CONSTRUCTION QUALITY ASSURANCE
FINAL REPORT

PHASE V
CELL 7 AND 8 FINAL COVER SYSTEMS

ON-SITE DISPOSAL FACILITY

United States Department of Energy
Fernald Closure Project
Fernald, Ohio

prepared by

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under

Fluor Fernald, Inc.
Contract No. 33F0699

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Department of Energy

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Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF THE CONSTRUCTION QUALITY ASSURANCE FINAL REPORT FOR ON-SITE DISPOSAL FACILITY PHASE V - CELL 7 WEST AND 8 FINAL COVER SYSTEMS

Enclosed for your information is the Construction Quality Assurance Final Report for On-Site Disposal Facility Phase V - Cell 7 West and 8 Final Cover Systems, Revision 0. This report consists of Volumes 1 through 5 dated October 2006.

If you have any questions or require additional information, please contact me at (513) 648-3139.

Sincerely,

Johnny Reising

Johnny W. Reising
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CONSTRUCTION QUALITY ASSURANCE
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GeoSyntec Consultants
Fluor Fernald

[redacted]

ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highways and Transportation Officials
ACI	American Concrete Institute
APZ	Acceptable Permeability Zone
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society of Testing and Materials
CCT	Closed-Circuit Television
CDF	Controlled Density Fill
CETCO	Colloid Environmental Technologies Company
CFC	Certified-For-Construction
CM	Construction Manager
CQA	Construction Quality Assurance
CQC	Construction Quality Control
CVH	Control Valve House
DCN	Design Change Notice
DCP	Design Criteria Package
DOE	Department of Energy
DSDP	Demolition, Soils and Disposal Project
EFBA	East Field Borrow Area
EPLTS	Enhanced Permanent Leachate Transmission System
FCP	Fernald Closure Project
FEMP	Fernald Environmental Management Project
FFC	Fluor Fernald Construction
GCC	Geosynthetic Clay Cap
GCL	Geosynthetic Clay Liner
GIS	Gravity Inlet Structure
HDPE	High Density Polyethylene
HMW	Horizontal Monitoring Well
IMP	Impacted Material Placement
LCS	Leachate Collection System
LDS	Leak Detection System

[redacted]

ACRONYMS AND ABBREVIATIONS

LGP	Low Ground Pressure
LLRW	Low-Level Radioactive Waste
LLSI	Leak Location Services, Inc
LTS	Leachate Transmission System
MDD	Maximum Dry Density
MH	Manhole
NCR	Nonconformance Report
O & M	Operations and Maintenance
OAC	Ohio Administrative Code
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
OMC	Optimum Moisture Content
OSDF	On-Site Disposal Facility
PI	Plasticity Index
PLS	Permanent Lift Station
QA	Quality Assurance
QC	Quality Control
RCI	Request for Clarification of Information
RCRA	Resource Conservation and Recovery Act
RLCS	Redundant Leachate Collection System
SWMEC	Surface Water Management and Erosion Control
SWP	Soil and Water Project
TIC	The Istre Company
TPPFR	Test Pad Program Final Report
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VH	Valve House
WAC	Waste Acceptance Criteria
WAO	Waste Acceptance Organization

1. INTRODUCTION

1.1 Terms of Reference

This final report summarizes the Construction Quality Control (CQC) and Construction Quality Assurance (CQA) activities performed by GeoSyntec Consultants (GeoSyntec) during the On-Site Disposal Facility (OSDF) Phase V Cells 7 and 8 final cover construction projects at the Fernald Closure Project (FCP) (previously known as Fernald Environmental Management Project (FEMP)), located near Fernald, Ohio. CQC and CQA activities performed by GeoSyntec will be collectively referred to as CQA activities in this report. The CQA activities performed by GeoSyntec included monitoring, testing and documentation of the construction of the various components of the Cell 7 and 8 final cover systems, and included: (i) earthwork construction, and (ii) geosynthetics installation. The CQA activities were performed to confirm that the construction materials, and construction and testing procedures, which were monitored and/or performed, were in compliance with the certified-for-construction (CFC) drawings, technical specifications, CQA plan, and approved design and/or specification changes.

This report was prepared for Fluor Fernald, Inc. under Contract 03FF0699 by Mr. James A. Fleck, P.E., and Mr. Collin P. Sukow; and it was reviewed by Mr. David K. Phillips, P.E., all of GeoSyntec.

1.2 Background

The OSDF is a mixed low-level radioactive waste (LLRW) disposal facility dedicated to the FCP that, upon completion, will cover approximately 90 acres (36 hectares). The OSDF is owned by the Department of Energy (DOE) and is being constructed, operated for waste disposal, and closed under the management of Fluor Fernald, Inc. as part of the overall FCP remediation activities.

DOE intends to build only one OSDF. Therefore, the OSDF is designed to accommodate all or any portion of the total volume of impacted material meeting the waste acceptance criteria (WAC) that results from remediation of the operable units. The total volume of material placed in the OSDF was 2.95 million bank/unbulked (i.e., in-place prior to excavation) cubic yards. The OSDF is being developed in several phases. Construction of the liner systems, placement of impacted material, and construction of the final cover system for the OSDF cells was completed by October 29, 2006.

The first year (1997) of construction included the OSDF Phase I liner system for Cell 1 and the overall Leachate Management System projects. The Leachate Management System projects consisted of: (i) the OSDF leachate transmission system (LTS) component that

included manholes MH-1, MH-2, and MH-3, respectively, for Cells 1 through 3, and a dual-containment high density polyethylene (HDPE) gravity piping system from manhole MH-1 to the permanent lift station (PLS); and (ii) the Leachate Conveyance System that consisted of a force main from the PLS to the biosurge lagoon. The interface between OSDF Phase I and the overall Leachate Management System was at the stub-outs of the manholes for Cell 1 leachate collection and leak detection systems. Construction of the OSDF Phase I liner system for Cell 1, the OSDF LTS and the Leachate Conveyance System occurred between August and December 1997. A CQA Final Report for the OSDF Phase I - Cell 1 liner system and the overall Leachate Management System construction was prepared and issued by GeoSyntec in January 1998 [GeoSyntec, 1998a].

The second year (1998) of construction included the OSDF Phase II liner system for Cell 2 and placement of impacted materials in Cell 1. Construction of the Cell 2 liner system occurred between June and November 1998. A CQA Final Report for the OSDF Phase II - Cell 2 liner system construction was prepared and issued by GeoSyntec in December 1998 [GeoSyntec, 1998b]. Placement of impacted materials in Cells 1 and 2 began in June 1998 and November 1998, respectively.

The third year (1999) of construction consisted of the Cell 3 liner system and placement of impacted material in Cells 1, 2, and 3 as part of the OSDF Phase II, Option 1 project. Construction of the Cell 3 liner system occurred between April and October 1999. A CQA Final Report for the OSDF Phase II - Cell 3 liner system construction was prepared and issued by GeoSyntec in November 1999 [GeoSyntec, 1999]. Placement of impacted materials in Cells 1 and 2 began in May 1999, while impacted materials placement in Cell 3 began in October 1999.

The fourth year (2000) of construction included placement of impacted materials in Cells 1, 2, and 3 as part of the OSDF Phase II, Option 2 project. Impacted materials placement began in March 2000 and was completed in September 2000 where Cell 1 was brought to final grades to facilitate construction of the final cover system. The fourth year of construction also included the Enhanced Permanent Leachate Transmission System (EPLTS) project that consisted of permanent LTS gravity line from Cell 1 to the permanent lift station (PLS); LTS valve houses (VHs) for each OSDF cell (a total of six); a control valve house (CVH) near the PLS; tie-in of the dual-containment pipes from Cells 1, 2, and 3 to the newly constructed VHs 1, 2, and 3, respectively; and the stub-outs from newly constructed VHs 4, 5, and 6, for future tie-in to dual-containment pipes from Cells 4, 5, and 6, respectively. A CQA Final Report for the EPLTS project was prepared and issued by GeoSyntec in October 2001 [GeoSyntec, 2001].

The fifth year (2001) of construction consisted of Cell 1 final cover construction and placement of impacted materials in Cells 2 and 3 as part of the OSDF Phase III project.

Construction of the Cell 1 final cover system occurred between April and December 2001. A CQA Final Report for the OSDF Phase III – Cell 1 final cover construction was prepared and issued by GeoSyntec in September 2002 [GeoSyntec, 2002]. Placement of impacted materials in Cells 2 and 3 began in April 2001.

The sixth year (2002) of construction consisted of Cells 4 and 5 liner systems construction and placement of impacted materials in Cells 2 and 3 as part of the OSDF Phase IV project. Construction of the Cells 4 and 5 liner systems and ancillary structures occurred between April 2002 and April 2003. A CQA Final Report for the OSDF Phase IV – Cells 4 and 5 liner systems construction was prepared and issued by GeoSyntec in June 2003 [GeoSyntec, 2003]. Placement of impacted materials in Cells 2 and 3 began in April 2002, and continued with placement of impacted protective layer materials in Cells 4 and 5 in November and December 2002, respectively.

The seventh year (2003) of construction consisted of Cell 2 final cover and Cell 6 liner systems constructed as part of the OSDF Phase IV and Phase V projects. Construction of the Cell 2 final cover and Cell 6 liner systems and ancillary structures occurred between April 2003 and December 2003. A CQA Final Report for the OSDF Phase IV – Cell 2 final cover and Phase V – Cell 6 liner construction was prepared and issued by GeoSyntec in January 2004 [GeoSyntec, 2004]. Impacted material was placed in Cell 2 to bring to final grade by April 2003. Placement of impacted material in Cells 3, 4, and 5 began in April 2003, and continued with placement of impacted protective layers in Cell 6 in November and December 2003.

The eighth year (2004) of construction consisted of Cell 3 and 4 final cover and Cell 7 and 8 liner systems and Valve Houses 7 and 8 constructed as part of the OSDF Phase V projects. Construction of the Cell 3 and 4 final cover and Cell 7 and 8 liner systems and ancillary structures occurred between January 2004 and December 2004. A CQA Final Report for the OSDF Phase V Cell 3 and 4 final cover and Cell 7 and 8 liner construction was prepared and issued by GeoSyntec in March 2005 [GeoSyntec, 2005]. Impacted material was placed in Cells 3 to bring to final grade by April 2004. Impacted material was placed in Cell 4 to final grade by October 2004. Placement of impacted material in Cells 3 through 6 began in January 2004, and continued with placement of impacted protective layers in Cells 7 and 8 in September and December 2004, respectively.

The ninth year (2005) of construction consisted of the construction of Cell 4, 5, 6, and the northeast quarter of Cell 7 final cover systems as part of the OSDF Phase V projects.

This CQA Final Report presents a summary of the CQA monitoring, testing, and documentation activities performed by GeoSyntec during the 2006 construction activities.

1.3 Report Organization

The remainder of this final report is organized as follows:

A description of the project is provided in Section 2.

A description of the CQA program, including a summary description of specific tasks performed under the program and a listing of project personnel, are presented in Section 3.

A description of the general field documentation prepared by the CQA personnel is summarized in Section 4.

A description of the CQA monitoring, testing, and documentation activities performed during the earthwork portion of the project is provided in Section 5.

A description of the CQA monitoring, testing, and documentation activities performed during the geosynthetics installation is provided in Section 6.

A summary of the observations resulting from the CQA monitoring, testing, and documentation activities performed by GeoSyntec; and a certification statement verifying that the OSDF Cell 7 and 8 final cover construction projects were constructed in general accordance with the project specifications, construction drawings, CQA plan, and approved design and/or specification changes are presented in Section 7.

2. PROJECT DESCRIPTION

The OSDF design incorporates a double-composite liner system, a final cover system, and other engineering controls that meet the applicable or relevant and appropriate requirements (ARARs), DOE functional requirements, and general design criteria as described in the Design Criteria Package (DCP) developed and approved for the project during the design phase [GeoSyntec, 2000].

The final cover system, designed to isolate impacted materials in the OSDF, includes the following components, from top to bottom:

6-in. (0.15-m) thick topsoil layer;

1.75-ft (0.425-m) thick vegetative soil layer;

6-in. (0.15-m) thick granular filter layer;

3-ft (0.9-m) thick biointrusion barrier with choke stone layer;

1-ft (0.3-m) thick cover drainage layer;

8-oz/yd^2 (270-g/m^2) needle-punched nonwoven geotextile cushion layer;

80-mil (2.0-mm) thick textured HDPE geomembrane component of the composite cap;

a geosynthetic clay cap (GCC) component of the composite cap;

2-ft (0.6-m) thick compacted clay cap component of the composite cap; and

1-ft (0.3-m) thick impacted and non-impacted contouring layer.

The Cell 7 final cover system footprint covers an area of approximately 7 acres (2.8 hectares); and is bounded on the north by the Cell 6 final cover system, to the west and east by the perimeter drainage channels, and on the south by the Cell 8 final cover construction. The northeast corner of the Cell 7 final cover was also completed during the 2005 construction activities. For simplicity, throughout the remainder of this report, that remaining portion of Cell 7 which encompasses approximately three fourths (3/4) of the total remaining acreage (5 acres) of Cell 7 that was constructed this year will be referred to as "Cell 7".

The Cells 8 final cover system footprint cover an area of approximately 11.25 acres (4.5 hectares); and is bounded on the north by the Cell 7 final cover system, to the west, south, and east by the perimeter drainage channels.

The Certified-For-Construction (CFC) Drawings and Technical Specifications for the OSDF Phase V construction were prepared by GeoSyntec in accordance with the terms of Fluor Fernald Subcontract 03FF0699, GeoSyntec Project Number GQ3211. The prime contractor for construction of the 2006 projects was Fluor Fernald Construction (FFC) under the self-performance program for the closure of the FCP [Fluor Fernald, 2002]. Installation of the geosynthetics components of the Cell 7 and 8 final cover systems was performed by The Istre Company (TIC) of Glenpool, Oklahoma and Environmental Specialties, International, Inc. (ESI) of Baton Rouge, LA, both as subcontractors to FFC. Leak detection testing of the installed Cell 7 and 8 final cover geomembranes was performed by Leak Location Services, Inc. (LLSI) of San Antonio, Texas, as subcontractor to FFC. The surveyor retained by Fluor Fernald for the 2005 construction projects was Tecumseh Surveying Inc. (Tecumseh) of Shandon, Ohio. CQA monitoring, testing, and documentation were provided by GeoSyntec. Fluor Fernald Quality Assurance (QA) also conducted independent CQA monitoring of the construction activities. A list of primary personnel involved in the 2005 construction projects is included in Section 3.2 of this report.

As required by the project specifications, Tecumseh surveyed the required layers of the: Cell 7 and 8 final cover systems (i.e., perimeter subgrade, top of contouring layer, top of compacted clay cap, layout of geomembrane cap, top of cover drainage layer, top of biointrusion barrier layer, top of rockfill, top of granular filter layer, top of rip-rap and the top of topsoil layer).

Primary construction activities monitored by GeoSyntec's CQA personnel for the OSDF Phase V - Cell 7 and 8 final cover construction projects included the following:

rough grading of the subgrade around the perimeter of the cells (i.e., cut and fill operations);

placement of compacted fill material in fill areas along the perimeter subgrade of the Cell 7 and 8 covers;

preparation of the surface of the select impacted material layer for placement of the contouring layer;

construction of the contouring layer;

construction of the compacted clay cap;

installation of the geosynthetic clay cap;

installation of the geomembrane cap;

installation of the geotextile cushion layer;

placement of the cover drainage layer;

placement of the biointrusion barrier with choke stone layer;

placement of the granular filter layer;

construction of the vegetative soil layer;

placement of the topsoil layer;

seeding and installation of the erosion mat over the final cover;

construction of the monitoring access road; and

construction of the perimeter drainage channels along the limits of the Cell 7 and 8 final covers.

The approval process for construction materials used during the OSDF Phase V – Cell 7 and 8 final cover construction projects required Fluor Fernald to submit manufacturer's data, quality control certifications, supplier's certifications, and shop drawings to the Construction Manager (CM) for review and approval. Fluor Fernald was responsible for procurement of the geosynthetics and other construction materials. The Fluor Fernald CM, QA, Safety, Engineering, and the GeoSyntec Resident Engineer reviewed, commented (as needed), and approved construction materials for use during construction. The approved submittals are included in the appendices to this final report.

3. CONSTRUCTION QUALITY ASSURANCE PROGRAM

3.1 Scope of Services

3.1.1 Overview

The scope of CQA services performed by GeoSyntec during the construction of the Cell 7 and 8 final cover projects included:

review of documents;

monitoring, testing, and documentation of field operations; and

preparation of final report.

These services are described in the following subsections of this report.

3.1.2 Review of Documents

As previously noted, this final report summarizes the CQA activities performed by GeoSyntec during the Cell 7 and 8 final cover constructions. The CQA activities conducted by GeoSyntec were intended to satisfy the requirements of the following documents:

"*Certified-For-Construction Technical Specifications, On-Site Disposal Facility Phase V – Project Number 20105*", 20105-TS-0001, Revision 0, prepared by GeoSyntec Consultants, dated January 2004;

"Certified-For-Construction Technical Specifications, Enhanced Permanent Leachate Transmission System Valve House 7 & 8, 20112-TS-0001 On-Site Disposal Facility", Revision B, prepared by Fluor Fernald, Inc., dated August 2003;

"*Phase V Procurement Specifications, On-Site Disposal Facility Procurement Specifications*", Revision 0, prepared by GeoSyntec Consultants, dated March 2004;

"*Construction Quality Assurance Plan, On-Site Disposal Facility*", 20100-PL-0006, Revision 1, prepared by GeoSyntec Consultants, dated May 2001;

"*On-Site Disposal Facility – Phase V Certified-For-Construction Drawings*", Revision 4, prepared by GeoSyntec Consultants, dated October 2006; and

"*Impacted Materials Placement Plan, On-Site Disposal Facility*", 20100-PL-007, Revision 4, prepared by GeoSyntec Consultants, dated June 2005.

During construction, design change notices (DCNs) were prepared which modified these documents. Documents containing the details of these DCNs are referenced in the appropriate sections of this report, and are included as an appendix to this final report. Also included in the appendices are requests for clarifications (RCIs) and nonconformance reports (NCRs).

The above documents (including the DCNs and RCIs) will be collectively referred to as the Project Documents in this final report. Prior to the commencement of on-site CQA activities, GeoSyntec CQA personnel reviewed the Project Documents for familiarity.

3.1.3 CQA Field Operations

The following activities were performed as part of GeoSyntec's on-site CQA services:

Earthwork:

periodically monitoring on-site borrow area soils excavations;

collecting pre-conformance and conformance test samples of soils considered for use as compacted fill and granular components of the Cell 7 and 8 final cover systems for testing;

performing geotechnical pre-conformance and conformance testing in either the on-site or off-site geotechnical laboratories;

reviewing and evaluating geotechnical laboratory pre-conformance and conformance test results to ensure compliance with the requirements of the Project Documents;

periodically monitoring grading operations on the Cell 7 and 8 perimeter subgrades;

monitoring placement and compaction of contouring layer for the Cell 7 and 8 final covers;

monitoring final preparation and proof rolling of top of Cell 7 and 8 contouring layers;

monitoring placement and compaction of pipe embedment fill and backfill;

monitoring placement and compaction of clay caps for Cells 7 and 8;

testing of the in-place moisture/density of the compacted fill and compacted clay cap;

monitoring surface of compacted clay cap for desiccation cracks prior to deployment of overlying GCC;

monitoring placement and tracking of cover drainage layer, rockfill, biointrusion barrier with choke stone layer, and granular filter;

monitoring placement and compaction of vegetative soil and topsoil layers;

verifying (by means of reviewing the surveyor's data, and/or observing the surveyor's survey stakes) that the elevations and the thicknesses of the soil layers are consistent with the Project Documents;

periodically monitoring placement of riprap in the perimeter drainage channels;

periodically monitoring placement and compaction of road base aggregate materials for the monitoring access along the perimeter of Cell 7 and 8 final covers;

Geosynthetics:

tracking the inventory of geosynthetics materials (i.e., GCC, textured HDPE geomembrane, and geotextile rolls) delivered to the site;

monitoring geosynthetics materials delivered to the site to observe whether the materials had been damaged during transportation or handling, and if so, notifying Fluor Fernald QA and CM and marking damage for replacement or repair;

collecting and reviewing geosynthetics manufacturers' quality control (QC) documents to verify compliance with the requirements of the Project Documents;

collecting geosynthetics conformance samples (at the manufacturing plants or onsite) and forwarding samples to the off-site geosynthetics testing laboratory;

reviewing and evaluating geosynthetics laboratory conformance test results to verify compliance with the requirements of the Project Documents;

monitoring deployment and installation of geosynthetics materials and marking damage for replacement or repair;

monitoring overlapping and direction of shingling of adjacent GCC panels;

monitoring placement of granular bentonite between overlapping GCC and panels (as required);

monitoring geomembrane trial seaming operations and field testing;

monitoring geomembrane production seaming operations;

periodically monitoring nondestructive testing of the geomembrane seams;

selecting geomembrane destructive seam sample locations, monitoring sample collection and field testing using a calibrated tensiometer, distributing destructive samples to the geosynthetics testing laboratory, and reviewing laboratory test results to verify compliance with the requirements of the Project Documents;

performing geomembrane laboratory destructive seam testing in the GeoSyntec owned, on-site laboratory;

monitoring electrical leak detection testing of completed portions of the Cell 7 and 8 final cover and geomembranes;

reviewing and commenting on the as-built geomembrane panel layout drawings prepared by Tecumseh;

monitoring the installation of geotextile and continuous sewing of adjacent panels;

periodically monitoring the installation and stapling of erosion mat on the Cell 7 and 8 final covers;

monitoring repairs to portions of the geosynthetics that were observed to have defects, or that failed destructive or nondestructive testing.

During construction activities involving monitoring and/or testing, the observations made, and test results obtained by GeoSyntec CQA personnel were compared to the Project Documents. Fluor Fernald and/or the appropriate subcontractor were notified of deficiencies in construction practices and/or materials so the contractor could take the appropriate corrective actions. The corrective actions were monitored and/or tested by CQA personnel to assure compliance with the Project Documents.

3.1.4 Final Report

This final CQA report was prepared as the final task of the CQA program. This final report summarizes the CQA monitoring, testing, and documentation activities performed by GeoSyntec.

During construction, CQA personnel maintained documentation of on-site CQA activities. Daily documentation consisted of daily field reports and testing and monitoring logs. These documents were used to prepare weekly field reports. CQA personnel also documented the results of on-site geotechnical laboratory testing conducted as part of the

CQA program. In addition, manufacturer quality control (QC) certificates and test results for the geosynthetics and other materials were provided to GeoSyntec for review; these documents are included in the appendices to this final report.

Progress survey data were provided to GeoSyntec for review. The licensed surveyor (Tecumseh) prepared as-built drawings for the top of each soil layer in the liner system. Tecumseh also prepared geomembrane panel layout drawings. The as-built panel layout drawings are included in the appendices to this final report. Descriptions of the construction activities and the CQA documentation are presented in the narrative sections of this report.

Volume I of this CQA report contains the narrative sections of the report and Appendices A through C. Volume II of this report contains Appendix D. Volume III contains Appendix E; Volume IV contains Appendices F through N; Volume V contains Appendices O through R. A summary of the documentation included in the appendices to the final report is provided below:

Appendix A:	Photographic Documentation
Appendix B:	Weekly Field Reports and Correspondence
Appendix C:	Personnel Logs
Appendix D:	Geotechnical Laboratory Test Results
Appendix E:	Manufacturers'/Suppliers' Quality Control Documentation
Appendix F:	Field Moisture/Density Test Results
Appendix G:	Geosynthetics Conformance Test Results
Appendix H:	Contractor's Certificate of Acceptance of Subgrade Surface
Appendix I:	Geomembrane Panel Placement Monitoring Logs
Appendix J:	Geomembrane Trial Seam Logs
Appendix K:	Geomembrane Production Seam Logs
Appendix L:	Geomembrane Destructive Seam Test Logs and Laboratory Test Results
Appendix M:	Geomembrane Repair Summary Logs

Appendix N: Electrical Leak Detection Testing Reports

Appendix O: As-Built and Geomembrane Record Drawings

Appendix P: Requests for Clarification of Information (RCIs)

Appendix Q: Design Change Notices (DCNs)

Appendix R: Non-Conformance Reports (NCRs)

3.2 Personnel

3.2.1 Project Personnel

Senior personnel or representatives for the firms involved in the project are as follows:

Department of Energy (Facility Owner)
- Allan Harris, DOE QA/QC Representative
- Donald A. Pfister, P.E., DOE Fernald Facility Representative
- Johnny W. Reising, DOE Representative

Ohio Environmental Protection Agency (Regulatory Agency)
- Tom Ontko, Federal Facilities Oversight Representative

Fluor Fernald, Inc. (Owner's Representative and Prime Contractor)
- H. Pete Bolig, Safety & Health Representative/DSDP Director
- Jeff Browning, Construction Superintendent
- Dick Browning, Construction Superintendent
- Thomas D. Carr, Construction Coordinator
- J.D. Chiou, Ph.D., P.E., OSDF Project Manager
- Corey Fabricante, Radiological Control Team Leader
- Frank L. Flack, Construction Contracts Manager
- Reinhard Friske, Quality Assurance Team Leader
- Donald B. Goetz, Construction Engineer
- Alan Hohnhorst, Contracts and Acquisition
- Gregg K. Johnson, Safety & Health Team Leader
- Uday A. Kumthekar, P.E., Engineering Manager
- John McDonald, Night-Shift Construction Manager
- Jeffrey A. Middaugh, Safety & Health Representative
- Frank Miller, Deputy DSDP Director
- Janet K. Porter, DSDP Secretary

Dan Powell, DSDP Director
Garner Powell, OSDF Safety & Health Team Leader
Richard Scheper, Quality Assurance
Perry Richardson, WAO
Rita Rose, Quality Assurance
Steven Schaeffer, Construction Superintendent
Anthony Snider, Soils Project Engineer
Gordon M. Stumbo, Construction Manager
Charles C. VanArsdale, P.E., Project Engineer
Greg Waller, Construction Superintendent
Eric Woods, Natural Resources/Stewardship Manager
William A. Zebick, SDFP Construction Support Manager

GeoSyntec Consultants (CQA Consultant)
Sheila Abney, Administrative Assistant
Jay Beech, Ph.D., P.E., Principal in Charge
John Carruth, Senior Engineering Technician
Brian Cassidy, Engineering Technician
Lindsey Cooper, Engineering Technician
Joseph Greaves, Engineering Technician
David Evans, Senior Engineering Technician/ Safety & Health Representative
James A. Fleck, P.E., Resident Engineer
Oloth Noravong, Senior Engineering Technician
David K. Phillips, P.E., Project Manager
Walter Ray, Senior Engineering Technician
Allison Schaeffer, Fluor QA Representative
Collin P. Sukow, CQA Site Manager
Rachel Tatum, Senior Engineering Technician
Jeremy Tibbs, Engineering Technician
Christopher Walker, Senior Engineering Technician
Aimee Wendt, Engineering Technician
Timothy Willis, Safety & Health Representative

Golder Associates, Inc. (off-site soil-geotechnical and geosynthetics laboratory)
Henry Mock, Laboratory Director
Barry E. Sigmon, P.G., Laboratory Manager

Soil-Geosynthetic Interaction (SGI) Testing Services
R. Swan, Jr., Laboratory Director
Z. Yuan, Jr., Ph.D., Quality Control Manager

The Istre Company, Inc. (Geosynthetics Installer, key personnel only)
Jerry Istre, Superintendent, Master Seamer

The Environmental Specialties International, Inc. (Geosynthetics Installer, key personnel only)
Randy Story, Supervisor
Rodney Story, QC Foreman

Leak Location Services, Inc. (Subcontractor, key personnel only)
Darren Laine, P.E., Project Manager
Herman J. Flores, Field Technician
Martin Morales, Senior Lead Technician

Tecumseh Surveying, Inc. (Contractor's Surveyor)
Lynn E. Hirsch, P.L.S., Senior Professional Land Surveyor

3.2.2 GeoSyntec's On-Site Personnel Schedules

GeoSyntec project personnel were present on site according to the following schedules:

James A. Fleck, P.E., Resident Engineer	01 January 2006 – Present
Sheila Abney, Administrative Assistant	01 January 2006 - Present
Collin P. Sukow, CQA Site Manager	01 January 2006 – 25 August 2006 18 September 2006 - 28 October 2006
Tim Willis, Senior Engineering Technician	01 January 2006 – 14 April 2006
Christopher Walker, Senior Engineering Technician	01 January 2006 – 10 June 2006
Walter Ray, Senior Engineering Technician	06 March 2006 – 09 May 2006
David Evans, Engineering Technician	01 January 2006 - 27 October 2006
Allison Schaeffer, Engineering Technician	01 January 2006 – 29 October 2006

Aimee Wendt, Engineering Technician	01 January 2006 – 29 October 2006
Oloth Noravong, Senior Engineering Technician	15 May 2006 – 28 September 2006
Jeremy Tibbs, Engineering Technician	14 March 2006 - 29 October 2006
Joseph Greaves, Engineering Technician	13 March 2006 – 29 October 2006
Brian Cassidy, Engineering Technician	20 March 2006 - 29 October 2006
Jameel Battle, Engineering Technician	01 January 2006 – 22 January 2006
Lindsey Cooper, Engineering Technician	23 May 2006 - 29 October 2006
Brian Yeardley, Engineering Technician	21 June 2006 – 03 September 2006
Rachel Tatum, Senior Engineering Technician	29 August 2006 – 26 October 2006
Ned Meekins, CQA Site Manager	24 August 2006 – 15 September 2006
John Carruth, Senior Engineering Technician	13 March 2006 – 19 April 2006
Dave Phillips, P.E., Project Manager	25-26 April 2006 18-20 September 2006 17-18 October 2006
Rudy Bonapart, PhD, P.E, CEO	25 April 2006
Jay Beech PhD, P.E., Principal-In-Charge	17-18 October 2006
Neil Davies, P.E., Principal	17-18 October 2006

4. GENERAL DOCUMENTATION

Documentation and as-built drawings on the results of the CQA monitoring and testing activities performed and/or reviewed by GeoSyntec are contained in the appendices to this report. GeoSyntec's on-site CQA personnel used photographs to record significant events and progress of work during construction of the Phase V – Cell 7 and 8 final cover system projects. Photographic documentation of the construction activities is presented in Appendix A.

GeoSyntec's on-site CQA personnel recorded daily events, site conditions, construction progress, and communications on Daily Field Reports. The daily reports prepared by the CQA personnel are not included in the appendices; however, they can be made available upon request. Weekly reports of construction progress prepared by the CQA Site Manager and Resident Engineer are included in Appendix B.

Results of CQA monitoring, testing, and documentation obtained during construction of the OSDF Cell 7 and 8 final cover systems have been recorded on their respective monitoring and data collection forms which can be found in the appendices of this report. These appendices will be referenced later in this CQA final report.

During construction of the OSDF Cell 7 and 8 final cover systems, RCIs and DCNs that provided clarifications and design changes to the CFC Drawings and Specifications were processed and approved according to procedures described in FCP Document No. ED-12-5002 titled "Engineering Design Change Process". RCIs and DCNs were approved, as appropriate, by the design organization and the Regulatory Agency. Copies of the RCIs and DCNs are presented in Appendix P and Appendix Q, respectively.

Finally, all non-conformances associated with the construction were resolved through disposition by the Fluor Fernald CM, Engineering and QA, with concurrence, where appropriate, by the GeoSyntec CQA personnel. Copies of the non-conformance reports (NCRs) that were written during the Phase V – Cell 7 and 8 final cover construction projects are included as Appendix R to this CQA final report.

5. CONSTRUCTION QUALITY ASSURANCE – EARTHWORK

5.1 General

GeoSyntec monitored the construction of the earthwork components associated with the OSDF Phase V – Cell 7 and 8 final cover. Different earthwork materials were used to construct the various components of the project. These materials included existing subgrade material, compacted fill, contouring layer, compacted clay cap, cover drainage layer, rockfill, biointrusion barrier and choke stone materials, granular filter, vegetative soil layer, topsoil, road base aggregate, and riprap. The earthwork construction activities using these materials are generally described below.

The surface of the Cell 7 and 8 select impacted material layers was scarified by tracking with a bulldozer. Contouring layer material was placed and compacted in lifts to the design grades. The contouring layer material consisted of impacted and non-impacted compacted fill, which was obtained from designated stockpiles or other borrow sources within the construction area. The majority of the impacted

contouring layer material used in Cell 8 was processed in the stockpile area by using a screener with a 4-inch screen installed. The contouring layer was placed in approximately 7- to 10-inch- (180- to 250-mm) thick (maximum) loose lifts and compacted to a minimum degree of compaction of 95 percent of the maximum dry unit weight, as determined by the standard Proctor compaction test (i.e., American Society for Testing and Materials (ASTM) D 698). The material was compacted at moisture content between 3 percent dry and 3 percent wet of the optimum moisture content (OMC) measured in the standard Proctor compaction test (ASTM D 698).

The top of the contouring layer was proof rolled by using a loaded articulated dump truck and visually monitored by CQA personnel. Isolated areas of soft or loose materials were either dried and compacted or undercut and replaced with contouring layer material, which was compacted as described above.

The 2-foot- (0.6-m) thick compacted clay cap for the Cell 7 and 8 final cover systems was constructed using 8-in. (200-mm) thick (maximum) loose lifts; with the exception of the first lift which was placed as a 10-inch- (200-mm) thick loose lift. This initial 10-inch- (200-mm) thick loose lift resulted in a compacted lift thickness of about 6 inches (150 mm) when measured to the bottom of the pad foot indentation, and about 2 inches (50 mm) of material between compactor foot indentations. This latter material was included in the second lift. The compacted clay cap material was obtained from the screened clay material stockpiles in the east field borrow area (EFBA). Each lift was compacted to a minimum degree of compaction of 95 percent of the maximum dry unit weight, as determined by the standard Proctor compaction test (ASTM D 698). The compacted clay cap was compacted at moisture content between 0 and +3 percent of the OMC measured by the standard Proctor compaction test (ASTM D 698). The field moisture content and dry unit weight were also required to fall within the acceptable permeability zone (APZ) established for each clay stockpile, in accordance with the Technical Specifications, CQA Plan, the Test Pad Program Final Report (TPPFR) and the TPPFR Addendum. The APZ criteria were used to assure a hydraulic conductivity of less than 1×10^{-7} cm/s. Clay materials used for construction of the compacted clay cap were approved through conformance testing which included remolded hydraulic conductivity testing on composite samples from each stockpile in the off-site geotechnical laboratory and the establishment of an APZ for each clay stockpile.

The cover drainage layer, which varied in thickness from 1 ft (0.3 m) on the Cell 7 and 8 final covers to 2 ft (0.6 m) along the perimeters (some areas reached about 5 feet (1.5 m) thick), was constructed using material obtained from off-site borrow sources. The cover drainage layer material was approved through conformance testing of

samples and review of supplier's certification test results. The material was placed in approximately 12-in. (300-mm) thick lifts using an LGP bulldozer, and 3-foot- (0.9-m) thick haul roads were used for heavy traffic loads in order to protect the underlying geosynthetics.

The biointrusion barrier and choke stone layer was constructed using materials obtained from off-site borrow sources. The biointrusion barrier material was placed in 3-foot- (0.9-m) thick lifts and the final surface was choked off with the choke stone material. The biointrusion barrier and choke stone materials were approved through conformance testing of samples and review of supplier's certification test results.

The 6-inch- (150-mm) thick granular filter layer was constructed using material obtained from off-site borrow sources; the material was approved through conformance testing of samples and review of supplier's certification test results. The granular filter layer was placed in one loose lift and compacted with an LGP bulldozer.

The vegetative soil layer was constructed to the design grades using 7- to 9-inch- (175- to 225-mm) thick loose lifts. Each lift was compacted to a minimum degree of compaction of 92 percent of the maximum dry unit weight and at moisture contents between –4 to +4 percent of the OMC, as determined by the standard Proctor compaction test (ASTM D 698). The vegetative soil layer material consisted of fill material, which was obtained from designated stockpiles within the construction area and from the brown-gray till in the EFBA. Fill materials used for the vegetative soil layer construction were approved through conformance testing of samples in accordance with the requirements of the Project Documents.

The 6-inch- (150-mm) thick topsoil layer was constructed using material obtained from designated stockpiles within the construction area. Topsoil material was approved through conformance testing of samples in accordance with the requirements of the Project Documents. The topsoil layer was placed in one loose lift and compacted with an LGP bulldozer.

Base aggregate material was used to construct the monitoring access as shown on the CFC Drawings. The material was obtained from off-site borrow sources, and was approved through review of supplier's certification test results. The base aggregate material was placed and compacted, in general accordance with Items 304.04 and 304.05 of Ohio Department of Transportation (ODOT) Specifications, to meet the requirements of the Technical Specifications.

Riprap was used to construct drainage channel linings, placed around the final cover/monitoring access interface, and also used for temporary slope protection and other surface-water management and erosion control (SWMEC) measures. The riprap material (Type C Dumped Rock Fill) was obtained from off-site borrow sources, and was approved through review of suppliers' certification test results. The riprap material was placed in accordance with the requirements of the Technical Specifications and as shown on the CFC Drawings.

CQA personnel monitored these earthwork construction activities and performed the appropriate geotechnical testing on the soil materials to confirm that the material properties conformed to the Project Documents, that the specific lift thicknesses were not exceeded, and that the materials were placed and compacted in accordance with the Project Documents. Geotechnical testing was performed and documented by CQA personnel. The testing was carried out either: (i) in-place; (ii) on-site, in the geotechnical laboratory; or (iii) in the off-site testing laboratory.

5.2 Changes in Earthwork Specifications

RCIs and DCNs of the earthwork drawings and specifications were processed and approved according to procedures described in FCP Document No. ED-12-5002 titled "Engineering Design Change Process". RCIs and DCNs were approved, as appropriate by the design organization and the regulatory agency (i.e., OEPA). Copies of the RCIs and DCNs for the Cell 7 and 8 final cover projects are presented in Appendices P and Q, respectively.

5.3 Pre-Conformance Testing Activities

A comprehensive pre-conformance sampling and testing program was conducted in the EFBA in 2000 and 2001. The purpose of the program was to identify candidate materials suitable for screening and processing as clay liner and cap material for cell liner and final cover construction. The results of the pre-conformance sampling and testing program are presented in previous OSDF CQA final reports [GeoSyntec, 2002 and 2003]. These results were used as the basis for the screening and processing of clay liner and cap material needed for the Cell 7 and 8 final cover systems described in this CQA final report.

5.4 Conformance Testing Activities

5.4.1 General

Soil samples were obtained from proposed sources, prior to construction, to verify conformance with the Project Documents for each material type. Also during construction,

soil samples were obtained from the delivered material for conformance testing, as required by the Project Documents. CQA personnel obtained representative samples of fill material and granular drainage layer materials from the appropriate source depending on the material type.

Fill material used for the contouring layer (only a small portion of the contouring layer material), vegetative soil layer, and compacted fill, was obtained from designated stockpiles within the OSDF construction areas and from the brown-gray till within the EFBA. Compacted clay liner and cap material was obtained from the screened clay material stockpiles in the EFBA. The majority of the contouring layer material placed was impacted and was obtained from the former production areas of the site.

The granular drainage materials were obtained from off-site sources. The cover granular drainage material (No. 78 coarse aggregate) was obtained from Hanson Aggregates (Hanson) Eagle quarry located in Winchester, Ohio. The biointrusion barrier layer material (ODOT Type D Dumped Rock Fill) was obtained from the Hanson Aggregates (Hanson) Highland quarry located in Hillsboro, Ohio, Eagle quarry located in Winchester, Ohio, and New Point Stone Co., Inc. (New Point) quarry located in Greensburg, Indiana. The biointrusion choke stone material (AASHTO No. 57 crushed aggregate) was obtained from the Martin Marietta quarry in Lynchburg, Ohio and Hanson Eagle quarry in Winchester, Ohio. The granular filter and embedment fill material (ODOT Type A-3 Sand) was obtained from the Welch quarry in Ross, Ohio.

The Type C riprap material, used for channel lining and other SWMEC measures, was obtained from New Point Stone Co., Inc. (New Point) quarry located in Greensburg, Indiana.

5.4.2 Test Methods

The following geotechnical tests, when appropriate, were performed on each of the soil components of the Cell 7 and 8 final cover systems:

Moisture content tests were performed on samples of compacted fill, contouring layer, vegetative soil layer, and non-impacted protective layer. The tests were performed in general accordance with ASTM D 2216.

Particle-size distribution tests were conducted on the fine-grained soils used for compacted fill, contouring layer, and non-impacted protective layer. The tests (sieve analysis and hydrometer) were performed in general accordance with ASTM D 422. Atterberg limits tests were performed in general accordance with ASTM D 4318.

The USCS was used to classify the materials in general accordance with ASTM D 2487.

Standard Proctor compaction tests were conducted on the soils used for compacted fill, contouring layer, and vegetative soil layer. The tests were performed in general accordance with ASTM D 698.

Organic content tests were performed on samples of the topsoil in general accordance with ASTM D 2974.

Particle-size distribution tests were performed on samples of the coarse-grained soils used for the cover drainage layers, granular filter, and biointrusion choke stone in general accordance with ASTM C 136. The USCS was used to classify the materials in general accordance with ASTM D 2487.

Carbonate content and hydraulic conductivity tests were conducted on the cover drainage layer materials. The tests were performed in general accordance with ASTM D 3042 and ASTM D 2434, respectively.

Bulk specific gravity and absorption tests were conducted on the biointrusion barrier and choke stone materials in general accordance with ASTM C 127.

The results of the geotechnical laboratory tests performed on the cohesive soil materials used for the Cell 7 and 8 final cover construction projects are presented in Appendix D, and summarized in Section 5.4.3.

5.4.3 Summary of Geotechnical Test Results

5.4.3.1 Compacted Fill

Index tests (i.e., moisture content, particle-size distribution, Atterberg limits and classification tests) were performed on a total of 1 sample of compacted fill material. The compacted fill material used in construction classified as CL according to the USCS when evaluated in accordance with ASTM D 2487 and the maximum particle size was 5.0 in. (130 mm). A total of 1 standard Proctor compaction tests were performed on fill materials used as compacted fill.

Table 5-1 presents a summary of the geotechnical tests conducted on the fill materials used as compacted fill. Compacted fill was used as trench backfill GIS-16, subgrade fill on the south and east sides of Cell 8, and compacted fill around Valve Houses 7 and 8.

5.4.3.2 Contouring Layer

Index tests (i.e., moisture content, particle-size distribution, Atterberg limits and classification tests) were performed on 12 samples of fill material used for the contouring layer and haul road construction. The material classified as GC, SC, SM, ML or CL according to the USCS when evaluated in accordance with ASTM D 2487 and the maximum particle size was 4.0 in. (100 mm). A total of 12 standard Proctor compaction tests were performed on fill materials used for the contouring and haul road construction.

Table 5-2 presents a summary of the geotechnical tests conducted on the fill materials used for the contouring layer.

5.4.3.3 Compacted Clay Cap

The results of the geotechnical laboratory conformance testing performed on the screened clay cap material stockpiles were presented in the 2005 certification report. For simplicity, we have only included the APXs that are applicable to the 2006 construction in Appendix D of this certification report. Therefore, Table 5-3 summarizes only the field testing of the compacted clay cap soil.

5.4.3.4 Cover Drainage Layer Materials

On-site laboratory particle-size distribution tests were performed on 19 samples obtained from the on-site stockpile for the cover drainage layer material. The laboratory particle-size distribution test results are presented in Appendix D. GeoSyntec also performed off-site laboratory hydraulic conductivity tests and carbonate content tests on representative samples of the cover drainage layer material. A summary of the testing requirements for the cover drainage layer materials is presented in Table 5-4.

Based on the testing performed, the granular drainage materials used in construction of the cover drainage layers classified as GP (i.e., poorly graded gravel) according to the USCS (ASTM D 2487); had 100 percent passing a 0.75 in. (19 mm) opening sieve when tested in accordance with ASTM C 136; generally met gradation requirements for No. 78 stone; had a carbonate content of less than or equal to 5 percent when tested in accordance with ASTM D 3042 modified with a pH of 4; and the hydraulic conductivity (i.e., permeability) requirement was 0.1 cm/s or greater when evaluated in accordance with ASTM D 2434. The results of the laboratory tests on the cover drainage layer materials are presented in Appendix D.

5.4.3.5 Biointrusion Barrier and Choke Stone

The biointrusion barrier material was tested and certified by the suppliers (Hanson and New Point) and met the requirements of Type D Dumped Rock Fill, as required by the Project Documents. Additionally, a total of ten (10) bulk specific gravity and absorption tests were conducted on the biointrusion barrier material to comply with the conformance testing requirements of the Project Documents. The results of the tests on the biointrusion barrier material are presented in Appendix D and summarized in Table 5-5.

The biointrusion barrier choke stone material was tested and certified by the supplier (Martin Marietta) to meet the requirements of AASHTO No. 57 crushed aggregate. Two (2) particle-size distribution tests (ASTM C 136), bulk specific gravity tests (ASTM C 127) and absorption tests (ASTM C 127) were also conducted on the biointrusion barrier choke stone. Test results are presented in Appendix D, and summarized in Table 5-6.

The choke stone material used in construction of the biointrusion barrier layer classified as GW or GP according to the USCS when evaluated in accordance with ASTM D 2487; had 100 percent passing a 1.5 in. (38 mm) opening sieve when tested in accordance with ASTM C 136; generally met gradation requirements for AASHTO No. 57 stone; had a minimum bulk specific gravity of 2.60 when tested in accordance with ASTM C 127; and a maximum absorption of 2 percent when evaluated in accordance with ASTM C 127.

5.4.3.6 Granular Filter Layer / Pipe Embedment Fill

A total of eight (8) index tests (particle-size distribution and classification tests) were performed on the granular filter and embedment fill layer materials used for the Cell 7 and 8 final cover constructions. The same material was also used as pipe embedment fill for the EPLTS pipe repair. The material classified as SP according to the USCS and met the requirements of the Project Documents. Test results are presented in Appendix D and summarized in Table 5-7.

5.4.3.7 Vegetative Soil Layer

A total of forty-five (45) index tests (i.e., moisture content, particle-size distribution, Atterberg limits and classification tests) were performed on vegetative soil layer material used for the Cell 7 and 8 final cover constructions. The material classified as GC, SC, or CL according to the USCS (ASTM D 2487) and the maximum particle size was 4.0 in. (100 mm). A total of forty-five (45) standard Proctor compaction tests were performed on fill materials used as vegetative soil layer. Table 5-8 presents a summary of the geotechnical tests conducted on the fill materials used as vegetative soil layer. Test results are presented in Appendix D.

5.4.3.8 Topsoil

A total of five (5) index and four (4) organic content tests were performed on samples of the topsoil used for construction of the Cell 7 and 8 final cover. Test results are summarized in Table 5-9, which indicate that the topsoil had a minimum organic content of 2 percent when tested in accordance with ASTM D 2974. Test results are presented in Appendix D.

5.5 Cell 7 and 8 Final Cover Field Monitoring Activities

5.5.1 General

GeoSyntec's CQA personnel monitored the placement of soil as previously described. Potentially nonconforming or questionable practices observed by CQA personnel were brought to the attention of the CM for review and correction.

5.5.2 Contouring Layer

5.5.2.1 Material

The contouring layer across Cells 7 and 8 was constructed directly above the select impacted material layer. The contouring layer material consists of fill material from on-site borrow sources described in Section 5.4. The results of standard Proctor compaction tests performed on select compacted fill material (see Table 5-2 and Appendix D) were used as reference for the compaction and testing of the contouring layer.

5.5.2.2 Construction Procedure

The nominal 1-ft (0.3-m) thick contouring layer was constructed in two lifts, with the first lift being of a 8 in. (200 mm) loose thickness. Each lift was compacted to a minimum degree of compaction of 95 percent of the maximum dry unit weight and within ±3 percent of the OMC, as determined by the standard Proctor compaction test (ASTM D 698). The fill material was placed in controlled lifts using Volvo A35C articulated dump trucks and using Caterpillar D-6 LGP bulldozers to spread the material. The lifts were compacted using a Caterpillar 815 and/or 825 sheepsfoot compactor and sealed with a smooth drum roller. During placement and compaction, CQA personnel monitored the contractor's activities, including removal of visible rock particles larger than 4 in. (100 mm) and limiting clod size to 3 in. (75 mm) or less, as required by the Project Documents.

5.5.2.3 Field Testing Activities

Geotechnical Testing

CQA personnel performed in-place nuclear moisture/density tests on compacted lifts of contouring layer. These tests were performed in general accordance with ASTM D 2922 and ASTM D 3017. A total of 292 field nuclear moisture/density tests were performed on the contouring layer for Cells 7 and 8, averaging 146 tests per lift. A minimum of 71 tests per lift are required to meet the frequency of 1 test/10,000 ft^2/lift required by the CQA Plan (see Table 5-2). The test frequencies meet the project requirements. In addition, thirteen (13) drive cylinder tests (ASTM D 2937) were performed as correlation tests to meet the minimum testing frequency of 1 test per 25 passing nuclear moisture/density tests.

The results of each field nuclear moisture/density tests were compared to the project requirements of a minimum degree of compaction of 95 percent of the maximum dry unit weight and within ±3 percent of the OMC, as determined by the standard Proctor compaction test (ASTM D 698). There were 34 tests that failed to meet the performance testing criteria. These areas were reworked until passing retests were achieved for each of the failing tests. The holes left from the moisture/density tests were filled with soil-bentonite mixture. The results of the field moisture/density tests performed on the contouring layer are presented in Appendix F.

Proof rolling

Following completion of the contouring layer construction, FFC proof rolled the surface of the contouring layer to detect soft or loose zones, as required by the Project Documents. The proof rolling was performed using a loaded Volvo A35C articulated dump truck with a minimum loaded weight of 20 tons (20.3 tonnes). During proof rolling, the surface was monitored by CQA personnel to confirm the firmness of the top of contouring layer for placement of the compacted clay cap.

5.5.2.4 Certification

The surveyed areas of the surface of the contouring layer were found to be within the project tolerance of -0.3 to +0.1 ft (-0.09 to +0.03 m) from the design elevations, and between 0.85 and 1.0 foot in thickness, as required by the Project Documents. The as-built top of contouring layer certification drawings, prepared by Tecumseh (Fluor Fernald's surveyor), are included in Appendix O.

5.5.3 Compacted Clay Cap

After completing the contouring layer construction operations, CQA personnel monitored the placement and compaction of the clay cap material by FFC. The compacted clay cap consisted of a minimum of 2 ft (0.6 m) thick layer, as shown on the CFC Drawings, placed and compacted in lifts, as described below.

5.5.3.1 Materials

The compacted clay cap was constructed using clay liner and cap material from the on-site screened clay material stockpiles in the EFBA described in Section 5.4. Each stockpile was approved through conformance testing which included hydraulic conductivity testing of remolded composite samples from each stockpile in an off-site geotechnical laboratory and establishment of an APZ (see Appendix D).

5.5.3.2 Construction Procedure

Construction of the compacted clay cap was performed in accordance with the Project Documents and patterned after the Test Pad Program. Two compacted clay liner/cap test pads were constructed prior to the construction of the Cell 1 compacted clay liner. The results of the test pad program were used to develop the specifications for compacted clay liner and cap materials and construction. The test pad program is described in a report entitled "Test Pad Program Final Report", Revision 0, dated June 1997. A "Test Pad Program Final Report Addendum No. 1", Revision 0, dated January 1999 modified the left boundary of the APZ from the 90% degree of saturation line to a line defined by the "line of optimums" for the clay liner and cap material in use. This modified APZ was established for each stockpile that was used for the compacted clay cap construction for Cell 7 and 8 final cover systems. The construction sequence of the compacted clay cap is described below:

- the contouring layer surface and the top surface of each lift of compacted clay were scarified by tracking back and forth with a Caterpillar D-6 LGP bulldozer;
- the clay cap material was hauled from each stockpile in the EFBA by articulated dump trucks and placed in the cell;
- the initial lift of compacted clay was placed in an approximate 10-inch (250-mm) thick loose lift to keep equipment from contacting the impacted contouring layer soils.
- Subsequent lifts of the compacted clay was spread in approximately 7- to 8-in. (180- to 200-mm) thick (loose) lifts using a D-6 LGP bulldozer;
- after spreading, the soil stabilizer was used to break up clods of compacted clay; water was added as necessary to increase the moisture content of the clay material within 0 to +3 percent of the OMC as determined by the standard Proctor compaction test (ASTM D 698);

- after each lift was stabilized using the soil stabilizer, visible rock particles greater than 2 in. (50 mm) in size were removed by laborers;
- each lift of compacted clay was compacted using a Caterpillar 815 and/or 825 sheepsfoot compactors making a minimum of six one-way passes;
- lift thickness was controlled by utilizing a GPS controlled Caterpiller D6 LGP dozer; CQA personnel visually monitored the placement and compaction of the compacted clay to provide a check of lift thickness;
- the final grade was rolled with a vibratory smooth drum roller to seal the top surface of the compacted clay cap; and
- after final grading of the compacted clay surface, the surveyor confirmed final grade elevations.

The compacted clay cap was generally constructed in four compacted lifts to a total thickness of 2 ft (0.6 m), as shown on the CFC Drawings. The contractor periodically added water during or after compacted clay cap placement and compaction to limit drying or desiccation cracking of the surface.

GeoSyntec CQA personnel monitored the compacted clay cap placement and compaction process described above. CQA personnel visually monitored that FFC utilized six or more passes with the compactor across the clay cap lift. CQA personnel also visually monitored that FFC protected completed compacted clay cap from significant drying or the surface from desiccation cracking by routine watering and sealing with the smooth drum roller. If significant drying or cracking of the compacted clay cap surface was observed, FFC was instructed to moisture condition and rework the affected area.

5.5.3.3 Field Testing Activities

CQA personnel performed in-place nuclear moisture/density tests as the clay cap material was placed and compacted. The tests were performed in general accordance with ASTM D 2922 and ASTM D 3017. For the maximum disturbed area of approximately 16.2 acres (6.6 hectares), a minimum of 81 tests per lift were needed to meet the minimum frequency of 5 tests per acre (12 tests per hectare) per lift required by the Project Documents for the Cell 7 and 8 compacted clay caps (see Table 5-3). A total of 656 field moisture/density tests were performed on the Cell 7 and 8 compacted clay caps, with an average of 164 tests per lift. In addition, 35 drive cylinder tests (ASTM D 2932) were performed as correlation tests to meet the minimum testing frequency of 1 test per 25 passing nuclear moisture/density tests.

The results of each field moisture/density test were checked to see if they were within the established APZ for each clay liner and cap material stockpile, as required by the Project Documents. A total of 104 tests failed to meet the minimum degree of compaction requirement of 95 percent of the maximum dry unit weight and at moisture content of 0 to 3 percent above the OMC, as determined by the standard Proctor compaction tests and within the established APZ. For each failed test, the contractor reworked and recompacted the area surrounding the failure and then CQA personnel retested the area. This procedure was repeated until satisfactory moisture/density test results were obtained. In one case, soil from stockpile 04-06 that was not meeting the required compaction criteria was removed from the cap placement area and returned to the stockpile. All compacted clay dap material that is currently in the Cell 7 and 8 constructions meets the project requirements.

The results of the field moisture/density tests are presented in Appendix F. The holes left from the moisture/density tests, were filled with bentonite granules and clay liner and cap material. The mixture was manually compacted in the holes using a steel rod.

5.5.3.4 Certification

The surveyed areas of the surface of the compacted clay cap were found to be within the tolerances of +0 to +0.3 ft (+0 to +0.09 m) of the thickness and within ±0.2 ft (±0.06 m) of the grades shown on the CFC Drawings. The as-built compacted clay cap certification drawing, prepared by Tecumseh (Fluor Fernald's surveyor), is included in Appendix O.

5.5.4 Cover Drainage Layer

5.5.4.1 Material

CQA personnel monitored the placement of the cover drainage layer material for the Cell 7 and 8 final covers. The cover drainage layer was constructed using granular material obtained from Martin Marietta and Hanson, as described in Section 5.4. The cover drainage material was stockpiled in an area southwest of the OSDF.

5.5.4.2 Construction Procedure

The construction sequence of the cover drainage layer was as follows:

- Volvo articulated dump trucks hauled the granular material from the stockpile to the cell area. Haul roads at least 3-foot- (0.9-m) thick were constructed of the granular material within the cap areas to protect the geosynthetic materials from the heavy loading of the trucks;

- the granular material was spread in approximately one 1-ft (0.3-m) thick lift using Caterpillar D-6 LGP bulldozers;
- the majority of the cover drainage layer was spread to the 1-foot thick lift during night shift operations as the wrinkles were smaller (or non-existent) at that time of day; and
- laborers were utilized during the spreading operation to control and prevent wrinkle formation in the underlying geosynthetics.

5.5.4.3 Field Monitoring Activities

During placement of the cover drainage layer, CQA personnel monitored the contractor's activities to verify that geomembrane wrinkling and the risk of damage to the underlying geomembrane was minimized. CQA personnel also checked that the contractor operated LGP bulldozers in areas where at least a 1-ft (0.3-m) thick layer of cover drainage layer material was maintained over the geosynthetics, and that a 3-ft (0.9-m) thick layer of cover drainage layer material was maintained over the underlying geosynthetics in heavily-trafficked areas.

5.5.4.4 Certification

Upon completion of grading and tracking using the bulldozer, the surface of the cover drainage layer was surveyed by Tecumseh. The surveyed areas of the surface of the cover drainage layer were found to be within the project tolerances of 0 to +0.1 ft (0 to +0.03 m) of the thickness shown on the CFC Drawings. The as-built top of cover drainage layer, prepared by Tecumseh, is included in Appendix O.

5.5.5 Biointrusion Barrier and Choke Stone Layer

5.5.5.1 Materials

CQA personnel monitored the placement of the biointrusion barrier and choke stone layer materials for the Cell 7 and 8 final covers. The biointrusion barrier and choke stone layer was constructed using granular materials obtained from Hanson's Highland and Eagle quarries, New Point Stone, and Martin Marietta as described in Section 5.4. The materials were stockpiled in an area southwest, west, and north of the OSDF.

5.5.5.2 Construction Procedure

The construction sequence of the biointrusion barrier and choke stone layer was as follows:

- Volvo articulated dump trucks hauled the biointrusion barrier material from the stockpile to the cell area. Haul roads at least 3-foot- (0.9-m) thick were constructed of the granular material within the cap areas to protect the Geosynthetic materials from the heavy loading of the trucks;

- the biointrusion barrier material was spread in approximately one 3-ft (0.9-m) thick (loose) lift(s) using Caterpillar D-6 LGP bulldozers;

- the choke stone material was then hauled and spread over the top of the biointrusion barrier material; and

- the bulldozer and Volvo articulated dump trucks were used to compact and/or track-in the choke stone to the final design grades.

5.5.5.3 Field Monitoring Activities

During placement of the biointrusion barrier and choke stone layer, CQA personnel periodically monitored the contractor's activities to verify that the risk of damage to the underlying geosynthetics was minimized. CQA personnel also checked that a 3-ft (0.9-m) thick layer of granular material was maintained over the underlying geosynthetics in heavily-trafficked areas.

5.5.5.4 Certification

Upon completion of grading and tracking using the bulldozer and articulated dump trucks, the surface of the biointrusion barrier layer was surveyed by Tecumseh. The surveyed areas of the surface were found to be within the project tolerances of -0.1 to +0.3 ft (-0.03 to +0.09 m) of the thickness shown on the CFC Drawings. The as-built top of biointrusion barrier layer, prepared by Tecumseh, is included in Appendix O.

5.5.6 Granular Filter Layer

CQA personnel monitored the placement operations for the granular filter layer for Cells 7 and 8. The granular filter was constructed using Type A-3 sand material obtained from off-site borrow sources, as indicated in Section 5.4. The material was placed in a nominal 6-in. (150-mm) thick lift and was tracked with a Caterpillar D-6 LGP bulldozer.

Upon completion of grading and tracking, the surface of the granular filter layer was surveyed by Tecumseh. The surveyed areas of the surface were found to be within the project tolerances of 0 to +0.1 ft (0 to +0.03 m) of the thickness shown on the CFC Drawings. The as-built top of granular filter layer, prepared by Tecumseh, is included in Appendix O.

5.5.7 Vegetative Soil Layer

5.5.7.1 Material

The vegetative soil layer across Cells 7 and 8 was constructed directly above the granular filter layer. The vegetative soil layer material consisted of fill material from on-site borrow sources described in Section 5.4. The results of standard Proctor compaction tests performed on select compacted fill material (see Table 5-8 and Appendix D) were used as reference for the compaction and testing of the vegetative soil layer.

5.5.7.2 Construction Procedure

The minimum 1.75-ft (0.53-m) thick layer was constructed in three lifts, with the first lift being of a 10 in. (250 mm) loose thickness. Each lift was compacted to a minimum degree of compaction of 92 percent of the maximum dry unit weight and within ±4 percent of the OMC, as determined by the standard Proctor compaction test (ASTM D 698). The subsequent lifts of fill material was placed and spread in 8-in. (200-mm) ±1 in. (25-mm) thick loose lifts using Volvo A35C articulated dump trucks and using Caterpillar D-6 LGP bulldozers to spread the material. The lifts were compacted using the bulldozer tracks or a Caterpillar 815 sheepsfoot compactor and sealed with a smooth drum roller. During placement and compaction, CQA personnel monitored the contractor's activities, including removal of visible rock particles larger than 4 in. (100 mm), roots and other deleterious material; and minimizing large clods by breaking them with the bulldozer tracks.

5.5.7.3 Field Testing Activities

CQA personnel performed in-place nuclear moisture/density tests on compacted lifts of vegetative soil layer. These tests were performed in general accordance with ASTM D 2922 and ASTM D 3017. A total of 453 field nuclear moisture/density tests were performed on the vegetative soil layer, with an average of 151 tests per lift. The resulting frequency is 9.2 tests/acre/lift, which exceeds the minimum frequency of 2 tests/acre/lift (5 tests/hectare/lift) required by the CQA Plan (see Table 5-8). In addition, 19 drive cylinder tests (ASTM D 2937) were performed as correlation tests to meet the minimum testing frequency of one test per 25 passing nuclear moisture/density tests.

The results of each field nuclear moisture/density tests were compared to the project requirements of a minimum degree of compaction of 92 percent of the maximum dry unit weight and within ±4 percent of the OMC, as determined by the standard Proctor compaction test (ASTM D 698). Ten (10) tests failed to meet this criteria, but were reworked and retested with passing results. The holes left from the moisture/density tests

were filled with soil-bentonite mixture. The results of the field moisture/density tests performed on the vegetative soil layer are presented in Appendix F.

5.5.7.4 Certification

The surveyed areas of the surface of the topsoil were found to be within the project tolerances of ±0.1 ft (±0.03 m) of the thickness required by the Project Documents. The as-built top of vegatative layer certification drawing, prepared by Tecumseh, is included in Appendix O.

5.5.8 Topsoil

GeoSyntec's on-site CQA personnel periodically monitored the hauling and placement of topsoil over the surface of the vegetative soil layer. Topsoil placement operations were performed by FFC. The topsoil material was transported from designated stockpiles in the OSDF construction area. CQA personnel periodically monitored the topsoil placement operations to assure the following:

- approved equipment was used for topsoil placement;
- the surface of the vegetative soil layer was scarified to the depths required by the Specifications; and
- a minimum thickness of 5 in. (150 mm) of topsoil was placed over the vegetative soil layer.

The surveyed areas of the surface of the topsoil were found to be within the project tolerances of ±0.1 ft (±0.03 m) of the thickness and within 0 to +0.5 ft (0 to 0.15 m) of the grades required by the Project Documents. The as-built top of topsoil layer certification drawing, prepared by Tecumseh, is included in Appendix O.

5.5.9 Vegetation

Seeding of the topsoil was performed by FFC. The seed mix and application rates are presented in Appendix E. Seeding of the Cell 7 and 8 final covers was performed using the seed-drill method, as required by the Technical Specifications. Erosion mat was manually installed and stapled over the seeded topsoil in accordance with the manufacturer's recommendations and the Project Documents (see Section 6.8).

GeoSyntec CQA personnel periodically monitored the seeding and installation of the erosion mat over the Cell 7 and 8 final covers.

[redacted]

TABLE 5-1

COMPACTED FILL MATERIAL PROPERTIES SUMMARY
CELLS 7 and 8 FINAL COVERS

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM D 422	100% Finer than 5.0 in.	1 per 5,000 yd^3	1	1 (0)
Standard Proctor Compaction	ASTM D 698	---	1 per 5,000 yd^3	1	1 (0)
Moisture	ASTM D 2216 ASTM D 4643	---	1 per 5,000 yd^3	1	1 (0)
Soil Classification	ASTM D 2487	GC, SC, SM, ML, CL or CH	1 per 5,000 yd^3	1	1 (0)
Atterberg Limits	ASTM D 4318	---	1 per 5,000 yd^3	1	1 (0)
FIELD TEST					
Drive Cylinder Soil density Soil moisture	 ASTM D 2937 ASTM D 2216	 ≥95% MDD[3] ± 3% OMC	1 per 25 passing nuclear tests	1	3
Nuclear Gauge: Soil density Soil moisture	 ASTM D 2922 ASTM D 3017	 ≥95% MDD ± 3% OMC	2/acre/lift	8	60 (3)

NOTES: (1) Reference Section 02200 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 3000 yd^3 for compacted fill on the south and west sides of cell 8, around valve houses 7 and 8, and backfill for GIS-16 installation.
(3) MDD = maximum dry density (unit weight); OMC = optimum moisture content

[redacted]

TABLE 5-2

CONTOURING LAYER PROPERTIES SUMMARY
CELLS 7 and 8 FINAL COVERS

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM D 422	100% Finer than 4.0 in.	1 per 5,000 yd^3	6	12 (0)
Standard Proctor Compaction	ASTM D 698	---	1 per 5,000 yd^3	6	12 (0)
Moisture Content	ASTM D 2216 ASTM D 4643	---	1 per 5,000 yd^3	6	12 (0)
Soil Classification	ASTM D 2487	GC, SC, CL	1 per 5,000 yd^3	6	12 (0)
Atterberg Limits	ASTM D 4318	---	1 per 5,000 yd^3	6	12 (0)
FIELD TEST					
Drive Cylinder Soil density Soil moisture	ASTM D 2937 ASTM D 2216	≥92% MDD ± 3% OMC	1 per 25 passing nuclear tests	11	13
Nuclear Gauge: Soil density Soil moisture	ASTM D 2922 ASTM D 3017	≥92% ± 3% OMC	1/10,000 ft^2	71	292 (30)

NOTES: (1) Reference Section 02240 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 26,200 yd^3 for the Cell 7 and 8 final cover construction projects.
(3) MDD = maximum dry density (unit weight); OMC = optimum moisture content

TABLE 5-3

COMPACTED CLAY CAP PROPERTIES SUMMARY
CELL 7 and 8 FINAL COVERS

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Complete laboratory testing summarized in 2005 Certification Report. All stockpiles meet or exceed Project requirements.					
FIELD TEST					
Drive Cylinder: Soil density Soil moisture	ASTM D 2937 ASTM D 2216	Within APZ and ≥95% MDD 0 - 3% OMC	1 per 25 passing density tests	22	35
Nuclear Gauge: Soil density Soil moisture	ASTM D 2922 ASTM D 3017	Within APZ and ≥95% MDD 0 - 3% OMC	5/acre/lift	325	656 (102)
Depth Verification Survey	Visual	As shown on drawings	--	--	--

NOTES: (1) Reference Section 02225 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a stockpile volume (from the Contractor's survey of processed clay material) and the area of the compacted clay liner and cap for the Cell 7 and 8 final cover construction projects.
(3) Failing nuclear density/moisture tests were reworked until passing results were obtained (see Section 5.5.4 of report).

TABLE 5-4

COVER DRAINAGE LAYER MATERIAL (NO. 78 STONE) FINAL COVER CONSTRUCTION

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM C 136	3/4 in. 100 1/2 in. 85-100 3/8 in. 40-75 No. 4 5-25 No. 8 0-10 No. 16 0-5 No. 200 0-2	1 per 3,000 yd^3	17	19 (0)
Soil Classification	ASTM D 2487	GP	1 per 3,000 yd^3	17	19 (0)
Carbonate Content	ASTM D 3042	≤5%	1 per 5,000 yd^3	10	11 (0)
Hydraulic Conductivity	ASTM D 2434	≥ 0.1 cm/s	1 per 3,000 yd^3	17	17 (0)
FIELD TEST					
Depth Verification: Survey	Visual	As shown on drawings	--	--	--

NOTES: (1) Reference Section 02710 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of approximately 48,667 yd^3 received for final cover construction.

[redacted]

TABLE 5-5

BIOINTRUSION BARRIER LAYER PROPERTIES SUMMARY (TYPE D RIPRAP) FINAL COVER CONSTRUCTION

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Bulk Specific Gravity	ASTM C 127	≥2.60	1 per 10,000yd^3	10	10 (0)
Absorption	ASTM C 127	≤2%	1 per 10,000yd^3	10	10 (0)
FIELD TEST					
Depth Verification: Survey	Visual	As shown on drawings	---	---	---

NOTES: (1) Reference Section 02280 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 96,000 yd^3 received for final cover construction.

TABLE 5-6

BIOINTRUSION CHOKE STONE PROPERTIES SUMMARY (NO. 57 STONE) FINAL COVER CONSTRUCTION

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM C 136	1 1/2 in. 100 1 in. 95 - 100 1/2 in. 25 - 60 No. 4 05 - 10 No. 8 0 - 5	1 per 10,000 yd^3	1	2 (0)
Soil Classification	ASTM D 2487	GP	1 per 10,000 yd^3	1	2 (0)
Bulk Specific Gravity	ASTM C 127	≥2.60	1 per 10,000 yd^3	1	2 (0)
Absorption	ASTM C 127	≤2%	1 per 10,000 yd^3	1	2 (0)
FIELD TEST					
Depth Verification: Survey	Visual	As shown on drawings	---	---	---

NOTES:
(1) Reference Section 02280 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 10,067 yd^3 received for final cover construction.

TABLE 5-7

GRANULAR FILTER / EMBEDMENT FILL MATERIAL PROPERTIES SUMMARY (ODOT TYPE A-3 SAND) FINAL COVER CONSTRUCTION

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM C 136	No. 4 100 No. 50 95 - 100 No. 200 25 - 60	1 per 5,000yd^3	4	8 (0)
Soil Classification	ASTM D 2487	SW, SP	1 per 5,000yd^3	4	8 (0)
FIELD TEST					
Depth Verification: Survey	Visual	As shown on drawings	---	---	---

NOTES: (1) Reference Section 02712 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 20,667 yd^3 received for final cover construction.

TABLE 5-8

VEGETATIVE SOIL LAYER PROPERTIES SUMMARY
CELL 7 and 8 FINAL COVERS

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM D 422	100% Finer than 4.0 in.	1 per 5,000 yd^3	11	45 (0)
Standard Proctor Compaction	ASTM D 698	---	1 per 5,000 yd^3	11	45 (0)
Moisture Content	ASTM D 2216 ASTM D 4643	---	1 per 5,000 yd^3	11	45 (0)
Soil Classification	ASTM D 2487	GC, SC, CL	1 per 5,000 yd^3	11	45 (2)
Atterberg Limits	ASTM D 4318	---	1 per 5,000 yd^3	11	45 (2)
FIELD TEST					
Drive Cylinder Soil density Soil moisture	ASTM D 2937 ASTM D 2216	≥92% MDD ± 3% OMC	1 per 25 passing nuclear tests	4	19 (0)
Nuclear Gauge: Soil density Soil moisture	ASTM D 2922 ASTM D 3017	≥92% ± 3% OMC	2/acre/lift	98	453 (10)

NOTES: (1) Reference Section 02250 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 45,900 yd^3 for the Cell 7 and 8 final cover construction projects.
(3) MDD = maximum dry density (unit weight); OMC = optimum moisture content

TABLE 5-9

TOPSOIL PROPERTIES SUMMARY
CELL 7 and 8 FINAL COVERS

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY (yd^3)	APPROXIMATE NUMBER OF TESTS REQUIRED[2]	NUMBER OF TESTS PERFORMED (FAILURES)
LABORATORY TEST					
Particle Size: Sieve	ASTM D 422	No. 10 0 - 40	1 per 5,000 yd^3	3	5 (0)
Organic Content	ASTM D 2974	---	1 per 5,000 yd^3	3	4 (0)
Soil Classification	ASTM D 2487	GC, SC, CL	1 per 5,000 yd^3	3	5 (0)
Atterberg Limits	ASTM D 4318	---	1 per 5,000 yd^3	3	5 (0)
FIELD TEST					
Depth Verification: Survey	ASTM D 2937	As shown on drawings	---	---	---

NOTES: (1) Reference Section 02920 of the Specification and Section 6 of the CQA Plan for further details.
(2) The approximate number of tests required is based on a total volume of 13,100 yd^3 for the Cell 7 and 8 final cover construction projects.

6. CONSTRUCTION QUALITY ASSURANCE - GEOSYNTHETICS

6.1 General

GeoSyntec monitored the installation of the geosynthetics components of the Cell 7 and 8 systems. Principal field activities are summarized in Section 3.1.3. Non-conforming or questionable practices observed by CQA personnel were brought to the attention of the Fluor Fernald QA and the CM for review and correction.

The total quantity of geomembrane installed during the Cell 7 and 8 final cover construction, as measured by CQA personnel, was approximately 720,000 ft^2 (66,885 m^2). The panel layout record drawings for the Cell 7 and 8 final cover geomembranes are presented in Appendix O.

6.2 Changes in Geosynthetics Specifications

RCI and DCN of the geosynthetics drawings and specifications were processed and approved according to procedures described in FCP document number ED-12-5002 entitled "Engineering Design Change Process".

These RCIs and DCNs were approved, as appropriate, by the design organization. Copies of the RCIs and DCNs issued for the Cell 7 and 8 final cover construction projects are presented in Appendices P and Q, respectively.

6.3 CQA of Geosynthetic Clay Liner and Cap

6.3.1 Conformance Testing and Documentation

A geosynthetic clay cap (GCC) was used in construction of the Cell 7 and 8 final cover systems. Rolls of the Bentomat ST GCL, manufactured by Colloid Environmental Technologies Company (CETCO) in Lovell, Wyoming were used for the Cell 7 and 8 final cover system construction.

For the Bentomat ST GCL, 1 samples (Nos. GCL-06-1) were collected for conformance testing. Two representatives from Fluor Fernald and one representative from GeoSyntec visited the CETCO plant in Lovell, Wyoming to observe production, review procedures, and sample material in January 2006. In all, 1 Bentomat ST conformance samples were obtained at the factory prior to shipment of materials. The sampling frequency met the minimum acceptable sample frequency of one per 100,000 ft^2 (9,300 m^2) required by the Project Documents. Conformance samples were forwarded to Golder Testing Laboratory, Atlanta, Georgia for hydraulic conductivity testing and to SGI Testing Services, Norcross,

Georgia for direct shear testing. Based on the conformance sampling and testing results, including the supplier's testing, the lots stated above were approved for construction.

The conformance test results and the manufacturer's quality control (QC) certificates were reviewed by CQA personnel. A summary table for Cell 7 and 8 final cover GCC approval is presented in Table 6-1. The manufacturer's QC documentation is presented in Appendix E. GeoSyntec's conformance test results are presented in Appendix G. A summary of the physical properties of the GCC and the conformance test frequency is presented in Table 6-2.

6.3.2 Field Monitoring Activities

6.3.2.1 Delivery and On-Site Storage

Upon delivery, GCC rolls were unloaded in a laydown area located south of the OSDF construction area and covered with a tarpaulin. The GCC rolls had a plastic wrapping to protect against water and premature hydration. An all-terrain lift truck transported the rolls. The rolls were temporarily stored adjacent to the construction area prior to deployment. CQA personnel periodically monitored the installer's delivery, unloading, and storage procedures. Potentially nonconforming or questionable practices observed by CQA personnel were brought to the attention of the CM for review and correction. The CQA personnel observed that the material was stored and handled in an appropriate manner or corrective action was taken, where appropriate.

6.3.2.2 Deployment

CQA personnel monitored the deployment of the GCC rolls for the Cell 7 and 8 final covers. During deployment, the CQA personnel checked for the following:

- manufacturing defects;
- evidence of premature hydration of the bentonite;
- damage that may have occurred during shipment, storage, and handling; and/or
- damage resulting from installation activities.

If materials were observed to be damaged, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations, during and after repair.

