



**Department of Energy**

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NOV 03 2000

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Mr. Tom Schneider, Project Manager  
Ohio Environmental Protection Agency  
401 East 5<sup>th</sup> Street  
Dayton, Ohio 45402-2911

DOE-0102-01

Dear Mr. Schneider:

**TRANSMITTAL OF RESPONSES TO ADDITIONAL COMMENTS ON THE OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENT RESPONSES FOR THE DRAFT 90% INTEGRATED REMEDIAL DESIGN PACKAGE FOR AREA 3A/4A**

- References:
- 1) Letter, J. Reising to J. Saric and T. Schneider, "Management of Wastewater Streams Containing F-Listed Constituents – Fernald Environmental Management Project," dated April 15, 1998
  - 2) Letter, T. Schneider to J. Reising, "Area 3A/4A IRDP RTC," dated August 30, 2000

Enclosed for your approval are responses to additional comments on the Ohio Environmental Protection Agency comment responses for the draft 90% Integrated Remedial Design Package (IRDP) for Area 3A/4A. Also enclosed with the responses are draft Technical Specification Sections 02100, 02230 and 02930 and Reference 1 as listed above. Upon acceptance of these comments by the Agencies, the Department of Energy will prepare the Area 3A/4A Certified for Construction package and the final Implementation Plan.

If you have any questions or need further information, please contact Robert Janke at (513) 648-3124.

Sincerely,

Johnny W. Reising  
Fernald Remedial Action  
Project Manager

FEMP:R.J. Janke

Enclosures

Mr. Tom Schneider

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NOV 03 2000

cc w/enclosures:

R. J. Janke, OH/FEMP  
G. Jablonowski, USEPA-V, SRF-5J  
J. Saric, USEPA-V, SRF-5J  
T. Schneider, OEPA-Dayton (three copies of enclosures)  
F. Bell, ATSDR  
F. Hodge, Tetra Tech  
M. Schupe, HSI GeoTrans  
R. Vandegrift, ODH  
AR Coordinator, Fluor Fernald, Inc./78

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D. Pfister, OH/FEMP  
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**RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY  
COMMENT RESPONSES ON THE  
DRAFT AREA 3A/4A INTEGRATED REMEDIAL DESIGN PACKAGE  
(20800-IRDP, REVISION B)**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT**

**GENERAL COMMENTS ON THE IMPLEMENTATION PLAN**

Commenting Organization: Ohio EPA  
Section #: Pg. #: Line #: Commentator: OFFO  
Code: C

Original Comment #: 1

Comment: 1. We still find it difficult to believe that the excavations will be built as designed. We cite the following additional examples of excavations that appear overly complex:

- A. Drawing 00021. Look north of the Plant 9 footprint about 140 feet north of the "table" in our original comment. Notice the four excavations roughly 11 feet square and 1 foot deep that are separated from each other by 10 feet. It is our experience in the STP and other projects that the three excavations would be performed continually, that is one excavation 70 feet long and 10 feet wide would be dug to a 1-foot depth. The increased volume to the OSDF would be less than 12 cubic yards.
- B. On Drawing G-00072 north of control point 21 is a long narrow berm between two deeper excavations.
- C. Also on Drawing G-00072 are seven 1-foot deep excavations roughly 5 feet square. These are oriented in an east-west line and span a distance of 140 feet.

Based on past experience at the FEMP, we believe that the design under-estimates the total volume of soil to be excavated. We predict that making these drawings so complicated will result in a larger volume of soil excavated than predicted. The STP and the South Field Projects both resulted in a significantly greater excavation volume than originally planned.

- 2. It is not our experience that "the survey to verify excavation volume is not a high priority." To the contrary, our observations have been that when excavation volumes are pay items, they are the highest priority.
- 3. Section 02100-Surveying was not included in our Package. This should be provided.
- 4. We also take issue with the priority to minimize the volume of uncontaminated soils placed in the OSDF. In any given area, soils excavation will of necessity follow debris generation. Since there is already an excess of debris, we do not see when the soil will catch up.

- Response:
1. The excavation drawings included in the Area 3A/4A IRDP represent the minimum extent of excavation required to remove subsurface structures and the known soil contamination while maintaining slope stability. It is not DOE's intention to ignore constructability issues. However, since many undefined field conditions may require additional excavation beyond the minimum grade, expanding the design for ease of construction alone is not very meaningful at this time.

DOE will add general language to the technical specifications to allow flexibility in expanding excavations when needed to accommodate actual field conditions. For example, if additional structures and contamination are discovered during the excavation, the materials and soil will be excavated to ensure final remediation levels (FRLs) can be met during the precertification and certification activities. Additionally, the construction manager may give directions to excavate soil beyond the design grade to provide suitable equipment access to the excavation and/or make the excavation constructable for the actual perched groundwater, climate and soil conditions. The current performance-based specifications provide flexibility for the subcontractor to efficiently handle unexpected conditions without being penalized for overexcavation. A safe work plan, to be submitted by the excavation subcontractor before initiation of excavation, will also provide contingencies for unexpected conditions.

Immediately after remedial excavation, precertification, and certification activities in Area 3A/4A are completed and remediation has been shown to be successful, all excavations will be smoothed and sloped at 5:1 by the same excavation contractor to grade the area into the final restoration configuration as much as possible. Conceptual drawings showing the smoothed final grades will be issued to U.S. EPA and OEPA for review and approval.

2. In general, the number of survey points will not be greatly affected by changing the design. The time needed to obtain a survey point is relatively short, given the use of GPS software.
3. The surveying specification is enclosed for review.
4. The bulk debris staging area is being constructed to provide relief for the initial demand of a large volume of soil to place the debris. Staging the debris will allow ample time for construction to open up excavations to provide the soil to place the staged debris. There is ample soil to place all debris. The problem in the past has been recycling of roll-off boxes, which required that the soil be immediately available to place the debris. This requirement is no longer applicable.

Action: Language will be added to Specification 02205 under the General Excavation heading to note that the excavation design may be modified as directed by the construction manager when field conditions warrant a change. Draft restoration drawings were provided to U.S. EPA and OEPA at the Technical Information Exchange (TIE) Meeting on October 10, 2000. The survey specification is enclosed for U.S. EPA and OEPA review and approval.

Commenting Organization: Ohio EPA  
 Section #: Pg. #: Line #: Commentator: OFFO  
 Code: C

Original Comment #: 6

Comment: The work plan for treating the PCE/TCE/DCE-contaminated soil must be submitted to the Agencies for review and approval. Be advised that Hamilton County will need to be contacted for the proper air permits along with whatever stack or performance testing requirements are necessary.

Response: Comment noted.

Action: A work plan will be written for treating PCE/TCE/DCE-contaminated soil and it will be submitted to U.S. EPA and OEPA for review and approval. The treatment plan will be submitted to the Agencies when the final Implementation Plan is delivered in late December 2000 or early January 2001.

Commenting Organization: Ohio EPA  
 Section #: Pg. #: Line #: Commentator: OFFO  
 Code: C

Original Comment #: 13

Comment: The response and action are satisfactory except for two minor issues:

1. Our danger signs were intended to illustrate examples and were not intended to be comprehensive yet our comment is to be added verbatim to the text. Geologists from the ARWWT Project should be consulted for a more thorough listing of indications that the GMA materials are being approached or penetrated.
2. Provide qualifications for the engineering personnel who will identify if the GMA is breached. They should have prior experience in soils classification.

Response: Text will be changed in the Original Action 13 response to incorporate the noted comments. Specifically, an Aquifer Restoration/Wastewater Project (ARWWP) geologist will be present to observe the excavated materials when excavations approach within 5 feet of the Great Miami Aquifer (GMA). Additionally, the geologist will review the current cross sections in the drawing package to verify that the correct depth has been used for the till/GMA contact.

Action: The following text will be added to Section 3.6 after Line 14: *When deep excavations approach within 5 feet of the till/GMA contact depicted on the cross sections, a geologist familiar with the GMA sand and gravel deposits will be present to observe the excavation. If the geologist believes that sand and gravel material associated with the GMA has been encountered, excavation activities will be stopped to examine the nature of the material in the bottom of the excavation. The geologist will determine if the GMA has been breached and, if so, what course of actions is required to protect the GMA.*

*Selected actions will be dictated by weather conditions and/or forecasts. If precipitation is likely in the next 24 hours, the breach will be backfilled immediately to a minimum depth of 2 feet with gray clay from the local excavation. All ponded water will be pumped from the affected excavation as soon as practical following the precipitation event. When excavation resumes, or in the event that excavation continues because a precipitation event is not imminent, the lateral extent of excavation around the breach*

*will be completed per the design. However, the depth of excavation will be taken as the top of the unconsolidated sand and gravel when this horizon is reached prior to the design depth. Excavation into the sand and gravel deposits of the GMA is prohibited. Once the excavation is complete, backfilling and sampling of the plug will take place as noted above.*

Text will also be added to Specification 02206 to communicate to the contractor that there may be a hold point in the work to determine if GMA sediments are present in the bottom of the excavation.

