WENCK File #3053-0040
October 2016

Rosemount Run-on/Run-off Control and Closure Plan and Post Closure Plan Updates

Prepared for:

SKB Environmental, Inc.

251 Starkey Street
St. Paul, Minnesota
55107

WENCK ASSOCIATES
Responsive partner.
Exceptional outcomes.

Prepared by:

WENCK Associates, Inc.
1800 Pioneer Creek Center
Maple Plain, MN 55359
Phone: 763-479-4200
Fax: 763-479-4242

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1.0 Introduction

1.1 PURPOSE

This report consists of the following documents that meet the requirements of the new federal rules regarding land disposal of a Coal Combustion Residual (CCR) material.

- Section 2 - Run-on and Run-off Control Plan (Rule § 257.81)
- Section 3 – Criteria for Conducting Closure or Retrofit of CCR units (Rule § 257.102)
- Section 4 - Post Closure Care Requirements (Rule § 257.104)

Many requirements of this report are addressed by the previously prepared and submitted Closure Plan, Post-Closure Plan, and Contingency Action Plan (Closure/Post Closure Plan) for the Rosemount Industrial facility (Rosemount, prepared by Conestoga-Rovers & Associates (CRA) in March, 2013 as part of the State solid waste permit and included as Appendix A. Where requirements of this report are addressed in this March, 2013 Closure/Post Closure plan, the section within that plan that addresses the rule requirement is referenced.

1.2 FACILITY DESCRIPTION

SKB Environmental Inc. owns and operates the SKB Rosemount Industrial Waste facility. The site is an industrial waste landfill located on an approximately 237.8 acre parcel of land located at 13425 Courthouse Blvd. in Rosemount, Minnesota. Approximately 27.5 acres of the site are currently being utilized for ash disposal activities.

The facility is operating under the MPCA Solid Waste Permit SW-383, issued on July 18, 2014. The attached Figure 1 presents a site location and a site layout is provided on Figure 2.

2.0 Run-on and Run-off Control (Rule § 257.81)

2.1 RUN-ON AND RUN-OFF CONTROL SYSTEMS

As part of its MPCA solid waste permit, Rosemount has developed a run-on and run-off control system to prevent flow onto and off of the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm in accordance with this requirement.

This section satisfies the requirement of Rule 257.81(a)(1) and Rule 257.81(a)(2).

2.2 RULE 257.81(B) RUN-OFF HANDLING REQUIREMENTS

Run-off from the active portion of the CCR unit will be handled in accordance with the surface water requirements under Rule 257.3-3, by complying with the following requirements.

The facility will comply with the requirements of its National Pollutant Discharge Elimination System (NPDES) permit and their MPCA Solid Waste Permit (SW-383). Rosemount shall not cause a discharge of dredged material or fill material to waters of the United States that is in violation of the requirements under section 404 of the Clean Water Act, as amended, nor will it cause non-point source pollution of waters of the United States that violates applicable legal requirements implementing an area wide or Statewide water quality management plan that has been approved by the Administrator under section 208 of the Clean Water Act, as amended.

This section satisfies the requirements of Rule 257.81(b).

2.3 RULE 257.81(C) RUN-ON AND RUN-OFF CONTROL SYSTEM PLAN

2.3.1. Initial Plan

As part of its MPCA solid waste permit, Rosemount has prepared initial run-on and run-off control system plans for the CCR disposal areas. They will amend the plan whenever there is a change that would substantially affect this plan and will revise the plan every five years beginning with the effective date of this plan. The effective date of this plan is the date it is placed into the facility's operating record as required by Rule 257.105(g)(3).

Calculations and figures demonstrating that the sites run-on and run-off control systems manage the peak discharge from a 25 year 24 hour storm event are provided in Appendix B.

This section satisfies the requirements of Rule 257.81(c)(1).

2.3.2. Amendment of the Plan

Amendments to the plan will be made whenever there's a change that would substantially affect this plan.

This section satisfies the requirements of Rule 257.81(c)(2).

2.3.3. Timeframes for Preparing the Initial Plan

The site meets the definition of an Existing CCR Landfill and therefore this plan will be placed into the facilities operating record on or before October 17, 2016 as required by Rule 257.281(c)(3).

2.3.4. Frequency for Revising the Plan

This plan will be revised every 5 years as required by Rule 257.281(c)(4) and placed into the facilities operating record as required by Rule 257.281(g)(3).

2.3.5. Certification

This report, including the initial run-on and run-off control plan is signed by a professional engineer registered in the state of Minnesota, meeting the certification requirements of Rule 257.81(c)(5).

2.4 RECORD KEEPING REQUIREMENTS

Recordkeeping requirements are outlined in Section 5 of this report.

3.0 Closure of CCR Units (Rule § 257.102)

3.1 CLOSURE AND POST CLOSURE PLAN

Closure of the landfill will be completed by leaving the CCR in place and installing a final cover system, in accordance with Rule 257.102(b) and 257.102 (d)-(j). Rule 257.102(c) addresses closure by removal of CCR. This rule is not applicable to the site and is not discussed further herein.

The final cover system will consist of the following:

- A layer of unclassified compacted soil 1-foot thick (intermediate cover)
- 40-mil Linear Low Density Polyethylene (LLDPE) liner
- A geocomposite drainage net
- A soil layer 2.5 feet thick
- A 6-inch layer of topsoil with vegetative cover

The final cover system is designed to contain and divert precipitation over filled areas of the site, thus reducing infiltration into the waste.

3.2 CONTENT OF THE CLOSURE PLAN

The content of the Closure Plan (Plan) is discussed below.

3.2.1. Rule 257.102(b)(1)(i) Closure Narrative

Closure of the CCR unit will be in accordance with the procedures described in Section 1.0 of the March 2013 Closure/Post Closure plan and as described in the subsequent portions of Section 3.0 of this Plan.

3.2.2. Rule 257.102(b)(1)(ii) Removal of CCR

Rosemount does not plan to complete the closure through removal of CCR and decontamination of the unit. If, in the future, Rosemount decides to consider closure in this manner, the Plan will be amended to include a new procedure for the closure.

3.2.3. Rule 257.102(b)(1)(iii) Leaving CCR in Place

Closure of the landfill will be completed by leaving the CCR in place and installing a final cover system, as described in Section 1.0 of the March 2013 Closure/Post Closure Plan.

3.2.4. Rule 257.102(b)(1)(iv) Volume of CCR

The estimated maximum inventory of CCR ever on site over the active life of the unit is 2,233,000 cubic yards. This is based on an existing 455,000 cubic yards of CCR in-place as of January 1, 2016 in addition to 1,778,000 cubic yards which is the annual acceptance rate of approximately 71,100 cubic yards over the anticipated 25 years of remaining disposal capacity at the Rosemount facility.

3.2.5. Rule 257.102(b)(1)(v) Largest Closure Area

The site will be closed in phases and the largest closure area anticipated over the life of the site is approximately 59 acres. This is the area that historically and currently has accepted CCR and consists of Cells 1, 2A through 2D, and 3A through 3D.

3.2.6. Rule 257.102(b)(1)(vi) Schedule

The CCR unit at Rosemount Landfill will be closed in phases as fill progresses to final waste grades. Each closure project's anticipated milestone schedule is shown below.

MILESTONE	DURATION
Prepare Construction Documents	2 months
Submit for Review	2 Weeks
Solicit bids/retain contractor (concurrent with MPCA review)	1 month
Complete Construction	2-3 months
Prepare Certification Report and Place in facility Operating Record	2 Weeks
Obtain MPCA Approval of Certification Report	2 Weeks

The MPCA will be provided a copy of the plans and specifications for each closure project in accordance with the requirements of Solid Waste Permit SW-383 and each closure project is anticipated to take 2 to 3 months to complete.

3.2.7. Timeframe for Preparing Initial Closure Plan

The site meets the definition of an Existing CCR Landfill and therefore this Plan will be placed into the facilities operating record on or before October 17, 2016 as required by Rule 257.102(b)(2).

3.2.8. Amendment of Closure Plan

Rosemount will amend this Plan whenever:

- There is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect; or
- Before or after closure activities have commenced; or
- Unanticipated events necessitate a revision of the written closure plan.