CQA personnel monitored the deployment of the GCC, as well as its condition after installation, to verify that the installer followed the following procedures:

- prior to deployment, the installer accepted the subgrade (Certificates of Subgrade Acceptance are presented in Appendix H);
- the GCC was unrolled and placed in a manner which kept the roll of GCC in sufficient tension to avoid excessive wrinkling using LGP rubber-tracked equipment;
- the rolls were deployed with the geotextile printed with the manufacturer's name facing upwards (i.e., woven geotextile up and nonwoven geotextile in contact with the underlying soil component);
- measures were taken to avoid entrapment of stones or other objects in the GCC panels;
- measures were taken to avoid damage to the underlying clay surface during deployment of the rolls;
- measures were taken to keep the GCC free of contamination and protected from premature hydration; and
- geomembrane installation immediately followed installation of the GCC.

After deployment of the GCC, CQA personnel observed that the adjacent rolls of GCC were joined using the following procedures:

- adjacent GCC panels were shingled in the direction of the slope to prevent the potential for runoff flow to enter the overlapped panel;
- adjacent GCC panels were overlapped a minimum of 6 in. (150 mm) along the length of the panels and a minimum of 24 in. (600 mm) along the width of the panels; and
- dry bentonite granules were applied between seams of overlapped panels in accordance with the GCC manufacturer's recommendation.

Observed holes or tears in the GCC were repaired by the installer by placing a patch of the same material over or under the hole or tear and at a distance of at least 2 ft (0.6 m) beyond the edges of the hole on slopes greater than 5 percent or 1 ft (0.3 m) beyond the edges of the hole or tear on slopes less than 5 percent. Dry bentonite granules were applied to the repaired area. In areas where premature hydration of the GCC was detected, the GCC was removed and replaced with new approved material.

6.4 CQA of Geomembrane Cap

6.4.1 Conformance Testing and Documentation

The 80-mil (2.0-mm) thick textured HDPE geomembrane was supplied by Agru America, (Agru) Georgetown, South Carolina, United States of America. All of the geomembrane material needed for the Sell 7 and 8 caps was delivered in 2005. Therefore, there was no conformance testing performed in 2006. Conformance testing data was presented in the 2005 certification report.

6.4.2 Field Monitoring Activities

6.4.2.1 Delivery and On-Site Storage

Upon delivery to the site, geomembrane rolls were stored in a laydown area located to the south of the OSDF construction area. The rolls were transported by a tele-handler forklift. Occasionally, the rolls were temporarily stored adjacent to the construction area prior to deployment. CQA personnel monitored the delivery, unloading, and storage procedures. The CQA personnel compared the roll numbers to the geomembrane rolls that were sampled at the manufacturer's plant and also to the bill of lading. The CQA personnel observed that, in general, procedures were used that minimized the potential for damage to the rolls.

6.4.2.2 Deployment

The geomembrane rolls were lifted using a spreader bar attached to a CAT Posi-Trac. This LGP rubber-tracked vehicle was used in the deployment of geomembrane panels over the previously installed GCC panels using procedures approved by the CM to assure no damage to the GCC. The installer generally deployed the geomembrane panels, in accordance with the approved panel layout drawings from the top of slope to the bottom.

The installer used laborers to manually position each panel.

CQA personnel monitored the deployment of each geomembrane panel or roll. During deployment, the CQA personnel checked for the following:

- manufacturing defects;
- damage that may have occurred during shipment, storage, or handling; and/or
- damage resulting from installation activities, including damage as a consequence of

panel placement, seaming operations, or weather.

If the materials were observed to be damaged or deficient, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations, either during or after the repairs were complete.

Details of the geomembrane panel placement were recorded by CQA personnel on the panel placement monitoring logs that are presented in Appendix I.

6.4.2.3 Trial Seams

Prior to production seaming, the installer prepared geomembrane trial seams at the beginning of each seaming period, and at least once each four hours, for each piece of seaming equipment used that day prior to seaming. Also, each seamer prepared at least one trial seam each day that seaming was performed by that seamer using a specific piece of seaming equipment. CQA personnel observed the trial seaming operations. The following procedure was used to evaluate the trial seams:

- trial seam samples varying in length from 3 to 15 ft (0.9 to 4.5 m) and having a width of approximately 12 in. (0.3 m) wide were welded under similar conditions as for production seaming;
- test strips were cut across the trial seam at random locations using a manual die press; each test strip was approximately 1 in. (25 mm) wide by 6 in. (150 mm) long;
- at least two test strips were tested in peel and two were tested in shear using a field tensiometer;
- the passing criteria for the tests were as follows:

Fusion

- *Peel test* - a minimum bonded seam strength of 115 lb/in. (20 kN/m) and the observation of a Film Tear Bond (FTB), and
- *Shear test* - a minimum bonded seam strength of 151 lb/in. (26 kN/m) and the observation of a FTB,

Extrusion

- *Peel test* - a minimum bonded seam strength of 84 lb/in. (15 kN/m) and the observation of a FTB, and

- *Shear test* - a minimum bonded seam strength of 151 lb/in. (26 kN/m); and the observation of a FTB,

If any of the strips failed, corrective actions to the welding procedure were implemented, a new trial seam was fabricated, and the test procedure repeated; passing tests in both peel and shear were achieved prior to acceptance of the trial seam; if these retest strips failed, the welder and/or the equipment were rejected until the problem was corrected and two consecutive passing trial seams were completed.

Once a trial seam passed both tests, the technician was authorized to proceed with production seaming following the procedures and controls used to prepare the accepted trial seams.

A total of 139 trial seams were observed by CQA personnel during Cell 7 and 8 final cover constructions. A total of 83 trial seams were made using double-track fusion (i.e., hot wedge) welders and 56 were made using extrusion welders. In the case of a failing test, the retesting protocol described above was followed or the equipment was not used.

Trial seam samples were not archived. The trial seam test results are presented in Appendix J.

6.4.2.4 Production Seams

Geomembrane production seaming operations were monitored by CQA personnel. The majority of the geomembrane production seams were fabricated using double-track fusion (i.e., hot wedge) welders. Geomembrane seam repairs were made using hand-held extrusion welders. During or after fabrication, the geomembrane seams were visually examined for workmanship and continuity. Geomembrane production seaming logs are presented in Appendix K.

6.4.3 Nondestructive Seam Testing

6.4.3.1 Scope

Nondestructive testing of geomembrane seams was periodically monitored by CQA personnel. Geomembrane seams were nondestructively tested by the installer for continuity using the air pressure or the vacuum-box test procedures. Double-track fusion seams were tested using air pressure test methods. The vacuum-box test method was used for seams made with extrusion welders. Failed air pressure test seams were capped and retested using vacuum-box test methods after minimizing the failed seam length. Leaks identified using the vacuum-box method were repaired and retested, as described in Section 6.4.5 of this report.

6.4.3.2 Air Pressure Testing

Accessible double-track fusion seams were nondestructively tested using the air pressure test. The procedure used by the installer for air pressure testing was as follows:

- a test section was isolated by sealing the ends of the annulus using heat and pressure;
- the needle of a pressure test apparatus was inserted into the annulus at one end of the seam;
- the annulus was inflated to a gauge pressure of 25 to 30 psi (170 to 200 kPa) with an air pump;
- the pressure in the seam was then checked after five minutes;
- if the pressure loss exceeded 3 psi (23 kPa), or if the pressure did not stabilize, the faulty area(s) was(were) located and repaired in accordance with Section 6.4.5 of this report;
- the location of the test was recorded along with the testing pressures; and
- upon completion of the test, airflow through the entire annulus was confirmed by releasing the air from the seam at the opposite end from where the needle was inserted.

Geomembrane air pressure test results are located on the geomembrane production seam logs located in Appendix K.

6.4.3.3 Vacuum-Box Testing

The vacuum-box was used by the installer to nondestructively test extrusion seams and repairs. The procedure used by the installer for vacuum testing was as follows:

- vacuum-box assembly was connected to the vacuum pump;
- a strip of seam was wetted with a soapy solution;
- the vacuum-box assembly was placed over the wetted area;
- the bleed valve was closed and the vacuum valve was opened, if necessary;
- the box was forced onto the sheet until a vacuum was established as evidenced by a negative box pressure of approximately 5 psi (34 kPa);

- the seam was examined through the viewing window for a period of approximately 20 seconds for the occurrence of air bubbles;
- the vacuum valve was closed and the bleed valve was opened, if necessary;
- the assembly was removed and the process was continued along the seam; and
- the location of any leaks was recorded and marked for repair.

When nondestructive testing indicated repairs were necessary, repairs were made in accordance with procedures presented in Section 6.4.5 of this report and the vacuum-box testing repeated. Vacuum test results are shown on the repair log presented in Appendix M.

6.4.4 Destructive Seam Sample Testing

6.4.4.1 Scope

In accordance with the CQA Plan, CQA personnel identified and collected geomembrane seam samples for destructive testing. The samples were either forwarded to Golder for destructive seam testing or tested in GeoSyntec's on-site, GAI Accredited, geomembrane destructive testing lab.

A total of 92 original geomembrane seam sample locations were identified during Cell 7 and 8 final cover constructions (Table 6-3). Approximately 34,481 linear ft (10,510 linear meters) of seams was constructed. This corresponds to an approximate sample frequency of one per 375 linear feet (114 linear meters) of seam. This frequency meets the minimum acceptable sample frequency of one per 500 linear feet (150 linear meters) required by the CQA Plan.

There were also six geomembrane seam sample locations identified on extrusion seams. These were obtained from areas of larger repairs or suspect seams.

After the removal of a full seam sample, the installer took at least two geomembrane test strips from each end of the destructive sample. Each strip was tested in the field in peel. If the peel samples exhibited a Film Tear Bond (FTB) failure mode and minimum required strength, the adjacent destructive seam sample was shipped to the laboratory for testing.

For a destructive seam sample to be considered as passing, the following seam strength criteria had to be met on four out of the five tests performed on each of the destructive seam specimens obtained from each of the destructive seam samples.

The following criteria were used for the 80-mil thick geomembrane seams:

Fusion

- *Peel test* - a minimum bonded seam strength of 115 lb/in. (kN/m) and the observation of a FTB, and
- *Shear test* - a minimum bonded seam strength of 151 lb/in. (26 kN/m); and the observation of a FTB; and

Extrusion

- *Peel test* - a minimum bonded seam strength of 84 lb/in. (15 kN/m); and the observation of a FTB, and
- *Shear test* - a minimum bonded seam strength of 151 lb/in. (26 kN/m); and the observation of a FTB.

In addition, if at least one non-FTB failure (i.e., greater than or equal to 10 percent seam separation) was observed, the destructive seam sample was considered to have failed.

6.4.4.2 Sampling Procedures

At each destructive seam sample location, a test sample that measured approximately 12 in. (300 mm) across the seam and 42 in. (1.1 m) along the seam was obtained. The sample was divided and distributed as follows:

- 12 in. (300 mm) wide by 12 in. (300 mm) long for owner's archives;
- 12 in. (300 mm) wide by 12 in. (300 mm) long for the installer; and
- 18 in. (500 mm) wide by 12 in. (300 mm) long for CQA laboratory testing.

6.4.4.3 Test Results

Off-site laboratory testing of geomembrane seam test samples was performed in accordance with the CQA Plan at the Golder Testing Laboratory. On-site laboratory destructive testing of geomembrane seam samples was performed in accordance with the CQA Plan in the GeoSyntec Geomembrane Testing laboratory. In the laboratories, 1-in. (25-mm) wide test specimens were removed from the destructive seam sample using a die press. Using a tensile testing machine, five test specimens were tested for peel adhesion. For fusion seams, tests were performed on both the inside and outside tracks. Additionally,

five specimens were tested for shear strength. The seam strength criteria and the acceptance/rejection criteria described in Section 6.4.4.1 were used.

For Cell 7 and 8 final covers, seven failures were recorded on the initial destructive seam samples; five of the failures occurred in the field test strips and two failures in the laboratory destructive samples (Table 6-3).

In each case (except for the 2 cases described below), the failed area was isolated by selecting additional test-strip locations at a minimum distance of 10 ft (3 m) on either side of the failure. If the additional test strips had passing results, a full destructive seam sample was taken. These destructive seam samples were tested in accordance with procedures previously described in this section. For the Cell 7 and 8 final covers, 14 additional seam samples were obtained to isolate the failure and on the reconstructed seams, as indicated in Table 6-3.

There were two cases where the seaming was suspected to be inadequate and was tested and rejected.

- Seaming on May 24 was suspect because the extrusion seams were tack welded on a previous date. The contractor did not remove the tack weld to dry the seam prior to welding. Destructive samples were obtained and tested. The tests failed. All of the extrusion seaming on that date where the seams were not dried prior to welding were capped.

- Two destructive samples (DS-30 and DS-33) were obtained from seam 18/26. This seam was suspect due to a lack of preparation of a very dirty geomembrane. Both destructive samples failed. Another destructive sample (DS-34) was taken near the beginning of the next seam that the welding device (No. 10) welded to confirm that there was not a problem with the machine. This test passed confirming that the machine did not have a problem. The entire seam (18/26) was capped. Extra care was taken to clean the geomembrane prior to welding the repair. Additional destructive tests (DS-41 and DS-42) were taken from the repair. These both passed.

Seams having failing destructive samples were repaired using procedures presented in Section 6.4.5. The destructive seam test sample locations were also repaired using the procedures presented in Section 6.4.5. The destructive seam test results and a summary of the number of samples obtained are presented in Appendix L.

6.4.5 Geomembrane Repairs

The procedures presented in this subsection were used by the installer during the following repair operations:

- patching holes and tears;
- capping failed seams; and
- spot-extruding impact damage or other minor scratches.

The repair procedure for fusion seams was to cap strip the failed seam. This procedure was used for seams with insufficient overlap and used for failing destructive tests. In the cases where patches or caps were used to repair the damaged geomembrane (i.e., small holes, tears, or on seams which failed nondestructive or destructive tests), an approximately 12 in. (300 mm) wide capping strip was used. All seam intersections (i.e., T-seams) were patched. During the repair or panel tie-in operations, the following provisions were implemented:

- technicians and seaming equipment used during repair operations had trial seams approved prior to use;
- geomembrane surfaces to be repaired were clean and dry at the time they were welded;
- patches or caps extended at least 6 in. (0.15 m) beyond the edge of the defect, and all corners were rounded;
- repairs were vacuum tested where accessible, and visually observed for continuity.

Appendix M presents repair summary logs for the Cell 7 and 8 final cover geomembranes. Complete panel layout drawings indicating the location of seam and panel repairs are shown on the Record Drawings presented in Appendix O.

6.4.6 Electrical Leak Detection Testing

The electrical leak detection testing was performed on the Cell 7 and 8 final cover geomembranes. The method uses the flow of electrical current to detect leaks or breaches in a geomembrane liner. The leak detection testing was performed by Leak Location Services, Inc. (LLSI) of San Antonio, Texas, as a subcontractor to FFC. The testing was performed on the exposed (or bare) geomembrane prior to installation of the overlying geotextile cushion and placement of the cover drainage material.

No leaks were found in the Cell 7 geomembrane. For the Cell 8 final cover

geomembrane, 1 leak was detected during testing. The leak was located on Panel No. 57. The detected leak was repaired by the installer following the repair procedures described in this Section. The repaired areas were retested by LLSI and no additional leaks were found. All repairs on the geomembranes referenced in this paragraph were non-destructively tested utilizing both the electrical leak detection and vacuum box techniques.

Appendix N presents 2 reports (covering 10 individual surveys) on the electrical leak detection testing which was conducted as part of the Cell 7 and 8 final cover construction projects.

6.5 CQA of Geotextiles

6.5.1 Conformance Testing and Documentation

A needle-punched nonwoven geotextile having a minimum mass per unit area of 8 oz/yd^2 (270 g/m^2) was used as the geotextile cushion layer for the Cell 7 and 8 final cover systems. This geotextile was also manufactured and supplied by Synthetic Industries.

CQA personnel obtained 6 conformance samples from the 62 geotextile rolls delivered to the site. This sampling frequency exceed the minimum acceptable frequency of one per 100,000 ft^2 (9,300 m^2) required by the Project Documents.

The conformance samples were forwarded to Golder for testing. The conformance test results and the manufacturer's QC certificates were reviewed by CQA personnel and were found to be in compliance with the Project Documents. The manufacturer's QC documentation is presented in Appendix E. The conformance test results are presented in Appendix G. A summary of the properties of the geotextile material and the conformance test results is presented in Table 6-4.

6.5.2 Field Monitoring Activities

6.5.2.1 Delivery and On-Site Storage

Upon delivery to the site, geotextile rolls were stored in a laydown area south of the OSDF construction area. The geotextile rolls had a plastic wrapping to protect against ultraviolet radiation, dust, and dirt. The geotextile rolls were transported by a tele-handler forklift. The rolls were deployed or temporarily stored adjacent to the construction area prior to deployment. CQA personnel periodically monitored the delivery, unloading, and storage procedures. The CQA personnel observed that the material was handled in an appropriate manner.

6.5.2.2 Deployment

CQA personnel monitored the deployment of the geotextile rolls for the following:

- manufacturing defects;
- damage that may have occurred during shipment, storage, and handling; and
- damage resulting from installation activities.

If any materials were observed to be damaged, the installer was notified and the damaged materials were either discarded or repaired. CQA personnel observed repair locations, either during or after the repair was completed.

- CQA personnel monitored the deployment of the geotextile as well as its condition after installation, to ensure that the installer: unrolled the geotextile down the slope in a manner which kept the geotextile panel in sufficient tension to avoid excessive wrinkling and folding; and
- took measures to avoid the entrapment of dust, stones, and other objects in the geotextile

After deployment of the geotextile, CQA personnel observed that the following procedures were used by the installer to join adjacent rolls of geotextile:

- geotextile panels were overlapped a minimum of 6 in. (0.15 m); and
- geotextile panels were continuously sewn.

The installer used a 2200-B Union Special sewing machine. The seams were sewn with a single-thread chain stitch using a nylon bonded thread.

The installer repaired holes or tears in the geotextile by placing a patch of the same material over the hole or tear with at least 2 ft (0.6 m) beyond the edges of the hole or tear and overlapped 6 in. (150 mm) and sewn.

6.6 CQA of Erosion Mat

6.6.1 Material Types

Two types of erosion mat were used in construction of the Cell 7 and 8 final covers:

- a biodegradable, woven jute matting having a minimum mass per unit area of 14.7 oz/yd^2 (500 g/m^2) was used as the erosion mat for the final covers; this jute matting was manufactured and supplied by Indian Valley Industries, Inc. in Johnson City, New York; and

- a biodegradable, woven erosion mat, made of coir (coconut) fiber and having a minimum mass per unit area of 26.8 oz/yd^2 (900 g/m^2) was used as the erosion mat in specific locations of the final cover systems; this erosion mat was also manufactured and supplied by Indian Valley Industries, Inc. in Johnson City, New York.

The manufacturers' certificates for the two erosion mat products are presented in Appendix D.

6.6.2 Field Monitoring Activities

During installation of the erosion mat, CQA personnel periodically monitored the following:

- two panels (i.e., two roll widths) of the coir matting were installed at the specific locations required by the Construction Drawings and other project documents;

- erosion mat panels were overlapped in accordance with the manufacturers' recommendations; and

- adjacent panels were stapled in accordance with manufacturers' recommendations using a minimum 6 in. (150 mm) long staples.

TABLE 6-1

GEOSYNTHETIC CLAY CAP CONFORMANCE TESTING APPROVAL SUMMARY
CELL 7-8 FINAL COVERS

Sample ID	LOT No.	CQA Roll No. (1)	MQC Roll No. (2)		CQA Test Results	MQC Test Results	Roll Nos. Approved for Construction	No. of Rolls (3)	Square Footage (4)
			Direct Shear	Hydraulic Conductivity					
GCL-06-1	200606LO	893	881	861, 878, 895	Pass	Pass	860-903	44	99,000

Notes:

1. CQA Roll No. is roll used for conformance testing (direct shear and hydraulic conductivity).
2. MQC Roll No. is roll used for manufacturer's QC testing (direct shear and hydraulic conductivity).
3. Number of rolls given is total delivered to site for use in the OSDF.
4. Square footage for total number of rolls given.

TABLE 6-2

GEOSYNTHETIC CLAY CAP PHYSICAL PROPERTIES SUMMARY
CELL 7-8 FINAL COVERS

DESCRIPTION	TEST STANDARD	MANUFACTURER SPECIFICATIONS[3]	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY[5] (ft^2)	
				Manf. QC	Conformance QA
Bentonite Content (lb/ft^2)	ASTM D 5993	1.0 lb/ft^2 @ 25% moisture	≥ 1.0	40,000	NA
Bentonite Moisture Content (%)	ASTM D 4643	25% max	≤25	40,000	NA
Direct Shear[4]	ASTM D 6243	NA	LD Shear - 12° LD Shear - 7° LD Shear - 6.5° Peak Shear - 17°	100,000	100,000 or per lot
Grab Elongation (%)	ASTM D 4632	10% (Typical)	NA	40,000	NA
Peel Strength (lb/in.)	ASTM D 4632	15 min	≥ 15	40,000	NA
Grab Strength (lb)	ASTM D 4632	90 MARV	NA	40,000	NA
Hydraulic Conductivity (cm/s) (σ' = 5 psi)	ASTM D 5887	$\leq 5x10^{-9}$	$\leq 5x10^{-9}$	40,000	100,000
Fluid Loss (ml)	ASTM D 5891	18 max	≤ 18	40,000	NA
Bentonite Free Swell (ml/2g)	ASTM D 5890	24	≥ 24	40,000	NA
Tensile Strength (lb/in.)	ASTM D 4595	35	≥35	40,000	NA

Total No. of Bentomat ST Rolls Delivered to Site: 44 (99,000 ft^2) Total No. of Conformance Samples: 1

Notes:
(1) Reference Section 02772P of the Specifications and Section 8 of the CQA Plan for further details.
(2) Ambient placement temperatures are between 40°F and 104°F. The GCC rolls are overlapped a minimum of 6 in. along edges, with a 24 in. end overlap. No horizontal seams are allowed on the slopes (≥5H:1V). Patches extend 12 in. beyond a defect on ≤5% slope areas and 24 in. on ≥5% slope areas. Granular bentonite is placed between seams involving Bentomat ST.
(3) Bentomat ST is the GCL used for Cell 7-8 final cover constructions. Roll dimensions are 15 ft by 150 ft.
(4) Peak Shear Strength and Large-Displacement (LD) shear strength at normal stress of 5, 20, 45 psi, reported as Secant Angle in degrees.
(5) Testing shall be performed at a frequency of one per lot or at listed frequency, whichever is greater. A lot is defined by ASTM D 4354.
MD - Machine Direction; XD - Cross-Machine Direction; NA - Not Applicable; σ' = Effective Confining Stress.

TABLE 6-3

80-MIL THICK HDPE GEOMEMBRANE (TEXTURED)
SEAM PROPERTIES SUMMARY
CELL 7-8 FINAL COVERS

DESCRIPTION	TEST STANDARD	PROJECT[1] SPECIFICATIONS		REQUIREMENTS	APPROXIMATE NUMBER OF TESTS REQUIRED
		Fusion	Extrusion		
Panel Deployment	---	---	---	Ambient placement temperatures are between 40°F and 104°F.	Assumption used for destructive seam testing is that each roll is approximately 22.5 ft by 400 ft (avg.)
Trial Seams: (peel)	ASTM D 6392	FTB 115 ppi	FTB 84 ppi	Prior to seaming period every 4 hours, or if seaming apparatus is turned off.	Minimum of: 2 peel per trial seam 2 shear per trial seam
(shear)	ASTM D 6392	FTB 151 ppi	FTB 151 ppi		

Notes: (1) One failure requires two consecutive successful trial seams.

DESCRIPTION	TEST STANDARD	PROJECT[1][2][3] SPECS		TEST FREQUENCY	APPROXIMATE NUMBER OF TESTS REQUIRED	ORIGINAL NO. OF SAMPLES	NUMBER OF FAILURES		ADDITIONAL NUMBER OF SAMPLES TO ISOLATE FAILURES	TOTAL NUMBER OF SAMPLES
		Fusion	Extrusion				FIELD	LAB		
Seam Strength[1]: Production Welds and Reconstructed Seams	ASTM D 6392	FTB 115 ppi	FTB 84 ppi	1/500 linear feet for primary seams and 1/150 linear feet for reconstructed seams	69	84	1	2	5	89
	ASTM D 6392	FTB 151 ppi	FTB 151 ppi		4	8	4	0	9	17

Note: (1) Reference Section 02770 of the Specifications and Section 7 of the CQA Plan for further details.
(2) 1 in. wide test strips are tested at a strain rate of 2 in. per minute. Four of five specimens meeting the strength requirement is acceptable provided that the FTB requirements are met.
(3) FTB = Film Tear Bond (maximum 10 percent seam separation)

TABLE 6-4

NONWOVEN GEOTEXTILE (8 oz/yd^2) CUSHION PROPERTIES SUMMARY
CELL 7-8 FINAL COVERS

DESCRIPTION	TEST STANDARD	MANUFACTURER SPECIFICATIONS (MARV)[4]	PROJECT[1] SPECIFICATIONS	TEST FREQUENCY		NUMBER OF TESTS[2]				RANGE OF TEST RESULTS	
						REQUIRED		PASSING			
				Manf. QC	Conf. QA	Manf. QC	Conf. QA	Manf. QC[6]	Conf. QA	MAXIMUM	MINIMUM
Mass Per Unit Area (oz/yd^2)	ASTM D 5261	8	≥8	50,000	100,000	8	5	10	6	11.6	8.9
Static Puncture Strength (lbs)	ASTM D 6241	350	≥350	50,000	100,000	8	5	10	6	1202	812
Grab Strength (lb)	ASTM D 4632	200	≥200	50,000	100,000	8	5	10	6	395.5	288.0
Tear Strength (lb)	ASTM D 4533	75	≥75	50,000	100,000	8	5	10	6	192.1	102.8
Puncture Strength (lb)	ASTM D 4833	90	≥90	50,000	100,000	8	5	10	6	207.4	136.1
Ultraviolet Resistance (%)	ASTM D 4355	70	≥70	Cert. Ltr.	NA	NA	NA	NA	NA	NA	NA
Nonwoven Needle punched Polymer Composition (%)	NA	95% polypropylene	95 polypropylene or polyester by weight	Cert. Ltr.	NA	NA	NA	NA	NA	NA	NA

Total Number of Rolls Delivered to Site[5]: 62

Total Number of Conformance Samples: 6

Notes:
(1) Reference Section 02714P of the Specifications and Section 9 of the CQA Plan for further details.
(2) The approximate number of tests required is based on total number of rolls delivered to the site.
(3) Roll dimensions are 15 ft by 450 ft for 8-oz/yd^2 geotextile.
(4) MARV = (minimum average roll value), 95 percent lower confidence limit.
(5) Additional rolls of 10-oz/yd^2 geotextile were delivered to site but not used as Cushion Geotextile.
(6) An additional 2 rolls of 10-oz/yd^2 geotextile were tesed by manufacturing but not used as Cushion Geotextile.

7. SUMMARY AND CONCLUSIONS

Construction of the OSDF Phase V – Cell 7 and 8 final cover construction projects for the FCP was carried out during the period from January 2006 through October 2006. During this time, GeoSyntec provided on-site CQA personnel to monitor the construction of the projects. As part of the CQA activities, GeoSyntec on-site CQA personnel monitored the construction and installation of the following components:

- earthwork for Cell 7 and 8 final covers – select impacted material layer placement, contouring layer construction, compacted clay cap construction, cover drainage layer, biointrusion barrier and choke stone layer placement; granular filter placement, rockfill placement, vegetative soil layer construction, topsoil placement, and vegetation, monitoring access construction, and riprap placement;

- geosynthetics (installation of GCC; Cells 7 and 8 geomembrane cap, geotextile cushion layers, and Cells 7 and 8 erosion mat); and

During construction of the above components, CQA personnel verified that conformance and CQA testing were performed on the construction materials at the frequencies required in the Project Documents, and that materials meeting the project document requirements were used. CQA personnel also verified that conditions or materials identified as not conforming to the Project Documents were replaced, repaired, and/or retested, and that all non-conformances associated with the construction were resolved through disposition by the Fluor Fernald Construction Manager with concurrence by the Fluor Fernald Engineering, Quality Assurance and the Resident Engineer. Copies of the non-conformance reports (NCRs) written during construction of the Phase V – Cell 7 and 8 final cover projects are included as Appendix R to this CQA final report.

Based on GeoSyntec's understanding of the project requirements, the results of testing conducted as part of the CQA monitoring activities, and the documentation by GeoSyntec's on-site CQA personnel as described in this report, it is concluded that the Phase V – Cell 7 and 8 final cover construction projects for the OSDF were constructed in general accordance with the Project Documents (i.e., Technical Specifications, Construction Drawings, and all applicable DCNs).

STATE OF OHIO
JAMES A. FLECK
E-61801
REGISTERED PROFESSIONAL ENGINEER
10/29/06

James A. Fleck, P.E.
Resident Engineer/Engineer-of-Record
Ohio P.E. No. E-61801

REFERENCES

Appurtenances

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APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

Photo 1. First lift of clay cap material over contouring layer on the east slope of Cell 8

Photo 2. Clay cap placement on the east slope of Cell 8

Photo 3. Geosynthetic clay liner (GCL) deployment on thee crest of Cell 7

Photo 4. Geomembrane liner (GML) tie-in to the existing Cell 7 GML on the east slope

Photo 5. Fusion welding tying in Cell 7 GML to existing Cell 7 GML cap

Photo 6. Fusion welding along the crest of Cell 7

Photo 7. Extrusion welding a patch on GML

Photo 8. Non-destructive air pressure testing of fusion welded seam

Photo 9. Geotextile seam being sewn

Photo 10. Placement of No. 78 stone cover drainage layer at the toe of Cell 7

Photo 11. Type D riprap biointrusion barrier being placed over No. 78 stone cover drainage layer

Photo 12. Type D riprap biointrusion barrier being placed to grade at the east toe of Cell 7. No. 57 choke stone placed in the background

Photo 13. Filter sand being placed over the No. 57 choke stone

Photo 14. Nuclear density testing on the vegetative cover on the west slope of Cell 7

Photo 15. Drive-ring sampling on vegetative cover

Photo 16. Topsoil preparation prior to seeding. Oversized material was continuously removed by Fluor laborers

Photo 17. Deployment of erosion mat after seeding

Photo 18. Deployment of erosion mat and seams being stapled

APPENDIX B

WEEKLY FIELD REPORTS AND CORRESPONDENCE

[redacted]

WEEKLY FIELD REPORT

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GeoSyntec Consultants

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 08 January 2006**

WEEKLY REPORT NO. 438

The report period covered by Weekly Report No. 438 is from Monday, 2 Janunary 2006 through Sunday, 8 January 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.6 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	149	0	149
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
Total	149	0	149

Phase V –Cell 7 Final Cover Construction

FFC continued placement of select material and contouring layer on the west slope of Cell 7 during the report period.

Construction Submittal Review

Construction submittals were reviewed as required.

Design Clarifications and Modifications

None

Meetings

Attended daily construction plan-of-the-day meetings and the weekly (Thursday) impacted material placement meetings. GeoSyntec personnel also attended additional meetings as requested throughout the week.

Per: C. Sukow/J. Fleck

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GeoSyntec Consultants

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 08 January 2006**

WEEKLY REPORT NO. 438

Survey

GeoSyntec reviewed progress survey certification points as needed for Cell 7 and 8 final cover system layers. Survey points were reviewed generally within 4 hours of receipt of survey data.

Construction Quality Control (CQC)

Phase V - Borrow Area Excavation, Clay Screening and Restoration Activities

No activities.

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 6 and Cell 7 Final Cover Construction

CQC monitored the placement and compaction of the Cell 7 contouring layer. Moisture/density tests were performed on lifts of contouring layer as required.

CQC continued testing stone materials for the Cell 7 and Cell 8 caps. CQC also began equipment calibrations for laboratory equipment.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 3 January 2006 covered home safety tips.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis,
6. A. Wendt,
7 J. Battle, and
8. S. Abney.

Per: C. Sukow/J. Fleck

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GeoSyntec Consultants

FLUOR FERNALD 006439

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 15 January 2006**

WEEKLY REPORT NO. 439

The report period covered by Weekly Report No. 439 is from Monday, 9 Janunary 2006 through Sunday, 15 January 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.3 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	134	46	**180**
2	0	23	**23**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**134**	**69**	**203**

Phase V –Cell 7 Final Cover Construction

No construction activities.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 15 January 2006**

WEEKLY REPORT NO. 439

Construction Quality Control (CQC)

Phase V - Borrow Area Excavation, Clay Screening and Restoration Activities

No activities.

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 6 and Cell 7 Final Cover Construction

CQC continued testing stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 10 January 2006 covered the Fernald radiation control program.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis,
6. A. Wendt,
7. J. Battle, and
8. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 29 January 2006**

WEEKLY REPORT NO. 441

The report period covered by Weekly Report No. 441 is from Monday, 23 Janunary 2006 through Sunday, 29 January 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.6 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	332	13	345
2	73	0	73
3	0	0	0
4	0	0	0
5	0	0	0
Total	405	13	418

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of contouring layer on the west slope of Cell 7 during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 29 January 2006

WEEKLY REPORT NO. 441

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Per: C. Sukow/J. Fleck

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Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 6 and Cell 7 Final Cover Construction

CQC continued testing stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 23 January 2006 covered recent near misses at the Fernald project.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans (Real Time),
5. T. Willis (Real Time),
6. A. Wendt,
7. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 12 February 2006**

WEEKLY REPORT NO. 443

The report period covered by Weekly Report No. 443 is from Monday, 6 February 2006 through Sunday, 12 February 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.4 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	42	39	**81**
2	0	19	**19**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**42**	**58**	**100**

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of contouring layer on the west slope of Cell 7 during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 12 February 2006**

WEEKLY REPORT NO. 443

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued testing stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 6 February 2006 covered first aide for choking. GeoSyntec personnel also attended to Fluor safety leadership meeting on 7 February 2006.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans (Real Time),
5. T. Willis (Real Time),
6. A. Wendt,
7. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 19 February 2006**

WEEKLY REPORT NO. 444

The report period covered by Weekly Report No. 444 is from Monday, 13 February 2006 through Sunday, 19 February 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.4 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	196	613	**809**
2	0	0	**0**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**196**	**613**	**809**

Phase V –Cell 7 and Cell 8 Final Cover Construction

No work activities during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 19 February 2006**

WEEKLY REPORT NO. 444

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued testing stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 6 February 2006 covered first aide for choking. GeoSyntec personnel also attended to Fluor safety leadership meeting on 7 February 2006.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans (Real Time),
5. T. Willis (Real Time),
6. A. Wendt,
7. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 26 February 2006**

WEEKLY REPORT NO. 445

The report period covered by Weekly Report No. 445 is from Monday, 20 February 2006 through Sunday, 26 February 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was no precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	47	300	347
2	0	11	11
3	0	0	0
4	0	0	0
5	0	0	0
Total	47	311	358

Fluor fernald also cleaned out the east half of the Cell 8 catchment basin for the placement of protective and select impacted material.

Phase V –Cell 7 and Cell 8 Final Cover Construction

No work activities during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 26 February 2006

WEEKLY REPORT NO. 445

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued testing stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 21 February 2006 covered hazardous landfill gases (H2S).

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans (Real Time),
5. T. Willis (Real Time),
6. A. Wendt,
7. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 05 March 2006

WEEKLY REPORT NO. 446

The report period covered by Weekly Report No. 446 is from Monday, 27 February 2006 through Sunday, 5 March 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was no precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	335	561	**896**
2	0	472	**472**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**335**	**1033**	**1368**

Phase V –Cell 7 and Cell 8 Final Cover Construction

No work activities during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD 006439

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 05 March 2006**

WEEKLY REPORT NO. 446

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued testing stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 1 March 2006 covered a heavy equipment fatality in West Virginia.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans (Real Time),
5. T. Willis (Real Time),
6. A. Wendt, and
7. S. Abney (part time).

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 12 March 2006

WEEKLY REPORT NO. 447

The report period covered by Weekly Report No. 447 is from Monday, 6 March 2006 through Sunday, 12 March 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.8 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	29	276	**305**
2	0	0	**0**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**29**	**276**	**305**

Phase V –Cell 7 and Cell 8 Final Cover Construction

No work activities during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 12 March 2006**

WEEKLY REPORT NO. 447

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued testing No.78 and No.57 stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 6 March 2006 covered recent site injuries.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis (Real Time),
6. A. Wendt,
7. W. Ray
8. J. Battle, and
9. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 19 March 2006

WEEKLY REPORT NO. 448

The report period covered by Weekly Report No. 448 is from Monday, 13 March 2006 through Sunday, 19 March 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 3.4 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	557	557
2	0	483	483
3	0	0	0
4	0	0	0
5	0	0	0
Total	**0**	**1040**	**1040**

Fluor Fernald began to clean the catchment basin in Cell 8 during the report period.

Phase V –Cell 7 and Cell 8 Final Cover Construction

The interim winter cover between Cell 6 and Cell 7 was removed and clay liner placement commenced on 18 March 2006. Fluor Fernald received shipments of GCL and geotextiles during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 19 March 2006

WEEKLY REPORT NO. 448

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued to monitor the placement of clay liner and contouring layer on the Cell 7 cap. Moisture/density tests were performed on lifts of clay liner as required.

CQC continued testing No.78 and Type D stone materials for the Cell 7 and Cell 8 caps.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 15 March 2006 covered proper rigging.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis (Real Time),
6. A. Wendt,
7. W. Ray,
8. J. Tibbs,
9. J. Carruth,
10. J. Greaves, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GO3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 26 March 2006

WEEKLY REPORT NO. 449

The report period covered by Weekly Report No. 449 is from Monday, 20 March 2006 through Sunday, 26 March 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.0 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	667	667
2	0	411	411
3	0	0	0
4	0	0	0
5	0	0	0
Total	0	1078	1078

Fluor Fernald continued to clean the catchment basin in Cell 8 during the report period.

Phase V –Cell 7 and Cell 8 Final Cover Construction

Clay liner placement in Cell 7 continued during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 26 March 2006**

WEEKLY REPORT NO. 449

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 26 March 2006**

WEEKLY REPORT NO. 449

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC continued to monitor the placement of clay liner and contouring layer on the Cell 7 cap. Moisture/density tests were performed on lifts of clay liner as required.

CQC continued testing No.78 for the Cell 7 and Cell 8 caps. CQC also worked on the Final Report for the 2005 construction season.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 20 March 2006 covered winter weather driving. GeoSyntec personnel also attended Fluor Fernalds leadership training on 24 March 2006.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis (Real Time),
6. A. Wendt,
7. W. Ray,
8. J. Tibbs,
9. J. Carruth,
10. J. Greaves,
11. B. Cassidy, and
12. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD [redacted]

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 02 April 2006**

WEEKLY REPORT NO. 450

The report period covered by Weekly Report No. 450 is from Monday, 27 March 2006 through Sunday, 2 April 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.8 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	266	266
2	0	141	141
3	0	0	0
4	0	0	0
5	0	0	0
Total	0	407	407

Fluor Fernald continued to clean the catchment basin in Cell 8 during the report period.

Phase V –Cell 7 and Cell 8 Final Cover Construction

Clay liner placement in Cell 7 continued during the report period. Fluor Fernald began the deployment of geomembrane liner (GML) and geosynthetic clay liner (GCL) on 29 March 2006. Vegetative Cover and Top Soil placement continued on the west slope of Cell 7 covering last years cap construction.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 02 April 2006

WEEKLY REPORT NO. 450

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of GML on the Cell 7 cap. CQC continued to monitor the placement of clay liner and contouring layer on the Cell 7 cap. Moisture/density tests were performed on lifts of clay liner and vegetative cover as required.

CQC continued work on the Final Report for the 2005 construction season.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 28 March 2006 covered control area driving patterns.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis (Real Time),
6. A. Wendt,
7. W. Ray,
8. J. Tibbs,
9. J. Carruth,
10. J. Greaves,
11. B. Cassidy, and
12. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 09 April 2006**

WEEKLY REPORT NO. 451

The report period covered by Weekly Report No. 451 is from Monday, 3 April 2006 through Sunday, 9 April 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.5 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	113	**113**
2	0	0	**0**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**0**	**113**	**113**

Phase V –Cell 7 and Cell 8 Final Cover Construction

Clay liner placement in Cell 7 continued during the report period. Fluor Fernald also continued the deployment of geomembrane liner (GML) and geosynthetic clay liner (GCL). Placement of contouring layer on the east slope of Cell 7 began on 7 April 2006.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 09 April 2006**

WEEKLY REPORT NO. 451

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of GML on the Cell 7 cap. CQC continued to monitor the placement of clay liner and contouring layer on the Cell 7 cap. Moisture/density tests were performed on lifts of clay liner and contouring layer as required. CQC also performed laboratory testing on drainage sand and type D rip rap.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 3 April 2006 covered hazardous road conditions.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis (Real Time),
6. A. Wendt,
7. W. Ray,
8. J. Tibbs,
9. J. Carruth,
10. J. Greaves,
11. B. Cassidy, and
12. S. Abney.

Per: C. Sukow/J. Fleck

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[redacted]

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 16 April 2006

WEEKLY REPORT NO. 452

The report period covered by Weekly Report No. 452 is from Monday, 10 April 2006 through Sunday, 16 April 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 2.5 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	288	**288**
2	0	110	**110**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**0**	**398**	**398**

Phase V –Cell 7 and Cell 8 Final Cover Construction

Clay liner placement in Cell 7 continued during the report period. Fluor Fernald also detailed deployed geomembrane liner (GML). A total of 82,620 ft^2 of GML has been deployed to date. Placement of contouring layer continued on the east slope of Cell 7.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 16 April 2006**

WEEKLY REPORT NO. 452

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of GML on the Cell 7 cap. CQC continued to monitor the placement of clay liner and contouring layer on the Cell 7 cap. Moisture/density tests were performed on lifts of clay liner and contouring layer as required. CQC also performed laboratory conformance testing on contouring layer.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 12 April 2006 covered site PPE requirements.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. T. Willis (Real Time),
6. A. Wendt,
7. W. Ray,
8. J. Tibbs,
9. J. Carruth,
10. J. Greaves,
11. B. Cassidy, and
12. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 23 April 2006**

WEEKLY REPORT NO. 453

The report period covered by Weekly Report No. 453 is from Monday, 17 April 2006 through Sunday, 23 April 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.3 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	32	148	180
2	0	5	5
3	0	0	0
4	0	0	0
5	0	0	0
Total	32	153	185

Placement of impacted materials within Cell 7 was completed during the report period.

Phase V –Cell 7 and Cell 8 Final Cover Construction

Clay liner placement on the west side of Cell 7 continued during the report period and placement of contouring layer continued on the east slope of Cell 7.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 7 during the report period. Approximately 17,225 ft^2 of GML was deployed during the report period and an approximate total of 99,842 ft^2 of GML has been deployed to date. Geotextile was placed over completed and approved GML during the report period.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 23 April 2006

WEEKLY REPORT NO. 453

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of geotextile over the GML in Cell 7.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 17 April 2006 covered radon and radon gas.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. B. Cassidy,
6. A. Wendt,
7. W. Ray,
8. J. Tibbs,
9. J. Carruth,
10. J. Greaves, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD [redacted]

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 30 April 2006**

WEEKLY REPORT NO. 454

The report period covered by Weekly Report No. 454 is from Monday, 24 April 2006 through Sunday, 30 April 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was trace of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	130	**130**
2	0	29	**29**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**0**	**159**	**159**

Phase V –Cell 7 and Cell 8 Final Cover Construction

Clay liner placement on the west side of Cell 7 continued during the report period. Placement of type D rip rap for bio-intrusion barrier, granular filter material, and vegetative cover was placed on the west slope of Cell 7.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 7 during the report period. Approximately 51,550 ft^2 of GML was deployed during the report period and an approximate total of 151,390 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 30 April 2006**

WEEKLY REPORT NO. 454

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of clay liner and vegetative cover during the report period. Moisture/density tests were performed on lifts of clay liner and vegetative cover as required.

CQC monitored the deployment of GML on the Cell 7 slopes during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 26 April 2006 covered parking on slopes. On 28 April 2006 Fluor Fernald called a site wide safety shutdown. All work activities were suspended until further notice.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. W. Ray,
6. A. Wendt,
7. J. Tibbs,
8. J. Greaves,
9. B. Cassidy,
10. R. Bonapart (part time),
11. D. Phillips (part time), and
12. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 07 May 2006**

WEEKLY REPORT NO. 455

The report period covered by Weekly Report No. 455 is from Monday, 1 May 2006 through Sunday, 7 May 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.9 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	0	**0**
2	0	0	**0**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**0**	**0**	**0**

Phase V –Cell 7 and Cell 8 Final Cover Construction

No work activities.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 07 May 2006**

WEEKLY REPORT NO. 455

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No work activities.

Phase V – Cell 7 and Cell 8 Final Cover Construction

No work activities.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 26 April 2006 covered parking on slopes. On 28 April 2006 Fluor Fernald called a site wide safety shutdown. All work activities were suspended until further notice.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. W. Ray,
6. A. Wendt,
7. J. Tibbs,
8. J. Greaves,
9. B. Cassidy, and
10. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 14 May 2006**

WEEKLY REPORT NO. 456

The report period covered by Weekly Report No. 456 is from Monday, 8 May 2006 through Sunday, 14 May 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there 0.9 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	12	12
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
Total	0	12	12

Phase V –Cell 7 and Cell 8 Final Cover Construction

Placement of vegetative cover was placed on the west slope of Cell 7.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 7 during the report period. Approximately 34,120 ft^2 of GML was deployed during the report period and an approximate total of 185,510 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 14 May 2006

WEEKLY REPORT NO. 456

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required. CQC also monitored the removal of mud and debris from the Cell 8 catchment basin.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of vegetative cover on the Cell 7 slopes. Moisture/density tests were performed on lifts of vegetative cover as required.

CQC monitored the placement of GML on the Cell 7 slopes during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 8 May 2006 covered the RWP for Troxler usage. On 9 May 2006 Fluor Fernald called off the site wide safety shutdown and construction activities resumed.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. W. Ray, (part time)
6. A. Wendt,
7. J. Tibbs,
8. J. Greaves,
9. B. Cassidy, and
10. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 21 May 2006

WEEKLY REPORT NO. 457

The report period covered by Weekly Report No. 457 is from Monday, 15 May 2006 through Sunday, 21 May 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.7 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	93	93
2	0	29	29
3	0	0	0
4	0	0	0
5	0	0	0
Total	0	122	122

Fluor Fernald began the process of removing the mud and debris from the Cell 8 catchment basin and cleaning off the sacrificial geotextile. During the operation, the sacrificial and primary geotextile was penetrated with an LGP D-6 dozer. The No. 78 stone will be removed during the next report period to determine any damage to the primary geomembrane liner (GML).

Phase V –Cell 7 and Cell 8 Final Cover Construction

Placement of type D rip rap for bio-intrusion barrier continued during the report period.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 7 during the report period. Approximately 8,560 ft^2 of GML was deployed during the report period and an approximate total of 194,070 ft^2 of GML has been deployed to date.

Per: C. Sukow/J. Fleck

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Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 21 May 2006**

WEEKLY REPORT NO. 457

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of bio-intrusion barrier on the slopes of Cell 7. Laboratory analysis was performed on vegetative cover, topsoil, No. 57 stone, and type D rip-rap during the report period.

CQC monitored the deployment of GML on the Cell 7 slopes during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 15 may 2006 covered the heat stress monitoring program.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. O. Norovong,
6. A. Wendt,
7. J. Tibbs,
8. J. Greaves,
9. B. Cassidy,
10. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 28 May 2006**

WEEKLY REPORT NO. 458

The report period covered by Weekly Report No. 458 is from Monday, 22 May 2006 through Sunday, 28 May 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.2 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	175	175
2	0	36	36
3	0	0	0
4	0	0	0
5	0	0	0
Total	0	211	211

Fluor Fernald continued the process of removing the mud and debris from the Cell 8 catchment basin and cleaning off the sacrificial geotextile. No. 78 stone was removed from the primary geomembrane liner (GML) in the areas that the primary geotextile was damaged. The primary GML was inspected and found to be undamaged. Fluor proceeded to repair the damaged geotextile layers and replace No. 78 stone.

Phase V –Cell 7 and Cell 8 Final Cover Construction

Placement of geotextile and No. 78 stone continued during the report period.

An approximate total of 194,070 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 28 May 2006

WEEKLY REPORT NO. 458

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required. CQC also monitored the removal of mud and debris from the Cell 8 catchment basin and inspected the primary GML for damage.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of bio-intrusion barrier on the slopes of Cell 7. Laboratory analysis was performed on vegetative cover, topsoil, and type D rip-rap during the report period.

CQC monitored the deployment of GML on the Cell 7 slopes during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 22 May 2006 covered heavy equipment and blind spots.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. O. Norovong,
6. A. Wendt,
7. J. Tibbs,
8. J. Greaves,
9. B. Cassidy,
10. L. Cooper, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 04 June 2006**

WEEKLY REPORT NO. 459

The report period covered by Weekly Report No. 459 is from Monday, 29 May 2006 through Sunday, 4 June 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.8 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	111	**111**
2	0	15	**15**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**0**	**126**	**126**

Phase V –Cell 7 and Cell 8 Final Cover Construction

Placement of geotextile, No. 78 stone, and type D rip-rap continued during the report period.

An approximate total of 194,070 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 04
DESCRIPTION: PHASE IV2 & V CONSTRUCTION WEEK ENDING: 04 June 2006

WEEKLY REPORT NO. 459

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of geotextile on the Cell 7 slopes during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 30 May 2006 covered heat stress and related injuries.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. C. Walker,
4. D. Evans,
5. O. Norovong,
6. A. Wendt,
7. J. Tibbs,
8. J. Greaves,
9. B. Cassidy,
10. L. Cooper, (part time) and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 11 June 2006**

WEEKLY REPORT NO. 460

The report period covered by Weekly Report No. 460 is from Monday, 5 June 2006 through Sunday, 11 June 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 3.0 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 7	Cell 8	Total
1	0	551	**551**
2	0	0	**0**
3	0	0	**0**
4	0	0	**0**
5	0	0	**0**
Total	**0**	**551**	**551**

Phase V –Cell 7 and Cell 8 Final Cover Construction

Placement of No. 78 stone, type D rip-rap, and No. 57 stone continued during the report period.

An approximate total of 194,070 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 11 June 2006**

WEEKLY REPORT NO. 460

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of stone materials on the Cell 7 slopes during the report period. CQC also performed laboratory testing on contouring layer materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 5 June 2006 covered asbestos awareness.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper, (part time) and
9. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 18 June 2006**

WEEKLY REPORT NO. 461

The report period covered by Weekly Report No. 461 is from Monday, 12 June 2006 through Sunday, 18 June 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.25 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	993	993
2	151	151
3	0	0
4	0	0
5	0	0
Total	1144	1144

FFC began crushing Category 2 concrete in order to produce Category 1 material for placement in Cell 8.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of No. 78 stone and began placement of vegetative cover on the west slope of Cell 7.

An approximate total of 194,070 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

CQC collected samples of crushed concrete for the determination of soil classification and suitability for use as category 1.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of stone materials and vegetative cover on the Cell 7 slopes during the report period.

CQC also performed laboratory testing on contouring layer and vegetative cover materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 12 June 2006 covered construction traffic and the affects on density testing/locations.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper, and
9. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 25 June 2006**

WEEKLY REPORT NO. 462

The report period covered by Weekly Report No. 462 is from Monday, 19 June 2006 through Sunday, 25 June 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.3 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	914	914
2	386	386
3	0	0
4	0	0
5	0	0
Total	1300	1300

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of granular filter and vegetative cover on the east slope of Cell 7. Contouring layer and compacted clay cap was placed on the east slope of Cell 8.

An approximate total of 194,070 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 25 June 2006**

WEEKLY REPORT NO. 462

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of contouring layer, compacted clay cap, vegetative cover, and granular filter materials on the Cell 7 and Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these soil components as required. CQC also performed laboratory testing on contouring layer and vegetative cover materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 20 June 2006 covered carbon filter placement as category 1.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. C. Sukow,
2. D. Evans
3. B. Cassidy,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper,
9. B. Yeardly, (part time) and
10. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 02 July 2006**

WEEKLY REPORT NO. 463

The report period covered by Weekly Report No. 463 is from Monday, 26 June 2006 through Sunday, 2 July 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.3 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	712	712
2	143	143
3	0	0
4	0	0
5	0	0
Total	855	855

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of vegetative cover on the east slope of Cell 7. Contouring layer and compacted clay cap was placed on the east slope of Cell 8.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 7 during the report period. Approximately 22,542 ft^2 of GML was deployed during the report period and an approximate total of 216,610 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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GeoSyntec Consultants	*FLUOR FERNALD*

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 02 July 2006**

WEEKLY REPORT NO. 463

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of GML on the east slopes of Cell 7 and Cell 8 during the report period. CQC continued to monitor the placement of contouring layer, compacted clay cap, and vegetative cover materials on the Cell 7 and Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these soil components as required. CQC also performed laboratory testing on contouring layer, No. 78 stone and crushed concrete materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 26 June 2006 covered hazards of placing carbon filter material, fugitive dust.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper,
9. B. Cassidy,
10. B. Yardly, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 09 July 2006**

WEEKLY REPORT NO. 464

The report period covered by Weekly Report No. 464 is from Monday, 3 July 2006 through Sunday, 9 July 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was no precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	583	583
2	61	61
3	0	0
4	0	0
5	0	0
Total	644	644

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of compacted clay cap on the east slope of Cell 8.

Deployment of geomembrane liner (GML) continued on the east slope of Cell 7 and Cell 8 during the report period. Approximately 51,084 ft^2 of GML was deployed during the report period and an approximate total of 267,694 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 09 July 2006**

WEEKLY REPORT NO. 464

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of GML on the east slopes of Cell 7 and Cell 8 during the report period. CQC continued to monitor the placement of compacted clay cap the Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these soil components as required. CQC also performed laboratory testing on contouring layer materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 3 July 2006 covered proper use of fireworks.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper,
9. B. Cassidy,
10. B. Yeardly, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 16 July 2006**

WEEKLY REPORT NO. 465

The report period covered by Weekly Report No. 465 is from Monday, 10 July 2006 through Sunday, 16 July 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.25 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	386	386
2	71	71
3	0	0
4	0	0
5	0	0
Total	457	457

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of compacted clay cap on the east slope of Cell 8. FFC placed No. 78 stone and type D rip-rap for bio-intrusion barrier on the east slope of Cell 8.

Leak Location Services, Inc. (LLSI) performed leak detection on the east slope of Cell 8. FFC deployed geotextile over completed GML. Approximately 267,694 ft^2 of geomembrane liner (GML) has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 16 July 2006**

WEEKLY REPORT NO. 465

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the leak detection performed on completed GML and deployment of geotextile on the east slope of Cell 8. CQC continued to monitor the placement of compacted clay cap the Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of clay cap as required. CQC also performed laboratory testing on crushed concrete materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 10 July 2006 covered site traffic hazards.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper,
9. B. Cassidy,
10. B. Yeardly, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

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WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 23 July 2006**

WEEKLY REPORT NO. 466

The report period covered by Weekly Report No. 466 is from Monday, 17 July 2006 through Sunday, 23 July 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.5 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	397	397
2	78	78
3	0	0
4	0	0
5	0	0
Total	475	475

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of compacted clay cap on the east slope of Cell 8. FFC also placed contouring layer and vegetative cover on the east slope of Cell 8.

Deployment of geomembrane liner (GML) continued on the east slope of Cell 8 during the report period. Approximately 56,782 ft^2 of GML was deployed during the report period and an approximate total of 324,476 ft^2 of GML has been deployed to date.

Leak Location Services, Inc. (LLSI) performed leak detection on the east slope of Cell 8. FFC deployed geotextile over completed GML.

Per: C. Sukow/J. Fleck

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Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

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PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GO3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 23 July 2006**

WEEKLY REPORT NO. 466

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of GML, leak detection performed on completed GML, and deployment of geotextile on the east slope of Cell 8. CQC continued to monitor the placement of contouring layer, compacted clay cap, and vegetative cover the Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these materials as required. CQC also performed laboratory testing on vegetative cover materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 24 July 2006 covered heat stress.

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GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper, (part time) and
9. B. Cassidy,
10. B. Yeardly, and
11. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 30 July 2006**

WEEKLY REPORT NO. 467

The report period covered by Weekly Report No. 467 is from Monday, 24 July 2006 through Sunday, 30 July 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.0 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	460	460
2	0	0
3	0	0
4	0	0
5	0	0
Total	460	460

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of contouring layer on the east slope of Cell 8. FFC also placed No. 78 stone, type D rip-rap, and filter sand on the east slope of Cell 8.

FFC deployed geotextile over completed GML. Approximately 324,476 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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GeoSyntec Consultants	*FLUOR FERNALD*

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 30 July 2006**

WEEKLY REPORT NO. 467

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of geotextile on the east slope of Cell 8. CQC continued to monitor the placement of contouring layer, No. 78 stone, type D rip-rap, and filter sand on the Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these materials as required. CQC also performed laboratory testing on vegetative cover materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 5 June 2006 covered auto repair and radiator caps.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. B. Cassidy,
7. J. Greaves,
8. L. Cooper,
9. B. Yeardly, and
10. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 06 August 2006**

WEEKLY REPORT NO. 468

The report period covered by Weekly Report No. 468 is from Monday, 31 July 2006 through Sunday, 6 August 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.5 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	376	376
2	21	21
3	0	0
4	0	0
5	0	0
Total	397	397

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC placed clay cap material on the east slope of Cell 8 and topsoil on the east slope of Cell 7.

FFC deployed geotextile over completed GML. Approximately 324,476 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitor the placement of clay cap material on the Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these materials as required. CQC also monitored topsoil placement on the east slope of Cell 7.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 31 July 2006 covered proper eye protection.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper, (part time) and
9. B. Cassidy,
10. B. Yeardly, and
11. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 13 August 2006**

WEEKLY REPORT NO. 469

The report period covered by Weekly Report No. 469 is from Monday, 7 August 2006 through Sunday, 13 August 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was no precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	454	454
2	1	1
3	0	0
4	0	0
5	0	0
Total	455	455

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of clay cap material on the south and east slopes of Cell 8. FFC also placed No. 78 stone on the east slopes of Cell 8.

Deployment of geomembrane liner (GML) continued on the south and east slopes of Cell 8 during the report period. Approximately 141,944 ft^2 of GML was deployed during the report period and an approximate total of 466,420 ft^2 of GML has been deployed to date.

Leak Location Services, Inc. (LLSI) performed leak detection on the south and east slope of Cell 8. FFC deployed geotextile over completed GML.

Per: C. Sukow/J. Fleck

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Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 13 August 2006**

WEEKLY REPORT NO. 469

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the deployment of during the report period.

CQC monitor the placement of clay cap material on the Cell 8 slopes during the report period. Moisture/density tests were performed on lifts of these materials as required. CQC also monitored deployment of GML, geotextile, and No. 78 stone.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 7 August 2006 covered fatigue and long hours.

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GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. B. Yeardly,
8. L. Cooper,
9. B. Yeardly, and
10. S. Abney.

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FLUOR FERNALD

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WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 20 August 2006**

WEEKLY REPORT NO. 470

The report period covered by Weekly Report No. 470 is from Monday, 14 August 2006 through Sunday, 20 August 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.25 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	527	527
2	0	0
3	0	0
4	0	0
5	0	0
Total	527	527

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of No. 78 stone and also placed type D rip-rap, No. 57 stone, granular filter material, and vegetative cover during the report period. FFC also deployed geotextile over completed GML.

An approximate total of 466,420 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review **(Cont'd)**

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 7 and Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of stone materials and vegetative cover on the south and east slopes of the Cell 8 cap. CQC also performed laboratory testing on contouring layer, No. 78 stone, and No. 57 stone materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 14 August 2006 covered proper trenching and shoring.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. B. Cassidy,
8. L. Cooper,
9. B. Yeardly, and
10. S. Abney.

Per: C. Sukow/J. Fleck

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GeoSyntec Consultants

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 27 August 2006**

WEEKLY REPORT NO. 471

The report period covered by Weekly Report No. 471 is from Monday, 21 August 2006 through Sunday, 27 August 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.4 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	550	550
2	0	0
3	0	0
4	0	0
5	0	0
Total	550	550

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of type D rip-rap, No. 57 stone, granular filter material, and vegetative cover during the report period.

An approximate total of 466,420 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 27 August 2006**

WEEKLY REPORT NO. 471

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of type D rip-rap, granular filter, No. 57 stone, and vegetative cover on the south and east slopes of Cell 8 during the report period. Moisture/density tests were performed on lifts of vegetative cover as required. CQC also performed laboratory testing on contouring layer and No. 78 stone materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 23 August 2006 covered suspended loads.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. J. Greaves,
8. L. Cooper,
9. B. Yeardly,
10. N.Meekins, and
11. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD 006439

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 03 September 2006**

WEEKLY REPORT NO. 472

The report period covered by Weekly Report No. 472 is from Monday, 28 August 2006 through Sunday, 3 September 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 2.55 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	266	266
2	0	0
3	0	0
4	0	0
5	0	0
Total	266	266

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of No. 78 stone, granular filter material, and vegetative cover during the report period. FFC also placed compacted clay cap on the west slope of Cell 8.

An approximate total of 466,420 ft^2 of GML has been deployed to date.

Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Construction Submittal Review (Cont'd)

Phase V – Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 03 September 2006**

WEEKLY REPORT NO. 472

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of No. 78 stone, granular filter, and vegetative cover on the south and east slopes of Cell 8. CQC also monitored the placement of compacted clay cap material on the west slope of Cell 8 during the report period. Moisture/density tests were performed on lifts of vegetative cover and compacted clay cap as required.

CQC performed laboratory testing on contouring layer materials.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 30 August 2006 covered fatigue and long hours.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. N. Meekins,
3. D. Evans (part time),
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. B. Cassidy,
8. L. Cooper,
9. B. Yeardly,
10. R. Tatum, and
11. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 10 September 2006**

WEEKLY REPORT NO. 473

The report period covered by Weekly Report No. 473 is from Monday, 4 September 2006 through Sunday, 10 September 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was no precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Fluor Fernald Construction (FFC) continued placement of impacted material in the OSDF cells. Total truck loads by cell are compiled as follows:

Category	Cell 8	Total
1	300	300
2	0	0
3	0	0
4	0	0
5	0	0
Total	300	300

Placement of impacted materials reached its final conclusion on 6 September 2006.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of compacted clay cap on the west and south slopes of Cell 8 during the report period. FFC also continued placement of vegetative cover on the south and east slopes of Cell 8.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 8 during the report period. Approximately 116,996 ft^2 of GML was deployed during the report period and an approximate total of 583,420 ft^2 of GML has been deployed to date.

Leak Location Services, Inc. (LLSI) performed leak detection on the west slope of Cell 8. FFC deployed geotextile over completed GML.

Per: C. Sukow/J. Fleck

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Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

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Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

CQC monitored the placement of impacted materials in Cell 8. Moisture/density tests were performed on lifts of Category 1 soil as required.

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of vegetative cover on the south slope of Cell 8. CQC also monitored the placement of compacted clay cap material on the west and southwest slopes of Cell 8 during the report period. Moisture/density tests were performed on lifts of vegetative cover and compacted clay cap as required.

CQC monitored the deployment of GML, geotextile, and leak location activities on the south slope of Cell 8 during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 4 September 2006 covered changing conditions and truck traffic.

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GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. N. Meekins,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. B. Cassidy,
8. L. Cooper,
9. R. Tatum, and
10. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 17 September 2006**

WEEKLY REPORT NO. 474

The report period covered by Weekly Report No. 474 is from Monday, 11 September 2006 through Sunday, 17 September 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 3.25 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

Placement of impacted materials reached its final conclusion on 6 September 2006. No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of compacted clay cap on the west and south slopes of Cell 8 during the report period. FFC also placed No. 78 stone, type d rip-rap, and No. 57 stone on the west slope of Cell 8.

Deployment of geomembrane liner (GML) continued on the west slope of Cell 8 during the report period. Approximately 51,398 ft^2 of GML was deployed during the report period and an approximate total of 634,815 ft^2 of GML has been deployed to date.

Leak Location Services, Inc. (LLSI) performed leak detection on the south and east slope of Cell 8. FFC deployed geotextile over completed GML.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 17 September 2006**

WEEKLY REPORT NO. 474

Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 17 September 2006**

WEEKLY REPORT NO. 474

Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of compacted clay cap, No. 78 stone, type D rip-rap, and No. 57 stone material on the west and southwest slopes of Cell 8 during the report period. Moisture/density tests were performed on lifts of compacted clay cap as required.

CQC monitored the deployment of GML, geotextile, and leak location activities on the south slope of Cell 8 during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 11 September 2006 covered airport security and regulations.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. N, Meekins,
3. D. Evans,
4. J. Tibbs,
5. O. Norovong,
6. A. Wendt,
7. B. Cassidy,
8. L. Cooper,
9. R. Tatum,
10. S. Abney.

Per: C. Sukow/J. Fleck

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 24 September 2006**

WEEKLY REPORT NO. 475

The report period covered by Weekly Report No. 475 is from Monday, 18 September 2006 through Sunday, 24 September 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 2.85 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of No. 78 stone on the west slope of Cell 8. Topsoil was placed on the east and south slopes of Cell 8.

Deployment of geomembrane liner (GML) continued on the west and southwest slopes of Cell 8 during the report period. Approximately 91,652 ft^2 of GML was deployed during the report period completing GML capping for Cell 8 and the OSDF. Approximately 726,470 ft^2 of GML was deployed for project completion.

Leak Location Services, Inc. (LLSI) performed leak detection on the west and southwest slopes of Cell 8. FFC deployed geotextile over completed GML.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

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Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of No. 78 stone, type on the west and southwest slopes of Cell 8 during the report period.

CQC monitored the deployment of GML, geotextile, and leak location activities on the south slope of Cell 8 during the report period.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 19 September 2006 covered changing field conditions.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. A. Wendt,
5. O. Norovong,
6. L. Cooper,
7. B. Cassidy,
8. R. Tatum,
9. D. Phillips (part time),
10. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 01 October 2006**

WEEKLY REPORT NO. 476

The report period covered by Weekly Report No. 476 is from Monday, 25 September 2006 through Sunday, 1 October 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.6 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of geotextile, No. 78 stone, and vegetative cover on the south and west slopes of Cell 8. Topsoil was placed on the east and south slopes of Cell 8.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

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Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of geotextile, No. 78 stone, vegetative cover, and topsoil on the south and west slopes of Cell 8 during the report period. Moisture/density tests were performed on lifts of vegetative cover as required.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 25 September 2006 covered safety during final closure.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. R. Tatum,
5. O. Norovong,
6. A. Wendt,
7. B. Cassidy,
8. L. Cooper and,
9. S. Abney.

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FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 08 October 2006**

WEEKLY REPORT NO. 477

The report period covered by Weekly Report No. 477 is from Monday, 2 October 2006 through Sunday, 8 October 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.75 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of No. 78 stone, type d rip-rap, choke stone, and vegetative cover on the south and west slopes of Cell 8. Compacted fill was placed along the between the toe of Cell 7 and Cell 8 and Valve Houses (VH) 7 and 8. Topsoil was placed on the top and south slopes of Cell 8.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

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Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of No. 78 stone, type d rip-rap, granular drainage, vegetative cover, topsoil, and compacted fill for Cell 7 and Cell 8 final cover during the report period. Moisture/density tests were performed on lifts of soil components as required.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 2 October 2006 covered eye protection.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. A. Wendt,
5. B. Cassidy,
6. L. Cooper,
7. R. Tatum and,
8. S. Abney.

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GeoSyntec Consultants

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 15 October 2006**

WEEKLY REPORT NO. 478

The report period covered by Weekly Report No. 478 is from Monday, 9 October 2006 through Sunday, 15 October 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 0.25 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of No. 78 stone, type d rip-rap, and choké stone, on the south and west slopes of Cell 8. Compacted fill was placed along the south toe and rock fill was placed along the west toe of Cell 8. Topsoil was placed on the top and south slopes of Cell 8.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

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Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

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Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of No. 78 stone, type d rip-rap, choke stone, topsoil, and compacted fill for Cell 7 and Cell 8 final cover during the report period. Moisture/density tests were performed on lifts of soil components as required.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 9 October 2006 covered hazardous driving and hydroplaning.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. A. Wendt,
5. L. Cooper,
6. B. Cassidy,
7. R. Tatum and,
8. S. Abney.

Per: C. Sukow/J. Fleck

©GeoSyntec Consultants FILE No. 1-05-WFR

[redacted]

GeoSyntec Consultants

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 22 October 2006**

WEEKLY REPORT NO. 479

The report period covered by Weekly Report No. 479 is from Monday, 16 October 2006 through Sunday, 22 October 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 2.0 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continued placement of vegetative cover on the south and west slopes of Cell 8. Rock fill was placed along the west toe of Cell 8. Topsoil was placed on the top and south slopes of Cell 8.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

©GeoSyntec Consultants FILE No. 1-05-WFR

Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

©GeoSyntec Consultants FILE No. 1-05-WFR

Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement of type d rip-rap, vegetative cover, topsoil, and rock fill for Cell 8 final cover during the report period. Moisture/density tests were performed on lifts of vegetative cover as required.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 16 October 2006 covered winter driving.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. A. Wendt,
5. B. Cassidy,
6. L. Cooper,
7. J. Beech (part time),
8. D. Phillips (part time),
9. R. Tatum,
10. N. Davies (part time) and,
11. S. Abney.

©GeoSyntec Consultants FILE No. 1-05-WFR

GeoSyntec Consultants

FLUOR FERNALD

WEEKLY FIELD REPORT

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO **PROJECT NO.: GQ3542** **TASK NO.: 04**
DESCRIPTION: PHASE IV2 & V CONSTRUCTION **WEEK ENDING: 29 October 2006**

WEEKLY REPORT NO. 480

The report period covered by Weekly Report No. 480 is from Monday, 23 October 2006 through Sunday, 29 October 2006. The Resident Engineer's Weekly Report and the Construction Quality Control (CQC) Consultant's Weekly Report are combined into one report for the On-Site Disposal Facility (OSDF) Phase V projects. During the period, there was 1.25 inches of precipitation recorded.

Construction Progress

Phase V - Impacted Material Placement

No activities.

Phase V –Cell 7 and Cell 8 Final Cover Construction

FFC continues to place rock fill along the west haul road and compacted fill around Valve Houses 7 and 8. Topsoil was placed on the west slope of Cell 8.

Phase V Construction Submittal Review

Phase V – Geosynthetics Procurement

The following geosynthetics procurement submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Cells 3 and 4 Final Cover Construction Project

The following construction submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Per: C. Sukow/J. Fleck

©GeoSyntec Consultants FILE No. 1-05-WFR

Phase V Construction Submittal Review (Cont'd)

Phase V – Cells 7 and 8 Liner Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Phase V – Valve Houses 7 and 8 Construction Project

The following construction materials submittals were reviewed during the report period.

Submittal No.	Item Description	RE Disposition	Recommended Status
None			

Design Clarifications and Modifications

None

Survey

GeoSyntec reviewed progress survey certification points for the following:

- Cell 3 Top of Biointrusion Layer, Top of Granular Filter Layer;
- Cell 4 Top of Biointrusion Layer; Top of Granular Filter Layer;
- Cell 5 None;
- Cell 6 None;
- Cell 7 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;
- Cell 8 Top of Compacted Clay Liner, Top of LDS Layer, Top of LCS Layer;

Construction Quality Control (CQC)

Phase V - Impacted Materials Placement

No activities.

©GeoSyntec Consultants FILE No. 1-05-WFR

Construction Quality Control (CQC) (Cont'd)

Phase V – Cell 7 and Cell 8 Final Cover Construction

CQC monitored the placement rock fill and compacted fill for Cell 8 final cover during the report period. Moisture/density tests were performed on lifts of compacted fill as required.

Health and Safety

GeoSyntec continues to hold daily safety tailgate meetings. In addition, representative GeoSyntec CQC field personnel attended the Contractor's daily construction/health and safety tailgate meetings.

GeoSyntec also holds weekly health and safety meetings for its on-site employees. The GeoSyntec weekly safety meeting held on 23 October 2006 covered safe storage and use of leftover food.

GeoSyntec Personnel Schedule

GeoSyntec had the following project staff personnel on site for the report period:

1. J. Fleck,
2. C. Sukow,
3. D. Evans,
4. A. Wendt,
5. J. Greaves (part time),
6. L. Cooper,
7. R. Tatum,
8. S. Abney.

©GeoSyntec Consultants FILE No. 1-05-WFR

CORRESPONDENCE

[redacted]

Fluor Fernald

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

[redacted]

006439

FLUOR

April 6, 2006

Fernald Closure Project
Letter No. C:CPD:2006-0072

Mr. Johnny W. Reising, Director
U. S. Department of Energy
Ohio Field Office - Fernald Closure Project
175 Tri-County Parkway
Cincinnati, Ohio 45246

Dear Mr. Reising:

CONTRACT DE-AC24-01OH20115, TRANSMITTAL OF THE CONSTRUCTION QUALITY ASSURANCE FINAL REPORT FOR ON-SITE DISPOSAL FACILITY PHASE V - CELL 4, 5, 6, AND 7 EAST FINAL COVER SYSTEMS

Enclosed for your information is the Construction Quality Assurance Final Report for On-Site Disposal Facility Phase V - Cell 4, 5, 6, and 7 East Final Cover Systems, Revision 0. This report consists of Volumes 1 through 6 dated March 2006.

Upon your concurrence, please forward this report to the U.S. Environmental Protection Agency and Ohio Environmental Protection Agency. If you have any questions or require additional information, please contact Jyh-Dong Chiou at (513) 738-2834 or Uday Kumthekar at (513) 738-2659.

Sincerely,

Cornelius M. Murphy
Closure Project Director

CMM:UAK:jkp

Enclosures

c: With Enclosures

Jim Fleck, GeoSyntec, MS38
SDFP Engineering File Station, MS64
DOE Records Center
Project Number 20100.2.22/20105.2.22 (20105-RP-0002)
Administrative Record, MS6

Without Enclosures

Richard Abitz, MS88
Christina Carr, DOE-OH/FCP, MS2
Tom Carr, MS64
Jyh-Dong Chiou, MS88
Mike Connors, MS1
Dennis Dalga, MS99
Joe Desormeau, DOE-OH/FCP, MS2
Reinhard Friske, MS60
Gregg Johnson, MS60
Frank Johnston, MS12
Timothy L. Jones, DOE Contracting Officer, DOE/EMCBC
Uday Kumthekar, MS88
Jeff Middaugh, MS60
Frank L. Miller, MS88
Dennis Nixon, MS1
Scott Osborn, MS25
M. D. Powell, MS64
Dennis Sizemore, Fluor Fernald, Inc. Prime Contract, MS1
Anthony Snider, MS88
Richard Stengel, MS1
Mike Stumbo, MS60
Chuck Van Arsdale, MS88
Christa Walls, MS25
Fred Wilson, MS64
William Zebick, MS60
Letter Log Copy, MS1

[redacted]

Department of Energy

Ohio Field Office
Fernald Closure Project
175 Tri-County Parkway
Springdale, Ohio 45246
(513) 648-3155

APR 6 2006

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0109-06

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF THE CONSTRUCTION QUALITY ASSURANCE FINAL REPORT FOR ON-SITE DISPOSAL FACILITY PHASE V - CELL 4, 5, 6, AND 7 EAST FINAL COVER SYSTEMS

Enclosed for your information is the Construction Quality Assurance Final Report for On-Site Disposal Facility Phase V - Cell 4, 5, 6, and 7 East Final Cover Systems, Revision 0. This report consists of Volumes 1 through 6 dated March 2006.

If you have any questions or require additional information, please me at (513) 648-3139.

Sincerely,

Johnny Reising

Johnny W. Reising
Director

Enclosures

cc w/enclosures:
M. Cullerton, Tetra Tech
M. Shupe, HSI GeoTrans
AR Coordinator, Fluor Fernald, Inc./MS6

cc w/o enclosures:
J. Desormeau, OH/FCP
G. Jablonowski, USEPA-V, SR-6J
R. Vandegrift, ODH
J. Chiou, Fluor Fernald, Inc./MS88
F. Johnston, Fluor Fernald, Inc./MS12
C. Murphy, Fluor Fernald, Inc./MS1

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

FLUOR

August 7, 2006

Fernald Closure Project
Letter No. C:CPD:2006-0176

Mr. Johnny W. Reising, Director
U. S. Department of Energy
Ohio Field Office - Fernald Closure Project
175 Tri-County Parkway
Cincinnati, Ohio 45246

Dear Mr. Reising:

CONTRACT DE-AC24-01OH20115, TRANSMITTAL OF RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ON-SITE DISPOSAL FACILITY PHASE V DESIGN CHANGE NOTICE 20105-010 - REMOVAL OF CELL 1 CAP MONITORING DEVICES

References: 1) "OSDF Phase V Design Change Notice 20105-010 - Removal of Cell 1 Final Cover Monitoring Devices," dated June 15, 2006

2) Letter, T. Schneider to J. Reising, "Disapproval - OSDF Cell #1 Cap Monitoring Device Removal," dated July 7, 2006

Enclosed for your approval are responses to Ohio Environmental Protection Agency (OEPA) comments on the On-Site Disposal Facility Phase V Design Change Notice (DCN) 20105-010 - Removal of Cell 1 Cap Monitoring Devices. Upon approval, these comment responses will be incorporated into the revised DCN and drawings.