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #:

Pg. #:

Line #:

Code: C

Original Comment #: 17

Comment: We have two concerns about returning overburden and pipe bedding material to the trench: contamination and the use of pipe bedding as select impacted material in the OSDF.

Firstly, pipe trenches may serve as a conduit for migration of contaminants. This is possible even for non-process pipes. For example, a trench for a communications cable may preferentially allow migration of surface spills. In this scenario, we suspect that efforts made during production years to clean up spills would have terminated well before the work proceeded very closely to the pipe. The text also acknowledges a lack of sampling data in the trenches. Furthermore, surface scans would be ineffective in detecting contamination that migrated within the bedding material. The process of excavating the trench and spreading the pipe bedding material into a 6-foot wide flat surface could serve to mix and dilute contamination. The possibility that above-FRL soils will be overlooked is particularly high in the case of the non-process piping in which pipe bedding material will only be scanned at 50-foot intervals.

Secondly, our understanding of the OSDF construction sequence is that there will nearly always be either a cap or a liner being built. We do not expect that there will be a time in the future that select material will not be in short supply. We expect that there will be a time in the future that select material will not be in short supply. We expect that the glacial tills comprising most of the cut and filled locations in the Former Production Area will not meet the specification for select material without sorting or screening. Pipe bedding should already meet the select criterion.

To summarize, our position is that pipe bedding should be administratively dispositioned in the OSDF as select impacted material providing it meets the WAC.

Response: The discussion in Section 3.4.4 does not refer to placing pipe bedding material back into the trench; this material is scanned with real-time instruments and then transported to Soil Stockpile 7 (SP7) or the OSDF. Overburden material was to be placed back in the trench if it passed a real-time scan. However, DOE has no problem with sending both overburden and pipe-bedding material to the OSDF for use as select and/or contouring material when it is below the OSDF waste acceptance criteria (WAC).

Action: The discussion in Section 3.4.4 will be revised to note that overburden and pipe-bedding material will be scanned and placed in the OSDF as select and/or contouring material if it is below the OSDF WAC. Figure 3.4 and Drawings 99x-1900-G-00045 and -00107 will be revised to reflect the change.

Commenting Organization: Ohio EPA

Commentator: ODH

Section #:

Pg. #:

Line #:

Code: C

Original Comment #: 22 and 29

Comment: Section 3.5.1 on Page 3-19 states that "Perched groundwater that resides in excavation zones that contain organic contamination... will be collected in tanks and transferred to the BSL, which is the headwater for Phase II treatment at the AWWT Facility. Non-VOC water will be routed through the settling basin and storm sewer to the SWRB. The SWRB serves as the headwater for Phase I for treatment at the AWWT Facility." This indicates that water in which VOCs are detected will be sent to Phase II for treatment. The response to comments states that water that exceeds the values listed in Table 7 of OAC 3745-1-07 will be sent to Phase I for treatment. This is unacceptable. If VOCs are detected, the water must be sent to Phase II for treatment. In addition, the VOCs listed (PCE, TCE, and DCE) do not appear in the NPDES permit for monitoring at either 001 or 002. In speaking with the permit writer in our office, it appears as though these VOCs may not have been included in the original application. In any event, it would appear prudent to apply for a permit modification to include monitoring of these VOCs at the outfalls 001 and 002.

Response: The comment addresses several issues. First, there is an error in the above comment citation of DOE's proposal to send water to Phase I treatment if it exceeds the VOC thresholds in Table 7-1 of OAC 3745-1-07. The second concerns the proposed VOC thresholds below which discharge to the Stormwater Retention Basin (SWRB) would be allowed. The third concerns the issue of current National Pollutant Discharge Elimination System (NPDES) permit applicability relative to dewatering activities in the Former Production Area.

First, the original response to original Comment No. 18, which is cited as the response to original Comment No. 22, states that *"If the VOC concentrations in the samples exceed 3,000 µg/L for 1,1-dichloroethylene, 1,100 µg/L for tetrachloroethylene, or 3,400 µg/L for trichloroethylene (the water standards for "inside the mixing zone maximum" from Table 7-1 of OAC 3745-1-07), the water will be collected in tanks and transported to the BSL, or pumped to the BSL, for Phase II treatment. Water with concentrations below the listed values will be pumped to the Tank Farm Settling Basin for eventual transmission to the SWRB and AWWT Phase I treatment"* (emphasis added).

Second, if OEPA does not agree with the thresholds in Table 7-1 of OAC 3745-1-07, DOE proposes the following threshold. DOE will sample the excavation water in suspect VOC areas and analyze the samples on a portable GC unit for PCE, TCE, and/or DCE (list of COCs is dependent on affected area) prior to a normal discharge event. A portable GC unit is proposed to allow the determination of contamination to be made as soon as possible in the event a 72-hour dewatering requirement is imposed upon the contractor. If any of the analytes exceed a reasonable detection limit for the portable GC unit (e.g., 50 µg/L for PCE, TCE, and DCE), the water will be transported or pumped to the BSL for Phase II treatment at the AWWT Facility. When each individual analyte level is below 50 µg/L, the water will be discharged to the SWRB. The 50-µg/L detection limit for the portable GC unit minimizes the chance for false positive detections that may occur when lower detection levels are used.

A possible contingency for this protocol may arise if a large storm event overwhelms the holding capacity of the excavation. When discharges to the BSL or any other holding basins are not possible due to an excessive inventory of water, the water would be directly discharged to the SWRB without screening for the indicated VOCs. To the extent possible, no discharges to the storm sewer system will be made during periods when the SWRB is bypassing or overflowing. These actions will be taken consistent with the bypassing provisions included in the NPDES permit.

Third, DOE does not believe that a permit modification is required in managing perched groundwater and storm water in this manner. Excavation dewatering from the Former Production Area was described in the NPDES Permit Application of September 1997. (NPDES Permit Renewal Application, September 18, 1997, EPA Form 3510-2C, Section IIB, "Flows, Sources of Pollution and Treatment Technology".) Further, each of the parameters identified (PCE, TCE, and DCE) were fully evaluated during the NPDES permitting process. The OEPA modeling section was provided with the perched groundwater data set collected during the remedial investigation. Following OEPA policy, their analysis determined that PCE and DCE did not meet thresholds necessary for establishing an effluent limit. At OEPA's discretion, monitoring requirements for these pollutants were not established in the renewed FEMP NPDES Permit effective March 1, 2000. OEPA determined that TCE did meet a threshold requiring effluent limits and monitoring requirements. These requirements for TCE were included in the renewed NPDES Permit.

Based on historical data, DOE used best professional judgment in the NPDES Permit Application to determine that VOCs would not be expected to be present at Outfall 4002 (SWRB Spill Way). Managing water from excavations in the Former Production Area as described above would not impact this determination. Therefore, DOE's position is that the proposed monitoring strategy noted above will not result in a significant change in the character of the FEMP discharge.

Also, during the TIE Meeting on October 10, 2000, OEPA asked DOE and Fluor Fernald to revisit the FEMP's existing agreements concerning the RCRA listed status and pretreatment requirements for perched groundwater that is collected during soil excavation activities, and reaffirm that the existing agreements remain appropriate for VOC-laden perched groundwater collected in Areas 3A and 4A. Our subsequent review indicates that, according to the December 15, 1995 final Operable Unit 5 ROD (see Page 9-8), pretreatment of VOC perched groundwaters was found to be necessary only for perched groundwaters collected in the vicinity of the Sludge Drying Beds and the former Fire Training Area to avoid introducing RCRA-listed substances into the treatment residuals produced at the FEMP's AWWT. Pretreatment of perched groundwaters collected from the other portions of the FEMP Production Area, was not considered necessary due to the multi-source nature of the VOCs existing in the perched groundwater (known informally as the "sea of soup" situation), provided that the collected water was routed for carbon treatment at Phase II of the AWWT. Then, in Spring 1998, the pretreatment step for waters collected at the Sludge Drying Beds and the Fire Training Area was also deemed to be unnecessary, based on the mixture rule exclusion for small wastewater streams provided in OAC 3745-51-03(a)(2)(e) (see attached April 15, 1998 letter). Therefore, based on ROD requirements and the subsequent April 15, 1998 letter, all VOC-laden groundwater that collects in soil excavations can be routed directly to Phase II of the AWWT for carbon treatment, without creating the need

for an additional carbon pretreatment step. What remains is the establishment of a concentration-based trigger level that can be readily implemented in the field (such as the field detection thresholds proposed in this comment response) for determining when detectable quantities of VOCs are present that should go to the Phase II carbon system.