Rosemount will amend this plan at least 60 days prior to a planned change in the operation of the landfill, or no later than 60 days after an unanticipated event requires the need to revise the existing Closure Plan.

If this Plan is revised after closure activities have commenced, Rosemount will amend this Closure Plan within 30 days of the triggering event. Additionally at a minimum, the Closure Plan will be reviewed and updated, if needed, at the time of MPCA Solid Waste Permit renewal (every 10 years).

This section satisfies the requirements of Rule 257.81(102)(b)(3).

3.2.9. Professional Engineer Certification

This report is signed by a professional engineer, meeting the certification requirements of Rule 257.102 (b)(4) as provided below:

I hereby certify that this engineering document was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Minnesota.
David M. Parenteau October 11, 2016
PE # 41243

3.3 CLOSURE PERFORMANCE STANDARD WHEN LEAVING CCR IN PLACE

3.3.1. Manner of Closure

The planned closure meets the requirements of subparts i-iv of Rule 257.102(d)(1), as described below.

3.3.1.1 Rule 257.102(d)(1)(i) Minimize Infiltration

The final cover system described within the March 2013 Closure Post Closure Plan above is designed to minimize infiltration of liquids into the waste to the extent possible. Stormwater generated by the landfill will be controlled on-site. Runoff will be controlled and routed by drainage swales, downslope structures, and four infiltration basins as shown in the drawings. Drainage routing features have all been sized to minimize erosion from the site.

3.3.1.2 Rule 257.102(d)(1)(ii) Future Impoundment

The expected differential settlement that could result in future impoundment of water on the final cover is minimized by the final cover geometry (slopes ranging from 3% to 25%) and the fact that there is negligible settlement of the waste expected.

3.3.1.3 Rule 257.102(d)(1)(iii) Slope Stability

The final cover system utilizes a textured geomembrane and a double sided geonet geocomposite drainage layer on the side slopes, resulting in a final cover system that typically provides a factor of safety of 1.5 or greater against sloughing or movement of the final cover system over the life of the site.

3.3.1.4 Rule 257.102(d)(1)(iv) Maintenance

All closure systems, including but not limited to: the final cover system, the leachate collection system, the groundwater monitoring system and the infiltration basin system, are designed to require as little future maintenance as possible. Regular inspections will be completed to identify any maintenance requirements to fix any issues in a timely manner.

In addition, the MPCA requires that there be financial assurance and contingency action plans in place for the duration of the 20 year post closure care period.

3.3.1.5 Rule 257.102(d)(1)(v) Schedule

The closure will be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

3.4 STABILIZATION OF WASTE FOR CCR IMPOUNDMENT

The requirement of rule 257.102(d)(2) is not applicable. Rosemount does not operate a CCR surface impoundment.

3.5 FINAL COVER SYSTEM

3.5.1.1 Rule 257.102(d)(3)(i) Final Cover System Design

Rosemount is proposing an alternate final cover system, therefore the requirements of Rule 257.102(d)(3)(i) are replaced with the requirements Rule 257.102(d)(3)(ii) described in the next paragraphs.

3.5.1.2 Rule 257.102(d)(3)(ii) Alternate Final Cover System Design

The proposed final cover system is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of Rule 257.102(d)(3)(ii) for an alternate final cover system.

Rule 257.102(d)(3)(ii) requires the alternate final cover system to meet the following criteria:

- Infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in Rule 257.102(d)(3)(i)(A) and (B).
- Erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in Rule 257.102(d)(3)(i)(C).
- Rule 257.102(d)(The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

Rule 257.102(d)(3)(i)(A) requires that the permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1x10-5 cm/sec, whichever is less.

This requirement is met by the use of a 40 mil LLDPE geomembrane or proposed clay barrier layer component.

Rule 257.102(d)(3)(i)(B) requires that the infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.

This requirement is met due to the proposed final cover systems each having an efficiency that approaches 99% and includes 2.5 feet of cover soils above the LLDPE or clay barrier, and the final cover system includes a drainage layer.

Rule 257.102(d)(3)(i)(C) requires that erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.

The proposed 6” topsoil layer within the final cover system meets this requirement.

Due to the nature of the site soils and the waste, settlement and subsidence at the site are expected to be minimal with negligible effects on the final cover system.

3.5.1.3 Rule 257.102(d)(3)(iii) Professional Engineer Certification

Upon completion of the closure a professional engineer will certify a report, verifying that the closure was completed in accordance with this closure plan and other approved closure plan documents.

3.6 INITIATION OF CLOSURE ACTIVITIES

Closure time frames were discussed in Section 3.1.1.1 of this report and meets the requirements of Rule 257.102(e)(1). Since the timeframes of Rule 257.102(e)(1) will be met, the requirements of Rule 257.102(e)(2) do not apply.

Should Rosemount anticipate a period of 2 years or longer without receipt of CCR, and without commencing closure, this Plan may be amended, with the appropriate documentation and justification.

According to Rule 257.102(e)(3) closure commencement occurs when Rosemount performs any of the following:

- i. Takes any steps necessary to implement the written closure plan
- ii. Submits a completed application for any required state or agency permit or permit modification; or
- iii. Takes any steps necessary to comply with any state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR unit.

3.6.1. Rule 257.102(e)(4) Timeframe Exceptions

Rule 257.102(e)(4) states that the timeframes outlined above do not apply to any of the following owners or operators:

- i. An owner or operator of an inactive CCR surface impoundment closing the CCR unit as required by Rule 257.100(b);
- ii. An owner or operator of an existing unlined CCR surface impoundment closing the CCR unit as required by Rule 257.101(a);
- iii. An owner or operator of an existing CCR surface impoundment closing the CCR unit as required by Rule 257.101(b);
- iv. An owner or operator of a new CCR surface impoundment closing the CCR unit as required by Rule 257.101(c); or
- v. An owner or operator of an existing CCR landfill closing the CCR unit as required by Rule 257.101(d).

Subparts (e)(4)(i) through (iv) do not apply as Rosemount does not operate a CCR surface impoundment. Subpart (e)(4)(v) does not apply because Rosemount is in compliance with the location restriction for unstable areas specified in Rule 257.64(a).

This section meets the requirements of Rule 257.102(e) and its subparts.

3.7 COMPLETION OF CLOSURE ACTIVITIES

The closure schedules described herein meet the requirements of Rule 257.102(f)(i) for existing CCR landfills. Should an extension be required, the procedures outlined in Rule 257.102(f)(ii) will be followed.

3.7.1. Rule 257.102(f)(3) Professional Engineer Certification

Upon completion of the closure a professional engineer will certify a report, verifying that the closure was completed in accordance with this closure plan and other approved closure plan documents.

3.8 NOTIFICATION OF INTENT TO CLOSE A CCR UNIT

As required by Rule 257.102(g); Prior to closure of a CCR unit, Rosemount will complete the notification of intent to close a CCR unit, including the professional engineer certification as required.

3.9 NOTIFICATION OF CLOSURE

As required by Rule 257.102(h); Within 30 days of completion of closure of a CCR unit, Rosemount will complete the notification of closure of a CCR unit, including the professional engineer certification as required. The notification will be placed into the facility's operating record as required by Rule 257.105(i)(8).

3.10 DEED NOTATIONS

As required by Rule 257.102(i), the following notations will be made on the deed or other instrument normally examined during a title search:

- The notation on the deed will in perpetuity notify any potential purchaser of the property that:
  - (i) The land has been used as a CCR unit; and
  - (ii) Its use is restricted under the post- closure care requirements as provided by Rule 257.104(d)(1)(iii).
- Within 30 days of recording a notation on the deed to the property, Rosemount will prepare a notification stating that the notation has been recorded. The notification is complete when it has been placed in the facility's operating record as required by Rule 257.105(i)(9).

3.11 RECORDKEEPING

Recordkeeping requirements are outlined in Section 5 of this report.

4.0 Post-Closure Care Requirements (Rule § 257.104)

4.1 APPLICABILITY

Rosemount is not closing by removing the CCR, and is not an inactive surface impoundment; therefore the requirements of Rule 257.104 apply.

