATIVE TO DISCUSS PAINT APPLICATION AND WORKMANSHIP. DO NOT START PAINTING WORK UNTIL THIS MEETING HAS BEEN HELD, DOCUMENTED, AND THE MEETING NOTES APPROVED.

C. OTHER REQUIREMENTS

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING SUBMITTALS.

09900.03 GENERAL

A. DELIVERY AND STORAGE

DELIVER ALL MATERIALS TO THE JOBSITE IN ORIGINAL, NEW AND UNOPENED PACKAGES AND CONTAINERS BEARING MANUFACTURER'S NAME AND LABEL.

PROVIDE LABELS ON EACH CONTAINER WITH THE FOLLOWING INFORMATION:

NAME OR TITLE OF MATERIAL
FEDERAL SPECIFICATION NUMBER, IF APPLICABLE
MANUFACTURER'S STOCK NUMBER
MANUFACTURER'S NAME
CONTENTS BY VOLUME, FOR MAJOR PIGMENT AND VEHICLE ELEMENTS
THINNING INSTRUCTIONS
APPLICATION INSTRUCTIONS

STORE MATERIALS USED ON JOB IN A SINGLE AREA. PROTECT FROM WEATHER. KEEP STORAGE AREA NEAT AND CLEAN. PROTECT FLOOR AND OTHER SURFACES WITH DROP CLOTHS OR BUILDING PAPER. TAKE NECESSARY PRECAUTIONS TO PREVENT FIRE. STORAGE PROCEDURES TO BE SUCH THAT THE STORAGE SPACE AMBIENT AIR CONDITIONS DO NOT EXCEED OSHA STANDARDS.

B. JOB CONDITIONS

INSPECT SURFACE TO BE PAINTED. STARTING OF WORK CONSTITUTES ACCEPTANCE OF THE SURFACES.

C. CLEANUP AND PROTECTION

AT THE COMPLETION OF THE PAINTING WORK, CLEAN OFF MISPLACED PAINT AND OTHER BLEMISHES CAUSED BY THIS WORK FROM FINISHED SURFACES AND RESTORE THEM TO THEIR ORIGINAL CONDITION.

ON A DAILY BASIS REMOVE ALL DISCARDED PAINT MATERIALS, DEBRIS, CANS AND RAGS.

PROTECT WORK OF OTHER TRADES, WHETHER TO BE PAINTED OR NOT, FROM DAMAGE BY PAINTING WORK. CORRECT DAMAGES BY CLEANING, REPAIRING OR REPLACING, AND REPAINTING AS DIRECTED.

REMOVE HARDWARE AND SIMILAR ITEMS BEFORE PAINTING AND REPLACE AFTER COMPLETION OF PAINTING. DO NOT DISPOSE OF PAINT MATERIALS IN ANY PLUMBING FIXTURE, OPEN WASTE OR VENT PIPE, OR OTHER PIPE OF ANY KIND. DO NOT USE WATER CLOSETS OR OTHER PLUMBING FIXTURES AS SUPPORTS FOR PLANKING.

D. COLORS

EXCEPT AS OTHERWISE INDICATED, FURNISH COLORS AS SELECTED.

PAINT BOLLARDS YELLOW.

09900.04 MATERIALS

A. PAINT MATERIALS

PROVIDE PAINTING MATERIALS OF TYPES AND BRANDS SPECIFIED, INCLUDING HIGHEST QUALITY BASIC PAINTING MATERIALS SUCH AS LINSEED OIL, SHELLAC, TURPENTINE AND THINNERS.

SPECIFIC PRODUCTS DESIGNATED HEREIN BY MANUFACTURER'S NAME AND NUMBER OR SIMILAR IDENTIFICATION ARE USED ONLY TO ESTABLISH STANDARDS OF QUALITY AND TYPE.

EQUIVALENT PRODUCTS OF THE FOLLOWING MANUFACTURERS, OR APPROVED EQUAL, MAY BE SUBMITTED, SUBJECT TO REVIEW FOR SPECIFICATION COMPLIANCE.

DU PONT
THE GLIDDEN COMPANY
DEVOE PAINT DIVISION OF CELANESE COATING COMPANY
PPG INDUSTRIES, INC.
PORTER PAINT COMPANY
PRATT AND LAMBERT, INC.
THE SHERWIN-WILLIAMS COMPANY
BENJAMIN MOORE AND COMPANY

B. PAINT TYPES

PROVIDE PAINTS OF FOLLOWING TYPES. NAMES AND NUMBERS ARE FROM CATALOG OF PORTER PAINT COMPANY.

TYPE 1	298N ALKYD CHROMATE PRIMER
TYPE 2	2400 SERIES INDUSTRIAL ALKYD GLOSS
TYPE 3	767 LATEX PRIMER SEALER
TYPE 4	520 SERIES MASONRY PAINT
TYPE 5	2481 ALKYD EGGSHELL
TYPE 6	290 GALVANIZED METAL PRIMER

C. PAINT FINISH SCHEDULE

		PAINT TYPES		
	SURFACE PREPARATION	FIRST COAT	SECOND COAT	THIRD COAT
EXTERIOR:				
FERROUS METAL, PRIMED	*	2	2	-
INTERIOR:				
FERROUS METAL, UNPRIMED	*	1	5	5
FERROUS METAL, PRIMED	*	5	5	-
GALVANIZED METAL, UNPRIMED	*	6	5	5
CEMENT ASBESTOS PANELS	*	3	4	4
FACTORY PRIMED METAL SURFACES	**	5	5	-

PAINT TYPES

	SURFACE PREPARATION	FIRST COAT	SECOND COAT	THIRD COAT
ELECTRICAL OR MECHANICAL ITEMS NOT FACTORY FINISHED	*	1	5	5

* AS SPECIFIED

**TOUCH UP WITH SHOP OR FACTORY PRIMER

09900.05 PREPARATION OF SURFACES

A. GENERAL

PERFORM SURFACE PREPARATION IN STRICT ACCORDANCE WITH PAINT MANUFACTURER'S INSTRUCTIONS AND AS SPECIFIED HEREIN, FOR EACH PARTICULAR SURFACE.

REMOVE HARDWARE, HARDWARE ACCESSORIES, PLATES, LIGHTING FIXTURES, AND SIMILAR ITEMS IN PLACE AND NOT TO BE FINISH PAINTED, OR PROVIDE SURFACE APPLIED PROTECTION PRIOR TO SURFACE PREPARATION AND PAINTING OPERATIONS. AT COMPLETION OF PAINTING OF EACH AREA, REINSTALL REMOVED ITEMS BY WORKMEN SKILLED IN TRADES INVOLVED.

BRUSH SURFACES CLEAN OF DUST AND DIRT. PREPARED SURFACES TO BE SMOOTH, DRY, FREE OF OIL, GREASE, SCALE, GRIT, FROST, AND IN CONDITION SUITABLE TO RECEIVE PAINT OR OTHER SPECIFIED MATERIALS.

B. CEMENTITIOUS SURFACES

PREPARE SURFACES OF CEMENT ASBESTOS PANELS TO BE PAINTED BY REMOVING EFFLORESCENCE, CHALK, DUST, DIRT, GREASE, OIL AND GLAZE. TEST TO DETERMINE ALKALINITY AND MOISTURE CONTENT. DO NOT PAINT OVER SURFACES WHERE ALKALINITY AND MOISTURE CONTENT EXCEED THE PAINT MANUFACTURER'S PRINTED INSTRUCTIONS.

C. FERROUS METAL

CLEAN FERROUS SURFACES, WHICH ARE NOT GALVANIZED OR SHOP-PRIMED, OF OIL, GREASE, DIRT, LOOSE MILL SCALE AND OTHER FOREIGN MATERIAL BY SOLVENT OR MECHANICAL CLEANING.

D. GALVANIZED METAL

REMOVE ALL GREASE, OIL, DIRT OR OTHER FOREIGN MATERIAL BY SOLVENT OR DETERGENT CLEANING. APPLY ZINC PHOSPHATE TREATMENT EQUAL TO PORTER PAINT COMPANY NO. 45 GALVAPREP IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, RINSE WITH CLEAR WATER AND ALLOW TO DRY. DO NOT USE VINEGAR OR ACETIC ACID.

E. EXISTING SURFACES

REMOVE GREASE, OIL, DUST, DIRT OR OTHER FOREIGN MATERIALS BY SOLVENT OR DETERGENT CLEANING. REMOVE CHIPPED, PEELING OR BLISTERED PAINT BY HAND TOOL OR POWER TOOL CLEANING, OR AS RECOMMENDED BY THE COATING MANUFACTURER. DULL HARD OR GLOSSY OLD PAINT BY LIGHT SANDING, SANDBLASTING OR OTHER ABRASIVE METHODS.