**Action:** The discussion in Section 3.5.1 will be modified to note that sampling and analysis will be conducted on excavation water present in suspect VOC areas prior to a normal discharge event. If analytical results obtained with a portable GC unit indicate that PCE, TCE, and/or DCE exceed 50 µg/L, the water will undergo Phase II treatment at the AWWT Facility. Water with concentrations of these constituents below 50 µg/L will be pumped to the SWRB. A contingency would be provided to allow for direct discharge of the water to the SWRB in the event that the water holding capacity in the excavations is exceeded by a large storm event, consistent with the relief provided by the FEMP's NPDES permit requirements.

Commenting Organization: Ohio EPA  
 Section #: Pg. #: Line #: Commentator: OFFO  
 Code: C  
 Original Comment #: 42

**Comment:** Ohio EPA does have a copy of the OSDF Phase III package. No where in the technical specifications does it mention that the referenced sections are in the Phase III package. Add a section clarifying where the referenced sections can be found.

**Response:** The OSDF Phase III package is no longer applicable to the Area 3A/4A design, as the DOE will no longer bid the construction of these projects as a single contract. All relative specifications will be placed in the Area 3A/4A specification package.

**Action:** The seeding and survey specifications in the OSDF Phase III package will be modified and added to the Area 3A/4A package. These specifications will be submitted to OEPA and U.S. EPA for review and approval prior to issuing the certified-for-construction (CFC) package.

Commenting Organization: Ohio EPA  
 Section #: Pg. #: Line #: Commentator: OFFO  
 Code: C  
 Original Comment #: 48

**Comment:** The response is not satisfactory. Operable Unit 3 procedures for sending a tank to the OSDF would have followed this sequence:

1. Safe shut-down would empty the tank of components that would be harmful to the D&D crew.
2. Process-related metals would be visually examined to verify the absence of process residues. Visible stains and/or corrosion would be allowed but hold-up material or fixed residue would not be consistent with the WAC Attainment Plan and would drive a requirement for off-site disposal.
3. The tank would be size-reduced to be placed as Category 2 material.

The response states probing with a dipstick is deemed sufficient to determine that a tank is empty. The response does not mention the visual determination criteria. The specification should be re-written to include the visual criteria. The re-write should also make it clear that sludge, residues, hold-up and the like do not comply with the WAC.

These materials should be drummed for placement in the Special Materials Handling Area.

Response: Agree. Visual examination of the interior tank wall will be required prior to making a decision on whether the tank can be disposed in the OSDF. The specification will be rewritten to reflect the visual criteria of no sludge, residue, or hold-up material if the tank is placed in the OSDF. If such materials are found, they will be handled as special materials.

Action: Revise Specification 02205 to incorporate the noted changes.

Commenting Organization: Ohio EPA  
Section #: Pg. #: Line #: Commentator: OFFO  
Code: C  
Original Comment #: 52

Comment: With SP4 already gone, the document should not reference "loading and hauling material from SP4." According to the comment response, the new stockpile is to be named A3A-008. To prevent any possible confusion as to what material is located at that spot, the text should reference the new pile name.

Response: Agree. The specification will be changed to reflect the new stockpile ID A3A-008.

Action: Modify Specification 02205 by replacing SP4 with A3A-008.

Commenting Organization: Ohio EPA  
Section #: Pg. #: Line #: Commentator: OFFO  
Code: C  
Original Comment #: 54

Comment: We agree that hydraulic conductivity is not an appropriate specification for the clay plug because of the turn-around time to perform the test. We take issue with the allowance that clay be compacted at +/- 3% optimum moisture content. Experience with the OSDF clay liner has shown that clay with a moisture content 0 to 3% wetter than optimum will more consistently give a satisfactory Proctor density.

Response: Agree. The specification will be revised to note that clay with a moisture content of 0 to 3 percent wetter than optimum will be used for the clay plugs.

Action: Revise Specification 02206 as noted above.

Commenting Organization: Ohio EPA  
Section #: Pg. #: Line #: Commentator: OFFO  
Code: C  
Original Comment #: 55

Comment: The issue of sequencing certification samples and installation of the clay plug should be re-visited in light of the response to Ohio EPA's Original Comment #8. Activities scheduled for the bottom of excavation (plugging, sampling, real-time scans are all at the mercy of rainfall. We learned at the STP during 1999 that rain delays can be very time consuming when excavations fill with water. We need to develop a strategy that includes performing all operations without delays in the excavations that require plugging.

We suggest a strategy that includes an expedited certification review. A certification approach should be developed around the designed excavation. This approach would have real-time and physical sampling components and would contain all of the elements

in a Certification Design Letter (CDL). The CDL would be reviewed prior to design grade being reached. It may be expeditious to negotiate a "cookbook" approach which standardizes the number of samples needed based on the area to be plugged. Real-time and physical sampling should commence as soon as design grade is reached. Construction of the plug should not be contingent on physical sampling but should commence when the real-time scans are satisfactory. The plugging will be at risk and the area will need to be re-excavated should the area fail certification.

**Response:** Agree. DOE will develop a strategy with OEPA that includes performing real-time surveys and physical sampling within a 24-hour period when excavations extend within 5 feet of the GMA sand and gravel. The strategy will be focused on developing a CDL approach that standardizes the certification process for these types of excavations. A CDL will be developed for U.S. EPA and OEPA review and approval prior to extending the excavation into the 5-foot buffer zone. Although details of the sampling approach will be provided in the CDL, the general approach will be to scan the surface of the design grade when it is reached and immediately follow with the collection of physical samples. The sample density will be 16 samples per acre, which corresponds closely to the sample density for a 250-foot by 250-foot certification unit. Construction of the plug can commence immediately after collection of the samples, with the understanding that the plug is placed at risk pending results of the certification samples.

**Action:** Specification 02206 and Section 3.6 of the Implementation Plan will be revised to incorporate the general approach for scanning and sample collection in footprints that extend within 5 feet of the GMA sand and gravel.

**NEW COMMENTS ON FIGURES 3-4 AND 3-5,  
TRENCHING BEYOND THE DESIGN SURFACE**

Commenting Organization: Ohio EPA  
Section #: Figure 3-4 Pg. #: Line #: Bullet 4 Commentator: OFFO  
Code: C

Original Comment #:

Comment: Based on our observations during the STP Project, the process piping will be mangled to the extent that visual inspection will be precluded. Pipes whose interiors can not be viewed should not be deemed compliant with the WAC.

What percentage of process piping is expected to not meet WAC? Again, our experience at the STP Protect was that a large fraction of process piping was not dispositioned in the OSDF.

Response: The present specification package and Implementation Plan are in line with OEPA's comment, namely process piping whose interior is not visible must be disposed at SP7. The general excavation section of Specification 02205 states that piping that is deformed, closed, or otherwise hinders visual inspection shall be managed as above-WAC debris.

Figures 3-4 and 3-5 have been combined into a single figure to account for all piping encountered in the excavations. Figure 3-4 has been revised to clarify and incorporate language found in Specification 02205, as noted above.

There is no estimate of the percentage of buried piping that exceeds the WAC. Based on the experience gained from the STP excavation, a high percentage of the removed pipe is likely to be deformed to the point that visual examination is not possible. Therefore, it is expected that a large percentage of the piping will be placed at SP-7.

Action: Add the following text to Figure 3-4, last sentence in Note 4: *Pipe that is deformed, closed or otherwise hinders visual inspection or that cannot be...*

Commenting Organization: Ohio EPA  
Section #: Figure 3-4, Bullets 5 and 6; Figure 3-5, Bullet 6 Commentator: OFFO  
Code: C

Original Comment #:

Comment: Physical samples should be taken from the excavator bucket before the bucket is emptied on the ground and possible contamination is mixed and diluted.

Response: DOE disagrees with the proposed sampling of soil from the excavation bucket due to the safety risk associated with personnel approaching active equipment. Physical samples can easily be obtained from the contents of the bucket dumped for real-time scanning. Waste Acceptance Organization (WAO) personnel will be present to monitor the sampling and ensure that mixing does not take place. OEPA is always free to observe and/or collect samples at their discretion.

Action: Figure 3-4 and Section 3.6 will be revised to note that physical samples will be collected from the contents dumped for real-time scanning prior to compacting the material into the 3-foot diameter by 6-inch deep pad needed for scanning.

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #: Figure 3-5

Pg. #:

Line #: Bullet 2

Code: C

Original Comment #:

Comment: The caption does not indicate the frequency at which pipe bedding material will be monitored for WAC. This should be indicated as one sample per specified length of trench.

Response: Note 6 on Figure 3-4 states that a physical sample is collected every 50 feet.