4.2 RULE 257.104(B) POST-CLOSURE CARE MAINTENANCE REQUIREMENTS

Following closure of the landfill, Rosemount will conduct post-closure care for the site which is described in Section 2 of the March 2013 Closure/Post Closure Plan.

4.2.1. Rule 257.104(b)(1) Final Cover System

Section 2 of the March 2013 Closure/Post Closure Plan addresses this requirement.

4.2.2. Rule 257.104(b)(2) Leachate Collection and Removal System

Section 2.3.1 of the March 2013 Closure/Post Closure Plan addresses this requirement.

4.2.3. Rule 257.104(b)(3) Groundwater Monitoring System

There are currently 27 monitoring wells at the Landfill, with 17 serving as the environmental monitoring system under the approved sampling and analysis plan. The groundwater monitoring network was designed based on the local and regional hydrogeologic conditions. Groundwater at the site generally moves from southwest to northeast. The existing MPCA approved monitoring system, along with any modifications, will continue to provide for groundwater quality monitoring and early detection of potential detections that may be related to waste disposal at the facility.

4.3 RULE 257.104(C) POST-CLOSURE CARE PERIOD

4.3.1. Rule 257.104(c)(1) Post-Closure Care Timeframe

Rosemount will conduct post-closure care for 30 years in accordance with this section.

4.3.2. Rule 257.104(c)(2) Assessment Monitoring Requirement

If assessment monitoring in accordance with Rule 257.95 becomes necessary, Rosemount will continue to conduct post-closure care and follow the Contingency Action Plan until the site can return to routine detection monitoring.

4.4 RULE 257.104(D) WRITTEN POST-CLOSURE PLAN

4.4.1. Rule 257.104(d)(1) Content of the Plan

Rosemount has prepared this written post-closure plan that includes, the information specified in Rule 257.104(d)(1)(i) through (iii).

i. A description of the monitoring and maintenance activities required for the CCR unit, and the frequency at which these activities will be performed;

   This is presented in Section 2 of the March 2013 Closure/Post Closure Plan.

ii. Contact after closure is:
   Mr. John Domke
   Division Vice President
   SKB Environmental, Inc.
   251 Starkey Street
   St. Paul, MN 55107

iii. Ultimate Land Use

This is presented in Section 2.3.8 of the March 2013 Closure/Post Closure Plan.

4.4.2. Rule 257.104(d)(2) Deadline to Prepare Initial Written Post-Closure Plan

Rosemount will prepare the initial written closure plan prior to October 17, 2016. The written post-closure plan, with certification, will be placed in the facility's operating record once complete.

4.4.3. Rule 257.104(d)(3) Amendment of a Written Post-Closure Plan

Rosemount will amend the written post-closure plan whenever:

- There is a change in the operation of the landfill that would substantially affect the written post-closure plan in effect; or
- After post-closure activities have commenced, unanticipated events necessitate a revision of the written post-closure plan.

Rosemount will amend its Post Closure plan at least 60 days prior to a planned change in the operation of the landfill, or no later than 60 days after an unanticipated event requires the need to revise the existing Post Closure Plan.

If a written closure plan is revised after closure activities have commenced, Rosemount will amend this Post Closure Plan within 30 days of the triggering event. Additionally at a minimum, the Closure Plan will be reviewed and updated, if needed, at the time of MPCA Solid Waste Permit renewal (every 10 years).

This section satisfies the requirements of Rule 257.81(104)(d)(3).

4.4.4. Rule 257.104(d)(4) Professional Engineer Certification

This report is signed by a professional engineer, meeting the certification requirements of Rule 257.104(d)(4).

4.5 RULE 257.104(E) NOTIFICATION OF COMPLETION OF POST-CLOSURE CARE PERIOD

As required by Rule 257.104(e); Within 60 days of completion of Post Closure care period, Rosemount will complete a notification that Post Closure Care has been completed The notification will include the certification by a professional engineer verifying that post-closure care has been completed in accordance with the Closure Plan and the Post Closure Plan. The owner or operator has will place the notification in the facility's operating record as required by Rule 257.105(i)(13).

4.6 RULE 257.104(F) RECORDKEEPING

Recordkeeping requirements are outlined in Section 5 of this report.

5.0 Recordkeeping Requirements (Rule § 257.105(g))

5.1 RECORD KEEPING REQUIREMENTS

As required by Rule 257.105 (g), the owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record:

- The Runoff/Runon Control Plan, Closure Plan and Post Closure Plan, and any subsequent amendment of the plans, except that only the most recent plans must be maintained in the facility's operating record.

Each owner or operator of a CCR unit subject to the requirements of this subpart must maintain files of all information required by this section in a written operating record at their facility.

- Unless specified otherwise, each file must be retained for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record, or study.
- An owner or operator of more than one CCR unit subject to the provisions of this subpart may comply with the requirements of this section in one recordkeeping system provided the system identifies each file by the name of each CCR unit. The files may be maintained on microfilm, on a computer, on computer disks, on a storage system accessible by a computer, on magnetic tape disks, or on microfiche.

The owner or operator of a CCR unit must submit to the State Director and/or appropriate Tribal authority any demonstration or documentation required by this subpart, if requested, when such information is not otherwise available on the owner or operator's publicly accessible Internet site.

5.2 NOTIFICATION REQUIREMENTS

As required by Rule 257.106(g), the owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator's publicly accessible internet site. The owner or operator must:

- Provide notification of the availability of the Runoff/Runon Control Plan, Closure Plan and Post Closure Plan, and any subsequent amendment of the plans.

The notifications must be sent to the relevant State Director and/or appropriate Tribal authority before the close of business on the day the notification is required to be completed. Before the close of business means the notification must be postmarked or sent by electronic mail (email). If a notification deadline falls on a weekend or federal holiday, the notification deadline is automatically extended to the next business day.

5.3 INTERNET REQUIREMENTS

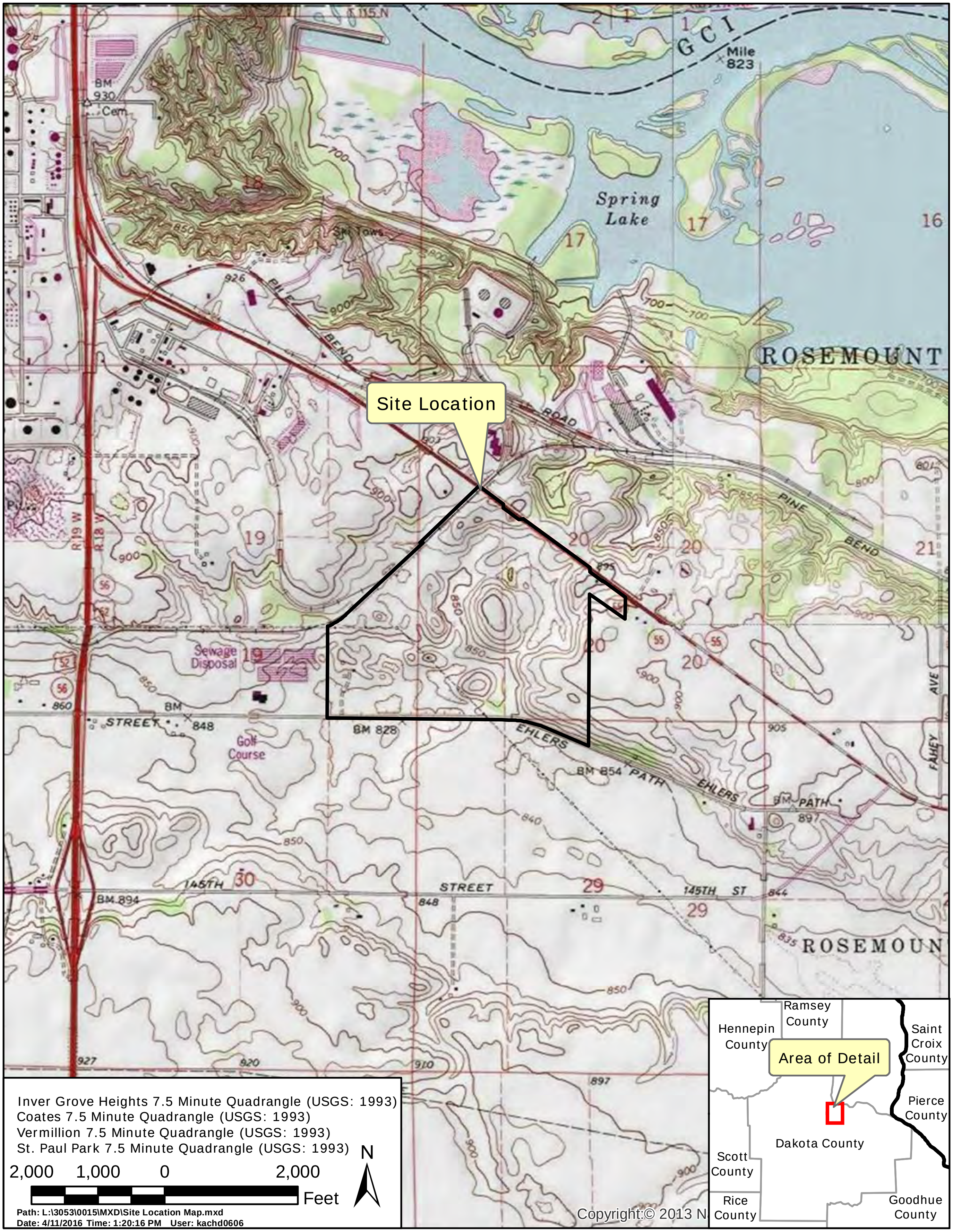
As required by Rule 257.107(g), the owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator's CCR Web site:

- The Runoff/Runon Control Plan, Closure Plan and Post Closure Plan, and any subsequent amendment of the plans, except that only the most recent plans must be maintained in the facility's operating record.

The owner or operator's Web site must be titled ''CCR Rule Compliance Data and Information.'' The same internet site may be used for multiple CCR units provided the CCR Web site clearly delineates information by the name or identification number of each unit.

The information required to be posted to the CCR Web site must be made available to the public for at least five years following the date on which the information was first posted to the CCR Web site. The information must be posted to the CCR Web site within 30 days of placing the pertinent information in the operating record.

Figures



SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY

Site Location Map

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

APR 2016

Figure 1

Plot Date & Time: 11 October 2016 11:45 AM

#	DESCRIPTION	XXX	XXX	XX/XX/XX
REV	REVISION DESCRIPTION	DWN	APP	REV DATE

SEAL

SUB CONSULTANT

PRIME CONSULTANT

WENCK ASSOCIATES

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1800 PIONEER CREEK CENTER P-763-479-4200
MAPLE PLAIN, MINNESOTA F-763-479-4242

PROJECT TITLE

SKB ROSEMOUNT LANDFILL
ROSEMOUNT, MINNESOTA

SHEET TITLE

EXISTING SITE CONDITIONS

DWN BY	CHK'D	APP'D	DWG DATE	OCT. 2016
JVB	TJS	TJS	SCALE	AS NOTED

PROJECT NO.	SHEET NO.	REV NO.
3053-0040	FIGURE 2	

M:\3053\0040\cad\civ\C-101_Phasing Drawing.dwg

Appendix A

Closure, Post-Closure and Contingency Action Plan (CRA, March 2013)

PERMIT RENEWAL APPLICATION
CLOSURE, POST-CLOSURE AND CONTINGENCY ACTION PLANS
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY, SW-383
13425 COURTHOUSE BOULEVARD
ROSEMOUNT, MINNESOTA 55068

Prepared For:
SKB Environmental, Inc.

Prepared by:
Conestoga-Rovers & Associates

1801 Old Highway 8
Suite 114
St. Paul, Minnesota 55112

Office: (651) 639-0913
Fax: (651) 639-0923

web: http:\\www.CRAworld.com

MARCH 2013
REF. NO. 075704 (27) CAP

DISTRIBUTION

No. of Copies	*Sent To*
3	Mr. Daniel Aamodt Minnesota Pollution Control Agency Industrial Land Permits 520 Lafayette Road North, 2nd Floor St. Paul, Minnesota 55155
3	Mr. Geoff Strack, P.E. SKB Environmental, Inc. 251 Starkey Street St. Paul, Minnesota 55107
1	Mr. Jeff Harthun Environmental Director Dakota County Environmental Management Western Service Center 14955 Galaxy Avenue Apple Valley, Minnesota 55124
1	Mr. Dwight Johnson City Administrator City of Rosemount 2875 West 145th Street Rosemount, Minnesota 55068
1	Ms. Margaret Zuckweiler, P.E. Conestoga-Rovers & Associates 1801 Old Highway 8, Suite 114 St. Paul, Minnesota 55112

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1.0 FACILITY CLOSURE PLAN

This report contains the closure plan for the SKB Rosemount Industrial Waste Facility (Facility). This report has been prepared to fulfill the Minnesota Pollution Control Agency (MPCA) rules for solid waste facility closure, which can be found in Minn. R. 7035.2625 (Closure) and Minn. R. 7035.2635 (Closure Procedures).

This Facility has several permitted activities. These activities include four landfilling activities: demolition debris land disposal area (DD001), two industrial waste land disposal areas (IL001 and IL002), and MSW combustor ash land disposal area (MA001). In addition to the land disposal areas, this Facility has three permitted areas that have the potential to stay open indefinitely: solid waste recycling area (RE001), solid waste transfer station area (TR001) and solid waste composting area (MC001).

Of these areas permitted areas, IL002 (the 3M cell) was closed in the fall of 2012. This plan will describe the how each of the other permitted areas will be closed.

1.1 NOTIFICATION OF CLOSURE

The MPCA will be notified in writing of the scheduled final Facility closure or of final closure of any permitted area at least 90 days prior to the termination date of that activity. A planned closure program will be included in the notification.

Regular customers of Facility activity will also be given written notification of the Facility closure date not less than 60 days prior to closure of the activity that is closing. In addition, a notice will be posted at the entrance of the Facility indicating the date of closure and listing alternate waste facilities providing similar services. The notice will remain posted at the Facility for no less than 120 days after the Facility activities have ceased.

Newspaper notices will be published no less than 30 days before final closure of the Facility or permitted area. A notice of closure will be published in the official newspapers serving the City of Rosemount and the Twin Cities Metro Area indicating the date of the Facility or permitted area closure and locations of alternative facilities. A copy of the notice will be sent to the MPCA Commissioner, Dakota County and the City of Rosemount within 10 days of its publication.

1.2 ACCESS CONTROL AND SECURITY

After final Facility closure, only those persons authorized by SKB will be permitted on the Facility grounds to perform closure and post-closure duties outlined in this report. Fencing around the Facility will be maintained to prevent damage and theft. The on-site entrance gates to the Facility will be locked to restrict unauthorized access to the site and will remain locked when authorized personnel are not on-site.

The existing fencing will be supplemented as part of the normal Facility operation to provide security as needed. Ultimate fencing requirements may be modified based on the final end use of the Site as determined by SKB.

1.3 EROSION CONTROL

The final contour plan and corresponding slopes are designed to promote moderate sheet flow drainage of the surface water to minimize erosion potential. If erosion problems on completed landfill areas are prevalent, regrading and turf establishment and/or other approved measures will be employed.

1.4 GRADING

When the landfill is completed and getting ready to close, the site will be graded and final cover of the landfill area will be placed. Grading of these areas shall be in accordance with the Engineering Plans. The final cover system will be placed over the final grades (see drawing CI-06). The profile of the final cover system that will be placed is shown on drawings CI-28. The topography of land surrounding the Facility is generally lower than the final contour elevations for the proposed completed fill areas. Drainage ways will be utilized for conveying surface water. The final contours shall be of uniform grade to facilitate surface water discharge. Any materials brought on-site as clean fill will be tested to assure that they meet the appropriate State and County standards.

Final cover will be constructed in accordance with Minnesota Solid Waste Rules Part 7035.2815, subpart 6. The final cover design is discussed in the Engineering Report. The Construction Quality Assurance Plan is presented in Appendix C of the Engineering Report for the Permit Renewal Application.