Upon your concurrence, please forward this document to the U.S. Environmental Protection Agency and OEPA. If you have any questions or require additional information, please contact Jyh-Dong Chiou at (513) 738-2834 or Uday Kumthekar at (513) 484-2260.

Sincerely,

Dennis J. Carr for

Cornelius M. Murphy
Closure Project Director

CMM:UAK:jkp
Enclosure

RECEIVED
AUG 09 2006

c: With Enclosure

Joe Desormeau, DOE-OH/FCP, MS2
Jim Fleck, GeoSyntec, MS38
Reinhard Friske, MS60
Uday Kumthekar, MS88
Chuck Van Arsdale, MS88
SDFP Library, MS88
DOE Records Center
Administrative Record (w/2 Enclosures), MS6
Letter Log Copy, MS1
Project Number 20105.2.22 (DCN 20105-010)

Without Enclosure

Richard Abitz, MS88
Pete Bolig, MS60
Jyh-Dong Chiou, MS88
Dennis Dalga, MS88
Ernie DiMuccio, MS1
Frank Johnston, MS12
Timothy L. Jones, DOE Contracting Officer, DOE/EMCBC
Donna Metzler, Stoller, MS2
Frank L. Miller, MS60
Garner Powell, MS60
Dennis Sizemore, Fluor Fernald, Inc. Prime Contract, MS1
Anthony Snider, MS88
Tammy Terry, MS1
Christa Walls, MS25
Fred Wilson, MS60
Bill Zebick, MS60

RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ON-SITE DISPOSAL FACILITY CELL 1 CAP MONITORING DEVICES REMOVAL (DCN 20105-010)

FERNALD CLOSURE PROJECT
FERNALD, OHIO

AUGUST 2006

U.S. DEPARTMENT OF ENERGY

[redacted]

RESPONSES TO OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ON-SITE DISPOSAL FACILITY CELL 1 CAP MONITORING DEVICES REMOVAL (OSDF PHASE V - DCN 20105-010)

COMMENTS

1. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: Pg #: Line #: Code:
Original Comment #: 1
Comment: Ohio EPA does not believe the approach for partial removal and abandonment of the Pressure Tranducer and Settlement Plate monitoring devices is protective of the liner system and likely present unacceptable risk of puncturing the liner in the proposed final state. The potential for a load (vehicle traffic) placed upon the top of the PVC pipe pushing the pipe or the rod through the liner presents a long-term threat to the integrity of the OSDF. An alternative approach to dealing with these devices is necessary.

Response: To protect the liner system from puncturing the geosynthetic liner system, 24-inch diameter RCP section and stainless steel checkered plate will not be removed. With this approach existing vegetation at monitoring locations will not be disturbed. After removal of the pressure transducers PVC riser will be filled with drainage layer material and open end of the PVC riser will be capped.

Action:
1. Revise Drawings 90X-5500-E-00581 and 90X-5500-G-00577 and incorporate the above comment response.
2. Revise Work Plan Articles B.3.b, B.3.c, and B.3.d and incorporate the above comment response.

2. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: Pg #: Line #: Code:
Original Comment #: 2
Comment: The LMICP will need to be revised to include specific inspection criteria for OSDF Cell #1 to monitor the proposed actions to assess potential failure mechanisms.

Response: Inspection Component 4E on the OSDF Cell Cap Post Closure Inspection Checklist (Appendix D of Volume II of the LMICP) includes monitoring the locations where Cell 1 monitoring equipment has been removed.

Action: Text will be included in Section 3.2.1 of Volume II of the LMICP that will discuss the inspection of the former Cell 1 monitor locations.

3. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: Pg #: Line #: Code:
Original Comment #: 3
Comment: At any location where soil is disturbed and seeding is required, matting should also be placed in accordance with the OSDF seeding spec.

Response: Agree. At locations where soil is disturbed matting will be placed in accordance with the technical specification Section 02930.

[redacted]

Action: 1. Add the following General Note on Drawings 90X-5500-E-00581and 00591 and 90X-5500-G-00577:

"At locations where soil is disturbed matting will be placed in accordance with the technical specification Section 02930."

2. Revise Work Plan Articles B.3.b, B 3.c, B.3.d, B.3.e, and B.3.f to incorporate the above comment response.

4. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: B.1.b Pg #: 1 Line #: Code: c
Original Comment #: 4
Comment: The text requires that the work be performed to minimize impacts to existing facilities including valve houses, final cover, drainage system, roads, etc. The Plan provides no further details or requirements. Lists of actions, prohibitions and requirements designed to prevent damage to the cover and the established vegetation should be developed, including ways to minimize the compaction of soil. Limitations on vehicle weight, turn radius and tire pressure should be included as well as prohibiting activity when the ground is soft. Where at all possible work should be completed with hand tools.

Response: Agree. Following requirements will be added to the Work Plan in Article B.1:

"c. Perform work at the OSDF Valve House - 1 (VH-1) in accordance with the OSDF System Plan for the Leachate Conveyance System and Safe Work Plan for removal of the monitoring system components at VH-1.

d. Use only rubber tire equipment with tire pressure less than 10-psi unless otherwise approved. Do not operate any equipment when the final cover is soft and wet. To minimize the impact to the final cover system, where at all possible, use hand tools to perform the work."

Action: Revise Work Plan Article B.1 to incorporate the above comment response.

5. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: B.3.b Pg #: Line #: 2nd paragraph Code: c
Original Comment #: 5
Comment: The text states that the pressure transducer PVC riser will be filled with cement grout. The drawings show that the bottom 12 inches of the riser is pierced by a series of 3/8-inch holes. Describe the properties of the grout or other actions to be taken to prevent the grout from eventually migrating over the years into the drainage layer. Why is grout preferable to filling with a porous media in the lower portion?

Response: PVC riser pipe will be filled with drainage layer material and capped with PVC cap.

Action: 1. Add the following General Note on Drawing 90X-5500-G-00577 and 90X-5500-E-00581:

"Fill PVC riser with drainage layer material and cap the riser with PVC cap."

2. Revise Work Plan Articles B.3.b, B.3.c, and B.3.d and incorporate the above comment response.

[redacted]

006439

6. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: B.3.b Pg #: Line #: Code:
Original Comment #: 6
Comment: The text states that the projecting section of the PVC riser will be cut and removed. How will the riser be cut and why can't the riser be cut lower into the vegetative layer? Are there devices which can cut the pipe from the inside?

Response: To minimize the impact to the vegetative layer PVC riser pipe will be filled with drainage layer material and capped.

Action: Revise Work Plan and drawing to incorporate the above comment response.

7. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: B.3.d Pg #: Line #: Code:
Original Comment #: 7
Comment: All settlement plates should be surveyed in one final time prior to removal.

Response: Agree. Settlement Plates will be surveyed before abandoning in-place.

Action: Revise Work Plan Article B.3.d to incorporate the above comment response.

8. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: B.3.d Pg #: Line #: Code:
Original Comment #: 8
Comment: What prevents removal of the 1-inch diameter stainless steel pipe? Can it not be pulled from the PVC pipe?

Response: The 1-inch stainless steel rod is welded to steel plate at the bottom. Therefore, the rod cannot be pulled from the PVC riser.

Action: No action required.

9. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: B.3.e Pg #: Line #: Code:
Original Comment #: 9
Comment: Upon removal of the junction box, all layers of the cap should be replaced to match the surrounding cap layers (e.g., replace granular layer).

Response: Agree. All layers disturbed during the removal of junction boxes will be replaced conforming to the Typical Section for the Final Cover System shown on Drawing 90X-6000-G-00396.

Action:
1. Add the following General Note on Drawing 90X-5500-E-00591:

   "All layers disturbed during the removal of junction boxes will be replaced conforming to the Typical Section for the Final Cover System shown on Drawing 90X-6000-G-00396."

2. Revise Work Plan Articles B.3.eand B.3.f to incorporate the above comment response.

[redacted]

10. Commenting Organization: Ohio EPA Commenter: OFFO
Section #: Pg #: Line #: Code: c
Original Comment #: 10
Comment: The drawings show that roughly 2,000 running feet of 2-inch and 4-inch PVC conduit will remain buried in the cap at a depth of 7 inches. Runs of hundreds of feet straight up-and-down the slope will remain after this change is implemented. In order to prevent the conduits from becoming preferential flow paths or sinks for soil transport, measures must be implemented to plug these runs. All wiring should be pulled from the conduits.

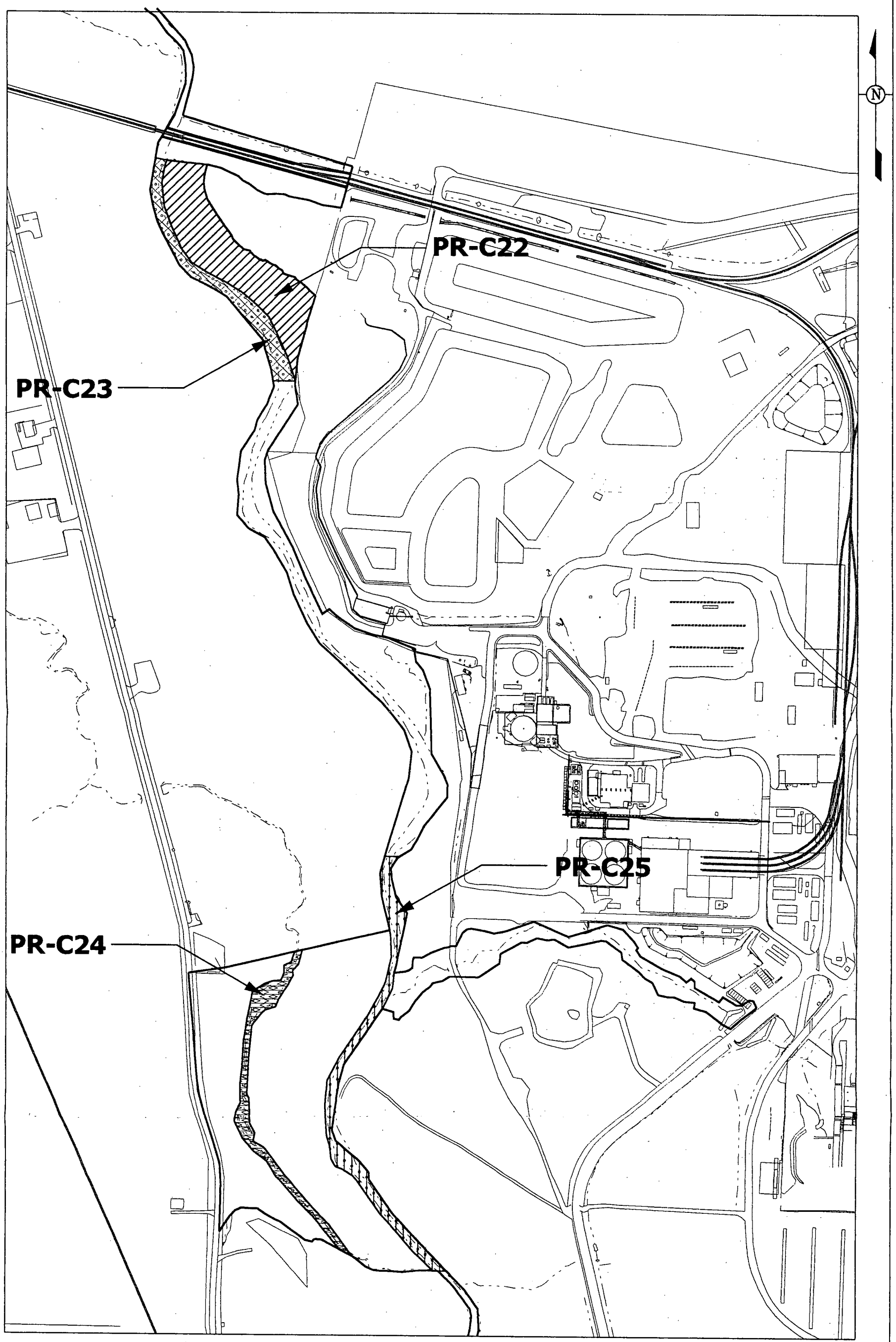
Response: Open ends of the PVC conduits will be capped with PVC caps to prevent the preferential paths or sinks for soil transport. Where accessible, wiring will be pulled from the conduit.

Action:

1. Add the following General Note on Drawing 90X-5500-E-00591:

   "Where accessible, pull wiring and close open end of the PVC conduit with PVC cap before backfilling with vegetative layer and topsoil materials."

2. Revise Work Plan Articles B.3.e and B.3.f to incorporate the above comment response.



LEGEND:

DRAFT

SCALE
300 150 0 300 FEET

FIGURE 1.

STATE PLANAR COORDINATE SYSTEM 1983

03-AUG-2006

v:\2fm12\dgn\ppaddy_400.dgn

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

FLUOR

October 6, 2006

Fernald Closure Project
Letter No. C:CPD:2006-0214

Mr. Johnny W. Reising, Director
U. S. Department of Energy
Ohio Field Office - Fernald Closure Project
175 Tri-County Parkway
Cincinnati, Ohio 45246

Dear Mr. Reising:

CONTRACT DE-AC24-01OH20115, TRANSMITTAL OF THE FINAL ON-SITE DISPOSAL FACILITY PHASE V CONSTRUCTION DRAWING PACKAGE, DESIGN CHANGE NOTICE 20105-011, NORTHWEST EXPANSION OF CELL 8

Enclosed for your information is the final On-Site Disposal Facility Phase V Construction Drawing Package, Design Change Notice 20105-011, Northwest Expansion of Cell 8, Revision 4.

Upon your concurrence, please forward this document to the U.S. Environmental Protection Agency and OEPA. If you have any questions or require additional information, please contact Jyh-Dong Chiou at (513) 738-2834 or Uday Kumthekar at (513) 484-2260.

Sincerely,

Cornelius M. Murphy
Closure Project Director

CMM:UAK:jkp
Enclosures

c: <u>With Enclosures</u>

Jim Fleck, GeoSyntec, MS38
Uday Kumthekar, MS88
DOE Records Center
Administrative Record, MS6
Project Number 20105.2.22 (20105-)

[redacted]

c: Without Enclosures

Richard Abitz, MS88
Pete Bolig, MS60
Jyh-Dong Chiou, MS88
Dennis Dalga, MS3
Joe Desormeau, DOE-OH/FCP, MS2
Ernie DiMuccio, MS1
Reinhard Friske, MS90
Frank Johnston, MS12
Timothy L. Jones, DOE Contracting Officer, DOE/EMCBC
Donna Metzler, Stoller, MS2
Frank L. Miller, MS60
Garner Powell, MS60
Dennis Sizemore, Fluor Fernald, Inc. Prime Contract, MS1
Tammy Terry, MS1
Chuck Van Arsdale, MS88
Christa Walls, MS3
Fred Wilson, MS60
Bill Zebick, MS60
SDFP Library, MS88
Letter Log Copy, MS1

[redacted]

REQUEST FOR CLARIFICATION/DESIGN CHANGE NOTICE

CHANGE OR CLARIFICATION REQUEST SECTION

PROJECT NUMBER:	SUBCONTRACT NO:	DATE:	PAGE 1 OF 1
20105	FSC-653	10/3/2006	

SUBCONTRACT OR PROJECT TITLE:	RCI NO:
On-Site Disposal Facility (OSDF) Phase V Construction	
RCI/DCN TITLE:	DCN No:
Cell 8 Northwest Expansion Construction Drawings	20105-011

DESCRIPTION OF REQUESTED CLARIFICATION or PROPOSED CHANGE or CHANGE TO BE ADDRESSED:

The Phase V Construction Drawings have been revised to reflect grading changes to the Northwest area for an additional expansion of Cell 8. Cell 8 sideslopes for the top of select material, contouring layer, clay cap, GCL/GML/Geotextile, cover drainage layer / bottom of biointrusion layer are revised from 6H:1V to 5.3H:1V and grading was revised around Valve House 8 to accommodate the northwest expansion. The final cover system sideslopes remain at a 6H:1V and are strengthened with additional Biointrusion barrier material at the toe.

DOCUMENTS AFFECTED	DOCUMENT NUMBER	REVISION
Revised Drawings:		
OSDF Phase V Construction Drawing X-1	90X-6000-X-00360	4
OSDF Phase V Construction Drawing G-6A	90X-6000-G-00414	3
OSDF Phase V Construction Drawing G-11A	90X-6000-G-00427	2
OSDF Phase V Construction Drawing G-13A	90X-6000-G-00416	3
OSDF Phase V Construction Drawing G-13B	90X-6000-G-00429	1
OSDF Phase V Construction Drawing G-15A	90X-6000-G-00417	3
OSDF Phase V Construction Drawing G-20A	90X-6000-G-00419	3
OSDF Phase V Construction Drawing G-23A	90X-6000-G-00420	3
OSDF Phase V Construction Drawing G-27	90X-6000-G-00389	3
OSDF Phase V Construction Drawing G-35	90X-6000-G-00397	3
OSDF Phase V Construction Drawing G-43	90X-6000-G-00405	3

FLUOR FERNALD REQUESTOR: (PRINT/SIGN)	DATE:
Uday Kumthekar UKumthekar	10/3/06

DESIGN REVIEW SECTION

_ RCI _x_ DCN	REQUESTOR PROPOSED CHANGE? _X _YES _ _NO	SBDR NO: USQD NO:	PERFORMANCE GRADE: 4 QUALITY LEVEL: 4	SRC/ENGINEERING REVIEW REVIEW MADE FOR PG 1, 2 or 3: _Y _XN/A

DESIGN ORGANIZATION EVALUATION, SOLUTION OR COMMENTS; _X_REQUESTOR PROPOSED CHANGE ACCEPTED; ___ REQUESTOR PROPOSED CHANGE ACCEPTED WITH MODIFICATIONS BELOW; ___ DESIGN ORGANIZATION CHANGE PROVIDED BELOW, ___ CHANGE REJECTED WITH JUSTIFICATION BELOW; _ _ RCI CLARIFICATION ADDRESSED BELOW

The attached drawings will replace the existing revisions of Phase V OSDF Construction Drawings.

ADDITIONAL DOCUMENTS AFFECTED OR ADDED

DOCUMENT TITLE	DOCUMENT NUMBER	REVISION

APPROVAL SECTION

DESIGN ORGANIZATION APPROVAL OF CLARIFICATION OR CHANGE AND VERIFICATION THAT ED-12-5002 REQUIREMENTS MET	PE CONCURRENCE (Not Required if none assigned or for Requestor Proposed Change)
NAME (PRINTED/SIGNED) DATE James Fleck James A Fleck 10/3/06	NAME (PRINTED/SIGNED) DATE
REQUESTOR CONCURRENCE	CHANGE COMPLETED
NAME (PRINTED/SIGNED) DATE Uday Kumthekar UKumthekar 10/3/2006	NAME (PRINTED/SIGNED) DATE

FS-F-4259
Rev. 7, 09/08/03, ED-12-5002

[redacted]

Department of Energy

Ohio Field Office
Fernald Closure Project
175 Tri-County Parkway
Springdale, Ohio 45246

JUN 21 2006

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0153-06

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF ADDENDA TO SECTIONS 12.5 AND 13.3 OF THE FINAL DESIGN CALCULATION PACKAGE FOR THE ON-SITE DISPOSAL FACILITY DUE TO CELL 8 EXPANSION

Enclosed for your information are addenda to Sections 12.5 and 13.3 of the final design calculation for the On-Site Disposal Facility (OSDF), Revision 2. The calculations support changes to the surface water management due to the Cell 8 expansion. Section 12.5 is entitled "OSDF Phase V, East 2000-Year Drainage Channel Evaluation." Section 13.3 is entitled "OSDF Phase V, Surface Water Management System Design and Post-Closure Hydrology."

If you have any questions or require additional information, please contact me at (513) 648-3139.

Sincerely,

Johnny Reising

Johnny W. Reising
Director

Enclosures

cc w/enclosures:
M. Cullerton, Tetra Tech
M. Shupe, HSI GeoTrans
AR Coordinator, Fluor Fernald, Inc./MS6

cc w/o enclosures:
J. Desormeau, DOE-OH/FCP
G. Jablonowski, USEPA-V, SRF-5J
S. Helmer, ODH
J. Chiou, Fluor Fernald, Inc./MS88
F. Johnston, Fluor Fernald, Inc./MS12
C. Murphy, Fluor Fernald, Inc./MS1

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

[redacted]

FLUOR

June 19, 2006

Fernald Closure Project
Letter No. C:CPD:2006-0136

Mr. Johnny W. Reising, Director
U. S. Department of Energy
Ohio Field Office - Fernald Closure Project
175 Tri-County Parkway
Cincinnati, Ohio 45246

Dear Mr. Reising:

CONTRACT DE-AC24-01OH20115, TRANSMITTAL OF ADDENDA TO SECTIONS 12.5 AND 13.3 OF THE FINAL DESIGN CALCULATION PACKAGE FOR THE ON-SITE DISPOSAL FACILITY DUE TO CELL 8 EXPANSION

Enclosed for your information are addenda to Section 12.5 and 13.3 of the final design calculation for the On-Site Disposal Facility (OSDF), Revision 2. The calculations support changes to the surface water management due to the Cell 8 expansion. Section 12.5 is entitled the OSDF Phase V, east 2000-year drainage channel evaluation. Section 13.3 is entitled OSDF Phase V, surface water management system design and post-closure hydrology.

Upon your concurrence, please forward this report to the U.S. Environmental Protection Agency and Ohio Environmental Protection Agency. If you have any questions or require additional information, please contact Jyh-Dong Chiou at (513) 738-2834 or Uday Kumthekar at (513) 738-2659.

Sincerely,

Cornelius M. Murphy
Closure Project Director

CMM:UAK:jkp

Enclosures

006439

c: With Enclosures

Jim Fleck, GeoSyntec, MS38
SDFP Engineering File Station, MS88
DOE Records Center
Project Number 20100.2.22/20105.2.22 (20105-QA-0001)
Administrative Record, MS6

Without Enclosures

RECEIVED
JUN 28 2006

Richard Abitz, MS88
Pete Bolig, MS60
Jyh-Dong Chiou, MS88
Dennis Dalga, MS88
Joe Desormeau, DOE-OH/FCP, MS2
Ernie DiMuccio, MS1
Reinhard Friske, MS60
Frank Johnston, MS12
Timothy L. Jones, DOE Contracting Officer, DOE/EMCBC
Uday Kumthekar, MS88
Donna Metzler, Stoller, MS2
Jeff Middaugh, MS60
Frank L. Miller, MS88
Scott Osborn, MS25
Garner Powell, MS19
Dennis Sizemore, Fluor Fernald, Inc. Prime Contract, MS1
Anthony Snider, MS88
Mike Stumbo, MS60
Tammy Terry, MS1
Chuck Van Arsdale, MS88
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Fred Wilson, MS64
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Letter Log Copy, MS1

Fluor Fernald, Inc.
P.O. Box 538704
Cincinnati, OH 45253-8704

FLUOR

October 25, 2006

RECEIVED
OCT 25 2006

Fernald Closure Project
Letter No. C:CPD:2006-0243

Mr. Johnny W. Reising, Director
U. S. Department of Energy
Ohio Field Office - Fernald Closure Project
175 Tri-County Parkway
Cincinnati, Ohio 45246

Dear Mr. Reising:

CONTRACT DE-AC24-01OH20115, TRANSMITTAL OF REPLACEMENT CONSTRUCTION DRAWINGS FOR THE FINAL ON-SITE DISPOSAL FACILITY PHASE V DESIGN CHANGE NOTICE 20105-011 - CELL 8 NORTHWEST EXPANSION CONSTRUCTION DRAWINGS

References: 1) "OSDF Phase V Design Change Notice 20105-011 - Cell 8 Northwest Expansion Construction Drawings," dated October 3, 2006

2) Letter DOE-0006-07, J. Reising to J. Saric/T. Schneider, "Transmittal of the Final On-Site Disposal Facility Phase V Construction Drawing Package, Design Change Notice 20105-011, Northwest Expansion of Cell 8," dated October 11, 2006

Enclosed for your approval are replacement construction drawings for the final On-Site Disposal Facility (OSDF) Phase V Construction Drawing Package for Design Change Notice (DCN) 20105-011 - Cell 8 Northwest Expansion Construction Drawings. These replacement drawings include the following:

- OSDF Phase V Construction Drawing X-1, 90X-6000-X-00360, Revision 5
- OSDF Phase V Construction Drawing G-23A, 90X-6000-G-00420, Revision 4
- OSDF Phase V Construction Drawing G-27A, 90X-6000-G-00389, Revision 4

These drawings were revised to include the existing field conditions.

Upon your concurrence, please forward these drawings to the U.S. Environmental Protection Agency and Ohio Environmental Protection Agency. If you have any questions or require additional information, please contact Jyh-Dong Chiou at (513) 738-2834 or Uday Kumthekar at (513) 484-2260.

Sincerely,

Cornelius M. Murphy
Closure Project Director

CMM:UAK:jkp
Enclosures

c: With Enclosures

Jim Fleck, GeoSyntec, MS38
John Homer, Stoller, MS12
Uday Kumthekar, MS88
DOE Records Center
Administrative Record, MS6
Project Number 20105.2.22 (DCN 20105-011)

Without Enclosures

Jyh-Dong Chiou, MS88
Joe Desormeau, DOE-OH/FCP, MS2
Frank Johnston, MS12
Timothy L. Jones, DOE Contracting Officer, DOE/EMCBC
Donna Metzler, Stoller, MS2
Dennis Sizemore, Fluor Fernald, Inc. Prime Contract, MS1
Tammy Terry, MS1
SDFP Library, MS88
Letter Log Copy, MS1

[redacted]

COMPUTATION COVER SHEET

SUBJECT OF COMPUTATIONS OSDF PHASE V, EAST 2000-YEAR DRAINAGE CHANNEL EVALUATION

Computations By: (Cognizant Engineer)
Signature: Victoria Cheplak — Date: 1-21-04
Printed Name and Title: Victoria Cheplak, Senior Staff Engineer

Assumptions and Procedures Checked By: (Checker)
Signature: [signature] — Date: 1-21-04
Printed Name and Title: Ganesh Gopalakrishnan, Senior Engineer

Computations Checked by:
Signature: Holly Kinnecom — Date: 1-21-04
Printed Name and Title: Holly Kinnecom, Staff Engineer

Computations Backchecked by: (Cognizant Engineer)
Signature: Victoria Cheplak — Date: 1-21-04
Printed Name and Title: Victoria Cheplak, Senior Staff Engineer

Approved by: (PDP)
Signature: [signature] — Date: 1-21-04
Printed Name and Title: Ganesh Gopalakrishnan, Senior Engineer

Approved by: (DTL/TETL)
Signature: Rudolph Bonaparte — Date: 1/22/04
Printed Name and Title: R. Bonaparte, Engineer of Record

Record of Revision (Number and initial all revisions)

Rev. No.	Reason	Date	By	Checked	Approval
0	Submittal to FF/DOE/EPA	30 Jan 02	DGP for DBM	DGP	JRB
1	CFC Revision 1 Submittal to FF/DOE/EPA	23 Jan 04	VSC VJC	GG	RB
2A	DCN-Cell 8 Expansion	16 June 04	VSC VJC	GG	DLP
2B	DCN-Cell 8 Change in Side and Crest Slope	5 April 06	RT RJ	VSC VJC	DLP
2	DCN-Cell 8 Change in Side and Crest Slope	1 June 06	VJC for RT	VSC VJC	DLP

ADDENDUM TO SECTION 13.3

(REVISION 2B DUE TO CELL 8 CHANGE IN SIDE SLOPE & CREST SLOPE)

This addendum details the calculations that were revised within Section 13.3, OSDF Phase V, East 2000-Year Drainage Channel Evaluation, of the Final Design Calculation Package for the Fernald Environmental Management Project (FEMP), due to the re-design of the Cell 8 cover system. This re-design encompasses the increase in impacted material placement volume of Cell 8 through a change in side slope and crest slope. This addendum discusses the modifications made to this calculation package as Revision 2B and as associated with this modification.

For Revision 2B to this calculation package, the critical case for the drainage channel aligned along the east perimeter of the OSDF during the 2000-Year, 24-Hour Storm (i.e. the 2000-Year Drainage Channel) was evaluated to confirm the adequacy of the channel using the revised channel and OSDF geometry. This critical case is presented as the Heavy Vegetation Scenario, which considers Manning's n values of 0.24 for sheet flow and 0.07 for channel flow. The surface water management system was modified to reflect the design changes resulting from the expansion of Cell 8 and analyzed to verify the adequacy of the channel. For this submittal, only the Heavy Vegetation Scenario was modified; it should be noted that the Light and Moderate Vegetation Scenarios, detailed in this section, were not modified as they are less conservative than the critical Heavy Vegetation Scenario and are therefore not presented.

In order to present the results of this DCN analysis in an efficient manner, only the attachments that summarize the modifications and updated results for the 2000-Year Drainage Channel Evaluation with regard to the DCN are presented. These attachments are listed subsequently and explained in further detail.

- **Attachment A-1 – Layout of 2000-Year Storm Design Scenarios.** This layout demonstrates the revised configuration of the OSDF. Each surface water structure is labeled as identified in the hydrologic analysis.

- **Attachment A-2 – Nodal Network Diagram.** This diagram demonstrates the revised configuration of the surface water management system as a result of the DCN.

- **Attachment B-2 – Data for Calculation of Time of Concentration.** These data demonstrate the revised flow paths used to calculate the time of concentration for the revised configuration of subcatchments used in the hydrologic analysis.

- **Attachment C-1C – HydroCAD Output Reports – 2000-Year, 24-Hour Storm Event, 2000-Year Design Scenario – Heavy Vegetation.** This attachment provides the results of the hydrologic modeling for the 2000-Year Drainage Channel under the Heavy Vegetation Design Scenario for the 2000-Year, 24-Hour Storm, which is considered the critical case for these calculations.

- **Attachment C-2 – Weighted Curve Number Calculations.** These calculations present the revised areas and Curve Numbers for the revised configuration of subcatchments used in the hydrologic analysis.

- **Attachment C-3 – Tabulated Channel Analysis Results.** These results present the revised channel characteristics (i.e., geometry), flow within each channel, and hydraulic characteristics including peak flow depth and available freeboard, for the revised configuration of the 2000-Year Drainage Channel used in the hydrologic and hydraulic analysis.

Based on the analyses for the design change of the expansion of Cell 8, the 2000-Year Drainage Channel is adequate to convey the 2000-Year, 24-Hour Storm Event and provide the required freeboard.

ATTACHMENT A-1

LAYOUT OF 2000-YEAR STORM DESIGN SCENARIOS

WORKING FIGURES.

[redacted]

LEGEND

SUBCATCHMENT LABEL AND BOUNDARY

REACH ALIGNMENT ANS LABEL

CULVERT

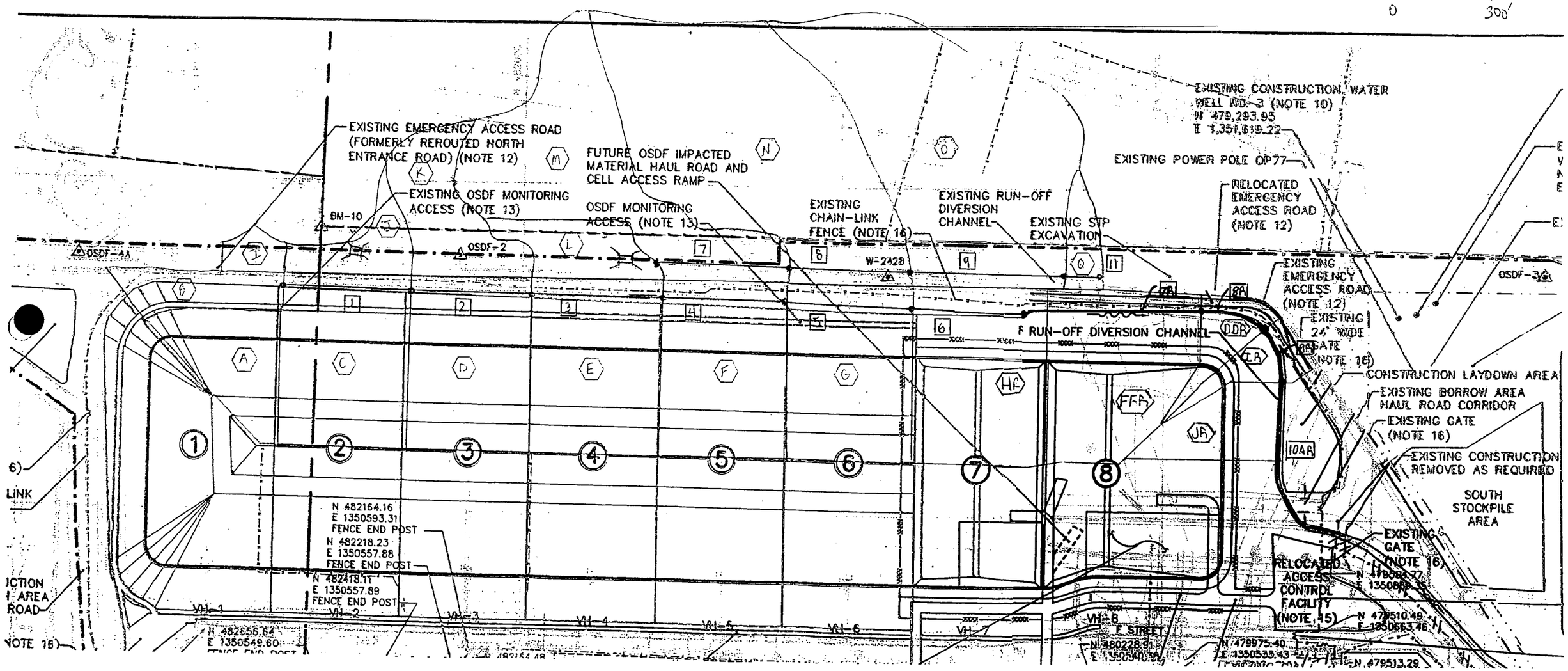
PHASE V

2000 YEAR STORM DESIGN SCEN.

N

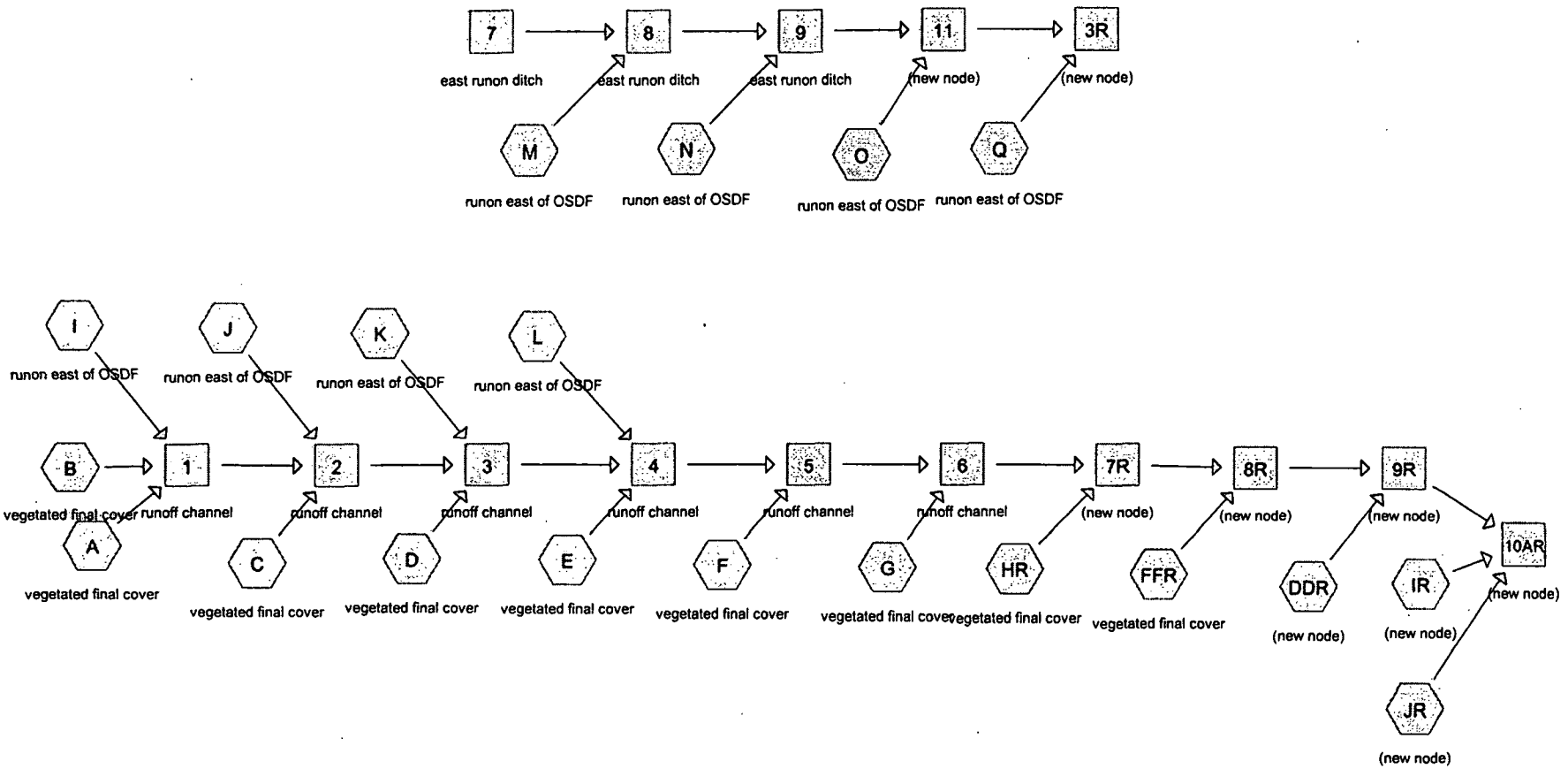
SCALE 1"=300'

0 300'



ATTACHMENT A-2

NODAL NETWORK DIAGRAM



Drainage Diagram for 2000 year storm-heavy

Prepared by {enter your company name here} 4/4/2006

HydroCAD® 7.10 s/n 000929 © 2005 HydroCAD Software Solutions LLC

ATTACHMENT B-2

DATA FOR CALCULATION OF TIME OF CONCENTRATION

006439

HYDROCAD™ INPUT PARAMETERS FOR THE CALCULATION OF TIME OF CONCENTRATION
2000 YEAR STORM DESIGN SCENARIO - HEAVY VEGETATION

2-year, 24-hr Design Rainfall Depth, P_{2-24} = 2.60 inches

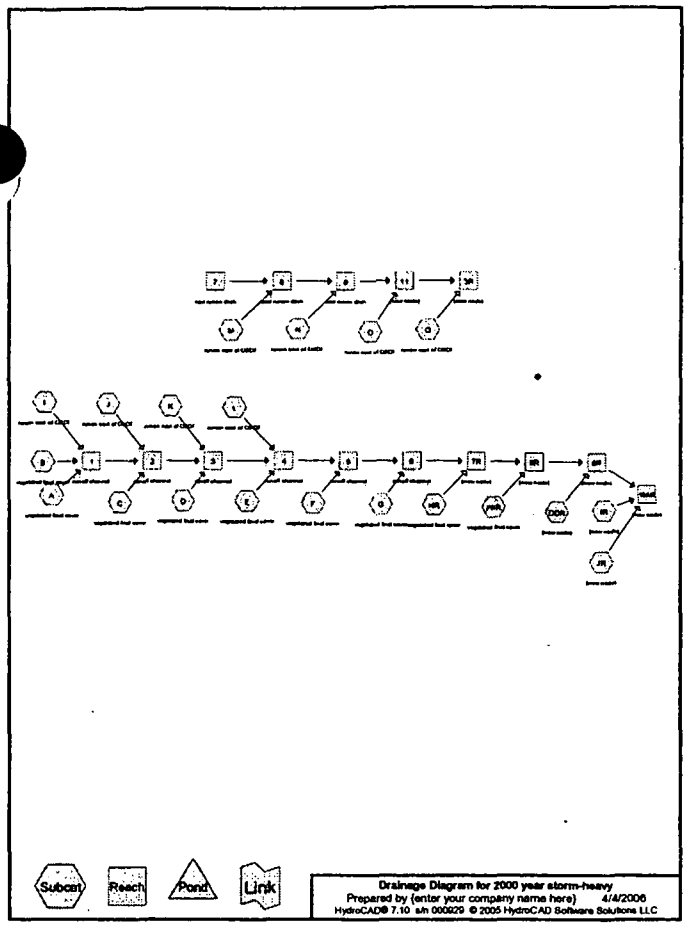
SUBCATCHMENT LABEL AND DESCRIPTION		SHEET FLOW 1				SHEET FLOW 2				SHEET FLOW 3				SHALLOW CONCENTRATED FLOW 1			SHALLOW CONCENTRATED FLOW 2			SHALLOW CONCENTRATED FLOW 3			SHALLOW CONCENTRATED FLOW 4			CHANNEL FLOW 1						CHANNEL FLOW 2					
No.	Description	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Bottom Width (ft)	Flow Depth (ft)	Sideslopes (ft/ft)	Manning's n	Longitudinal Slope (ft/ft)	Flow Length (ft)	Bottom Width (ft)	Flow Depth (ft)	Sideslopes (ft/ft)	Manning's n	Longitudinal Slope (ft/ft)
A	vegetated final cover	90	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	190	unpaved	0.1700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B	vegetated final cover	90	grass; dense	0.240	0.0750	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130	0	2.03	6.0, 6.0	0.070	0.0250	320	0	2.03	4.0, 6.0	0.070	0.0075
C	vegetated final cover	90	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	190	unpaved	0.1700	-	-	-	-	-	-	-	-	-	370	0	2.33	6.0, 4.0	0.070	0.0035	-	-	-	-	-	-
D	vegetated final cover	90	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	180	unpaved	0.1700	-	-	-	-	-	-	-	-	-	200	0	2.86	6.0, 5.0	0.070	0.0083	150	0	2.86	6.0, 4.0	0.070	0.0045
DDR	vegetated final cover	300	grass; dense	0.240	0.1430	-	-	-	-	-	-	-	-	80	unpaved	0.1430	15	paved	0.0400	25	unpaved	0.1667	-	-	-	190	0	4.50	4.0, 3.0	0.070	0.0071	-	-	-	-	-	-
E	vegetated final cover	90	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	170	unpaved	0.1700	-	-	-	-	-	-	-	-	-	50	0	3.32	6.0, 4.0	0.070	0.0045	320	0	3.32	6.0, 3.0	0.070	0.0105
F	vegetated final cover	90	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	175	unpaved	0.1700	-	-	-	-	-	-	-	-	-	360	0	3.68	4.0, 6.0	0.070	0.0050	-	-	-	-	-	-
FFR	vegetated final cover	70	grass; dense	0.240	0.0500	90	grass; dense	0.240	0.1000	140	grass; dense	0.240	0.1667	135	unpaved	0.1667	15	paved	0.0400	20	unpaved	0.1667	-	-	-	610	0	4.00	6.0, 3.0	0.070	0.0050	-	-	-	-	-	-
G	vegetated final cover	90	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	175	unpaved	0.1700	-	-	-	-	-	-	-	-	-	370	0	3.86	3.0, 6.0	0.070	0.0050	-	-	-	-	-	-
HR	vegetated final cover	90	grass; dense	0.240	0.0500	50	grass; dense	0.240	0.1000	150	grass; dense	0.240	0.1700	160	unpaved	0.1700	-	-	-	-	-	-	-	-	-	400	0	5.70	3.0, 6.0	0.070	0.0100	-	-	-	-	-	-
I	runon east of OSDF	210	grass; dense	0.240	0.0500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	55	0	2.03	4.0, 6.0	0.070	0.0075	-	-	-	-	-	-
IR	vegetated final cover	300	grass; dense	0.240	0.1430	-	-	-	-	-	-	-	-	80	unpaved	0.1430	15	paved	0.0400	25	unpaved	0.1667	-	-	-	170	6	5.00	4.0, 3.0	0.070	0.0083	-	-	-	-	-	-
J	runon east of OSDF	300	grass; dense	0.240	0.0158	-	-	-	-	-	-	-	-	100	unpaved	0.0158	-	-	-	-	-	-	-	-	-	150	0	2.33	6.0, 4.0	0.070	0.0035	-	-	-	-	-	-
JR	vegetated final cover	40	grass; dense	0.240	0.0500	60	grass; dense	0.240	0.1000	200	grass; dense	0.240	0.1667	115	unpaved	0.1667	15	paved	0.0200	30	unpaved	0.1667				-	-	-	-	-	-	-	-	-	-	-	-
K	runon east of OSDF	300	grass; dense	0.240	0.0070	-	-	-	-	-	-	-	-	290	unpaved	0.0200	-	-	-	-	-	-	-	-	-	250	0	2.86	6.0, 4.0	0.070	0.0045	-	-	-	-	-	-
L	runon east of OSDF	300	grass; dense	0.240	0.0250	-	-	-	-	-	-	-	-	140	unpaved	0.0250	170	unpaved	0.0375	-	-	-	-	-	-	90	0	3.32	6.0, 3.0	0.070	0.0105	-	-	-	-	-	-
M	runon east of OSDF	300	grass; dense	0.240	0.0100	-	-	-	-	-	-	-	-	350	unpaved	0.0139	180	unpaved	0.0167	-	-	-	-	-	-	360	0	0.82	4.0, 3.0	0.070	0.0125	-	-	-	-	-	-
N	runon east of OSDF	300	grass; dense	0.240	0.0198	-	-	-	-	-	-	-	-	770	unpaved	0.0198	-	-	-	-	-	-	-	-	-	395	0	1.17	58.0, 3.0	0.070	0.0100	-	-	-	-	-	-
O	runon east of OSDF	300	grass; dense	0.240	0.0200	-	-	-	-	-	-	-	-	420	unpaved	0.0200	-	-	-	-	-	-	-	-	-	250	0	1.17	60.0, 3.0	0.070	0.0100	-	-	-	-	-	-
Q	runon east of OSDF	300	grass; dense	0.240	0.0200	-	-	-	-	-	-	-	-	250	unpaved	0.0200	-	-	-	-	-	-	-	-	-	170	0	4.08	5.7, 13.5	0.070	0.0100	-	-	-	-	-	-

ATTACHMENT C-1C

HydroCAD™ OUTPUT REPORTS

2,000-YEAR, 24-HOUR STORM EVENT

2,000-YEAR DESIGN SCENARIO – HEAVY VEGETATION



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: vegetated final cover Runoff Area=2.601 ac Runoff Depth>12.83"
Flow Length=490' Tc=25.4 min CN=99 Runoff=27.84 cfs 2.780 af

Subcatchment B: vegetated final cover Runoff Area=1.637 ac Runoff Depth>12.86"
Flow Length=540' Tc=12.1 min CN=99 Runoff=24.87 cfs 1.754 af

Subcatchment C: vegetated final cover Runoff Area=4.960 ac Runoff Depth>12.82"
Flow Length=880' Tc=29.9 min CN=99 Runoff=48.10 cfs 5.297 af

Subcatchment D: vegetated final cover Runoff Area=4.746 ac Runoff Depth>12.82"
Flow Length=830' Tc=28.2 min CN=99 Runoff=47.77 cfs 5.070 af

Subcatchment DDR: (new node) Runoff Area=0.730 ac Runoff Depth>12.84"
Flow Length=610' Tc=18.9 min CN=99 Runoff=9.17 cfs 0.781 af

Subcatchment E: vegetated final cover Runoff Area=4.946 ac Runoff Depth>12.82"
Flow Length=840' Tc=27.5 min CN=99 Runoff=50.54 cfs 5.285 af

Subcatchment F: vegetated final cover Runoff Area=4.814 ac Runoff Depth>12.82"
Flow Length=835' Tc=28.0 min CN=99 Runoff=48.59 cfs 5.143 af

Subcatchment FFR: vegetated final cover Runoff Area=5.510 ac Runoff Depth>12.82"
Flow Length=1,080' Tc=29.5 min CN=99 Runoff=53.96 cfs 5.885 af

Subcatchment G: vegetated final cover Runoff Area=4.946 ac Runoff Depth>12.82"
Flow Length=845' Tc=28.0 min CN=99 Runoff=49.93 cfs 5.284 af

Subcatchment HR: vegetated final cover Runoff Area=4.590 ac Runoff Depth>12.82"
Flow Length=850' Tc=26.2 min CN=99 Runoff=48.22 cfs 4.905 af

Subcatchment I: runon east of OSDF Runoff Area=0.530 ac Runoff Depth>11.71"
Flow Length=265' Tc=20.4 min CN=90 Runoff=6.24 cfs 0.517 af

Subcatchment IR: (new node) Runoff Area=0.810 ac Runoff Depth>12.84"
Flow Length=590' Tc=18.5 min CN=99 Runoff=10.28 cfs 0.867 af

Subcatchment J: runon east of OSDF Runoff Area=1.242 ac Runoff Depth>11.66"
Flow Length=550' Tc=44.5 min CN=90 Runoff=9.07 cfs 1.207 af

Subcatchment JR: (new node) Runoff Area=2.200 ac Runoff Depth>12.83"
Flow Length=460' Tc=23.1 min CN=99 Runoff=24.83 cfs 2.352 af

Subcatchment K: runon east of OSDF Runoff Area=2.623 ac Runoff Depth>11.10"
Flow Length=840' Tc=62.4 min CN=86 Runoff=14.65 cfs 2.425 af

Subcatchment L: runon east of OSDF Runoff Area=1.779 ac Runoff Depth>11.15"
Flow Length=700' Tc=37.2 min CN=86 Runoff=14.28 cfs 1.653 af

Subcatchment M: runon east of OSDF Runoff Area=7.234 ac Runoff Depth>11.10"
Flow Length=1,190' Tc=59.5 min CN=86 Runoff=41.83 cfs 6.693 af

Subcatchment N: runon east of OSDF Runoff Area=11.664 ac Runoff Depth>10.99"
Flow Length=1,465' Tc=48.4 min CN=85 Runoff=77.52 cfs 10.687 af

Subcatchment O: runon east of OSDF Runoff Area=10.935 ac Runoff Depth>11.14"
Flow Length=970' Tc=44.0 min CN=86 Runoff=78.19 cfs 10.149 af

Subcatchment Q: runon east of OSDF Runoff Area=1.520 ac Runoff Depth>11.28"
Flow Length=720' Tc=40.7 min CN=87 Runoff=11.56 cfs 1.428 af

Reach 1: runoff channel Peak Depth=2.59' Max Vel=1.5 fps Inflow=52.44 cfs 5.051 af
n=0.070 L=405.0' S=0.0035 '/' Capacity=1,099.51 cfs Outflow=49.07 cfs 5.034 af

Reach 2: runoff channel Peak Depth=2.94' Max Vel=2.2 fps Inflow=104.36 cfs 11.538 af
n=0.070 L=385.0' S=0.0064 '/' Capacity=880.57 cfs Outflow=102.73 cfs 11.513 af

Reach 3: runoff channel Peak Depth=3.58' Max Vel=2.7 fps Inflow=155.41 cfs 19.009 af
n=0.070 L=405.0' S=0.0075 '/' Capacity=681.67 cfs Outflow=153.39 cfs 18.973 af

Reach 3R: (new node) Inflow=180.08 cfs 28.844 af
Outflow=180.08 cfs 28.844 af

Reach 4: runoff channel Peak Depth=4.12' Max Vel=2.4 fps Inflow=206.22 cfs 25.911 af
n=0.070 L=395.0' S=0.0050 '/' Capacity=590.36 cfs Outflow=203.76 cfs 25.859 af

Reach 5: runoff channel Peak Depth=4.53' Max Vel=2.5 fps Inflow=236.60 cfs 31.002 af
n=0.070 L=405.0' S=0.0050 '/' Capacity=360.07 cfs Outflow=234.19 cfs 30.942 af

Reach 6: runoff channel Peak Depth=4.71' Max Vel=2.6 fps Inflow=262.61 cfs 36.226 af
n=0.070 L=490.0' S=0.0050 '/' Capacity=433.33 cfs Outflow=259.87 cfs 36.144 af

Reach 7: east runon ditch Peak Depth=0.00' Max Vel=0.0 fps
n=0.070 L=395.0' S=0.0125 '/' Capacity=104.13 cfs Outflow=0.00 cfs 0.000 af

ch 7R: (new node) Peak Depth=4.81' Max Vel=2.6 fps Inflow=279.05 cfs 41.049 af
n=0.070 L=610.0' S=0.0050 '/' Capacity=496.85 cfs Outflow=275.08 cfs 40.936 af

ach 8: east runon ditch Peak Depth=1.01' Max Vel=1.3 fps Inflow=41.83 cfs 6.693 af
n=0.070 L=405.0' S=0.0100 '/' Capacity=768.96 cfs Outflow=41.21 cfs 6.667 af

Reach 8R: (new node) Peak Depth=5.10' Max Vel=3.3 fps Inflow=295.75 cfs 46.821 af
n=0.070 L=190.0' S=0.0071 '/' Capacity=456.66 cfs Outflow=294.87 cfs 46.788 af

Reach 9: east runon ditch Peak Depth=1.43' Max Vel=1.7 fps Inflow=110.42 cfs 17.353 af
n=0.070 L=475.0' S=0.0100 '/' Capacity=5,717.07 cfs Outflow=108.78 cfs 17.290 af

Reach 9R: (new node) Peak Depth=4.18' Max Vel=3.4 fps Inflow=296.23 cfs 47.570 af
n=0.070 L=170.0' S=0.0083 '/' Capacity=688.42 cfs Outflow=295.55 cfs 47.540 af

Reach 10AR: (new node) Peak Depth=4.00' Max Vel=2.7 fps Inflow=302.28 cfs 50.759 af
n=0.070 L=530.0' S=0.0050 '/' Capacity=1,078.23 cfs Outflow=300.23 cfs 50.631 af

Reach 11: (new node) Peak Depth=2.65' Max Vel=2.5 fps Inflow=171.73 cfs 27.440 af
n=0.070 L=170.0' S=0.0100 '/' Capacity=543.34 cfs Outflow=171.26 cfs 27.416 af

Total Runoff Area = 80.017 ac Runoff Volume = 80.165 af Average Runoff Depth = 12.02"

Subcatchment A: vegetated final cover

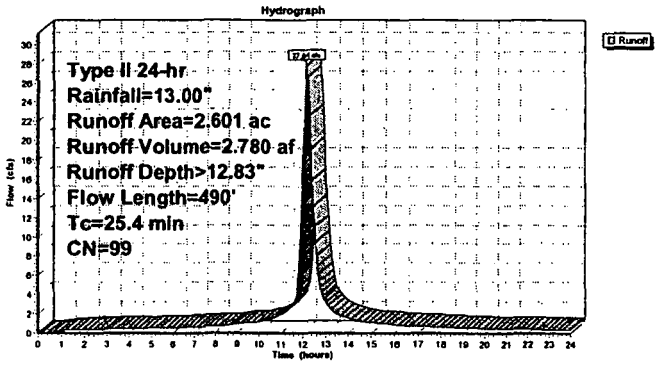
Runoff = 27.84 cfs @ 12.17 hrs, Volume= 2.780 af, Depth>12.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
2.601	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.5	190	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
25.4	490	Total			

Subcatchment A: vegetated final cover



Subcatchment B: vegetated final cover

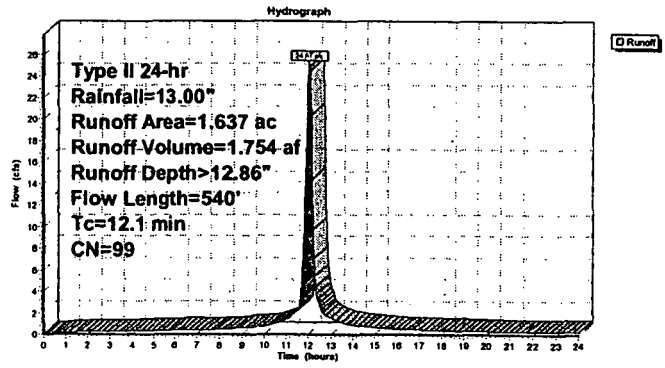
Runoff = 24.87 cfs @ 12.03 hrs, Volume= 1.754 af, Depth>12.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
1.637	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	90	0.0750	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.6	130	0.0250	3.4	83.06	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.03' Z= 6.0 '/' Top.W=24.36' n= 0.070
2.9	320	0.0075	1.8	37.74	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.03' Z= 4.0 & 6.0 '/' Top.W=20.30' n= 0.070
12.1	540	Total			

Subcatchment B: vegetated final cover



Subcatchment C: vegetated final cover

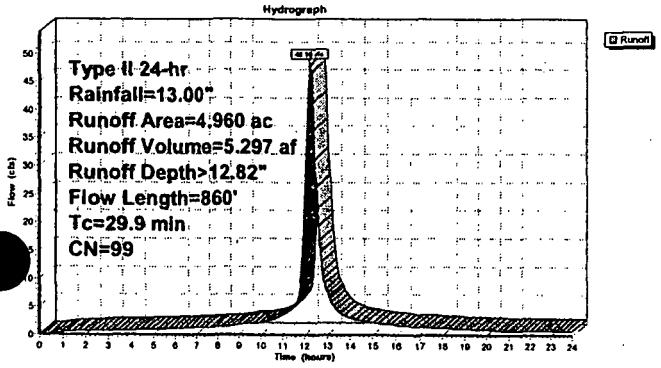
Runoff = 48.10 cfs @ 12.23 hrs, Volume= 5.297 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
4.960	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.5	190	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.5	370	0.0035	1.4	37.24	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.33' Z= 6.0 & 4.0 '/' Top.W=23.30' n= 0.070
29.9	860	Total			

Subcatchment C: vegetated final cover



Subcatchment D: vegetated final cover

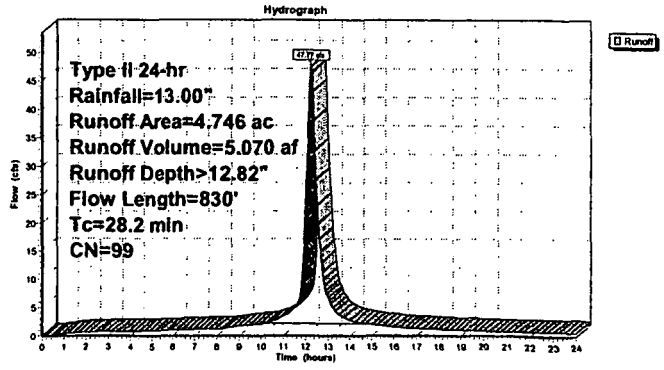
Runoff = 47.77 cfs @ 12.21 hrs, Volume= 5.070 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
4.746	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.5	180	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.4	200	0.0083	2.4	109.24	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.86' Z= 6.0 & 5.0 '/' Top.W=31.46' n= 0.070
1.4	150	0.0045	1.8	72.93	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.86' Z= 6.0 & 4.0 '/' Top.W=28.60' n= 0.070
28.2	830	Total			

Subcatchment D: vegetated final cover



Subcatchment DDR: (new node)

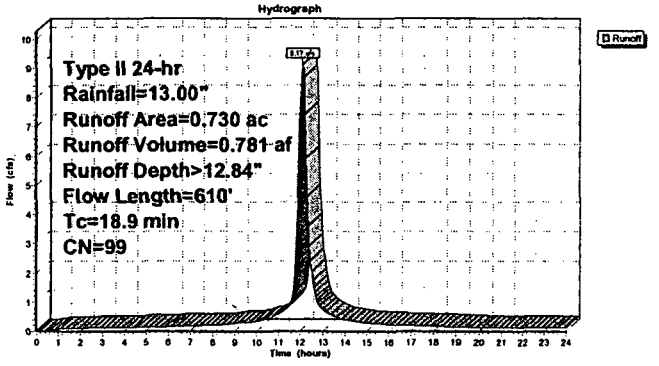
Runoff = 9.17 cfs @ 12.10 hrs, Volume= 0.781 af, Depth>12.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
0.730	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	300	0.1430	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.2	80	0.1430	6.1		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	25	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.1	190	0.0071	3.0	211.96	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=4.50' Z= 4.0 & 3.0 '/' Top.W=31.50' n= 0.070
18.9	610	Total			

Subcatchment DDR: (new node)



Subcatchment E: vegetated final cover

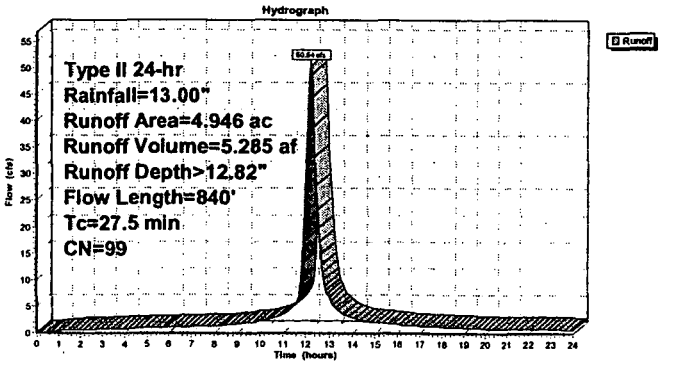
Runoff = 50.54 cfs @ 12.20 hrs, Volume= 5.285 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
4.946	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.4	170	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	50	0.0045	2.0	108.55	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.32' Z= 6.0 & 4.0 '/' Top.W=33.20' n= 0.070
1.8	320	0.0105	3.0	148.58	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.32' Z= 6.0 & 3.0 '/' Top.W=29.88' n= 0.070
27.5	840	Total			

Subcatchment E: vegetated final cover



Subcatchment F: vegetated final cover

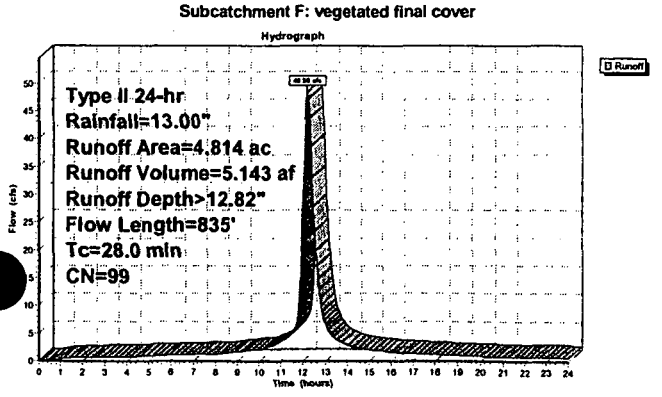
Runoff = 48.59 cfs @ 12.20 hrs, Volume= 5.143 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
4.814	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.4	175	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.7	360	0.0050	2.2	150.56	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.68' Z= 4.0 & 6.0 '/' Top.W=36.80' n= 0.070
28.0	835	Total			

Subcatchment F: vegetated final cover



Subcatchment FFR: vegetated final cover

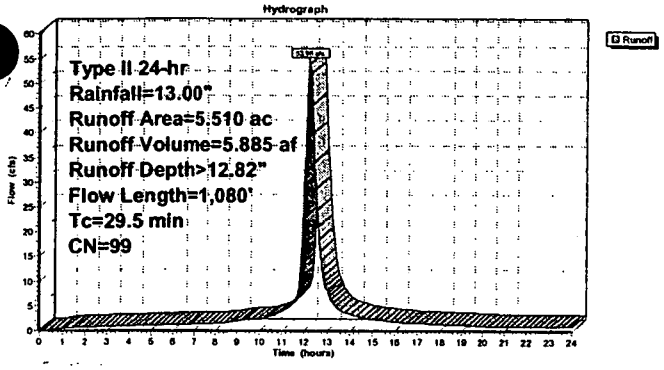
Runoff = 53.96 cfs @ 12.22 hrs, Volume= 5.885 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
5.510	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	70	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
7.6	90	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
8.9	140	0.1667	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.3	135	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	20	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.3	610	0.0050	2.3	168.52	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=4.00' Z= 6.0 & 3.0 '/' Top.W=36.00' n= 0.070
29.5	1,080	Total			

Subcatchment FFR: vegetated final cover



Subcatchment G: vegetated final cover

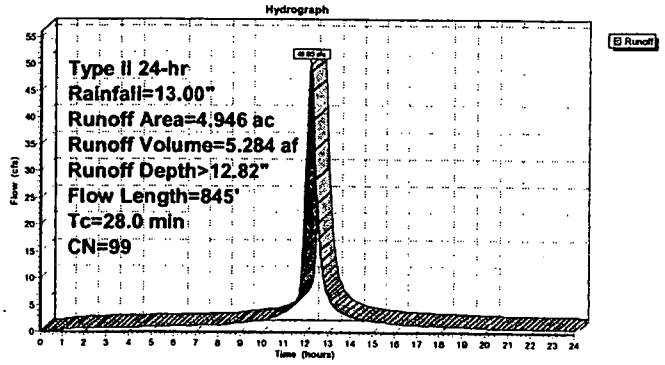
Runoff = 49.93 cfs @ 12.20 hrs, Volume= 5.284 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
4.946	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.4	175	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.7	370	0.0050	2.3	153.25	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.86' Z= 3.0 & 6.0 '/' Top.W=34.74' n= 0.070
28.0	845	Total			

Subcatchment G: vegetated final cover



Subcatchment HR: vegetated final cover

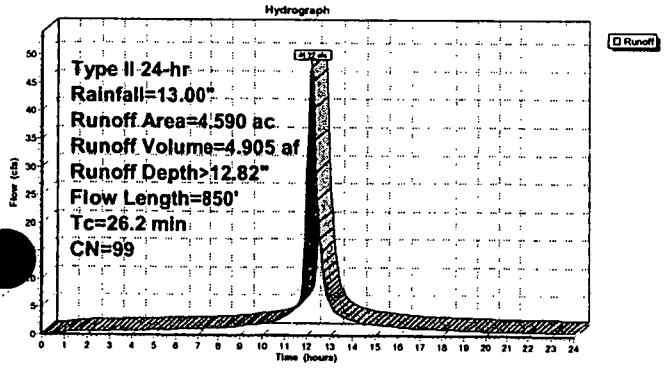
Runoff = 48.22 cfs @ 12.18 hrs, Volume= 4.905 af, Depth>12.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
4.590	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	90	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
4.8	50	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
9.3	150	0.1700	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.4	160	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.6	400	0.0100	4.2	612.82	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=5.70' Z= 3.0 & 6.0 '/' Top.W=51.30' n= 0.070
26.2	850	Total			

Subcatchment HR: vegetated final cover



Subcatchment I: runon east of OSDF

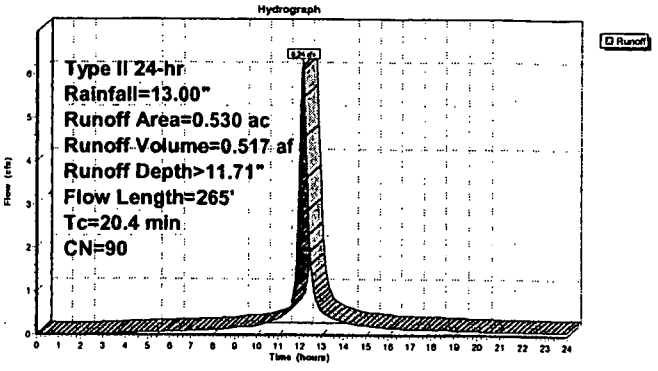
Runoff = 6.24 cfs @ 12.12 hrs, Volume= 0.517 af, Depth>11.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
0.530	90	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	210	0.0500	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.5	55	0.0075	1.8	37.74	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.03' Z= 4.0 & 6.0 '/' Top.W=20.30' n= 0.070
20.4	265	Total			

Subcatchment I: runon east of OSDF



Subcatchment IR: (new node)

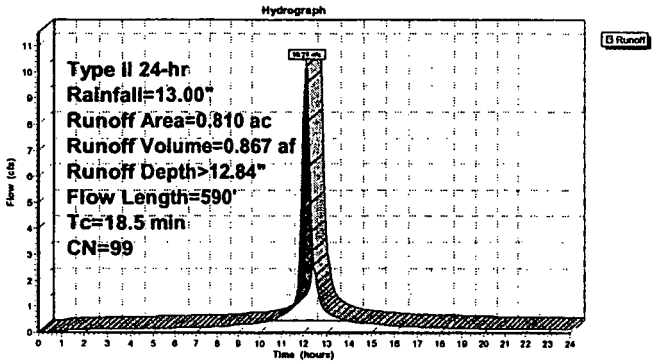
Runoff = 10.28 cfs @ 12.10 hrs, Volume= 0.867 af, Depth>12.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
0.810	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	300	0.1430	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.2	80	0.1430	6.1		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	25	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	170	0.0083	3.8	448.16	Trap/Vee/Rect Channel Flow, Bot.W=6.00' D=5.00' Z= 4.0 & 3.0 '/' Top.W=41.00' n= 0.070
18.5	590	Total			

Subcatchment IR: (new node)



Subcatchment J: runon east of OSDF

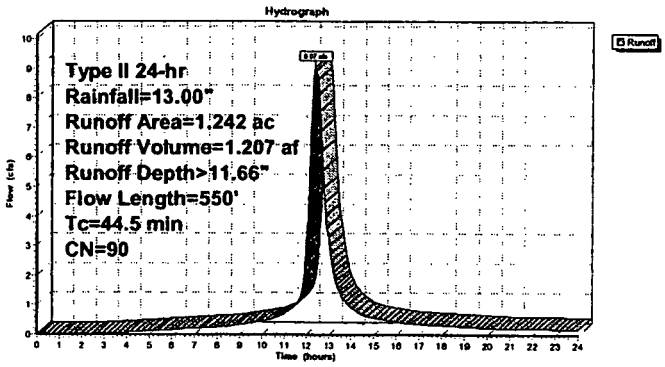
Runoff = 9.07 cfs @ 12.40 hrs, Volume= 1.207 af, Depth>11.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
1.242	90	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.9	300	0.0158	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.8	100	0.0158	2.0		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.8	150	0.0035	1.4	37.24	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.33' Z= 6.0 & 4.0 '/' Top.W=23.30' n= 0.070
44.5	550	Total			

Subcatchment J: runon east of OSDF



Subcatchment JR: (new node)

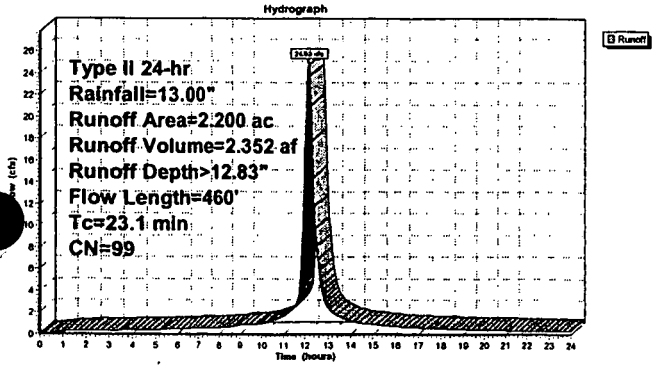
Runoff = 24.83 cfs @ 12.15 hrs, Volume= 2.352 af, Depth>12.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
2.200	99	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	40	0.0500	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.5	60	0.1000	0.2		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
11.8	200	0.1667	0.3		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.3	115	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	30	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.1	460	Total			

Subcatchment JR: (new node)



Subcatchment K: runon east of OSDF

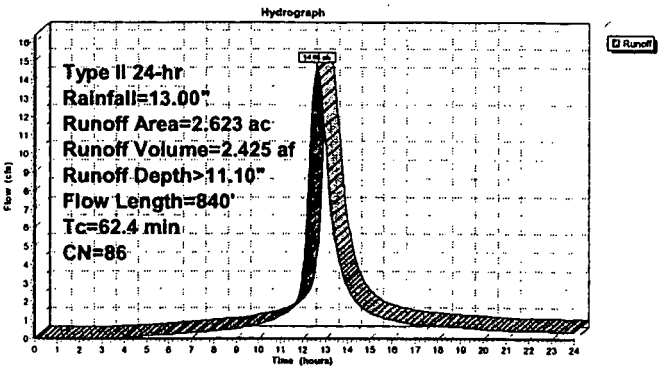
Runoff = 14.65 cfs @ 12.63 hrs, Volume= 2.425 af, Depth>11.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
2.623	86	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
58.0	300	0.0070	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
2.1	290	0.0200	2.3		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.3	250	0.0045	1.8	72.93	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.86' Z= 6.0 & 4.0 '/' Top.W=28.60' n= 0.070
62.4	840	Total			

Subcatchment K: runon east of OSDF



Subcatchment L: runon east of OSDF

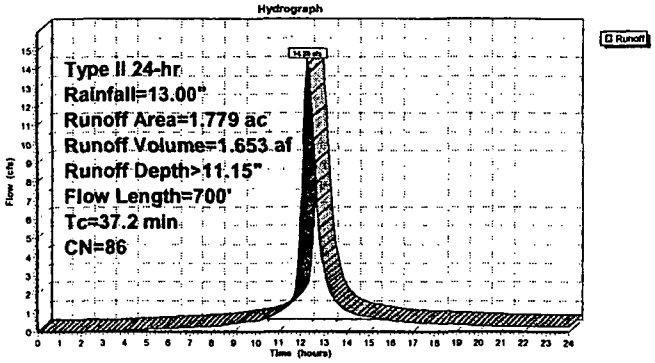
Runoff = 14.28 cfs @ 12.31 hrs, Volume= 1.653 af, Depth>11.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
1.779	86	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.9	300	0.0250	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
0.9	140	0.0250	2.5		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.9	170	0.0375	3.1		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	90	0.0105	3.0	148.58	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.32' Z= 6.0 & 3.0 '/' Top.W=29.88' n= 0.070
37.2	700	Total			

Subcatchment L: runon east of OSDF



Subcatchment M: runon east of OSDF

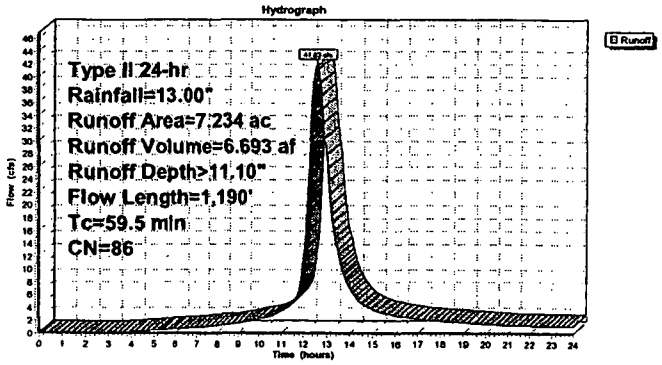
Runoff = 41.83 cfs @ 12.59 hrs, Volume= 6.693 af, Depth>11.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
7.234	86	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.3	300	0.0100	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
3.1	350	0.0139	1.9		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.4	180	0.0167	2.1		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.7	360	0.0125	1.3	3.00	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=0.82' Z= 4.0 & 3.0 '/' Top.W=5.74' n= 0.070
59.5	1,190	Total			

Subcatchment M: runon east of OSDF



Subcatchment N: runon east of OSDF

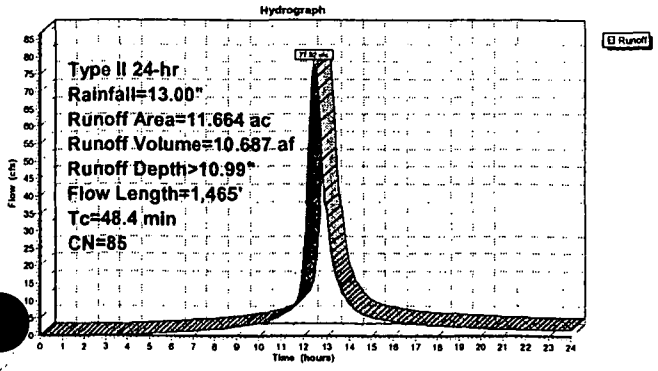
Runoff = 77.52 cfs @ 12.45 hrs, Volume= 10.687 af, Depth>10.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
11.664	85	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.3	300	0.0198	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
5.7	770	0.0198	2.3		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
4.4	395	0.0100	1.5	61.88	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=1.17' Z= 58.0 & 3.0 '/' Top.W=71.37' n= 0.070
48.4	1,465	Total			