Action: Figure 3-4 will be revised to note that physical samples will be collected from bedding material at the same 50-foot interval as the real-time monitoring and physical sampling conducted on material excavated from the trench bottom (i.e., below the bedding material).

Commenting Organization: Ohio EPA

Commentator: OFFO

Section #:

Pg. #:

Line #:

Code: C

Original Comment #:

Comment: In the strategy for process piping as outlined in Figure 3-4, the overburden is never tested for FRL before it is returned to the trench. A strategy should be devised to scan the overburden before it is returned to the trench. Similarly, in Figure 3-5, the overburden for non-process piping is referred to in Step 1 as "precertified" but we can not find reference to how this is performed in either the Figure or in Section 3.4.4.

Response: See response to Original Comment No. 17 (this submittal).

Action: Incorporate the noted response on Figure 3-4.

SECTION 02230  
ROAD CONSTRUCTION

PART 1 GENERAL

1.1 SCOPE

- A. This Section includes maintenance roads and the Special Materials Transfer Area (SMTA).

1.2 RELATED SECTIONS AND PLANS

- A. Section 02100 - Surveying  
B. Section 02205 - Impacted Material Excavation  
C. Section 02275 - Erosion and Sediment Control and Surface Water Management  
D. Part 6 - Statement of Work  
E. Part 8 - Environmental Health & Safety/Training Requirements  
F. Part 9 - Quality Assurance Requirements

1.3 REFERENCE

- A. State of Ohio, Department of Transportation (ODOT), Construction and Material Specifications, current edition.

1.4 SUBMITTALS

- A. For each source of base aggregate material, submit the following to the Construction Manager for review and approval within 30 calendar days from Notice to Proceed:
1. the source of the materials along with written certification from the supplier that the material meets the material requirements of this Section; and
  2. test results as required by Ohio DOT Specifications for base aggregate materials demonstrating that it meets the requirements specified in this Section.
- B. Provide name of manufacturer of geotextile along with technical data and certification from the manufacturer or supplier that the geotextile fabric meets the material requirements specified in this Section.
- C. Provide a list of equipment, description of construction methods, and other required information to perform the construction activities described in this Section with the Earthwork Work Plan specified in Section 02205.

1.5 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health & safety/training requirements shall be in accordance with Part 8 of the Contract Documents.

## 1.6 CONTRACTOR'S QUALITY ASSURANCE

- A. Contractor's quality assurance requirements shall be in accordance with Part 9 of the Contract Documents.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Furnish base aggregate material consisting of crushed carbonate stone or crushed gravel, free of organic matter and other deleterious materials, in accordance with ODOT Item 304.02 and 703.04 (2) requirements.
- B. Furnish a geotextile separator in accordance with ODOT Item 712.09 for Type D requirements.

### 2.2 EQUIPMENT

- A. Furnish equipment for construction of the SMTA and maintenance roads in accordance with the requirements of this Section.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Dust control during the performance of road construction activities described in this Section shall be in accordance with Part 6 of the Contract Documents.
- B. Install surface-water management and erosion controls in accordance with Section 02275.
- C. Locate, install, and access the SMTA in accordance with Section 02205.

### 3.2 SUBGRADE PREPARATION

- A. Prior to any earthwork activity, verify that erosion and sediment required for the drainage area are in place and functional.
- B. Verify that areas to be filled or backfilled are free of debris, snow, ice, or water and that surfaces are not frozen. In the event water is encountered, remove and dispose in accordance with the Contractor's approved Surface Water Management Plan (SWMP).
- C. Verify that subgrade is not soft, spongy, or composed of otherwise unstable materials. If unstable materials are encountered, notify the Construction Manager.
- D. Subgrade material shall consist of soil free of debris, foreign objects, organics, and other deleterious materials.

### 3.3 GEOTEXTILE PLACEMENT

- A. Place geotextile on the prepared subgrade under the aggregate material in accordance with manufacturer's installation instructions and as follows:
1. Take precautions to prevent damage to underlying subgrade, including rutting during placement of geotextile fabric.
  2. Geotextile fabric shall be placed directly over the subgrade. The geotextile fabric shall be placed and temporarily anchored in such a manner that placement of overlying materials will not tear or excessively stretch the fabric.
  3. Geotextile fabric shall be installed to the limits of aggregate surface as indicated on the Construction Drawing Details. The geotextile fabric shall be unrolled as smooth as possible on the prepared subgrade. Wrinkles and folds in the geotextile fabric shall be removed by stretching and placing of sod staples or small aggregate piles as required. The fabric shall be installed according to the manufacturer's suggestion at curve locations.
  4. The geotextile fabric shall be field joined, factory seamed, or manufactured in seamless width. Methods of field joining shall include overlapping of adjacent edges and ends of geotextile fabric a minimum of 18-inches. Sand bags or other weights may be used for temporary anchoring.
  5. The geotextile fabric shall extend to the edges of the aggregate surface.
  6. The Contractor is responsible for repair/replacement of geotextile left uncovered. The construction Manager may direct the Contractor to remove/replace geotextile left uncovered for more than 24 hours.
  7. Construction traffic shall not be permitted directly on the geotextile fabric.
  8. Geotextile fabric is not required when additional aggregate material is to be added to existing aggregate surface, unless otherwise directed by the Construction Manager.

### 3.4 BASE AGGREGATE

- A. Construct the base aggregate layer to the thickness indicated on the Construction Drawings.
- B. End dumping or tailgate dumping shall not be permitted directly onto the geotextile fabric. The aggregate shall be dumped adjacent to the fabric or on previously placed stone. The aggregate shall be spread from the backdumped pile using a bulldozer, loader, track hoe, or grader, with care being taken to avoid damage to the fabric by blades, tracks, tires, or buckets.
- C. Immediately following spreading, the aggregate material shall be shaped to the required smoothness and thickness, and compacted. The initial lift of aggregated on the geotextile shall be a minimum thickness of 6 inches after compaction. The desired degree of compaction will be reached when the surface is tightly bound and shows no undue rutting or displacement under operations of the roller or other equipment. The determination of undue rutting or displacement will be made by the Construction Manager.

- D. When additional aggregate material is to be added to existing aggregate, scarify existing aggregate to a depth of 3 inches.

### 3.5 SURVEY CONTROL

- A. Survey alignment and grades for roads, ramps, the SMTA, and corridor in accordance with Section 02100.

### 3.6 TOLERANCES

- A. Construct the base aggregate to within 0.0 to +0.1 feet of the thickness indicated on the Construction Drawings.
- B. Construct the SMTA, and maintenance roads shown on the Construction Drawings to within  $\pm 0.1$  feet of the thickness indicated on the Construction Drawings.

END OF SECTION

SECTION 02100  
SURVEYING

## PART 1 GENERAL

## 1.1 SCOPE

- A. This Section describes the requirements for surveying, including, but not limited to:
1. establishing temporary survey and control points;
  2. establishing a horizontal and vertical project control system based on existing benchmarks;
  3. verification of existing conditions;
  4. setting limits and boundaries of construction activities;
  5. performing support surveys and surveys for conformance checks, and to determine measurement of quantities for periodic progress payments and final payment;
  6. preparing and furnishing "red-line" drawings and sketches; and
  7. layout of area isolation trench shown on the Construction Drawings.

## 1.2 RELATED SECTIONS AND PLANS

- A. Section 02150 - Traffic Control
- B. Section 02205 - Impacted Material Excavation
- C. Section 02206 - Earthwork for Remediation
- D. Section 02207 - Area Isolation Trenching
- E. Section 02230 - Road Construction
- F. Part 6 - Statement of Work
- G. Part 8 - Environmental Health & Safety/Training Requirements
- H. Part 9 - Quality Assurance Requirements

## 1.3 REFERENCES

- A. National Geodetic Survey (NGS) Standards:

## 1.4 QUALIFICATIONS

- A. Oversight for the survey work shall be provided and certified by a Land Surveyor licensed in the State of Ohio.

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- B. Surveying work shall be performed under the direct supervision of a person who has at least 5 years of experience in construction surveying.
- C. Work performed in referencing or re-establishment of land or United States survey monuments shall be signed and sealed by a Land Surveyor licensed in the State of Ohio.