1.5 VEGETATION

Once the final cover system is in place, vegetation will be established on final cover as soon as is practicable after final cover construction. Within 180 days after the landfill areas of the Facility have ceased to accept wastes, the finished surface will be seeded, mulched, and fertilized in accordance with this plan and permit conditions. Areas previously covered and seeded will be re-inspected at this time for adequacy of turf cover. Those areas lacking adequate vegetation will be reassessed and procedures taken (reseeding, fertilization, mulching, etc.) to ensure adequate establishment of turf.

Short-rooted, drought resistant vegetation will be established on inactive portions of the fill areas until construction of the final cover is complete. An alternate seed mixture may be used based on seasonal requirements. The MPCA will be advised prior to any changes in this program. The turf cover will be regularly inspected by the Facility operator to determine seeding, mulching and/or fertilizing needs for maintaining adequate vegetation.

SKB will use topsoil that meets Minnesota Department of Transportation (MnDOT) Specification 3877 for topsoil borrow, which includes a suitable organic content.

In the event of adverse weather conditions and upon approval of the MPCA, the timeline for completion of turf establishment may be extended.

During certain times of the year, based on weather conditions, it may be necessary to irrigate newly seeded areas. This will be accomplished sparingly on an as-needed basis.

1.6 ADMINISTRATION BUILDING

The administrative building is located near the truck scales on the northwest portion of the Facility. The building was constructed during initial Facility construction. It is approximately 3,300 square feet and has been used for administration activities. The administration building also contains a laboratory which is used for waste evaluation.

Upon closure of the Facility, the administration building will be prepared for its post-closure use. Possible post-closure uses include:

- Leasing to a commercial tenant, or
- Use by SKB as offices or laboratory

SKB will prepare the building in a manner for its appropriate post-closure use. SKB will comply with all regulatory closure and post-closure requirements of the MPCA, Dakota County and the City of Rosemount. The cleaning and closure of the administration building will include the tasks listed in the following "Administration Building Closure Procedure".

1.6.1 ADMINISTRATION BUILDING CLOSURE PROCEDURES

1. To the extent possible, all waste and waste samples stored in the laboratory or other portions of the building will be gathered and placed in the last cell. Any waste that cannot be placed in the last cell will be sent to another waste management facility permitted or otherwise approved to accept the material.
2. All laboratory chemicals will be removed, sent to other laboratories for use, or managed according to applicable regulations.
3. The building will be cleaned and left available for post-closure use.

1.7 CONTAINER MANAGEMENT BUILDING

The container management building is located west of the administration building next to the rail siding. This building was constructed during the initial Facility construction. The building is approximately 3,600 square feet in size. The container management building is used for the storage of equipment and to temporarily store containers delivered to the Facility.

Closure of this building will be accomplished by cleaning the building in a manner appropriate for an industrial or commercial end use. SKB will comply with the regulatory closure and post-closure requirements of the MPCA, Dakota County and the City of Rosemount.

The building will be certified closed in accordance with the following "Container Management Building Closure Procedure."

1.7.1 CONTAINER MANAGEMENT BUILDING CLOSURE PROCEDURE

1. All containers of waste stored in the building will be placed in the last cell, returned to the customer, or sent to another waste facility.
2. Any visible deposits of waste in the building will be swept, scraped, if necessary, and disposed of in a manner consistent with the "Administration Building Closure Procedures."
3. The building will otherwise be cleaned, as needed, in preparation for post-closure use.

1.8 TRUCK SCALES

Two truck scales are located east of the administration building which currently service the Ash, Industrial waste, and recycling/transfer facility. Two truck scales are located directly east of the main entrance and north of Cell 3. Closure of the truck scales will be accomplished by cleaning the area and locking or removing the scales as necessary.

SKB will comply with the regulatory closure and post-closure requirements of the MPCA, Dakota County and the City of Rosemount. The truck scales will be certified closed in accordance with the following "Truck Scale Closure Procedure."

1.8.1 TRUCK SCALE CLOSURE PROCEDURE

1. Any visible deposits of waste on, or around, the scales will be cleaned of waste and the waste shall be placed in the last cell, or sent to an alternative waste management facility.
2. The scales will be removed for salvage or disposal unless a known end use exists.
3. The structural pad system for the scales will also be cleaned of any visible waste. This waste will be disposed of accordingly.

1.9 RAIL SPUR

The rail spur is located next to the rail siding. This unit was installed during the initial Facility construction. SKB will comply with regulatory closure and post-closure requirements of the MPCA, Dakota County, and the City of Rosemount. The rail spur will be certified closed in accordance with the following "Railcar Spur Closure Procedure."

1.9.1 RAIL SPUR CLOSURE PROCEDURE

1. All waste, if any, in the rail spur will be collected and placed in the last cell or sent to an alternate waste facility.
2. The unloading area will be cleaned. Any areas of apparently contaminated asphalt will be washed with a high pressure water wash and rinsed with clean water.
3. All wash water will be collected and placed in the leachate storage tanks.

1.10 LEACHATE STORAGE TANKS

Currently, the leachate storage tanks located at the Facility are not used. However, routine maintenance will be conducted. The tanks are maintained in the event the waste water treatment plant is not able to accept leachate and/or in the event leachate production rates exceed the handling capacity of the MCES WWTP.

At the time of closure, Facility leachate generation patterns will be analyzed to determine whether any or all of the tanks will remain in service.

SKB has prepared the tanks for standby use by removal of all leachate, minimizing the possibility of escape of leachate and/or contaminated runoff to the soil, ground or surface waters, or the atmosphere. In the event SKB utilizes the storage tanks in the future, SKB will comply with the regulatory closure and post-closure requirements of the MPCA, Dakota County, and the City of Rosemount. The tanks will be managed in accordance to the following "Tank Closure Procedure."

1.10.1 TANK CLOSURE PROCEDURE

1. Liquids other than leachate will be tested ad pretreated, if necessary, then discharged to the Metropolitan Council Environmental Services (MCES) Wastewater Treatment Plant (WWTP), or trucked to an approved off-site disposal facility.

2. Each tank will first be isolated from all associated piping using in-place valves.
3. Each tank, including fill pipes, will be subject to a high pressure water wash and rinsed. All piping will be flushed with at least three volumes of clean water. Rinse water from this operation will be subjected to the same testing requirements as leachate and routed to the WWTP.
4. The tanks may be sold or dismantled and the steel recycled.
5. Tank drains may be sealed with concrete, if appropriate to a known end use.
6. Removable plugs will be installed in the sewer lines.

1.11 ACCESS ROAD AND PARKING AREA

The roads and parking lots located at the Site are shown on the drawings (CI-01A and CI-01B). The roads provide access to buildings, landfill cells and leachate clean-out and control panel locations.

Roads and parking lots deemed non-essential for post-closure maintenance and monitoring will be closed. SKB will close roads and parking lots in a manner that minimizes the need for further maintenance. SKB will comply with the regulatory closure and post-closure requirements of the MPCA, Dakota County and the City of Rosemount.

1.12 SOLID WASTE TRANSFER STATION AREA

The permit for the Facility authorizes the construction and operation of a solid waste transfer station (TR001). SKB has not currently constructed the transfer station at the Facility. However, when and if the transfer station area is constructed and operated and SKB decides to close the area; SKB will follow the procedures outlined in the transfer station closure section and this area will be added to the postclosure care with the other parts of the Facility that are final closed.

SKB will prepare the transfer station building in a manner for its appropriate postclosure use. SKB will comply with all regulatory closure and postclosure requirements of the MPCA, Dakota County and the City of Rosemount. The cleaning and closure of the transfer station building will include the tasks listed in the following "Transfer Station Building Closure Procedure".

1.12.1 TRANSFER STATION BUILDING CLOSURE PROCEDURE

1. All waste remaining in the transfer station will be placed in the last cell of the landfill, if appropriate. Otherwise, the remaining waste will be sent to a waste management facility that is permitted to manage that type of waste.
2. Once all the waste is removed from the transfer station area, the transfer station building will be cleaned as needed and prepared for any post-closure use.

1.13 SOLID WASTE RECYCLING AREA

The permit for the Facility authorizes the construction and operation of a solid waste recycling area (RE001). SKB operates two recycling operations within the footprint of the approved land disposal areas. In addition to these two recycling operations, the previously approved permit application approves the operation of a recycling operation within the transfer station operation.