09900.06 TOUCH-UP AND PRIMING

TOUCH UP SHOP PRIMER WHEREVER DAMAGED OR BARE. CLEAN, AS SPECIFIED ABOVE, AND TOUCH UP WITH SAME TYPE PAINT AS SHOP-APPLIED PRIMER. APPLY PRIME COAT OR COATS TO ANY SURFACE NOT SHOP PRIMED.

09900.07 PATCH PAINTING

PAINT AREAS DISTURBED OR DAMAGED TO MATCH ADJOINING SURFACES. PAINT SURFACES BEYOND DAMAGED OR PATCHED AREAS TO NEAREST EXTERNAL OR INTERNAL CORNER, OR TO BOTH ENDS (AND TOP TO BOTTOM) OF ANY BAY, COLUMN TO COLUMN, HORIZONTALLY AND VERTICALLY IN ALL DIRECTIONS.

09900.08 APPLICATION

APPLY COATINGS IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. USE EQUIPMENT AND APPLICATION METHODS BEST SUITED FOR THE TYPE MATERIAL BEING APPLIED. APPLY EACH COAT AT COATING MANUFACTURER'S RECOMMENDED RATE OF COVERAGE SO CORRECT MINIMUM DRY FILM THICKNESS IS ACHIEVED, PER COAT.

DO NOT PAINT WHILE SURFACE IS DAMP, DURING COLD, RAINY OR MISTY WEATHER OR WHEN WINDS CARRY DUST OR DIRT AND EMBED IT IN PAINT.

DO NOT APPLY PAINT WHEN AMBIENT OR SURFACE TEMPERATURE IS BELOW 50F OR ABOVE 100F. DO NOT APPLY PAINT UNLESS SURFACE TEMPERATURE IS 5F ABOVE DEW POINT. DO NOT APPLY PAINT TO SURFACES EXPOSED TO HOT SUN.

APPLY MATERIALS UNDER ADEQUATE ILLUMINATION, SPREAD EVENLY AND FLOW ON SMOOTHLY WITHOUT RUNS OR SAGS. ALLOW EACH COAT TO DRY THOROUGHLY BEFORE APPLYING THE SUCCEEDING COAT.

HAVE EACH COAT OF MATERIAL INSPECTED BEFORE APPLYING SUCCEEDING COATS; CREDITS FOR CONCEALED COAT WILL NOT BE GIVEN. GIVE NOTIFICATION WHEN EACH COAT IS READY FOR INSPECTION.

DO NOT THIN COATINGS MORE THAN RECOMMENDED BY PAINT MANUFACTURER AND USE ONLY WITHIN RECOMMENDED LIMITS. THOROUGHLY STIR COATINGS AND MAINTAIN AT A UNIFORM CONSISTENCY DURING APPLICATION.

SAND LIGHTLY BETWEEN EACH COAT OF ENAMEL.

WHENEVER SPRAY APPLICATION IS USED, EACH SPRAY-APPLIED COAT MUST BE EQUIVALENT IN ALL RESPECTS TO THE SAME COAT, BRUSH APPLIED BY HIGH QUALITY BRUSH APPLICATION. THE NUMBER OF COATS REQUIRED IS THE SAME, REGARDLESS OF APPLICATION METHOD. DOUBLING BACK WITH SPRAY EQUIPMENT FOR PURPOSE OF BUILDING UP FILM THICKNESS OF TWO COATS IN ONE OPERATION IS PROHIBITED.

DIVISION 16

16010 - ELECTRICAL WORK - GENERAL

16010.01 GENERAL

FURNISH MATERIALS AND EQUIPMENT WHICH ARE NEW, PRODUCTS OF REPUTABLE MANUFACTURERS CONFORMING TO THE REQUIREMENTS OF APPLICABLE STANDARDS AND RECOMMENDED PRACTICES OF AUTHORITIES LISTED BELOW AND WHICH CONFORM TO THOSE STANDARDS AND RECOMMENDED PRACTICES IN DESIGN, MANUFACTURE, RATINGS AND TEST.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
INSULATED CABLE ENGINEERS ASSOCATION (ICEA)
NATIONAL ELECTRICAL MANUFACTURERS ASSOCATION (NEMA)
UNDERWRITERS LABORATORIES INC. (UL), INCLUDING PRODUCT DIRECTORIES
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
FACTORY MUTUAL (FM) "APPROVAL GUIDE" AND "LOSS PREVENTION DATA"
ELECTRICAL AND ELECTRONICS GRAPHIC SYMBOLS AND REFERENCE DESIGNATIONS, ANSI/IEEE Y32E
GENERAL SERVICES ADMINISTRATION, FEDERAL SUPPLY SERVICE, "FEDERAL STANDARDS" AND "FEDERAL SPECIFICATIONS"

ALL WORK TO COMPLY WITH THE FOLLOWING:

DEPARTMENT OF LABOR "OCCUPATIONAL SAFETY AND HEALTH STANDARDS," TITLE 29, CODE OF FEDERAL REGULATIONS (CFR), PART 1910 (OSHA) AND PART 1926 (SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION)
NATIONAL ELECTRICAL CODE (NEC)
NATIONAL ELECTRICAL SAFETY CODE (NESC)
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
OHIO BASIC BUILDING CODE (OBBC)
FEDERAL, STATE AND LOCAL CODES
DOE 6430.1A, "GENERAL DESIGN CRITERIA MANUAL"
UNIFORM BUILDING CODE (UBC), SECTION 2312 "EARTHQUAKE REGULATIONS"
AMERICAN WELDING SOCIETY (AWS), STRUCTURAL WELDING CODE (AWS D1.1)

OBTAIN REQUIRED PERMITS AND, AT COMPLETION OF WORK, CERTIFICATES OF FINAL INSPECTION BY OPERATING CONTRACTOR.

PROVIDE EQUIPMENT AND MATERIALS HAVING FEATURES AND CHARACTERISTICS AS REQUIRED SO THAT THE COMPLETED FACILITIES COMPLY WITH ALL APPLICABLE SAFETY REQUIREMENTS.

ALL WORK AND MATERIALS TO BE SUCH THAT THE COMPLETED FACILITIES COMPLY WITH ALL APPLICABLE REQUIREMENTS OF SEISMIC ZONE 2 (OBBC).

16010.02 MANUFACTURERS' NAMES

LISTING OF A MANUFACTURER'S NAME FOR ANY MATERIAL OR EQUIPMENT DOES NOT NECESSARILY IMPLY ACCEPTANCE OF THAT MANUFACTURER'S PRODUCT UNLESS IT COMPLIES WITH STANDARDS AND DETAIL SPECIFICATIONS RELATING THERETO.

16010.03 EQUIPMENT RATINGS

VOLTAGE, AMPERE, INTERRUPTING AND OTHER RATINGS FOR EQUIPMENT ARE SHOWN ON DRAWINGS, UNLESS OTHERWISE INDICATED.

16010.04 NAMEPLATES

PROVIDE NAMEPLATE FOR EACH OF THE FOLLOWING ITEMS OF EQUIPMENT, AND AS ADDITIONALLY INDICATED, TO INDICATE DESIGNATION OR PURPOSE.

MOTOR CONTROL CENTER COMPARTMENT

NAMEPLATE TO BE ENGRAVED LAMINATED PHENOLIC, BLACK LETTERS ON WHITE BACKGROUND, 1 INCH HIGH BY 3 INCHES WIDE, OR OTHER ACCEPTABLE SMALLER SIZE, FASTENED BY MEANS OTHER THAN ADHESIVES, SUCH AS SUITABLY SIZED SELF-TAPPING SCREWS OR RIVETS.

NAMEPLATE REQUIREMENTS WILL NOT BE FURTHER SPECIFIED UNDER INDIVIDUAL HEADINGS.

16010.05 APPEARANCE

GIVE SPECIAL ATTENTION TO THE APPEARANCE OF ALL FACILITIES EXPOSED TO VIEW, AND INSTALL MATERIAL AND DEVICES AS REQUIRED TO GIVE A NEAT AND ORDERLY APPEARANCE.

WHERE EXPOSED TO VIEW, INSTALL RACEWAYS, MATERIALS AND DEVICES PARALLEL OR PERPENDICULAR TO STRUCTURE LINES.

WHERE INSTALLATION HEIGHTS ARE NOT INDICATED OR WHERE THERE IS ANY QUESTION AS TO THE APPEARANCE OF THE INSTALLATION, LOCATE MATERIALS AND DEVICES AS DIRECTED BY THE CONSTRUCTION MANAGER.