1.5 SUBMITTALS

- A. Submit a copy of Land Surveyor's license and a résumé of the person supervising the surveys to the Construction Manager within 10 calendar days from Notice to Proceed.
- B. Submit two copies of the survey notes, sketches, and drawings for the following surveys to the Construction Manager within one week of performance:
  - 1. preliminary surveys;
  - 2. intermediate surveys;
  - 3. written statement and surveys for conformance checks and "red-line" drawings;
  - 4. surveys prior to end of construction season and/or winter shutdown;
  - 5. survey at completion of impacted material excavation specified in Section 02205 of the following:
    - a. above Waste Acceptance Criteria (WAC) material;
    - b. above Final Remedial Level (FRL) material;
    - c. Resource Conservation and Recovery Act (RCRA) hazardous waste;
    - d. underground storage tanks; and
    - e. Hazardous Waste Management Units (HWMUs);
  - 6. survey before winter breaks and at completion of the Contract;
  - 7. measurement and payment surveys; and
  - 8. final surveys.
- C. On request by the Construction Manager, submit documentation verifying accuracy of survey work.
- D. Upon completion of the survey work, provide the Construction Manager the original field notes, layout, computations, signed and sealed sketches and drawings in Microstation 95 ".dgn" format or electronic files in other format approved by the Construction Manager.
- E. One complete set of final "red-line" drawings, sketches, and survey notes signed and sealed by a Land Surveyor licensed in the State of Ohio shall be submitted to the Construction Manager within 15 days of completion of the Contract. Drawing and sketch format shall be Microstation 95 ".dgn" or electronic files in other format approved by the Construction Manager. Survey notes shall include a point listing with coordinates, elevation, and description.
- F. Submittals for the environmental health and safety requirements shall be as specified in Part 8.

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## 1.6 PROJECT RECORD DOCUMENTS

- A. Maintain on site, a complete, accurate log documenting survey work as it progresses.
- B. Maintain on-site, a plan showing survey control points, and benchmarks with coordinates and elevations. These drawings shall be updated the same day as new control points are set.
- C. Maintain on-site, an accurate and current set of marked-up "red-line" drawings showing "as-built" conditions. "As-built" conditions shall be marked-up on "red-line" drawings within one week of completion of the respective construction activity.

## 1.7 HEALTH AND SAFETY REQUIREMENTS

- A. Environmental health & safety/training requirements shall be in accordance with Part 8 of the Contract Documents.

## 1.8 CONTRACTOR'S QUALITY ASSURANCE

- A. Contractor's quality assurance requirements shall be in accordance with Part 9 of the Contract Documents.

## PART 2 PRODUCTS

### 2.1 MATERIALS AND SURVEY INSTRUMENTS

- A. Provide materials as required to properly perform the surveys, including, but not limited to, personal protective equipment, instruments, tapes, rods, measures, mounts and tripods, stakes and hubs, nails, ribbons, other reference markers, and all else as required.
- B. The survey instruments used for this work shall be precise and accurate to meet the needs of the project. Survey instruments should be capable of reading to a precision of 0.01 feet and with a setting accuracy of  $\pm 8$  seconds.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Maintain accurate and complete notes of surveys:
  - 1. Handwritten survey field notes and information shall be documented. A copy of the numbered, dated, and signed documentation shall be given to the Construction Manager weekly or upon request by the Construction Manager. Survey notes shall be legibly

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recorded. Notation shall be consistently applied to survey work. The stake marking format and the document notations shall be compatible. Identify survey benchmarks on the field notes, sketches, and drawings.

2. Electronically collected field survey information shall be stored, for retrieval and submittal if requested by the Construction Manager, during the period of performance of the Contract.

a. Electronic format for printed output of data collector field survey notes shall be compatible with the approved field notation format.

b. Electronic format for printed output of data collector survey work shall be compatible with the Contractor's computer equipment and software specified in this Section for verifying and checking the work. A copy of the data disk shall be submitted to the Construction Manager monthly.

B. During construction, survey notes shall be retained by the Contractor and Land Surveyor.

C. Perform surveys for conformance checks specified in this Section. Contractor shall submit a written statement with conformance surveys certifying compliance with thickness, limits, and grades to the Construction Manager.

D. The precision of horizontal and vertical controls shall meet or exceed Third-Order Class I and Third-Order accuracy, respectively, as defined by NGS Standards. Elevation shall be referenced to National Geodetic Vertical Datum (NGVD of 1929 and horizontal coordinates to North American Datum (NAD) 1983.

E. Conformance check surveys for elevation and for horizontal coordinates shall be recorded to the nearest 0.01 feet and for angles shall be to the nearest 20 seconds.

F. Measurement and payment surveys for elevation and for horizontal distances shall be recorded to the nearest 0.1 feet and 0.05 feet, respectively.

G. Final "red-line" drawings and sketches shall be signed and sealed for method and accuracy of work and sealed by the Land Surveyor.

H. Perform construction layout surveys in advance of scheduled excavation activities. At completion of a survey, provide a copy of the field notes, drawings, or sketches to the Construction Manager for review. The Contractor shall allow the CQC Consultant and/or Construction Manager three working days for review of conformance surveys. The Contractor shall be responsible for rework and/or construction delays caused by survey or staking errors.

I. Set grade and slope stakes required for construction activities as the work progresses. Staking shall be in accordance with accepted surveying practices, provisions herein, and subject to Construction Manager review. Set fine grade stakes on all surfaces for which the plans show a definite grade line.

J. Verify pipe alignment and elevation. The Contractor shall:

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1. check layout and elevation of pipe embedment fill prior to pipe placement;
2. check pipe alignment during placement and backfill; and
3. verify alignment and elevation at top of pipe after pipe has been backfilled to top of pipe at a maximum interval of 25 feet.

K. Upon completion of the work, the Contractor shall provide the Construction Manager with original survey field notes, layouts, computations, and electronic files, binders containing electronic file information and one copy each of electronic files specified in this Section.

L. Protect benchmarks and survey control points. Replace disturbed survey control points and benchmarks at no additional cost.

M. Establish temporary survey control points to support construction work activities.

N. Survey control points, accuracy, and documentation:

1. Record the following information in survey notebooks for each control point established:
  - a. designation of control point;
  - b. coordinates based on State Planar North American Datum (NAD) 1983 Ohio South;
  - c. elevations based on National Geodetic Vertical Datum (NGVD);
  - d. date of establishment;
  - e. description and sketch of the control point location; and
  - f. control points referenced to a minimum of three features that can be seen from the control point.
2. Document survey work in the fieldbooks using the format and procedures described below:
  - a. title and consecutive fieldbook number on the front cover;
  - b. consecutively numbered pages;
  - c. table of contents, indicated by survey task, on the first numbered page;
  - d. legend indicating symbols used in survey notes;
  - e. names of survey team for each task;
  - f. notes on weather, equipment, etc.;
  - g. date and time on each page to indicate when work was recorded;
  - h. notes in a uniform character such that they can be interpreted and used by anyone with survey knowledge; and
  - i. description and/or sketches of the existing survey control used.

### 3.2 SUPPORT SURVEYS

A. Preliminary Surveys:

1. Verification of the Existing Conditions:

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- a. Prior to earthwork activities, verify the accuracy of the existing conditions shown on the Construction Drawings and Reference Drawings. Immediately notify the Construction Manager in writing of deviations from the existing conditions indicated on the Construction Drawings and Reference Drawings that affect construction cost and/or schedule.
2. Verify the existing benchmarks, structures, utilities, wells, topography, surface- water management and erosion control measures, construction safety and radiological-control fences, sedimentation basins and appurtenances, drainage features, and existing stockpiles of materials and quantities shown on the Construction Drawings, Reference Drawings, or specified in the Contract. Notify the Construction Manager of any differences or conflicts with work included in this Contract.
3. Establish construction limits required for installation of the construction safety fence and radiological-control fence specified in Section 02205.
4. Establish location for the installation of the surface-water management and erosion control measures specified in Sections 02275.
5. Earthwork Staking: Staking for excavation and fill limits shall establish the exterior limits of excavations and fills. The maximum staking interval shall be 50 feet. Stakes shall be prominently noted with description of point, vertical distance to design elevation, and offset distance as applicable.
6. Perform additional surveys required for the layout of other excavation activities.
7. Prior to excavation activities in remedial excavation areas specified in Sections 02205, 02206 and 02207, perform topographic surveys of Stockpile 7 (SP7) debris, staging areas, excavation areas, and concrete crushing support areas at minimum 50-foot intervals with additional points as follows:
  - a. grade breaks;
  - b. points of horizontal curvature and tangency;
  - c. edge and corners of concrete or asphalt pads, slabs, catch basins, and manholes;
  - d. above-grade obstructions (e.g., fire hydrants, utility poles, handrails, etc.); and
  - e. ditches, channels, and depressions.

In addition, spot check slab elevations as indicated on applicable building foundation reference drawings. This includes basement, pit, sump, and other below-grade slab elevations.

8. Prior to area isolation trench excavation specified in Section 02207, survey the trench location and stake the center line of the trenches.
9. Initial limits of excavation specified in Section 02207 shall be surveyed and staked after the completion of excavation of area isolation trenches.

**B. Intermediate Surveys:**

1. Perform surveys during progress of the excavation activities to verify the accuracy of work and as directed by the Construction Manager.