The first recycling operation within the landfill footprint is a metal recycling operation for the clean-up and recovery of post-burn metal from the HERC incinerator. This activity takes place within the approved foot print of the MSW combustor ash land disposal area (MA001). The second recycling within the landfill footprint is a C&D and asphalt shingle recycling operation that currently takes place within the approved demolition debris disposal area (DD001). This operation is a mobile operation and could be moved to other places within the landfill footprint where C&D debris is acceptable for disposal, which includes the industrial solid waste cells.

SKB will close the solid waste recycling areas in a manner that is appropriate for its post closure use. SKB will comply with all regulatory closure and post closure requirements of the MPCA, Dakota County and the City of Rosemount. The cleaning and closure of the solid waste recycling areas will include the tasks listed in the following "Recycling Areas Closure Procedure".

1.13.1 RECYCLING AREAS CLOSURE PROCEDURE

1. All processed recyclable materials will be cleaned up and sent to the appropriate recycling end market.

2. All recycling residuals will either be disposed of in the appropriate landfill cell or sent to another waste management facility that is permitted to accept the material.
3. All unprocessed recyclable materials will either be processed, disposed (if acceptable), or sent to another facility that is cable of processing the material.
4. Once all the materials are cleaned up and managed according to the steps above, the area will be cleaned-up and be readied for the postclosure use of the area in a manner consistent with the "Recycling Area Closure Procedures."

1.14 SOLID WASTE COMPOSTING AREA

The Facility is permitted to construct and operate a solid waste composting area. This permitted activity is permitted to be constructed and operated within the footprint of the land disposal areas. Once constructed, the area will need to be moved around the Facility to facilitate landfilling activities as the landfill progresses.

SKB will close the solid waste composting area in a manner that is appropriate for its post closure use. SKB will comply with all regulatory closure and post closure requirements of the MPCA, Dakota County and the City of Rosemount. The cleaning and closure of the solid waste composting areas will include the tasks listed in the following "Composting Area Closure Procedure".

1.14.1 COMPOSTING AREA CLOSURE PROCEDURE

1. SKB will finish composting all materials that have been delivered to the Facility in accordance with the composting plans and all Facility permits and licenses.
2. Once all the compostable material has been turned into compost, SKB will utilize or distribute all the compost in accordance with its approved compost distribution plan.

1.15 CERTIFICATION

Upon completion of land disposal area closure activities listed above, the MPCA will be provided with a certification by a Professional Engineer registered in the State of Minnesota that the land disposal area has been closed in accordance with the approved plans and requirements with all exceptions noted. The certification will be submitted no later than 60 days following completions of said landfill closure activities. The certification will include: (1) a completed signed Site Closure Record; (2) a set of “as-built” plans showing changes from original design; and (3) a complete set of soil tests, depth requirements, and survey results collected to show compliance with approved design requirements.

A description and survey plat, prepared and certified by the land surveyor, registered in the State of Minnesota, will be submitted to the Dakota County registrar of deeds for recording. The detailed description will include the general type, quantity and locations of deposited solid waste, the estimated depth of waste fill and final terrain descriptions, and other pertinent characteristics of the completed landfill site.

For the final closure of the non-landfill areas of the Facility, a report will be submitted to the MPCA. The report will include a summary of how the closure activities outlined in this closure plan have been fulfilled and the areas and equipment have been decontaminated. This closure report will include a certification found in Minn. R. 7001.0070.

Approval of the Facility closure by the MPCA will be based on a professional engineer’s certification. Final inspection will be performed by the MPCA. The City and County may perform a final inspection at their discretion.

1.16 COST ESTIMATES

A summary of closure cost estimates are presented in the Financial Assurance section of the Contingency Action Plan (Section 3.8) of this Report. The cost estimates were calculated assuming closure activities will be completed by an outside contractor or consultant.

As required in Minn. R. 7035.2685, the closure cost estimate will be updated annually to adjust for inflation. In addition to the changes in cost estimates based solely on inflation, SKB will submit for approval to the MPCA approval to adjust the closure cost if the actual incurred costs are higher or lower than previous estimates, and to account for decreases in the area of the landfill requiring closure.

2.0 FACILITY POST-CLOSURE PLAN

2.1 INTRODUCTION

The owner or operator of the landfill will be responsible for post-closure care of the Site for a period of 20 years following final site closure, as required by Minnesota Rule 7035.2655 Subp. 1 A and Dakota County Closure/Post-Closure Plan Requirements. The name and address of the Facility contact person responsible for management of the post-closure plan will be supplied to the MPCA, Dakota County and City of Rosemount at the commencement of the Facility post-closure care period, as required by Minnesota Rule 7035.2645 Subp.2.C. A summary of the post-closure program is provided in the following sections.

2.2 INSPECTIONS

Over the course of the 20 year postclosure period, both routine and event-triggered inspections will be performed at the Facility by the operator.

2.2.1 ROUTINE INSPECTIONS

Routine inspection of the Site will be performed two times per year (i.e., April and September) throughout the 20-year post-closure period. The inspections will include observations related to:

- Leachate collection system (pumps, leachate collection pipes)
- Leachate storage tanks (rust, clogging, painting, fixtures, storm drains, and secondary containment areas)
- Groundwater monitoring system (wear, rust, defects, operation, locks, deterioration of pads)
- Adequate vegetation of storm-water drainage system
- Infiltration rate in storm-water retention areas
- Erosion of storm-water drainage system
- Vegetation of final cover system
- Gas vents at the perimeter and/or top of the final cover system, if applicable
- The security system (gates, fence, locks, roadways and signs on the property)

- Administrative and container management buildings (if unoccupied and still owned by SKB)
- On-site portable pumps
- Evidence of burrowing animals and
- Landfill final cover differential settlement

2.2.2 EVENT TRIGGERED INSPECTIONS

The Facility contact person or their designee will conduct an event triggered inspection when one or more of the following events may have occurred:

- Rainfall exceeding 3.0 inches in a 24-hour period near the Facility;
- Tornado activity within one mile of the Facility; or
- Sustained winds in excess of 50 miles per hour (mph) or wind gusts in excess of 70 mph recorded within a one mile radius of the Facility.

When an event triggered inspection is necessary, it will be completed within 72 hours of receiving the information concerning the event.

The following items will be inspected during an event triggered inspection:

- Leachate storage tanks (clogging, storm drains and secondary containment)
- Groundwater monitoring system
- Infiltration rate of storm-water retention areas, if applicable
- Erosion of storm-water drainage system
- Administrative and container management buildings (if unoccupied and still owned by SKB)
- The security system (gates, fences, signs and roads on the property)
- Adequate vegetation of storm-water drainage system, and
- Vegetation of final cover system
- Evidence of wind and/or erosion damage to pertinent parts of the final cover system and/or surrounding vegetation

2.2.3 ACTIONS TO BE TAKEN

A record of the findings will be made after each inspection. If it is discovered that maintenance is required, it will be completed in accordance with the post-closure maintenance items. A summary of the inspection results will be prepared and will include a discussion of items requiring maintenance, an evaluation of the significance of any problems identified, and an outline of required corrective measures.

2.3 POST-CLOSURE OPERATION AND MAINTENANCE

Operation and maintenance of several systems/items will need to be continued during the post-closure period. The following are a list of systems/items that will need to continue operation and/or require periodic maintenance during post-closure operations:

- Leachate Collection System
- Leachate Collection Tanks
- Groundwater monitoring system
- Storm-water drainage systems and Infiltration Areas
- Final cover vegetation
- Site access roads
- Differential settlement
- Vector control

2.3.1 LEACHATE COLLECTION SYSTEM

The leachate collection system for all cells will be operated to ensure that less than one foot of head on the liner.

2.3.1.1 OPERATION

The operation schedule for a closed cell leachate collection system will be the same schedule as that used for an active cell. This schedule will be followed until the cell's collection system presents evidence of diminishing volumes of leachate production; at which point, the frequency of operating the leachate collection system will be decreased accordingly.

Experience gained from operation of closed cell leachate collection systems will establish an operation schedule which can be applied to subsequent cells. Varying weather conditions and seasons will be taken into consideration when determining the operation schedule for each landfill cell.