16010.06 SUPPORTS FOR EQUIPMENT

PROVIDE ALL NECESSARY SUPPORTS FOR EQUIPMENT PROVIDED OR INSTALLED UNDER THIS DIVISION. SUPPORTS TO CONSIST OF STEEL FRAMES, PLATES, BRACKETS, RACKS AND OTHER SHAPES OF ADEQUATE SIZE AND FASTENED WITH BOLTS, SCREWS OR BY WELDING, TO PROVIDE RIGID SUPPORT OF SUFFICIENT STRENGTH. WELDS TO BE CONTINUOUS AND REASONABLY SMOOTH. SURFACES TO BE SUITABLY PROTECTED FROM THE ENVIRONMENT. ACCEPTABLE METHODS INCLUDE FULL GALVANIZING AFTER FABRICATION OR COVERING WITH

ZINC RICH PAINT AS SPECIFIED HEREINAFTER. WHERE PAINT IS USED, MAINTAIN TIGHT CONTROL ON EACH STEP OF THE OPERATION FROM SURFACE PREPARATION, THROUGH PRIMER AND TO FINAL FINISH COATS.

16010.07 FIELD CONDITIONS

COORDINATE WORK WITH THE VARIOUS TRADES INVOLVED IN THE PROJECT TO FIT AVAILABLE SPACE. IF THERE IS ANY QUESTION AS TO WHERE ELECTRICAL SYSTEM COMPONENTS SHOULD BE LOCATED SO THAT THE WORK OF OTHER TRADES CAN BE PROPERLY INSTALLED, MEET AND DISCUSS SUCH QUESTIONS WITH THE OTHER TRADES INVOLVED, JOINTLY PREPARE SKETCHES OR COORDINATION DRAWINGS IF NECESSARY, AND OTHERWISE COORDINATE THE WORK. ANY WORK INSTALLED IN SUCH LOCATIONS AS TO PREVENT OTHER TRADES FROM INSTALLING THEIR WORK WITH REASONABLE CONVENIENCE MUST BE RELOCATED AT NO ADDITIONAL CONTRACT COST.

DRAWINGS INDICATE DESIRED POSITION OF EQUIPMENT. UNLESS DIMENSIONED, RACEWAY ROUTING IS SHOWN SCHEMATICALLY. DO NOT INSTALL RACEWAYS IN LOCATIONS WHICH WOULD MAKE IMPOSSIBLE THE WORK OF OTHER TRADES. COORDINATE WORK WITH OTHER TRADES TO AVOID INTERFERENCES. IF CONDITIONS ARE ENCOUNTERED WHICH MAKE INDICATED ARRANGEMENTS IMPOSSIBLE OR IMPRACTICAL, SUBMIT REQUEST FOR DEVIATION WITH DRAWINGS AS REQUIRED TO CLARIFY THE REQUEST.

16010.08 OPENINGS, PENETRATIONS AND SEALS FOR CONDUIT OR CABLE

PROVIDE A SCHEDULE 40 PIPE SLEEVE FOR EACH SINGLE CONDUIT WHICH PENETRATES PARTITIONS OR WALLS. USE PIPE TWO SIZES LARGER THAN CONDUIT. PACK VOID BETWEEN CONDUITS AND PIPE SLEEVE WITH OAKUM WHERE CONDUIT PASSES THROUGH SLEEVE IN EXTERIOR WALLS. FILL ENDS OF SLEEVES WITH GENERAL ELECTRIC SILICONE FOAM RTV 851, OR APPROVED EQUAL, AND TROWEL NEATLY TO MAKE SEAL. PIPE SLEEVES IN WALLS TO BE FLUSH WITH WALL SURFACES AND PIPE SLEEVES IN FLOORS TO BE EXTENDED 1-1/2 INCHES ABOVE FINISHED FLOOR. PROVIDE SPLIT PLATES TO CLOSE AROUND EXPOSED CONDUITS PASSING THROUGH WALLS AND AROUND EXPOSED SLEEVES EXTENDING ABOVE FLOORS.

16010.09 ACCESS

PROVIDE ACCESS FOR ALL ITEMS REQUIRING INSPECTION OR MAINTENANCE, SUCH AS JUNCTION, PULL AND OUTLET BOXES AND SEALING FITTINGS.

16010.10 PROTECTION OF PROPERTY

PROTECT EQUIPMENT AND MATERIALS FROM INTRUSION OF ALL FOREIGN MATERIALS. DO NOT INSTALL SENSITIVE ELECTRICAL EQUIPMENT UNTIL MAJOR CONSTRUCTION WORK IS COMPLETED. DURING AND AFTER INSTALLATION, PROTECT EQUIPMENT FROM DAMAGE BY WATER, DUST, PAINT, WET CONCRETE, IMPACT, ETC.

16010.11 CUTTING AND PATCHING

WHERE SLEEVES, FRAMING OR FORMING HAVE NOT BEEN PLACED FOR PROPER INSTALLATION OF WORK, OBTAIN FROM THE CONSTRUCTION MANAGER THE LOCATIONS NECESSARY TO CONTINUE WITH CONSTRUCTION OPERATION.

PATCH SUCH OPENINGS IN ACCORDANCE WITH APPLICABLE REQUIREMENTS SPECIFIED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS BY WORKERS SKILLED IN THE TRADE INVOLVED.

NEATLY BAND HOLES CUT IN GRATINGS. WHERE GRATINGS ARE GALVANIZED, IMMEDIATELY COAT THE BANDING AND ANY ABRADED SURFACES WITH TWO COATS OF ZINC RICH PAINT AS SPECIFIED HEREINAFTER.

INSOFAR AS POSSIBLE, AVOID MAKING HOLES IN EXISTING OR NEW STRUCTURAL STEEL. IF HOLES ARE REQUIRED, OBTAIN CONSTRUCTION MANAGER'S PERMISSION AND DRILL OR PUNCH HOLES. DO NOT CUT WITH TORCH.

16010.12 WELDING

NO WELDING OR OPEN FLAME WORK WILL BE PERMITTED IN THE CONSTRUCTION AREA UNLESS PERMITTED BY, PREARRANGED WITH, AND COORDINATED WITH THE CONSTRUCTION MANAGER, AND AN FMPC WELDING PERMIT OBTAINED.

WELDING MUST BE DONE BY ACCEPTABLE CERTIFIED WELDERS AND IN ACCORDANCE WITH FMPC APPROVED WELDING STANDARDS AND COMPLYING WITH THE LATEST AWS D1.1 CODE OR WITH ANY STATE OR LOCAL CODE REQUIREMENTS WHICH SUPERSEDE IT.

BEFORE WELDING, SUBMIT CERTIFICATION OF COMPLIANCE FORMS FOR EACH WELDER. ALL WELDING AND MATERIALS TO BE SUITABLE FOR USE IN SEISMIC ZONE 2.

16010.13 PAINTING

A. GENERAL

UNLESS FACTORY FINISH IS SPECIFIED, OR PRIOR PAINTING IS PART OF MANUFACTURER'S STANDARD PROCEDURE, PRIME PAINT FABRICATED OR MANUFACTURED EQUIPMENT AND MATERIAL PRIOR TO, OR IMMEDIATELY AFTER, INSTALLATION AS HEREINAFTER SPECIFIED.

ITEMS NOT INCLUDED:

GALVANIZED OR SIMILAR TREATED SURFACES. INSOFAR AS POSSIBLE, AVOID FIELD CUTTING, BURNING OR WELDING OF GALVANIZED HARDWARE. WHERE SUCH OPERATIONS ARE NECESSARY, SPOT PRIME AND PAINT INVOLVED SURFACES WITH HIGH ZINC DUST CONTENT PAINT FOR REGALVANIZING GALVANIZED STEEL, AS MANUFACTURED BY AMERON, CARBOLINE, PORTER, TNEMEC, OR APPROVED EQUAL

NONFERROUS SURFACES

NONMETALLIC SURFACES
PLATED SURFACES
STAINLESS STEEL SURFACES
INSIDE OF CONDUITS AND DEVICES
WEARING SURFACES

THOROUGHLY CLEAN AND REPRIME SHOP COATED MATERIALS OR EQUIPMENT WHICH SHOW EVIDENCE OF CORROSION.

FIELD FINISH PAINTING IS SPECIFIED UNDER SECTION 09900 EXCEPT AS INDICATED FOR TOUCH-UP OF DAMAGED GALVANIZED SURFACES.

B. PAINTING

CLEAN ALL SURFACES TO REMOVE DIRT, OIL, GREASE, DUST, SCALE, RUST AND FOREIGN MATTER BEFORE APPLYING PAINT. PREPARE SURFACES AND APPLY PAINT IN ACCORDANCE WITH PAINT MANUFACTURER'S RECOMMENDATIONS.