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- a. Perform interim surveys of impacted material stockpiles or other areas designated by the Construction Manager. This survey shall include volume (CY) remaining in the stockpiles or in designated areas.
2. Perform surveys for measurement and periodic progress payment as specified in this Section.
3. Perform surveys during progress of impacted material excavations specified in Section 02205 to confirm limits of the excavation.
4. Perform survey if either the Great Miami Aquifer (GMA) is encountered or excavation has reached the GMA elevation as indicated on the Construction Drawings.
5. Perform surveys after the installation of the first 2 feet of GMA plug placement to confirm 2 feet thickness.
6. Perform surveys at the completion of GMA plug placement (5-feet+ thick).
7. Perform surveys at the completion of the 3A/4A Tank Farm Settling Basin, including:
  - a. half section of 24-inch diameter reinforced concrete pipe (RCP);
  - b. precast concrete basin;
  - c. 18-inch diameter corrugated metal pipe (CMP); and
  - d. discharge elevation into catch basin CB-86.
8. Perform survey when establishing new Special Material Transfer Areas or Debris Staging Areas.
9. Prior to obtaining clay fill material for constructing GMA plug, perform topographic survey and establish work limits of designated borrow areas.
10. Perform survey at the completion of each supplemental excavation.

C. Final Surveys:

1. Final topography shall be surveyed at nominal 50-foot intervals. Additionally, the following points shall be surveyed as applicable:
  - a. grade breaks;
  - b. points of horizontal curvature and tangency; and
  - c. points of stationing equation.
2. Structures: Survey structure centerlines or building lines so that the orientation, position, limits, and foundation elevation(s) are positively identified.
3. Ditches and Channels: Survey ditches, channels, and culverts as specified in Section 02275.
4. Limits of Final Excavations: Survey limits of final impacted material excavations.

### 3.3 SURVEYS FOR MEASUREMENT AND PAYMENT

- A. Perform surveys for periodic progress payments and final payment to determine quantities of work and percent of completed work. Quantities to be measured and measurements for quantities shall be as specified in Part 6 of the Contract Documents.
- B. Calculate and certify quantities of work and submit survey notes and calculations to the Construction Manager for review, evaluation, and payment.

### 3.4 SURVEYS FOR CONFORMANCE CHECKS AND "RED-LINE" DOCUMENTS

- A. Survey the following to verify the locations, lines, and grades achieved during construction for conformance checks and "red-line" documents:
  - 1. for berms, roads, ditches, and other earthwork specified in Sections 02205, 02206, and 02230.
    - a. original grade surface;
    - b. compacted surface of cut slopes; and
    - c. finished grade surface;
  - 2. for culverts and other surface-water management and erosion control structures specified in Sections 02275:
    - a. original grade surface;
    - b. pipe inverts; and
    - c. finished grade surface;
- B. Drawings and sketches for the items described in this Section shall include the following:
  - 1. North arrow, graphical scale, title block, and legend;
  - 2. Northing and Easting grid lines;
  - 3. spot grade location and elevation on plan including list of coordinates with point number, northing, easting, and elevation in table format;
  - 4. 1-foot contour lines;
  - 5. location of structures;
  - 6. labeled components; number; and
  - 7. for pipe profiles:
    - a. original grades with stationing;
    - b. final grades with stationing; and
    - c. pipe with inverts, slopes, pipe material, pipe size, and length of pipe.
- C. Perform conformance checks and "red-line" surveying immediately upon completion of a given installation or excavation activity to facilitate progress and avoid delaying commencement of the

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next installation. Provide the following minimum spacings and locations for survey points (additional survey points may be required if field conditions warrant):

1. surfaces with gradients less than 10 percent, survey on a square grid spaced not wider than 50 feet;
2. on slopes greater than 10 percent, a square grid spaced not wider than 50 feet shall be used, but in any case, a line at the crest and toe of the slope shall be taken; if the slope distance is greater than 50 feet, a midpoint slope survey point is required;
3. a line of survey points spaced not more than 50 feet apart shall be taken along any slope break (this will include the inside edge and outside edge of any bench on a slope);
4. a line of survey points spaced not more than 25 feet apart shall be taken at the top of any pipes or other appurtenances;
5. at the corners and midpoints of the top and bottom of slope breaks for liner penetration areas in cells; and
6. along the southern wall spillway of the 3A/4A Tank Farm Settling Basin, survey points not more than 25-feet apart.

END OF SECTION

## SECTION 02930

## VEGETATION

## PART 1 GENERAL

## 1.1 SCOPE

- A. This Section includes soil stabilization, which includes application of crusting agent and establishing vegetation by seeding. The work in this Section includes, but is not limited to; soil preparation, interim vegetation, permanent vegetation, application of fertilizer, application of mulches, and application of crusting agent.

## 1.2 RELATED SECTIONS AND PLANS

- A. Section 02205 – Impacted Material Excavation
- B. Section 02275 - Erosion and Sediment Control and Surface Water Management
- C. Part 6 - Statement of Work
- D. Part 8 - Environmental Health & Safety/Training Requirements
- E. Part 9 - Quality Assurance Requirements

## 1.3 REFERENCES

- A. Latest version of Ohio Department of Natural Resources (ODNR) Rainwater and Land Development Standards (ODNR Rainwater and Land Development Standards).
- B. "Identification and Listing of Hazardous Waste", Title 40, Code of Federal Regulations (CFR), Part 261, Subpart E.C.
- C. "Federal Hazardous Material Transportation Law", U.S. Department of Transportation [U.S. DOT, 1994].

## 1.4 SUBMITTALS

- A. Submit the following to the Construction Manager for review within 15 calendar days from Notice to Proceed:
  - 1. proposed mixes and application rates for seed, mulch, fertilizers, and crusting agents;
  - 2. Manufacturer's product data and recommended methods of application for seed, mulches, fertilizer, and crusting agents;
  - 3. product data for fertilizer shall also include chemical analysis including uranium analysis to assure there is no resultant or derived uranium from fertilizer use, unless waived by Construction Manager;

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4. material safety data sheet (MSDS) for fertilizer, mulch binder and crusting agent; and inoculant information for the permanent seed mixes.

B. Submit the following to the Construction Manager for review within 30 calendar days before seeding:

1. certificate stating seed mixture, guaranteed percentages of purity, weed content, germination of seed, name of seller, test date for the seed, and the net weight and date of shipment;
2. Manufacturer's certificate stating the available nutrients contained in the proposed fertilizer;
3. Manufacturer's certificate stating that the fiber matrix (wood fibers) meets the requirements of this Section;
4. Manufacturer's certificate stating the mulch binder meets the requirements of this Section;
5. Manufacturer's certificate stating the crusting agent meets the requirements of this Section; and
6. documentation of the straw to be used for mulch; this documentation shall verify that the straw is weed free in accordance with the requirements of this Section.

C. Submit to the Construction Manager for review within 10 calendar days before seeding a plan showing seeding area and a written statement of application rate of seed mix and/or associated materials (i.e., fertilizer, mulch, and mulch binder). Choice of seeding type shall follow the site seeding requirements and as approved by the Construction Manager.

D. Provide a list of equipment, description of construction methods, and other required information for vegetation and application of crusting agent in the Contractor's Earthwork Work Plan specified in Section 02205.

## 1.5 HEALTH AND SAFETY REQUIREMENTS

A. Environmental health & safety/training requirements shall be in accordance with Part 8 of the Contract Documents.

## 1.6 CONTRACTOR'S QUALITY ASSURANCE

A. Contractor's quality assurance requirements shall be in accordance with Part 9 of the Contract Documents.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Furnish seed labeled in accordance with U.S. Department of Agriculture (USDA) Rules and Regulations under the Federal Seed Act and applicable State seed laws. Furnish seed in sealed bags or containers bearing the date of expiration. Do not use seed after its date of expiration. Each variety of seed shall have a purity of not less than 90 percent by weight, a percentage of germination not less than 80 percent by weight, and a weed to seed content of not more than 0.75 percent by weight and contain no noxious weeds. Furnish seed mixtures having seed proportioned by weight in accordance with Tables 02930-1A, 02930-1B, and 02930-2. Areas requiring

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permanent seeding during the summer months (July 1 – September 20) shall be seeded with 30 lbs/acre of ReGreen or stabilize with a crusting agent as specified in this Section. Stabilization performed during the summer shall be followed by fall application of the appropriate permanent seed mix.

B. Permanent seed mixes shall be treated with fungal (Mycorrhizae) inoculant and bacterial (Rhyzobium) inoculants. The specified legumes must be inoculated with the appropriate Rhizobial strains.