2.3.1.2 MAINTENANCE

Continued maintenance of the leachate pumps and leachate collection pipes will be required during the post-closure period.

The frequency of pump repair or replacement will be determined by results of site inspections. During inspections of the Facility after closure, each leachate riser will be inspected for damage or deterioration.

The pumps will also be turned on in order to remove any accumulated leachate. Since new rainfall infiltration will have been prevented by installation of the final cover, it is expected that the quantities of leachate available to be pumped will steadily diminish over time. The quantity of leachate removed will be recorded and any unusual patterns will be documented. A sudden, sustained increase in leachate production may indicate a problem with the final cover. A sudden decrease in leachate production may indicate there is a problem with the pumps or associated piping. In either case, investigation is warranted and repairs will be made as needed.

Once leachate production declines to near-zero for a given cell, all pumps on that cell will be periodically removed from the leachate system for inspection and testing to ensure functionality. This will occur at least every five years during the post-closure, resulting in a minimum of four removals over the 20-year post-closure period.

Repairs will be recorded in the inspection log and will be available for review by regulatory personnel.

In addition to leachate pump maintenance, the leachate lines will continue to be maintained during the post-closure period. The lines will be jetted periodically to ensure that they remain capable of transmitting leachate to the leachate sumps.

2.3.2 LEACHATE STORAGE TANKS

The leachate storage tanks will be operated, as necessary, when leachate volumes should exceed the capabilities of the MCES WWTP and/or in the event the MCES WWTP is non-operational.

2.3.2.1 OPERATION

Currently the leachate storage tanks at the Facility are not in use. However, SKB maintains the tanks in the event they are needed as an emergency storage facility. Such an event would be the result of major utility work on the existing piping to the MCES WWTP, and / or closure of the MCES WWTP; in which case, SKB will locate alternative waste water treatment options for the leachate generated at the Facility.

2.3.2.2 MAINTENANCE

It is expected that the tanks may need to be repainted and/or that some of the fixtures (e.g., valves, piping) may need to be repaired or replaced. Some or all of the tanks will remain in place and operable to manage leachate collected from closed cells as indicated by cell leachate generation. Following closure of the final cell, it is anticipated that leachate volume will decrease.

The general inspections would identify any necessary maintenance items. The tanks will be repainted periodically to protect the tanks from excessive deterioration.

If a tank requires repairs, arrangements will be made and leachate contained will be transferred as is practicable to allow maintenance.

2.3.3 SETTLEMENT

In the event that settling, gullying or excessive erosion occurs, additional cover soil will be placed in accordance with the final cover specifications and measures taken to prevent future occurrence of the problem.

2.3.4 VEGETATION

If routine inspection reveals areas of cover vegetation that are poorly established or otherwise stressed, re-seeding and/or growth and development measures will be instituted to establish an adequate turf. Periodic mowing and fertilizing activities will occur to encourage an active vegetation cover and to prevent the growth of plants and/or trees that have root systems deep enough to damage the final cover.

2.3.5 VECTOR CONTROL

Flies, other insects, rodents, or other vermin do not result from activities at the Facility due to the inert nature of the waste received. If a nuisance problem develops, remedial measures will be implemented, such as spraying for insects or rodent baiting programs.

2.3.6 GROUNDWATER MONITORING

Groundwater monitoring is performed for the purpose of evaluating groundwater quality at the Facility and as a detection method to ensure the landfill liner systems are operating properly.

2.3.6.1 OPERATION

Groundwater monitoring will be performed at the landfill three times a year throughout the post-closure period. If approved by the MPCA, monitoring requirements may be reduced. Sampling procedures and analytical requirements are as specified in the MPCA quarterly groundwater monitoring reports. Monitoring results are electronically reported to the MPCA in a timely and organized fashion. In addition, SKB will prepare quarterly monitoring reports following each sampling event and an annual summary report.

2.3.6.2 MAINTENANCE

The groundwater monitoring system shall be maintained such that wells remain in good working order for sampling. General inspections will identify any maintenance needs required for individual wells, maintenance or replacement needs for a given well, and possibly the abandonment and installation of a new well.

Pumps installed in wells that fail to operate properly will be removed, repaired and/or replaced.

2.3.7 STORMWATER DRAINAGE SYSTEMS AND INFILTRATION AREAS

Storm water structures and systems will continue to be used for managing storm water leaving the Facility during the post-closure period.

For the first five years of the post-closure period, the storm water retention areas will be inspected according to the current Storm Water Pollution Prevention Plan (SWPPP). After the initial five years of the post-closure period, if no significant changes occur to the storm water management systems, a new SWPPP may be developed and maintained to reflect future uses of the Facility.

Inspections will determine if any maintenance is required. Maintenance may include removing silt and debris from retention areas, removing debris from catch basins and other drainage structures and/or repairing erosion damage to storm water management structures.

2.3.8 POST-CLOSURE END USE PLAN

The SKB Post-Closure End Use Plan reflects the requirements of the MPCA (7035.2645 and 7035.2815 subp. 16), Dakota County (Dakota County/Post-Closure Plan Requirements, VI.1) and the City of Rosemount for identifying proposed end uses for the Site.

The landfill cells will be covered and maintained. No end use of the property would be allowed that could potentially disturb the integrity of the final cover, line, leachate collection system or groundwater monitoring system.

The end use alternatives for the Site will be maintained throughout the operating life of the Facility including continuing to operate the recycling, transfer, and composting areas. Following closure of the Facility, the structures will be cleaned and left for industrial or commercial use. The buffer areas around the landfill cells will be available for open space or structural development.

The Post-Closure End Use Plan addresses the proposed end uses of the Site and considers: proposed land uses, structures (including surface water drainage), roads, parking areas, landscaping and areas available for post-closure development.

2.3.8.1 PROPOSED LAND USE

The Site is located in an area of heavy industrial land uses known as the Pine Bend Industrial Area. Land uses adjacent to the north and west are industrial; land uses to the east and south are golf courses and agricultural. The City of Rosemount's Year 2030 Comprehensive Plan identifies the site as Waste Management District and areas to the north and west as industrial land uses. Further, the City's Zoning Ordinance identifies the site as Waste Management District and areas to the north and west of the site as Industrial Districts.

Based on the historical pattern of industrial development moving southeastward through the Pine Bend Area, the types of future development anticipated by the City of Rosemount, as stated in the Comprehensive Guide Plan and the City's Zoning Ordinance, will continue to be industrial and waste management uses.

2.3.8.2 STRUCTURES

The Post-Closure End Use Plan identifies that the primary structures will continue to be available for industrial type uses. The office building and container management building will be cleaned and available for further use.

Some or all of the leachate storage tanks will remain in their pre-closure locations and will continue to function as a back-up storage system until deemed no longer needed through inspection and diminished leachate production rates among the landfill cells.

The final configuration of the storm water management system will remain in place following closure to manage storm water runoff from the landfill cells and site area. The storm water retention areas will compliment either further industrial development or open space alternatives.

2.3.8.3 ROADS AND PARKING AREAS

The roads and parking areas serving the Facility will remain for future use. The rail siding will also be cleaned and left to provide future infrastructure support for potential industrial development.

2.3.8.4 LANDSCAPING

There will be significant landscaping improvements as part of operations screening at the time of final site closure. At the time of Facility closure, these landscaped areas will have experienced approximately 25 years of growth, providing significant vegetative cover at selected locations around the perimeter of the Site. In addition to the designed landscaping, the vegetation in the majority of the buffer area will be allowed to grow and mature, in a natural state, adding to the vegetative screening.

2.3.8.5 POTENTIAL POST-CLOSURE DEVELOPMENT

A primary objective of the End Use Plan includes maintaining a development area within the buffer area around the Facility. The purpose of maintaining this development area is to provide end use development alternatives for the Site following closure and will allow continued use of the rail spur. An area would be available for a wide range of industrial or commercial development, consistent with the zoning regulations in place for the Site. Further, the development area is served by utility corridors which will provide that sewer, communications, electrical and gas services for industrial or commercial use.

2.3.9 POST-CLOSURE COST ESTIMATE

A summary of post-closure cost estimates are presented in the Financial Assurance section of the Contingency Action Plan (Section 3.8) of this Report. The cost estimates were calculated assuming that the work will be completed by an outside contractor or consultant and that the post-closure care period will last 20 years.