Subcatchment N: runon east of OSDF



Subcatchment O: runon east of OSDF

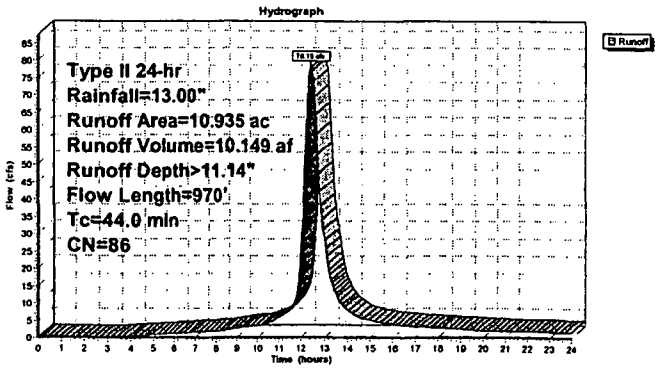
Runoff = 78.19 cfs @ 12.40 hrs, Volume= 10.149 af, Depth>11.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
10.935	86	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.1	300	0.0200	0.1		Sheet Flow, Grass: Dense n= 0.240 P2= 2.60"
3.1	420	0.0200	2.3		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	250	0.0100	1.5	63.91	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=1.17' Z= 60.0 & 3.0 '/' Top.W=73.71' n= 0.070
44.0	970	Total			

Subcatchment O: runon east of OSDF



Subcatchment Q: runon east of OSDF

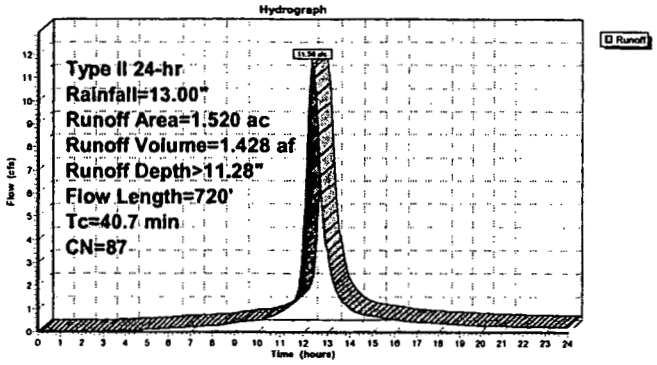
Runoff = 11.56 cfs @ 12.36 hrs, Volume= 1.428 af, Depth>11.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=13.00"

Area (ac)	CN	Description
1.520	87	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.1	300	0.0200	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.60"
1.8	250	0.0200	2.3		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	170	0.0100	3.4	543.34	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.08' Z= 5.7 & 13.5 '/' Top.W=78.34' n= 0.070
40.7	720	Total			

Subcatchment Q: runon east of OSDF



006439

Reach 1: runoff channel

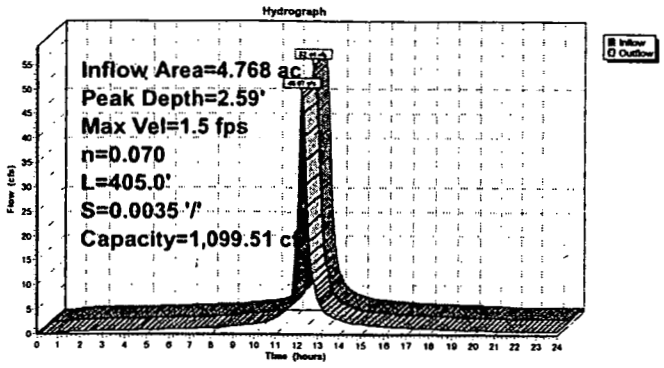
[65] Warning: Inlet elevation not specified

Inflow Area = 4.768 ac, Inflow Depth > 12.71"
Inflow = 52.44 cfs @ 12.08 hrs, Volume= 5.051 af
Outflow = 49.07 cfs @ 12.22 hrs, Volume= 5.034 af, Atten= 6%, Lag= 8.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.5 fps, Min. Travel Time= 4.6 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 11.1 min

Peak Depth= 2.59' @ 12.14 hrs
Capacity at bank full= 1,099.51 cfs
0.00' x 8.29' deep channel, n= 0.070
Side Slope Z-value= 6.0 4.0 '/' Top Width= 82.90'
Length= 405.0' Slope= 0.0035 '/'

Reach 1: runoff channel



Reach 2: runoff channel

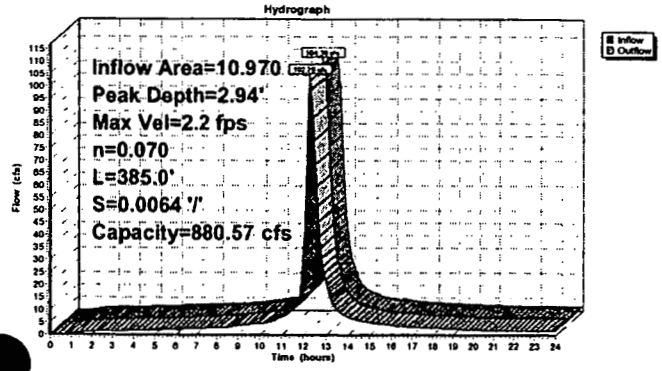
[65] Warning: Inlet elevation not specified

Inflow Area = 10.970 ac, Inflow Depth > 12.62"
Inflow = 104.36 cfs @ 12.23 hrs, Volume= 11.538 af
Outflow = 102.73 cfs @ 12.32 hrs, Volume= 11.513 af, Atten= 2%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.2 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 7.0 min

Peak Depth= 2.94' @ 12.27 hrs
Capacity at bank full= 880.57 cfs
0.00' x 6.57' deep channel, n= 0.070
Side Slope Z-value= 6.0 5.0 '/' Top Width= 72.27'
Length= 385.0' Slope= 0.0064 '/'

Reach 2: runoff channel



Reach 3: runoff channel

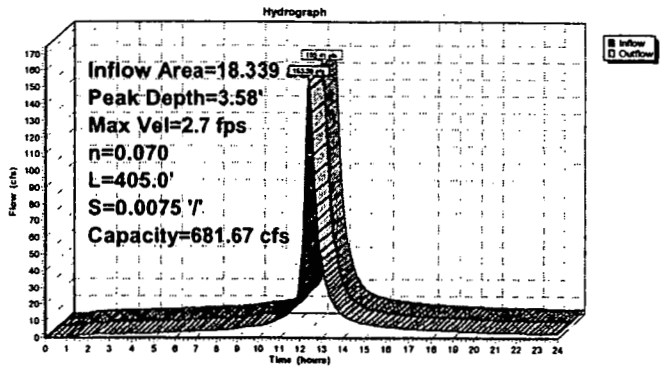
[65] Warning: Inlet elevation not specified

Inflow Area = 18.339 ac, Inflow Depth > 12.44"
Inflow = 155.41 cfs @ 12.30 hrs, Volume= 19.009 af
Outflow = 153.39 cfs @ 12.37 hrs, Volume= 18.973 af, Atten= 1%, Lag= 4.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 5.9 min

Peak Depth= 3.58' @ 12.33 hrs
Capacity at bank full= 681.67 cfs
0.00' x 6.26' deep channel, n= 0.070
Side Slope Z-value= 3.0 6.0 '/' Top Width= 56.34'
Length= 405.0' Slope= 0.0075 '/'

Reach 3: runoff channel



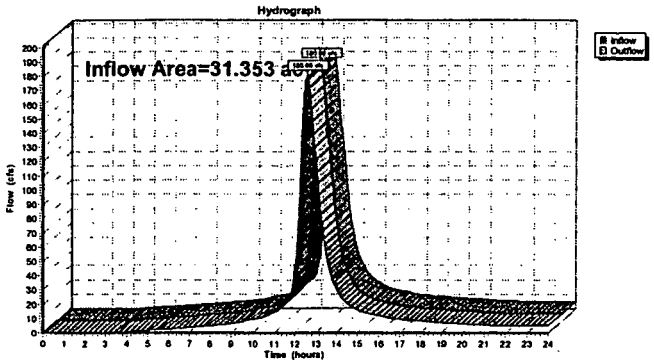
Reach 3R: (new node)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 31.353 ac, Inflow Depth > 11.04"
Inflow = 180.08 cfs @ 12.58 hrs, Volume= 28.844 af
Outflow = 180.08 cfs @ 12.58 hrs, Volume= 28.844 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 3R: (new node)



Reach 4: runoff channel

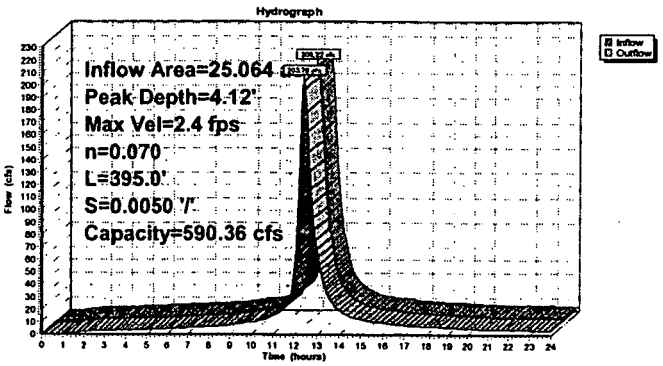
[65] Warning: Inlet elevation not specified

Inflow Area = 25.064 ac, Inflow Depth > 12.41"
Inflow = 206.22 cfs @ 12.34 hrs, Volume= 25.911 af
Outflow = 203.76 cfs @ 12.42 hrs, Volume= 25.859 af, Atten= 1%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.4 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 6.3 min

Peak Depth= 4.12' @ 12.37 hrs
Capacity at bank full= 590.36 cfs
0.00' x 6.14' deep channel, n= 0.070
Side Slope Z-value= 4.0 6.0 '/' Top Width= 61.40'
Length= 395.0' Slope= 0.0050 '/'

Reach 4: runoff channel



Reach 5: runoff channel

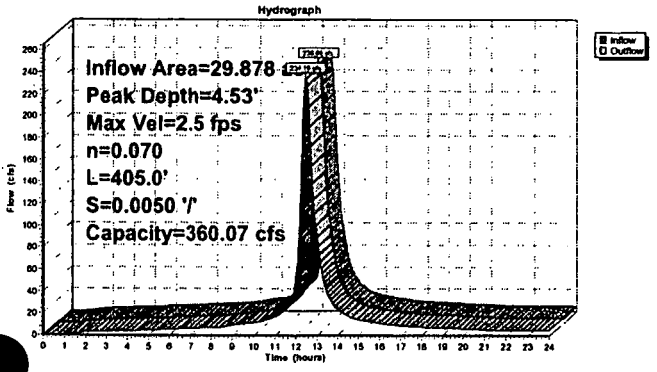
[65] Warning: Inlet elevation not specified

Inflow Area = 29.878 ac, Inflow Depth > 12.45"
Inflow = 236.60 cfs @ 12.39 hrs, Volume= 31.002 af
Outflow = 234.19 cfs @ 12.47 hrs, Volume= 30.942 af, Atten= 1%, Lag= 4.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 6.1 min

Peak Depth= 4.53' @ 12.42 hrs
Capacity at bank full= 360.07 cfs
0.00' x 5.32' deep channel, n= 0.070
Side Slope Z-value= 6.0 3.0 '/' Top Width= 47.88'
Length= 405.0' Slope= 0.0050 '/'

Reach 5: runoff channel



Reach 6: runoff channel

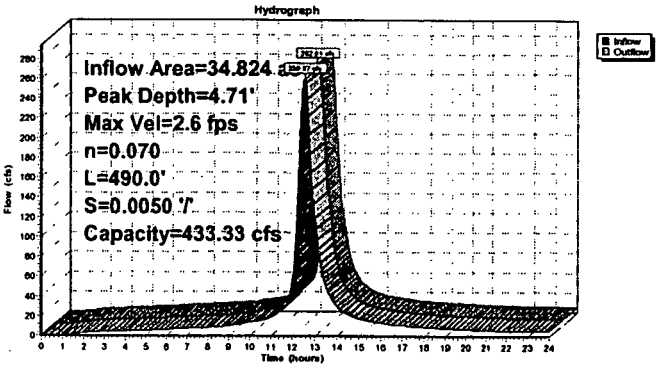
[65] Warning: Inlet elevation not specified

Inflow Area = 34.824 ac, Inflow Depth > 12.48"
Inflow = 262.61 cfs @ 12.44 hrs, Volume= 36.226 af
Outflow = 259.87 cfs @ 12.53 hrs, Volume= 36.144 af, Atten= 1%, Lag= 5.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 7.1 min

Peak Depth= 4.71' @ 12.48 hrs
Capacity at bank full= 433.33 cfs
0.00' x 5.70' deep channel, n= 0.070
Side Slope Z-value= 6.0 3.0 '/' Top Width= 51.30'
Length= 490.0' Slope= 0.0050 '/'

Reach 6: runoff channel



Reach 7: east runon ditch

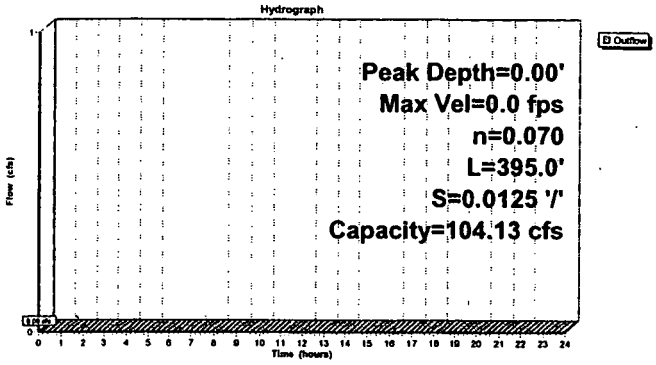
[43] Hint: Has no inflow (Outflow=Zero)

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 0.00 hrs
Capacity at bank full= 104.13 cfs
0.00' x 3.10' deep channel, n= 0.070
Side Slope Z-value= 4.0 3.0 '/' Top Width= 21.70'
Length= 395.0' Slope= 0.0125 '/'

Reach 7: east runon ditch



Reach 7R: (new node)

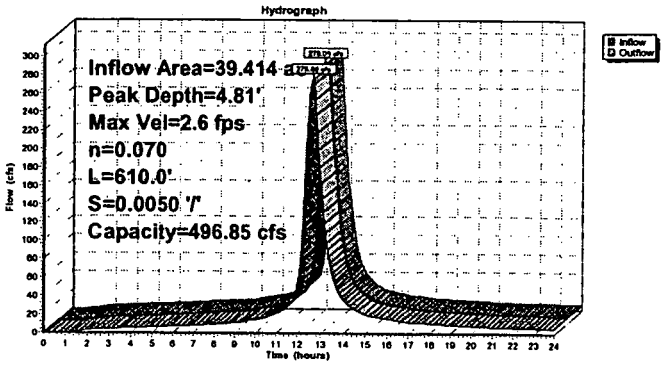
[65] Warning: Inlet elevation not specified

Inflow Area = 39.414 ac, Inflow Depth > 12.50"
Inflow = 279.05 cfs @ 12.51 hrs, Volume= 41.049 af
Outflow = 275.08 cfs @ 12.62 hrs, Volume= 40.936 af, Atten= 1%, Lag= 6.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 8.5 min

Peak Depth= 4.81' @ 12.56 hrs
Capacity at bank full= 496.85 cfs
0.00' x 6.00' deep channel, n= 0.070
Side Slope Z-value= 6.0 3.0 '/' Top Width= 54.00'
Length= 610.0' Slope= 0.0050 '/'

Reach 7R: (new node)



Reach 8: east runon ditch

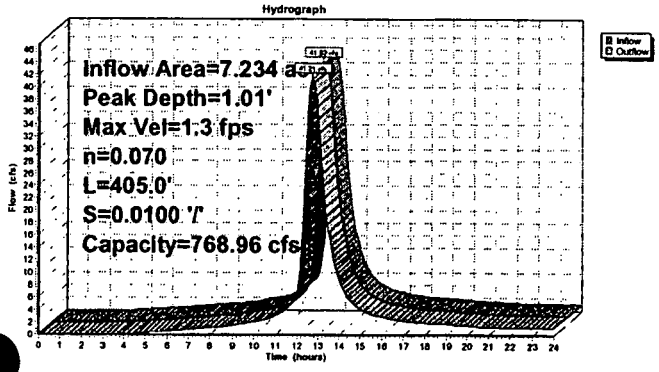
[65] Warning: Inlet elevation not specified

Inflow Area = 7.234 ac, Inflow Depth > 11.10"
Inflow = 41.83 cfs @ 12.59 hrs, Volume= 6.693 af
Outflow = 41.21 cfs @ 12.74 hrs, Volume= 6.667 af, Atten= 1%, Lag= 8.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.3 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 10.9 min

Peak Depth= 1.01' @ 12.66 hrs
Capacity at bank full= 768.96 cfs
0.00' x 3.01' deep channel, n= 0.070
Side Slope Z-value= 58.0 3.0 '/' Top Width= 183.61'
Length= 405.0' Slope= 0.0100 '/'

Reach 8: east runon ditch



Reach 8R: (new node)

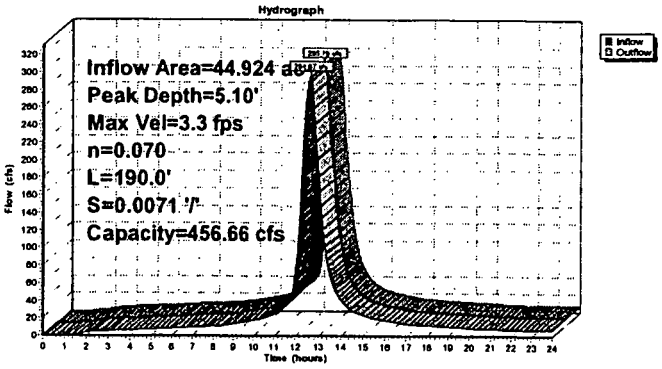
[65] Warning: Inlet elevation not specified

Inflow Area = 44.924 ac, Inflow Depth > 12.51"
Inflow = 295.75 cfs @ 12.60 hrs, Volume= 46.821 af
Outflow = 294.87 cfs @ 12.63 hrs, Volume= 46.788 af, Atten= 0%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.3 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 2.1 min

Peak Depth= 5.10' @ 12.61 hrs
Capacity at bank full= 456.66 cfs
0.00' x 6.00' deep channel, n= 0.070
Side Slope Z-value= 3.0 4.0 '/' Top Width= 42.00'
Length= 190.0' Slope= 0.0071 '/'

Reach 8R: (new node)



Reach 9: east runon ditch

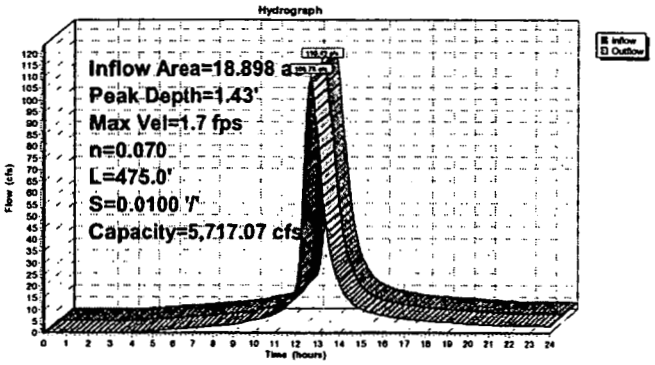
[65] Warning: Inlet elevation not specified

Inflow Area = 18.898 ac, Inflow Depth > 11.02"
Inflow = 110.42 cfs @ 12.54 hrs, Volume= 17.353 af
Outflow = 108.78 cfs @ 12.68 hrs, Volume= 17.290 af, Atten= 1%, Lag= 8.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.7 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 10.2 min

Peak Depth= 1.43' @ 12.60 hrs
Capacity at bank full= 5,717.07 cfs
0.00' x 6.31' deep channel, n= 0.070
Side Slope Z-value= 60.0 3.0 '/' Top Width= 397.53'
Length= 475.0' Slope= 0.0100 '/'

Reach 9: east runon ditch



Reach 9R: (new node)

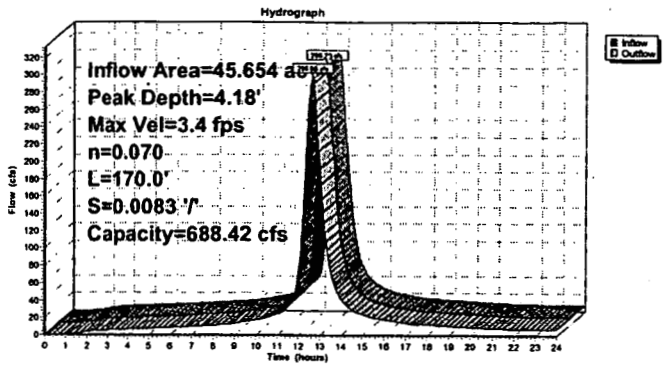
[65] Warning: Inlet elevation not specified

Inflow Area = 45.654 ac, Inflow Depth > 12.50"
Inflow = 296.23 cfs @ 12.62 hrs, Volume= 47.570 af
Outflow = 295.55 cfs @ 12.65 hrs, Volume= 47.540 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 1.9 min

Peak Depth= 4.18' @ 12.63 hrs
Capacity at bank full= 688.42 cfs
6.00' x 6.00' deep channel, n= 0.070
Side Slope Z-value= 3.0 4.0 '/' Top Width= 48.00'
Length= 170.0' Slope= 0.0083 '/'

Reach 9R: (new node)



Reach 10AR: (new node)

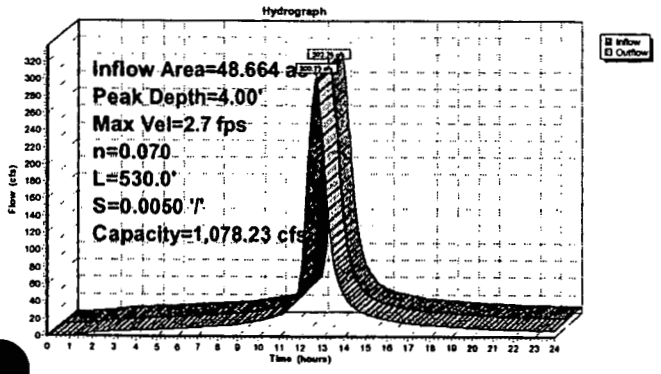
[65] Warning: Inlet elevation not specified

Inflow Area = 48.664 ac, Inflow Depth > 12.52"
Inflow = 302.28 cfs @ 12.64 hrs, Volume= 50.759 af
Outflow = 300.23 cfs @ 12.73 hrs, Volume= 50.631 af, Atten= 1%, Lag= 5.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 7.6 min

Peak Depth= 4.00' @ 12.68 hrs
Capacity at bank full= 1,078.23 cfs
10.00' x 7.00' deep channel, n= 0.070
Side Slope Z-value= 6.0 3.0 '/' Top Width= 73.00'
Length= 530.0' Slope= 0.0050 '/'

Reach 10AR: (new node)



Reach 11: (new node)

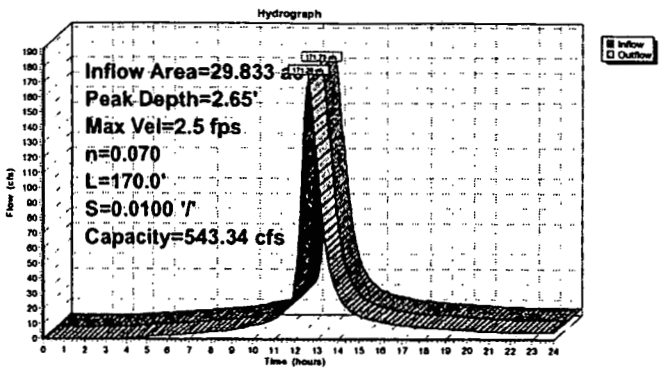
[65] Warning: Inlet elevation not specified

Inflow Area = 29.833 ac, Inflow Depth > 11.04"
Inflow = 171.73 cfs @ 12.56 hrs, Volume= 27.440 af
Outflow = 171.26 cfs @ 12.59 hrs, Volume= 27.416 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 2.4 min

Peak Depth= 2.65' @ 12.57 hrs
Capacity at bank full= 543.34 cfs
0.00' x 4.08' deep channel, n= 0.070
Side Slope Z-value= 5.7 13.5 '/' Top Width= 78.34'
Length= 170.0' Slope= 0.0100 '/'

Reach 11: (new node)



ATTACHMENT C-2

WEIGHTED CURVE NUMBER CALCULATIONS

[redacted]

SUBCATCHMENT AREA AND HYDROCAD™ INPUT PARAMETERS FOR THE CALCULATION OF WEIGHTED CN
2000 YEAR STORM DESIGN SCENARIOS

Subcatchment Label	Area (acres)	Percent of Total Area %	HSG	Land Use Description	CN AMC = 2	Weighted CN AMC = 2	Weighted CN (2) AMC = 3
A	2.60	100%	B/C	vegetated final cover	74	(1) 98	99
B	1.64	100%	B/C	vegetated final cover	74	(1) 98	99
C	4.96	100%	B/C	vegetated final cover	74	(1) 98	99
D	4.75	100%	B/C	vegetated final cover	74	(1) 98	99
DDR	0.73	100%	B/C	vegetated final cover	74	(1) 98	99
E	4.95	100%	B/C	vegetated final cover	74	(1) 98	99
F	4.81	100%	B/C	vegetated final cover	74	(1) 98	99
FFR	5.51	100%	B/C	vegetated final cover	74	(1) 98	99
G	4.95	100%	B/C	vegetated final cover	74	(1) 98	99
HR	4.59	100%	B/C	vegetated final cover	74	(1) 98	99
I	0.53	100%	C	runon east of OSDF	79	79	90
IR	0.81	100%	B/C	vegetated final cover	74	(1) 98	99
J	1.24	100%	C	runon east of OSDF	79	79	90
JR	2.20	100%	B/C	vegetated final cover	74	(1) 98	99
K	2.62	65% 35%	B C	runon east of OSDF runon east of OSDF	69 79	73	86
L	1.78	70% 30%	B C	runon east of OSDF runon east of OSDF	69 79	72	86
M	7.23	60% 40%	B C	runon east of OSDF runon east of OSDF	69 79	73	86
N	11.66	75% 25%	B C	runon east of OSDF runon east of OSDF	69 79	72	85
O	10.94	65% 35%	B C	runon east of OSDF runon east of OSDF	69 79	73	86
Q	1.52	50% 50%	B C	runon east of OSDF runon east of OSDF	69 79	74	87

Note (1): The weighted curve number of the final cover system is assumed to be 98, as consistent with the *OSDF Final Design Package*, prepared by GeoSyntec Consultants for the United States Department of Engergy, Fernald Environmental Management Project, in May 1997.
Note (2): The Antecedent Moisture Condition (III) was calculated using the equation CN(III) = 23CN(II) / 10 + 0.13CN(II).

N/A - Not Applicable

ATTACHMENT C-3

TABULATED ANALYSIS RESULTS FOR CHANNELS

2000 YEAR STORM DESIGN SCENARIO - HEAVY VEGETATION
SUMMARY OF CHANNEL ANALYSIS RESULTS

Channel Identification			Channel Characteristics							Hydrologic Calculations		Hydraulic Calculations							
Channel Name[1]	Status	Design Scenario	Section Shape	Minimum Channel Depth (ft)	Longitudinal Slope[2] (%)	Manning n	Bottom Width B (ft)	Side Slope M_1:1	Side Slope M_2:1	HydroCAD Node	HydroCAD Q[3] (cfs)	Area of Flow A (sq ft)	Perimeter P (ft)	Hydraulic Radius, R (ft)	Peak Flow Depth[5] Y (ft)	Estimated Q[5] (cfs)	Channel Freeboard[4] (ft)	Peak Flow Velocity (fps)	Lining Type[6]
subcatchment B	existing	2000 DS	vee	11.90	0.35%	0.070	0	6	4	1	52.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
reach 1	existing	2000 DS	vee	8.29	0.35%	0.070	0	6	4	2	104.4	58.8	35.01	1.68	3.43	104.72	4.86	1.78	riprap
reach 2	existing	2000 DS	vee	6.57	0.64%	0.070	0	6	-5	3	155.4	64.71	38.35	1.69	3.43	156.18	3.14	2.41	riprap
reach 3	new	2000 DS	vee	6.26	0.75%	0.070	0	6	3	4	206.2	71.64	36.89	1.94	3.99	205.62	2.27	2.87	riprap
reach 4	new	2000 DS	vee	6.14	0.50%	0.070	0	6	4	5	236.6	94.61	44.40	2.13	4.35	235.89	1.79	2.49	riprap
reach 5	new	2000 DS	vee	5.32	0.50%	0.070	0	6	3	6	262.6	99.83	43.54	2.29	4.71	261.31	0.61	2.62	riprap
reach 6	new	2000 DS	vee	5.70	0.50%	0.070	0	6	3	7R	279.1	104.98	44.65	2.35	4.83	279.45	0.87	2.66	riprap
reach 7	new	2000 DS	vee	3.10	1.25%	0.070	0	4	3	8	41.8	16.94	16.03	1.06	2.20	41.83	0.90	2.47	grass
reach 7R	new	2000 DS	vee	6.0	0.50%	0.070	0	3	6	8R	295.8	109.82	45.67	2.40	4.94	296.75	1.06	2.70	riprap
reach 8	new	2000 DS	vee	3.01	1.00%	0.070	0	58	3	9	110.4	64.13	88.70	0.72	1.45	109.94	1.56	1.71	grass
reach 8R	new	2000 DS	vee	6.0	0.71%	0.070	0	3	4	9R	296.2	91.04	37.16	2.45	5.10	296.83	0.90	3.26	riprap
reach 9	new	2000 DS	vee	6.31	1.00%	0.070	0	60	3	11	171.7	89.97	106.76	0.84	1.69	170.84	4.62	1.90	grass
reach 9R	new	2000 DS	trapezoidal	6.0	0.83%	0.070	6	3	4	10AR	302.3	87.65	36.74	2.39	4.22	303.53	1.78	3.46	riprap
reach 10AR	new	2000 DS	trapezoidal	7.0	0.50%	0.070	10	6	3	11	171.7	74.25	38.66	1.92	3.10	172.69	3.90	2.33	riprap
reach 11	new	2000 DS	vee	4.08	1.00%	0.070	0	5.7	13.5	3R	180.1	70.31	53.21	1.32	2.23	180.21	1.85	2.56	grass

2000 DS = 2000 Year Storm Design Scenario

Notes:
1. Channels are named after the corresponding subcatchment or reach.
2. Longitudinal slopes taken from existing topographic information and Construction Drawings.
3. Peak flow rates calculated by HydroCAD for each reach. See attachment C-1.
4. Calculated as the difference between minimum channel depth and peak flow depth.
5. Calculated flow rates using Manning's equation.
6. Maximum permissible velocity for grass lined channels is 5 fps.
   Maximum permissible velocity for riprap lined channels is 12 fps.

006439

[redacted]

COMPUTATION COVER SHEET

SUBJECT OF COMPUTATIONS OSDF PHASE V, SURFACE-WATER MANAGEMENT SYSTEM DESIGN AND POST-CLOSURE HYDROLOGY

Computations By: (Cognizant Engineer)
Signature: Victoria S. Cheplak — Date: 1-21-04
Printed Name and Title: Victoria S. Cheplak, Senior Staff Engineer

Assumptions and Procedures Checked By: (Checker)
Signature: [signature] — Date: 1-21-04
Printed Name and Title: Ganesh Gopalakrishnan, Senior Engineer

Computations Checked by:
Signature: Hollie Kinnecom — Date: 1-21-04
Printed Name and Title: Hollie Kinnecom, Staff Engineer

Computations Backchecked by: (Cognizant Engineer)
Signature: Victoria S. Cheplak — Date: 1-21-04
Printed Name and Title: Victoria S. Cheplak, Senior Staff Engineer

Approved by: (PDP)
Signature: [signature] — Date: 1-21-04
Printed Name and Title: Ganesh Gopalakrishnan, Senior Engineer

Approved by: (DTL/TETL)
Signature: Rudolph Bonaparte — Date: 1/22/04
Printed Name and Title: R. Bonaparte, Engineer of Record

Record of Revision (Number and initial all revisions)

Rev. No.	Reason	Date	By	Checked	Approval
0	Submittal to FF/DOE/EPA	30 Jan 02	DBM	DGP	JFB
1	CFC Revision 1 Submittal to FF/DOE/EPA	23 Jan 04	VSC VSC	GG GG	RB
2A	DCN-Cell 8 Expansion	16 June 04	VSC VSC	GG GG	DKP
2B	DCN-Cell 8 Change in Side + Crest Slope	4 April 06	RJ RJ	VSC VSC	DKP
2	DCN-Cell 8 Change in Side and Crest Slope	1 June 06	VSC for RT	VSC VSC	DKP

ADDENDUM TO SECTION 12.5

(REVISION 2B DUE TO CELL 8 CHANGE IN SIDE SLOPE & CREST SLOPE)

This addendum details the calculations that were revised within Section 12.5, OSDF Phase V, Surface-Water Management System Design and Post-Closure Hydrology, of the Final Design Calculation Package for the Fernald Environmental Management Project (FEMP), due to the re-design of the Cell 8 cover system. This re-design encompasses the increase in impacted material placement volume of Cell 8 through a change in side slope and crest slope. This addendum discusses the modifications made to this calculation package as Revision 2B and as associated with this modification.

For Revision 2B to this calculation package, the critical case for the Surface-Water Management System Design was evaluated to confirm compliance with the Surface-Water Management and Erosion Control (SWMEC) Plan and the OSDF Design Criteria Package (DCP). This critical case is presented as the Construction Design Scenario, which considers the 25-Year, 24-Hour Storm. The surface water management system was modified to reflect the design changes resulting from the re-design of the Cell 8 cover ssytem and analyzed to verify the adequacy of the designed surface water management features. For this submittal, only the East and West OSDF Construction Design Scenarios were modified; it should be noted that Design Cases A through C, detailed in this section, are not impacted, and therefore, are not presented.

In order to present the results of this DCN analysis in an efficient manner, only the attachments that summarize the modifications and updated results for the surface water management system with regard to the DCN are presented. These attachments are listed subsequently and explained in further detail.

- **Attachment A-2 – Layout of Design Scenario and Design Case SWM Systems.** These layouts demonstrate the revised configuration of the OSDF. Each surface water structure is labeled as identified in the hydrologic analysis.

- **Attachment A-8 – Nodal Network Diagrams.** These diagrams demonstrate the revised configuration of the surface water management system as a result of the DCN.

- **Attachment B-4 – Data for Time of Concentration Calculations.** These data demonstrate the revised flow paths used to calculate the time of concentration for the revised configuration of subcatchments used in the hydrologic analysis.

- **Attachment C-1A – HydroCAD Output Reports – 25-Year, 24-Hour Storm Event, East OSDF Construction-Phase Design Scenario.** This attachment provides the results of the hydrologic modeling for the East OSDF Construction Design Scenario for the 25-Year, 24-Hour Storm, considered the critical case for these calculations.

- **Attachment C-1B – HydroCAD Output Reports – 25-Year, 24-Hour Storm Event, West OSDF Construction-Phase Design Scenario.** This attachment provides the results of the hydrologic modeling for the West OSDF Construction Design Scenario for the 25-Year, 24-Hour Storm, considered the critical case for these calculations.

- **Attachment C-2 – Weighted Curve Number Calculations.** These calculations present the revised areas and Curve Numbers for the revised configuration of subcatchments used in the hydrologic analysis.

- **Attachment C-3 – Tabulated Analysis Results for Channels.** These results present the revised channel characteristics (i.e., geometry), flow within each channel, and hydraulic characteristics including peak flow depth and available freeboard, for the revised configuration of channels used in the hydrologic and hydraulic analysis. The table has been modified to reflect these results for the East OSDF and West OSDF Construction Design Scenario only. The remainder of the table (i.e., features that have not been modified), has been shaded in gray.

- **Attachment C-4A – CulvertMaster Output Reports for Culverts.** These reports present the hydraulic analysis for the culverts. These reports are provided only for those culverts in the East and West OSDF Construction Design Scenario that were modified in design or were impacted by the DCN through altered flow rates.

- **Attachment C-4B – Tabulated Analysis Results for Culverts.** These results present the revised physical characteristics (i.e., geometry) and profile (i.e., inverts) of the revised configuration of culverts. The results also present the hydraulic capacity, structural capacity, and required outlet protection for these culverts as a result of flows analyzed based on the DCN. The table has been modified to reflect these results for the East OSDF and West OSDF Construction Design Scenario only. The remainder of the table (i.e., the features that have not been modified) has been shaded in gray.

Based on the analyses for the design change of the expansion of Cell 8, all channels and culverts are designed in accordance with the requirements of the SWMEC Plan and the DCP.

ATTACHMENT A-2

LAYOUT OF DESIGN SCENARIO AND DESIGN CASE SWM SYSTEMS

LEGEND

- SUBCATCHMENT LABEL AND BOUNDARY
- REACH ALIGNMENT AND LABEL
- CULVERT
- POND LABEL

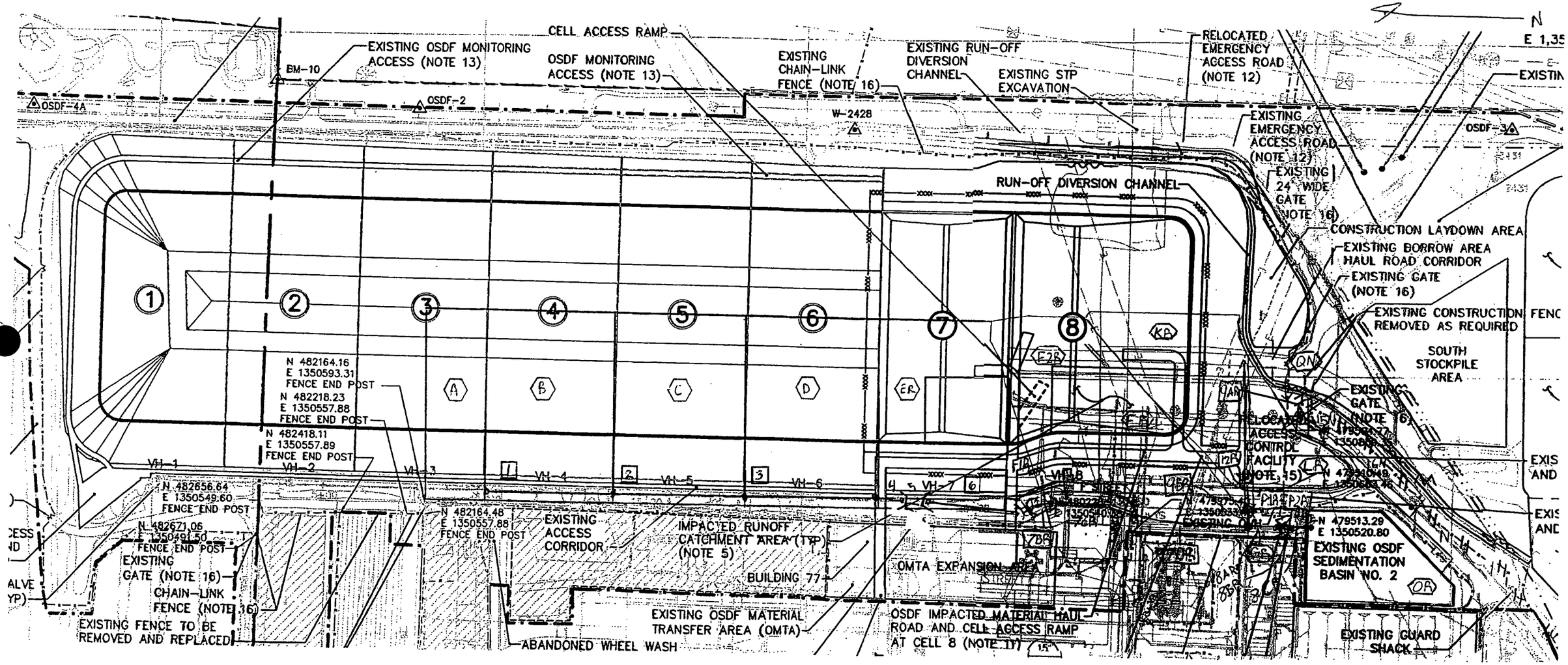
PHASE V

WEST OSDF DESIGN SCENARIO

SCALE 1" = 300'

0 300

N



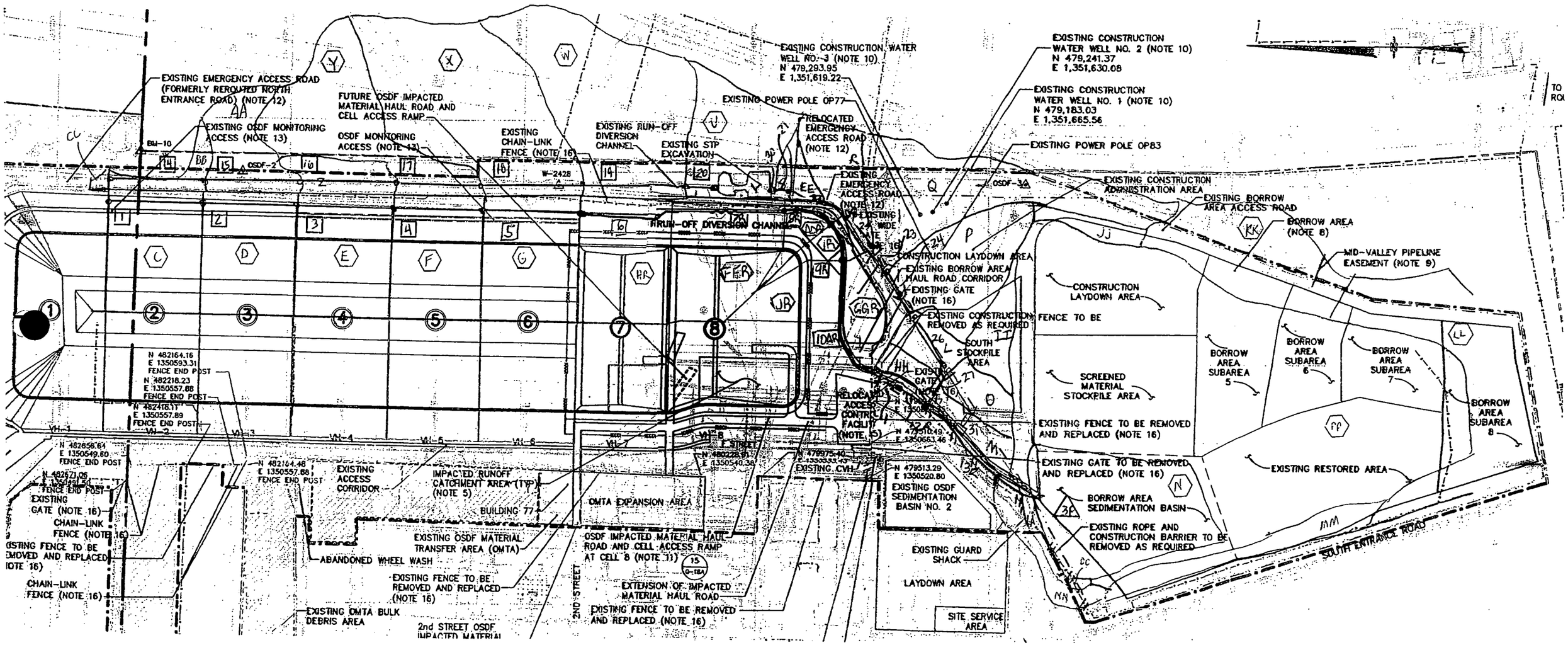
LEGEND

- SUBCATCHMENT LABEL AND BOUNDARY
- REACH ALIGNMENT AND LABEL
- CULVERT
- POND LABEL

PHASE V

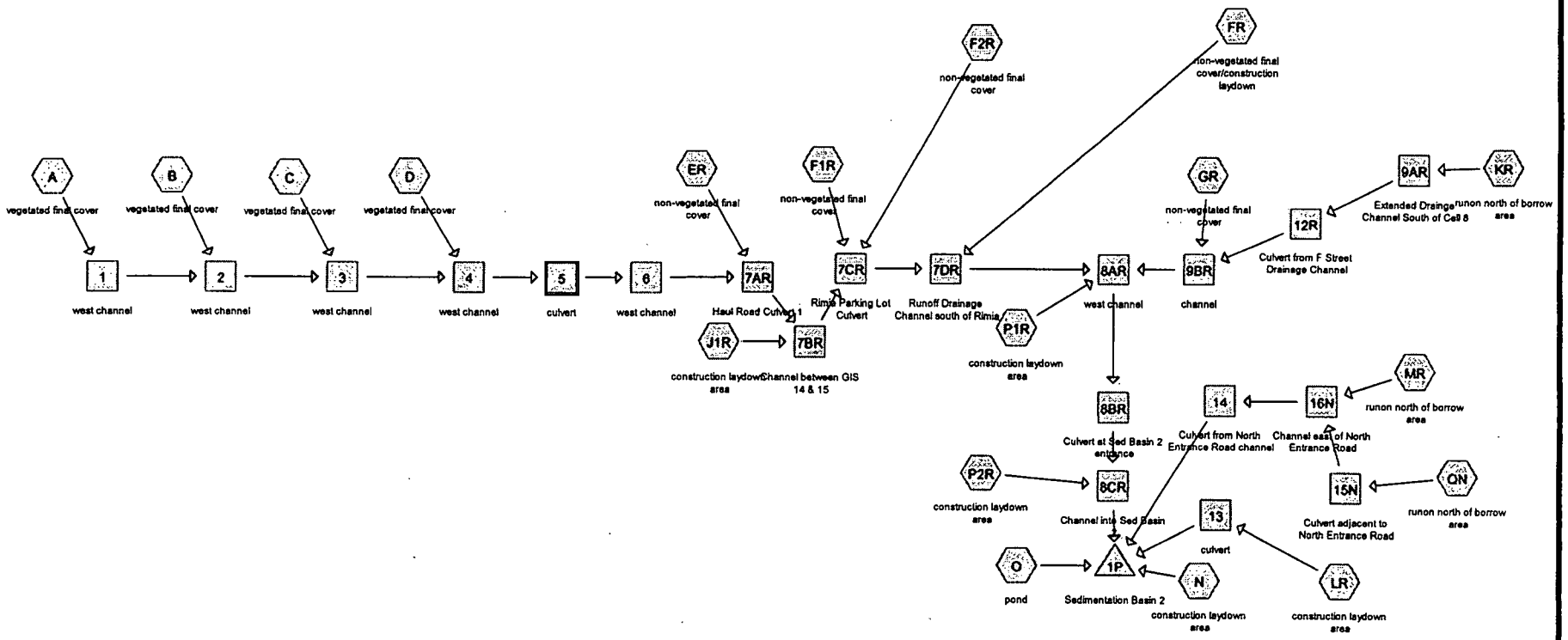
EAST OSDF DESIGN SCENARIO

SCALE 1" = 400'



ATTACHMENT A-8

NODAL NETWORK DIAGRAMS

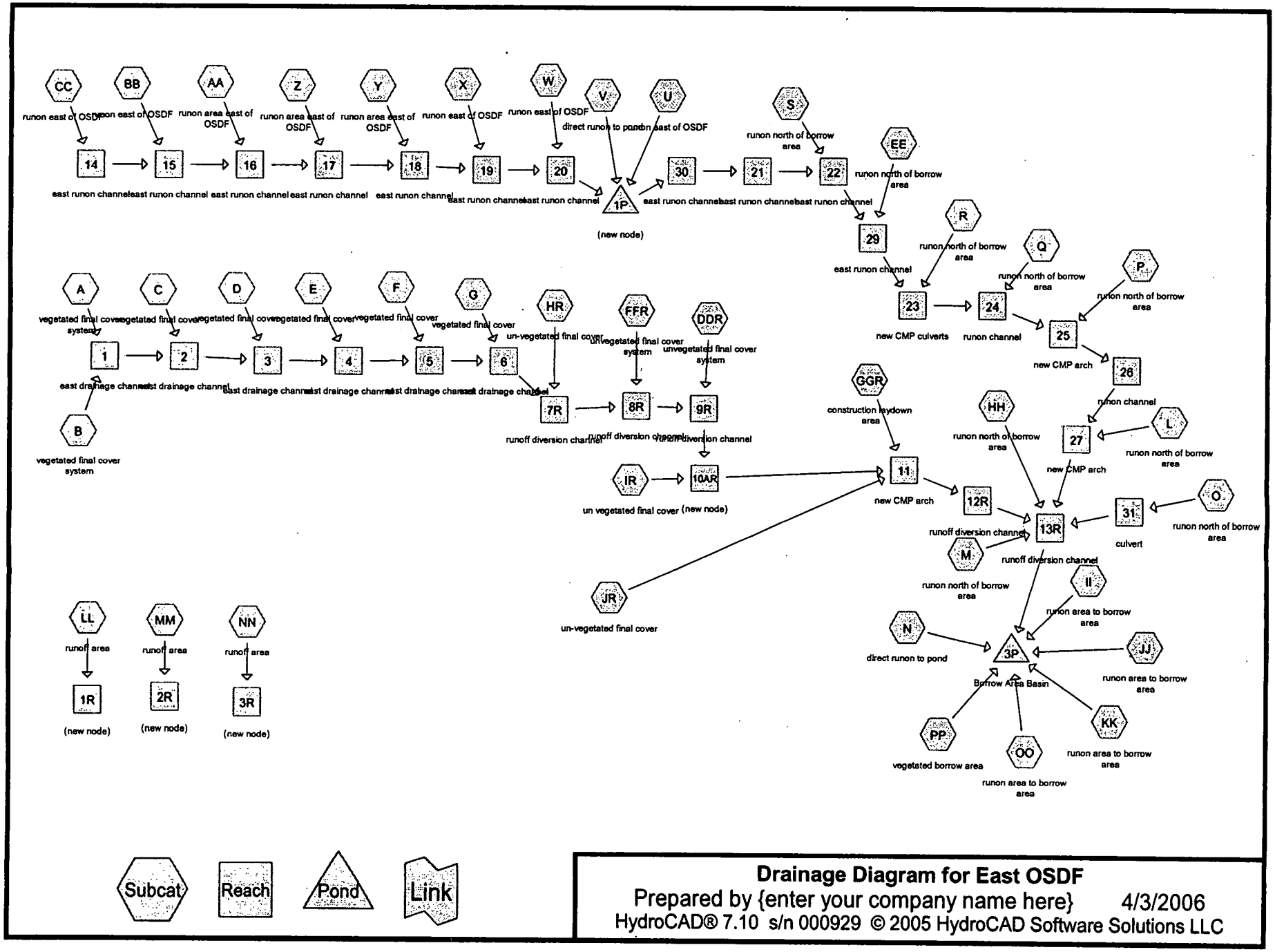


Subcat Reach Pond Link

Drainage Diagram for West OSDF

Prepared by {enter your company name here} 4/3/2006

HydroCAD® 7.10 s/n 000929 © 2005 HydroCAD Software Solutions LLC



Drainage Diagram for East OSDF

Prepared by {enter your company name here} 4/3/2006

HydroCAD® 7.10 s/n 000929 © 2005 HydroCAD Software Solutions LLC

ATTACHMENT B-4

DATA FOR CALCULATION OF TIME OF CONCENTRATION

HYDROCAD™ INPUT PARAMETERS FOR THE CALCULATION OF TIME OF CONCENTRATION
WEST OSDF CONSTRUCTION DESIGN SCENARIO

2-year, 24-hr Design Rainfall Depth, $P_{2,24}$ = 2.60 inches

SUBCATCHMENT LABEL AND DESCRIPTION		SHEET FLOW 1				SHEET FLOW 2				SHEET FLOW 3			
No.	Description	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)
A	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700
B	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700
C	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700
D	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700
ER	NON VEGETATED FINAL COVER	110	SMOOTH	0.011	0.0625	45	SMOOTH	0.011	0.1110	150	SMOOTH	0.011	0.1700
F1R	NON VEGETATED FINAL COVER	90	SMOOTH	0.011	0.0530	50	SMOOTH	0.011	0.1000	150	SMOOTH	0.011	0.1670
F2R	NON VEGETATED FINAL COVER	120	SMOOTH	0.011	0.0500	180	SMOOTH	0.011	0.1667	-	-	-	-
FR	NON VEGETATED FINAL COVER	20	SMOOTH	0.011	0.1000	280	SMOOTH	0.011	0.1667	-	-	-	-
GR	NON VEGETATED FINAL COVER/ RUNON NORTH OF BORROW AREA	280	SMOOTH	0.011	0.1667	20	SMOOTH	0.011	0.0400	-	-	-	-
J1R	CONSTRUCTION LAYDOWN	54	GRASS: SHORT	0.150	0.1670	-	-	-	-	-	-	-	-
KR	NON VEGETATED FINAL COVER/ RUNON NORTH OF BORROW AREA	55	SMOOTH	0.011	0.0500	65	SMOOTH	0.011	0.1000	180	SMOOTH	0.011	0.1667
LR	CONSTRUCTION LAYDOWN	300	GRASS: SHORT	0.150	0.0140	-	-	-	-	-	-	-	-
MR	RUNON NORTH OF BORROW AREA	40	GRASS: SHORT	0.150	0.0985	-	-	-	-	-	-	-	-
N	CONSTRUCTION LAYDOWN	170	GRASS: SHORT	0.150	0.0250	-	-	-	-	-	-	-	-
O	DIRECT RUNON TO POND	-	-	-	-	-	-	-	-	-	-	-	-
P1R	CONSTRUCTION LAYDOWN	100	GRASS: SHORT	0.150	0.0385	-	-	-	-	-	-	-	-
P2R	CONSTRUCTION LAYDOWN	110	GRASS: SHORT	0.150	0.0473	-	-	-	-	-	-	-	-
QN	RUNON NORTH OF BORROW AREA	100	GRASS: SHORT	0.150	0.0167	-	-	-	-	-	-	-	-

No.	SHALLOW CONCENTRATED FLOW 1			SHALLOW CONCENTRATED FLOW 2			SHALLOW CONCENTRATED FLOW 3			SHALLOW CONCENTRATED FLOW 4		
	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)
A	190	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-
B	200	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-
C	200	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-
D	205	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-
ER	200	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-
F1R	200	UNPAVED	0.1670	-	-	-	-	-	-	-	-	-
F2R	200	UNPAVED	0.1667	60	UNPAVED	0.0330	-	-	-	-	-	-
FR	70	UNPAVED	0.1667	15	PAVED	0.0400	15	UNPAVED	0.1667	25	UNPAVED	0.0330
GR	20	PAVED	0.0400	30	UNPAVED	0.3333	100	UNPAVED	0.0400	-	-	-
J1R	-	-	-	-	-	-	-	-	-	-	-	-
KR	135	UNPAVED	0.1667	15	PAVED	0.0400	30	UNPAVED	0.1667	-	-	-
LR	60	UNPAVED	0.0170	-	-	-	-	-	-	-	-	-
MR	-	-	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-	-	-
P1R	-	-	-	-	-	-	-	-	-	-	-	-
P2R	-	-	-	-	-	-	-	-	-	-	-	-
QN	-	-	-	-	-	-	-	-	-	-	-	-

No.	CHANNEL FLOW 1						PIPE FLOW				CHANNEL FLOW 2					
	Flow Length (ft)	Bottom Width (ft)	Flow Depth (ft)	Sideslopes (ft/ft)	Manning's n	Longitudinal Slope (ft/ft)	Flow Length (ft)	Diameter (inch)	Manning's n	Longitudinal Slope (ft/ft)	Flow Length (ft)	Bottom Width (ft)	Flow Depth (ft)	Sideslopes (ft/ft)	Manning's n	Longitudinal Slope (ft/ft)
A	180	0	2.00	3.0, 6.0	0.030	0.0075	-	-	-	-	-	-	-	-	-	-
B	190	0	2.00	3.0, 6.0	0.030	0.0075	60	72	0.013	0.0100	200	0	4.00	6.0, 2.0	0.030	0.0075
C	190	0	2.00	3.0, 6.0	0.030	0.0075	60	72	0.013	0.0100	195	0	4.00	6.0, 2.0	0.030	0.0075
D	190	0	2.00	3.0, 6.0	0.030	0.0075	60	72	0.013	0.0100	195	0	4.00	6.0, 2.0	0.030	0.0075
ER	510	0	3.50	3.0, 6.0	0.030	0.0075	85	72	0.013	0.0029	-	-	-	-	-	-
F1R	160	0	3.50	3.0, 6.0	0.030	0.0075	53	72	0.013	0.0580	-	-	-	-	-	-
F2R	-	-	-	-	-	-	78	72	0.013	0.0052	-	-	-	-	-	-
FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
J1R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P1R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P2R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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006439

HYDROCAD™ INPUT PARAMETERS FOR THE CALCULATION OF TIME OF CONCENTRATION
EAST OSDF CONSTRUCTION DESIGN SCENARIO

2-year, 24-hr Design Rainfall Depth, $P_{2,24}$ = 2.60 inches

SUBCATCHMENT LABEL AND DESCRIPTION		SHEET FLOW 1				SHEET FLOW 2				SHEET FLOW 3				SHALLOW CONCENTRATED FLOW 1			SHALLOW CONCENTRATED FLOW 2			SHALLOW CONCENTRATED FLOW 3			SHALLOW CONCENTRATED FLOW 4			CHANNEL FLOW 1						CHANNEL FLOW 2					
No.	Description	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Manning's n	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Surface Description	Land Slope (ft/ft)	Flow Length (ft)	Bottom Width (ft)	Flow Depth (ft)	Sideslopes (ft/ft)	Manning's n	Longitudinal Slope (ft/ft)	Flow Length (ft)	Bottom Width (ft)	Flow Depth (ft)	Sideslopes (ft/ft)	Manning's n	Longitudinal Slope (ft/ft)
A	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700	80	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B	VEGETATED FINAL COVER	50	GRASS: SHORT	0.150	0.1800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	450	0	1.52	6.0, 3.0	0.030	0.0045	-	-	-	-	-	-
C	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700	170	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	400	0	1.32	6.0, 4.0	0.030	0.0045	-	-	-	-	-	-
D	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700	170	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	250	0	1.29	5.0, 3.0	0.030	0.0045	150	0	1.59	4.0, 3.0	0.030	0.0050
E	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700	170	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	380	0	1.60	4.0, 3.0	0.030	0.0050	-	-	-	-	-	-
F	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700	170	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	390	0	1.69	4.0, 3.0	0.030	0.0050	-	-	-	-	-	-
G	VEGETATED FINAL COVER	90	GRASS: SHORT	0.150	0.0500	60	GRASS: SHORT	0.150	0.1000	150	GRASS: SHORT	0.150	0.1700	170	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	410	0	1.59	4.0, 3.0	0.030	0.0050	-	-	-	-	-	-
HR	NON VEGETATED FINAL COVER	90	SMOOTH	0.011	0.0500	50	SMOOTH	0.011	0.1000	150	SMOOTH	0.011	0.1700	160	UNPAVED	0.1700	-	-	-	-	-	-	-	-	-	400	0	5.70	6.0, 3.0	0.030	0.0100	-	-	-	-	-	-
IR	NON VEGETATED FINAL COVER	300	SMOOTH	0.011	0.1430	-	-	-	-	-	-	-	-	80	UNPAVED	0.1430	15	PAVED	0.0400	25	UNPAVED	0.1667	-	-	-	170	6	5.00	3.0, 4.0	0.030	0.0083	-	-	-	-	-	-
JR	NON VEGETATED FINAL COVER	40	SMOOTH	0.011	0.0500	60	SMOOTH	0.011	0.1000	200	SMOOTH	0.011	0.1667	115	UNPAVED	0.1667	15	PAVED	0.0200	30	UNPAVED	0.1667	-	-	-	530	10	6.30	6.0, 3.0	0.030	0.0050	-	-	-	-	-	-
L	RUNON NORTH OF BORROW AREA	140	GRASS: SHORT	0.150	0.0200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	290	0	2.90	3.0, 3.0	0.030	0.0075	-	-	-	-	-	-
M	RUNON NORTH OF BORROW AREA	170	GRASS: SHORT	0.150	0.0500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	20	2.30	3.0, 3.0	0.030	0.0045	-	-	-	-	-	-
N	DIRECT RUNON TO POND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O	RUNON NORTH OF BORROW AREA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	230	0	1.10	5.0, 5.0	0.030	0.0086	-	-	-	-	-	-
P	RUNON NORTH OF BORROW AREA	300	GRASS: SHORT	0.150	0.0150	-	-	-	-	-	-	-	-	350	UNPAVED	0.0070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Q	RUNON NORTH OF BORROW AREA	300	GRASS: SHORT	0.150	0.0260	-	-	-	-	-	-	-	-	1280	UNPAVED	0.0260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R	RUNON NORTH OF BORROW AREA	300	GRASS: SHORT	0.150	0.0400	-	-	-	-	-	-	-	-	350	UNPAVED	0.0400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	RUNON NORTH OF BORROW AREA	280	GRASS: SHORT	0.150	0.0150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	0	3.20	3.0, 3.0	0.030	0.0100	-	-	-	-	-	-
U	RUNON EAST OF OSDF	300	GRASS: SHORT	0.150	0.0140	-	-	-	-	-	-	-	-	240	UNPAVED	0.0140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V	DIRECT RUNON TO POND	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W	RUNON EAST OF OSDF	300	GRASS: SHORT	0.150	0.1780	-	-	-	-	-	-	-	-	400	UNPAVED	0.1780	-	-	-	-	-	-	-	-	-	270	0	3.30	3.0, 30.0	0.030	0.0114	-	-	-	-	-	-
X	RUNON EAST OF OSDF	300	GRASS: SHORT	0.150	0.0190	-	-	-	-	-	-	-	-	730	UNPAVED	0.0190	-	-	-	-	-	-	-	-	-	330	0	2.90	3.0, 3.0	0.030	0.0100	-	-	-	-	-	-
Y	RUNON EAST OF OSDF	300	GRASS: SHORT	0.150	0.0130	-	-	-	-	-	-	-	-	510	UNPAVED	0.0130	-	-	-	-	-	-	-	-	-	340	0	2.00	5.0, 4.0	0.030	0.0110	-	-	-	-	-	-
Z	RUNON EAST OF OSDF	300	GRASS: SHORT	0.150	0.0310	-	-	-	-	-	-	-	-	250	UNPAVED	0.0310	-	-	-	-	-	-	-	-	-	50	0	2.00	5.0, 4.0	0.030	0.0070	-	-	-	-	-	-
AA	RUNON AREA EAST OF OSDF	300	GRASS: SHORT	0.150	0.0800	-	-	-	-	-	-	-	-	170	UNPAVED	0.0800	-	-	-	-	-	-	-	-	-	300	0	2.00	3.0, 3.0	0.030	0.0070	-	-	-	-	-	-
BB	RUNON AREA EAST OF OSDF	110	GRASS: SHORT	0.150	0.0800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	360	0	1.50	3.0, 5.0	0.030	0.0040	-	-	-	-	-	-
CC	RUNON AREA EAST OF OSDF	110	GRASS: SHORT	0.150	0.0800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DDR	NON VEGETATED FINAL COVER	300	SMOOTH	0.011	0.1430	-	-	-	-	-	-	-	-	80	UNPAVED	0.1430	15	PAVED	0.0400	25	UNPAVED	0.1667	-	-	-	190	0	4.50	3.0, 4.0	0.030	0.0071	-	-	-	-	-	-
EE	RUNON NORTH OF BORROW AREA	300	GRASS: SHORT	0.150	0.0230	-	-	-	-	-	-	-	-	80	UNPAVED	0.0230	-	-	-	-	-	-	-	-	-	40	0	4.00	3.0, 3.0	0.030	0.0100	-	-	-	-	-	-
FFR	NON VEGETATED FINAL COVER	70	SMOOTH	0.011	0.0500	90	SMOOTH	0.011	0.1000	140	SMOOTH	0.011	0.1667	135	UNPAVED	0.1667	15	PAVED	0.0400	20	UNPAVED	0.1667	-	-	-	610	0	4.00	6.0, 3.0	0.030	0.0050	-	-	-	-	-	-
GGR	CONSTRUCTION LAYDOWN	240	GRASS: SHORT	0.150	0.0180	-	-	-	-	-	-	-	-	55	UNPAVED	0.0145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HH	RUNON NORTH OF BORROW AREA	90	GRASS: SHORT	0.150	0.0100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	230	20	2.51	3.0, 3.0	0.030	0.0045	-	-	-	-	-	-
II	RUNON AREA TO BORROW AREA	210	GRASS: SHORT	0.150	0.0400	-	-	-	-	-	-	-	-	70	UNPAVED	0.1660	380	UNPAVED	0.0025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JJ	RUNON AREA TO BORROW AREA	300	GRASS: SHORT	0.150	0.0250	-	-	-	-	-	-	-	-	40	UNPAVED	0.0250	110	UNPAVED	0.1660	840	UNPAVED	0.0025	840	UNPAVED	0.0025	-	-	-	-	-	-	-	-	-	-	-	-
KK	RUNON AREA TO BORROW AREA	300	GRASS: SHORT	0.150	0.0280	-	-	-	-	-	-	-	-	150	UNPAVED	0.0140	110	UNPAVED	0.1660	630	UNPAVED	0.0030	630	UNPAVED	0.0030	-	-	-	-	-	-	-	-	-	-	-	-
LL	RUNOFF	300	GRASS: SHORT	0.150	0.0240	-	-	-	-	-	-	-	-	200	UNPAVED	0.0240	-	-	-	-	-	-	-	-	-	900	0	3.00	3.0, 3.0	0.030	0.0090	-	-	-	-	-	-
MM	RUNOFF	100	GRASS: SHORT	0.150	0.0760	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	980	0	3.00	5.0, 4.0	0.030	0.0060	-	-	-	-	-	-
NN	RUNOFF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	600	0	2.60	3.0, 3.0	0.030	0.0130	-	-	-	-	-	-
OO	RUNON AREA TO BORROW AREA	120	GRASS: SHORT	0.150	0.1660	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PP	VEGETATED BORROW AREA	150	GRASS: SHORT	0.150	0.1660	150	GRASS: SHORT	0.150	0.0025	-	-	-	-	1190	UNPAVED	0.0025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

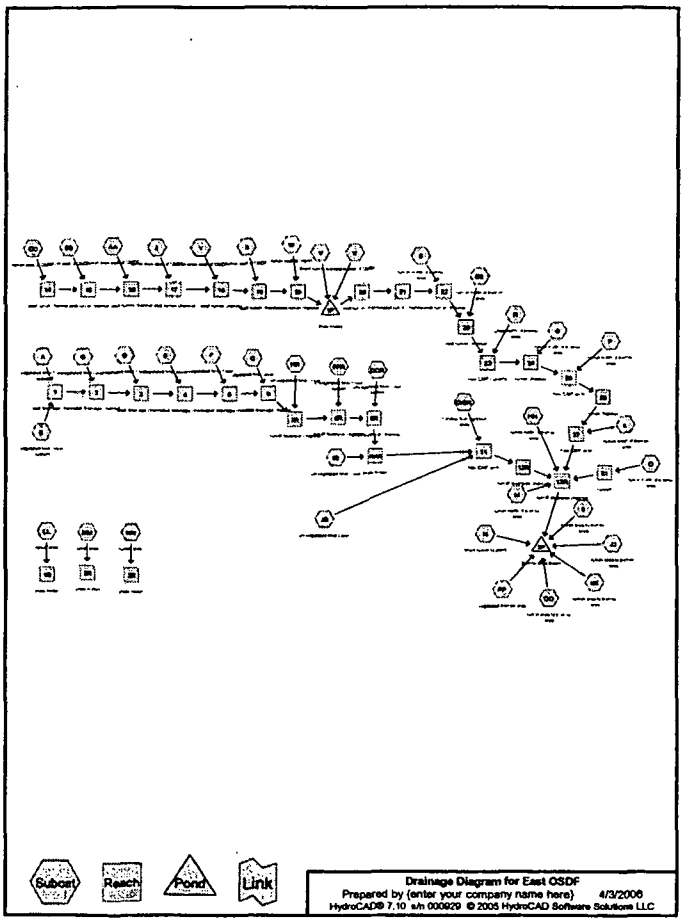
ATTACHMENT C-1A

HydroCAD™ OUTPUT REPORTS

EAST OSDF CONSTRUCTION-PHASE DESIGN SCENARIO

25-YEAR, 24-HOUR STORM EVENT

[redacted]



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: vegetated final cover system Runoff Area=1.964 ac Runoff Depth>2.89"
Flow Length=380' Tc=17.3 min CN=83 Runoff=6.81 cfs 0.473 af

Subcatchment AA: runon area east of OSDF Runoff Area=2.708 ac Runoff Depth>2.12"
Flow Length=770' Tc=16.8 min CN=74 Runoff=6.97 cfs 0.478 af

Subcatchment B: vegetated final cover system Runoff Area=1.179 ac Runoff Depth>2.90"
Flow Length=500' Tc=6.2 min CN=83 Runoff=5.75 cfs 0.285 af

Subcatchment BB: runon east of OSDF Runoff Area=0.761 ac Runoff Depth>2.54"
Flow Length=470' Tc=9.1 min CN=79 Runoff=3.03 cfs 0.161 af

Subcatchment C: vegetated final cover Runoff Area=5.209 ac Runoff Depth>2.89"
Flow Length=870' Tc=20.7 min CN=83 Runoff=16.37 cfs 1.255 af

Subcatchment CC: runon east of OSDF Runoff Area=0.121 ac Runoff Depth>2.54"
Flow Length=110' Tc=6.7 min CN=79 Runoff=0.52 cfs 0.026 af

Subcatchment D: vegetated final cover Runoff Area=5.131 ac Runoff Depth>2.89"
Flow Length=870' Tc=20.1 min CN=83 Runoff=16.39 cfs 1.236 af

Subcatchment DDR: unvegetated final cover system Runoff Area=0.730 ac Runoff Depth>3.48"
Flow Length=610' Tc=2.4 min CN=89 Runoff=4.49 cfs 0.212 af

Subcatchment E: vegetated final cover Runoff Area=5.092 ac Runoff Depth>2.89"
Flow Length=850' Tc=19.7 min CN=83 Runoff=16.48 cfs 1.227 af

Subcatchment EE: runon north of borrow area Runoff Area=0.925 ac Runoff Depth>2.36"
Flow Length=420' Tc=25.4 min CN=77 Runoff=2.10 cfs 0.182 af

Subcatchment F: vegetated final cover Runoff Area=5.053 ac Runoff Depth>2.89"
Flow Length=860' Tc=19.7 min CN=83 Runoff=16.35 cfs 1.217 af

Subcatchment FFR: unvegetated final cover system Runoff Area=5.510 ac Runoff Depth>3.48"
Flow Length=1,080' Tc=4.5 min CN=89 Runoff=33.37 cfs 1.599 af

Subcatchment G: vegetated final cover Runoff Area=5.309 ac Runoff Depth>2.89"
Flow Length=880' Tc=19.8 min CN=83 Runoff=17.13 cfs 1.279 af

Subcatchment GGR: construction laydown area Runoff Area=1.550 ac Runoff Depth>2.44"
Flow Length=295' Tc=23.3 min CN=78 Runoff=3.86 cfs 0.316 af

Subcatchment HH: runon north of borrow area Runoff Area=0.548 ac Runoff Depth>2.54"
Flow Length=320' Tc=13.9 min CN=79 Runoff=1.86 cfs 0.116 af

Subcatchment HR: un-vegetated final cover Runoff Area=4.590 ac Runoff Depth>3.48"
Flow Length=850' Tc=3.2 min CN=89 Runoff=28.80 cfs 1.333 af

Subcatchment II: runon area to borrow area Runoff Area=1.669 ac Runoff Depth>1.66"
Flow Length=660' Tc=23.0 min CN=68 Runoff=2.73 cfs 0.230 af

Subcatchment IR: un vegetated final cover Runoff Area=0.810 ac Runoff Depth>3.48"
Flow Length=590' Tc=2.2 min CN=89 Runoff=5.01 cfs 0.235 af

Subcatchment JJ: runon area to borrow area Runoff Area=0.914 ac Runoff Depth>1.24"
Flow Length=1,290' Tc=41.9 min CN=62 Runoff=0.69 cfs 0.094 af

Subcatchment JR: un-vegetated final cover Runoff Area=2.200 ac Runoff Depth>3.48"
Flow Length=990' Tc=3.5 min CN=89 Runoff=13.73 cfs 0.639 af

Subcatchment KK: runon area to borrow area Runoff Area=5.893 ac Runoff Depth>1.37"
Flow Length=1,190' Tc=36.4 min CN=64 Runoff=5.63 cfs 0.674 af

Subcatchment L: runon north of borrow area Runoff Area=1.683 ac Runoff Depth>2.28"
Flow Length=430' Tc=15.4 min CN=76 Runoff=4.88 cfs 0.320 af

Subcatchment LL: runoff area Runoff Area=7.049 ac Runoff Depth>1.18"
Flow Length=1,400' Tc=28.1 min CN=61 Runoff=6.61 cfs 0.693 af

Subcatchment M: runon north of borrow area Runoff Area=1.000 ac Runoff Depth>2.54"
Flow Length=370' Tc=12.1 min CN=79 Runoff=3.60 cfs 0.212 af

Subcatchment MM: runoff area Runoff Area=1.943 ac Runoff Depth>1.19"
Flow Length=1,080' Tc=9.9 min CN=61 Runoff=3.30 cfs 0.192 af

Subcatchment N: direct runon to pond Runoff Area=7.818 ac Runoff Depth>4.46"
Tc=1.0 min CN=98 Runoff=57.89 cfs 2.908 af

Subcatchment NN: runoff area Runoff Area=1.274 ac Runoff Depth>1.53"
Flow Length=600' Tc=1.4 min CN=66 Runoff=3.78 cfs 0.162 af

Subcatchment O: runon north of borrow area Runoff Area=1.317 ac Runoff Depth>2.55"
Flow Length=230' Tc=1.3 min CN=79 Runoff=6.54 cfs 0.279 af

Subcatchment OO: runon area to borrow area Runoff Area=0.399 ac Runoff Depth>1.52"
Flow Length=120' Tc=5.4 min CN=66 Runoff=1.06 cfs 0.051 af

Subcatchment P: runon north of borrow area Runoff Area=5.238 ac Runoff Depth>2.19"
Flow Length=650' Tc=33.7 min CN=75 Runoff=9.16 cfs 0.955 af

Subcatchment PP: vegetated borrow area Runoff Area=40.964 ac Runoff Depth>1.36"
Flow Length=1,490' Tc=65.5 min CN=64 Runoff=25.40 cfs 4.631 af

Subcatchment Q: runon north of borrow area Runoff Area=7.700 ac Runoff Depth>1.95"
Flow Length=1,580' Tc=31.8 min CN=72 Runoff=12.29 cfs 1.252 af

Subcatchment R: runon north of borrow area Runoff Area=2.612 ac Runoff Depth>2.11"
Flow Length=650' Tc=21.6 min CN=74 Runoff=5.83 cfs 0.460 af

Subcatchment S: runon north of borrow area Runoff Area=0.402 ac Runoff Depth>2.44"
Flow Length=310' Tc=27.9 min CN=78 Runoff=0.89 cfs 0.082 af

Subcatchment U: runon east of OSDF Runoff Area=4.149 ac Runoff Depth>1.95"
Flow Length=540' Tc=32.3 min CN=72 Runoff=6.57 cfs 0.674 af

Subcatchment V: direct runon to pond Runoff Area=0.274 ac Runoff Depth>4.46"
Tc=1.0 min CN=98 Runoff=2.03 cfs 0.102 af

Subcatchment W: runon east of OSDF Runoff Area=10.593 ac Runoff Depth>1.96"
Flow Length=970' Tc=12.6 min CN=72 Runoff=28.88 cfs 1.733 af

Subcatchment X: runon east of OSDF Runoff Area=11.853 ac Runoff Depth>1.87"
Flow Length=1,360' Tc=33.4 min CN=71 Runoff=17.50 cfs 1.851 af

Subcatchment Y: runon area east of OSDF Runoff Area=6.522 ac Runoff Depth>2.03"
Flow Length=1,150' Tc=36.8 min CN=73 Runoff=9.84 cfs 1.101 af

Subcatchment Z: runon area east of OSDF Runoff Area=1.606 ac Runoff Depth>1.96"
Flow Length=600' Tc=23.7 min CN=72 Runoff=3.11 cfs 0.262 af

Reach 1: east drainage channel Peak Depth=0.99' Max Vel=2.1 fps Inflow=10.81 cfs 0.758 af
n=0.030 L=420.0' S=0.0045 '/' Capacity=754.76 cfs Outflow=10.06 cfs 0.756 af