C. Furnish mulch meeting the following requirements:

1. Mulch shall be straw or wood cellulose fiber, free of clay, stone, foreign substances, and free of weeds.
2. Straw should not contain sticks larger than ¼-inch diameter or other materials that may prevent matting down during application. Use straw that is free from mold and other objectionable material for placing with mulch blower equipment or other equipment as approved by the Construction Manager. Straw shall be generally 6 inches or more in length.
3. Straw shall be:
  - a. weed free straw from the Minnesota Crop Improvement Association certified weed free straw vendors;
  - b. straw that has been inspected and determined to be weed free by Central Ohio Seed Testing;
  - c. native prairie grass mulch; or
  - d. equivalent substitute as approved by the Construction Manager.
4. Mulch applied by hydrospraying shall be a bonded fiber matrix containing wood fibers held together with a hydrocolloid-based binder, which upon drying becomes insoluble and non-dispersible. The fibers shall be composed of 100 percent wood or wood by-products and shall be 100 percent biodegradable. Use a bonded fiber matrix containing a green dye that will provide for easy visual inspection for uniformity of slurry spread. The bonded fiber matrix, including dye, shall contain no growth or germination inhibiting properties. The wood cellulose fiber shall be manufactured in such a manner that, after addition and agitation in slurry tanks with water, the fibers in the material become uniformly suspended to form a homogeneous material. When sprayed on the ground, the material shall allow absorption and percolation of moisture. The wood cellulose fiber shall meet the following requirements:

<u>Item</u>	<u>Specification Limit</u>
Particle Length	0.4 inch (maximum)
Particle Thickness	0.047 inch (maximum)
PH	4.0 to 8.5
Ash Content	1.6 % (maximum)
Water Holding Capacity (based on fiber dry weight)	500 % (minimum)
Moisture Content	12 % ± 3 % (by weight)

D. Mulch binder agent shall be as approved by the Construction Manager and shall meet the following requirements:

1. The mulch binder shall be hydrocolloid base (guar gum) and shall not dissolve or disperse upon rewetting.
2. The mulch binder shall not have hazardous characteristics of ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR Part 261, Subpart C, for a hazardous waste in either its pre-applied or cured states.
3. The mulch binder shall have a flash point greater than 200°F. The mulch binder shall be neither a flammable nor combustible liquid per United States (US) Department of Transportation definition [U. S. DOT, 1994]. The mulch binder must not be susceptible to significant deterioration from exposure to the elements, including sunlight.
4. The mulch binder shall be provided in concentrated solution and prepared so that it will not change in transportation or storage.

E. The crusting agent shall be as approved by the Construction Manager and shall meet the following criteria:

1. pine sap emulsion comprised of a 100 percent organic emulsion produced from naturally occurring resins (pine sap); or a mixture of Conwed Fiber's Enviroblend hydraulic mulch and Finn Corporation's A-500 Hydro-Stik tacking agent (mulch binder); or an approved equal;
2. not comprised of chloride, lignosulfonate, petroleum, or asphaltic-type emulsions;
3. provide dust suppression and surface stability for exposed soils, both disturbed and undisturbed soils, and exposed coal fired ash (fly ash);
4. compatible with application via a hydro seeder, and must not require intense cleaning of equipment after application;
5. non-tracking (i.e., will not stick to boots or tires) once cured;
6. not have hazardous characteristics of ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR Part 261, Subpart C, for a hazardous waste in either its pre-applied or cured states;
7. have a flash point greater than 200 °F;
8. be neither a flammable nor combustible liquid per DOT definition; and
9. not be susceptible to significant deterioration from exposure to the elements, including sunlight.

F. Erosion mat shall be in accordance with Section 02275.

G. Fertilizer:

1. Furnish commercial grade fertilizer, uniform in composition that meets the requirements of all State and Federal regulations and standards of the Association of Agricultural Chemists.
2. Fertilizer shall be slow release complete fertilizer.
3. Two types of fertilizer mixes shall be used. Fertilizer for application within the former production area shall be 34-0-10; other fertilizers may be approved by the Construction Manager for the former production area, but they must not contain phosphorous. Fertilizer

for other areas shall be 22-5-10. Fertilizers shall contain not less than 1 percent added sulfur and not more than 8 percent added iron, or an approved equal.

4. Fertilizer must have MSDS submitted in accordance with this Section.
5. Fertilizer shall be used for interim seeding only.

H. Construction water shall be obtained from the water source shown on the Construction Drawings, Master Plan.

## 2.2 EQUIPMENT

- A. Provide equipment of size and type to perform work specified in this Section.

## PART 3 EXECUTION

### 3.1 DELIVERY, STORAGE, AND HANDLING

- A. Deliver containerized materials in uniform packages bearing the name of the manufacturer, the net weight and a statement of content. Deliver containerized materials to the site in original, properly labeled, unopened, clean containers each showing the manufacturer's guaranteed analysis conforming to applicable regulations and standards.
- B. Store materials in a dry area in a manner to prevent physical damage.

### 3.2 GENERAL

- A. Stabilization of disturbed areas by vegetation or by use of a crusting agent shall be performed at completion of excavation and stockpiles or within 7 calendar days of knowing a disturbed area will be idle for more than 45 calendar days, whichever is sooner.
- B. Crusting agents may be used as temporary measures prior to placement of interim vegetation after approval for the area by the Construction Manager.
- C. Interim vegetation, as specified in this Section, is required for all areas and soil stockpiles, which are scheduled to be disturbed in future. Fertilizer shall be used for interim vegetation as specified in this Section.
- D. Permanent vegetation, as specified in this Section, is required for final remediation grading. No fertilizer shall be used with permanent vegetation as specified in this Section.
- E. Disturbed areas which are scheduled to be significantly disturbed after initial stabilization and/or need effective erosion control immediately, are to be stabilized with the interim seed mix rate specified in this Section. Disturbed areas which are not scheduled to be significantly disturbed within 5 years are to be stabilized with the permanent seed mix rate specified in this Section. Soil piles, which require effective erosion control immediately, are to be stabilized with the interim seed mix rate or a crusting agent as specified in this Section.
- F. Stabilize permanent slopes steeper than 3:1, as directed by the Construction Manager. In areas of concentrated stormwater flow, stabilize with erosion mat as specified in Section 02275 after application of seed mixture.
- G. Area(s) to be seeded shall be generally free of debris, rock, root material, and other objects that may impede soil preparation and seeding activities. Perform soil preparation by tilling/cultivating, to a depth of approximately 2 inches, to eliminate uneven areas and low spots. Maintain lines, levels and contours.

- H. Repeat cultivation in areas where equipment used for hauling and spreading has compacted the area(s) to be seeded.

### 3.3 APPLICATION

- A. The seeding season, for interim vegetation specified in this Section, is year round. However, if seeding is contemplated during the winter months of December through March, then field conditions should be assessed for ability to provide soil to seed contact. If field conditions do not support the ability to provide soil to seed contact then the area shall be stabilized with a crusting agent followed by seeding during conditions conducive to adequate soil to seed contact.
- B. The seeding seasons for permanent seeding in wet and dry areas are Spring Season between April 1 and July 1 and Fall Season between September 20 and November 30.
- C. Apply fertilizer, seed, and mulch to disturbed areas and areas excavated and graded under this Contract requiring seeding unless otherwise directed by the Construction Manager. Apply mulch within 24 hours of seeding; do not seed areas in excess of that which can be mulched within 24 hours. Winter application of seed and related materials are subject to adjustment as directed by the Construction Manager.
- D. Apply seed using either the drilling, broadcasting, or hydroseeding method, as described below:
1. Seed drilling method:
    - a. This method shall be used for applying the permanent seed mix in accessible areas unless otherwise approved by the Construction Manager. The method may also be used for interim vegetation.
    - b. Prepare area to be seeded by loosening the soil to a minimum depth of 3 inches.
    - c. Apply commercial grade, slow release complete fertilizer, for interim vegetation only, at a rate of 150 lbs/acre at the time of preparing the seedbed for seeding.
    - d. Install seed with a seed drill to obtain a final planting depth of  $\frac{1}{4}$  to  $\frac{1}{2}$  inch using the seed rates indicated in Tables 02930-1A, 02930-1B, and 02930-2. All seed drilling should be done perpendicular to the direction of surface-water flow.
  2. Broadcast Seeding Method:
    - a. This method may be used for interim vegetation, and can be performed with the use of mechanical "cyclone" seeders, by hand seeding or by any other method which scatters seed over the soil surface.
    - b. This method may also be used for permanent seeding in areas that are not accessible with the seed drill (i.e., sloped areas) as approved by the Construction Manager.
    - c. If Broadcast Method is used to apply permanent seed mix in sloped areas (3H:1V slope or steeper), seeding application rates in Tables 02930-1A and 02930-1B should be doubled.
    - d. Prepare the area to be seeded by loosening the soil to a minimum depth of 3 inches. This is critical to allow seeds to filter into the soil to avoid washout from runoff.