PAINT WITH ONE COAT OF PRIMER. USE PORTER NO. 298 GRAY ALKYD PRIMER, OR EQUIVALENT PPG, SHERWIN-WILLIAMS, DUPONT, PRATT AND LAMBERT, DEVOE, GLIDDEN, BENJAMIN MOORE, OR APPROVED EQUAL.

16010.14 TESTS AND REPORTS

MAKE TESTS AND ARRANGE FOR INSPECTIONS NECESSARY TO DETERMINE THAT WIRING AND EQUIPMENT INSTALLED UNDER THESE SPECIFICATIONS ARE IN SATISFACTORY CONDITION TO BE ENERGIZED. SCHEDULE TESTS AND INSPECTIONS AT TIMES SATISFACTORY TO THE CONSTRUCTION MANAGER'S REPRESENTATIVE TO ENABLE THEM TO BE PRESENT. ALL PARTS OF THE INSTALLATION, WHEN TESTED, TO MEET APPLICABLE STANDARDS.

KEEP A COMPLETE AND ACCURATE RECORD OF ALL TESTS AND INSPECTIONS AND SUBMIT ONE COPY FOR REVIEW.

FURNISHING AND SETTING UP OF REQUIRED TEST EQUIPMENT AND PERFORMANCE OF WORK INCIDENTAL TO MAKING TESTS IS A PART OF WORK UNDER THIS DIVISION.

REPLACE ANY WORK AND EQUIPMENT PROVIDED UNDER THIS DIVISION AND FOUND FAULTY OR DEFECTIVE UNDER TEST. SHOULD THE CONSTRUCTION MANAGER AGREE, FAULTY OR DEFECTIVE WORK AND EQUIPMENT MAY BE REPAIRED RATHER THAN REPLACED. AFTER REPLACEMENT OR REPAIR, TEST WORK AGAIN. FINAL ACCEPTANCE OF WORK DEPENDS ON SUCCESSFUL COMPLETION OF OPERATIONAL TESTS ON ALL EQUIPMENT TO SHOW THAT THE EQUIPMENT WILL PERFORM THE FUNCTIONS FOR WHICH IT IS SPECIFIED.

PRIOR TO MAKING ALTERATIONS OR ADDITIONS TO EXISTING EQUIPMENT OR SYSTEMS, CHECK SUCH EXISTING EQUIPMENT OR SYSTEMS FOR PROPER OPERATION. IF EQUIPMENT OR SYSTEMS ARE FOUND TO BE FAULTY, DAMAGED, OR INOPERATIVE SO AS TO BE UNSUITABLE FOR ALTERATION OR ADDITION, IMMEDIATELY NOTIFY CONSTRUCTION MANAGER FOR DISPOSITION.

INSTRUMENTS USED FOR TESTS ARE TO BE MAINTAINED UNDER A DOCUMENTED CALIBRATION PROGRAM AS SPECIFIED IN SECTION 01100.

PERFORM OPERATIONAL TESTS ON ALL LIGHTING.

PERFORM INSULATION RESISTANCE TEST ON 480 VOLT CIRCUITS AFTER INSTALLATION AND BEFORE ENERGIZATION USING A 1,000 VOLT BIDDLE MEGGER TEST SET, OR APPROVED EQUAL. MAINTAIN TEST UNTIL READINGS ARE STEADY. INVESTIGATE CAUSES AND TAKE APPROPRIATE REMEDIAL ACTION WHEN INSULATION RESISTANCE TESTS LESS THAN 5 MEGOHMS, OR WHEN MULTIPLE TESTS INDICATE A SIGNIFICANT DOWNWARD TREND IN THE RESISTANCE READINGS.

INSPECT ALL GROUND CONNECTIONS FOR CONTINUITY AND TIGHT ELECTRICAL AND MECHANICAL CONNECTIONS.

16010.15 PHASE ROTATION AND IDENTIFICATION

MAINTAIN NEMA PHASE POSITIONS IN ALL ELECTRICAL EQUIPMENT CONNECTIONS.

TAG EACH TERMINAL OF EQUIPMENT WITH PHASE MARKINGS AS AN AID IN MAKING PROPER WIRING CONNECTIONS.

16010.16 WORK ON ENERGIZED CIRCUITS AND EQUIPMENT

CERTAIN EXISTING FACILITIES WILL REMAIN IN SERVICE THROUGHOUT CONSTRUCTION WITH ONLY BRIEF SHUTDOWN PERIODS PERMITTED FOR MODIFICATIONS. SCHEDULE SHUTDOWN PERIODS TO CONFORM TO OPERATING CONTRACTOR'S AND CONSTRUCTION MANAGER'S REQUIREMENTS, AND ONLY WITH WRITTEN AUTHORIZATION FROM THE CONSTRUCTION MANAGER.

WHEN IT IS NECESSARY TO PERFORM PORTIONS OF WORK ON OR ADJACENT TO ENERGIZED EQUIPMENT, USE ONLY PERSONNEL QUALIFIED AND EXPERIENCED IN SUCH OPERATIONS, AND TAKE PROPER SAFETY MEASURES TO PROTECT PERSONNEL AND EQUIPMENT.

FOLLOW FMPC LOCK AND TAG PROCEDURES.

16010.17 CODES, PERMITS AND INSPECTIONS

CONTRACT DOCUMENTS GOVERN WHERE MORE STRICT THAN LAWS, ORDINANCES, APPLICABLE STANDARDS OF UL, NFPA, AND NEC, EVEN THOUGH SUCH ADDITIONAL WORK IS NOT STATUATORILY REQUIRED BY ANY LAW OR ORDINANCES.

PROVIDE MATERIALS AND EQUIPMENT BEARING CERTIFICATION OF UL WHERE SUCH LABELS OR STAMPS ARE CUSTOMARY, REQUIRED, OR SPECIFIED.

WITHIN 30 DAYS AFTER AWARD OF CONTRACT, SUBMIT TO OPERATING CONTRACTOR SUCH WORKING AND LAYOUT DRAWINGS AS MAY BE REQUIRED. PROVIDE SERVICES OF A QUALIFIED ENGINEER, IF REQUIRED BY THE OPERATING CONTRACTOR, TO PREPARE DRAWINGS. OBTAIN APPROVAL BEFORE PROCEEDING.

16010.18 SHOP DRAWINGS

SUBMIT WIRING DIAGRAMS OR CONNECTION DIAGRAMS ACCOMPANIED BY ADEQUATELY DEFINED SYMBOLS LIST. PREPARE SCHEMATIC AND WIRING DIAGRAMS IN ACCORDANCE WITH ANSI/IEEE PUBLICATION Y32E, "ELECTRICAL AND ELECTRONICS GRAPHIC SYMBOLS AND REFERENCE DESIGNATIONS."

REFER TO SECTION 01100 FOR ADDITIONAL INFORMATION AND SHOP DRAWING SUBMITTAL REQUIREMENTS.

DIVISION 16

16020 - SCOPE OF ELECTRICAL WORK

16020.01 SCOPE OF WORK

FURNISH ALL EQUIPMENT AND MATERIALS, ALL LABOR AND SERVICES, AND DO ALL WORK SHOWN OR SPECIFIED, TOGETHER WITH ALL NECESSARY APPURTENANCES, TO PROVIDE COMPLETE AND OPERABLE ELECTRICAL SYSTEMS.

IN GENERAL, WORK UNDER THIS DIVISION INCLUDES, BUT IS NOT NECESSARILY LIMITED TO:

MODIFICATION OF EXISTING MOTOR CONTROL CENTER
GROUNDING
CONDUIT AND WIRING SYSTEMS FOR LIGHTING
EXTERIOR LIGHTING INCLUDING AERIAL FEEDERS, LUMINAIRES WITH POLES AND CONTROL
DEMOLITON

16020.02 DEMOLITION OF ELECTRICAL WORK

ALL DEMOLITION WORK TO BE PERFORMED IN ACCORDANCE WITH CURRENT FMPC OPERATING PROCEDURES. REFER TO SECTION 02050 FOR ADDITIONAL INFORMATION AND REQUIREMENTS REGARDING DEMOLITION.

PROVIDE ALL NECESSARY LABOR, MATERIALS, TOOLS, DEVICES AND EQUIPMENT AS REQUIRED TO COMPLETE THE FOLLOWING DEMOLITION WORK:

REMOVE EXISTING WOOD ELECTRICAL POLES AND ASSOCIATED LUMINAIRES FROM CONSTRUCTION PHASE C/D/E AREAS AS INDICATED ON THE DRAWINGS. POLES ARE TO BE REMOVED COMPLETELY INCLUDING ALL UNDERGROUND PORTIONS. BACKFILLING AND RESURFACING IS PROVIDED UNDER DIVISIONS 2 AND 3.