Reach 1R: (new node) Peak Depth=0.33' Max Vel=5.4 fps Inflow=6.61 cfs 0.693 af
D=72.0" n=0.010 L=100.0' S=0.0100 '/' Capacity=1,101.12 cfs Outflow=6.59 cfs 0.693 af

Reach 2: east drainage channel Peak Depth=1.54' Max Vel=2.7 fps Inflow=26.37 cfs 2.010 af
n=0.030 L=420.0' S=0.0045 '/' Capacity=1,205.98 cfs Outflow=25.59 cfs 2.005 af

Reach 2R: (new node) Peak Depth=0.24' Max Vel=4.3 fps Inflow=3.30 cfs 0.192 af
D=72.0" n=0.010 L=100.0' S=0.0100 '/' Capacity=1,101.12 cfs Outflow=3.25 cfs 0.192 af

Reach 3: east drainage channel Peak Depth=1.87' Max Vel=3.3 fps Inflow=40.77 cfs 3.241 af
n=0.030 L=420.0' S=0.0050 '/' Capacity=1,563.67 cfs Outflow=39.76 cfs 3.234 af

Reach 3R: (new node) Peak Depth=0.25' Max Vel=4.5 fps Inflow=3.78 cfs 0.162 af
D=72.0" n=0.010 L=100.0' S=0.0100 '/' Capacity=1,101.12 cfs Outflow=3.72 cfs 0.162 af

Reach 4: east drainage channel Peak Depth=2.07' Max Vel=3.5 fps Inflow=53.10 cfs 4.461 af
n=0.030 L=420.0' S=0.0050 '/' Capacity=1,106.53 cfs Outflow=52.07 cfs 4.451 af

Reach 5: east drainage channel Peak Depth=2.01' Max Vel=3.5 fps Inflow=63.69 cfs 5.669 af
n=0.030 L=440.0' S=0.0050 '/' Capacity=182.58 cfs Outflow=62.69 cfs 5.656 af

Reach 6: east drainage channel Peak Depth=1.87' Max Vel=4.6 fps Inflow=73.28 cfs 6.935 af
n=0.030 L=480.0' S=0.0100 '/' Capacity=258.21 cfs Outflow=72.46 cfs 6.923 af

Reach 7R: runoff diversion channel Peak Depth=2.14' Max Vel=3.6 fps Inflow=75.24 cfs 8.256 af
n=0.030 L=610.0' S=0.0050 '/' Capacity=393.21 cfs Outflow=74.18 cfs 8.233 af

Reach 8R: runoff diversion channel Peak Depth=1.73' Max Vel=3.7 fps Inflow=77.19 cfs 9.832 af
n=0.030 L=190.0' S=0.0071 '/' Capacity=989.53 cfs Outflow=76.74 cfs 9.825 af

Reach 9R: runoff diversion channel Peak Depth=1.51' Max Vel=4.5 fps Inflow=77.10 cfs 10.037 af
n=0.030 L=170.0' S=0.0083 '/' Capacity=1,307.31 cfs Outflow=76.74 cfs 10.030 af

Reach 10AR: (new node) Peak Depth=1.37' Max Vel=3.4 fps Inflow=77.12 cfs 10.265 af
n=0.030 L=530.0' S=0.0050 '/' Capacity=2,114.41 cfs Outflow=76.26 cfs 10.235 af

Reach 11: new CMP arch Peak Depth=1.57' Max Vel=6.6 fps Inflow=78.55 cfs 11.189 af
D=72.0" n=0.010 L=40.0' S=0.0022 '/' Capacity=522.31 cfs Outflow=78.50 cfs 11.188 af

Reach 12R: runoff diversion channel Peak Depth=1.15' Max Vel=3.7 fps Inflow=78.50 cfs 11.188 af
n=0.030 L=240.0' S=0.0063 '/' Capacity=317.79 cfs Outflow=78.00 cfs 11.174 af

Reach 13R: runoff diversion channel Peak Depth=1.25' Max Vel=4.3 fps Inflow=143.58 cfs 21.140 af
n=0.030 L=450.0' S=0.0067 '/' Capacity=346.63 cfs Outflow=142.73 cfs 21.088 af

Reach 14: east runon channel Peak Depth=0.33' Max Vel=0.9 fps Inflow=0.52 cfs 0.026 af
n=0.030 L=420.0' S=0.0040 '/' Capacity=22.78 cfs Outflow=0.38 cfs 0.025 af

Reach 15: east runon channel Peak Depth=0.64' Max Vel=1.8 fps Inflow=3.20 cfs 0.186 af
n=0.030 L=420.0' S=0.0063 '/' Capacity=61.62 cfs Outflow=2.82 cfs 0.186 af

Reach 16: east runon channel Peak Depth=0.98' Max Vel=2.6 fps Inflow=9.76 cfs 0.664 af
n=0.030 L=420.0' S=0.0074 '/' Capacity=256.58 cfs Outflow=9.33 cfs 0.661 af

Reach 17: east runon channel Peak Depth=0.92' Max Vel=3.2 fps Inflow=12.43 cfs 0.923 af
n=0.030 L=420.0' S=0.0125 '/' Capacity=436.18 cfs Outflow=12.07 cfs 0.921 af

Reach 18: east runon channel Peak Depth=1.38' Max Vel=3.7 fps Inflow=21.43 cfs 2.022 af
n=0.030 L=440.0' S=0.0100 '/' Capacity=169.20 cfs Outflow=20.99 cfs 2.017 af

Reach 19: east runon channel Peak Depth=0.91' Max Vel=2.8 fps Inflow=38.43 cfs 3.868 af
n=0.030 L=470.0' S=0.0090 '/' Capacity=911.12 cfs Outflow=37.75 cfs 3.855 af

Reach 20: east runon channel Peak Depth=1.87' Max Vel=4.2 fps Inflow=43.35 cfs 5.587 af
n=0.030 L=75.0' S=0.0083 '/' Capacity=153.84 cfs Outflow=43.26 cfs 5.586 af

Reach 21: east runon channel Peak Depth=1.84' Max Vel=4.5 fps Inflow=45.89 cfs 6.150 af
n=0.030 L=65.0' S=0.0100 '/' Capacity=169.20 cfs Outflow=45.84 cfs 6.148 af

Reach 22: east runon channel Peak Depth=1.85' Max Vel=4.5 fps Inflow=46.33 cfs 6.230 af
n=0.030 L=190.0' S=0.0100 '/' Capacity=384.40 cfs Outflow=46.18 cfs 6.225 af

Reach 23: new CMP culverts Peak Depth=1.31' Max Vel=5.4 fps Inflow=48.76 cfs 6.861 af
D=72.0" n=0.018 L=92.0' S=0.0059 '/' Capacity=468.67 cfs Outflow=48.70 cfs 6.858 af

Reach 24: runon channel Peak Depth=1.19' Max Vel=4.0 fps Inflow=57.15 cfs 8.110 af
n=0.030 L=160.0' S=0.0075 '/' Capacity=153.54 cfs Outflow=56.99 cfs 8.102 af

Reach 25: new CMP arch Peak Depth=1.49' Max Vel=5.9 fps Inflow=64.24 cfs 9.057 af
D=72.0" n=0.018 L=53.0' S=0.0060 '/' Capacity=475.34 cfs Outflow=64.22 cfs 9.055 af

Reach 26: runon channel Peak Depth=2.20' Max Vel=4.4 fps Inflow=64.22 cfs 9.055 af
n=0.030 L=300.0' S=0.0075 '/' Capacity=90.11 cfs Outflow=64.05 cfs 9.044 af

Reach 27: new CMP arch Peak Depth=1.64' Max Vel=5.2 fps Inflow=65.00 cfs 9.364 af
D=72.0" n=0.018 L=106.0' S=0.0042 '/' Capacity=398.58 cfs Outflow=64.89 cfs 9.360 af

Reach 29: east runon channel Peak Depth=1.86' Max Vel=4.6 fps Inflow=47.10 cfs 6.407 af
n=0.030 L=230.0' S=0.0100 '/' Capacity=255.23 cfs Outflow=46.92 cfs 6.400 af

Reach 30: east runon channel Peak Depth=1.84' Max Vel=4.5 fps Inflow=45.98 cfs 6.150 af
n=0.030 L=30.0' S=0.0100 '/' Capacity=104.05 cfs Outflow=45.89 cfs 6.150 af

Reach 31: culvert Peak Depth=0.34' Max Vel=5.1 fps Inflow=6.54 cfs 0.279 af
D=72.0" n=0.012 L=80.0' S=0.0125 '/' Capacity=1,025.91 cfs Outflow=6.34 cfs 0.279 af

Pond 1P: (new node) Peak Elev=593.91' Storage=1.584 af Inflow=49.32 cfs 6.362 af
Outflow=45.98 cfs 6.150 af

Pond 3P: Borrow Area Basin Peak Elev=574.21' Storage=29.662 af Inflow=174.95 cfs 29.678 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 172.262 ac Runoff Volume = 31.186 af Average Runoff Depth = 2.17"

Subcatchment A: vegetated final cover system

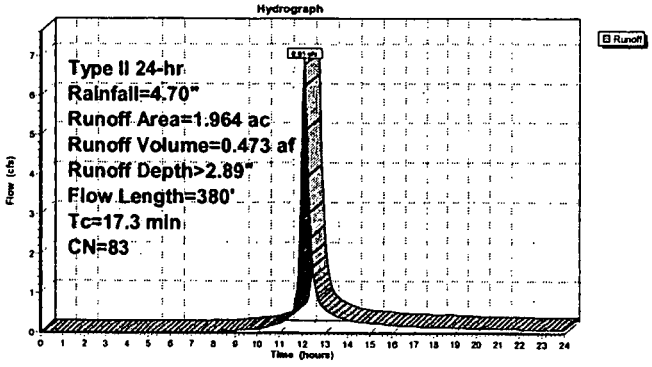
Runoff = 6.81 cfs @ 12.10 hrs, Volume= 0.473 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.964	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.2	80	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.3	380	Total			

Subcatchment A: vegetated final cover system



Subcatchment AA: runon area east of OSDF

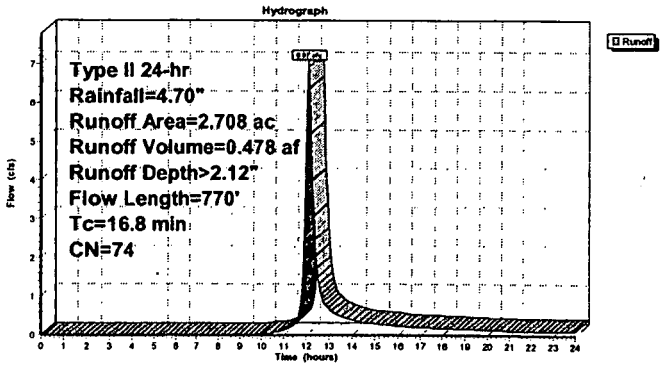
Runoff = 6.97 cfs @ 12.10 hrs, Volume= 0.478 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.708	74	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	300	0.0800	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.6	170	0.0800	4.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.2	300	0.0070	4.0	48.01	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.00' Z= 3.0 '/' Top.W=12.00' n= 0.030
16.8	770	Total			

Subcatchment AA: runon area east of OSDF



Subcatchment B: vegetated final cover system

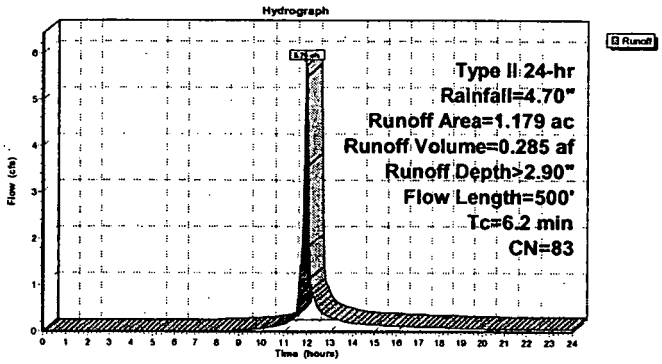
Runoff = 5.75 cfs @ 11.97 hrs, Volume= 0.285 af, Depth> 2.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.179	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	50	0.1800	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
3.6	450	0.0045	2.1	9.75	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=1.02' Z= 6.0 & 3.0 '/' Top.W=9.18' n= 0.030
6.2	500	Total			

Subcatchment B: vegetated final cover system



Subcatchment BB: runon east of OSDF

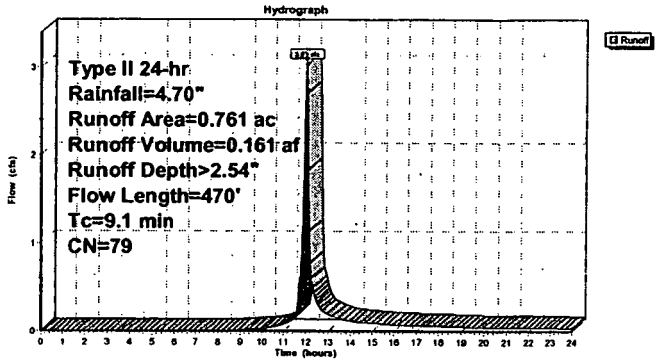
Runoff = 3.03 cfs @ 12.01 hrs, Volume= 0.161 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.761	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	110	0.0800	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
2.4	360	0.0040	2.5	22.78	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=1.50' Z= 3.0 & 5.0 '/' Top.W=12.00' n= 0.030
9.1	470	Total			

Subcatchment BB: runon east of OSDF



Subcatchment C: vegetated final cover

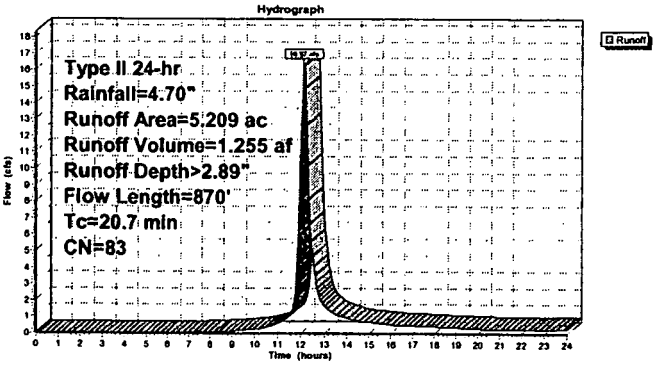
Runoff = 16.37 cfs @ 12.13 hrs, Volume= 1.255 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.209	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.4	170	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
3.2	400	0.0045	2.1	10.88	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=1.02' Z= 6.0 & 4.0 '/' Top.W=10.20' n= 0.030
20.7	870	Total			

Subcatchment C: vegetated final cover



Subcatchment CC: runon east of OSDF

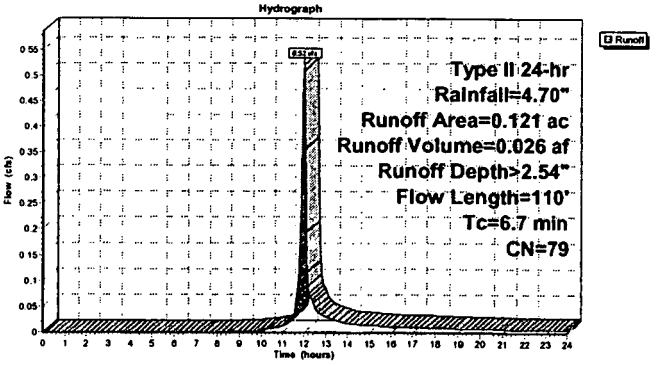
Runoff = 0.52 cfs @ 11.98 hrs, Volume= 0.026 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.121	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	110	0.0800	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment CC: runon east of OSDF



Subcatchment D: vegetated final cover

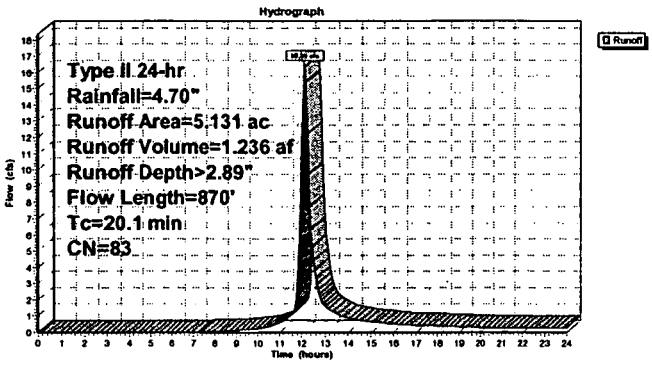
Runoff = 16.39 cfs @ 12.13 hrs, Volume= 1.236 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.131	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.4	170	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.7	250	0.0045	2.4	16.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.29' Z= 5.0 & 3.0 '/' Top.W=10.32' n= 0.030
0.9	150	0.0050	2.9	25.90	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.59' Z= 4.0 & 3.0 '/' Top.W=11.13' n= 0.030
20.1	870	Total			

Subcatchment D: vegetated final cover



Subcatchment DDR: unvegetated final cover system

[49] Hint: Tc<2dt may require smaller dt

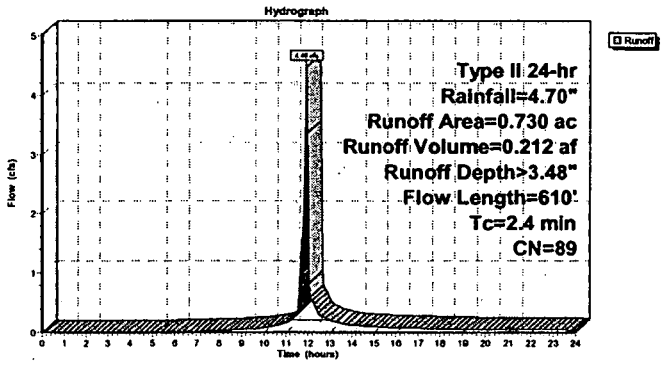
Runoff = 4.49 cfs @ 11.92 hrs, Volume= 0.212 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.730	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	300	0.1430	3.4		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.2	80	0.1430	6.1		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	25	0.1667	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.5	190	0.0071	7.0	494.58	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.50' Z= 3.0 & 4.0 '/' Top.W=31.50' n= 0.030
2.4	610	Total			

Subcatchment DDR: unvegetated final cover system



Subcatchment E: vegetated final cover

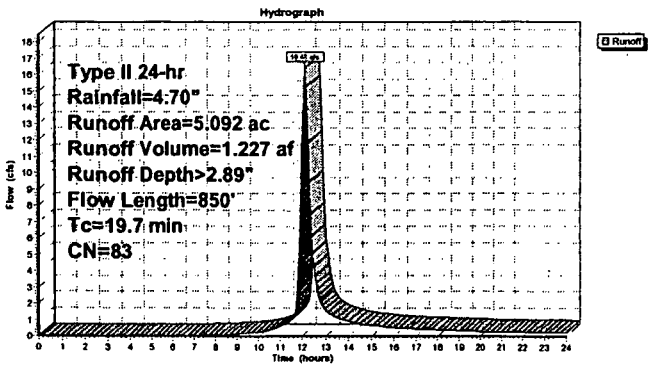
Runoff = 16.48 cfs @ 12.12 hrs, Volume= 1.227 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.092	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.4	170	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.2	380	0.0050	2.9	26.33	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.60' Z= 4.0 & 3.0 '/' Top.W=11.20' n= 0.030
19.7	850	Total			

Subcatchment E: vegetated final cover



Subcatchment EE: runon north of borrow area

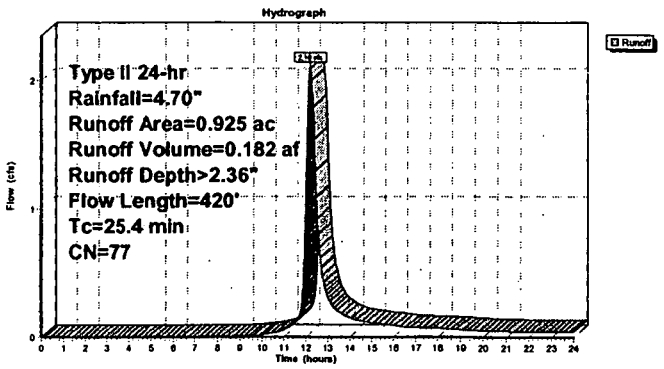
Runoff = 2.10 cfs @ 12.19 hrs, Volume= 0.182 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.925	77	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.8	300	0.0230	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.5	80	0.0230	2.4		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	40	0.0100	7.6	364.40	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.00' Z= 3.0 '/' Top.W=24.00' n= 0.030
25.4	420	Total			

Subcatchment EE: runon north of borrow area



Subcatchment F: vegetated final cover

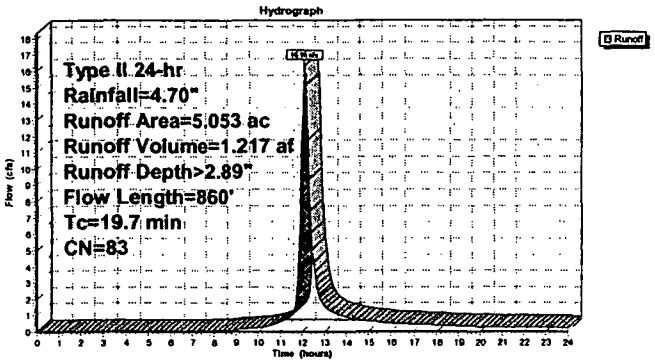
Runoff = 16.35 cfs @ 12.12 hrs, Volume= 1.217 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.053	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.4	170	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.2	390	0.0050	2.9	26.33	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.60' Z= 4.0 & 3.0 '/' Top.W=11.20' n= 0.030
19.7	860	Total			

Subcatchment F: vegetated final cover



Subcatchment FFR: unvegetated final cover system

[49] Hint: Tc<2dt may require smaller dt

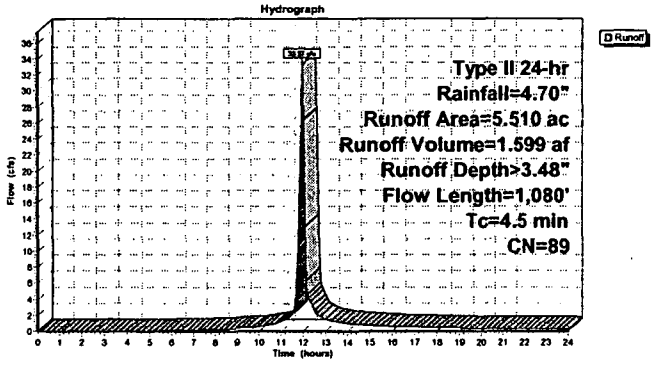
Runoff = 33.37 cfs @ 11.95 hrs, Volume= 1.599 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.510	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	70	0.0500	1.7		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.6	90	0.1000	2.3		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.8	140	0.1667	3.1		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.3	135	0.1667	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.1	20	0.1667	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.9	610	0.0050	5.5	393.21	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.00' Z= 6.0 & 3.0 '/' Top.W=36.00' n= 0.030
4.5	1,080	Total			

Subcatchment FFR: unvegetated final cover system



Subcatchment G: vegetated final cover

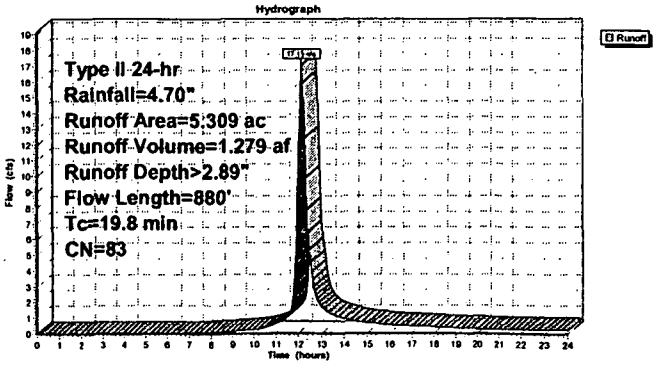
Runoff = 17.13 cfs @ 12.12 hrs, Volume= 1.279 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.309	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.4	170	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.3	410	0.0050	2.9	26.33	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.60' Z= 4.0 & 3.0 '/' Top.W=11.20' n= 0.030
19.8	880	Total			

Subcatchment G: vegetated final cover



Subcatchment GGR: construction laydown area

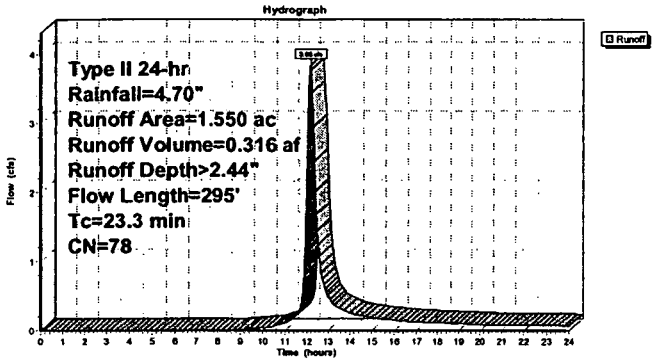
Runoff = 3.86 cfs @ 12.17 hrs, Volume= 0.316 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.550	78	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	240	0.0180	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.5	55	0.0145	1.9		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.3	295	Total			

Subcatchment GGR: construction laydown area



Subcatchment HH: runon north of borrow area

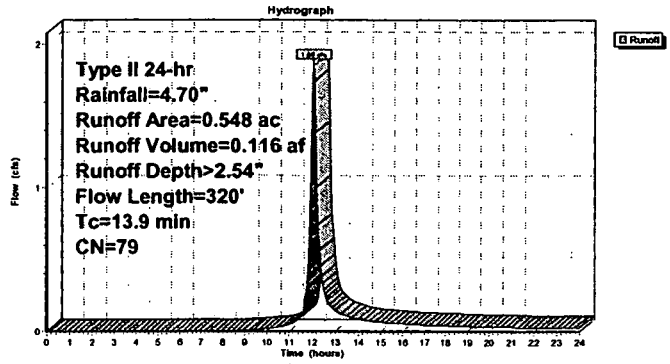
Runoff = 1.86 cfs @ 12.06 hrs, Volume= 0.116 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.548	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	90	0.0100	0.1		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.7	230	0.0045	5.1	352.87	Trap/Vee/Rect Channel Flow, Bot.W=20.00' D=2.50' Z= 3.0 '/' Top.W=35.00' n= 0.030
13.9	320	Total			

Subcatchment HH: runon north of borrow area



Subcatchment HR: un-vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

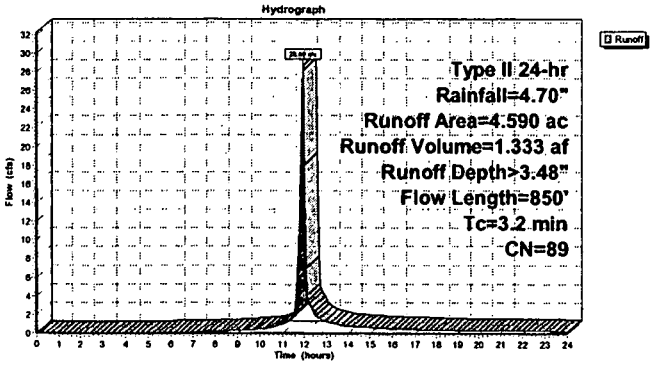
Runoff = 28.80 cfs @ 11.93 hrs, Volume= 1.333 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
4.590	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	90	0.0500	1.8		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
0.4	50	0.1000	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
0.8	150	0.1700	3.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
0.4	160	0.1700	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	400	0.0100	9.8	1,429.92	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=5.70' Z= 6.0 & 3.0 '/' Top.W=51.30' n= 0.030
3.2	850	Total			

Subcatchment HR: un-vegetated final cover



Subcatchment II: runon area to borrow area

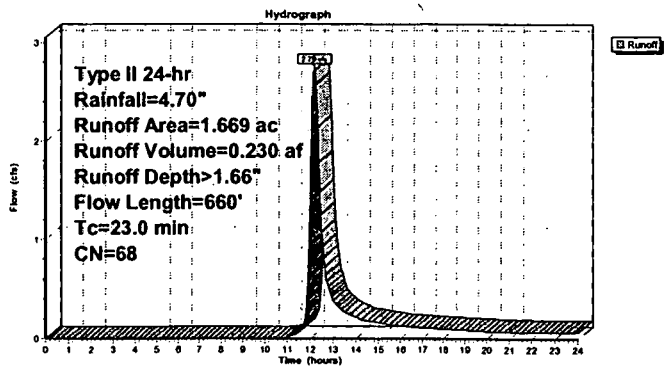
Runoff = 2.73 cfs @ 12.17 hrs, Volume= 0.230 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.669	68	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	210	0.0400	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.2	70	0.1660	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
7.9	380	0.0025	0.8		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
23.0	660	Total			

Subcatchment II: runon area to borrow area



Subcatchment IR: un vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

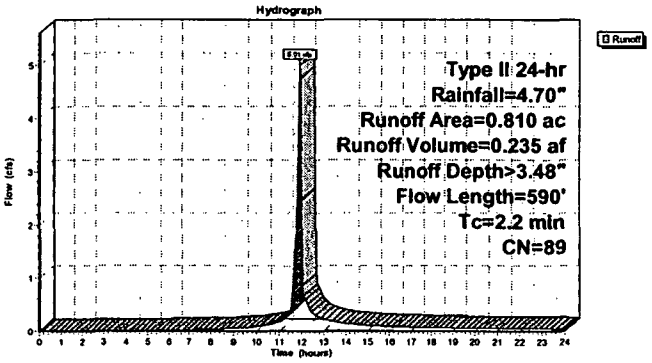
Runoff = 5.01 cfs @ 11.92 hrs, Volume= 0.235 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.810	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	300	0.1430	3.4		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
0.2	80	0.1430	6.1		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	25	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	170	0.0083	8.9	1,045.70	Trap/Vee/Rect Channel Flow, Bot.W=6.00' D=5.00' Z= 3.0 & 4.0 '/' Top.W=41.00' n= 0.030
2.2	590	Total			

Subcatchment IR: un vegetated final cover



Subcatchment JJ: runon area to borrow area

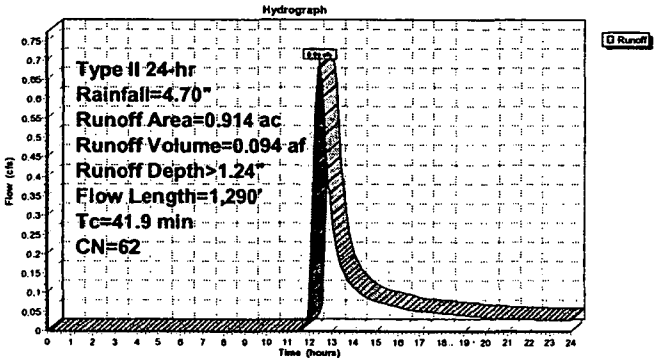
Runoff = 0.69 cfs @ 12.44 hrs, Volume= 0.094 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.914	62	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	300	0.0250	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.3	40	0.0250	2.5		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	110	0.1660	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.4	840	0.0025	0.8		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
41.9	1,290	Total			

Subcatchment JJ: runon area to borrow area



Subcatchment JR: un-vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

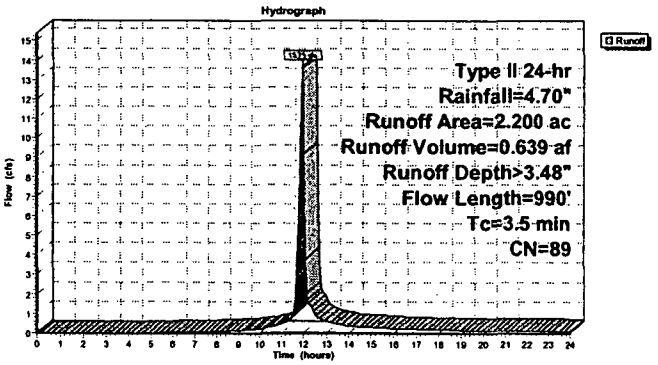
Runoff = 13.73 cfs @ 11.94 hrs, Volume= 0.639 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.200	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	40	0.0500	1.5		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
0.5	60	0.1000	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
1.0	200	0.1667	3.3		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.60"
0.3	115	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0200	2.9		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	30	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.1	530	0.0050	8.3	2,114.41	Trap/Vee/Rect Channel Flow, Bot.W=10.00' D=6.50' Z= 6.0 & 3.0 '/' Top.W=68.50' n= 0.030
3.5	990	Total			

Subcatchment JR: un-vegetated final cover



Subcatchment KK: runon area to borrow area

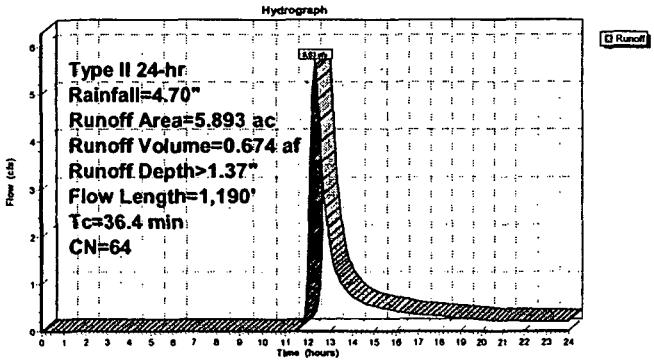
Runoff = 5.63 cfs @ 12.36 hrs, Volume= 0.674 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.893	64	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	300	0.0280	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
1.3	150	0.0140	1.9		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	110	0.1660	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
11.9	630	0.0030	0.9		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
36.4	1,190	Total			

Subcatchment KK: runon area to borrow area



Subcatchment L: runon north of borrow area

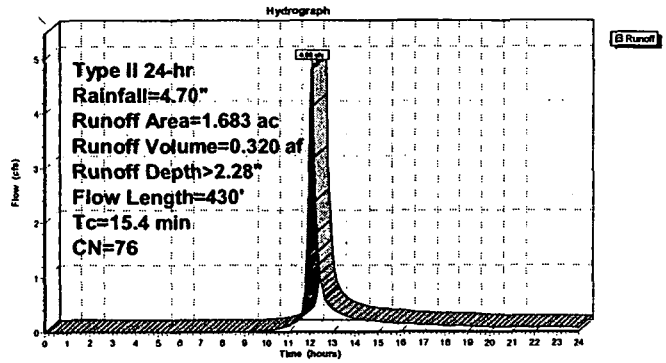
Runoff = 4.88 cfs @ 12.08 hrs, Volume= 0.320 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.683	76	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	140	0.0200	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
1.2	290	0.0075	4.1	49.70	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.00' Z= 3.0 '/' Top.W=12.00' n= 0.030
15.4	430	Total			

Subcatchment L: runon north of borrow area



Subcatchment LL: runoff area

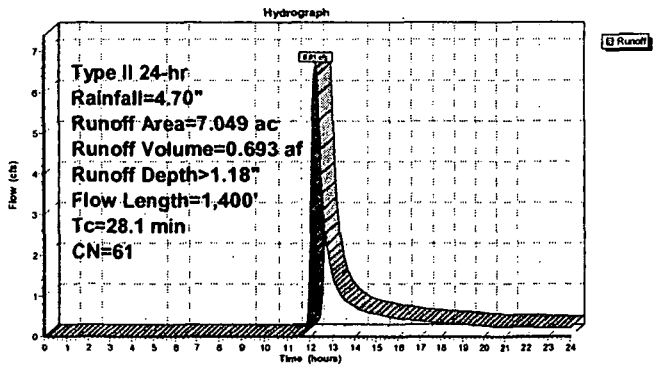
Runoff = 6.61 cfs @ 12.25 hrs, Volume= 0.693 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
7.049	61	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.3	300	0.0240	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
1.3	200	0.0240	2.5		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.5	900	0.0090	5.9	160.52	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.00' Z= 3.0 '/' Top.W=18.00' n= 0.030
28.1	1,400	Total			

Subcatchment LL: runoff area



Subcatchment M: runon north of borrow area

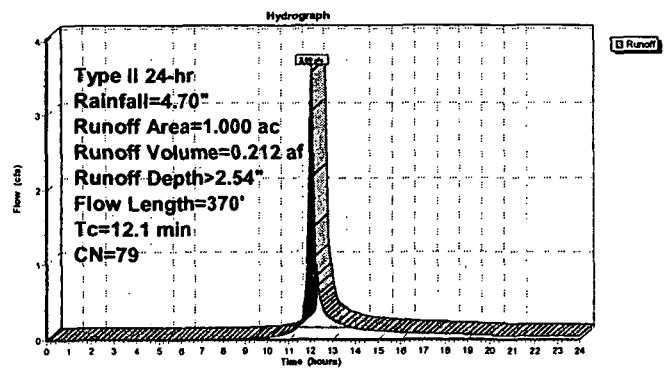
Runoff = 3.60 cfs @ 12.04 hrs, Volume= 0.212 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.000	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	170	0.0500	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.6	200	0.0045	5.1	352.87	Trap/Vee/Rect Channel Flow, Bot.W=20.00' D=2.50' Z= 3.0 '/' Top.W=35.00' n= 0.030
12.1	370	Total			

Subcatchment M: runon north of borrow area



Subcatchment MM: runoff area

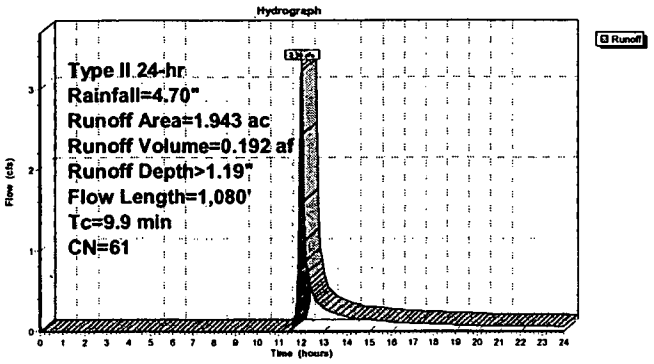
Runoff = 3.30 cfs @ 12.03 hrs, Volume= 0.192 af, Depth> 1.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.943	61	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0700	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
3.3	980	0.0060	4.9	200.34	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.00' Z= 5.0 & 4.0 '/' Top.W=27.00' n= 0.030
9.9	1,080	Total			

Subcatchment MM: runoff area



Subcatchment N: direct runon to pond

[49] Hint: Tc<2dt may require smaller dt

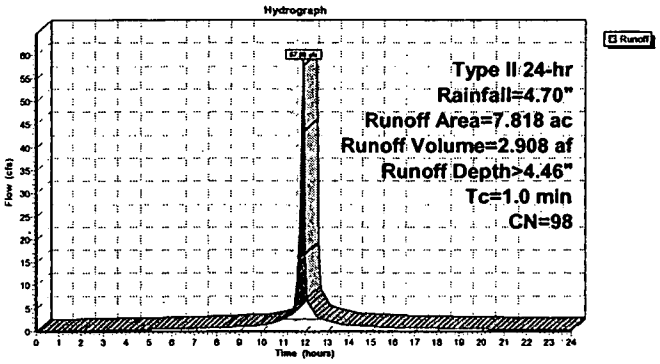
Runoff = 57.89 cfs @ 11.90 hrs, Volume= 2.908 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
7.818	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,

Subcatchment N: direct runon to pond



Subcatchment NN: runoff area

[49] Hint: Tc<2dt may require smaller dt

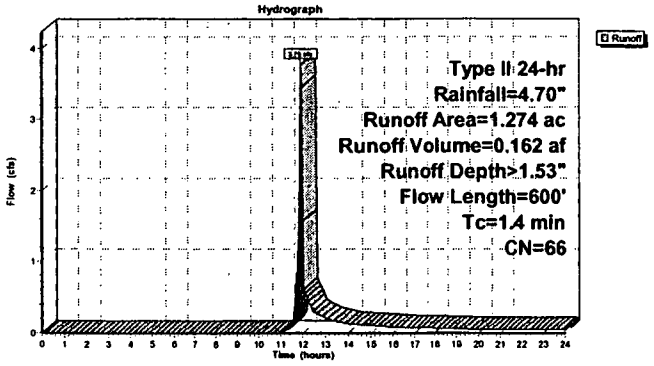
Runoff = 3.78 cfs @ 11.92 hrs, Volume= 0.162 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.274	66	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	600	0.0130	7.1	192.92	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.00' Z= 3.0 '/' Top.W=18.00' n= 0.030

Subcatchment NN: runoff area



Subcatchment O: runon north of borrow area

[49] Hint: Tc<2dt may require smaller dt

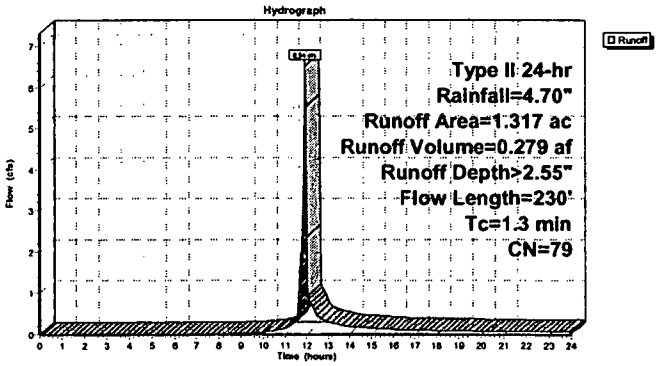
Runoff = 6.54 cfs @ 11.91 hrs, Volume= 0.279 af, Depth> 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.317	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	230	0.0086	2.9	14.28	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=1.00' Z= 5.0 '/' Top.W=10.00' n= 0.030

Subcatchment O: runon north of borrow area



Subcatchment OO: runon area to borrow area

[49] Hint: Tc<2dt may require smaller dt

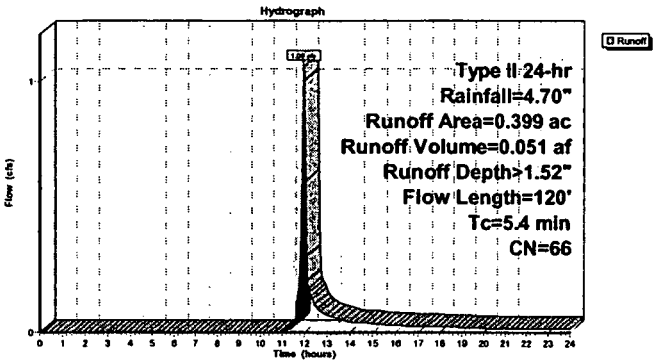
Runoff = 1.06 cfs @ 11.97 hrs, Volume= 0.051 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.399	66	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	120	0.1660	0.4		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment OO: runon area to borrow area



Subcatchment P: runon north of borrow area

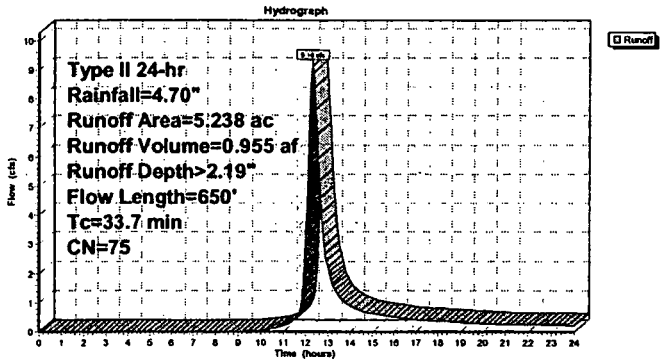
Runoff = 9.16 cfs @ 12.30 hrs, Volume= 0.955 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.238	75	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.4	300	0.0150	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
4.3	350	0.0070	1.3		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
33.7	650	Total			

Subcatchment P: runon north of borrow area



Subcatchment PP: vegetated borrow area

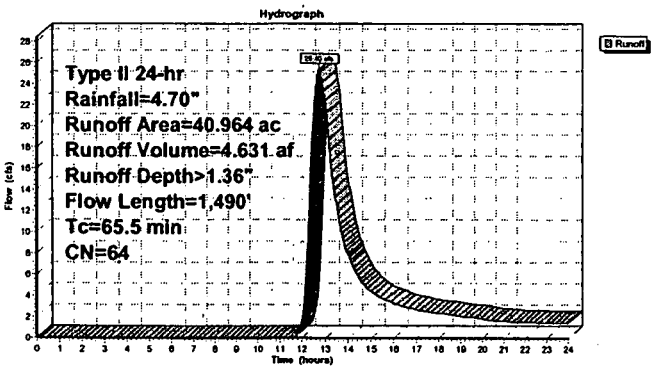
Runoff = 25.40 cfs @ 12.75 hrs, Volume= 4.631 af, Depth> 1.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
40.964	64	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	150	0.1660	0.4		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
34.5	150	0.0025	0.1		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
24.6	1,190	0.0025	0.8		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
65.5	1,490	Total			

Subcatchment PP: vegetated borrow area



Subcatchment Q: runon north of borrow area

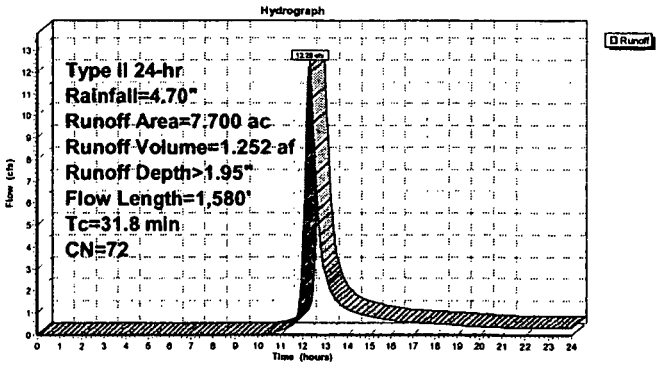
Runoff = 12.29 cfs @ 12.28 hrs, Volume= 1.252 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
7.700	72	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.6	300	0.0260	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
8.2	1,280	0.0260	2.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
31.8	1,580	Total			

Subcatchment Q: runon north of borrow area



Subcatchment R: runon north of borrow area

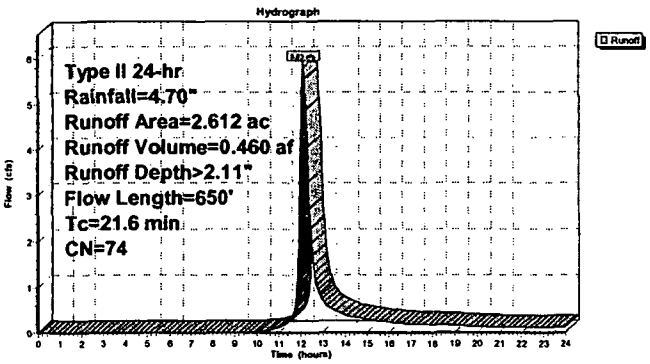
Runoff = 5.83 cfs @ 12.15 hrs, Volume= 0.460 af, Depth> 2.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.612	74	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.8	300	0.0400	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
1.8	350	0.0400	3.2		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
21.6	650	Total			

Subcatchment R: runon north of borrow area



Subcatchment S: runon north of borrow area

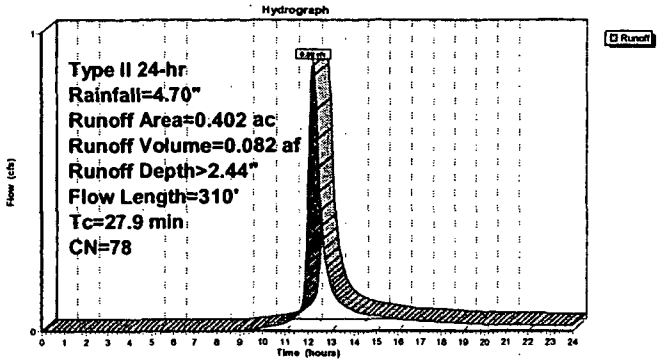
Runoff = 0.89 cfs @ 12.22 hrs, Volume= 0.082 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.402	78	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.8	280	0.0150	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.1	30	0.0100	6.3	169.20	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.00' Z= 3.0 '/' Top.W=18.00' n= 0.030
27.9	310	Total			

Subcatchment S: runon north of borrow area



Subcatchment U: runon east of OSDF

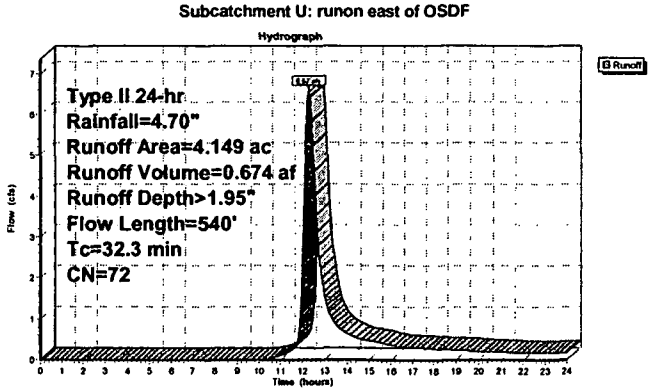
Runoff = 6.57 cfs @ 12.28 hrs, Volume= 0.674 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
4.149	72	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.2	300	0.0140	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
2.1	240	0.0140	1.9		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
32.3	540	Total			

Subcatchment U: runon east of OSDF



Subcatchment V: direct runon to pond

[49] Hint: Tc<2dt may require smaller dt

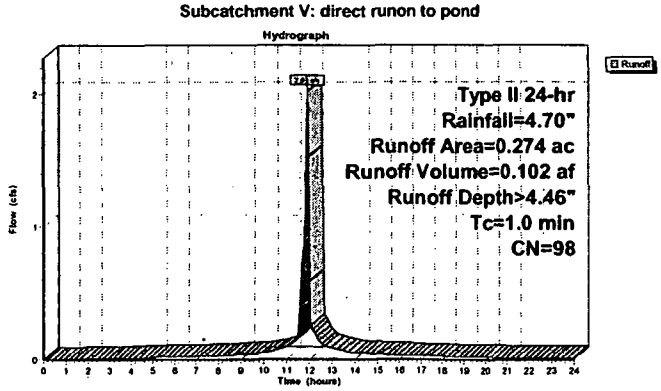
Runoff = 2.03 cfs @ 11.90 hrs, Volume= 0.102 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.274	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,

Subcatchment V: direct runon to pond



Subcatchment W: runon east of OSDF

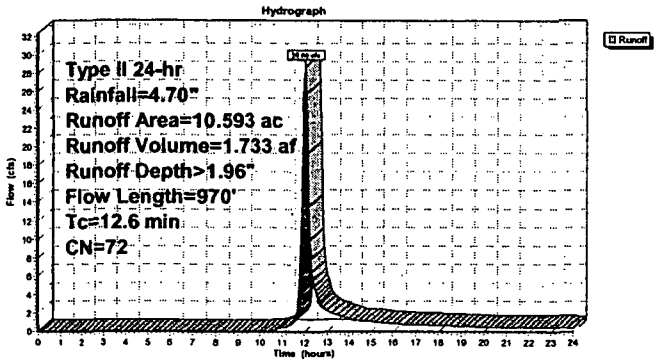
Runoff = 28.88 cfs @ 12.05 hrs, Volume= 1.733 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
10.593	72	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	300	0.1780	0.5		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
1.0	400	0.1780	6.8		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	270	0.0114	6.9	1,025.43	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=3.00' Z= 3.0 & 30.0 '/' Top.W=99.00' n= 0.030
12.6	970	Total			

Subcatchment W: runon east of OSDF



Subcatchment X: runon east of OSDF

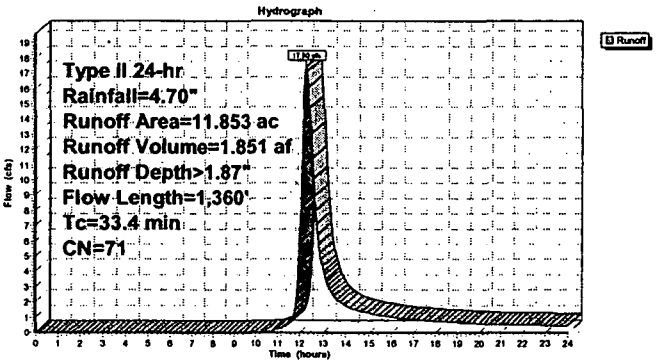
Runoff = 17.50 cfs @ 12.30 hrs, Volume= 1.851 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
11.853	71	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.7	300	0.0190	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
5.5	730	0.0190	2.2		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.2	330	0.0100	4.8	57.39	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.00' Z= 3.0 '/' Top.W=12.00' n= 0.030
33.4	1,360	Total			

Subcatchment X: runon east of OSDF



Subcatchment Y: runon area east of OSDF

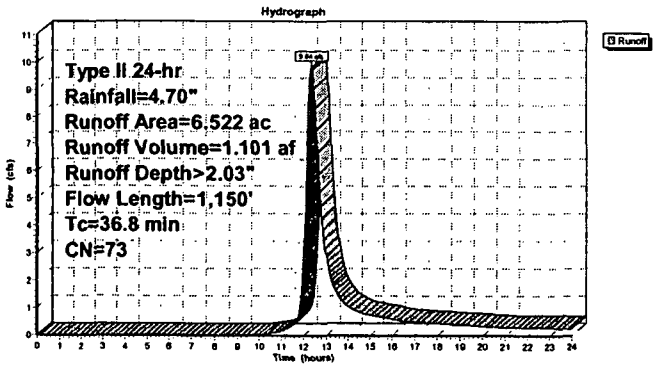
Runoff = 9.84 cfs @ 12.34 hrs, Volume= 1.101 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
6.522	73	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	300	0.0130	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
4.6	510	0.0130	1.8		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.1	340	0.0110	5.1	92.00	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.00' Z= 5.0 & 4.0 '/' Top.W=18.00' n= 0.030
36.8	1,150	Total			

Subcatchment Y: runon area east of OSDF



Subcatchment Z: runon area east of OSDF

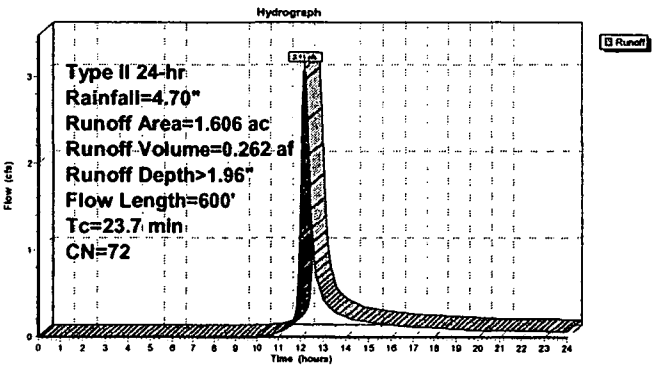
Runoff = 3.11 cfs @ 12.18 hrs, Volume= 0.262 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.606	72	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.0	300	0.0310	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
1.5	250	0.0310	2.8		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.2	50	0.0070	4.1	73.39	Trap/Vee/Rect Channel Flow, Bot.W=0.00' D=2.00' Z= 5.0 & 4.0 '/' Top.W=18.00' n= 0.030
23.7	600	Total			

Subcatchment Z: runon area east of OSDF



Reach 1: east drainage channel

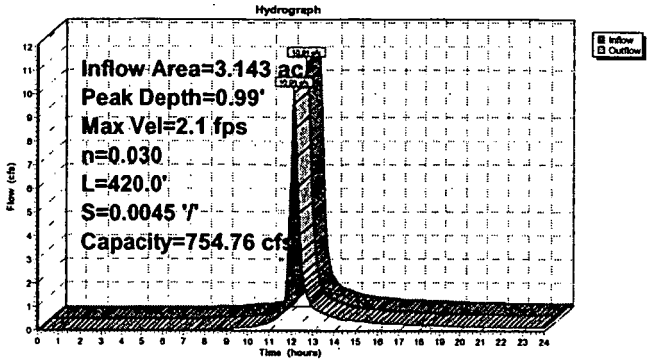
[65] Warning: Inlet elevation not specified

Inflow Area = 3.143 ac, Inflow Depth > 2.90"
Inflow = 10.81 cfs @ 12.01 hrs, Volume= 0.758 af
Outflow = 10.06 cfs @ 12.11 hrs, Volume= 0.756 af, Atten= 7%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.1 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 8.5 min

Peak Depth= 0.99' @ 12.05 hrs
Capacity at bank full= 754.76 cfs
0.00' x 5.00' deep channel, n= 0.030
Side Slope Z-value= 6.0 4.0 '/' Top Width= 50.00'
Length= 420.0' Slope= 0.0045 '/'

Reach 1: east drainage channel



Reach 1R: (new node)

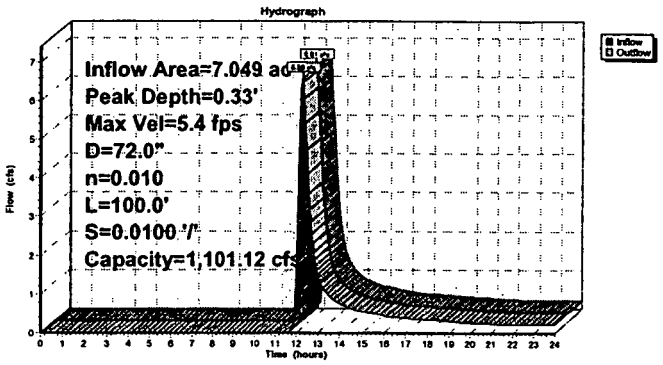
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 7.049 ac, Inflow Depth > 1.18"
Inflow = 6.61 cfs @ 12.25 hrs, Volume= 0.693 af
Outflow = 6.59 cfs @ 12.26 hrs, Volume= 0.693 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.4 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.33' @ 12.26 hrs
Capacity at bank full= 1,101.12 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.010
Length= 100.0' Slope= 0.0100 '/'

Reach 1R: (new node)



Reach 2: east drainage channel

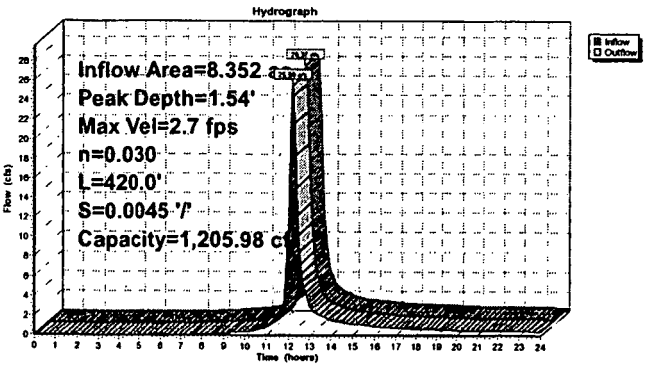
[65] Warning: Inlet elevation not specified

Inflow Area = 8.352 ac, Inflow Depth > 2.89"
Inflow = 26.37 cfs @ 12.12 hrs, Volume= 2.010 af
Outflow = 25.59 cfs @ 12.20 hrs, Volume= 2.005 af, Atten= 3%, Lag= 4.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 6.3 min

Peak Depth= 1.54' @ 12.16 hrs
Capacity at bank full= 1,205.98 cfs
0.00' x 6.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 52.00'
Length= 420.0' Slope= 0.0045 '/'

Reach 2: east drainage channel



Reach 2R: (new node)

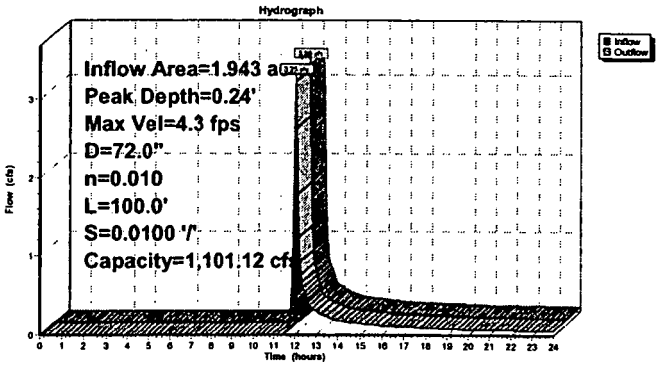
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 1.943 ac, Inflow Depth > 1.19"
Inflow = 3.30 cfs @ 12.03 hrs, Volume= 0.192 af
Outflow = 3.25 cfs @ 12.04 hrs, Volume= 0.192 af, Atten= 1%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.3 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.24' @ 12.04 hrs
Capacity at bank full= 1,101.12 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.010
Length= 100.0' Slope= 0.0100 '/'

Reach 2R: (new node)



Reach 3: east drainage channel

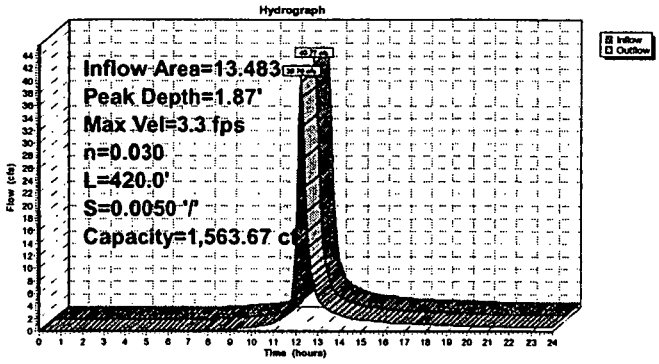
[65] Warning: Inlet elevation not specified

Inflow Area = 13.483 ac, Inflow Depth > 2.88"
Inflow = 40.77 cfs @ 12.17 hrs, Volume= 3.241 af
Outflow = 39.76 cfs @ 12.24 hrs, Volume= 3.234 af, Atten= 2%, Lag= 4.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.3 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 5.3 min

Peak Depth= 1.87' @ 12.20 hrs
Capacity at bank full= 1,563.67 cfs
0.00' x 7.40' deep channel, n= 0.030
Side Slope Z-value= 3.0 4.0 '/' Top Width= 51.80'
Length= 420.0' Slope= 0.0050 '/'

Reach 3: east drainage channel



Reach 3R: (new node)

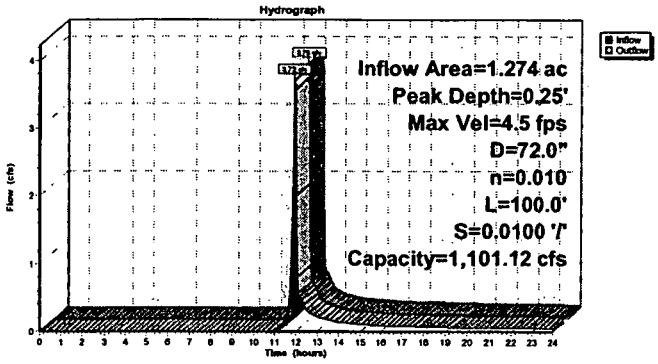
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 1.274 ac, Inflow Depth > 1.53"
Inflow = 3.78 cfs @ 11.92 hrs, Volume= 0.162 af
Outflow = 3.72 cfs @ 11.93 hrs, Volume= 0.162 af, Atten= 2%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.25' @ 11.92 hrs
Capacity at bank full= 1,101.12 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.010
Length= 100.0' Slope= 0.0100 '/'

Reach 3R: (new node)



Reach 4: east drainage channel

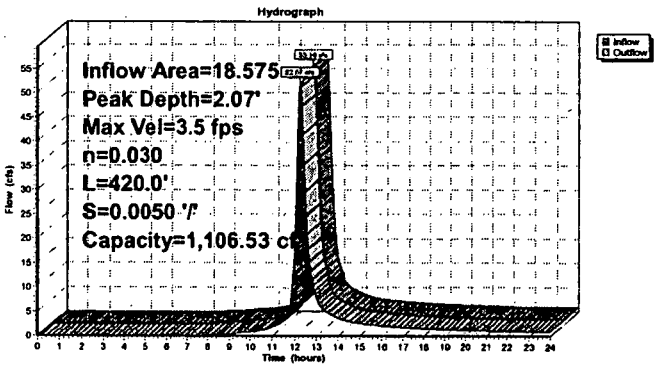
[65] Warning: Inlet elevation not specified

Inflow Area = 18.575 ac, Inflow Depth > 2.88"
Inflow = 53.10 cfs @ 12.21 hrs, Volume= 4.461 af
Outflow = 52.07 cfs @ 12.27 hrs, Volume= 4.451 af, Atten= 2%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 4.9 min

Peak Depth= 2.07' @ 12.23 hrs
Capacity at bank full= 1,106.53 cfs
0.00' x 6.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 4.0 '/' Top Width= 45.50'
Length= 420.0' Slope= 0.0050 '/'

Reach 4: east drainage channel



Reach 5: east drainage channel

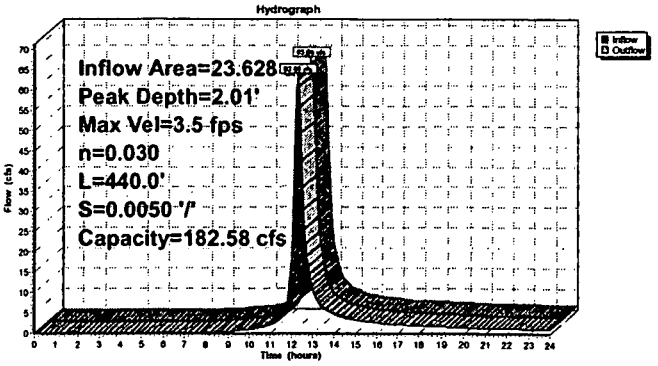
[65] Warning: Inlet elevation not specified

Inflow Area = 23.628 ac, Inflow Depth > 2.88"
Inflow = 63.69 cfs @ 12.24 hrs, Volume= 5.669 af
Outflow = 62.69 cfs @ 12.30 hrs, Volume= 5.656 af, Atten= 2%, Lag= 3.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 5.1 min

Peak Depth= 2.01' @ 12.27 hrs
Capacity at bank full= 182.58 cfs
0.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 6.0 '/' Top Width= 27.00'
Length= 440.0' Slope= 0.0050 '/'

Reach 5: east drainage channel



Reach 6: east drainage channel

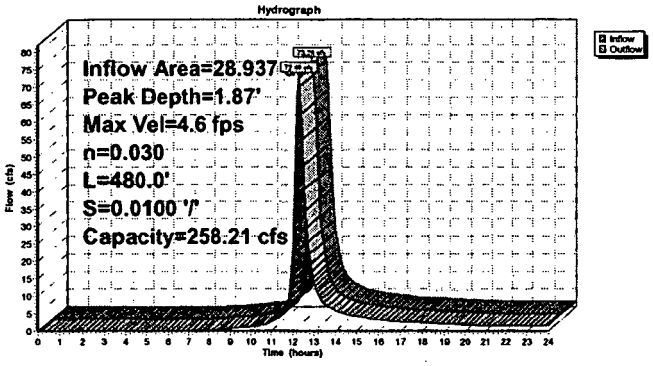
[65] Warning: Inlet elevation not specified

Inflow Area = 28.937 ac, Inflow Depth > 2.88"
Inflow = 73.28 cfs @ 12.27 hrs, Volume= 6.935 af
Outflow = 72.46 cfs @ 12.32 hrs, Volume= 6.923 af, Atten= 1%, Lag= 3.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.6 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 4.1 min

Peak Depth= 1.87' @ 12.29 hrs
Capacity at bank full= 258.21 cfs
0.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 6.0 '/' Top Width= 27.00'
Length= 480.0' Slope= 0.0100 '/'

Reach 6: east drainage channel



Reach 7R: runoff diversion channel

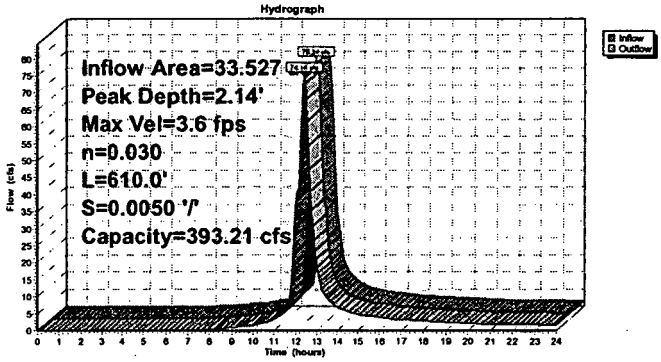
[65] Warning: Inlet elevation not specified

Inflow Area = 33.527 ac, Inflow Depth > 2.95"
Inflow = 75.24 cfs @ 12.32 hrs, Volume= 8.256 af
Outflow = 74.18 cfs @ 12.40 hrs, Volume= 8.233 af, Atten= 1%, Lag= 5.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 6.9 min

Peak Depth= 2.14' @ 12.36 hrs
Capacity at bank full= 393.21 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 6.0 '/' Top Width= 36.00'
Length= 610.0' Slope= 0.0050 '/'

Reach 7R: runoff diversion channel



Reach 8R: runoff diversion channel

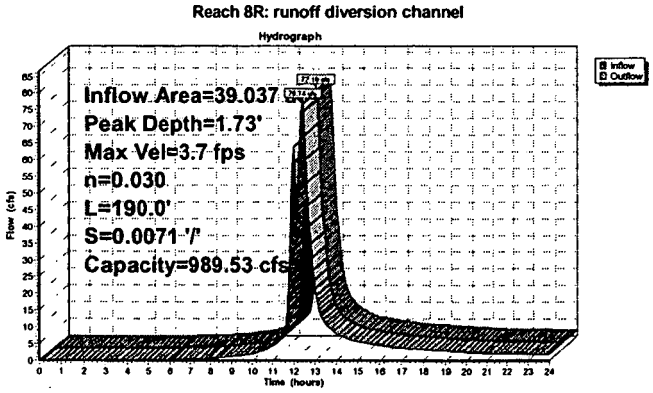
[65] Warning: Inlet elevation not specified

Inflow Area = 39.037 ac, Inflow Depth > 3.02"
Inflow = 77.19 cfs @ 12.40 hrs, Volume= 9.832 af
Outflow = 76.74 cfs @ 12.42 hrs, Volume= 9.825 af, Atten= 1%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 2.0 min

Peak Depth= 1.73' @ 12.41 hrs
Capacity at bank full= 989.53 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
0.00' x 4.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 4.0 '/' Top Width= 31.50'
Length= 190.0' Slope= 0.0071 '/'

Reach 8R: runoff diversion channel



Reach 9R: runoff diversion channel

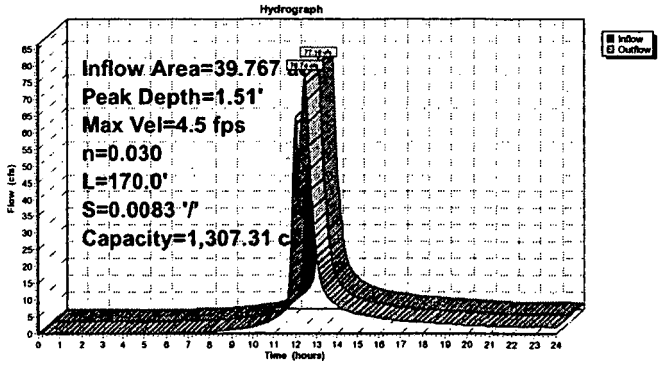
[65] Warning: Inlet elevation not specified

Inflow Area = 39.767 ac, Inflow Depth > 3.03"
Inflow = 77.10 cfs @ 12.42 hrs, Volume= 10.037 af
Outflow = 76.74 cfs @ 12.44 hrs, Volume= 10.030 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 1.7 min

Peak Depth= 1.51' @ 12.43 hrs
Capacity at bank full= 1,307.31 cfs
6.00' x 5.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 4.0 '/' Top Width= 44.50'
Length= 170.0' Slope= 0.0083 '/'

Reach 9R: runoff diversion channel



Reach 10AR: (new node)

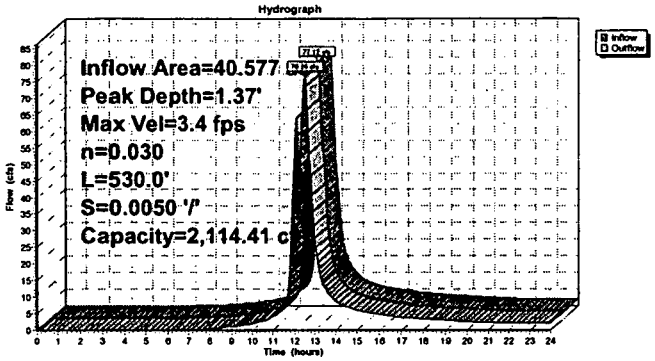
[65] Warning: Inlet elevation not specified

Inflow Area = 40.577 ac, Inflow Depth > 3.04"
Inflow = 77.12 cfs @ 12.44 hrs, Volume= 10.265 af
Outflow = 76.26 cfs @ 12.52 hrs, Volume= 10.235 af, Atten= 1%, Lag= 4.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 7.1 min

Peak Depth= 1.37' @ 12.47 hrs
Capacity at bank full= 2,114.41 cfs
10.00' x 6.50' deep channel, n= 0.030
Side Slope Z-value= 6.0 3.0 '/' Top Width= 68.50'
Length= 530.0' Slope= 0.0050 '/'

Reach 10AR: (new node)



Reach 11: new CMP arch

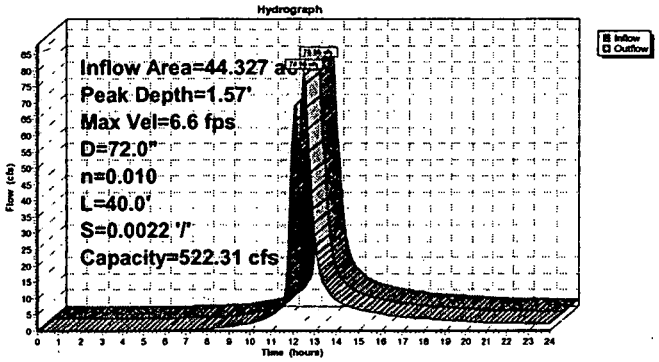
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 44.327 ac, Inflow Depth > 3.03"
Inflow = 78.55 cfs @ 12.51 hrs, Volume= 11.189 af
Outflow = 78.50 cfs @ 12.52 hrs, Volume= 11.188 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.6 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.6 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.57' @ 12.51 hrs
Capacity at bank full= 522.31 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.010
Length= 40.0' Slope= 0.0022 '/'

Reach 11: new CMP arch



Reach 12R: runoff diversion channel

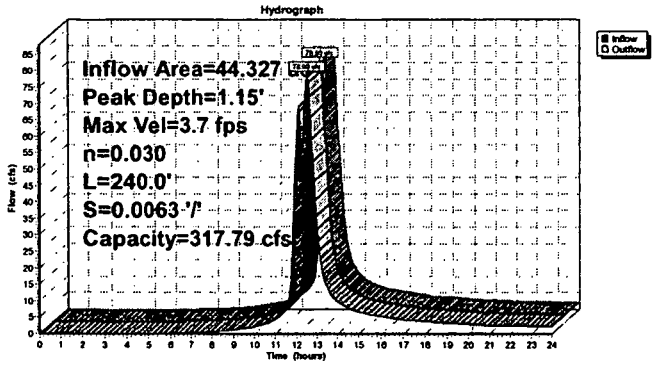
[65] Warning: Inlet elevation not specified

Inflow Area = 44.327 ac, Inflow Depth > 3.03"
Inflow = 78.50 cfs @ 12.52 hrs, Volume= 11.188 af
Outflow = 78.00 cfs @ 12.55 hrs, Volume= 11.174 af, Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 3.2 min

Peak Depth= 1.15' @ 12.53 hrs
Capacity at bank full= 317.79 cfs
14.00' x 2.45' deep channel, n= 0.030
Side Slope Z-value= 3.0 4.3 '/' Top Width= 31.89'
Length= 240.0' Slope= 0.0063 '/'

Reach 12R: runoff diversion channel



Reach 13R: runoff diversion channel

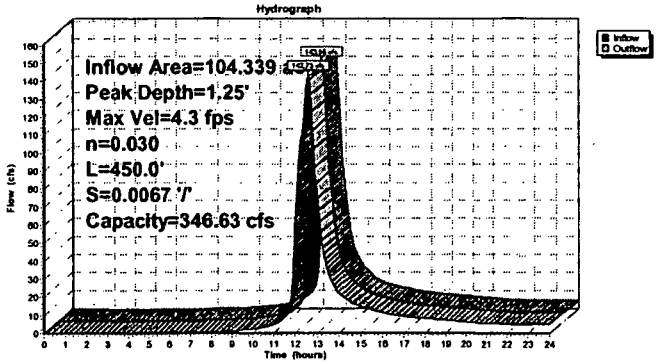
[65] Warning: Inlet elevation not specified

Inflow Area = 104.339 ac, Inflow Depth > 2.43"
Inflow = 143.58 cfs @ 12.53 hrs, Volume= 21.140 af
Outflow = 142.73 cfs @ 12.58 hrs, Volume= 21.088 af, Atten= 1%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.3 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 5.5 min

Peak Depth= 1.25' @ 12.55 hrs
Capacity at bank full= 346.63 cfs
23.11' x 2.06' deep channel, n= 0.030
Side Slope Z-value= 2.3 4.0 '/' Top Width= 36.09'
Length= 450.0' Slope= 0.0067 '/'