- e. Apply commercial grade, slow release complete fertilizer, for interim vegetation only, at a rate of 150 lbs/acre at the time of preparing the seedbed for seeding.
- f. Install seed by broadcasting evenly over the entire site using the seed rates indicated in Table 02930-2.
- g. Rake the area after seeding.
- h. Mulch and disc-anchor using weed free mulch at a rate of 2.0 tons per acre. Spread straw mulch, either by hand or by blowing method, at the rate of 2 air-dried tons per acre. During June through September, increase straw mulch application rate to 3 air-dried tons per acre. Application of straw mulch by the blowing method is exempt from the dust control requirements specified in Part 6 of the Contract Documents.

3. Hydroseeding Method:

- a. This method may be used for interim vegetation only. Hydroseeding shall be a two-step process. The seed shall be applied first, followed by a separate application of the mulch. This is to ensure soil to seed contact.
- b. The mixture tank shall be cleaned prior to use to ensure remnant seed is not introduced to the proposed seed mixture.
- c. Prepare area to be seeded by loosening the soil to a minimum depth of 3 inches. This is critical to allow seeds to filter into the soil to avoid washout from runoff.
- d. Apply commercial grade, slow release complete fertilizer, for interim vegetation only, at a rate of 150 lbs/acre. The fertilizer is to be mixed and applied with the mulch.
- e. Install seed by hydroseeding evenly over the entire area using the seed rates indicated in Table 02930-2. Use a fan-type nozzle with approximately 500 gallons of water per acre to ensure even distribution.
- f. Rake the area where accessible following seeding.
- g. Apply sprayed mulch at a net dry weight of 2,000 pounds per acre minimum and 100 percent continuous coverage. Mix the mulch with water at a ratio of 50 pounds of mulch per 100 gallons of water.

E. Application of Crusting Agent:

- 1. Apply crusting agent in accordance with manufacturer's directions.
- 2. Unless otherwise specified by the manufacturer, dilute concentrated pine sap emulsion to ratio of 4 parts water to 1 part concentrate. Apply diluted pine sap emulsion at a rate of 2,500 gallons per acre.
- 3. Apply a mixture of Conwed Fiber's Enviroblend hydraulic mulch and Finn Corporation's A-500 Hydro-Stik mulch binder, using the hydroseeder, at the rate of 1,000 lbs/acre on flat surfaces; and 1,125 lbs/acre on slopes greater than 3H:1V. The mixture rate for each product shall be 20 lbs/acre on flat surfaces and 30 lbs/acre on greater than 3H:1V slopes for the hydraulic mulch; and 20 lbs/acre on flat surfaces and 30 lbs/acre on slopes greater than 3H:1V for the Hydro-Stik mulch binder.

3.4 MAINTENANCE

- A. Maintain the vegetated areas in satisfactory condition until acceptance of the vegetation by the Construction Manager. Maintenance of the vegetated areas includes repairing eroded areas,

revegetating when necessary, watering, and mowing (if applicable). A satisfactory condition of vegetated area is defined as follows:

1. an area shall have a predominant stand of the seeded vegetation;
  2. within 3 weeks, germination must occur over 90 percent of the area with no single bare area greater than 3 square feet; and within 3 months, 90 percent of the area must be covered with mature vegetation.
- B. The above timeframes for germination and coverage requirements are to be delayed during the dormant season between November 1 and March 15 application of the seed. The performance criteria shall be measured at the beginning of the growing season (April 1) for seed applied during the previous dormant season.
- C. Areas that fail to meet these requirements shall be repaired or reseeded as necessary to produce an acceptable stand of vegetation, as specified in this Section.
- D. The acceptance inspection will be performed by the Construction Manager who will determine whether repair of vegetated areas or revegetation is required.
- E. Maintain areas with a crusting agent to ensure proper erosion control. The crusting agent shall be reapplied to eroded and bare areas as necessary.

### 3.6 WARRANTY

- A. Vegetated areas shall be subject to a warranty period of not less than 12 months from initial establishment of vegetation over 100 percent of the areas seeded.
- B. At the end of the warranty period, the Construction Manager will perform an inspection of the area. Seeded areas not demonstrating satisfactory condition of vegetation as specified in this Section, shall be repaired, reseeded, and maintained to meet requirements as specified in this Section at the Contractor's expense.

### 3.7 ACCEPTANCE

- A. The vegetated areas shall be accepted at the end of the warranty period if a satisfactory condition exists as defined in this Section.
- B. After disturbed areas are stabilized and all necessary corrective work has been completed, the Construction Manager will certify in writing the final acceptance of the vegetated areas.

### 3.8 CONSTRUCTION QUALITY REQUIREMENTS

- A. CQC Consultant will monitor vegetation and crusting agent application in accordance with this Section and Construction Quality Assurance (CQA) Plan.

TABLE 02930-1A

## SEED MIX IN DRY AREAS FOR PERMANENT VEGETATION

Species	Pounds Per Acre (lb/ac)
Big Bluestem	3
Little Bluestem	2
Side-Oats Grama	0.5
Indian Grass	2
Canada Wild-Rye	3
Switch grass	0.5
ReGreen	10
Wildflowers, uniform mix of the following:	1.5
Butterflyweed ( <i>Asclepias tuberosa</i> )	
New England Aster ( <i>Aster novae-angliae</i> )	
Smooth Aster ( <i>Aster laevis</i> )	
Canada Milkvetch ( <i>Astragalus Canadensis</i> )	
Purple Prairie Clover ( <i>Petalostemum purpureum</i> )	
Ox-eye Sunflower ( <i>Heliopsis helianthoides</i> )	
Bergamot ( <i>Monarda fistulosa</i> )	
Purple Coneflower ( <i>Echinacea purpurea</i> )	
Pale Purple Coneflower ( <i>Echinacea pallida</i> )	
Yellow Coneflower ( <i>Ratibida pinnata</i> )	
Black-Eyed Susan ( <i>Rudbeckia hirta</i> )	
Spiderwort ( <i>Tradescantia ohioensis</i> )	
Blue Vervain ( <i>Verbena hastata</i> )	
Hoary Vervain ( <i>Verbena stricta</i> )	
Beardtongue ( <i>Penstemon grandiflorus</i> )	
Cupplant ( <i>Silphium perfoliatum</i> )	
Sweet Joe Pye-Weed ( <i>Eupatorium purpureum</i> )	
White False Indigo ( <i>Baptisia leucantha</i> )	
Blue False Indigo ( <i>Baptisia australis</i> )	
Partridge Pea ( <i>Cassia fasciculata</i> )	
Rattlesnake Master ( <i>Eryngium yuccifolium</i> )	
Round-headed Bush Clover ( <i>Lespedeza Capitata</i> )	
Stiff Goldenrod ( <i>Solidago risida</i> )	

TABLE 02930-1B

SEED MIX IN WET AREAS<sup>(1)</sup> FOR PERMANENT VEGETATION

Species	Pounds Per Acre (lb/ac)
Big Bluestem	3
Canada Wild-Rye	3
Switch Grass	0.5
Blue Joint Grass	0.5
Porcupine Sedge	1 ounce per acre (oz/ac)
Fox Sedge	1 ounce per acre (oz/ac)
Dark Green Bulrush	1 ounce per acre (oz/ac)
ReGreen	10
Prairie Cordgrass ( <i>Spartina pectinata</i> )	1
Wildflowers, uniform mix of the following:	1.5
Red Milkweed ( <i>Asclepias incarnata</i> )	
New England Aster ( <i>Aster novae-angliae</i> )	
Wild Senna ( <i>Cassia hebecarpa</i> )	
Canada Tick Trefoil ( <i>Desmodium canadense</i> )	
Prairie Blazingstar ( <i>Liatris pycnostachya</i> )	
Great Blue Lobelia ( <i>Lobelia siphilitica</i> )	
Bergamot ( <i>Monarda fistulosa</i> )	
Yellow Coneflower ( <i>Ratibida pinnata</i> )	
Branched Coneflower ( <i>Rudbeckia hirta</i> )	
Blue Vervain ( <i>Verbena hastata</i> )	
Angelica ( <i>Angelica atropurpurea</i> )	
Sweet Joe-Rye Weed ( <i>Eupatorium purpureum</i> )	

<sup>(1)</sup> Seeding in drainage ditches or swales shall contain erosion mats as specified in Section 02275 after application of seed mixture. Erosion mat shall cover a minimum width of 12 feet.

TABLE 02930-2

SEED MIX FOR INTERIM VEGETATION

Species	Pounds Per Acre (lb/ac)
ReGreen	50
Annual Rye Grass	20
Canada Wild Rye	20

END OF SECTION