CUT OFF CONDUIT AND WIRE FEEDING POLES FLUSH WITH TOP OF EXISTING PAD. TAPE AND ABANDON WIRES IN PLACE. SEALING OF CONDUIT IS PROVIDED UNDER DIVISION 3. DISCONNECT PRIMARY AND SECONDARY OF CONSTANT CURRENT TRANSFORMER NEAR PLANT 1 WHICH FEEDS LIGHTING CIRCUITS IN CONSTRUCTION PHASE D AND E AREAS. IN PHASE C AREA, CUT FEEDER WHERE INDICATED AND TAPE AND ABANDON IN PLACE.

CIRCUITRY TO BE MAINTAINED AS REQUIRED TO MAINTAIN PAD ILLUMINATION IN AREAS NOT BEING DEMOLISHED DUE TO PHASING OF WORK.

REMOVE ALL ELECTRICAL WORK ASSOCIATED WITH THE CONVEYOR GALLERIES NORTH OF PLANT 1 BACK TO THE INTERIOR OF PLANT 1. DEENERGIZE WIRING AND CUT, TAPE AND ABANDON IN PLACE. PATCH OPENINGS(S) IN EXTERIOR WALL OF PLANT 1.

16020.03 RESTORATION OF EXISTING FACILITIES

REPLACE OR RESTORE TO THEIR ORIGINAL UNDAMAGED CONDITION ALL FACILITIES DAMAGED DURING PROGRESS OF WORK EXCEPT AS OTHERWISE INDICATED FOR DEMOLITION OF LIGHT POLES. SUCH REPLACEMENT OR RESTORATION APPLIES TO BOTH SURFACE AND SUBSURFACE INSTALLATIONS AND MATERIALS. USE MATERIALS AND INSTALLATION METHODS TO MATCH EXISTING INSTALLATIONS.

DIVISION 16

16307 - ELECTRICAL SWITCHING AND CONTROLS - LOW VOLTAGE
(1,000 VOLTS AND BELOW)

16307.01 CIRCUIT BREAKER

PROVIDE A MOLDED CASE 480 VOLT BREAKER IN MOTOR CONTROL CENTER MCC N2-2 IN FIRST FLOOR OF PLANT 1. BREAKER TO HAVE MINIMUM 25,000 AMPERES INTERRUPTING RATING. BREAKER TO HAVE CHARACTERISTICS AS REQUIRED TO MAKE IT COMPATIBLE WITH THE EXISTING MOTOR CONTROL CENTER AND THESE SPECIFICTIONS.

DIVISION 16

16400 - ELECTRICAL WIRING

16400.01 ELECTRIC SERVICE SYSTEMS

VOLTAGES ARE NOMINAL SYSTEM VOLTAGES IN ACCORDANCE WITH ANSI C84.1. UTILIZATION EQUIPMENT PROVIDED UNDER THESE SPECIFICATIONS TO BE SUITABLE FOR USE UNDER THE CONDITIONS OUTLINED IN THIS STANDARD.

480 VOLTS, 3-PHASE, 3-WIRE, 60 HZ, WITH 480 VOLT SINGLE PHASE TAPS TO LUMINAIRES. BALANCE LOADS ON PHASES AS CLOSE AS POSSIBLE.

16400.02 WIRING

GENERAL:

INSTALL ALL WIRING, EXCEPT AERIAL DISTRIBUTION, IN CONDUIT OR OTHER ACCEPTABLE RACEWAY.

PULL NO WIRE UNTIL THE CONDUIT SYSTEM IS COMPLETELY AND THOROUGHLY SWABBED. USE INERT PULLING COMPOUNDS FREE OF INGREDIENTS HARMFUL TO INSULATION. DO NOT USE GREASE OR OIL. PLACE ALL WIRES OF A CIRCUIT IN SAME RACEWAY.

LABEL AND COLOR CODE WIRE AND CABLE IN ACCORDANCE WITH NEC AND IN ACCORDANCE WITH OPERATING CONTRACTOR'S CRITERIA, AS FOLLOWS:

HANDWRITTEN OR WRAPAROUND LABELS ARE NOT ACCEPTABLE FOR USE AT THE FMPC. LABEL ALL CABLES PROPERLY USING A RAYCHEM TYPE TMS, OR APPROVED EQUAL, RECTANGULAR, FLAT, NON-HEAT-SHRINKABLE TAG WITH 1/8 INCH HIGH LETTERING, FASTENED BY NYLON "TIE-WRAPS" PASSED THROUGH PREPUNCHED HOLES. FOR SINGLE CONDUCTORS AND INDIVIDUAL CABLE WIRES, PROVIDE SLIP-ON, HEAT-SHRINKABLE SLEEVE MARKERS, WITH BLACK LETTERING ON A WHITE BACKGROUND, W. H. BRADY COMPUTER-PRINTABLE "BRADY-SLEEVE," OR APPROVED EQUAL. MARK ALL SPARE WIRES AND CABLES "SP" AT BOTH ENDS. MARK CABLES WITH A CIRCUIT OR CABLE NUMBER. MARK ALL SINGLE CONDUCTOR WIRE AND CONDUCTORS OF CABLES WITH A WIRE NUMBER AND CIRCUIT NUMBER. IF SEVERAL CIRCUITS ARE CONTAINED WITHIN THE CABLE, ALSO MARK EACH CONDUCTOR WITH A CIRCUIT NUMBER.

WITH THE EXCEPTIONS NOTED BELOW, LOCATE MARKERS AT ORIGIN AND DESTINATION, AND AT ALL INTERVENING ACCESSIBLE SPLICE OR JUNCTION BOXES. MARK ALL WIRE AND CABLE WITH A CABLE OR CIRCUIT NUMBER ONLY.

LOCATE WIRE MARKERS WITHIN 3 INCHES OF A TERMINATION OR SPLICE. LOCATE CABLE MARKERS WITHIN 3 INCHES OF THE SPREAD, CABLE END, PENETRATION, OR BOX EXIT.

FOR BRANCH CIRCUITS AND ALL INTERIOR SUPPLY SIDE CIRCUITS, COLOR CODE AS FOLLOWS:

FOR 480 VAC SYSTEM

PHASE A - YELLOW
PHASE B - ORANGE
PHASE C - BROWN
GROUND - GREEN

COLOR CODE UNGROUNDED ("PHASE" OR "HOT") CIRCUIT CONDUCTORS IN SIZES NO. 8 AWG AND SMALLER BY MEANS OF COLORED INSULATION OR JACKET. WHERE COLORED INSULATIONS OR JACKETS ARE ONLY AVAILABLE ON SPECIAL ORDER, ALTERNATE METHODS FOR COLOR CODING UNGROUNDED CONDUCTORS MAY BE APPROVED UPON REQUEST TO THE CONSTRUCTION MANAGER. COLOR CODE THESE CONDUCTORS IN SIZES NO. 6 AWG AND LARGER BY MEANS OF COLORED INSULATION OR JACKET, OR BY USE OF COLORED TAPE AT TERMINALS AND AT ALL POINTS WHERE ACCESSIBLE AFTER INSTALLATION.

YELLOW TAPE TO CONSIST OF TWO SEPARATE BANDS AT EACH APPLICATION POINT IN ORDER TO AVOID CONFUSION WITH WHITE, GRAY, OR ORANGE AFTER AGING.

FOR ALL CONDUCTOR SIZES, GREEN, GRAY OR WHITE COLORS ARE RESERVED EXCLUSIVELY FOR GROUNDING AND GROUNDED CONDUCTORS RESPECTIVELY. DO NOT USE THESE COLORS IN ANY WAY TO IDENTIFY AN UNGROUNDED CONDUCTOR. USE GRAY OR WHITE, AS REQUIRED BY THE APPROPRIATE COLOR CODE, ONLY FOR THE GROUNDED OR NEUTRAL CONDUCTOR IDENTIFICATION.

COLOR CODE GROUNDED ("NEUTRAL") CIRCUIT CONDUCTORS AND EQUIPMENT GROUNDING ("GROUND WIRE") CONDUCTORS IN SIZES NO. 6 AWG AND SMALLER ONLY BY MEANS OF COLORED INSULATION OR JACKET. COLOR CODE THESE CONDUCTORS IN SIZES NO. 4 AWG AND LARGER BY MEANS OF COLORED INSULATION OR JACKET OR BY MEANS OF COLORED TAPE AT TERMINALS AND AT ALL POINTS WHERE ACCESSIBLE AFTER INSTALLATION.