Reach 13R: runoff diversion channel



Reach 14: east runon channel

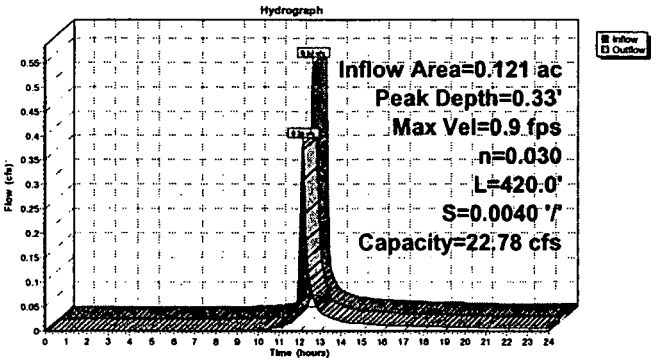
[65] Warning: Inlet elevation not specified

Inflow Area = 0.121 ac, Inflow Depth > 2.54"
Inflow = 0.52 cfs @ 11.98 hrs, Volume= 0.026 af
Outflow = 0.38 cfs @ 12.17 hrs, Volume= 0.025 af, Atten= 27%, Lag= 11.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.9 fps, Min. Travel Time= 7.6 min
Avg. Velocity = 0.4 fps, Avg. Travel Time= 19.1 min

Peak Depth= 0.33' @ 12.04 hrs
Capacity at bank full= 22.78 cfs
0.00' x 1.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 12.00'
Length= 420.0' Slope= 0.0040 '/'

Reach 14: east runon channel



Reach 15: east runon channel

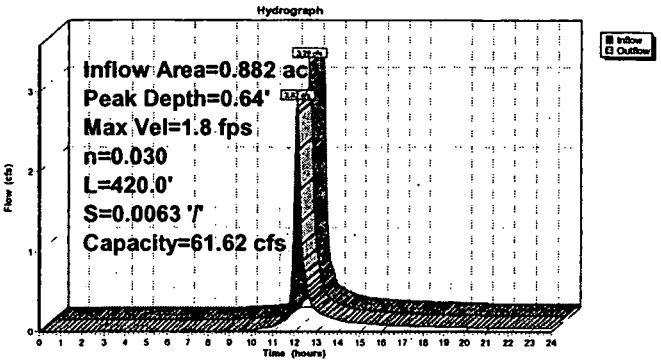
[65] Warning: Inlet elevation not specified

Inflow Area = 0.882 ac, Inflow Depth > 2.54"
Inflow = 3.20 cfs @ 12.01 hrs, Volume= 0.186 af
Outflow = 2.82 cfs @ 12.12 hrs, Volume= 0.186 af, Atten= 12%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.8 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 9.9 min

Peak Depth= 0.64' @ 12.05 hrs
Capacity at bank full= 61.62 cfs
0.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 5.0 '/' Top Width= 16.00'
Length= 420.0' Slope= 0.0063 '/'

Reach 15: east runon channel



Reach 16: east runon channel

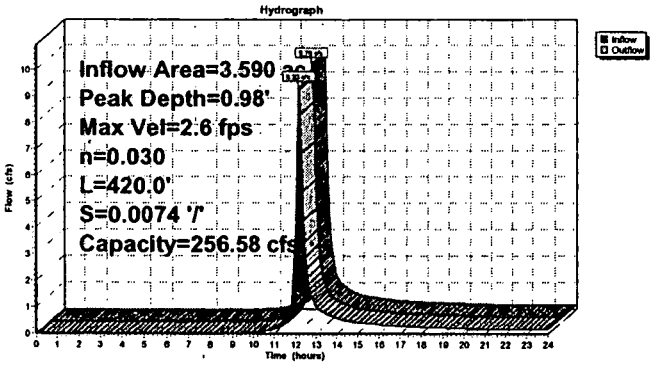
[65] Warning: Inlet elevation not specified

Inflow Area = 3.590 ac, Inflow Depth > 2.22"
Inflow = 9.76 cfs @ 12.10 hrs, Volume= 0.664 af
Outflow = 9.33 cfs @ 12.19 hrs, Volume= 0.661 af, Atten= 4%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 6.7 min

Peak Depth= 0.98' @ 12.14 hrs
Capacity at bank full= 256.58 cfs
0.00' x 3.40' deep channel, n= 0.030
Side Slope Z-value= 2.5 5.0 '/' Top Width= 25.50'
Length= 420.0' Slope= 0.0074 '/'

Reach 16: east runon channel



Reach 17: east runon channel

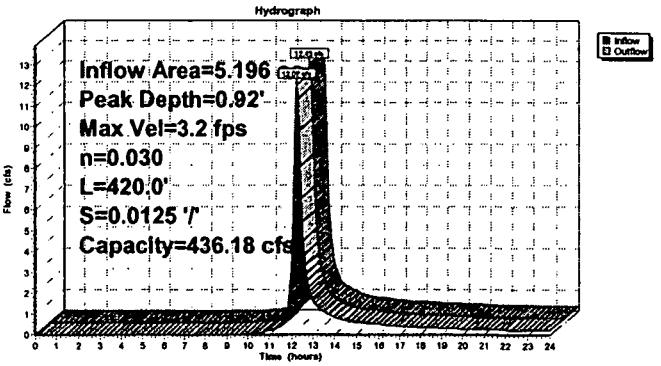
[65] Warning: Inlet elevation not specified

Inflow Area = 5.196 ac, Inflow Depth > 2.13"
Inflow = 12.43 cfs @ 12.18 hrs, Volume= 0.923 af
Outflow = 12.07 cfs @ 12.25 hrs, Volume= 0.921 af, Atten= 3%, Lag= 4.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.2 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 5.3 min

Peak Depth= 0.92' @ 12.21 hrs
Capacity at bank full= 436.18 cfs
0.00' x 3.50' deep channel, n= 0.030
Side Slope Z-value= 4.0 5.0 '/' Top Width= 31.50'
Length= 420.0' Slope= 0.0125 '/'

Reach 17: east runon channel



Reach 18: east runon channel

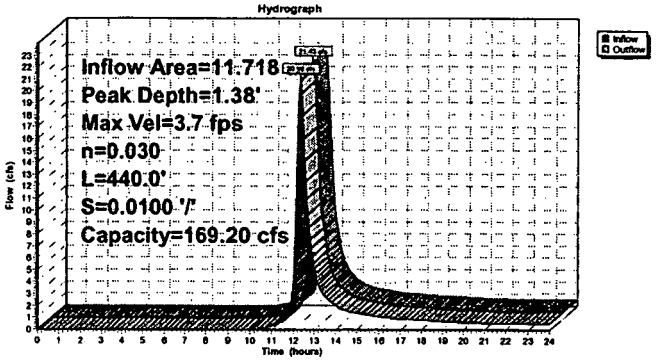
[65] Warning: Inlet elevation not specified

Inflow Area = 11.718 ac, Inflow Depth > 2.07"
Inflow = 21.43 cfs @ 12.27 hrs, Volume= 2.022 af
Outflow = 20.99 cfs @ 12.33 hrs, Volume= 2.017 af, Atten= 2%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 4.5 min

Peak Depth= 1.38' @ 12.30 hrs
Capacity at bank full= 169.20 cfs
0.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 440.0' Slope= 0.0100 '/'

Reach 18: east runon channel



Reach 19: east runon channel

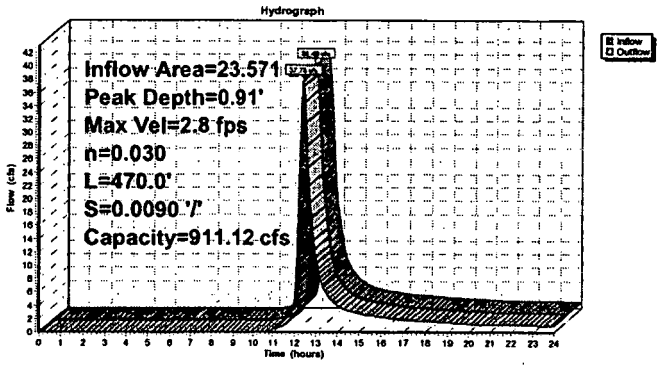
[65] Warning: Inlet elevation not specified

Inflow Area = 23.571 ac, Inflow Depth > 1.97"
Inflow = 38.43 cfs @ 12.32 hrs, Volume= 3.868 af
Outflow = 37.75 cfs @ 12.41 hrs, Volume= 3.855 af, Atten= 2%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.8 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 6.4 min

Peak Depth= 0.91' @ 12.36 hrs
Capacity at bank full= 911.12 cfs
0.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 30.0 '/' Top Width= 99.00'
Length= 470.0' Slope= 0.0090 '/'

Reach 19: east runon channel



Reach 20: east runon channel

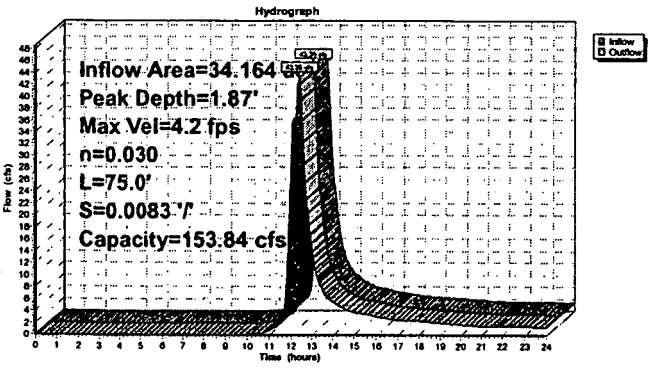
[65] Warning: Inlet elevation not specified

Inflow Area = 34.164 ac, Inflow Depth > 1.96"
Inflow = 43.35 cfs @ 12.39 hrs, Volume= 5.587 af
Outflow = 43.26 cfs @ 12.40 hrs, Volume= 5.586 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.2 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 0.6 min

Peak Depth= 1.87' @ 12.39 hrs
Capacity at bank full= 153.84 cfs
0.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 75.0' Slope= 0.0083 '/'

Reach 20: east runon channel



Reach 21: east runon channel

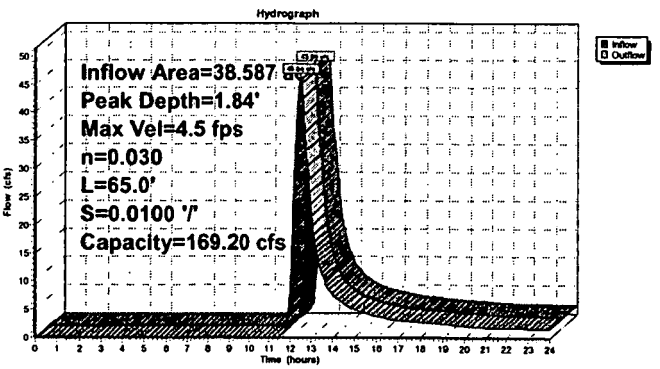
[65] Warning: Inlet elevation not specified

Inflow Area = 38.587 ac, Inflow Depth > 1.91"
Inflow = 45.89 cfs @ 12.48 hrs, Volume= 6.150 af
Outflow = 45.84 cfs @ 12.49 hrs, Volume= 6.148 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.6 min

Peak Depth= 1.84' @ 12.48 hrs
Capacity at bank full= 169.20 cfs
0.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 65.0' Slope= 0.0100 '/'

Reach 21: east runon channel



Reach 22: east runon channel

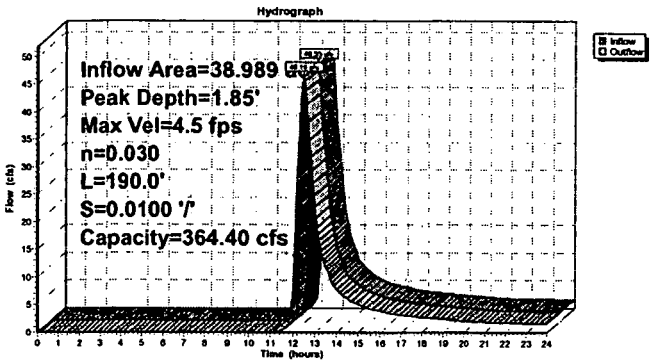
[65] Warning: Inlet elevation not specified

Inflow Area = 38.989 ac, Inflow Depth > 1.92"
Inflow = 46.33 cfs @ 12.49 hrs, Volume= 6.230 af
Outflow = 46.18 cfs @ 12.51 hrs, Volume= 6.225 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 1.7 min

Peak Depth= 1.85' @ 12.49 hrs
Capacity at bank full= 364.40 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 24.00'
Length= 190.0' Slope= 0.0100 '/'

Reach 22: east runon channel



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Reach 23: new CMP culverts

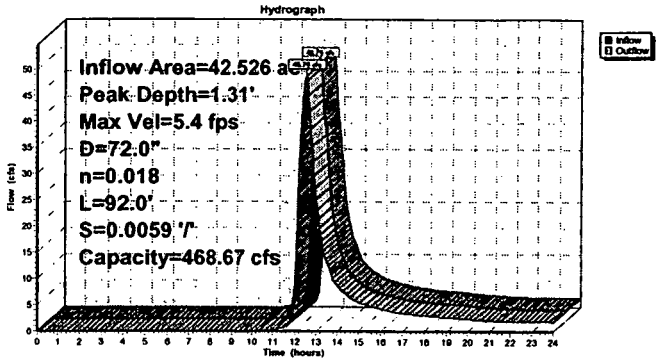
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 42.526 ac, Inflow Depth > 1.94"
Inflow = 48.76 cfs @ 12.51 hrs, Volume= 6.861 af
Outflow = 48.70 cfs @ 12.52 hrs, Volume= 6.858 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.4 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 0.7 min

Peak Depth= 1.31' @ 12.52 hrs
Capacity at bank full= 468.67 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.018
Length= 92.0' Slope= 0.0059 '/'

Reach 23: new CMP culverts



Reach 24: runon channel

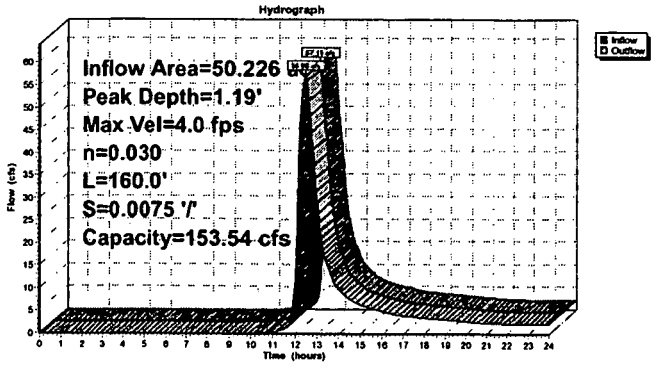
[65] Warning: Inlet elevation not specified

Inflow Area = 50.226 ac, Inflow Depth > 1.94"
Inflow = 57.15 cfs @ 12.47 hrs, Volume= 8.110 af
Outflow = 56.99 cfs @ 12.49 hrs, Volume= 8.102 af, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 4.0 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 1.9 min

Peak Depth= 1.19' @ 12.48 hrs
Capacity at bank full= 153.54 cfs
8.50' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.50'
Length= 160.0' Slope= 0.0075 '/'

Reach 24: runon channel



Reach 25: new CMP arch

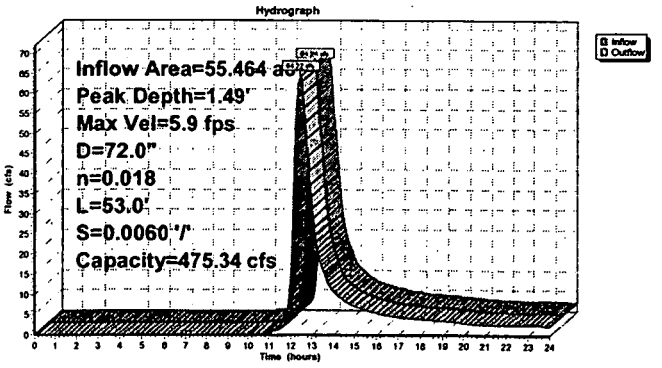
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 55.464 ac, Inflow Depth > 1.96"
Inflow = 64.24 cfs @ 12.45 hrs, Volume= 9.057 af
Outflow = 64.22 cfs @ 12.46 hrs, Volume= 9.055 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.9 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 0.4 min

Peak Depth= 1.49' @ 12.45 hrs
Capacity at bank full= 475.34 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.018
Length= 53.0' Slope= 0.0060 '/'

Reach 25: new CMP arch



Reach 26: runon channel

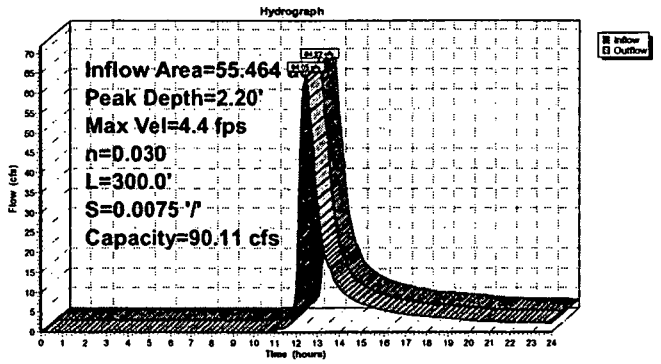
[65] Warning: Inlet elevation not specified

Inflow Area = 55.464 ac, Inflow Depth > 1.96"
Inflow = 64.22 cfs @ 12.46 hrs, Volume= 9.055 af
Outflow = 64.05 cfs @ 12.49 hrs, Volume= 9.044 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.4 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 2.7 min

Peak Depth= 2.20' @ 12.47 hrs
Capacity at bank full= 90.11 cfs
0.00' x 2.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 300.0' Slope= 0.0075 '/'

Reach 26: runon channel



Reach 27: new CMP arch

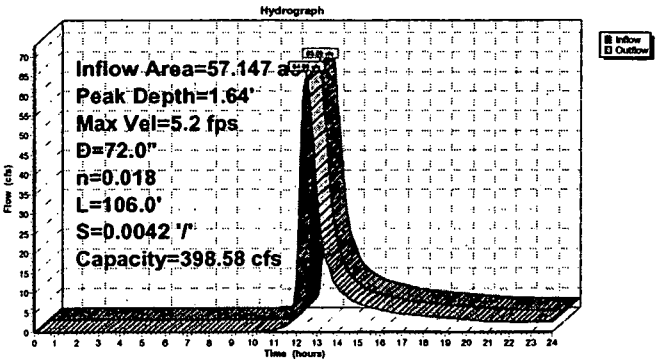
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 57.147 ac, Inflow Depth > 1.97"
Inflow = 65.00 cfs @ 12.48 hrs, Volume= 9.364 af
Outflow = 64.89 cfs @ 12.49 hrs, Volume= 9.360 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 5.2 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.0 fps, Avg. Travel Time= 0.9 min

Peak Depth= 1.64' @ 12.49 hrs
Capacity at bank full= 398.58 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.018
Length= 106.0' Slope= 0.0042 '/'

Reach 27: new CMP arch



Reach 29: east runon channel

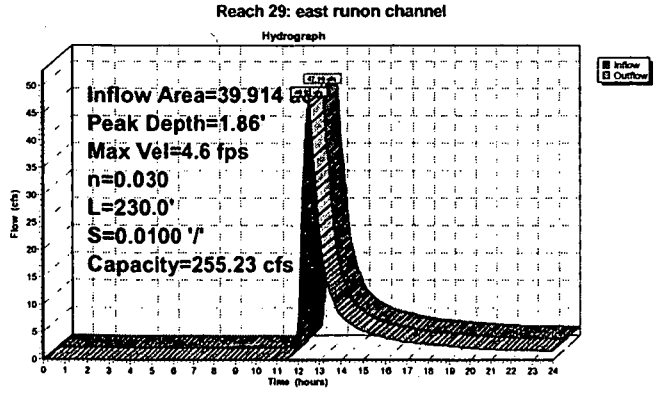
[65] Warning: Inlet elevation not specified

Inflow Area = 39.914 ac, Inflow Depth > 1.93"
Inflow = 47.10 cfs @ 12.50 hrs, Volume= 6.407 af
Outflow = 46.92 cfs @ 12.53 hrs, Volume= 6.400 af, Atten= 0%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.6 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 2.0 min

Peak Depth= 1.86' @ 12.51 hrs
Capacity at bank full= 255.23 cfs
0.00' x 3.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 21.00'
Length= 230.0' Slope= 0.0100 '/'

Reach 29: east runon channel



Reach 30: east runon channel

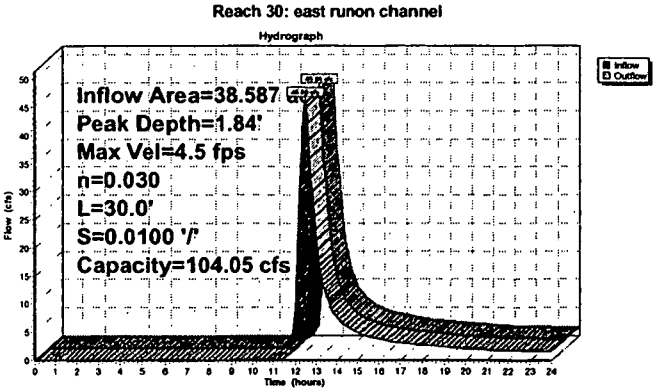
[65] Warning: Inlet elevation not specified

Inflow Area = 38.587 ac, Inflow Depth > 1.91"
Inflow = 45.98 cfs @ 12.48 hrs, Volume= 6.150 af
Outflow = 45.89 cfs @ 12.48 hrs, Volume= 6.150 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 4.5 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.84' @ 12.48 hrs
Capacity at bank full= 104.05 cfs
0.00' x 2.50' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 30.0' Slope= 0.0100 '/'

Reach 30: east runon channel



Reach 31: culvert

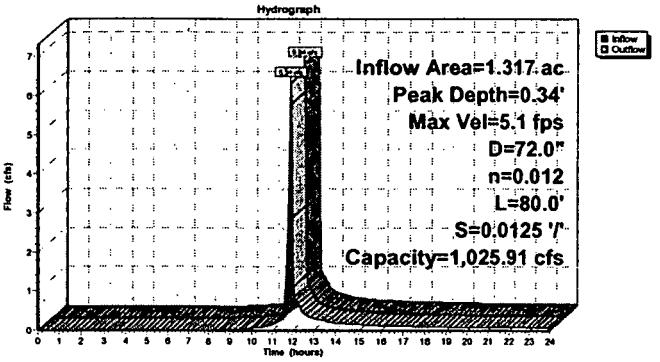
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 1.317 ac, Inflow Depth > 2.55"
Inflow = 6.54 cfs @ 11.91 hrs, Volume= 0.279 af
Outflow = 6.34 cfs @ 11.91 hrs, Volume= 0.279 af, Atten= 3%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.1 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.34' @ 11.91 hrs
Capacity at bank full= 1,025.91 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.012
Length= 80.0' Slope= 0.0125 '/'

Reach 31: culvert



Pond 1P: (new node)

Inflow Area = 38.587 ac, Inflow Depth > 1.98"
Inflow = 49.32 cfs @ 12.39 hrs, Volume= 6.362 af
Outflow = 45.98 cfs @ 12.48 hrs, Volume= 6.150 af, Atten= 7%, Lag= 5.4 min
Primary = 45.98 cfs @ 12.48 hrs, Volume= 6.150 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 592.00' Surf.Area= 0.342 ac Storage= 0.691 af
Peak Elev= 593.91' @ 12.48 hrs Surf.Area= 0.609 ac Storage= 1.584 af (0.893 af above start)
Plug-Flow detention time= 101.8 min calculated for 5.448 af (86% of inflow)
Center-of-Mass det. time= 18.3 min (878.5 - 860.2)

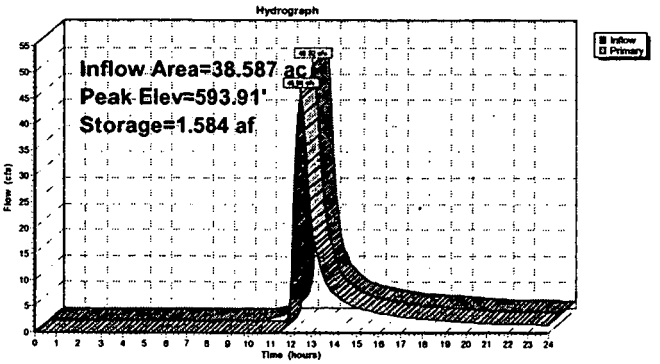
Volume	Invert	Avail.Storage	Storage Description
#1	589.30'	1.634 af	**Custom Stage Data (Conic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
589.30	0.186	0.000	0.000	0.186
590.00	0.210	0.139	0.139	0.211
591.00	0.278	0.243	0.382	0.279
592.00	0.342	0.309	0.691	0.344
593.00	0.463	0.401	1.092	0.465
594.00	0.624	0.542	1.634	0.627

Device	Routing	Invert	Outlet Devices
#1	Primary	592.00'	**Special & User-Defined** Head (feet) 0.00 0.01 0.18 0.51 1.01 1.34 1.67 2.00 Disch. (cfs) 0.000 0.000 0.080 1.330 8.210 17.570 31.730 51.470

Primary OutFlow Max=45.80 cfs @ 12.48 hrs HW=593.91' (Free Discharge)
└**1=Special & User-Defined** (Custom Controls 45.80 cfs)

Pond 1P: (new node)



Pond 3P: Borrow Area Basin

Inflow Area = 161.996 ac, Inflow Depth > 2.20"
Inflow = 174.95 cfs @ 12.59 hrs, Volume= 29.676 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 574.21' @ 24.00 hrs Surf.Area= 7.679 ac Storage= 29.662 af
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

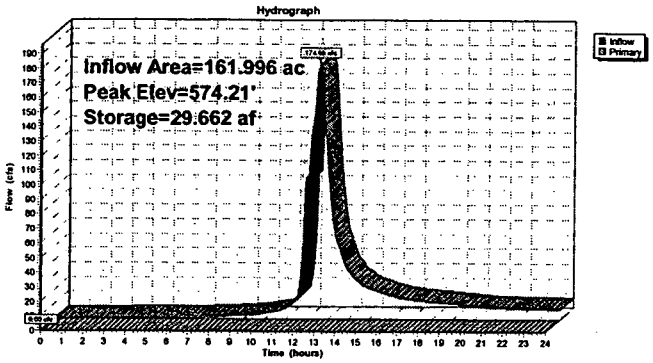
Volume	Invert	Avail.Storage	Storage Description
#1	570.00'	35.760 af	**Custom Stage Data (Conic)** Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
570.00	6.391	0.000	0.000	6.391
571.00	6.687	6.538	6.538	6.690
572.00	7.017	6.851	13.390	7.023
573.00	7.290	7.153	20.543	7.300
574.00	7.613	7.451	27.994	7.626
575.00	7.921	7.766	35.760	7.938

Device	Routing	Invert	Outlet Devices
#1	Device 2	575.30'	**48.0" Horiz. Orifice/Grate X 2.00** Limited to weir flow C= 0.600
#2	Primary	569.80'	**48.0" x 200.0' long Culvert X 2.00** Ke= 0.700 Outlet Invert= 569.00' S= 0.0040 '/' Cc= 0.900 n= 0.024
#3	Primary	578.00'	**20.0' long Broad-Crested Rectangular Weir** Head (feet) 0.50 1.00 1.50 2.00 2.50 3.00 4.00 5.00 Coef. (English) 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=570.00' (Free Discharge)
├**2=Culvert** (Passes 0.00 cfs of 0.26 cfs potential flow)
│└**1=Orifice/Grate** (Controls 0.00 cfs)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Borrow Area Basin

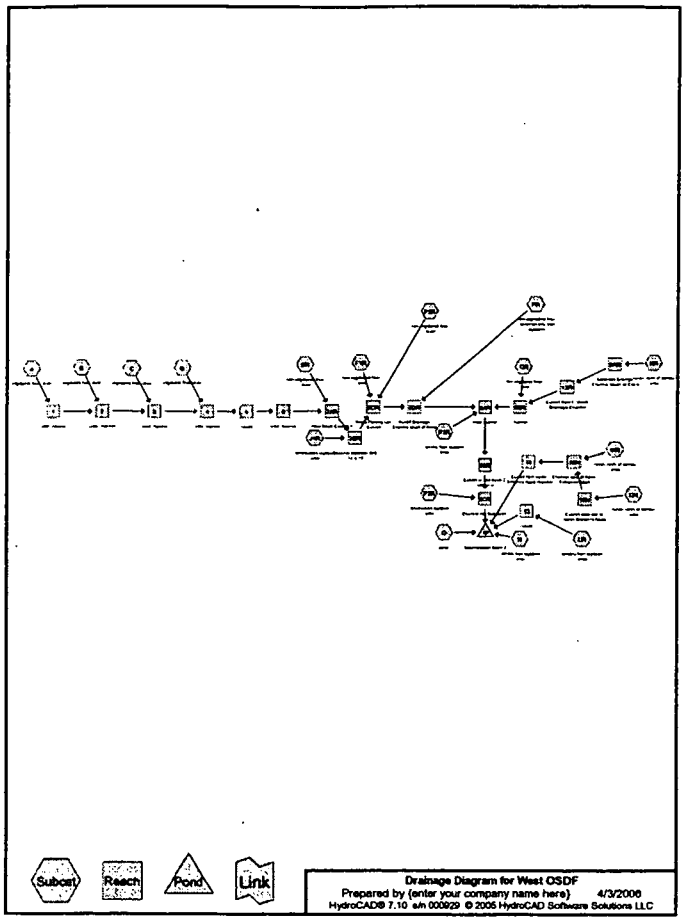


ATTACHMENT C-1B

HydroCAD™ OUTPUT REPORTS

WEST OSDF CONSTRUCTION-PHASE DESIGN SCENARIO

25-YEAR, 24-HOUR STORM EVENT



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: vegetated final cover Runoff Area=2.730 ac Runoff Depth>2.89"
Flow Length=670' Tc=18.3 min CN=83 Runoff=9.20 cfs 0.658 af

Subcatchment B: vegetated final cover Runoff Area=5.342 ac Runoff Depth>2.89"
Flow Length=950' Tc=19.0 min CN=83 Runoff=17.63 cfs 1.287 af

Subcatchment C: vegetated final cover Runoff Area=5.399 ac Runoff Depth>2.89"
Flow Length=945' Tc=19.0 min CN=83 Runoff=17.82 cfs 1.301 af

Subcatchment D: vegetated final cover Runoff Area=5.530 ac Runoff Depth>2.89"
Flow Length=950' Tc=19.0 min CN=83 Runoff=18.25 cfs 1.332 af

Subcatchment ER: non-vegetated final cover Runoff Area=5.320 ac Runoff Depth>3.48"
Flow Length=1,100' Tc=4.2 min CN=89 Runoff=32.56 cfs 1.544 af

Subcatchment F1R: non-vegetated final cover Runoff Area=0.918 ac Runoff Depth>3.48"
Flow Length=703' Tc=2.9 min CN=89 Runoff=5.78 cfs 0.267 af

Subcatchment F2R: non-vegetated final cover Runoff Area=2.730 ac Runoff Depth>3.48"
Flow Length=638' Tc=2.8 min CN=89 Runoff=17.20 cfs 0.793 af

Subcatchment FR: non-vegetated final cover/construction lay Runoff Area=2.910 ac Runoff Depth>3.49"
Flow Length=425' Tc=1.9 min CN=89 Runoff=18.22 cfs 0.845 af

Subcatchment GR: non-vegetated final cover Runoff Area=0.270 ac Runoff Depth>3.48"
Flow Length=450' Tc=2.3 min CN=89 Runoff=1.67 cfs 0.078 af

Subcatchment J1R: construction laydown area Runoff Area=0.312 ac Runoff Depth>2.81"
Flow Length=54' Tc=2.8 min CN=82 Runoff=1.66 cfs 0.073 af

Subcatchment KR: runon north of borrow area Runoff Area=3.020 ac Runoff Depth>3.48"
Flow Length=480' Tc=2.5 min CN=89 Runoff=19.05 cfs 0.877 af

Subcatchment LR: construction laydown area Runoff Area=1.540 ac Runoff Depth>2.79"
Flow Length=360' Tc=30.7 min CN=82 Runoff=3.69 cfs 0.358 af

Subcatchment MR: runon north of borrow area Runoff Area=0.675 ac Runoff Depth>2.54"
Flow Length=40' Tc=2.8 min CN=79 Runoff=3.30 cfs 0.143 af

Subcatchment N: construction laydown area Runoff Area=1.043 ac Runoff Depth>2.80"
Flow Length=170' Tc=15.2 min CN=82 Runoff=3.73 cfs 0.244 af

Subcatchment O: pond Runoff Area=2.252 ac Runoff Depth>4.46"
Tc=1.0 min CN=98 Runoff=16.67 cfs 0.838 af

Subcatchment P1R: construction laydown area Runoff Area=0.490 ac Runoff Depth>2.81"
Flow Length=100' Tc=8.4 min CN=82 Runoff=2.20 cfs 0.115 af

Subcatchment P2R: construction laydown area Runoff Area=0.214 ac Runoff Depth>2.81"
Flow Length=110' Tc=8.3 min CN=82 Runoff=0.96 cfs 0.050 af

Subcatchment QN: runon north of borrow area Runoff Area=0.170 ac Runoff Depth>2.54"
Flow Length=100' Tc=11.8 min CN=79 Runoff=0.62 cfs 0.036 af

Reach 1: west channel Peak Depth=0.94' Max Vel=2.5 fps Inflow=9.20 cfs 0.658 af
n=0.030 L=400.0' S=0.0075 '/' Capacity=424.60 cfs Outflow=8.87 cfs 0.656 af

Reach 2: west channel Peak Depth=1.39' Max Vel=3.3 fps Inflow=25.75 cfs 1.943 af
n=0.030 L=400.0' S=0.0075 '/' Capacity=424.60 cfs Outflow=25.10 cfs 1.939 af

Reach 3: west channel Peak Depth=1.66' Max Vel=3.7 fps Inflow=41.23 cfs 3.240 af
n=0.030 L=400.0' S=0.0075 '/' Capacity=424.60 cfs Outflow=40.35 cfs 3.234 af

Reach 4: west channel Peak Depth=1.86' Max Vel=4.0 fps Inflow=55.70 cfs 4.566 af
n=0.030 L=90.0' S=0.0076 '/' Capacity=426.17 cfs Outflow=55.45 cfs 4.565 af

Reach 5: culvert Peak Depth=1.52' Max Vel=4.9 fps Inflow=55.45 cfs 4.565 af
D=72.0" n=0.024 L=95.0' S=0.0075 '/' Capacity=396.64 cfs Outflow=55.23 cfs 4.563 af

Reach 6: west channel Peak Depth=1.86' Max Vel=4.0 fps Inflow=55.23 cfs 4.563 af
n=0.030 L=380.0' S=0.0075 '/' Capacity=424.60 cfs Outflow=54.31 cfs 4.555 af

Reach 7AR: Haul Road Culvert 1 Peak Depth=2.44' Max Vel=5.4 fps Inflow=57.96 cfs 6.100 af
D=72.0" n=0.024 L=81.5' S=0.0053 '/' Capacity=166.63 cfs Outflow=57.80 cfs 6.098 af

Reach 7BR: Channel between GIS 14 & 15 Peak Depth=2.37' Max Vel=2.6 fps Inflow=57.98 cfs 6.171 af
n=0.030 L=100.0' S=0.0023 '/' Capacity=200.78 cfs Outflow=57.49 cfs 6.167 af

Reach 7CR: Rimla Parking Lot Culvert Peak Depth=1.90' Max Vel=8.4 fps Inflow=65.26 cfs 7.227 af
D=72.0" n=0.013 L=296.0' S=0.0049 '/' Capacity=296.41 cfs Outflow=63.02 cfs 7.222 af

Reach 7DR: Runoff Drainage Channel south Peak Depth=1.49' Max Vel=3.5 fps Inflow=78.17 cfs 8.067 af
n=0.030 L=340.0' S=0.0062 '/' Capacity=1,440.47 cfs Outflow=73.93 cfs 8.054 af

Reach 8AR: west channel Peak Depth=2.09' Max Vel=3.9 fps Inflow=91.38 cfs 9.118 af
n=0.030 L=75.0' S=0.0048 '/' Capacity=405.20 cfs Outflow=90.36 cfs 9.114 af

Reach 8BR: Culvert at Sed Basin 2 entrance Peak Depth=1.67' Max Vel=7.0 fps Inflow=90.36 cfs 9.114 af
D=72.0" n=0.013 L=30.0' S=0.0040 '/' Capacity=535.70 cfs Outflow=90.13 cfs 9.114 af

Reach 8CR: Channel into Sed Basin 2 Peak Depth=2.17' Max Vel=6.7 fps Inflow=91.07 cfs 9.164 af
n=0.030 L=62.7' S=0.0159 '/' Capacity=728.12 cfs Outflow=90.57 cfs 9.162 af

Reach 9AR: Extended Drainge Channel Sout Peak Depth=0.77' Max Vel=1.6 fps Inflow=19.05 cfs 0.877 af
n=0.030 L=395.0' S=0.0020 '/' Capacity=102.00 cfs Outflow=15.94 cfs 0.872 af

Reach 9BR: channel Peak Depth=0.61' Max Vel=2.3 fps Inflow=16.31 cfs 0.950 af
n=0.030 L=76.0' S=0.0050 '/' Capacity=566.70 cfs Outflow=16.03 cfs 0.949 af

Reach 12R: Culvert from F Street Drainage Peak Depth=0.96' Max Vel=5.4 fps Inflow=15.94 cfs 0.872 af
D=72.0" n=0.013 L=65.0' S=0.0046 '/' Capacity=287.72 cfs Outflow=15.83 cfs 0.871 af

Reach 13: culvert Peak Depth=0.41' Max Vel=4.3 fps Inflow=3.69 cfs 0.358 af
D=72.0" n=0.013 L=120.0' S=0.0083 '/' Capacity=386.61 cfs Outflow=3.68 cfs 0.358 af

Reach 14: Culvert from North Entrance Road Peak Depth=0.27' Max Vel=3.5 fps Inflow=3.29 cfs 0.178 af
D=72.0" n=0.024 L=112.0' S=0.0321 '/' Capacity=822.56 cfs Outflow=3.21 cfs 0.178 af

Reach 15N: Culvert adjacent to North Entran Peak Depth=0.17' Max Vel=2.6 fps Inflow=0.62 cfs 0.036 af
D=72.0" n=0.010 L=55.0' S=0.0055 '/' Capacity=406.62 cfs Outflow=0.61 cfs 0.036 af

Reach 16N: Channel east of North Entrance Peak Depth=0.91' Max Vel=2.2 fps Inflow=3.69 cfs 0.179 af
n=0.030 L=382.0' S=0.0069 '/' Capacity=71.46 cfs Outflow=3.29 cfs 0.178 af

Pond 1P: Sedimentation Basin 2 Peak Elev=575.69' Storage=8.969 af Inflow=101.95 cfs 10.780 af
Outflow=3.50 cfs 1.922 af

Total Runoff Area = 40.865 ac Runoff Volume = 10.839 af Average Runoff Depth = 3.18"

Subcatchment A: vegetated final cover

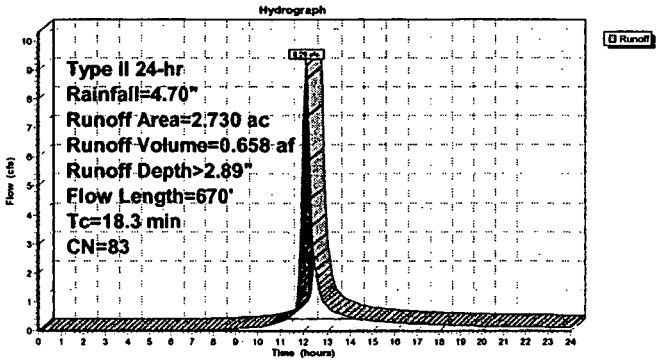
Runoff = 9.20 cfs @ 12.11 hrs, Volume= 0.658 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.730	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.5	190	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	180	0.0075	4.2	75.84	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 3.0 & 6.0 '/' Top.W=18.00' n= 0.030
18.3	670	Total			

Subcatchment A: vegetated final cover



Subcatchment B: vegetated final cover

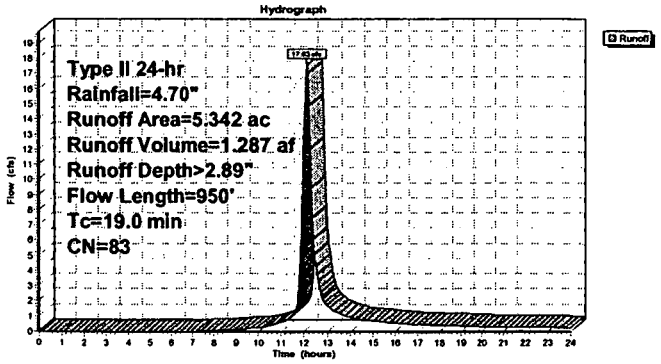
Runoff = 17.63 cfs @ 12.11 hrs, Volume= 1.287 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.342	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.5	200	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	190	0.0075	4.2	75.84	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 3.0 & 6.0 '/' Top.W=18.00' n= 0.030
0.1	60	0.0100	15.0	423.51	**Circular Channel (pipe),** Diam= 72.0" Area= 28.3 sf Perim= 18.8' r= 1.50' n= 0.013
0.5	200	0.0075	6.6	424.60	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.00' Z= 6.0 & 2.0 '/' Top.W=32.00' n= 0.030
19.0	950	Total			

Subcatchment B: vegetated final cover



Subcatchment C: vegetated final cover

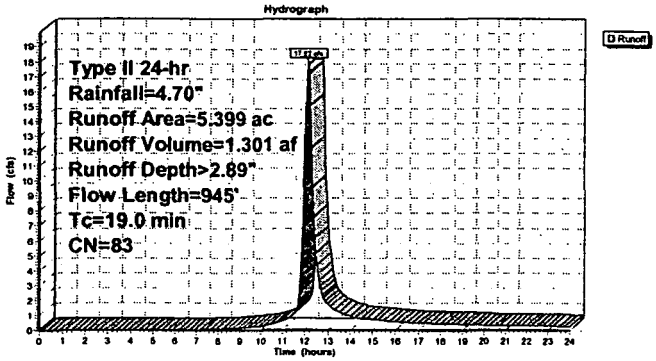
Runoff = 17.82 cfs @ 12.11 hrs, Volume= 1.301 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.399	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.5	200	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	190	0.0075	4.2	75.84	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 3.0 & 6.0 '/' Top.W=18.00' n= 0.030
0.1	60	0.0100	15.0	423.51	**Circular Channel (pipe),** Diam= 72.0" Area= 28.3 sf Perim= 18.8' r= 1.50' n= 0.013
0.5	195	0.0075	6.6	424.60	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.00' Z= 6.0 & 2.0 '/' Top.W=32.00' n= 0.030
19.0	945	Total			

Subcatchment C: vegetated final cover



Subcatchment D: vegetated final cover

Runoff = 18.25 cfs @ 12.11 hrs, Volume= 1.332 af, Depth> 2.89"

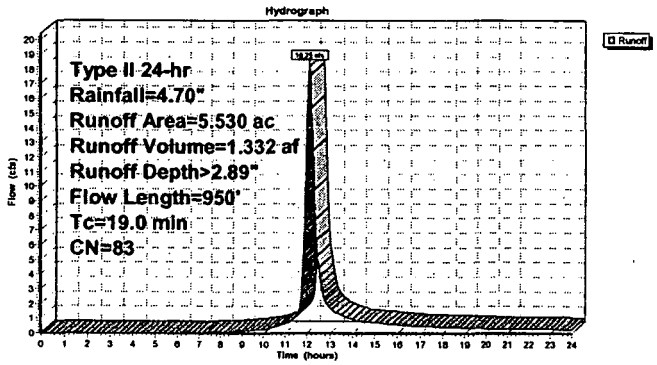
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

006439

Area (ac)	CN	Description
5.530	83	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	90	0.0500	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
3.8	60	0.1000	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
6.4	150	0.1700	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.60"
0.5	205	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	190	0.0075	4.2	75.84	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 3.0 & 6.0 '/' Top.W=18.00' n= 0.030
0.1	60	0.0100	15.0	423.51	**Circular Channel (pipe),** Diam= 72.0" Area= 28.3 sf Perim= 18.8' r= 1.50' n= 0.013
0.5	195	0.0075	6.6	424.60	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=4.00' Z= 6.0 & 2.0 '/' Top.W=32.00' n= 0.030
19.0	950	Total			

Subcatchment D: vegetated final cover



Subcatchment ER: non-vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

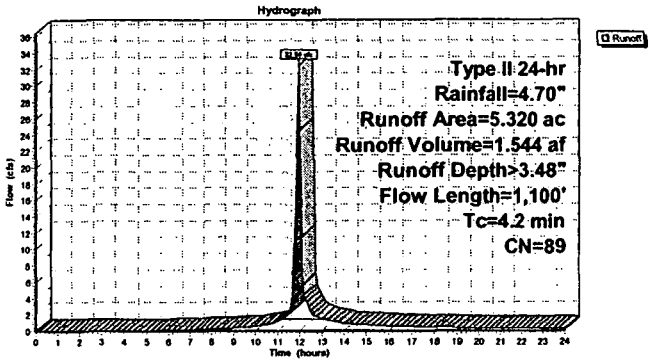
Runoff = 32.56 cfs @ 11.94 hrs, Volume= 1.544 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.320	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	110	0.0625	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.4	45	0.1110	2.1		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.8	150	0.1700	3.2		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.60"
0.5	200	0.1700	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.4	510	0.0075	6.1	337.31	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=3.50' Z= 3.0 & 6.0 '/' Top.W=31.50' n= 0.030
0.2	85	0.0029	8.1	228.07	**Circular Channel (pipe),** Diam= 72.0" Area= 28.3 sf Perim= 18.8' r= 1.50' n= 0.013
4.2	1,100	Total			

Subcatchment ER: non-vegetated final cover



Subcatchment F1R: non-vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

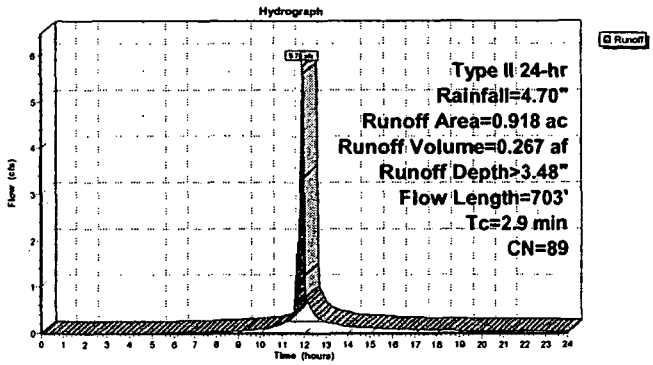
Runoff = 5.78 cfs @ 11.93 hrs, Volume= 0.267 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.918	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	90	0.0530	1.8		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.55"
0.4	50	0.1000	2.0		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.55"
0.8	150	0.1670	3.1		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.55"
0.5	200	0.1670	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	160	0.0075	6.1	337.31	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=3.50' Z= 6.0 & 3.0 '/' Top.W=31.50' n= 0.030
0.0	53	0.0580	36.1	1,019.94	**Circular Channel (pipe),** Diam= 72.0" Area= 28.3 sf Perim= 18.8' r= 1.50' n= 0.013
2.9	703	Total			

Subcatchment F1R: non-vegetated final cover



Subcatchment F2R: non-vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

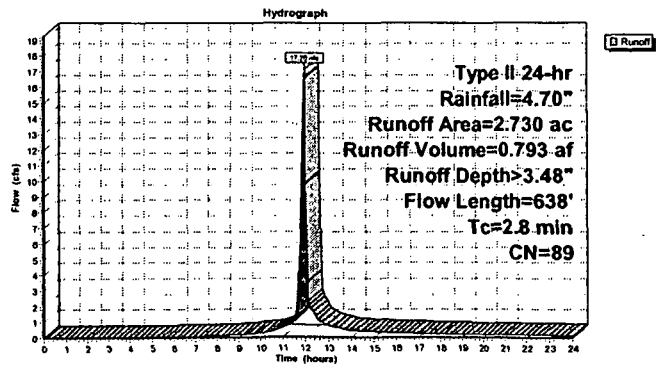
Runoff = 17.20 cfs @ 11.93 hrs, Volume= 0.793 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.730	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	120	0.0500	1.8		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.55"
0.9	180	0.1667	3.2		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.55"
0.5	200	0.1667	6.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.2	60	0.0830	4.6		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	78	0.0052	10.8	305.40	**Circular Channel (pipe),** Diam= 72.0" Area= 28.3 sf Perim= 18.8' r= 1.50' n= 0.013
2.8	638	Total			

Subcatchment F2R: non-vegetated final cover



Subcatchment FR: non-vegetated final cover/construction laydown

[49] Hint: Tc<2dt may require smaller dt

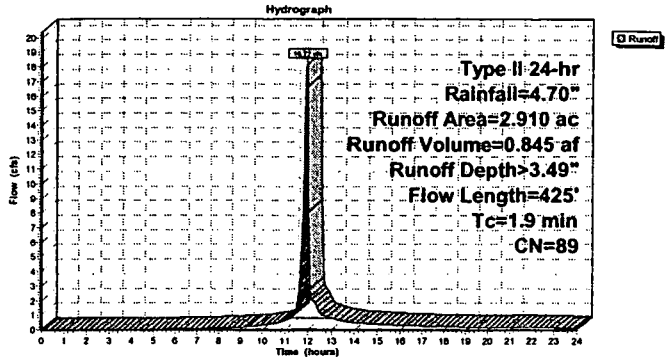
Runoff = 18.22 cfs @ 11.91 hrs, Volume= 0.845 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.910	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	20	0.1000	1.7		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
1.3	280	0.1667	3.5		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
0.2	70	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.0	15	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	25	0.0330	2.9		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.9	425	Total			

Subcatchment FR: non-vegetated final cover/construction laydown



Subcatchment GR: non-vegetated final cover

[49] Hint: Tc<2dt may require smaller dt

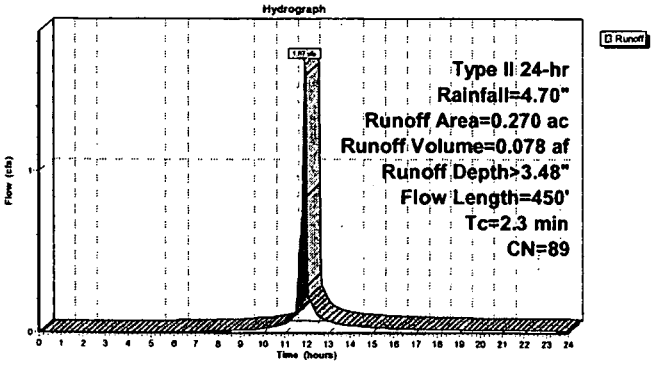
Runoff = 1.67 cfs @ 11.92 hrs, Volume= 0.078 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.270	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	280	0.1667	3.5		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
0.3	20	0.0400	1.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
0.1	20	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	30	0.3333	9.3		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	100	0.0400	3.2		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.3	450	Total			

Subcatchment GR: non-vegetated final cover



Subcatchment J1R: construction laydown area

[49] Hint: Tc<2dt may require smaller dt

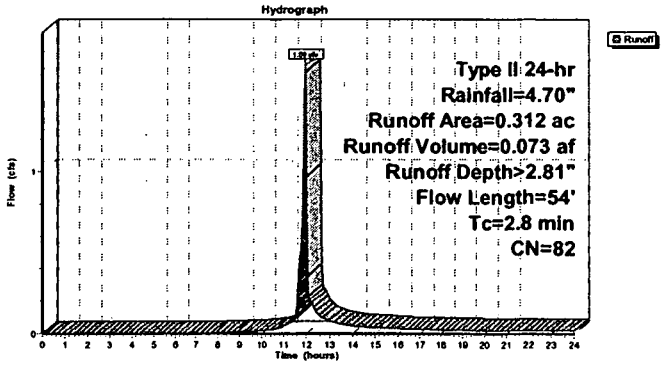
Runoff = 1.66 cfs @ 11.93 hrs, Volume= 0.073 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.312	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	54	0.1670	0.3		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment J1R: construction laydown area



Subcatchment KR: runon north of borrow area

[49] Hint: Tc<2dt may require smaller dt

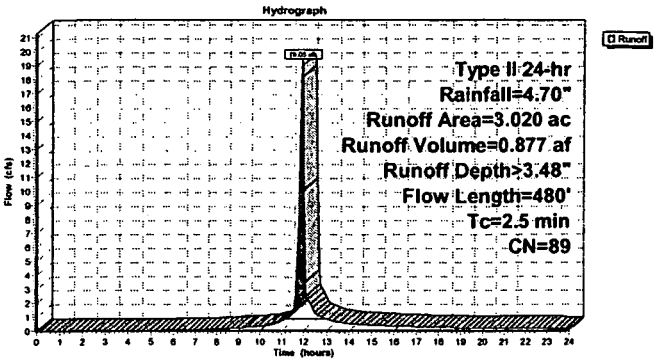
Runoff = 19.05 cfs @ 11.93 hrs, Volume= 0.877 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
3.020	89	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	55	0.0500	1.6		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
0.5	65	0.1000	2.1		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
0.9	180	0.1667	3.2		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.55"
0.3	135	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.1	15	0.0400	4.1		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	30	0.1667	6.6		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.5	480	Total			

Subcatchment KR: runon north of borrow area



Subcatchment LR: construction laydown area

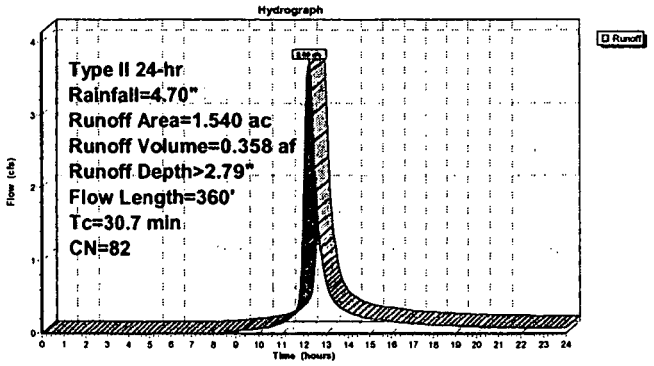
Runoff = 3.69 cfs @ 12.25 hrs, Volume= 0.358 af, Depth> 2.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.540	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.2	300	0.0140	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"
0.5	60	0.0170	2.1		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
30.7	360	Total			

Subcatchment LR: construction laydown area



Subcatchment MR: runon north of borrow area

[49] Hint: Tc<2dt may require smaller dt

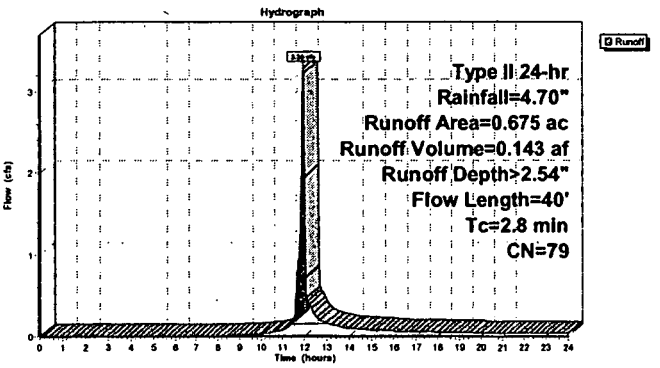
Runoff = 3.30 cfs @ 11.93 hrs, Volume= 0.143 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.675	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	40	0.0985	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment MR: runon north of borrow area



Subcatchment N: construction laydown area

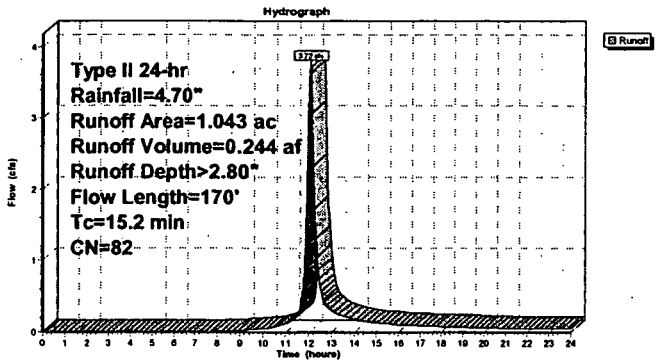
Runoff = 3.73 cfs @ 12.07 hrs, Volume= 0.244 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.043	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	170	0.0250	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment N: construction laydown area



Subcatchment O: pond

[49] Hint: Tc<2dt may require smaller dt

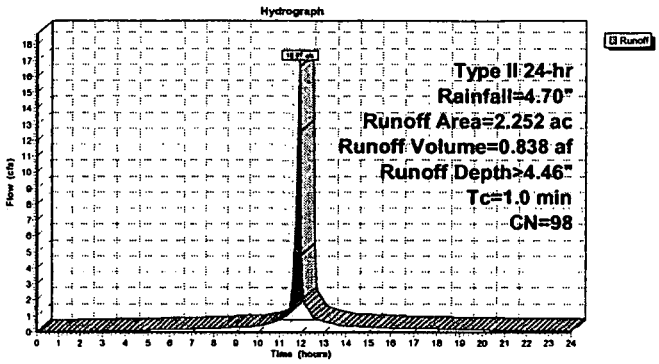
Runoff = 16.67 cfs @ 11.90 hrs, Volume= 0.838 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
2.252	98	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,

Subcatchment O: pond



Subcatchment P1R: construction laydown area

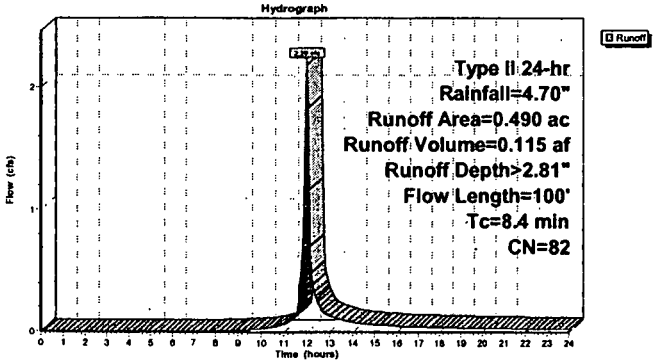
Runoff = 2.20 cfs @ 12.00 hrs, Volume= 0.115 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.490	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0385	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment P1R: construction laydown area



Subcatchment P2R: construction laydown area

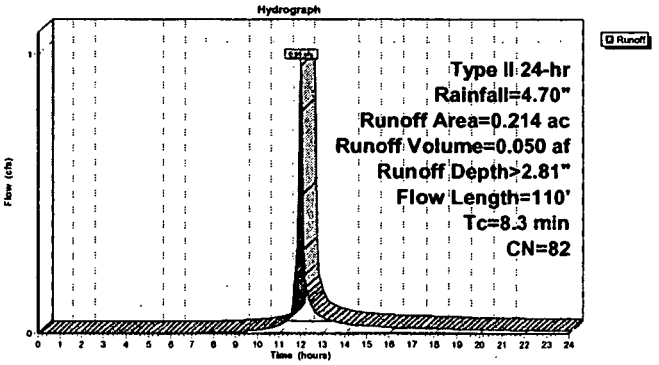
Runoff = 0.96 cfs @ 12.00 hrs, Volume= 0.050 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.214	82	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	110	0.0473	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.60"

Subcatchment P2R: construction laydown area



Subcatchment QN: runon north of borrow area

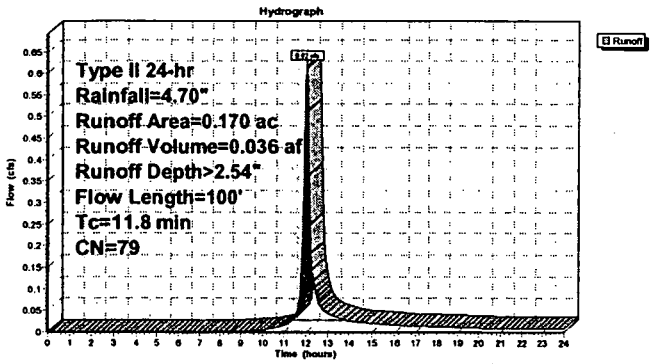
Runoff = 0.62 cfs @ 12.04 hrs, Volume= 0.036 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.170	79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0167	0.1		Sheet Flow, Grass: Short n= 0.150 P2= 2.55"

Subcatchment QN: runon north of borrow area



Reach 1: west channel

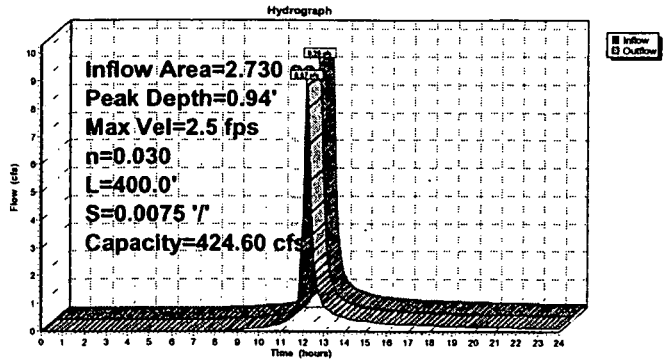
[65] Warning: Inlet elevation not specified

Inflow Area = 2.730 ac, Inflow Depth > 2.89"
Inflow = 9.20 cfs @ 12.11 hrs, Volume= 0.658 af
Outflow = 8.87 cfs @ 12.19 hrs, Volume= 0.656 af, Atten= 4%, Lag= 4.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 6.6 min

Peak Depth= 0.94' @ 12.14 hrs
Capacity at bank full= 424.60 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 6.0 '/' Top Width= 32.00'
Length= 400.0' Slope= 0.0075 '/'

Reach 1: west channel



Reach 2: west channel

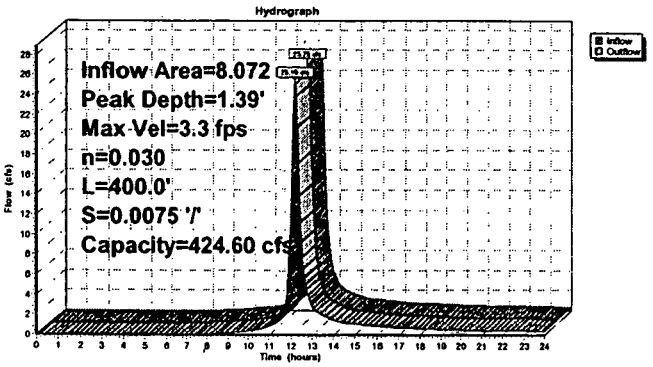
[65] Warning: Inlet elevation not specified

Inflow Area = 8.072 ac, Inflow Depth > 2.89"
Inflow = 25.75 cfs @ 12.14 hrs, Volume= 1.943 af
Outflow = 25.10 cfs @ 12.20 hrs, Volume= 1.939 af, Atten= 3%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.3 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 5.1 min

Peak Depth= 1.39' @ 12.16 hrs
Capacity at bank full= 424.60 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 6.0 '/' Top Width= 32.00'
Length= 400.0' Slope= 0.0075 '/'

Reach 2: west channel



Reach 3: west channel

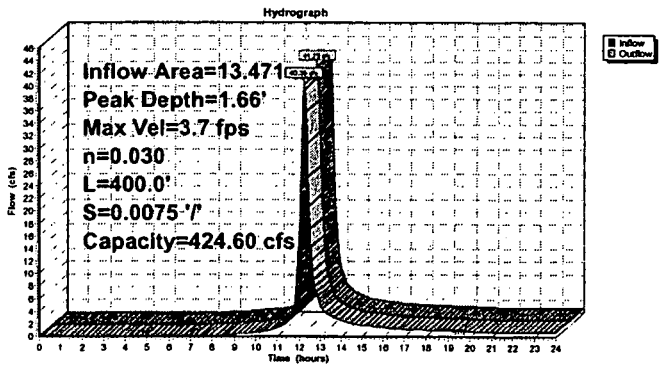
[65] Warning: Inlet elevation not specified

Inflow Area = 13.471 ac, Inflow Depth > 2.89"
Inflow = 41.23 cfs @ 12.16 hrs, Volume= 3.240 af
Outflow = 40.35 cfs @ 12.22 hrs, Volume= 3.234 af, Atten= 2%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 4.5 min

Peak Depth= 1.66' @ 12.19 hrs
Capacity at bank full= 424.60 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 6.0 '/' Top Width= 32.00'
Length= 400.0' Slope= 0.0075 '/'

Reach 3: west channel



Reach 4: west channel

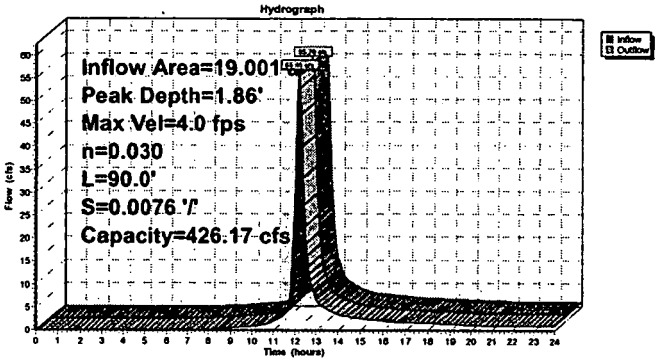
[65] Warning: Inlet elevation not specified

Inflow Area = 19.001 ac, Inflow Depth > 2.88"
Inflow = 55.70 cfs @ 12.19 hrs, Volume= 4.566 af
Outflow = 55.45 cfs @ 12.20 hrs, Volume= 4.565 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.0 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.9 min

Peak Depth= 1.86' @ 12.19 hrs
Capacity at bank full= 426.17 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 6.0 '/' Top Width= 32.00'
Length= 90.0' Slope= 0.0076 '/'

Reach 4: west channel



Reach 5: culvert

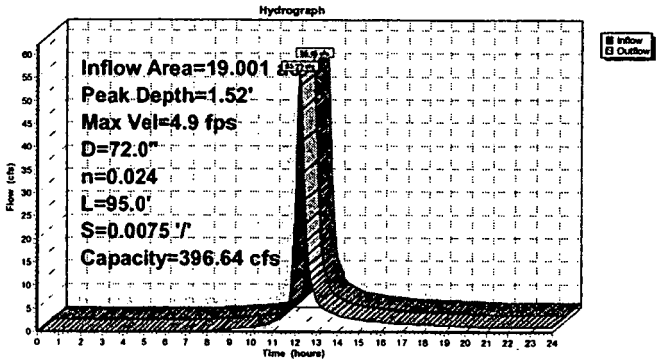
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 19.001 ac, Inflow Depth > 2.88"
Inflow = 55.45 cfs @ 12.20 hrs, Volume= 4.565 af
Outflow = 55.23 cfs @ 12.21 hrs, Volume= 4.563 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.9 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 0.9 min

Peak Depth= 1.52' @ 12.20 hrs
Capacity at bank full= 396.64 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.024
Length= 95.0' Slope= 0.0075 '/'

Reach 5: culvert



Reach 6: west channel

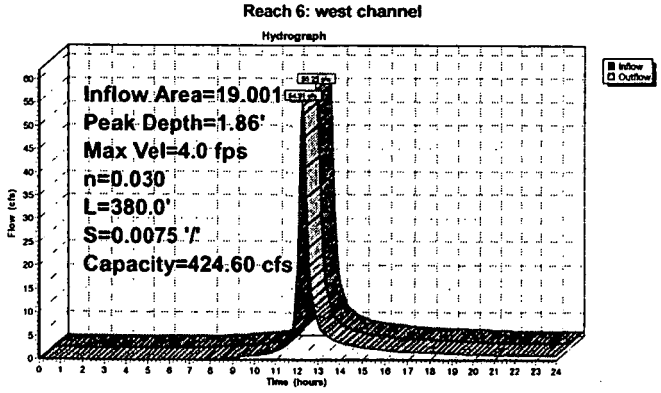
[65] Warning: Inlet elevation not specified

Inflow Area = 19.001 ac, Inflow Depth > 2.88"
Inflow = 55.23 cfs @ 12.21 hrs, Volume= 4.563 af
Outflow = 54.31 cfs @ 12.25 hrs, Volume= 4.555 af, Atten= 2%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.0 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 3.9 min

Peak Depth= 1.86' @ 12.23 hrs
Capacity at bank full= 424.60 cfs
0.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 6.0 2.0 '/' Top Width= 32.00'
Length= 380.0' Slope= 0.0075 '/'

Reach 6: west channel



Reach 7AR: Haul Road Culvert 1

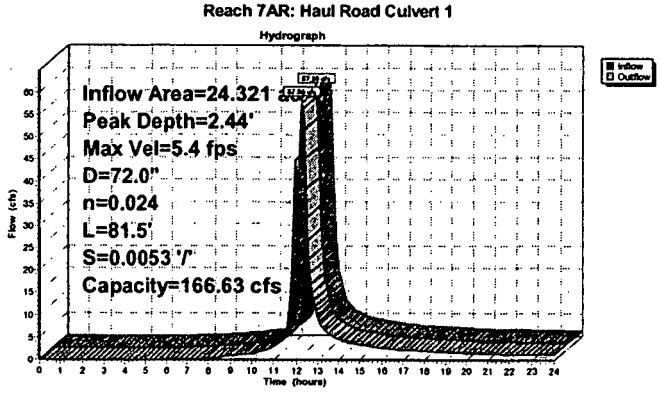
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 24.321 ac, Inflow Depth > 3.01"
Inflow = 57.96 cfs @ 12.25 hrs, Volume= 6.100 af
Outflow = 57.80 cfs @ 12.26 hrs, Volume= 6.098 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.4 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.7 min

Peak Depth= 2.44' @ 12.25 hrs
Capacity at bank full= 166.63 cfs
72.0" Diameter Pipe, n= 0.024
Length= 81.5' Slope= 0.0053 '/'

Reach 7AR: Haul Road Culvert 1



Reach 7BR: Channel between GIS 14 & 15

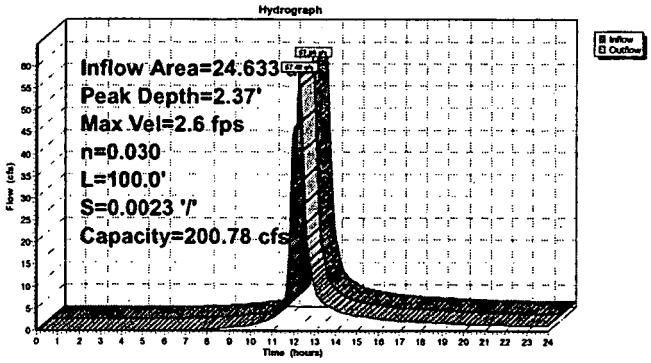
[65] Warning: Inlet elevation not specified

Inflow Area = 24.633 ac, Inflow Depth > 3.01"
Inflow = 57.98 cfs @ 12.26 hrs, Volume= 6.171 af
Outflow = 57.49 cfs @ 12.28 hrs, Volume= 6.167 af, Atten= 1%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 1.6 min

Peak Depth= 2.37' @ 12.27 hrs
Capacity at bank full= 200.78 cfs
0.00' x 3.77' deep channel, n= 0.030
Side Slope Z-value= 6.0 2.0 '/' Top Width= 30.16'
Length= 100.0' Slope= 0.0023 '/'

Reach 7BR: Channel between GIS 14 & 15



Reach 7CR: Rimia Parking Lot Culvert

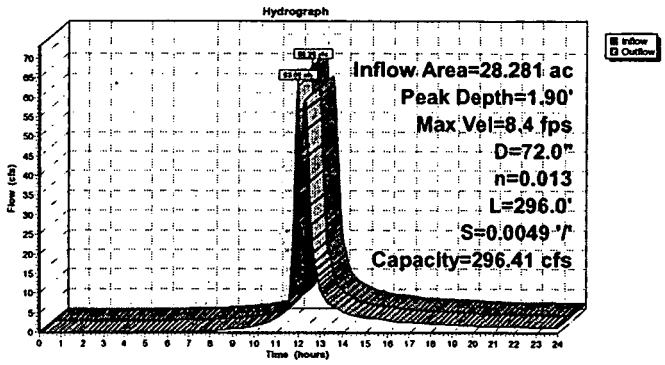
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 28.281 ac, Inflow Depth > 3.07"
Inflow = 65.26 cfs @ 11.96 hrs, Volume= 7.227 af
Outflow = 63.02 cfs @ 11.98 hrs, Volume= 7.222 af, Atten= 3%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.4 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 3.1 fps, Avg. Travel Time= 1.6 min

Peak Depth= 1.90' @ 11.97 hrs
Capacity at bank full= 296.41 cfs
72.0" Diameter Pipe, n= 0.013
Length= 296.0' Slope= 0.0049 '/'

Reach 7CR: Rimia Parking Lot Culvert



Reach 7DR: Runoff Drainage Channel south of Rimia

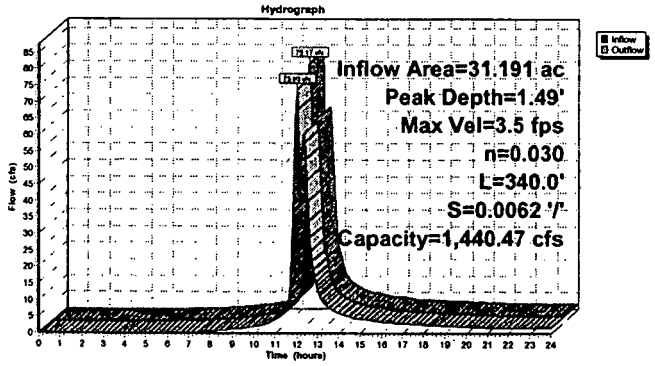
[65] Warning: Inlet elevation not specified

Inflow Area = 31.191 ac, Inflow Depth > 3.10"
Inflow = 78.17 cfs @ 11.95 hrs, Volume= 8.067 af
Outflow = 73.93 cfs @ 12.00 hrs, Volume= 8.054 af, Atten= 5%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 4.1 min

Peak Depth= 1.49' @ 11.98 hrs
Capacity at bank full= 1,440.47 cfs
4.00' x 5.00' deep channel, n= 0.030
Side Slope Z-value= 4.0 10.0 '/' Top Width= 74.00'
Length= 340.0' Slope= 0.0062 '/'

Reach 7DR: Runoff Drainage Channel south of Rimia



Reach 8AR: west channel

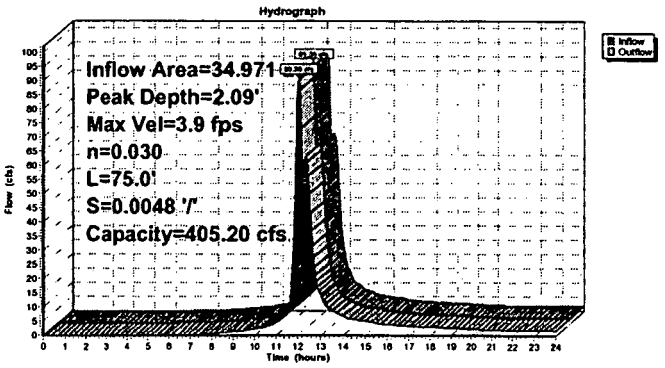
[65] Warning: Inlet elevation not specified

Inflow Area = 34.971 ac, Inflow Depth > 3.13"
Inflow = 91.38 cfs @ 12.01 hrs, Volume= 9.118 af
Outflow = 90.36 cfs @ 12.02 hrs, Volume= 9.114 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 0.9 min

Peak Depth= 2.09' @ 12.01 hrs
Capacity at bank full= 405.20 cfs
4.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 4.2 2.6 '/' Top Width= 31.20'
Length= 75.0' Slope= 0.0048 '/'

Reach 8AR: west channel



Reach 8BR: Culvert at Sed Basin 2 entrance

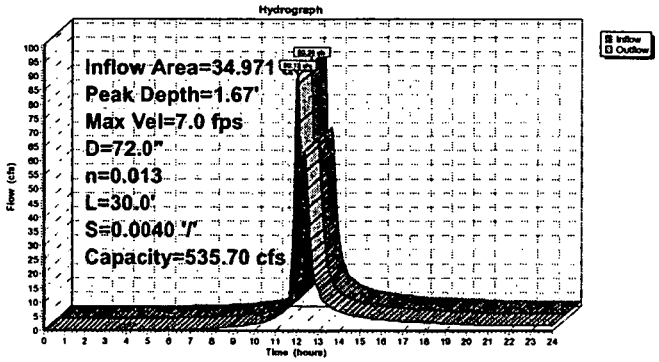
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 34.971 ac, Inflow Depth > 3.13"
Inflow = 90.36 cfs @ 12.02 hrs, Volume= 9.114 af
Outflow = 90.13 cfs @ 12.02 hrs, Volume= 9.114 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.0 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.2 min

Peak Depth= 1.67' @ 12.02 hrs
Capacity at bank full= 535.70 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.013
Length= 30.0' Slope= 0.0040 '/'

Reach 8BR: Culvert at Sed Basin 2 entrance



Reach 8CR: Channel into Sed Basin 2

[65] Warning: Inlet elevation not specified

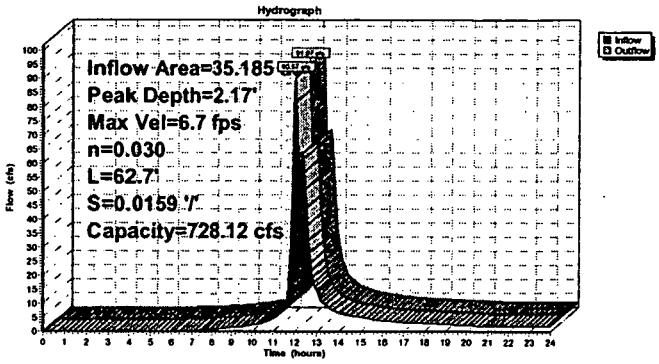
Inflow Area = 35.185 ac, Inflow Depth > 3.13"
Inflow = 91.07 cfs @ 12.02 hrs, Volume= 9.164 af
Outflow = 90.57 cfs @ 12.02 hrs, Volume= 9.162 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.7 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.7 fps, Avg. Travel Time= 0.4 min

Peak Depth= 2.17' @ 12.02 hrs
Capacity at bank full= 728.12 cfs
1.17' x 5.00' deep channel, n= 0.030
Side Slope Z-value= 2.4 2.3 '/' Top Width= 24.67'
Length= 62.7' Slope= 0.0159 '/'

006439

Reach 8CR: Channel into Sed Basin 2



Reach 9AR: Extended Drainge Channel South of Cell 8

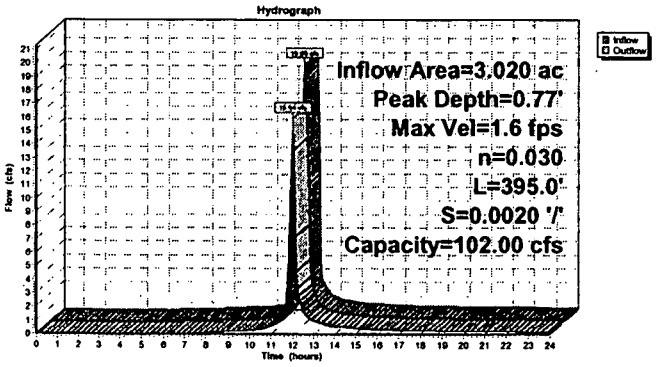
[65] Warning: Inlet elevation not specified

Inflow Area = 3.020 ac, Inflow Depth > 3.48"
Inflow = 19.05 cfs @ 11.93 hrs, Volume= 0.877 af
Outflow = 15.94 cfs @ 12.03 hrs, Volume= 0.872 af, Atten= 16%, Lag= 6.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.6 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.4 fps, Avg. Travel Time= 17.3 min

Peak Depth= 0.77' @ 11.96 hrs
Capacity at bank full= 102.00 cfs
10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 6.0 '/' Top Width= 28.00'
Length= 395.0' Slope= 0.0020 '/'

Reach 9AR: Extended Drainge Channel South of Cell 8



Reach 9BR: channel

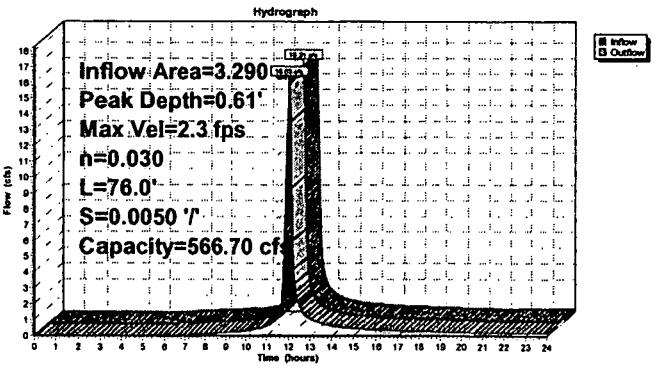
[65] Warning: Inlet elevation not specified

Inflow Area = 3.290 ac, Inflow Depth > 3.46"
Inflow = 16.31 cfs @ 12.03 hrs, Volume= 0.950 af
Outflow = 16.03 cfs @ 12.04 hrs, Volume= 0.949 af, Atten= 2%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.3 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 2.3 min

Peak Depth= 0.61' @ 12.03 hrs
Capacity at bank full= 566.70 cfs
10.00' x 4.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 34.00'
Length= 76.0' Slope= 0.0050 '/'

Reach 9BR: channel



Reach 12R: Culvert from F Street Drainage Channel

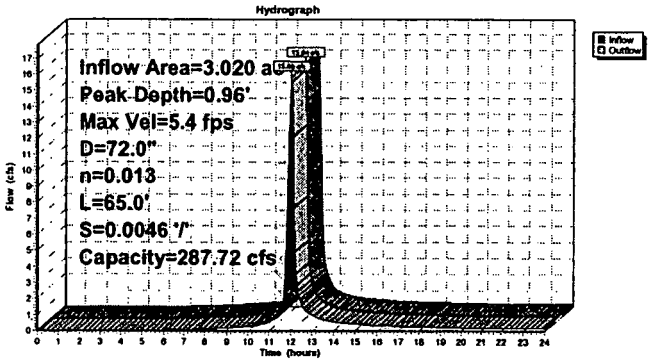
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 3.020 ac, Inflow Depth > 3.46"
Inflow = 15.94 cfs @ 12.03 hrs, Volume= 0.872 af
Outflow = 15.83 cfs @ 12.03 hrs, Volume= 0.871 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.4 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.96' @ 12.03 hrs
Capacity at bank full= 287.72 cfs
72.0" Diameter Pipe, n= 0.013
Length= 65.0' Slope= 0.0046 '/'

Reach 12R: Culvert from F Street Drainage Channel



Reach 13: culvert

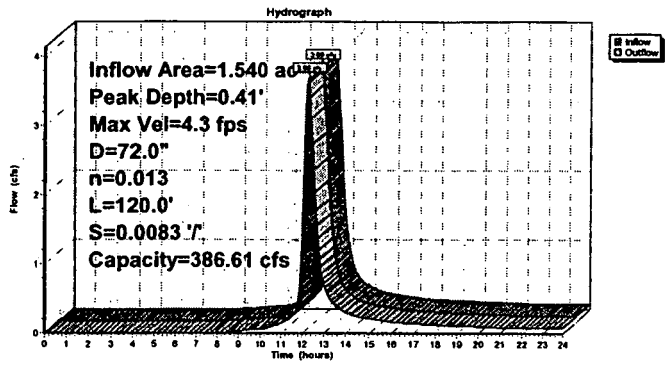
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 1.540 ac, Inflow Depth > 2.79"
Inflow = 3.69 cfs @ 12.25 hrs, Volume= 0.358 af
Outflow = 3.68 cfs @ 12.26 hrs, Volume= 0.358 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.3 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 1.2 min

Peak Depth= 0.41' @ 12.26 hrs
Capacity at bank full= 386.61 cfs
72.0" Diameter Pipe, n= 0.013
Length= 120.0' Slope= 0.0083 '/'

Reach 13: culvert



Reach 14: Culvert from North Entrance Road channel

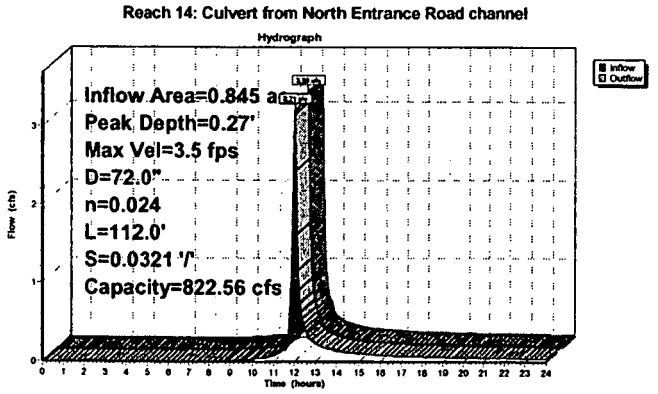
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 0.845 ac, Inflow Depth > 2.53"
Inflow = 3.29 cfs @ 12.01 hrs, Volume= 0.178 af
Outflow = 3.21 cfs @ 12.03 hrs, Volume= 0.178 af, Atten= 2%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 1.3 min

Peak Depth= 0.27' @ 12.02 hrs
Capacity at bank full= 822.56 cfs
A factor of 2.00 has been applied to the supplied storage and discharge data
72.0" Diameter Pipe, n= 0.024
Length= 112.0' Slope= 0.0321 '/'

Reach 14: Culvert from North Entrance Road channel



Reach 15N: Culvert adjacent to North Entrance Road

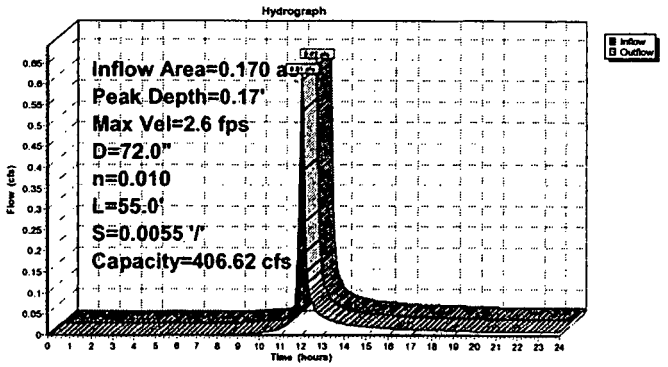
[52] Hint: Inlet conditions not evaluated
[65] Warning: Inlet elevation not specified

Inflow Area = 0.170 ac, Inflow Depth > 2.54"
Inflow = 0.62 cfs @ 12.04 hrs, Volume= 0.036 af
Outflow = 0.61 cfs @ 12.05 hrs, Volume= 0.036 af, Atten= 1%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.17' @ 12.04 hrs
Capacity at bank full= 406.62 cfs
72.0" Diameter Pipe, n= 0.010
Length= 55.0' Slope= 0.0055 '/'

Reach 15N: Culvert adjacent to North Entrance Road



Reach 16N: Channel east of North Entrance Road

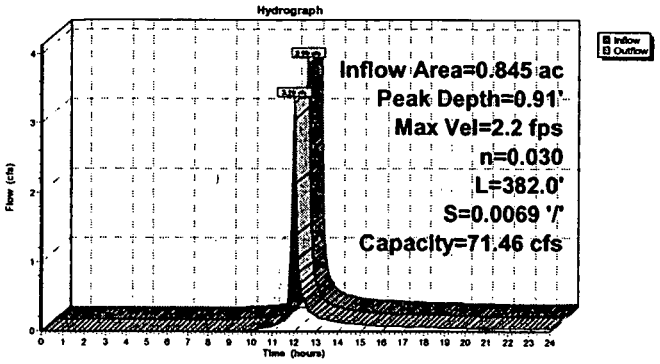
[65] Warning: Inlet elevation not specified

Inflow Area = 0.845 ac, Inflow Depth > 2.54"
Inflow = 3.69 cfs @ 11.94 hrs, Volume= 0.179 af
Outflow = 3.29 cfs @ 12.01 hrs, Volume= 0.178 af, Atten= 11%, Lag= 4.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.2 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 7.6 min

Peak Depth= 0.91' @ 11.97 hrs
Capacity at bank full= 71.46 cfs
0.00' x 2.88' deep channel, n= 0.030
Side Slope Z-value= 2.2 1.4 '/' Top Width= 10.37'
Length= 382.0' Slope= 0.0069 '/'

Reach 16N: Channel east of North Entrance Road



Pond 1P: Sedimentation Basin 2

Inflow Area = 40.865 ac, Inflow Depth > 3.17"
Inflow = 101.95 cfs @ 12.02 hrs, Volume= 10.780 af
Outflow = 3.50 cfs @ 17.65 hrs, Volume= 1.922 af, Atten= 97%, Lag= 338.3 min
Primary = 3.50 cfs @ 17.65 hrs, Volume= 1.922 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 575.69' @ 17.65 hrs Surf.Area= 1.993 ac Storage= 8.969 af
Plug-Flow detention time= 528.1 min calculated for 1.922 af (18% of inflow)
Center-of-Mass det. time= 357.5 min (1,171.4 - 813.8)

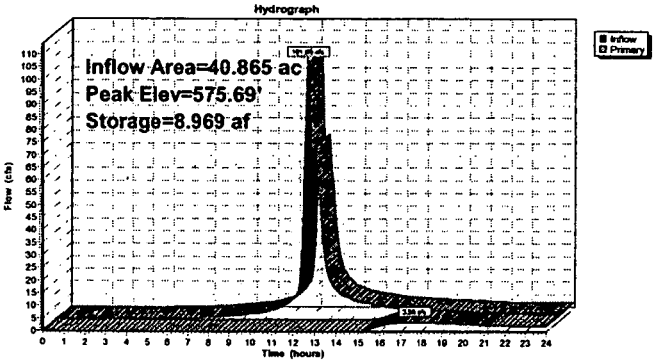
Volume	Invert	Avail.Storage	Storage Description
#1	570.50'	11.667 af	Custom Stage Data (Conic) Listed below

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
570.50	1.460	0.000	0.000	1.460
571.00	1.512	0.743	0.743	1.513
572.00	1.614	1.563	2.306	1.617
573.00	1.713	1.663	3.969	1.719
574.00	1.819	1.766	5.735	1.827
575.00	1.917	1.868	7.602	1.928
576.00	2.026	1.971	9.574	2.039
577.00	2.162	2.094	11.667	2.177

Device	Routing	Invert	Outlet Devices
#1	Device 2	575.50'	48.0" Horiz. Orifice/Grate Limited to weir flow C= 0.600
#2	Primary	570.78'	36.0" x 680.0' long Culvert Ke= 0.700 Outlet Invert= 563.30' S= 0.0110 '/' Cc= 0.900 n= 0.024
#3	Primary	576.00'	20.0' long Broad-Crested Rectangular Weir Head (feet) 0.50 1.00 1.50 2.00 2.50 3.00 4.00 5.00 Coef. (English) 3.00 3.00 3.00 3.00 3.00 3.00 3.00 3.00

Primary OutFlow Max=3.49 cfs @ 17.65 hrs HW=575.69' (Free Discharge)
└2=Culvert (Passes 3.49 cfs of 40.39 cfs potential flow)
└1=Orifice/Grate (Weir Controls 3.49 cfs @ 1.4 fps)
└3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Sedimentation Basin 2



ATTACHMENT C-2

WEIGHTED CURVE NUMBER CALCULATIONS

RESULTS FOR THE CALCULATION OF WEIGHTED CN
West OSDF Construction Design Scenario

Subcatchment Label	Area (acres)	Percent of Total Area %	HSG	Land Use Description	CN	Weighted CN
A	2.73	100%	B/C	vegetated final cover	83	83
B	5.34	100%	B/C	vegetated final cover	83	83
C	5.40	100%	B/C	vegetated final cover	83	83
D	5.53	100%	B/C	vegetated final cover	83	83
ER	5.32	100%	B/C	unvegetated final cover	89	89
F1R	0.92	100%	B/C	unvegetated final cover	89	89
F2R	2.73	100%	B/C	unvegetated final cover	89	89
FR	2.91	100%	B/C	unvegetated final cover	89	89
GR	0.27	100%	B/C	unvegetated final cover	89	89
HR	0.14	100%	B/C	unvegetated final cover	89	89
J1R	0.31	100%	C	construction laydown	82	82
KR	3.02	100%	C	unvegetated final cover	89	89
LR	1.54	100%	C	construction laydown	82	82
MR	0.68	100%	C	runon north of borrow area	79	79
N	1.04	100%	C	construction laydown	82	82
O	2.25	100%	N/A	direct runon to pond	98	98
P1R	0.49	100%	C	construction laydown	82	82
P2R	0.21	100%	C	construction laydown	82	82
QN	0.17	100%	C	runon north of borrow area	79	79

SUBCATCHMENT AREA AND HYDROCAD™ INPUT PARAMETERS FOR THE CALCULATION OF WEIGHTED CN

East OSDF Construction Design Scenario

Subcatchment Label	Area (acres)	Percent of Total Area %	HSG	Land Use Description	CN	Weighted CN
A	1.96	100%	B/C	vegetated final cover	83	83
B	1.18	100%	B/C	vegetated final cover	83	83
C	5.21	100%	B/C	vegetated final cover	83	83
D	5.13	100%	B/C	vegetated final cover	83	83
E	5.09	100%	B/C	vegetated final cover	83	83
F	5.05	100%	B/C	vegetated final cover	83	83
G	5.31	100%	B/C	vegetated final cover	83	83
HR	4.59	100%	B/C	unvegetated final cover	89	89
IR	0.81	100%	B/C	unvegetated final cover	89	89
JR	2.20	100%	B/C	unvegetated final cover	89	89
L	1.68	30% 70%	B C	runon north of borrow area runon north of borrow area	69 79	76
M	1.00	100%	C	runon north of borrow area	79	79
N	7.82	100%	N/A	direct runon to pond	98	98
O	1.32	100%	C	runon north of borrow area	79	79
P	5.24	45% 55%	B C	runon north of borrow area runon north of borrow area	69 79	75
Q	7.70	70% 30%	B C	runon north of borrow area runon north of borrow area	69 79	72
R	2.61	55% 45%	B C	runon north of borrow area runon north of borrow area	69 79	74
S	0.40	10% 90%	B C	runon north of borrow area runon north of borrow area	69 79	78
U	4.15	70% 30%	B C	runon east of OSDF runon east of OSDF	69 79	72
V	0.27	100%	N/A	direct runon to pond	98	98
W	10.59	70% 30%	B C	runon east of OSDF runon east of OSDF	69 79	72
X	11.85	80% 20%	B C	runon east of OSDF runon east of OSDF	69 79	71
Y	6.52	60% 40%	B C	runon east of OSDF runon east of OSDF	69 79	73
Z	1.61	70% 30%	B C	runon east of OSDF runon east of OSDF	69 79	72
AA	2.71	55% 45%	B C	runon east of OSDF runon east of OSDF	69 79	74
BB	0.76	100%	C	runon east of OSDF	79	79
CC	0.12	100%	C	runon east of OSDF	79	79
DDR	0.73	100%	B/C	unvegetated final cover	89	89
EE	0.93	20% 80%	B C	runon north of borrow area runon north of borrow area	69 79	77
FFR	5.51	100%	B/C	unvegetated final cover	89	89
GGR	1.55	55% 45%	B C	construction laydown construction laydown	74 82	78
HH	0.55	100%	C	runon north of borrow area	79	79
II	1.67	50% 50%	B C	runon area to borrow area runon area to borrow area	61 74	68
JJ	0.91	93% 7%	B C	runon area to borrow area runon area to borrow area	61 74	62
KK	5.89	80% 20%	B C	runon area to borrow area runon area to borrow area	61 74	64
LL	7.05	100%	B	runoff	61	61
MM	1.94	100%	B	runoff	61	61
NN	1.27	60% 40%	B C	runoff runoff	61 74	66
OO	0.40	65% 35%	B C	runon area to borrow area runon area to borrow area	61 74	66
PP	40.96	80% 20%	B C	vegetated borrow area vegetated borrow area	61 74	64

N/A - Not Applicable

ATTACHMENT C-3

TABULATED ANALYSIS RESULTS FOR CHANNELS

OSDF CONSTRUCTION/FILLING PERIOD CONDITIONS
SUMMARY OF CHANNEL ANALYSIS RESULTS

Channel Identification			Channel Characteristics							Hydrologic Calculations		Hydraulic Calculations							
Channel Name[1]	Status	Design Scenario	Section Shape	Minimum Channel Depth (ft)	Longitudinal Slope[2] (%)	Manning n	Bottom Width B (ft)	Side Slope M_1:1	Side Slope M_2:1	HydroCAD Node	HydroCAD Q[4] (cfs)	Area of Flow A (sq ft)	Perimeter P (ft)	Hydraulic Radius, R (ft)	Peak Flow Depth[5] Y (ft)	Estimated Q[5] (cfs)	Channel Freeboard[7] (ft)	Peak Flow Velocity (fps)	Lining Type[6]
7R	new	E OSDF	vee	4.0	0.50%	0.030	0	3	6	8R	77.19	21.39	20.15	1.06	2.18	78.14	1.8	3.65	grass
8R	new	E OSDF	vee	4.5	0.71%	0.030	0	3	4	9R	77.10	17.56	16.32	1.08	2.24	77.18	2.3	4.39	grass
9R	new	E OSDF	trapezoidal	5.5	0.83%	0.030	6	3	4	10AR	77.12	17.04	17.00	1.00	1.51	77.22	4.0	4.53	grass
10AR	new	E OSDF	trapezoidal	6.5	0.50%	0.030	10	6	3	11	78.55	22.59	22.85	0.99	1.39	78.76	5.1	3.49	grass
12R	existing	E OSDF	trapezoidal	2.5	0.63%	0.030	14	3	4.3	12R + HH	80.36	21.38	22.87	0.93	1.17	80.57	1.3	3.77	grass
13R	existing	E OSDF	trapezoidal	2.1	0.67%	0.030	23.11	2.3	4	13R	143.58	33.81	31.40	1.08	1.25	144.40	0.8	4.27	grass
18	new	E OSDF	vee	3.0	1.00%	0.030	0	3	3	19	38.43	8.77	10.81	0.81	1.71	37.89	1.3	4.32	grass
19	new	E OSDF	vee	3.0	0.90%	0.030	0	3	3	20	43.35	10.05	11.57	0.87	1.83	43.07	1.2	4.29	grass
20	new	E OSDF	vee	3.0	0.83%	0.030	0	3	3	1P - U - V	40.72	9.94	11.51	0.86	1.82	40.77	1.2	4.10	grass
30	new	E OSDF	vee	2.5	1.00%	0.030	0	3	3	30	45.98	10.05	11.57	0.87	1.83	45.40	0.7	4.52	grass
21	new	E OSDF	vee	3.0	1.00%	0.030	0	3	3	22	46.33	10.27	11.70	0.88	1.85	46.74	1.2	4.55	grass
22	new	E OSDF	vee	4.0	1.00%	0.030	0	3	3	29	47.10	10.27	11.70	0.88	1.85	46.74	2.2	4.55	grass
29	new	E OSDF	vee	3.5	1.00%	0.030	0	3	3	23	48.76	10.49	11.83	0.89	1.87	48.10	1.6	4.58	grass
24	new	E OSDF	trapezoidal	2.0	0.75%	0.030	8.5	3	3	24	57.15	14.21	15.96	0.89	1.18	56.54	0.8	3.98	grass
26	new	E OSDF	vee	2.5	0.75%	0.030	0	3	3	27	65.00	14.52	13.91	1.04	2.20	64.26	0.3	4.43	grass
7BR	new	W OSDF	vee	3.8	0.23%	0.030	0	6	2	7BR	57.98	22.47	19.72	1.14	2.37	58.39	1.4	2.60	grass
7DR	existing	W OSDF	trapezoidal	5.0	0.62%	0.030	4	4	10	7DR	78.17	22.00	25.40	0.87	1.51	78.17	3.5	3.55	grass
8AR	existing	W OSDF	trapezoidal	4.0	0.48%	0.030	4	4.2	2.6	8AR	91.38	23.21	18.85	1.23	2.09	91.78	1.9	3.95	grass
8CR	existing	W OSDF	trapezoidal	5.0	1.59%	0.030	1.17	2.4	2.3	8CR	91.07	13.60	12.25	1.11	2.17	91.36	2.8	6.72	rip rap
9AR	new	W OSDF	trapezoidal	2.0	0.20%	0.030	10	3	6	9AR	19.05	11.58	17.77	0.65	0.84	19.32	1.2	1.67	grass
9BR	new	W OSDF	trapezoidal	4.0	0.50%	0.030	10	3	3	9BR	16.31	7.22	13.86	0.52	0.61	16.40	3.4	2.27	grass
16N	existing	W OSDF	vee	2.9	0.69%	0.030	0	2.2	1.4	16N	3.69	1.62	3.93	0.41	0.95	3.72	1.9	2.29	grass
2	existing	DC A	vee	3.0	1.50%	0.030	0	4	6	1 + O	8.82	2.81	7.65	0.37	0.75	8.77	2.3	3.12	grass
5	new	DC A	vee	2.5	0.34%	0.030	0	3	3	5	12.05	5.63	8.66	0.65	1.37	12.16	1.1	2.16	grass
6	new	DC A	vee	2.5	0.23%	0.030	0	3	3	6 + D	12.43	6.66	9.42	0.71	1.49	12.53	1.0	1.88	grass
7	existing	DC A	vee	2.0	2.00%	0.030	0	4	6	7 + E	21.37	5.10	10.36	0.49	1.01	22.41	1.0	4.39	grass
1	existing	DC B	vee	6.5	0.45%	0.030	0	3	3	1	45.68	14.44	15.70	0.92	1.90	45.51	4.6	3.15	grass
2	new	DC B	vee	7.4	0.50%	0.030	0	3	4	2	66.63	17.88	16.46	1.09	2.26	66.32	5.1	3.71	grass
3	new	DC B	vee	6.5	0.50%	0.030	0	3	4	3	64.14	17.56	16.32	1.08	2.24	64.77	4.3	3.69	grass
4	new	DC B	vee	5	0.50%	0.030	0	3	6	4	62.72	18.00	18.49	0.97	2.00	62.09	1.0	3.45	grass
5	new	DC B	vee	5	0.50%	0.030	0	3	6	5	62.18	18.00	18.49	0.97	2.00	62.09	1.0	3.45	grass
6A	new	DC B	trapezoidal	2.75	0.50%	0.030	5.75	3.3	6	6A	64.11	18.95	19.88	0.95	1.50	64.42	1.3	3.40	grass
6B	new	DC B	trapezoidal	2	0.50%	0.030	7.1	3.3	3.5	6B	65.36	18.19	17.59	1.03	1.50	65.32	0.5	3.59	grass
8	new	DC B	trapezoidal	1.28	1.00%	0.030	2	3	3	8	13.70	4.33	8.77	0.49	0.82	13.42	0.5	3.10	grass
9	new	DC B	vee	2.5	1.50%	0.030	0	3	3	9	13.96	3.50	6.83	0.51	1.08	13.62	1.4	3.89	grass
11	existing	DC B	vee	3	0.45%	0.030	0	6	4	11	20.89	8.45	13.27	0.64	1.30	20.84	3.7	2.47	grass
1	new	DC C	vee	4	0.75%	0.030	0	2	6	2	25.75	7.73	11.56	0.67	1.39	25.41	2.6	3.29	grass
2	new	DC C	vee	4	0.75%	0.030	0	2	6	3	41.23	11.16	13.89	0.80	1.67	41.43	2.3	3.72	grass
3	new	DC C	vee	4	0.75%	0.030	0	2	6	4	46.28	12.23	14.56	0.84	1.75	46.96	2.3	3.83	grass
4	new	DC C	vee	4	0.76%	0.030	0	2	6	5	43.14	11.70	14.23	0.82	1.71	44.43	2.3	3.80	grass

E OSDF = East OSDF Construction-Phase Design Scenario
W OSDF = West OSDF Construction-Phase Design Scenario
DC A = Design Case "A"
DC B = Design Case "B"

Notes:
1. Channels are named after the corresponding subcatchment or reach.
2. Longitudinal slopes taken from the Drawings.
4. Peak inflow rates calculated by HydroCAD for each reach. See attachment C-1.
5. Calculated flow rates using an iterative procedure and compared with flow from HydroCAD.
6. Maximum permissible velocity for grass lined channels is 5 fps.
7. Calculated as the difference between minimum available flow depth and peak flow depth.

ATTACHMENT C-4A

CulvertMaster® OUTPUT REPORTS FOR CULVERTS

Culvert Designer/Analyzer Report
west node 7CR design

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev	578.25	ft	Discharge	65.26	cfs
Headwater Depth/Height	1.16		Tailwater Elevation	575.01	ft
Inlet Control HW Elev.	578.22	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	578.25	ft			

Grades					
Upstream Invert	574.96	ft	Downstream Invert	573.50	ft
Length	296.00	ft	Constructed Slope	0.004932	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.95	ft
Slope Type	Steep		Normal Depth	1.95	ft
Flow Regime	Supercritical		Critical Depth	2.07	ft
Velocity Downstream	8.61	ft/s	Critical Slope	0.004275	ft/ft

Section					
Section Shape	Horizontal Ellipse		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.44	ft
Section Size	34x53 inch		Rise	2.83	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	578.25	ft	Upstream Velocity Head	1.02	ft
Ke	0.20		Entrance Loss	0.20	ft

Inlet Control Properties					
Inlet Control HW Elev.	578.22	ft	Flow Control	Transition	
Inlet Type	Groove end with headwall (horizontal ellipse)		Area Full	10.2	ft^2
K	0.00180		HDS 5 Chart	29	
M	2.50000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Designer/Analyzer Report
west node 8BR

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev	575.56	ft	Discharge	90.36	cfs
Headwater Depth/Height	1.15		Tailwater Elevation	574.17	ft
Inlet Control HW Elev.	575.47	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	575.56	ft			

Grades					
Upstream Invert	572.12	ft	Downstream Invert	572.00	ft
Length	30.00	ft	Constructed Slope	0.004000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	2.19	ft
Slope Type	Mild		Normal Depth	2.74	ft
Flow Regime	Subcritical		Critical Depth	2.19	ft
Velocity Downstream	8.17	ft/s	Critical Slope	0.005887	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	575.56	ft	Upstream Velocity Head	0.87	ft
Ke	0.20		Entrance Loss	0.17	ft

Inlet Control Properties					
Inlet Control HW Elev.	575.47	ft	Flow Control	Transition	
Inlet Type	Groove end w/headwall		Area Full	14.1	ft^2
K	0.00180		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	2	
C	0.02920		Equation Form	1	
Y	0.74000				

Culvert Designer/Analyzer Report
west node 13

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev:	580.08	ft	Discharge	3.69	cfs
Headwater Depth/Height	0.72		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	580.03	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	580.08	ft			

Grades					
Upstream Invert	579.00	ft	Downstream Invert	578.00	ft
Length	120.00	ft	Constructed Slope	0.008300	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.65	ft
Slope Type	Steep		Normal Depth	0.65	ft
Flow Regime	Supercritical		Critical Depth	0.73	ft
Velocity Downstream	5.06	ft/s	Critical Slope	0.005321	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	580.08	ft	Upstream Velocity Head	0.29	ft
Ke	0.20		Entrance Loss	0.06	ft

Inlet Control Properties					
Inlet Control HW Elev.	580.03	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	1.8	ft^2
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Designer/Analyzer Report
west node 14 design

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	581.90	ft	Storm Event	Design	
Computed Headwater Elev	579.27	ft	Discharge	3.29	cfs
Headwater Depth/Height	0.26		Tailwater Elevation	0.00	ft
Inlet Control HW Elev.	579.11	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	579.27	ft			

Grades					
Upstream Invert	578.60	ft	Downstream Invert	575.00	ft
Length	112.00	ft	Constructed Slope	0.032143	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.32	ft
Slope Type	Steep		Normal Depth	0.32	ft
Flow Regime	Supercritical		Critical Depth	0.40	ft
Velocity Downstream	4.08	ft/s	Critical Slope	0.013346	ft/ft

Section					
Section Shape	Arch		Mannings Coefficient	0.024	
Section Material	Aluminum 18x1 Corrugations Historic		Span	4.17	ft
Section Size	50 x 31 inch		Rise	2.58	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	579.27	ft	Upstream Velocity Head	0.15	ft
Ke	0.90		Entrance Loss	0.13	ft

Inlet Control Properties					
Inlet Control HW Elev.	579.11	ft	Flow Control	Unsubmerged	
Inlet Type	CR structural plate, projecting		Area Full	8.4	ft²
K	0.03000		HDS 5 Chart	35	
M	1.50000		HDS 5 Scale	1	
C	0.04960		Equation Form	1	
Y	0.57000				

Culvert Designer/Analyzer Report
west node 15N design

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev	584.56	ft	Discharge	0.62	cfs
Headwater Depth/Height	0.44		Tailwater Elevation	584.55	ft
Inlet Control HW Elev.	584.55	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	584.56	ft			

Grades					
Upstream Invert	583.90	ft	Downstream Invert	583.60	ft
Length	55.00	ft	Constructed Slope	0.005455	ft/ft

Hydraulic Profile					
Profile	S1		Depth, Downstream	0.95	ft
Slope Type	Steep		Normal Depth	0.25	ft
Flow Regime	Subcritical		Critical Depth	0.29	ft
Velocity Downstream	0.53	ft/s	Critical Slope	0.002996	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.010	
Section Material	HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	584.56	ft	Upstream Velocity Head	0.01	ft
Ke	0.20		Entrance Loss	0.00	ft

Inlet Control Properties					
Inlet Control HW Elev.	584.55	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	1.8	ft^2
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Designer/Analyzer Report
west node 12 design

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev	580.03	ft	Discharge	15.94	cfs
Headwater Depth/Height	1.13		Tailwater Elevation	578.08	ft
Inlet Control HW Elev.	579.99	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	580.03	ft			

Grades					
Upstream Invert	577.77	ft	Downstream Invert	577.47	ft
Length	63.76	ft	Constructed Slope	0.004768	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.44	ft
Slope Type	Mild		Normal Depth	1.68	ft
Flow Regime	Subcritical		Critical Depth	1.44	ft
Velocity Downstream	6.58	ft/s	Critical Slope	0.006595	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	580.03	ft	Upstream Velocity Head	0.53	ft
Ke	0.20		Entrance Loss	0.11	ft

Inlet Control Properties					
Inlet Control HW Elev.	579.99	ft	Flow Control	Transition	
Inlet Type	Groove end projecting		Area Full	3.1	ft^2
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Designer/Analyzer Report
east node 11

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	N/A	ft	Storm Event	Design	
Computed Headwater Elev	586.60	ft	Discharge	78.55	cfs
Headwater Depth/Height	1.30		Tailwater Elevation	584.73	ft
Inlet Control HW Elev.	586.60	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	586.60	ft			

Grades					
Upstream Invert	583.67	ft	Downstream Invert	583.58	ft
Length	40.00	ft	Constructed Slope	0.002355	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.79	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.79	ft
Velocity Downstream	7.74	ft/s	Critical Slope	0.004495	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.010	
Section Material	HDPE (Smooth Interior)		Span	2.25	ft
Section Size	27 inch		Rise	2.25	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	586.60	ft	Upstream Velocity Head	0.75	ft
Ke	0.20		Entrance Loss	0.15	ft

Inlet Control Properties					
Inlet Control HW Elev.	586.60	ft	Flow Control	Submerged	
Inlet Type	Groove end projecting		Area Full	11.9	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

ATTACHMENT C-4B

TABULATED ANALYSIS RESULTS FOR CULVERTS

OSDF CONSTRUCTION/FILLING PERIOD CONDITIONS
SUMMARY OF CULVERT ANALYSES RESULTS

CULVERT IDENTIFICATION			PHYSICAL CHARACTERISTICS OF CULVERT						CULVERT PROFILE				CULVERTMASTER® MODELING CHARACTERISTICS			HYDRAULIC CAPACITY					STRUCTURAL CAPACITY (6)				OUTLET PROTECTION (6)				
Culvert Name	Status (1)	Design Scenario	Material - Type	Entrance Loss Coefficient (Ke)	Manning's n	Entrance Configuration (2)	Number of Culverts - Diameter	Approximate Length (ft)	Inlet Invert Elevation (ft MSL)	Outlet Invert Elevation (ft MSL)	Slope ft/ft	Overtopping Elevation (ft MSL)	Entrance Configuration(2)	Entrance Loss Coefficient (Ke)	Number of Culverts - Diameter (3)	HydroCad Node / Peak Flow Rate (cfs)	Tailwater Elevation (ft MSL)	Calculated Headwater Depth - Inlet Control (4) (ft MSL)	Calculated Headwater Depth Outlet Control (4) (ft MSL)	Calculated Freeboard (ft)	Available Cover (ft)	Design Traffic Type	Minimum Required Cover (ft)	Structurally Stable	Outlet Velocity (ft/s)	Riprap Length at Inlet (ft)	Riprap Length at Outlet (ft)	d_{50} (in)	Thickness (in)
11a	existing	E OSDF	HDPE	0.2	0.010	Projecting	2 - 27 inch	40	583.67	583.58	0.0023	587.20	Groove - Projecting	0.7	3 - 27 inch	11R / 78.55	584.73	586.60	586.60	0.6	-	-	-	-	7.7	-	-	-	-
11b	existing	E OSDF	RCP	0.2	0.013	Projecting	1 - 30 inch	40																					
23	new	E OSDF	Helical CMP	0.9	0.018	Projecting	2 - 36 inch	92	586.32	585.78	0.0059	590.00	Projecting	0.9	2 - 36 inch	23 / 48.76	587.01	588.83	589.02	1.0	2.04	On-Highway	2	yes	6.4	6	12	6	12
25	new	E OSDF	Helical CMP - Arch	0.9	0.018	Projecting	2 - 42 x 29 inch	53	584.85	584.53	0.0060	588.50	Thin Wall Projecting	0.9	2 - 42 x 29 inch	25 / 64.24	586.73	578.53	587.71	0.8	3.23	On-Highway	2	yes	4.9	0	0	0	0
27	new	E OSDF	Helical CMP - Arch	0.9	0.018	Projecting	2 - 42 x 29 inch	106	582.80	582.36	0.0042	587.00	Thin Wall Projecting	0.9	2 - 42 x 29 inch	27 / 65.00	583.88	585.50	585.63	1.4	3.78	Off-Highway	3	yes	6.8	7	14	6	12
28R	new - temporary	E OSDF	Helical CMP - Arch	0.9	0.019	Projecting	2 - 49 x 33 inch	140	585.75	585.00	0.0054	592.39	Thin Wall Projecting	0.9	2 - 49 x 33 inch	28R / 77.45	586.01	587.87	588.02	4.4	3.89	Off-Highway	3	yes	6.9	8	16	6	12
31	existing	E OSDF	HDPE	0.9	0.012	Projecting	1 - 27 inch	80	584.00	583.00	0.0125	588.50	Groove - Projecting	0.9	1 - 27 inch	31 / 6.54	584.51	585.20	585.49	3.0	-	-	-	-	2.3	-	-	-	-
5	new - temporary	W OSDF	Helical CMP	0.9	0.024	Projecting	1 - 42 inch	95	560.68	579.98	0.0737	585.34	Projecting	0.9	1 - 42 inch	5 / 55.45	582.50	584.67	584.89	0.5	27.64	Off-Highway	3	yes	7.48	7	14	6	12
7AR	new	W OSDF	CMP	0.9	0.024	Projecting	1 - 42 inch	82	577.67	577.23	0.0053	582.57	Projecting	0.9	1 - 42 inch	7AR / 57.96	579.58	581.8	582.10	0.5	4.83	Off-Highway	3	yes	8.30	6	12	6	12
7CR	existing	W OSDF	RCP - Horizontal Ellipse	0.2	0.013	Concrete Headwall	1 - 34 x 53 inch	296	574.96	573.50	0.00493	580.00	Groove - Headwall	0.2	1 - 34 x 53 inch	7CR / 65.26	575.01	578.22	578.25	1.8	-	-	-	-	8.61	-	-	-	-
8BR	existing	W OSDF	RCP	0.2	0.013	Concrete Headwall	2 - 36 inch	30	572.12	572.00	0.00400	577.00	Groove - Headwall	0.2	2 - 36 inch	8BR / 90.36	574.17	575.47	575.56	1.4	-	-	-	-	8.17	-	-	-	-
12R	new	W OSDF	RCP	0.2	0.013	Projecting	1 - 24 inch	64	577.77	577.47	0.0047	580.50	Groove -Projecting	0.2	1 - 24 inch	12R / 15.94	578.08	579.99	580.03	0.5	4.21	On-Highway	2	yes	6.58	5	10	6	12
13	new	W OSDF	RCP	0.2	0.013	Projecting	1 - 18 inch	120	579.00	578.00	0.0083	582.33	Groove - Projecting	0.2	1 - 18 inch	13 / 3.69	N/A	580.03	580.08	2.3	2.33	On-Highway	2	yes	5.06	3	6	6	12
14	existing	W OSDF	CMP	0.9	0.024	Projecting	1 - 50 x 31 inch	112	578.60	575.00	0.0321	581.90	Projecting	0.9	1 - 50 x 31 inch	14 / 3.29	N/A	579.11	579.27	2.6	-	-	-	-	4.08	-	-	-	-
15N	existing	W OSDF	HDPE	0.2	0.010	Projecting	1 - 18 inch	55	583.90	583.60	0.0055	585.05	Groove - Projecting	0.2	1 - 18 inch	15N / 0.62	584.55	584.55	584.56	0.5	-	-	-	-	0.53	-	-	-	-
1	existing temporary	DC A	CMPA - Arch	0.5	0.018	Flared End Section	1 - 13 x 17 inch	80	587.35	586.37	0.0123	590.00	Headwall	0.5	1 - 13 x 18 inch	1 / 2.02	586.80	587.97	588.03	2.0	-	-	-	-	3.3	-	-	-	-
2	existing temporary	DC A	PVC	0.2	0.010	Concrete Headwall	2 - 18 inch	55	581.60	581.30	0.0055	585.50	Groove Headwall	0.2	2 - 18 inch	3 / 8.41	582.57	582.70	582.76	2.7	-	-	-	-	4.15	-	-	-	-
3	existing temporary	DC A	PVC	0.2	0.010	Concrete Headwall	2 - 18 inch	60	582.70	581.50	0.0200	587.00	Groove Headwall	0.2	2 - 18 inch	4 / 1.90	582.94	583.4	583.45	3.5	-	-	-	-	1.16	-	-	-	-
4	existing temporary	DC A	PVC	0.2	0.010	Concrete Headwall	2 - 18 inch	60	582.70	581.50	0.0200	587.00	Groove Headwall	0.2	2 - 18 inch	4 / 1.90	582.94	583.4	583.45	3.5	-	-	-	-	1.16	-	-	-	-
6	new temporary	DC A	Helical CMP	0.9	0.017	Projecting	2 - 30 inch	49	579.33	578.84	0.0100	582.50	Projecting	0.9	2 - 30 inch	6 / 24.73	579.84	581.13	581.38	1.1	2.37	On-Highway	1	yes	6.0	5	10	6	12
7	new temporary	DC B	Helical CMP - Arch	0.9	0.019	Projecting	2 - 49 x 33 inch	92	586.95	586.53	0.0046	593.5	Thin Wall Projecting	0.9	2 - 49 x 33 inch	7 / 64.43	587.98	589.27	589.44	4.1	3.8	Off-Highway	3	yes	6.1	8	16	6	12
5	new temporary	DC C	Helical CMP	0.9	0.0181	Projecting	1 - 42 inch	95	580.68	579.98	0.0074	591.82	Projecting	0.9	1 - 42 inch	5 / 45.14	581.71	584.11	584.36	7.5	7.64	Off-Highway	3	yes	7.515	7	14	6	12

- E OSDF = East OSDF Construction-Phase Design Scenario
- W OSDF = West OSDF Construction-Phase Design Scenario
- DC A = Design Case "A"
- N/A = Not Applicable
- d_{50} = Average particle diameter

Notes
(1) New indicates a new culvert to be installed.
(2) Entrance configuration assumed.
(3) Dimensions and entrance configurations used in the Culvertmaster software package were selected to match existing culvert characteristics as closely as possible.
(4) Headwater depths calculated using Culvertmaster software package. Summary output presented for each culvert in Attachment C-4A.
(5) Grading is provided in the Construction Drawings
(6) Neither structural capacity nor outlet protection are evaluated for existing culverts.

GeoSyntec

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M E M O R A N D U M

TO: Uday Kumthekar, P.E., Fluor Fernald, Inc.
Chuck Vanarsdale, P.E., Fluor Fernald, Inc.

CC: J. D. Chiou, PhD., P.E., Fluor Fernald, Inc.

FROM: Dave Phillips, P.E., GeoSyntec Consultants, Inc.
Jay Beech, PhD., P.E., GeoSyntec Consultants, Inc.

DATE: 15 February 2006

SUBJECT: On-Site Disposal Facility (OSDF)
U.S. Department of Energy (DOE) - Fernald Closure Project
Engineering Evaluation of Proposed Change in Side Slopes and Crest Slope of Cell 8 of the OSDF Final Cover System

---

1. INTRODUCTION

The purpose of this technical memorandum is to summarize the results of an engineering evaluation of a proposed change in side slopes and the crest slope of the OSDF Cell 8 final cover system. This engineering evaluation was performed based on criteria described in the approved Design Criteria Package (GeoSyntec, May 1997, Revision 0). The change in side slopes and crest slope, if found acceptable and approved by DOE and regulating agencies, will be incorporated in constructing the Cell 8 final cover system with the exception of the west sideslope from north of Valve House 8 to the tie-in with the Cell 7 final cover system. The final cover system from north of Valve House 8 to the tie-in with the Cell 7 final cover system will remain unchanged. Specifically, this engineering evaluation is performed to evaluate the impacts of changing the 6 Horizontal (H):1 Vertical (V) side slope in the final cover system as shown in the approved OSDF Design Package to a maximum of 5.3H:1V for impacted materials placement through the contouring layer; the compacted clay cap; the

geosynthetics layer; and the granular drainage layer. The biointrusion layer will have a 5.3H:1V slope at the bottom of the layer and a 6H:1V slope at the top of the layer resulting in the layer increasing in thickness from 3-ft thick at the top of the slope to an average thickness of about 6.75-ft thick at the bottom of the slope. The thickened biointrusion layer provides an enhanced buttress resistance for the evaluated surface. Enhancement of the buttress resistance results in an increased calculated factor of safety for the evaluated surface. The sideslopes of the vegetative soil layer and topsoil layer will be unchanged and will be constructed at a slope of 6H:1V. This engineering evaluation also evaluates a change in the crest slope of the final cover system from -0.5 percent (North to South) to +0.5 percent (North to South). The change in side slope and crest slope is evaluated to allow for a possible increase in the OSDF impacted material placement volume, if needed.

GeoSyntec Consultants (GeoSyntec) performed this engineering evaluation at the request of Fluor Fernald, Inc. The remainder of this memorandum provides: an executive summary; engineering evaluation results; and a summary and recommendations.

2. EXECUTIVE SUMMARY

GeoSyntec was requested by Fluor Fernald to perform an engineering evaluation of the approved OSDF cover system design for providing additional OSDF capacity for possible increase in impacted material placement volumes. Specifically, the objective of the engineering evaluation is to evaluate the impacts of change in the final cover system side slopes and crest slope on the short-term and long-term performance of the OSDF on human health and the environment. This engineering evaluation was performed in accordance with the approved design criteria.

The approved Design Criteria Package requires minimum acceptable factors of safety based on the UMTRA Technical Approach Document (DOE, 1989) of: (i) short-term stability of the cover system, FS $\geq$ 1.3; and (ii) long-term stability of the final cover system, FS $\geq$ 1.5. Additionally, the approved Design Criteria Package states:

- "The maximum height of the OSDF from the top of the final cover system to the existing grade (measured at the crest of the facility) should not exceed 70 ft

(functional requirement) and the average maximum height along the crestline should not exceed about 65 ft (design consideration).

- "The final cover system will be constructed at slopes between 5 and 25 percent (ARAR: OAC 3745-27-08(C)(15)(f)(ii)). The slopes should be flat enough to satisfy slope stability criteria and erosion control criteria. Within these constraints, slopes should be as steep as possible to achieve a cost effective design."

GeoSyntec reviewed the approved Design Criteria Package in detail and confirmed that the above listed criteria are the only criteria directly related to the proposed side slope and crest slope changes.

3. ENGINEERING EVALUATION

Factors considered in the engineering evaluation of the side slopes and crest slope of the OSDF are as follows:

3.1 Stability

The approved *On Site Disposal Facility Calculation Package (GeoSyntec May 1997, Revision 0)* evaluated the Final Cover System stability with the following results (See Attachment A):

Case	UMTRA Factor of Safety (Required)	Calculated Factor of Safety (Approved)	Calculated Results
6H:1V Short Term Stability	FS $\geq$ 1.3	FS = 2.4	acceptable
6H:1V Long Term Stability	FS $\geq$ 1.5	FS = 1.6	acceptable
5H:1V Long Term Stability	FS $\geq$ 1.5	FS = 1.4	not acceptable

A 6H:1V slope was selected for the cover system without further evaluation; however, an intermediate maximum slope between 6H:1V and 5H:1V will produce acceptable results. The final OSDF design calculations did not perform calculations to identify this acceptable maximum intermediate slope with acceptable factors of safety.

GeoSyntec performed the calculations in this engineering evaluation (See Attachment B) to identify an intermediate maximum acceptable side slope. To increase the calculated factor of safety, the biointrusion layer has been thickened to maintain the approved final sideslope of 6H:1V. This thickened biointrusion layer provides an enhanced buttress resistance. Following are the results of this engineering evaluation:

Case	**UMTRA Factor of Safety (Required)**	**Calculated Factor of Safety (Revised)**	**Calculated Results**
5.3H:1V Short Term Stability	FS $\geq$ 1.3	FS = 2.52	acceptable
5.3H:1V Long Term Stability	FS $\geq$ 1.5	FS = 1.89	acceptable

The calculated revised factor of safety in the proposed side slope configuration is higher than the factor of safety in the approved calculation package. This higher calculated factor of safety is due principally to the following:

- The calculated factor of safety for the final cover system sideslopes in the approved calculation package is based on a maximum sideslope height of 60 feet. The maximum height of the sideslope in the revised Cell 8 cover system is 46 feet. The decrease in the sideslope height of Cell 8 provides a higher factor of safety for the revised 5.3H:1V sideslope.

- The enhanced buttress resistance provided by the thickened biointrusion layer contributes directly to an increase in stability of the slope.

The following conceptual drawings are included in Attachment C.

- a plan view showing the portions of the OSDF cover system and adjacent grading affected by the proposed change;

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- conceptual north-south and east-west cross sections of the OSDF showing the 5.3H:1V sideslope with a thickened biointrusion layer to provide a final grading surface of 6H:1V; and

- a typical conceptual detail of the affected perimeter of the final cover system of Cell 8.

The proposed change in the crest slope of the OSDF final cover system from -0.5 percent (North to South) to +0.5 percent (North to South) for Cell 8 meets the overall height criteria as described in the Design Criteria Package (i.e., the maximum height at any point does not exceed 70 ft and the average height of the OSDF at the crest line does not exceed 65 ft. The change in the crest slope has no effect on short or long term stability of the OSDF.

3.2 Settlement

GeoSyntec has reviewed the approved Design Criteria Package and Design Calculations to confirm that proposed changes in the side slopes and crest slope has insignificant effect on settlement calculations.

3.3 Seepage Through the Final Cover System

GeoSyntec has reviewed the approved Design Criteria Package and Design Calculations to confirm that proposed changes in the side slopes and crest slope has insignificant effect on seepage through the final cover system.

3.4 Drainage Layer

GeoSyntec has reviewed the approved Design Criteria Package and Design Calculations to confirm that proposed changes in the side slopes and crest slope has insignificant effect on the drainage layer component of the final cover system.

3.5 Erosion

GeoSyntec has reviewed the approved Design Criteria Package and Design Calculations to confirm that proposed changes in the side slopes and crest slope has insignificant effect on erosion of the final cover system. It is interesting to note, however, that the change in side slope does have the effect of shortening the steepest slope of the cover system while adding in length to the slope of the 10H:1V which may have the effect of further reduction in the potential for erosion for the combined slope.

3.6. Vegetation

GeoSyntec has reviewed the approved Design Criteria Package and Design Calculations to confirm that proposed changes in the side slopes and crest slope has insignificant effect on the vegetative component of the final cover system.

3.7 Other Factors

GeoSyntec believes that the approved Design Criteria Package provided clear intent to achieve a cost effective design by allowing the maximum side slope within established criteria, as restated below:

- "The final cover system will be constructed at slopes between 5 and 25 percent (ARAR: OAC 3745-27-08(C)(15)(f)(ii)). The slopes should be flat enough to satisfy slope stability criteria and erosion control criteria. Within these constraints, slopes should be as steep as possible to achieve a cost effective design."

4. SUMMARY AND RECOMMENDATIONS

In summary, GeoSyntec believes that the engineering evaluation for the proposed change in side slopes of the OSDF final cover system to a maximum slope of 5.3H:1V is acceptable and meets the criteria described in the approved Design Criteria Package. Likewise, GeoSyntec believes that a change in the slope of the crest line of the OSDF cover system for Cell 8 from -0.5 percent (North to South) to +0.5 percent (North to

South) is acceptable and meets the criteria described in the approved Design Criteria Package. The proposed changes have no detrimental effects on the short term or long term performance of the OSDF.

GeoSyntec further notes that by maintaining the 6H:1V sideslope for the upper layers of the OSDF final cover system:

- An enhanced buttress resistance provides for increased stability thus providing a higher factor of safety.
- The 46-ft height of the steepest sideslope of Cell 8, compared to a 60-ft height of the steepest sideslope used in calculating slope stability factors of safety for Cells 1 through 7, provides a higher slope stability factor of safety for the Cell 8 cover system where the 5.3H:1V sideslopes are proposed.
- The steeper sideslope of the OSDF cover system has been shortened while the 10H:1V sideslope of the OSDF has been lengthened to further reduce the potential for gully initiation with an overall improvement in erosion resistance.
- The thicker biointrusion layer at the toe of the perimeter of the cover system will provide additional capacity to drain precipitation that infiltrates into the final cover system.

GeoSyntec recommends that the proposed changes in the side slopes and crest slope of the OSDF cover system be approved to achieve the most cost effective design for the Cell 8 cover system.

If the proposed change is implemented, GeoSyntec will review surface-water calculations of the affected portions of the OSDF cover system to confirm that drainage channels and culverts adjacent to the OSDF are revised to manage surface-water in the most effective manner protective of the OSDF; human health; and the environment.

* * * * *

List of Attachments:

A. Approved Stability Calculations
B. Revised Stability Calculations
C. Conceptual Drawings

List of References:

GeoSyntec Consultants, Inc., *"Final Design Criteria Package, On-Site Disposal Facility"*, Revision 0, May 1997

GeoSyntec Consultants, Inc., *"Final Design Calculation Package, On-Site Disposal Facility"*, Revision 0 (GeoSyntec, May 1997)

ATTACHMENT A

FINAL COVER SYSTEM STABILITY CALCULATIONS

"ON-SITE DISPOSAL FACILITY CALCULATION PACKAGE"
(GEOSYNTEC MAY 1997, REVISION 0)

[redacted]

COMPUTATION COVER SHEET

SUBJECT OF CALCULATION: FINAL COVER SYSTEM

Computations By: (Cognizant Engineer)
Signature: Mark H. Gleason — Date: 17 Feb 96
Printed Name and Title: MARK H. GLEASON, Assistant Project Engineer

Assumptions and Procedures Checked by: (Checker)
Signature: Saad Qureshi — Date: 20 FEB '96
Printed Name and Title: SAAD QURESHI, PROJECT ENGINEER

Computations Checked by:
Signature: Saad Qureshi — Date: 20 Feb '96
~~SAAD~~
Checked by:
Printed Name and Title: SAAD QURESHI, PROJECT ENGINEER

Computations Backchecked by: (Cognizant Engineer)
Signature: Mark H. Gleason — Date: 20 Feb 96
Printed Name and Title: MARK H. GLEASON, Assistant Project Engineer

Approved by: (PDP)
Signature: Mark H. Gleason — Date: 20 Feb 96
Printed Name and Title: MARK H. GLEASON, Assistant Project Engineer

Approved by: (DTL and TETL)
Signature: Rudolph Bonaparte — Date: 22 FEB 96
Printed Name and Title: Rudolph Bonaparte, Principal (DTL)

Record of Revision (Number and initial all revisions)

NO.	REASON	DATE	BY	CHECKED	APPROVAL
C	Intermediate Design				
D	IDP-EPA Submittal	3 Apr 96			
G	Final Design Package	4 Oct 96			
O	Response to Final Design Cmts	1 May 97			

Signature: _____
Number: _____
Registration Stamp (if applicable)

Written by: M. Gleason Date: 96/2/17 Reviewed by: SQ Date: 20/Feb/96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

COVER SYSTEM STABILITY

EXECUTIVE SUMMARY

Purpose

The purpose of this calculation package is to evaluate the minimum static slope stability factor of safety of the final cover system for the On-Site Disposal Facility (OSDF) and to compare the calculated value with the minimum accepted value.

Procedure

Provided in this package are the analyses of final cover system static slope stability for potential slip surfaces that pass along interfaces within the final cover system. The conditions considered are: (i) final cover system for short-term stability at 6H:1V inclination; (ii) final cover system for long-term stability at 6H:1V and 5H:1V slope inclinations.

The minimum acceptable factors of safety based on the UMTRA Technical Approach Document (DOE, 1989) are: (i) long-term stability of final cover system, FS $\geq$ 1.5; and (ii) short-term stability of final cover system, FS $\geq$ 1.3. The stability analyses are performed using established geotechnical procedures for calculating veneer stability.

Results for Final Cover System Stability

Case	Factor of Safety	
· 6H:1V Short-Term Stability	FS = 2.4	acceptable
· 6H:1V Long-Term Stability	FS = 1.6	acceptable
· 5H:1V Long-Term Stability	FS = 1.4	not acceptable

Based on the calculations presented in this document, the static slope stability for both short-term and long-term conditions for the final cover system must meet the minimum acceptable value established in DOE (1989). A final cover system with a 5H:1V slope does not meet this minimum acceptable factor of safety requirement.

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GEOSYNTEC CONSULTANTS

Written by: _____

Client: FERMCO Project: OSDF

THIS PAGE IS INSERTED ONLY FOR CLARITY AND DOES NOT AFFECT THE NUMBERING SYSTEM OF THE REST OF THE PACKAGE

FINAL COVER SYSTEM

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3.	Analysis	2/11

Written by: M. Gleason Date: 96/2/17 Reviewed by: SQ. Date: 20/Feb/'96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

RB (DTL) 18 FEB96

COVER SYSTEM STABILITY

CALCULATION PACKAGE

Purpose: The purpose of this document is to provide the engineering calculations to evaluate the static slope stability factor of safety for the OSDF final cover system (Figure 1). The calculations provide an analysis of the stability of the final cover system for potential slip surfaces that pass along the critical interfaces that exist within the system.

Procedure: The calculation procedure for the final cover system stability analysis is described in the Design Criteria Package and is summarized below. The data used for the analyses are provided in the Data Verification Package that is included with these calculations. The slope stability of the final cover system is calculated using the methods described in Giroud, et al. 1995a and 1995b.

Final Cover System

The final cover system will be constructed over the entire OSDF. The maximum slope inclination for the final cover system is 6H:1V. For the analysis, a maximum continuous slope height is assumed to be 60 ft. Consider for the analysis the following cases: (i) short-term stability; (ii) long-term stability; and (iii) long-term stability of a 5H:1V slope (to establish that a 5H:1V slope does not satisfy minimum stability requirements).

Analysis:

Use the following equation adapted from Giroud et al. 1995a and 1995b:

$$FS = \frac{\gamma_t (t - t_w) + \gamma_b t_w}{\gamma_t (t - t_w) + \gamma_{sat} t_w} \frac{\tan\delta}{\tan\beta} + \frac{a/\sin\beta}{\gamma_t (t - t_w) + \gamma_{sat} t_w}$$

$$+ \frac{\gamma_t (t - t_w^*) + \gamma_b t_w}{\gamma_t (t - t_w) + \gamma_{sat} t_w} \frac{t}{h} \frac{\sin\phi}{2 \sin\beta \cos\beta \cos(\beta + \phi)}$$

$$+ \frac{c\, t/h}{\gamma_t (t - t_w) + \gamma_{sat} t_w} \frac{\cos\phi}{\sin\beta \cos(\beta + \phi)} \frac{T/h}{\gamma_t (t - t_w) + \gamma_{sat} t_w}$$

Written by: M. Gleason Date: 96 / 2 /17 Reviewed by: SB. Date: 20 / Feb / 96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

RB(DTL) 18 FEB 96

COVER SYSTEM STABILITY

where:

FS = Factor of Safety
γ_t = total unit weight of soil (pcf)
γ_{sat} = saturated unit weight of soil (pcf)
γ_b = buoyant unit weight of soil (pcf)
t = thickness of soil layer (ft)
t_w = thickness of water flow along slope (ft)
t_w^* = thickness of water flow in toe of slope (ft)
β = slope angle (degrees)
δ = interface friction along slip surface (degrees)
a = interface adhesion (assumed to be zero)
ϕ = internal friction of soil above critical surface (degrees)
h = height of slope (ft)
T = tension in geosynthetics (assumed to be zero)
c = cohesion of soil above critical surface (assumed to be zero)

For c, T, and a = 0, the equation becomes:

$$FS = \frac{\gamma_t (t - t_w) + \gamma_b t_w}{\gamma_t (t - t_w) + \gamma_{sat} t_w} \frac{\tan \delta}{\tan \beta} + \frac{\gamma_t (t - t_w^*) + \gamma_b t_w}{\gamma_t (t - t_w) + \gamma_{sat} t_w} \frac{t}{h} \frac{\sin \phi}{2 \sin \beta \cos \beta \cos(\beta + \phi)}$$

Data for Analysis:

Presented below are the components and the interfaces present in the final cover system, as indicated in Figure 1. Assumptions are made regarding the shear strengths of these materials and interfaces to evaluate which material or interface is most critical in terms of shear strength for the slope stability analysis. A more detailed discussion regarding selection of these material properties is provided in the Data Verification Section of the other calculations.

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Written by: M. Gleason Date: 96/2/17 Reviewed by: SQ. Date: 20/Feb/96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

RB (DTL) 18 FEB 96

COVER SYSTEM STABILITY

Interface/Material	Properties	Reference
Contouring layer (compacted fill)	Assume ML/SM Material γ_t = 130pcf ϕ_{min} = 30°	Reference 2
Compacted clay cap	γ_t = 130pcf compacted ϕ = 23-29° c = 100-400psf For analysis use ϕ = 25° c = 0	Reference 3 Table 4-9
GCL internal shear strength and/or GCL/HDPE geomembrane interface shear strength		Reference 5
long-term: Hydrated bentonite, no effect on GCL reinforcement	ϕ dependent on σ_n For cover system σ_n = 850psf ϕ_{peak} = 15° $\phi_{large\ displacement}$ = 13° Fig 3	
short-term: Hydrated reinforced GCL or non-hydrated geomembrane-protected GCL (i.e., Gundseal)	Reinforced GCL $\phi_p = 2\phi_p$ unreinforced - at low σ_n ϕ_p = 30° Dry GCL ϕ_p = 25° dry tanδ/tanϕ = 0.8 δ = 20°	
Geotextile/textured HDPE geomembrane interface	Assume lowest δ_p = 25° under low normal stress	Reference 4
Granular soil - drainage gravel, biointrusion barrier, granular filter, vegetative soil layer, topsoil	Assume γ_t = 125pcf Assume ϕ_{min} = 30°	Reference 4
Geotextile/granular soil interface	tanδ/tanϕ = 0.8 δ_{min} = 25° for ϕ = 30°	Reference 4
Geotextile/compacted clay interface	For ϕ_{clay} = 25° tan δ/tan ϕ = 0.8 δ = 20°	Reference 4

Written by: M. Gleason Date: 96/2/17 Reviewed by: SQ. Date: 20/Feb/96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

RB(DTL)18 FEB 96

COVER SYSTEM STABILITY

From the analysis presented in the previous section, the interfaces presented below are considered to be critical for this slope stability analysis.

- The critical interface for short-term final cover system stability is either:
  - interface shear strength of dry GCL/HDPE geomembrane interface (assuming Gundseal type product used) without hydraulic head (head acts on geomembrane, not GCL); or
  - interface shear strength of geotextile/HDPE geomembrane interface with 0.5 ft of hydraulic head.
- The critical interface shear strength for the final cover system stability for long-term conditions is the shear strength of the hydrated bentonite component of the GCL. For long-term conditions, the bentonite component of the GCL (either reinforced or unreinforced) is assumed to be hydrated and any reinforcement is not effective. In addition, for long-term conditions, assume that the HDPE geomembrane is not intact, and a maximum hydraulic head of 0.5 ft acts on the GCL.

Based on analyses performed by GeoSyntec in the Cover System Performance Calculation Package, assume that the maximum hydraulic head in the final cover system is 0.5 ft.

Minimum Acceptable Factors of Safety Based on UMTRA Technical Approach Document (DOE, 1989) Ref. 6

For Final Cover System

Long-Term Stability	FS $\geq$ 1.5
Short-Term Stability	FS $\geq$ 1.3

Written by: M. Gleason Date: 96/2/17 Reviewed by: SQ. Date: 20/Feb/96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

RB(DTL) 18 FEB 96

COVER SYSTEM STABILITY

Parameters for Design

Final Cover System

$\gamma_t = \gamma_{sat} = 125$ pcf

$\gamma_b = 62.6$ pcf

$\phi = 30°$

$t = 6.8$

$t_w = 0.5$ ft (Assumed)

$t_w^* = 3.4$ ft (Assumed)

$\beta = 9.5°$ (6H:1V) [or 11.3° (5H:1V)]

$h = 60$ ft max

δ = Variable with case

Final Cover System Stability

Short-Term Stability

Case A Dry GCL/HDPE geomembrane interface $\delta = 20°$
For this case, tw = 0, tw* = 0

$$FS = \frac{125(6.8-0) + 62.6(0)}{125(6.8-0) + 125(0)} \frac{\tan 20}{\tan 9.5}$$

$$+ \frac{125(6.8-0) + 62.6(0)}{125(6.8-0) + 125(0)} \frac{6.8}{60} \frac{\sin 30}{2\sin 9.5 \cos 9.5 \cos(39.5)}$$

FS = 2.18 + 0.22 = 2.4 acceptable

Case B Reinforced GCL/HDPE geomembrane interface with $\delta = 25°$, tw = 0.5 ft, tw* = 3.4 ft

$$FS = \frac{125(6.8-0.5) + 62.6(0.5)}{125(6.8-0.5) + 125(0.5)} \frac{\tan 25}{\tan 9.5}$$

Written by: M. Gleason Date: 96/2/17 Reviewed by: SQ. Date: 20/Feb/96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

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COVER SYSTEM STABILITY

$$+ \frac{125(6.8-3.4) + 62.6(3.4)}{125(6.8-0.5) + 125(0.5)} \frac{6.8}{60} \frac{\sin 30}{2\sin 9.5 \cos 9.5 \cos(39.5)}$$

FS = 2.68 + 0.07 = 2.7 acceptable

Final cover system is stable in short term.

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Long-Term Stability - Hydrated GCL

6H:1V Slope

tw = 0.5 tw* = 3.4 δ = 15° peak

$$FS = \frac{125(6.8-0.5) + 62.6(0.5)}{125(6.8-0.5) + 125(0.5)} \frac{\tan 15}{\tan 9.5}$$

$$+ \frac{125(6.8-3.4) + 62.6(3.4)}{125(6.8-0.5) + 125(0.5)} \frac{6.8}{60} \frac{\sin 30}{2\sin 9.5 \cos 9.5 \cos(39.5)}$$

FS = 1.54 + 0.07 = 1.6 acceptable

Check large displacement FS > 1.3 δ = 13°

FS = 1.33 + 0.07 = 1.4 acceptable

5H:1V Slope

tw = 0.5 tw* = 3.4 δ = 15° peak β = 11.3°

$$FS = \frac{125(6.8-0.5) + 62.6(0.5)}{125(6.8-0.5) + 125(0.5)} \frac{\tan 15}{\tan 9.5}$$

$$+ \frac{125(6.8-3.4) + 62.6(3.4)}{125(6.8-0.5) + 125(0.5)} \frac{6.8}{60} \frac{\sin 30}{2\sin 9.5 \cos 9.5 \cos(39.5)}$$

FS = 1.34 + 0.7 = 1.4 Not acceptable. Minimum FS of 1.5 not achieved.
∴ slope must be 6H:1V.

Written by: M. Gleason Date: 96 / 2 / 17 Reviewed by: SQ. Date: 20 / Feb / '96

Client: FERMCO Project: OSDF Proj./Proposal No.: GE3900 Task No.: 9.7

RB (DTL) 18 FEB 96

COVER SYSTEM STABILITY

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2. Holtz, R.P., and Kovacs, W.D., "*An Introduction to Geotechnical Engineering*", Prentice-Hall, Inc., Englewood Cliffs, NJ, 1981, p. 518.

3. "*Disposal Facility Pre-Design Geotechnical Investigation, Soil Investigation Data Report*", Operable Unite 2, Project Order 132, July 1995 by Parsons, Fairfield Executive Center, 6120 South Gilmore Road, Fairfield, Ohio 45014.

4. Data established from:

   - Martin, J.P., Koerner, R.M., and Whitty, J.E., "Experimental Friction Evaluation of Slippage Between Geomembranes, Geotextiles, and Soils", *Proceedings, International Conference on Geotextiles*, IFAI, Denver, 1984, po. 191-196.

   - Koerner, R.M., Martin, J.P., and Koerner, G.R., "Shear Strength Parameters Between Geomembranes and Cohesive Soils", *Geotextiles and Geomembranes*, Vol. 4, No. 1, 1986, pp. 21-30.

   - Williams, N.D., and Houlihan, M.F., "Evaluation of Interface Friction Properties Between Geosynthetics and Soils", *Proceedings, Geosynthetics '87*, New Orleans, LA, Feb 1987, pp. 616-627.

5. Bonaparte, R., Othman, M.A., Rad, N.R., Swan, R.H., Vander Linde, D.L., "Evaluation of Various Aspects of GCL Performance," *Proceedings, Geosynthetic Clay Liner Workshop*, U.S. Environmental Protection Agency, Ohio, August, 1995, in press.

6. U.S. Department of Energy, "*Uranium Mini Tailings Remediation Control Act, Remedial Action Design*", Technical Approach Document, Revision II, December 1989.

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8. Giroud, J.P., Bachus, R.C., and Bonaparte, R., "Influence of Water Flow on the Stability of Geosynthetic - Soil Layered Systems on Slopes," Industrial Fabrics Association International, *Geosynthetics International*, Vol. 2, No. 6, St. Paul, MN, pp. 1149-1180.

[redacted]

Written By: M. GLEASON Date: 96/2/17 Reviewed by: SQ. Date: 20 Feb '96

Client: FERNALD Project: OSDF Project/Proposal No.: GE 3900 Task No.: 9.7

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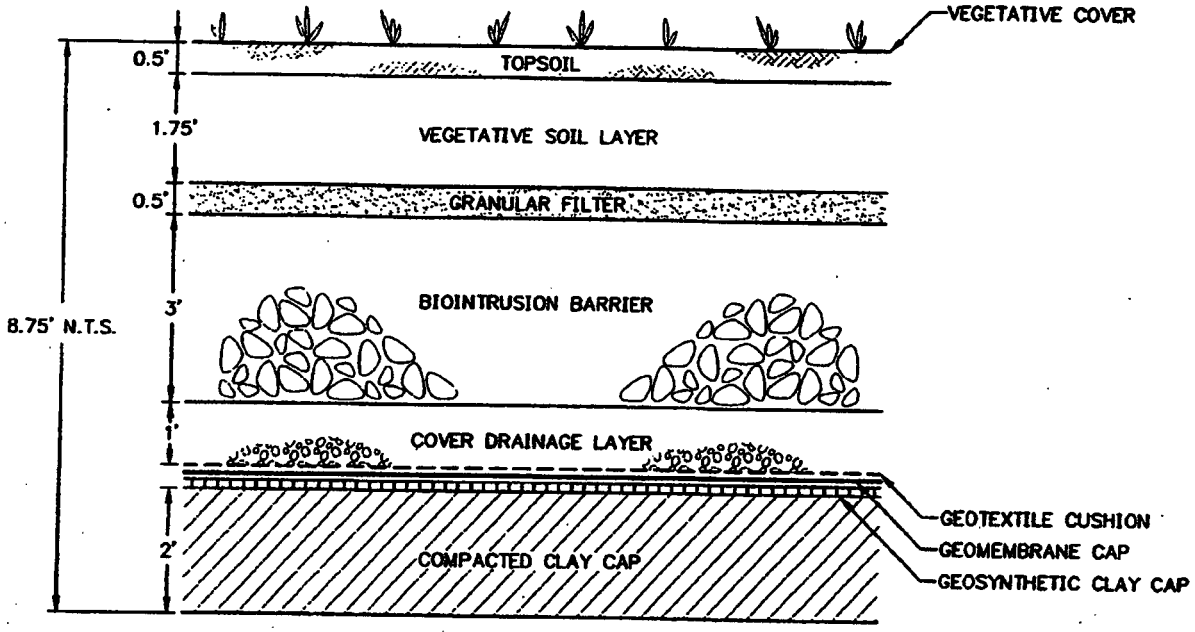
FIGURE 1



FINAL COVER SYSTEM

M. Gleason 17 Feb 96

RB(DTL) 18 FEB 96

11/11

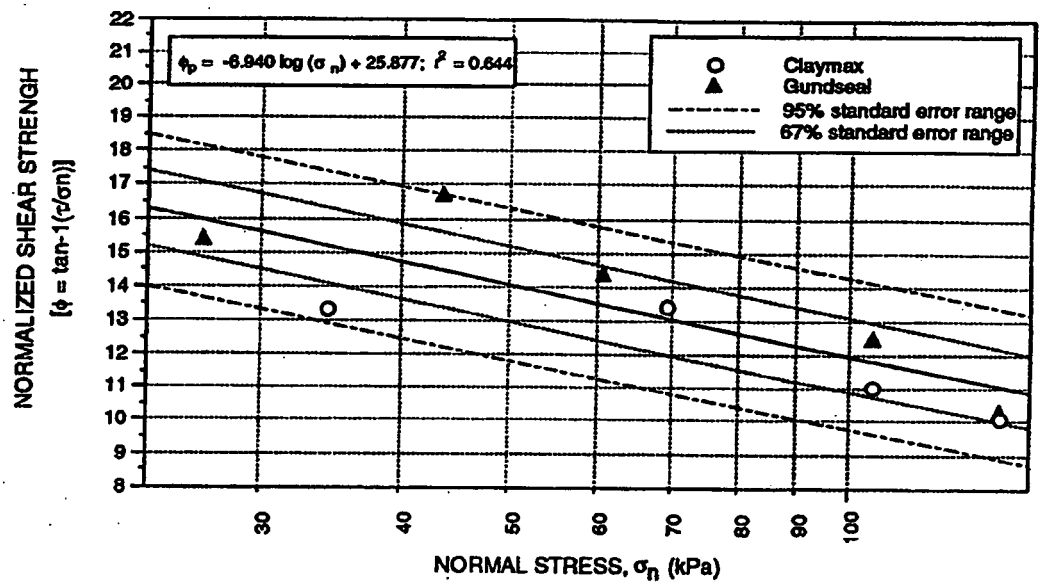


Figure 4. Log-linear regression analysis for peak CD conditions.

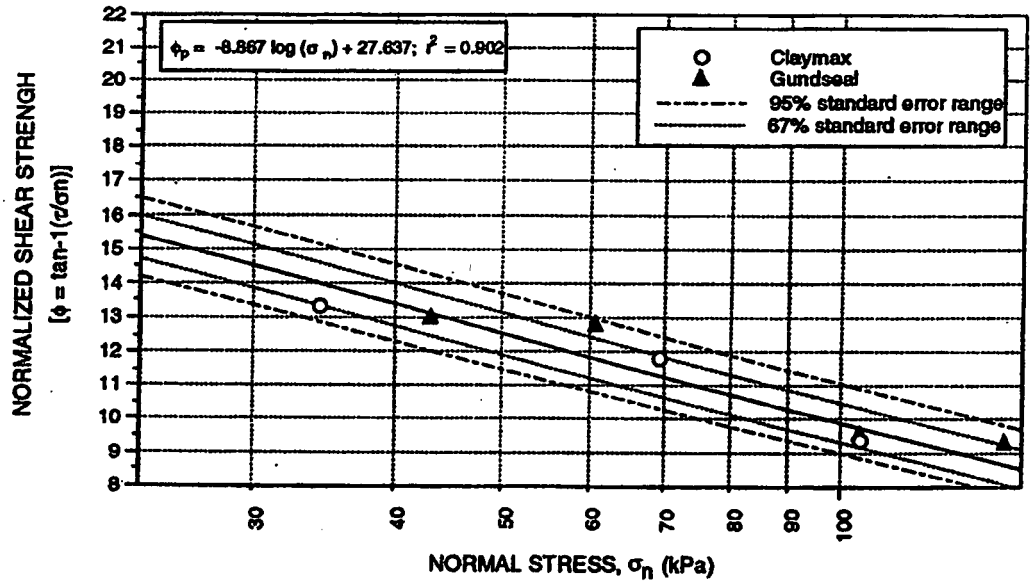


Figure 5. Log-linear regression analysis for large-displacement CD conditions. From Bonaparte et al (1996).