PAINTING, TAPING, OR OTHER ALTERATION OF THE COLOR OF A GREEN, WHITE, OR GRAY COLORED CONDUCTOR IS PROHIBITED.

INSTALL WIRING CONTINUOUS, WITHOUT SPLICES, EXCEPT IN ACCESSIBLE JUNCTION BOXES OR ACCESSIBLE RACEWAYS.

ROUTE EQUIPMENT GROUNDING CONDUCTORS WITH SUPPLY CONDUCTORS BACK TO THE SOURCE.

TRAIN AND LACE WIRING INSIDE EQUIPMENT WITH PLASTIC WRAP FOR WORKMANLIKE NEATNESS. DO NOT LACE OR STRAP TIGHTLY ANY CURRENT CARRYING LIGHTING OR POWER WIRING.

16400.03 TAPS, SPLICES AND CONNECTIONS

THOROUGHLY CLEAN WIRES BEFORE INSTALLING LUGS AND CONNECTORS SO THAT JOINT WILL CARRY FULL CAPACITY OF CONDUCTORS WITHOUT PERCEPTIBLE TEMPERATURE RISE ABOVE CONDUCTOR TEMPERATURE.

SOLDERED JOINTS WILL NOT BE PERMITTED, EXCEPT WHEN PART OF VENDOR-FURNISHED EQUIPMENT WHERE SOLDERING IS STANDARD PRACTICE.

FOR WIRE NO. 10 AWG OR SMALLER, USE INSULATED SPRING PRESSURE CONNECTORS UTILIZING AN EXPANDABLE CONE-SHAPED COIL SPRING SUCH AS 3M COMPANY SCOTCHLOKS, IDEAL INDUSTRIES INC. WING NUTS, THOMAS & BETTS PIGGY CONNECTORS, BUCHANAN B-CAPS, OR APPROVED EQUAL. INSULATED SPRING PRESSURE CONNECTORS UTILIZING A NONEXPANDABLE FULLY SEATED COIL SPRING, SUCH AS IDEAL "WIRE-NUT" ARE NOT ACCEPTABLE. ALSO ACCEPTABLE ARE CRIMP-TYPE CAPS APPLIED WITH PROPER INDENTOR TOOL, WHICH PROVIDES DEFORMATION OF THE CAP IN TWO DIRECTIONS AT RIGHT ANGLES TO EACH OTHER, AS MANUFACTURED BY AMP, BURNDY, THOMAS & BETTS, OR APPROVED EQUAL.

FOR NO. 8 AWG AND LARGER COPPER WIRE, SPLICE OR TERMINATE WITH INDENTOR, CRIMP-TYPE CONNECTORS AND COMPRESSION TOOLS OR WITH BOLTED CLAMP-TYPE CONNECTORS, AS MANUFACTURED BY AMP, BURNDY, THOMAS & BETTS, OR APPROVED EQUAL.

UNLESS PROPERLY INSULATED BY THE CONNECTOR, INSULATE ALL JOINTS AT LEAST EQUAL TO THE CONDUCTOR INSULATION. INSTALL SELF-FUSING RUBBER-BASED INSULATING COMPOUND, MOLDED AROUND SHARP EDGES AND/OR DIFFICULT SHAPES, TO PROVIDE SMOOTH SURFACE FOR APPLYING ELECTRICAL TAPE. INSULATING COMPOUND TO BE 3M COMPANY SCOTCH NO. 2200 PADS OR NO. 2210 ROLLS, OR APPROVED EQUAL. ELECTRICAL TAPE, 3M COMPANY NO. 33+ SCOTCH TAPE, OR APPROVED EQUAL.

ARRANGE CONDUIT SUPPORTS TO PREVENT DISTORTION OF ALIGNMENT BY WIRE PULLING OPERATIONS. PROVIDE GALVANIZED STEEL HANGERS, CLAMPS AND MALLEABLE IRON GALVANIZED CONDUIT STRAPS. PERFORATED PIPE STRAPS WILL NOT BE ACCEPTED. FASTEN HANGERS TO BUILDING STEEL WITH MECHANICAL BEAM CLAMPS. USE TOGGLE BOLTS IN HOLLOW MASONRY WALLS, AND EXPANSION SHIELDS IN CONCRETE OR BRICK WALLS. TRAPEZE HANGERS WITH CONDUIT CLAMPS MAY BE USED WHERE GROUPS OF CONDUITS RUN PARALLEL. DO NOT SUPPORT CONDUITS FROM PIPING, DUCTWORK, CEILING SUPPORT SYSTEM, OR OTHER SUCH FACILITIES. UNLESS OTHERWISE INDICATED, SUPPORT CONDUITS ONLY FROM STRUCTURE. PROVIDE A SUPPORT AT EACH ELBOW OR CONDUIT BODY.

16400.04 CONDUIT SYSTEMS

A. GENERAL

USE RIGID, GALVANIZED THREADED STEEL CONDUIT WITH ALL CAST FERROUS METAL JUNCTION BOXES AND CONDUIT BODIES, EXCEPT AS OTHERWISE INDICATED. CAST BOXES TO HAVE THREADED HUBS AND/OR CONDUIT OPENINGS.

INTERMEDIATE METAL CONDUIT MAY BE SUBSTITUTED FOR RIGID STEEL CONDUIT.

CUT CONDUITS SQUARE AND CAREFULLY REAM ENDS. BRING JOINTS TO A SHOULDER. SECURELY FASTEN CONDUITS TO SHEET METAL BOXES AND ENCLOSURES WITH GALVANIZED DOUBLE LOCKNUTS AND INSULATING BUSHINGS, EXCEPT PROVIDE SUITABLE BONDING FITTINGS WHERE REQUIRED BY THE NEC. PROVIDE MYERS, OR APPROVED EQUAL, WATERTIGHT TYPE HUBS FOR CONDUIT CONNECTIONS TO SHEET METAL ENCLOSED DEVICES IN WET LOCATIONS. USE CARE SO THAT SUFFICIENT THREADS PROJECT THROUGH TO PERMIT BUSHING TO BE DRAWN TIGHTLY AGAINST END OF CONDUIT. DO NOT INSTALL CONDUIT WITH RUSTY THREADS.

WHERE CONDUIT SYSTEMS CANNOT OTHERWISE BE CONSTRUCTED USE ERICKSON TYPE UNIONS, OR THREADED SPLIT COUPLINGS. WHERE SPLIT COUPLINGS ARE USED, ENSURE THREADS OF CONDUITS AND COUPLINGS ARE MATCHED PRIOR TO FINAL TIGHTENING.

RUN EXPOSED CONDUIT PARALLEL WITH, OR PERPENDICULAR TO, MEMBERS OF THE STRUCTURE.

RING PIPE OR TRAPEZE HANGERS MAY BE USED TO SUPPORT CONDUITS EXCEPT FOR THE FIRST AND LAST HANGERS OF THE CONDUIT RUN OR WHERE A VERTICAL OR HORIZONTAL DIRECTION CHANGE OCCURS. IN THESE CASES, RIGIDLY BRACE CONDUIT SUPPORTS SO THAT WIRE MAY BE PULLED WITHOUT DAMAGE TO THE CONDUIT SYSTEM. STUD WELDS MAY BE USED FOR FASTENING CLAMPS TO STEEL. DO NOT USE FLAT STRAPS TO SUPPORT CONDUIT OR BOXES.

SEAL CONDUITS TERMINATING IN CABINETS AND SIMILAR EQUIPMENT AGAINST ENTRANCE OF FOREIGN MATTER INTO SYSTEM BY USE OF APPROPRIATE CONDUIT PENNIES AND RETAINING BUSHINGS PRIOR TO SWABBING AND PULLING IN WIRE.

AVOID MOISTURE TRAPS WHERE POSSIBLE. WHERE UNAVOIDABLE, PROVIDE DRAIN FITTINGS AT LOW POINTS.

INSTALL CROUSE-HINDS TYPE EZS SEAL FITTINGS, OR EQUIVALENT APPLETON, OR APPROVED EQUAL, AT ALL POINTS WHERE CONDUITS PASS FROM HOT TO COLD LOCATIONS AND FROM INSIDE TO OUTSIDE OF BUILDING WALLS AND ROOFS. PACK SEAL FITTINGS IN NONHAZARDOUS AREAS WITH NON-HARDENING DUCT SEALING COMPOUND, GRAYBAR PERMAGUM, OR EQUAL.