ATTACHMENT B

FINAL COVER SYSTEM STABILITY CALCULATIONS

ENGINEERING EVALUATION OF PROPOSED CHANGE IN SIDE SLOPES AND CREST SLOPE OF REMAINING CELLS OF THE OSDF FINAL COVER SYSTEM

BASED ON APPROVE DESIGN CALCULATIONS

FROM

"ON-SITE DISPOSAL FACILITY CALCULATION PACKAGE" (GEOSYNTEC MAY 1997, REVISION 0)

[redacted]

006439

COMPUTATION COVER SHEET

SUBJECT OF COMPUTATIONS FINAL COVER SYSTEM

Computations By:
(Cognizant Engineer)

Signature Rachel Tatum — Date 2/13/06

Printed Name RACHEL TATUM
and Title Engineering Intern

Assumptions and Procedures Checked By:
(Checker)

Signature J.F. Beelt — Date 13 Feb 2006

Printed Name J.F. BEELT
and Title PRINCIPAL

Computations Checked by:

Signature J.F. Beelt — Date 13 Feb 2006

Printed Name J.F. BEELT
and Title PRINCIPAL

Computations Backchecked by:
(Cognizant Engineer)

Signature Rachel Tatum — Date 2/13/06

Printed Name RACHEL TATUM
and Title Engineering Intern

Approved by:
(PDP)

Signature David K. Phillips — Date 13 FEB 2006

Printed Name David K. Phillips
and Title SENIOR CONSULTANT

Approved by:
(DTL / TETL)

Signature J.F. Beelt — Date 13 Feb 2006

Printed Name J.F. BEELT
and Title PRINCIPAL

Record of Revision (Number and initial all revisions)

Rev. No.	Reason	Date	By	Checked	Approval

Written by: R. Tatum Date: 2/13/06 Reviewed by: [illegible] Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GO3542 Task No.: 02

COVER SYSTEM STABILITY

EXECUTIVE SUMMARY

Purpose

The purpose of this calculation package is to evaluate the minimum static slope stability factor of safety of the final cover system of the On-Site Disposal Facility (OSDF) and to compare the calculated value with the minimum accepted value. The procedures, analysis methods, and assumptions in this calculation package are taken from the Cover System Stability calculation package completed as part of the OSDF Final Design Calculation Package (DOE, 1997).

Procedure

Provided in this calculation package are the analyses of final cover system static slope stability for potential slip surfaces that pass along interfaces within the final cover system. The conditions considered are: (i) short-term stability of a tapered slope with a 5.3H:1V slope inclination at the GCL and a 6:1 slope inclination at the final cover; and (ii) long-term stability of a tapered slope with a 5.3H:1V slope inclination at the GCL and a 6:1 slope inclination at the final cover. Note that the Cover System Stability calculation package (DOE, 1997) considered the conditions of: (i) short-term stability at 6H:1V; and (ii) long-term stability at 5H:1V and 6:H:1V slope inclinations.

The minimum acceptable factors of safety based on the UMTRA Technical Approach Document (DOE, 1989) are: (i) long-term stability of final cover system, FS $\geq$ 1.5; and (ii) short-term stability of final cover system, FS $\geq$ 1.3. The stability analyses are performed using established geotechnical procedures for calculating veneer stability.

Results for Final Cover System Stability

Case	Factor of Safety	
5.3H:1V Short-Term Stability, Case A	FS = 2.52	acceptable
5.3H:1V Short-Term Stability, Case B	FS = 2.90	acceptable
5.3H:1V Long-Term Stability	FS = 1.89	acceptable

Written by: R. Tatum Date: 2/13/06 Reviewed by: [illegible] Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

COVER SYSTEM STABILITY

CALCULATION PACKAGE

Purpose

The purpose of this document is to provide the engineering calculations to evaluate the static slope stability factor of safety for the OSDF final cover system (Figure 1). The calculations provide an analysis of the stability of the final cover system for potential slip surfaces that pass along the critical interfaces that exist within the final cover system.

Procedure

The calculation procedure for the final cover system stability analysis is described in the Design Criteria Package and is summarized below. The data used for the analyses are provided in the Data Verification Package. The slope stability of the final cover system is calculated using the methods described in Giroud, et al. 1995a and 1995b.

Final Cover System

The final cover system will be constructed over the entire OSDF. The maximum slope inclination for the final cover system is currently 6H:1V. However, as part of this calculation package, a tapered final cover system with a slope of 5.3H:1V at the GCL and a slope of 6H:1V at the final cover is being evaluated. For the analysis, a maximum continuous slope height is assumed to be 38.24 ft. Consider for the analysis the following cases: (i) short-term stability; (ii) long-term stability; and (iii) the influence of water on both short-term and long-term stability.

Analysis 1

Use the following equation adapted from Giroud et al. 1995a and 1995b to analyze the stability of a tapered slope:

$$FS = \frac{\tan\delta}{\tan\beta} + \frac{a}{\gamma t_{avg}\sin\beta} + \frac{t^2{}_B}{h t_{avg}}\frac{\sin\phi}{\sin(2\beta)\cos(\beta+\phi)} + \frac{c}{\gamma h}\frac{t_B}{t_{avg}}\frac{\sin\beta}{\sin\beta\cos(\beta+\phi)} + \frac{T}{\gamma h t_{avg}} \qquad (1)$$

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COVER SYSTEM STABILITY

where:

$$t_{avg} = \frac{t_A + t_B}{2}$$

FS	=	Factor of Safety;
γ	=	total unit weight of soil (pcf);
t	=	thickness of soil layer (ft);
t_A	=	thickness of soil at the top of the slope (ft);
t_B	=	thickness of soil at the base of the slip surface (ft);
β	=	slope angle (degrees);
δ	=	interface friction along slip surface (degrees);
a	=	interface adhesion (assumed to be zero);
ϕ	=	internal friction of soil above critical surface (degrees);
h	=	height of slope (ft);
T	=	tension in geosynthetic (assumed to be zero); and
c	=	cohesion of soil above critical surface (assumed to be zero).

For c, T, and a = 0, Equation 2 becomes:

$$FS = \frac{\tan\delta}{\tan\beta} + \frac{t^2{}_B}{ht_{avg}} \frac{\sin\phi}{\sin(2\beta)\cos(\beta+\phi)} \qquad (2)$$

Analysis 2

Use the following equation adapted from Giroud et al. 1995a and 1995b to analyze the influence of water on layered systems on slopes:

$$FS = \left[\frac{\gamma_t(t-t_w)+\gamma_b t_w}{\gamma_t(t-t_w)+\gamma_{sat}t_w}\right]\frac{\tan\delta}{\tan\beta} + \frac{a/\sin\beta}{\gamma_t(t-t_w)+\gamma_{sat}t_w}$$

$$+\left[\frac{\gamma_t(t-t^*{}_w)+\gamma_b t^*{}_w}{\gamma_t(t-t_w)+\gamma_{sat}t_w}\right]\left[\frac{\sin\phi}{2\sin\beta\cos\beta\cos(\beta+\phi)}\right]\frac{t}{h} \qquad (3)$$

$$+\left[\frac{ct/h}{\gamma_t(t-t_w)+\gamma_{sat}t_w}\right]\left[\frac{\cos\phi}{\sin\beta\cos(\beta+\phi)}\right]+\frac{T/h}{\gamma_t(t-t_w)+\gamma_{sat}t_w}$$

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COVER SYSTEM STABILITY

where:

FS	=	Factor of Safety;
γ_t	=	total unit weight of soil (pcf);
γ_{sat}	=	saturated unit weight of soil (pcf);
γ_b	=	buoyant unit weight of soil (pcf);
t	=	thickness of soil layer (ft);
t_w	=	thickness of water flow along slope (ft);
t_w*	=	thickness of water flow in toe of slope (ft);
β	=	slope angle (degrees);
δ	=	interface friction along slip surface (degrees);
a	=	interface adhesion (assumed to be zero);
ϕ	=	internal friction of soil above critical surface (degrees);
h	=	height of slope (ft);
T	=	tension in geosynthetic (assumed to be zero); and
c	=	cohesion of soil above critical surface (assumed to be zero)

For c, T, and a = 0, Equation 1 becomes:

$$FS = \left[\frac{\gamma_t(t-t_w)+\gamma_b t_w}{\gamma_t(t-t_w)+\gamma_{sat} t_w}\right]\frac{\tan\delta}{\tan\beta} \tag{4}$$

$$+\left[\frac{\gamma_t(t-t^*_w)+\gamma_b t^*_w}{\gamma_t(t-t_w)+\gamma_{sat} t_w}\right]\left[\frac{\sin\phi}{2\sin\beta\cos\beta\cos(\beta+\phi)}\right]\frac{t}{h}$$

Data for Analyses

Presented below are the components and the interfaces present in the final cover system, as indicated in Figure 1. Assumptions are made regarding the shear strengths of these materials and interfaces to evaluate which material or interface is most critical in terms of shear strength for the slope stability analysis. A more detailed discussion regarding selection of these material properties is provided in the Data Verification Section of the other calculations.

Written by: R. Tatum Date: 2/13/06 Reviewed by: [illegible] Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GO3542 Task No.: 02

COVER SYSTEM STABILITY

Interface/Material	Properties	Reference
Contouring layer (compacted fill)	Assume ML/SM Material $\gamma_t = 130$ pcf $\phi_{min} = 30°$	Reference 2
Compacted clay cap	$\gamma_t = 130$ pcf compacted $\phi = 23\text{-}39°$ c = 100-400 psf For analysis use $\phi = 25°$ c = 0	Reference 3 Table 4-9
GCL internal shear strength and/or GCL/HDPE geomembrane interface shear strength		Reference 5
Long-term: Hydrated bentonite, no effect on GCL reinforcement	ϕ dependent on σ_n For cover system $\sigma_n \approx 850$ psf $\phi_{peak} = 15°$ $\phi_{large\ displacement} = 13°$ Fig 3	
Short-term: Hydrated reinforced GCL or non-hydrated geomembrane-protected GCL (i.e., Gundseal)	Reinforced GCL $\phi_p = 2\phi_p$ unreinforced - at low σ_n, $\phi_p = 30°$ Dry GCL $\phi_p = 25°$ dry $\frac{\tan\delta}{\tan\phi} = 0.8$ $\delta = 20°$	
Geotextile/textured HDPE geomembrane interface	Assume lowest $\delta_p = 25°$ Under low normal stress	Reference 4
Granular soil – drainage gravel, biointrusion barrier, granular filter, vegetative soil layer, topsoil	Assume $\gamma_t = 125$ pcf Assume $\phi_{min} = 30°$	Reference 4
Geotextile/granular soil interface	$\frac{\tan\delta}{\tan\phi} = 0.8$ $\delta_{min} = 25°$ for $\phi = 30°$	Reference 4
Geotextile/compacted clay interface	For $\phi_{clay} = 25°$ $\frac{\tan\delta}{\tan\phi} = 0.8$ $\delta = 20°$	Reference 4

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Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

COVER SYSTEM STABILITY

From the analysis presented in the previous section, the interfaces presented below are considered to be critical for this slope stability analysis.

- The critical interface shear strength for short-term final cover system stability is either:
  - interface shear strength of dry GCL/HDPE geomembrane interface (assuming Gundseal type product used) without hydraulic head (head acts on geomembrane, not GCL); or
  - interface shear strength of geotextile/HDPE geomembrane interface with 0.5 ft of hydraulic head.
- The critical interface shear strength for the final cover system stability for long-term conditions is the shear strength of the hydrated bentonite component of the GCL. For long-term conditions, the bentonite component of the GCL (either reinforced or unreinforced) is assumed to be hydrated and any reinforcement is not effective. In addition, for long-term conditions, assume that the HDPE geomembrane is not intact and a maximum head of 0.5 acts on the GCL.

Based on analyses performed by GeoSyntec in the Cover System Performance Calculation Package, assume that the maximum hydraulic head in the final cover system is 0.5 ft.

The minimum acceptable factors of safety based on UMTRA Technical Approach Documents (DOE, 1989) for the final cover system are:

Long-Term Stability	$FS \geq 1.5$
Short-Term Stability	$FS \geq 1.3$

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Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

COVER SYSTEM STABILITY

Parameters for Design

Final Cover System

γ = 125 pcf
ϕ = 30°
t_A = 6.85 ft
t_B = 11.9 ft
t_{avg} = 9.37 ft
β = 10.7°
h = 46 ft
δ = variable with case
t_w = 0.5 ft (assumed)
t_{w*} = 3.4 ft (assumed)

CASE A: Dry GCL/HDPE geomembrane interface $\delta = 20°$

$$FS = \frac{\tan 20}{\tan 10.7} + \frac{11.9^2}{(46)(9.37)} \frac{\sin 30}{\sin(2(10.7))\cos(10.7+30)}$$

FS = 1.93 + 0.59 = **2.52**

CASE B: Reinforced geotextile/HDPE geomembrane interface $\delta = 25°$

$$FS = \frac{\tan 25}{\tan 10.7} + \frac{11.9^2}{(46)(9.37)} \frac{\sin 30}{\sin(2(10.7))\cos(10.7+30)}$$

FS = 2.47 + 0.59 = **3.06**

CASE C: Long-term HDPE geomembrane not intact $\delta = 15°$

$$FS = \frac{\tan 15}{\tan 10.7} + \frac{11.9^2}{(46)(9.37)} \frac{\sin 30}{\sin(2(10.7))\cos(10.7+30)}$$

FS = 1.42 + 0.59 = **2.01**

Written by: R. Tatum Date: 2/13/06 Reviewed by: J.E. Bal Date: 2006

Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

COVER SYSTEM STABILITY

Influence of Water on Slope Stability

CASE B: Reinforced geotextile/HDPE geomembrane interface

Dry $\delta = 25°$, tw = 0 ft, tw* = 0 ft

$$FS = \frac{125(6.85-0)+62.6(0)}{125(6.85-0)+125(0)}\frac{\tan 25}{\tan 10.7} + \frac{125(6.85-0)+62.6(0)}{125(6.85-0)+125(0)}\frac{6.85}{46}\frac{\sin 30}{2\sin 10.7\cos 10.7\cos(10.7+30)}$$

FS = 2.47 + 0.27 = 2.74

Hydrated $\delta = 25°$, tw = 0.5 ft, tw* = 3.4 ft

$$FS = \frac{125(6.85-0.5)+62.6(0.5)}{125(6.85-0.5)+125(0.5)}\frac{\tan 25}{\tan 10.7} + \frac{125(6.85-3.4)+62.6(3.4)}{125(6.85-0.5)+125(0.5)}\frac{6.85}{46}\frac{\sin 30}{2\sin 10.7\cos 10.7\cos(10.7+30)}$$

FS = 2.38 + 0.20 = 2.58

Written by: R. Tatum Date: 2/13/06 Reviewed by: [signature] Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

COVER SYSTEM STABILITY

CASE C: Long-term HDPE geomembrane not intact

Dry $\delta = 15°$ peak, tw = tw* = 0

$$FS = \frac{125(6.85-0)+62.6(0)}{125(6.85-0)+125(0)}\frac{\tan 15}{\tan 10.7} + \frac{125(6.85-0)+62.6(0)}{125(6.85-0)+125(0)}\frac{6.85}{46}\frac{\sin 30}{2\sin 10.7\cos 10.7\cos(10.7+30)}$$

FS = 1.42 + 0.27 = 1.69

Hydrated $\delta = 15°$ peak, tw = 0.5 ft, tw* = 3.4 ft

$$FS = \frac{125(6.85-0.5)+62.6(0.5)}{125(6.85-0.5)+125(0.5)}\frac{\tan 15}{\tan 10.7} + \frac{125(6.85-3.4)+62.6(3.4)}{125(6.85-0.5)+125(0.5)}\frac{6.85}{46}\frac{\sin 30}{2\sin 10.7\cos 10.7\cos(10.7+30)}$$

FS = 1.37 + 0.20 = 1.57

Written by: R. Tatum Date: 2/13/06 Reviewed by: [illegible] Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

COVER SYSTEM STABILITY

Adjusted Factor of Safeties

$$\Delta FS = FS_{ww} - FS_{wo}$$

where:

FS_{ww} = Factor of Safety without Consideration of Water
FS_{wo} = Factor of Safety with Consideration of Water

Short-Term

Dry GCL/HDPE geomembrane interface

FS = **2.52 acceptable**

Reinforced geotextile/HDPE geomembrane interface

ΔFS = 2.74 – 2.58= 0.16

Adjusted Short-term FS = **3.06** – 0.16 = **2.90 acceptable**

Long-Term

ΔFS = 1.69 – 1.57= 0.12

Adjusted Long-term FS = 2.01 – 0.12 = **1.89 acceptable**

Written by: R. Tatum Date: 2/13/06 Reviewed by: J.T. Bal Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GO3542 Task No.: 02

COVER SYSTEM STABILITY

REFERENCES

1. FERMCO, *On-Site Disposal Facility Statement of Work*, June 1995.

2. Holtz, R.P., and Kovacs, W.D., "*An Introduction to Geotechnical Engineering*", Prentice-Hall, Inc., Englewood Cliffs, NJ, 1981, p. 518.

3. "*Disposal Facility Pre-Design Geotechnical Investigation, Soil Investigation Data Report*", Operable Unite 2, Project Order 132, July 1995 by Parsons, Fairfield Executive Center, 6120 South Gilmore Road, Fairfield, Ohio 45014.

4. Data established from:

   - Martin, J.P., Koerner, R.M. and Whitty, J.E., "Experimental Friction Evaluation of Slippage Between Geomembranes, Geotextiles, and Soils", *Proceedings, International Conference on Geotextiles*, IFAI, Denver, 1984, pp. 191-196.

   - Koerner, R.M., Martin, J.P., and Koerner, G.R., "Shear Strength Parameters Between Geomembranes and Cohesive Soils", *Geotextiles and Geomembranes*, Vol. 4, No. 1, 1986, pp. 21-30.

   - Williams, N.D., and Houlihan, M.F., "Evaluation of Interface Friction Properties Between Geosynthetics and Soils", *Proceedings, Geosynthetics '87*, New Orleans, LA, Feb 1987, pp. 616-627.

5. Bonaparte, R., Othman, M.A., Rad, N.R., Swan, R.H., Vander Linde, D.L., "Evaluation of Various Aspects of GCL Performance", *Proceeding, Geosynthetic Clay Liner Workshop*, U.S. Environmental Protection Agency, Ohio, August, 1995, in press.

6. U.S. Department of Energy, "*Uranium Mini Tailings Remediation Control Act, Remedial Action Design*", Technical Approach Document, Revision II, December 1989.

7. Giroud, J.P., Williams, N.D., Pelte, T., and Beech, J.F., "Stability of Geosynthetic – Soil Layered Systems on Slopes," Industrial Fabrics Association International, *Geosynthetics International*, Vol. 2, No. 6, St. Paul, MN, pp. 1115-1148.

8. Giroud, J.P., Bachus, R.C., and Bonaparte, R., "Influence of Water Flow on the Stability of Geosynthetic – Soil Layered Systems on Slopes", Industrial Fabrics Association International, *Geosynthetics International*, Vol. 2, No. 6, St. Paul, MN, pp. 1149-1180.

Written by: R. Tatum Date: 2/13/06 Reviewed by: J.L. Ball Date: 13 Feb 2006

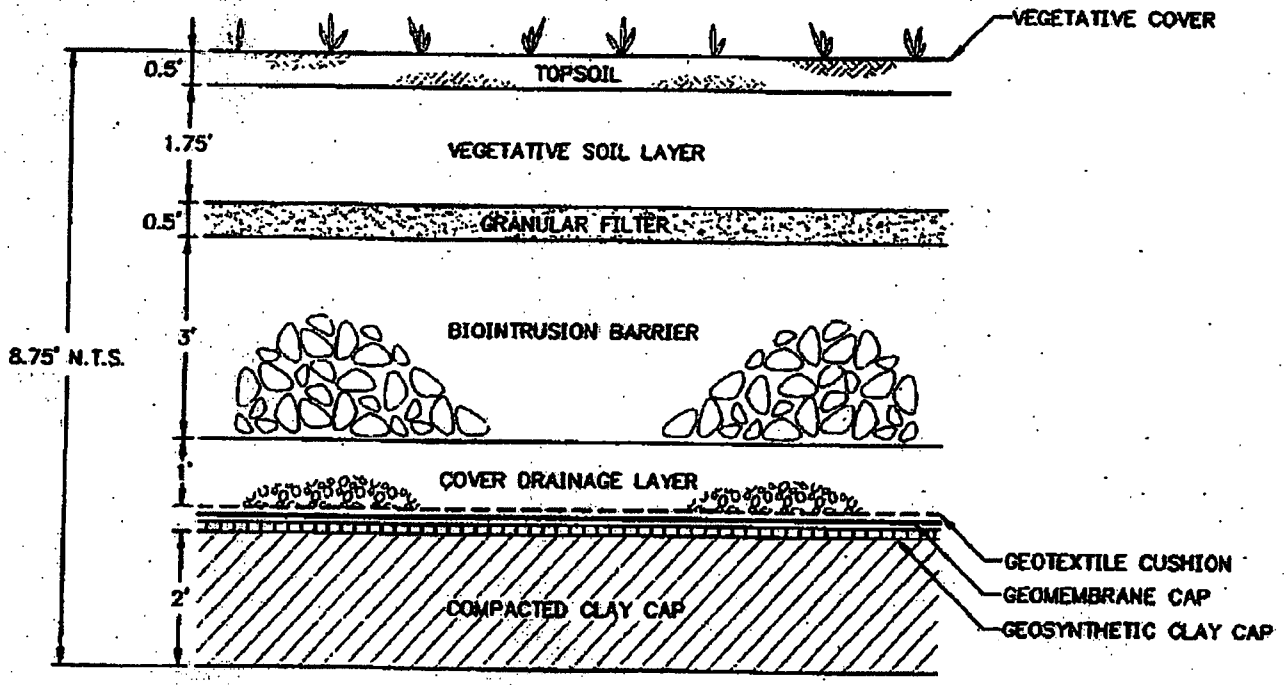
Client: Fernald Project: OSDF Project/Proposal No.: GO3542 Task No.: 02

9. U.S. Department of Energy, "*On-site Disposal Facility Final Design Calculation Package*", Prepared by GeoSyntec Consultants, Revision 0, Vol. 2, May 1997.

Written by: R. Tatum Date: 2/13/06 Reviewed by: H. Bal Date: 13 Feb 2006

Client: Fernald Project: OSDF Project/Proposal No.: GQ3542 Task No.: 02

Figure 1.

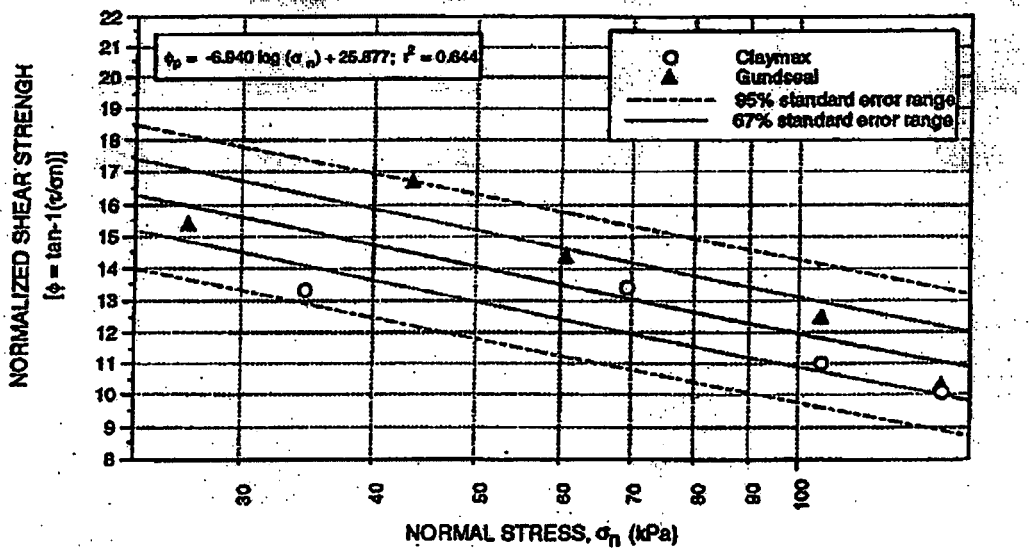


FINAL COVER SYSTEM

Written by: R. Tatum Date: 2/13/06 Reviewed by: [illegible] Date: 13 Feb 2006

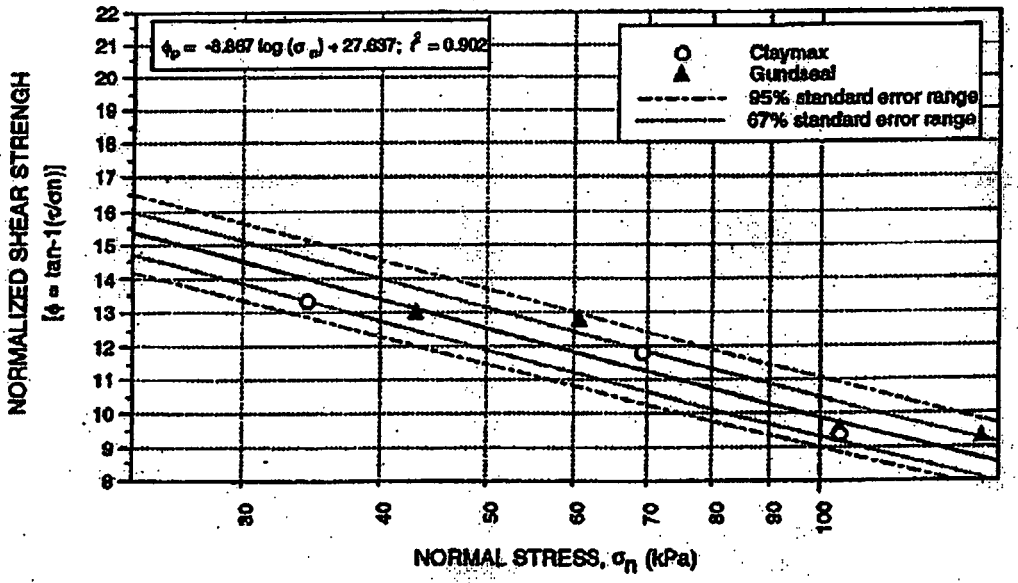
Client: Fernald Project: OSDF Project/Proposal No.: GO3542 Task No.: 02

Figure 2.



Log-linear regression analysis for peak CD conditions.

Figure 3.



Log-linear regression analysis for large-displacement CD conditions. From Bonaparte et al (1996).

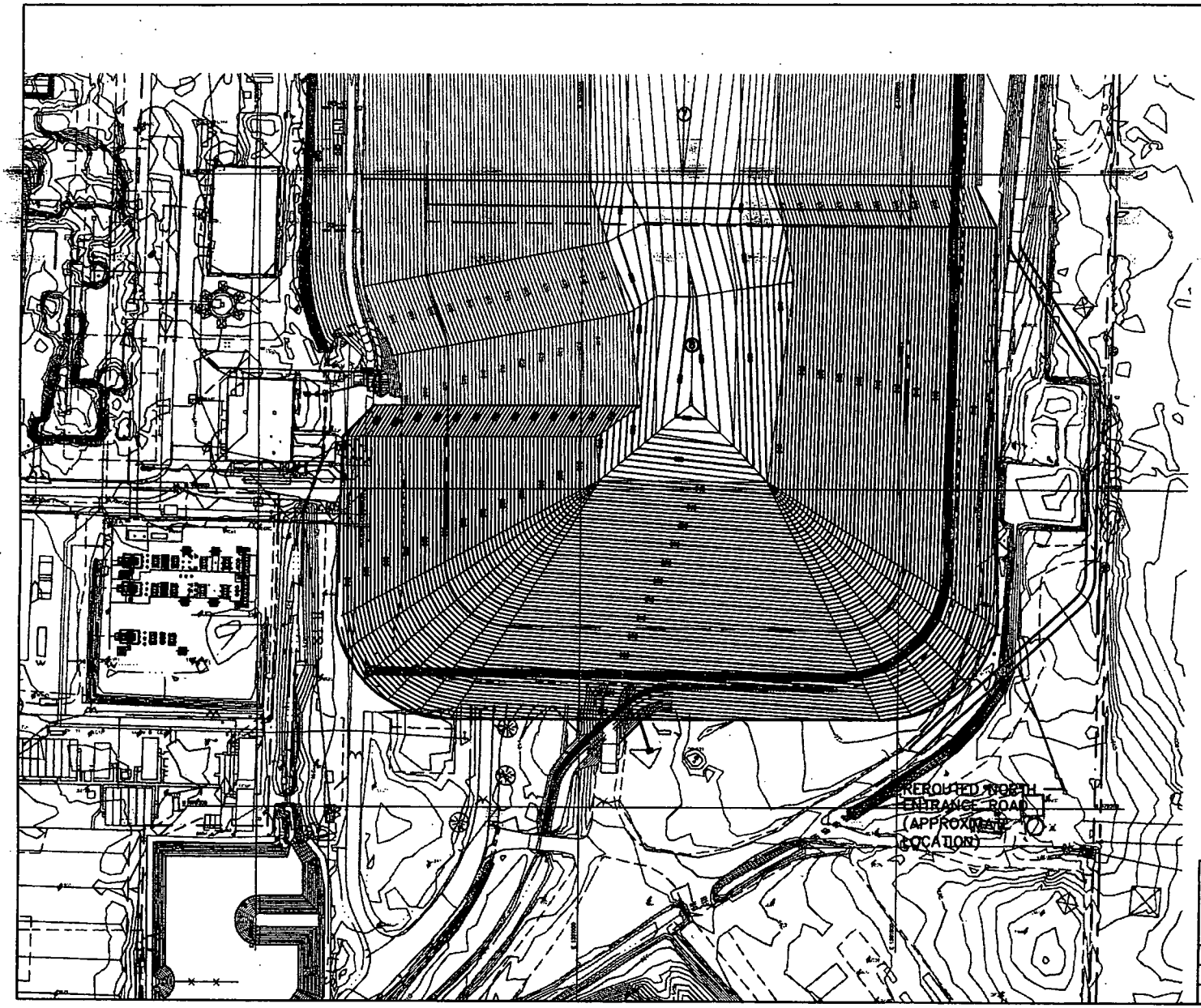
ATTACHMENT C

OSDF SECTIONS ILLUSTRATING

FINAL COVER SYSTEM SIDE SLOPES

OF

5.3H:1V AND 6H:1V



LEGEND

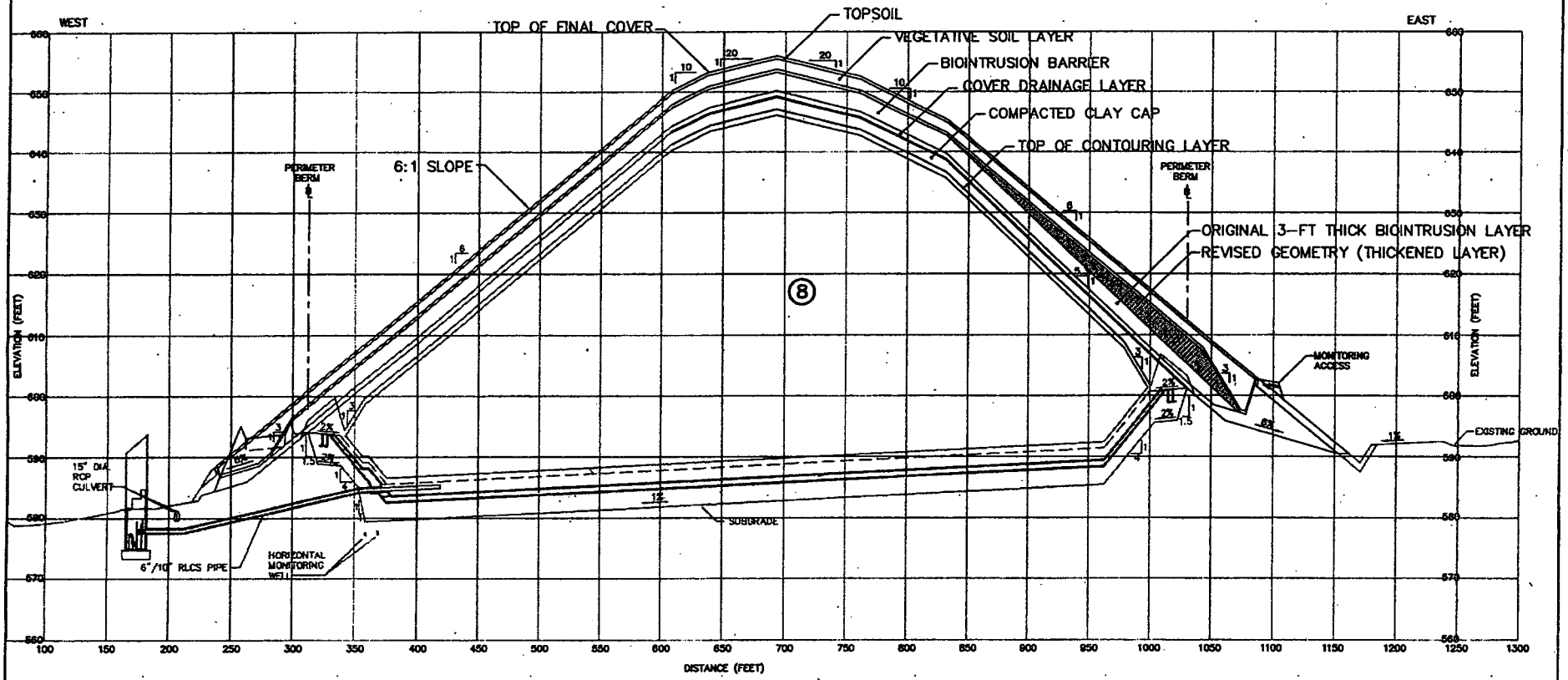
- - - - - - - - - - TOE OF SIDESLOPE APPROVED CONFIGURATION

———————— TOE OF SIDESLOPE REVISED CONFIGURATION

CELL 8 COVER SYSTEM GRADING PLAN
REVISED SIDESLOPE AND CREST SLOPE
CONCEPTUAL DRAWING

GEOSYNTEC CONSULTANTS
KENNESAW, GA.

DATE:	15 FEBRUARY 2006	SCALE:	NOT TO SCALE
PROJECT NO.	GQ3542-02.02	FILE NO.	F06-F009
DOCUMENT NO.	–	FIGURE NO.	–



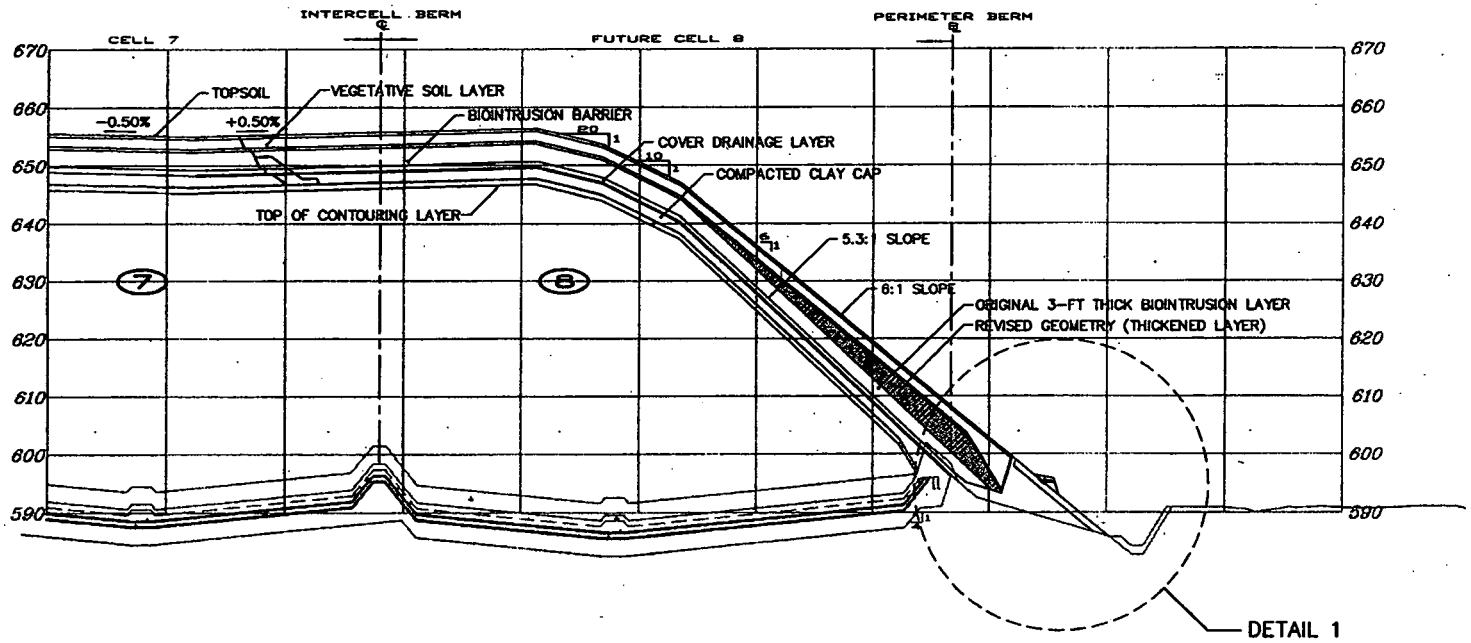
TYPICAL CONCEPTUAL SECTION
WEST–EAST CELL 8 AT IMPACTED RUNOFF CATCHMENT AREA
HORIZONTAL SCALE: 1" = 80'
VERTICAL SCALE: 1" = 16'

0 80
SCALE IN FEET

GEOSYNTEC CONSULTANTS
KENNESAW, GA.

DATE:	13 FEBRUARY 2006	SCALE:	1" = 80'
PROJECT NO.	GQ3542-02.02	FILE NO.	F06-F006
DOCUMENT NO.	–	FIGURE NO.	–

006439



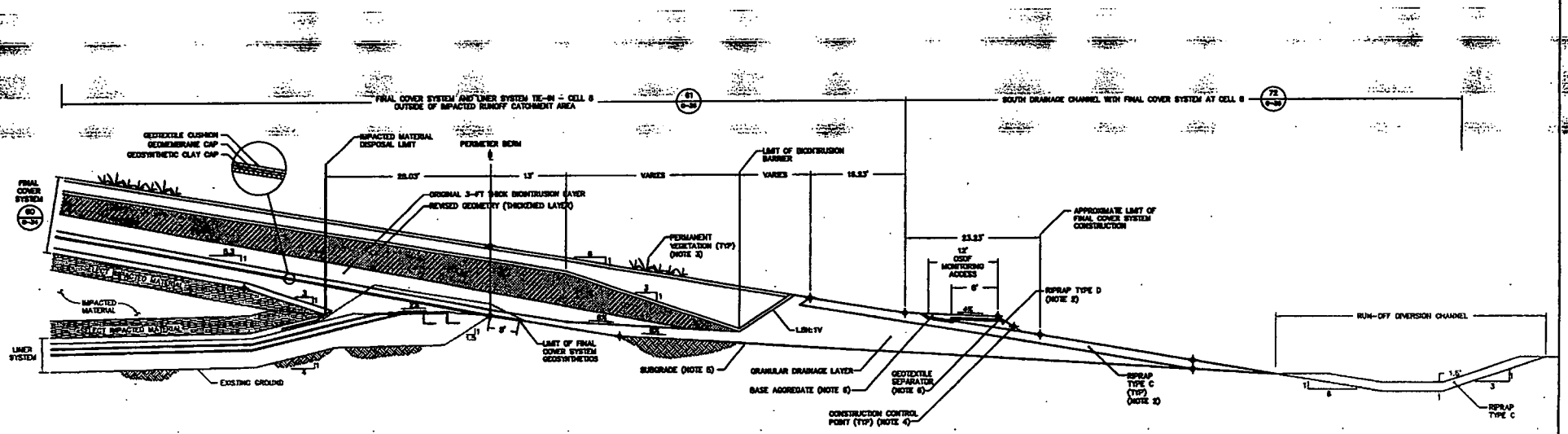
TYPICAL CONCEPTUAL SECTION

NOTRH – SOUTH SECTION AT CELL 8

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 20'

GEOSYNTEC CONSULTANTS
KENNESAW, GA.

DATE:	10 FEBRUARY 2006	SCALE:	1" = 100'
PROJECT NO.	GQ3542-02.02	FILE NO.	F06-F005
DOCUMENT NO.	–	FIGURE NO.	–



DETAIL 1 – TYPICAL CONCEPTUAL DETAIL
SOUTH PERIMETER FINAL COVER SYSTEM AT CELL 8
SCALE: NOT TO SCALE

NOTES:

1. THIS CONCEPT WILL BE APPLIED FOR THE CELL 8 PERIMETER AFFECTED BY PROPOSED CHANGE IN SIDESLOPE.

GEOSYNTEC CONSULTANTS
KENNESAW, GA.

DATE:	15 FEB 2006	SCALE:	NOT TO SCALE
PROJECT NO.	GQ3542-02.02	FILE NO.	F06-F007.DWG
DOCUMENT NO.	–	FIGURE NO.	–

M E M O R A N D U M

TO: Dan Powell, J.D. Chiou, Ph.D., P.E., and Uday Kumthekar, P.E.

FROM: James Fleck, P.E., Robert Bachus, P.E., and David Phillips, P.E.

DATE: 24 February 2006

SUBJECT: Compacted Clay Cap Placement Concerns
Options During Periods of Freezing Weather
Fernald Closure Project, Fernald, Ohio

INTRODUCTION

GeoSyntec Consultants (GeoSyntec) has prepared this memorandum in response to Mr. Powell's verbal request for information regarding placement concerns and procedures for Compacted Clay Cap (CCC) materials during periods of cold weather. This memorandum explains why frozen CCC is unacceptable, proposes CCC construction practices to address freezing temperatures, outlines an investigation procedure if the CCC is suspected to have frozen, and describes certification protocols when frozen CCC materials are suspected or confirmed.

ADVERSE IMPACTS OF FREEZING

CCC material cannot be allowed to freeze before, during, or after placement. If CCC material does freeze, it must be removed, allowed to fully thaw prior to re-placement, allowed to adjust to a moisture content identified in the specifications, and re-compacted.

The following provides a brief explanation of the adverse impacts on performance caused by frozen CCC materials.

1. The primary function of the CCC is a low-permeability (i.e., low hydraulic conductivity) barrier. When the CCC material freezes, the moisture (water) within the soil matrix freezes and expands. This mechanism can cause an increase or decrease in the dry unit weight of the material, but almost always causes an increase in the moisture content of the material. The freezing and the increase in moisture content result in an increase in the hydraulic conductivity.

2. When the CCC material is frozen prior to placement, the soil particles are frozen into solid pieces, whether they are in large chunks or minute particles. These solid pieces of frozen soil are not able to properly mold and bond to one another. The lack of bonding also causes an increase in the hydraulic conductivity.

3. If the CCC is in-place (i.e., compacted and tested) prior to freezing, the freezing can create cracks within the CCC, thus disrupting the structure of the clay material. As described previously, freezing also causes an increase in moisture content when the CCC material subsequently thaws. The increased moisture content also makes the materials more susceptible to desiccation cracking if the CCC material dries. The alteration of the structure ultimately causes an increase in the hydraulic conductivity.

For all of the above adverse impacts the CCC material must not be allowed to freeze. The project specifications were developed to address this potential adverse performance of frozen CCC materials.

CONSTRUCTION PRACTICES DURING FREEZING CONDITIONS

The ambient air temperatures in the Greater Cincinnati Area typically rise throughout the month of March. In general, temperatures are normally above freezing during the day and tend to drop below freezing over night. Therefore, unprotected clay cap (CCC) will usually have some degree of frozen material on the surface each morning. This frozen clay cap material will need to be removed prior to placement of subsequent lifts. This removed material must be reworked and can be reused once it is thawed and the moisture content has been confirmed to be within acceptable tolerance.

Alternatively, to minimize the need to remove previously certified in-place CCC materials, a sacrificial lift of clay material may be placed over the completed (or partially completed) CCC surface to insulate the lower reaches of CCC from the freezing ambient air temperatures. This sacrificial lift provides frost protection and will vary in thickness according to the expected temperatures. Site-specific experience has indicated that a 4- to 6-inch thick sacrificial lift is usually sufficient for average March temperature conditions at the site. The sacrificial lift should be placed before the ambient air temperature drops below freezing and must be removed prior to placement of subsequent lifts. The sacrificial material can be reused for frost protection or it and

may be used for CCC construction provided it meets the project specifications, including (importantly) the specified moisture content.

It is noted that the practice of continuously "working the soil" during freezing temperatures by running equipment over the area does **not** prevent the surface materials from freezing and locally increasing in moisture content. This process simply prevents the soil materials from freezing into a large mass. The moisture in soil particles will still freeze and prevent proper molding and bonding during compaction. The only way to prevent the clay soil material from freezing is to provide a form of insulation on top of the working surface that prevents exposure of the clay to freezing temperatures.

Site-specific experience indicates that the above-referenced procedure of placement and removal of a sacrificial insulating lift of soil or removal of the frozen surface layer prior to each day's operations has been successful. This experience has indicated that frozen CCC material will come out in relatively thin "sheets". Therefore, at the start of each day's operations, it is relatively easy to delineate the frozen from the non-frozen soil. When the removed material is allowed to thaw, particularly after being exposed to several freeze/thaw cycles, an investigation will need to be performed to assure that the moisture content is within the specified tolerance before it is re-used in the cap. This investigation procedure is identified subsequently.

If one or more freeze/thaw cycles occur prior to removal of the sacrificial lift, GeoSyntec personnel will monitor ambient air and soil temperatures to determine the likelihood of frost reaching the depth of the certified compacted clay cap. If it is suspected that freezing has occurred, the following procedures are implemented.

INVESTIGATION PROCEDURE

If it is suspected that the CCC has frozen, the area of concern is investigated as written in the project CQA Plan. These plans essentially incorporate the recommendations identified in the document titled "Quality Assurance and Quality Control for Waste Containment Facilities," EPA document number EPA/600/R-93/182 by David E. Daniel and Robert M. Koerner. This USEPA document states that the following three steps are recommended for evaluating possible frost damage:

1. "Measure the water content of the soil within and beneath the zone of suspected frost damage. Density may also be measured, but freeze/thaw has little effect on density and may actually cause an increase in dry unit weight. Freeze/thaw is often accompanied by desiccation; water content measurements will help to determine whether drying has taken place.
2. Investigate the morphology of the soil by digging into the soil and examining its condition. Soil damaged by freezing usually contains hairline cracks, and the soil breaks apart in chunks along larger cracks caused by freeze/thaw. Soil that has not been frozen should not have tiny cracks nor should it break apart in small chunks. The morphology of the soil should be examined by excavating a small pit into the soil liner and peeling off sections from the wall of the pit. One should not attempt to cut pieces of the sidewall; smeared soil will mask cracks. A distinct depth may be obvious; above this depth the soil breaks into chunks along frost-induced cracks, and below this depth there is no evidence of cracks produced by freezing.
3. One or more samples of soil should be carefully hand trimmed for hydraulic conductivity testing. The soil is usually trimmed with the aid of a sharpened section of \tube of the appropriate inside diameter. The tube is set on the soil surface with the sharpened end facing downward, soil is trimmed away near the sharpened edge of the trimming ring, the tube is pushed a few millimeters into the soil, and the trimming is repeated. Samples may be taken at several depths to delineate the depth to which freeze/thaw damage occurred. The minimum diameter of a cylindrical test specimen should be 300 mm (12 in.). Small test specimens, e.g., 17 mm (3in.) diameter specimens, should not be used because freeze/thaw can create morphological structure in the soil on a scale too large to permit representative testing with small samples. Hydraulic conductivity tests should be performed as described in ASTM D-5084. The effective confining stress should not exceed the smallest vertical effective stress to which the soil will be subjected in the field, which is usually the stress at he beginning of service for liners. If no compressive stress is specified, a value of 35 kPa (5 psi) is recommended for both liner and cover system."

This last step is not an easy procedure and will take a significant amount of time to perform. Therefore GeoSyntec recommends that the CCC not be exposed to freeze/thaw cycles.

CERTIFICATION PROCEDURE

As identified in the project specifications, frozen CCC materials are not allowed during construction. Similarly, if CCC materials are frozen after placement, they must be removed. In accordance with the project specifications, any portion of the cell that includes frozen CCC materials (either during or after placement) cannot and will not be certified.

CONCLUSION

The function of the compacted clay cap is to provide a low permeability barrier to impede water infiltration into the OSDF. Allowing frozen material within the compacted clay cap would adversely impact the function of the CCC by increasing its permeability. If construction of the CCC is to proceed during periods when freezing temperatures are possible, work must be performed diligently to prevent the CCC from exposure to freezing temperatures. Frozen compacted clay cap materials decreases the integrity of the cap system and are not in compliance with the project Technical Specifications and the EPA Regulations.

M E M O R A N D U M

TO: Uday Kumthekar, P.E., Fluor Fernald, Inc.
Chuck Vanarsdale, P.E., Fluor Fernald, Inc.

CC: J. D. Chiou, PhD., P.E., Fluor Fernald, Inc.

FROM: Dave Phillips, P.E., GeoSyntec Consultants, Inc.
Jim Fleck, P.E., GeoSyntec Consultants, Inc.

DATE: 15 March 2006

SUBJECT: On-Site Disposal Facility (OSDF)
U.S. Department of Energy (DOE) - Fernald Closure Project
Proposed Removal Strategy for Cell 1 Monitoring Devices
OSDF Final Cover System

INTRODUCTION

The purpose of this memorandum is to provide an engineering evaluation of potential impacts on the long term performance of the OSDF by a proposed partial removal of the OSDF Cell 1 final cover system monitoring devices. This engineering evaluation is based on GeoSyntec's understanding of the removal strategy, described herein.

GeoSyntec Consultants (GeoSyntec) is providing this engineering evaluation at the request of Fluor Fernald, Inc. The remainder of this memorandum provides: an executive summary; engineering evaluation results; and a summary and recommendations.

EXECUTIVE SUMMARY

GeoSyntec was requested by Fluor Fernald to perform an engineering evaluation of the long term performance of the OSDF final cover system with partial removal of monitoring devices installed in accordance with Fluor Fernald drawings dated 29 October 2001. GeoSyntec understands that these devices were installed in accordance with the plans provided to GeoSyntec and that Fluor Fernald intends to remove all portions of these devices except the 6-inch diameter vertical pipes and the 12-inch by 12-inch by 3/16 inch thick stainless steel plates. All other portions of these monitoring devices will be removed; the vertical pipes will be filled with a flowable grout or other approved material; and the surrounding surface area around each monitoring device will be repaired in accordance with the OSDF cover system drawings and specifications, to include establishing vegetation.

GeoSyntec believes that removal and repair, as described above, is protective of the cover system and will result in no long term detrimental impact on the performance of the OSDF.

ENGINEERING EVALUATION

Factors considered in the engineering evaluation of the vertical pipes and steel plates to be retained in their installed positions on the OSDF cover system are as follows:

Stability

These devices have no impact on stability.

Settlement

GeoSyntec understands that these devices are installed with the vertical pipes resting at the approximate center of the stainless steel plates. The stainless steel plates are installed parallel to the surfaces on which installed to distribute any vertical load from the pipes to the 12-inch by 12-inch surface of the plate and over the surface of the cover system layer. The plates were installed on the following surfaces: surface of the geotextile cushion overlying the 60-mil geomembrane cap; surface of the drainage layer aggregate, and the surface of the vegetative soil layer. The puncture strength (resistance) of the geotextile cushion and geomembrane cap were specified in the OSDF

Technical Specifications for the Cell 1 cover system and tested to confirm strengths of no less than 120 pounds when tested in accordance with ASTM D4833. These puncture strengths provide adequate protection against puncture of the geotextile and the geomembrane from forces that may be induced by settlement of the layers surrounding the vertical pipes since these forces are distributed over the 144 square-inch surface of the stainless steel plate. As installed the pipes and plates over the drainage layer aggregate and vegetative soil layers have no impact on long term performance of the OSDF.

Seepage Through the Final Cover System

These devices have no impact on seepage through the cover system.

Drainage Layer

These devices have no significant impact on the drainage layer. The 6-inch diameter pipes which penetrate the drainage layer have an area of influence within the drainage layer that is so small that it does not impact calculation results.

Erosion

These devices have no impact on erosion of the cover system.

Vegetation

These devices have no impact on vegetation.

SUMMARY AND RECOMMENDATIONS

In summary, GeoSyntec believes abandoning the vertical pipes and steel plates in the installed location within the Cell 1 cover system has no long term detrimental effects on the performance of the OSDF.

* * * * *

APPENDIX C

PERSONNEL LOGS

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

006439

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 2-Jan-~~03~~06

ITEM	REF ID	COMPANY	MON 2-Jan	TUES 3-Jan	WED 4-Jan	THURS 5-Jan	FRI 6-Jan	SAT 7-Jan	SUN 8-Jan
Jim Fleck	JF	GeoSyntec		✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec		✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec		✓	✓	✓	✓		
Tim Willis	TW	GeoSyntec	Holiday	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec		✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec		✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH		✓	✓	✓	✓		
Jameel Battle	JB	AEROTECH		✓	✓	✓	✓		

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 9-Jan-~~05~~06

ITEM	REF ID	COMPANY	MON 9-Jan	TUES 10-Jan	WED 11-Jan	THURS 12-Jan	FRI 13-Jan	SAT 14-Jan	SUN 15-Jan
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Tim Willis	TW	GeoSyntec	✓	✓		✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓		✓		
Jameel Battle	JB	AEROTECH	✓	✓		✓	✓		

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 16-Jan-~~05~~06

ITEM	REF ID	COMPANY	MON 16-Jan	TUES 17-Jan	WED 18-Jan	THURS 19-Jan	FRI 20-Jan	SAT 21-Jan	SUN 22-Jan
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓			
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		✓
Chris Walker	CW	GeoSyntec		✓	✓	✓	✓	✓	
Tim Willis	TW	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓		✓	✓		
Aimee Wendt	AW	AEROTECH		✓	✓	✓	✓		
Jameel Battle	JB	AEROTECH		✓	✓	✓	✓	✓	✓

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 23-Jan-06

ITEM	REF ID	COMPANY	MON 23-Jan	TUES 24-Jan	WED 25-Jan	THURS 26-Jan	FRI 27-Jan	SAT 28-Jan	SUN 29-Jan
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec		✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	✓	✓	✓	RT	RT		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓			✓	✓	✓	

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 30-Jan-06

ITEM	REF ID	COMPANY	MON 30-Jan	TUES 31-Jan	WED 1-Feb	THURS 2-Feb	FRI 3-Feb	SAT 4-Feb	SUN 5-Feb
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	RT	RT	RT	RT	RT		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 6-Feb-~~08~~ 06

ITEM	REF ID	COMPANY	MON 6-Feb	TUES 7-Feb	WED 8-Feb	THURS 9-Feb	FRI 10-Feb	SAT 11-Feb	SUN 12-Feb
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓			
Dave Evans	DE	GeoSyntec	RT	RT	RT	RT	RT		
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 13-Feb-~~05~~ 06

ITEM	REF ID	COMPANY	MON 13-Feb	TUES 14-Feb	WED 15-Feb	THURS 16-Feb	FRI 17-Feb	SAT 18-Feb	SUN 19-Feb
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓			
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓			
Dave Evans	DE	GeoSyntec	RT	RT	RT	RT	RT		
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

006439

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 20-Feb-06

ITEM	REF ID	COMPANY	MON 20-Feb	TUES 21-Feb	WED 22-Feb	THURS 23-Feb	FRI 24-Feb	SAT 25-Feb	SUN 26-Feb
Jim Fleck	JF	GeoSyntec	✓	✓	✓		✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	RT	RT	RT	RT	RT		
Sheila Abney	SA	GeoSyntec		✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH		✓	✓	✓	✓		

0[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 27-Feb-06

ITEM	REF ID	COMPANY	MON 27-Feb	TUES 28-Feb	WED 1-Mar	THURS 2-Mar	FRI 3-Mar	SAT 4-Mar	SUN 5-Mar
Jim Fleck	JF	GeoSyntec	✓		✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec		✓	✓	✓	✓	✓	
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	✓RT	✓RT	✓RT	RT	RT		
Sheila Abney	SA	GeoSyntec				✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓			

[redacted]

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 6-Mar-06

ITEM	REF ID	COMPANY	MON 6-Mar	TUES 7-Jun	WED 8-Mar	THURS 9-Mar	FRI 10-Mar	SAT 11-Mar	SUN 12-Mar
Jim Fleck	JF	GeoSyntec	✓	✓	✓		✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Walter Ray	WR	GeoSyntec	✓	✓	✓		✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Jameel Battle	JB	AEROTECH			✓				
Aimee Wendt	AW	AEROTECH				✓			

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 13-Mar-06

ITEM	REF ID	COMPANY	MON 13-Mar	TUES 14-Jun	WED 15-Mar	THURS 16-Mar	FRI 17-Mar	SAT 18-Mar	SUN 19-Mar
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Tim Willis	TW	GeoSyntec	**RT**	**RT**	**RT**	**RT**	**RT**		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
John Carruth	JC	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH		✓	✓	✓	✓	✓	✓
Jeremy Tibbs	JT	AEROTECH		✓	✓	✓	✓	✓	
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 20-Mar-06

ITEM	REF ID	COMPANY	MON 20-Mar	TUES 21-Jun	WED 22-Mar	THURS 23-Mar	FRI 24-Mar	SAT 25-Mar	SUN 26-Mar
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓	✓		
John Carruth	JC	GeoSyntec	✓	✓	✓				
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓			
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 27-Mar-06

ITEM	REF ID	COMPANY	MON 27-Mar	TUES 28-Jun	WED 29-Mar	THURS 30-Mar	FRI 31-Mar	SAT 1-Apr	SUN 2-Apr
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Tim Willis	TW	GeoSyntec	**RT**	**RT**	**RT**	**RT**	**RT**		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
John Carruth	JC	GeoSyntec			✓	✓	✓	✓	✓
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓	✓	
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		✓
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓	✓	
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	✓

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

006439

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 3-Apr-06

ITEM	REF ID	COMPANY	MON 3-Apr	TUES 4-Apr	WED 5-Apr	THURS 6-Apr	FRI 7-Apr	SAT 8-Apr	SUN 9-Apr
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Tim Willis	TW	GeoSyntec	RT	RT	RT	RT	RT		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓	✓		
John Carruth	JC	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓			
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 10-Apr-06

ITEM	REF ID	COMPANY	MON 10-Apr	TUES 11-Apr	WED 12-Apr	THURS 13-Apr	FRI 14-Apr	SAT 15-Apr	SUN 16-Apr
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓			
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	
Tim Willis	TW	GeoSyntec	**RT**	**RT**	**RT**	**RT**	**RT**		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓	✓	✓	
John Carruth	JC	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓				
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓	✓	
Joe Greaves	JB	AEROTECH	✓	✓	Troxler Training	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	✓	Troxler Training	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 17-Apr-06

ITEM	REF ID	COMPANY	MON 17-Apr	TUES 18-Apr	WED 19-Apr	THURS 20-Apr	FRI 21-Apr	SAT 22-Apr	SUN 23-Apr
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓			
Collin Sukow	CS	GeoSyntec	✓	✓		✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓			
John Carruth	JC	GeoSyntec	✓	✓	✓				
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓	✓	
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓	✓	

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 24-Apr-06

ITEM	REF ID	COMPANY	MON 24-Apr	TUES 25-Apr	WED 26-Apr	THURS 27-Apr	FRI 28-Apr	SAT 29-Apr	SUN 30-Apr
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Walter Ray	WR	GeoSyntec		✓	✓	✓	✓		
John Carruth	JC	GeoSyntec							
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		
Dave Phillips	DP	GeoSyntec		✓	✓				
Rudy Bonapart	RB	GeoSyntec		✓					

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 1-May-06

ITEM	REF ID	COMPANY	MON 1-May	TUES 2-May	WED 3-May	THURS 4-May	FRI 5-May	SAT 6-May	SUN 7-May
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓			
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Walter Ray	WR	GeoSyntec	✓	✓	✓	✓	✓		
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓			
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓				

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 8-May-06

ITEM	REF ID	COMPANY	MON 8-May	TUES 9-May	WED 10-May	THURS 11-May	FRI 12-May	SAT 13-May	SUN 14-May
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓		✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Walter Ray	WR	GeoSyntec	✓	✓					
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 15-May-06

ITEM	REF ID	COMPANY	MON 15-May	TUES 16-May	WED 17-May	THURS 18-May	FRI 19-May	SAT 20-May	SUN 21-May
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓		✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	ON	GeoSyntec	✓	✓	✓	✓	✓	✓	
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓	✓	
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓	✓	
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓			

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 22-May-06

ITEM	REF ID	COMPANY	MON 22-May	TUES 23-May	WED 24-May	THURS 25-May	FRI 26-May	SAT 27-May	SUN 28-May
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓			
Sheila Abney	SA	GeoSyntec	✓	✓	✓		✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Billy Noravong	ON	GeoSyntec	✓	✓	✓	✓	✓	✓	
Joe Greaves	JB	AEROTECH	✓	✓		✓			
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓			
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		
Linsey Cooper	LC	AEROTECH		✓	✓	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

006439

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 29-May-06

ITEM	REF ID	COMPANY	MON 29-May	TUES 30-May	WED 31-May	THURS 1-Jun	FRI 2-Jun	SAT 3-Jun	SUN 4-Jun
Jim Fleck	JF	GeoSyntec		✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec		✓	✓	✓	✓	✓	
Chris Walker	CW	GeoSyntec		✓	✓	✓	✓	✓	✓
Sheila Abney	SA	GeoSyntec		✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec		✓	✓	✓	✓	✓	
Billy Noravong	ON	GeoSyntec		✓	✓	✓	✓		✓
Joe Greaves	JB	AEROTECH		✓	✓	✓	✓	✓	
Brian Cassidy	BC	AEROTECH		✓	✓	✓	✓		
Aimee Wendt	AW	AEROTECH		✓	✓	✓	✓		✓
Jeremy Tibbs	JT	AEROTECH		✓	✓	✓	✓		
Linsey Cooper	LC	AEROTECH		✓					

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 5-Jun-05

ITEM	REF ID	COMPANY	MON 5-Jun	TUES 6-Jun	WED 7-Jun	THURS 8-Jun	FRI 9-Jun	SAT 10-Jun	SUN 11-Jun
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Chris Walker	CW	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓	✓	
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		
Joe Greaves	JB	AEROTECH	✓	✓	✓	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 12-Jun-06

ITEM	REF ID	COMPANY	MON 12-Jun	TUES 13-Jun	WED 14-Jun	THURS 15-Jun	FRI 16-Jun	SAT 17-Jun	SUN 18-Jun
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓		✓		✓
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Brian Cassidy	BC	AEROTECH							
Brian Yeardley	BY	AEROTECH							
Joe Capeaves	JG	Aerotech	✓	✓	✓	✓	✓	✓	✓

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 19-Jun-06

ITEM	REF ID	COMPANY	MON 19-Jun	TUES 20-Jun	WED 21-Jun	THURS 22-Jun	FRI 23-Jun	SAT 24-Jun	SUN 25-Jun
Jim Fleck	JF	GeoSyntec							
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		✓
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		✓
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓		✓	✓
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓		✓	✓	✓
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	
Brian Yeardley	BY	AEROTECH			✓	✓	✓		✓
Joe Gareaves	JG	Aerotech	✓	✓	✓	✓	✓	✓	✓

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

006439

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 26-Jun-06

ITEM	REF ID	COMPANY	MON 26-Jun	TUES 27-Jun	WED 28-Jun	THURS 29-Jun	FRI 30-Jun	SAT 1-Jul	SUN 2-Jul
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓		✓
Aimee Wendt	AW	AEROTECH	✓		✓	✓		✓	✓
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓			
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	
Brian Yeardley	BY	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Joe Greaves	JG	Aerotech	✓	✓	✓	✓	✓		✓

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 3-Jul-06

ITEM	REF ID	COMPANY	MON 3-Jul	TUES 4-Jul	WED 5-Jul	THURS 6-Jul	FRI 7-Jul	SAT 8-Jul	SUN 9-Jul
Jim Fleck	JF	GeoSyntec	✓		✓		✓		
Collin Sukow	CS	GeoSyntec	✓		✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓		✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓		✓	✓	✓	✓	
Dave Evans	DE	GeoSyntec			✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓		✓	✓	✓		
Aimee Wendt	AW	AEROTECH	✓		✓	✓	✓	✓	✓
Jeremy Tibbs	JT	AEROTECH	✓		✓		✓	✓	✓
Brian Cassidy	BC	AEROTECH	✓		✓	✓	✓	✓	
Brian Yeardley	BY	AEROTECH			✓	✓	✓	✓	
Joe Greaves	JG	Aerotech	✓		✓	✓	✓		✓

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 10-Jul-06

ITEM	REF ID	COMPANY	MON 10-Jul	TUES 11-Jul	WED 12-Jul	THURS 13-Jul	FRI 14-Jul	SAT 15-Jul	SUN 16-Jul
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		✓
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓			
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓			
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓		✓	✓
Jeremy Tibbs	JT	AEROTECH	✓	✓		✓	✓	✓	✓
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	
Brian Yeardley	BY	AEROTECH	✓	✓	✓	✓	✓		✓
Joe Greaves	JG	Aerotech	✓		✓	✓	✓		✓

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

006439

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 17-Jul-06

ITEM	REF ID	COMPANY	MON 17-Jul	TUES 18-Jul	WED 19-Jul	THURS 20-Jul	FRI 21-Jul	SAT 22-Jul	SUN 23-Jul
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓		✓		✓	✓	
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH							✓
Aimee Wendt	AW	AEROTECH	✓	✓	✓				
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓	✓	
Brian Cassidy	BC	AEROTECH	✓	✓		✓	✓	✓	✓
Brian Yeardley	BY	AEROTECH	✓	✓	✓		✓	✓	
Joe Greaves	JG	Aerotech	✓	✓	✓		✓	✓	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 24-Jul-06

ITEM	REF ID	COMPANY	MON 24-Jul	TUES 25-Jul	WED 26-Jul	THURS 27-Jul	FRI 28-Jul	SAT 29-Jul	SUN 30-Jul
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓					
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Aimee Wendt	AW	AEROTECH							
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓	✓		✓
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓			✓
Brian Yeardley	BY	AEROTECH	✓	✓	✓	✓	✓	✓	
Joe Greaves	JG	Aerotech	✓	✓	✓				

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 31-Jul-06

ITEM	REF ID	COMPANY	MON 31-Jul	TUES 1-Aug	WED 2-Aug	THURS 3-Aug	FRI 4-Aug	SAT 5-Aug	SUN 6-Aug
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓		✓	✓	✓	✓	✓
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH		✓	✓	✓	✓		✓
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓		✓	✓
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓		✓	✓	✓
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Brian Yeardley	BY	AEROTECH	✓	✓	✓	✓	✓	✓	✓
Joe Greaves	JG	Aerotech		✓	✓	✓	✓		

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FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 7-Aug-06

ITEM	REF ID	COMPANY	MON 7-Aug	TUES 8-Aug	WED 9-Aug	THURS 10-Aug	FRI 11-Aug	SAT 12-Aug	SUN 13-Aug
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓		✓	✓		✓	✓
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓	✓		✓
Jeremy Tibbs	JT	AEROTECH	✓	✓		✓	✓	✓	
Brian Cassidy	BC	AEROTECH	✓	✓	✓	✓	✓		
Brian Yeardley	BY	AEROTECH	✓	✓	✓	✓			
Brit									

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FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 14-Aug-06

ITEM	REF ID	COMPANY	MON 14-Aug	TUES 15-Aug	WED 16-Aug	THURS 17-Aug	FRI 18-Aug	SAT 19-Aug	SUN 20-Aug
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓		✓		
Lindsey Cooper	LC	AEROTECH		✓	✓	✓			
Aimee Wendt	AW	AEROTECH	✓	✓	✓		✓		
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓				
Brian Cassidy	BC	AEROTECH	✓		✓	✓	✓		
Brian Yeardley	BY	AEROTECH	✓	✓	✓	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 21-Aug-06

ITEM	REF ID	COMPANY	MON 21-Aug	TUES 22-Aug	WED 23-Aug	THURS 24-Aug	FRI 25-Aug	SAT 26-Aug	SUN 27-Aug
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	✓		✓	✓	
Lindsey Cooper	LC	AEROTECH		✓	✓		✓		
Aimee Wendt	AW	AEROTECH	✓	✓	✓	✓			
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓			
Brian Cassidy	BC	AEROTECH	✓		✓	✓	✓		
Brian Yeardley	BY	AEROTECH	✓		✓	✓	✓	✓	
NED MEEKINS	NM	GEOSYNTEC				✓	✓	✓	

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 28-Aug-06

ITEM	REF ID	COMPANY	MON 28-Aug	TUES 29-Aug	WED 30-Aug	THURS 31-Aug	FRI 1-Sep	SAT 2-Sep	SUN 3-Sep
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Ned Meekins	NM	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	
Dave Evans	DE	GeoSyntec	✓	✓		VAC	VAC	VAC	VAC
Lindsey Cooper	LC	AEROTECH		N ✓	N ✓	N ✓		N ✓	N ✓
Aimee Wendt	AW	AEROTECH	N ✓	N ✓	N ✓		N ✓		N ✓
Jeremy Tibbs	JT	AEROTECH	✓	✓	✓	✓			
Brian Cassidy	BC	AEROTECH	N ✓		N ✓	N ✓	N ✓	N ✓	
Brian Yeardley	BY	AEROTECH	✓	✓	✓		✓	✓	✓
Rachel Tatum	RT			✓	✓	✓	✓		

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 4-Sep-06

ITEM	REF ID	COMPANY	MON 4-Sep	TUES 5-Sep	WED 6-Sep	THURS 7-Sep	FRI 8-Sep	SAT 9-Sep	SUN 10-Sep
Jim Fleck	JF	GeoSyntec	HOL	✓	✓	✓	✓		
Ned Meekins	NM	GeoSyntec	HOL	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	HOL	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	HOL	✓	✓	✓	✓		✓
Dave Evans	DE	GeoSyntec	VAC HOL	VAC	VAC	VAC	✓	✓	✓
Lindsey Cooper	LC	AEROTECH	HOL	✓	✓	✓	✓		✓
Aimee Wendt	AW	AEROTECH	HOL	✓	✓	✓	✓		✓
Jeremy Tibbs	JT	AEROTECH	HOL	✓	VAC	VAC	VAC	VAC	VAC
Brian Cassidy	BC	AEROTECH	HOL	✓	VAC ✓	VAC ✓	VAC ✓	VAC ✓	VAC
Brian Yeardley	BY	AEROTECH							
Rachel Tatum	RT			✓	✓	✓	✓	✓	✓

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FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 11-Sep-06

ITEM	REF ID	COMPANY	MON 11-Sep	TUES 12-Sep	WED 13-Sep	THURS 14-Sep	FRI 15-Sep	SAT 16-Sep	SUN 17-Sep
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Ned Meekins	NM	GeoSyntec	✓	✓	✓	✓	✓		
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	OFF	✓	✓	✓		
Dave Evans	DE	GeoSyntec	✓	✓	~~OFF~~ ✓	OFF	✓	~~OFF~~	
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	OFF		OFF
Aimee Wendt	AW	AEROTECH	✓	✓	OFF	✓		OFF	
Jeremy Tibbs	JT	AEROTECH	VAC	VAC	VAC	✓	✓		
Brian Cassidy	BC	AEROTECH	✓	OFF	~~OFF~~	OFF			
Brian Yeardley	BY	AEROTECH	NA	NA	NA				
Rachel Tatum	RT		✓		✓	✓	✓	✓	✓

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FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 18-Sep-06

ITEM	REF ID	COMPANY	MON 18-Sep	TUES 19-Sep	WED 20-Sep	THURS 21-Sep	FRI 22-Sep	SAT 23-Sep	SUN 24-Sep
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓		
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓		✓
Aimee Wendt	AW	AEROTECH			✓	✓	✓	✓	✓
Jeremy Tibbs	JT	AEROTECH	FQA						
Brian Cassidy	BC	AEROTECH	✓		✓	✓	✓	✓	
~~Brian Yeardley~~	~~BY~~	~~AEROTECH~~							
Rachel Tatum	RT	GeoSyntec	✓	✓	✓	✓	✓		
Dave Phillips	DP	GS	✓	✓	✓				

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FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 25-Sep-06

ITEM	REF ID	COMPANY	MON 25-Sep	TUES 26-Sep	WED 27-Sep	THURS 28-Sep	FRI 29-Sep	SAT 30-Sep	SUN 1-Oct
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec	✓	✓	✓	✓			
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓		✓
Aimee Wendt	AW	AEROTECH		✓	✓	✓			✓
Brian Cassidy	BC	AEROTECH	✓		✓	✓	✓	✓	
Rachel Tatum	RT	GeoSyntec	✓	✓	✓	✓	✓		

GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 2-Oct-06

ITEM	REF ID	COMPANY	MON 2-Oct	TUES 3-Oct	WED 4-Oct	THURS 5-Oct	FRI 6-Oct	SAT 7-Oct	SUN 8-Oct
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec							
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓	✓	
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓		✓
Aimee Wendt	AW	AEROTECH		✓	✓	✓			✓
Brian Cassidy	BC	AEROTECH	✓	✓		✓	✓	✓	
Rachel Tatum	RT	GeoSyntec	✓	✓	✓	✓	✓		

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GEOSYNTEC CONSULTANTS

FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 9-Oct-06

ITEM	REF ID	COMPANY	MON 9-Oct	TUES 10-Oct	WED 11-Oct	THURS 12-Oct	FRI 13-Oct	SAT 14-Oct	SUN 15-Oct
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec							
Dave Evans	DE	GeoSyntec	✓	✓			✓	✓	✓
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓			
Aimee Wendt	AW	AEROTECH		✓	✓	✓			✓
Brian Cassidy	BC	AEROTECH	✓	✓		✓	✓	✓	
Rachel Tatum	RT	GeoSyntec	✓	✓	✓	✓	✓		

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FLUOR FERNALD, INC

PERSONNEL LOG

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 16-Oct-06

ITEM	REF ID	COMPANY	MON 16-Oct	TUES 17-Oct	WED 18-Oct	THURS 19-Oct	FRI 20-Oct	SAT 21-Oct	SUN 22-Oct
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓		
Billy Noravong	BN	GeoSyntec							
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓			✓
Lindsey Cooper	LC	AEROTECH		✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH		✓	✓	✓			✓
Brian Cassidy	BC	AEROTECH	✓	✓		✓	✓	✓	
Rachel Tatum	RT	GeoSyntec	✓	✓	✓	✓	✓		
Dave Phillips	DP	GeoSyntec		✓	✓				
Jay Beech	JB	GeoSyntec		✓	✓				
Neil Davies	ND	GeoSyntec		✓	✓				

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FLUOR FERNALD, INC

PERSONNEL LOG

00006439

PROJECT: ON-SITE DISPOSAL FACILITY (OSDF)
LOCATION: FERNALD, OHIO PROJECT NO.: GQ3542 TASK NO.: 3
DESCRIPTION: PHASE V WEEK BEGINNING 23-Oct-06

ITEM	REF ID	COMPANY	MON 23-Oct	TUES 24-Oct	WED 25-Oct	THURS 26-Oct	FRI 27-Oct	SAT 28-Oct	SUN 29-Oct
Jim Fleck	JF	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Collin Sukow	CS	GeoSyntec	✓	✓	✓	✓	✓	✓	
Sheila Abney	SA	GeoSyntec	✓	✓	✓	✓	✓	✓	✓
Billy Noravong	BN	GeoSyntec							
Dave Evans	DE	GeoSyntec	✓	✓	✓	✓	✓		
Lindsey Cooper	LC	AEROTECH	✓	✓	✓	✓	✓	✓	
Aimee Wendt	AW	AEROTECH	✓	✓		✓	✓	✓	
Brian Cassidy	BC	AEROTECH	✓		✓	✓			
Rachel Tatum	RT	GeoSyntec	✓	✓	✓	✓			
Joe Greaves	JG	AEROTECH				✓	✓		