DO NOT INSTALL CONDUITS CLOSER THAN 6 INCHES TO PARALLEL RUNS OF FLUES, STEAM LINES, HOT WATER PIPES OR OTHER PIPES CARRYING MATERIALS HOTTER THAN 200F.

LIQUIDTIGHT FLEXIBLE METAL CONDUIT WHERE FLEXIBILITY IS REQUIRED.

MINIMUM CONDUIT SIZE 1/2 INCH.

B. RIGID STEEL CONDUIT

MANUFACTURERS (OR APPROVED EQUAL):

ALLIED TUBE AND CONDUIT
STEELDUCT
TRIANGLE - PWC
WHEATLAND TUBE

HOT-DIP GALVANIZED, THREADED, RIGID STEEL IN ACCORDANCE WITH UL 6 AND ANSI C80.1.

C. INTERMEDIATE CONDUIT

MANUFACTURERS (OR APPROVED EQUAL):

ALLIED TUBE AND CONDUIT
TRIANGLE - PWC

HOT-DIP GALVANIZED, THREADED RIGID-TYPE STEEL IN ACCORDANCE WITH UL 1242.

D. LIQUIDTIGHT FLEXIBLE CONDUIT

MANUFACTURERS (OR APPROVED EQUAL):

ANACONDA INDUSTRIES - SEALTITE TYPE UA
ELECTRI-FLEX LA
LIQUATITE LA
O-Z/GEDNEY FLEXI-GUARD TYPE UAG

UL LISTED, CONCAVE SINGLE STRIP, HELICALLY WOUND GALVANIZED STEEL STRIP INTERLOCKED AND TIGHTLY JOINTED, THE WHOLE COVERED WITH A CONTINUOUS LIQUIDTIGHT PVC JACKET. EXTRA-FLEXIBLE NON UL-LISTED TYPES WILL NOT BE ACCEPTABLE.

E. CONDUIT BODIES

MANUFACTURERS (OR APPROVED EQUAL):

APPLETON
CROUSE-HINDS
PYLE-NATIONAL
RACO

UNLESS OTHERWISE INDICATED, ALL CONDUIT BODIES FOR RIGID STEEL AND INTERMEDIATE METAL CONDUIT TO BE THREADED. NEOPRENE GASKETED COVERS WITH BLIND TYPE CAPTIVE SCREWS. COVERS TO BE CAST TYPE.

F. COUPLINGS, FITTINGS AND CONNECTORS

MANUFACTURERS (OR APPROVED EQUAL):

APPLETON
EFCOR
O-Z/GEDNEY
PYLE-NATIONAL
RACO
STEEL CITY
THOMAS & BETTS

FOR LIQUIDTIGHT FLEXIBLE METAL CONDUIT, USE O-Z/GEDNEY "GROUND-TIGHT" TYPE 4QLT, OR APPROVED EQUAL, GROUNDING LIQUIDTIGHT CONNECTORS WITH INSULATED THROATS.

16400.05 RACEWAY MARKING

MARK RACEWAYS CONTAINING CIRCUITS OPERATING IN EXCESS OF 120V TO GROUND OR IN EXCESS OF 240V LINE-TO-LINE, ON GROUNDED OR UNGROUNDED SYSTEMS, AS FOLLOWS:

LOCATE RACEWAY MARKERS AT ORIGIN AND DESTINATION OF BRANCHES, AT INTERVENING ACCESSIBLE BOXES, FITTINGS WITH REMOVABLE COVERS, AT LEAST ONE IN EACH ROOM, COMPARTMENT OR VAULT, BOTH SIDES OF AND WITHIN 2 FEET OF THE WALL, FLOOR, OR CEILING PENETRATIONS, AND EVERY 20 FEET. MARK RACEWAYS PRIOR TO CABLE INSTALLATION. JUDICIOUS SELECTION OF MARKING LOCATIONS MAY SATISFY SEVERAL OF THE ABOVE REQUIREMENTS SIMULTANEOUSLY.

AS GENERAL EXCEPTIONS TO THE PRECEDING PARAGRAPH, EXPOSED RACEWAYS 20 FEET OR LESS IN LENGTH MAY BE MARKED IN ONLY ONE LOCATION.

IN SMALL BUILDINGS, ROOMS, ETC., WHERE VERY FEW RACEWAYS EXIST AND THE FUNCTION, ORIGINATION AND DESTINATION OF THE RACEWAY IS OBVIOUS, NO MARKING IS REQUIRED EXCEPT A VOLTAGE MARKING AT ACCESSIBLE TERMINAL, JUNCTION, OR SPLICE BOXES WITH REMOVABLE COVERS. EMBEDDED OR BURIED RACEWAYS NEED NOT BE MARKED WHERE BURIED OR EMBEDDED.

MARK WITH SELF-STICKING VINYL CLOTH LABELS, BLACK IDENTIFICATION ON AN ORANGE BACKGROUND, AS MANUFACTURED BY W. H. BRADY CO., OR APPROVED EQUAL, WITH LENGTH AS INDICATED BELOW, ENCIRCLING A MAJORITY OF THE VISIBLE PART OF THE RACEWAY.

IDENTIFICATION LETTER/NUMBER AND LABEL SIZE IN ACCORDANCE WITH THE FOLLOWING (NEAREST SIZE IS ACCEPTABLE):

CONDUIT TRADE SIZE OR LARGEST DIMENSION, EXCEPT LENGTH OF OTHER RACEWAY	BAND LENGTH	LEGEND LETTER/ NUMBER SIZE
1/2 TO 1-1/4	8	1/2
1-1/2 TO 2	8	3/4
2-1/2 TO 6	12	1-1/4
8 TO 10	24	2-1/2
OVER 10	32	3-1/2

(ALL DIMENSIONS IN INCHES)

LOCATE LABELS AND LETTERING IN THE MOST LEGIBLE AND PROMINENT POSITION. AFTER INSTALLATION, BRUSH COAT LABELS WITH CLEAR LACQUER, COVERING EDGES WELL. IN LIEU OF THE LABELS, A STENCILED IDENTIFICATION BAND IS PERMISSIBLE IF CONDUIT IS TREATED TO ACCEPT PAINT.

IDENTIFICATION TO INCLUDE CONDUIT NUMBERS, WHERE DESIGNATED, CABLE OR CIRCUIT NUMBER OR AN ORANGE BACKGROUND BAND, SUCH AS "R-50," "F4-67," OR "LP-6-15."

MARK SPARE RACEWAYS WITH A RACEWAY NUMBER SUCH AS "R-50" OR "C-109." WHERE SUCH RACEWAYS ARE NOT EXPOSED, MARK WITH ETCHED OR STAMPED NUMBERS ON ACCESSIBLE PLUGS OR CAPS OR ON METAL TAGS ATTACHED TO THE STUBS, CAPS, OR PLUGS.

16400.06 PULL BOXES AND JUNCTION BOXES

PULL BOXES AND JUNCTION BOXES FOR INTERIOR WORK, 6 INCHES BY 6 INCHES BY 4 INCHES DEEP MINIMUM OR SIZED AS INDICATED, CODE GAGE GALVANIZED STEEL, COVERS FASTENED WITH BRASS SCREWS. SUPPORT BOXES INDEPENDENT OF RACEWAY SYSTEMS.

16400.07 WIRE AND CABLE

A. BUILDING WIRE, 600 VOLTS OR LESS

USE NO WIRE SMALLER THAN NO. 12 AWG, RATED AT 600 VOLTS, FOR LIGHTING CIRCUITS AND NO SMALLER THAN NO. 14 FOR CONTROL WIRING, UNLESS OTHERWISE SPECIFIED OR INDICATED.

ALL WIRE, REGARDLESS OF SIZE, TO BE STRANDED COPPER.

NO REDUCTION IN WIRE SIZES BASED ON AMPACITY OR OTHER REASON WILL BE PERMITTED.

DETERMINE, FOR LUMINAIRES FURNISHED, WHETHER SPECIAL WIRING IS REQUIRED, AND PROVIDE THAT TYPE OF WIRING.

PROVIDE UL LISTED COPPER BUILDING WIRE AND CABLE AS MANUFACTURED BY AMERICAN, ANACONDA-ERICSSON, ITT ROYAL, OKONITE, PHELPS-DODGE, PIRELLI, ROME, TRIANGLE - PWC, OR APPROVED EQUAL, TYPES AS INDICATED BELOW.

FOR LIGHTING AND CONTROL:

ALL SIZES TYPE THHN/THWN.

B. PREASSEMBLED AERIAL CABLE

BRAND-REX TYPE VN-TC, OR APPROVED EQUAL, 3-CONDUCTOR, 600 VOLT, ROUND CABLE WITH TYPE THHN/THWN STRANDED COPPER CONDUCTORS, BLACK PVC, HYPALON OR NEOPRENE JACKET MEETING UL1277 REQUIREMENTS FOR FLAME RETARDANCE, COLD BEND AND SUNLIGHT RESISTANCE.

PREASSEMBLE CABLE TO 3 NO. 8 AWG (3-STRAND) 30 PERCENT/EHS COPPERCLAD STEEL MESSENGER WITH POLYETHYLENE-COATED COPPER BINDING STRIP. CABLE ASSEMBLY TO MEET NEC REQUIREMENTS FOR TYPE TC CABLES, OUTDOOR USE.

16400.08 GROUNDING

GROUNDING MATERIALS AND HARDWARE - BURNDY, CHANCE, ITT BLACKBURN, ITT WEAVER, JOSLYN, MCGRAW EDISON, O-Z/GEDNEY, THOMAS AND BETTS, OR APPROVED EQUAL.

EXOTHERMIC WELDING - HEAVY-DUTY CADWELD OR HEAVY-DUTY THERMOWELD, OR APPROVED EQUAL.

GROUND THE FOLLOWING AS REQUIRED BY THE NEC AND AS SPECIFIED:

DERIVED SYSTEM NEUTRALS
ALL EQUIPMENT ENCLOSURES
LUMINAIRES AND POLES
OTHER ELECTRICAL DEVICES AS INDICATED OR REQUIRED BY NEC

CLEAN SURFACES TO BRIGHT METAL BEFORE MAKING GROUND CONNECTIONS AND RESTORE ORIGINAL FINISH AFTER MAKING CONNECTIONS.

INSTALL A SEPARATE INSULATED METALLIC GROUND CONDUCTOR IN ALL CONDUITS, WHETHER OR NOT INDICATED.

GROUND POLES AND LUMINAIRES AS INDICATED ON THE DRAWINGS.

DIVISION 16

16480 - EXTERIOR ELECTRICAL WORK

16480.01 AERIAL SERVICE

PROVIDE AERIAL SERVICE FROM PLANT 1 TO LIGHTING POLES, SAGGING AND CONNECTING PREASSEMBLED AERIAL CABLE AS INDICATED.

WHEN INSTALLING AERIAL CABLE USE EQUIPMENT AND METHODS SUCH THAT SAFETY OF ALL PERSONNEL IS MAINTAINED AND THAT MATERIAL USED IN CONSTRUCTION IS NOT DAMAGED. TAKE CARE THAT CONDUCTORS ARE NOT SCRATCHED, ABRADED, KINKED OR TWISTED DURING INSTALLATION. EMPLOY FREE-TURNING STRINGING BLOCKS OF SUFFICIENT SIZE AND DIAMETER FOR THE CONDUCTORS. IN NO CASE ARE STRINGING BLOCKS TO HAVE SMALLER RADII THAN CABLE MANUFACTURER'S MINIMUM ALLOWABLE BEND RADIUS.

DIVISION 16

16500 - LUMINAIRES AND LIGHTING

16500.01 LUMINAIRES

PROVIDE NEW LUMINAIRE OF THE TYPE INDICATED AT EACH LOCATION INDICATED.

16500.02 POLE MOUNTED 400 WATT FLOOD LIGHTS

A. MECHANICAL

THE HOUSING SHALL BE DIE CAST COPPER FREE ALUMINUM (LESS THAN 0.2%) AND SHALL BE COATED WITH ELECTROSTATICALLY DEPOSITED AND THERMALLY SET POWDERED POLYESTER PAINT. ALL EXPOSED METAL PARTS, INCLUDING THE YOKE, SHALL BE AISI TYPE 316 STAINLESS STEEL. THE FIXTURE SHALL BE CAPABLE OF BEING AIMED IN ANY DIRECTION FROM ANY MOUNTING SURFACE ORIENTATION. THE DOOR SHALL BE HINGED TO PROVIDE EASY ACCESS DURING LAMPING AND SHALL BE SECURED TO THE FIXTURE WHILE OPEN. DOOR FASTENING DEVICES SHALL BE CAPTIVE. THE DOOR ASSEMBLY SHALL INCLUDE MECHANICAL STOPS TO ASSURE PROPER COMPRESSION OF THE HOLLOW CORE SILICONE GASKET. THE FIXTURE SHALL HAVE THREADED ENTRY TO ACCOMMODATE 1/2 INCH CONDUIT OR CONNECTOR.

B. ELECTRICAL

ALL ELECTRICAL COMPONENTS, INCLUDING SOCKET AND QUICK DISCONNECT, SHALL BE REMOVEABLE AND REPLACEABLE AS A SINGLE UNIT WITHOUT DISTRUBING THE AIMING. THE BALLAST SHALL BE 400 WATT HIGH PRESSURE SODIUM, 480 VOLT, DOUBLE FUSED, HIGH POWER FACTOR AUTOTRANSFORMER, COPPER WOUND WITH CLASS H INSULATION. TOTAL INPUT WATTS AT 480 VOLTS SHALL NOT EXCEED 455 WHILE DELIVERING NO LESS THAN 400 WATTS TO THE LAMP.

C. OPTICAL

FIXTURE SHALL INCLUDE A REFLECTOR ANODIZED TO A MINIMUM DEPTH OF 2 MILS. THE REFLECTOR SHALL HAVE TRANSVERSE ELCIPTICAL FLUTING TO PREVENT REDIRECTION OF LIGHT ENERGY THROUGH THE ARC TUBE AND TO PROVIDE EVEN ILLUMINATION ON THE LIGHTED SURFACE. NO LESS THAN 50 PERCENT OF THE LAMP LUMENS SHALL BE INCLUDED IN A VERTICAL BEAM ANGLE OF 60°, CENTERED AT THE AIMING POINT. THE CENTER BEAM INTENSITY SHALL NOT EXCEED 20,000 CANDELAS.

D. LISTING

THE FIXTURE SHALL BE UL LISTED FOR 40°C AMBIENT, "SUITABLE FOR WET LOCATIONS," AND UL595 MARINE/OUTSIDE FIXTURE TO BE HO LOPHANE "PREDATOR NO. 1F2A-48-N-M-F2," OR APPROVED EQUAL.

16500.03 LAMPS

GENERAL ELECTRIC, PHILIPS, SYLVANIA, OR APPROVED EQUAL, WITH THE FOLLOWING RATINGS AND SUITABLE FOR LUMINAIRE TYPES UTILIZED.

WATTAGE	ANSI CODE & DESCRIPTION	MINIMUM LUMENS, INITIAL	LIFE, HOURS
400	S51WA-400 (CLEAR)	50,000	24,000

16500.04 LUMINAIRE MOUNTING AND WIRING

MOUNT LUMINAIRES ON BRACKETS ON POLE AND WIRE AS INDICATED OR REQUIRED AND IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

MOUNT LUMINAIRES PLUMB, LEVEL AND IN ALIGNMENT. AIM EACH LUMINAIRE IN ACCORDANCE WITH INFORMATION ON THE DRAWINGS.

16500.05 STEEL LIGHTING POLES

PROVIDE GALVANIZED ANCHOR BASE TYPE TAPERED STEEL POLE AT EACH LOCATION INDICATED.

POLE TO BE COMPLETE WITH BULLHORN FLOODLIGHT BRACKETS, LUMINAIRE MOUNTING ADAPTERS, MESSENGER CABLE ATTACHMENT FACILITIES, SECONDARY LIGHTNING ARRESTERS, CABLE TERMINAL BOX, PHOTOCELL (WITH ENCLOSED FUSED TRANSFORMER AND RELAY AS REQUIRED). PROVIDE GALVANIZED OR STAINLESS STEEL ACCESSORIES AND HARDWARE AS INDICATED OR REQUIRED.

PROVIDE POLE OF ADEQUATE CROSS-SECTION, WALL THICKNESS AND STRENGTH TO MEET THE FOLLOWING REQUIREMENTS:

BENDING MOMENT AT THE BASE AT YIELD POINT: 50,000 FOOT-POUNDS MINIMUM.
ELASTIC DEFLECTION AT A POINT 18 INCHES BELOW THE TOP OF THE POLE, FOR A STEADY FORCE APPLIED 18 INCHES BELOW THE TOP, TO BE A MAXIMUM OF 2 INCHES PER 100 POUNDS.

FURNISH HIGH STRENGTH GALVANIZED ANCHOR BOLTS FOR INSTALLATION IN CONCRETE POLE BASE UNDER DIVISION 3.

INSTALL POLES PLUMB EXCEPT WHERE INDICATED TO BE RAKED.

INSTALL POLES ON CONCRETE BASES PROVIDED UNDER DIVISION 3.