If deemed necessary, the post-closure cost estimate will be updated annually to adjust for inflation and to account for differences between estimated and actual post-closure care costs.

3.0 CONTINGENCY ACTION PLAN

The main goal of the Contingency Action Plan is to develop a management scheme to address potential situations and minimize the associated risk. The Contingency Action Plan will be used in conjunction with the Emergency Response Plan in the event of an emergency.

The engineering design and other site-specific features have been reviewed to determine conditions that may lead to potential hazards to human health and the environment. Remedial measures are based on alteration or correction necessary to mitigate the potential hazards. Incidents associated with the normal operations of the Facility and monitoring and maintenance activities undertaken during normal operation and post-closure are also addressed in this section. Potential incidents during the post-closure period include settlement, final cover erosion repair, site security, and surface drainage. Details on the procedures to be implemented and the schedule and costs for correcting such problems is provided.

The Contingency Action Plan will be reviewed and amended when an event occurs for which the plan did not provide an appropriate response. The Contingency Action Plan will also be amended when changes in design, construction, operation, or maintenance are made which affect proposed contingency actions.

3.1 INTRODUCTION

This Contingency Action Plan (Plan) has been prepared in response to the requirements of Minnesota Rules pt. 7035.2615, Dakota County's Solid Waste Management Ordinance 110, and the City of Rosemount's Zoning Ordinance. The Operational Contingency Action Plan will be amended and updated in accordance with the MPCA whenever:

- The Facility permit is reissued
- A failure or release occurs for which the plan did not provide an appropriate response; or
- Changes in the design, construction, operation or maintenance of the Facility conflicts with the current Contingency Action Plan

The purpose of the Plan is to:

- Discuss potential incidents at the Facility that may endanger human health and the environment
- Actions and procedures that would minimize hazards to human health and the environment should an incident occur
- The schedule for the implementation of the actions and procedures
- Contingency action cost estimates as required by Minn. Rules 7035.2615

The Contingency Action Plan addresses potential incidents that could occur at the Facility. Inclusion of a potential incident does not mean that it is likely to occur, rather it means there is only a potential for this incident to occur. This plan identifies potential incidents that could occur during the remaining 40 years of expected Facility operating life and the 20 year post-closure period.

Potential incidents could include incidents resulting from Facility operations such as fires, explosions, and spills or releases resulting from Facility operations.

Not every incident identified will require this plan to be implemented. When an incident occurs which could threaten human health or the environment, this Operational Contingency Action Plan would be implemented. .

The Facility will accept for disposal only non-hazardous industrial, MSW combustor ash, and C&D wastes, so that the risk of incidents creating threats to public health and/or the environment is considered slight. This Contingency Action Plan, however, has been prepared to address these possibilities. Potential incidents, which may occur during the post-closure care period, are also addressed.

3.2 INCIDENT COORDINATORS

There will be a minimum of one person, either at the Facility or on call, who has the responsibility for coordination of all response measures involving Contingency Action. This person will be the Facility manager or his/her designee and will be termed the Incident Coordinator (IC). He/she will be authorized to utilize all available company resources necessary to protect human health and the environment.

The IC may appoint Alternate Incident Coordinators (AICs) as necessary to ensure timely implementation of this plan. An IC may designate specific individuals with special expertise (including consultants) in a given discipline (e.g., groundwater remediation) to coordinate and carry out particular remedial or corrective actions required under a Contingency Action.

The IC and all AICs will be familiar with the Facility, facility operations and activities, and the location of records. The AICs will act as needed during the absence of the IC. The AICs and IC are collectively referred to as Incident Coordinator(s) (ICs). Identified ICs will have the authority to commit the appropriate resources necessary to implement the Operational Contingency Action Plan.

For non-sudden events, the IC will use this plan as a guide for responses but will also coordinate response actions with SKB corporate offices. Government authorities (i.e., fire departments, police departments, etc.) will be asked to coordinate their activities through the IC.

Since the commencement of operations at the Facility, the IC and a list of the AICs by position and name has been supplied to regulatory and response agencies. This list will be updated as needed to reflect personnel and organizational changes. The list of all ICs is also contained in Appendix B of this report. It will be updated, as necessary, to reflect changes in personnel or telephone numbers. In addition, this list will be posted at the Facility and be available for inspection.

The list of Facility ICs and AIC is presented in Appendix B.

3.3 GENERAL CONTINGENCY RESPONSE GUIDELINES

To assist in responding to specific incidents identified in this plan, the Facility maintains general contingency response guidelines. These guidelines help ensure that the specific responses for each incident can be carried out in a timely and coordinated fashion. These guidelines have been established based on review of the MPCA, Dakota County and the City of Rosemount requirements. These general contingency response guidelines address Implementation of Contingency Actions, Basic Responsibilities of the Incident Coordinator, Assessment of Incidents, Control Procedures, and Incident Control Equipment and Communication Systems.

3.3.1 IMPLEMENTATION OF CONTINGENCY ACTIONS

All employees are responsible for safety and environmental protection. No employee will be asked or expected to do something beyond their training. Because not every potential incident can be identified in this plan, facility personnel will be familiar with general guidelines to respond to incidents not specifically identified. Listed below are general guidelines for response to incidents. The first person discovering an incident will:

- If necessary, and if possible, evacuate any injured personnel;
- If possible, stop the spread of contamination (i.e., turn off a valve on a tank);
- If possible, begin primary containment of wastes or spills (i.e., begin sweeping up waste);
- If necessary, notify and evacuate other personnel from the area surrounding the incident; and
- After taking these initial actions, the individual will then proceed to inform the IC.

Upon being informed of an incident, the IC will immediately implement appropriate actions as identified in the Operational Contingency Action Plan. The IC is to use his/her best judgment at the time as to whether conditions warrant deviating from the specific on-site actions specified in this plan. The IC will use the Operational Contingency Action Plan as a guide. Throughout this plan, many of the IC's options for responding to an incident are listed. The objective of the plan is to help the IC consider all options and potential problems so that he/she will be able to exercise sound judgment in resolving the incident; however, the IC must use his/her best judgment in responding to each incident.

3.3.2 BASIC RESPONSIBILITIES OF THE INCIDENT COORDINATOR

After the IC has been informed that an incident has occurred, the IC will:

- Place priority on notifying all potentially affected facility personnel;
- Make an assessment of what is the appropriate response;
- Implement appropriate actions as needed to respond to the situation;
- Coordinate the activities of available personnel, as necessary; and
- Subsequently notify, if required, appropriate state or local agencies.

3.3.3 ASSESSMENT OF INCIDENTS

After being informed of an incident, the IC will make a preliminary assessment of the effects of the incident. The assessment procedures are aimed primarily at emergency-type situations. In assessing how to respond to an incident, the IC will consider:

- The potential impact of any irritating gases or smoke that may be generated (i.e., from a fire);
- The potential impact of any contaminated surface water runoff from water or chemical agents used to control fires;
- The potential for heat induced explosions (i.e., a fire could produce enough heat for containers to explode);
- The potential for fire spreading to other areas (i.e., fire in any part of a structure could spread to other structures or buffer areas);
- The potential risk to which Facility personnel, or other emergency response personnel, might be exposed by attempting to control a fire, or assist in controlling a release;
- The potential for leakage to be released to the environment; and
- Other factors as appropriate.

In assessing how to respond to incidents, the IC will utilize available information such as truck placards, manifests, operating records, weather conditions, waste testing results and container labels.

Since the Facility will be managing only non-hazardous industrial waste, the likelihood of an incident having the potential to threaten human health or the environment is very low. As stated in this plan the IC will, however, notify local authorities if such an incident occurs which would require assistance. The IC will assist local authorities in determining if evacuation of the local area is necessary and then notify state and local permitting authorities as identified in this plan. The call to the appropriate authorities may provide the following details, if applicable:

- Name of caller
- Name of facility and telephone number
- Location of facility
- Time and type of incident

- Name and quantity of material(s) involved to the extent known
- Extent of known injuries, if any
- Potential hazards to health and environment to the extent known

3.3.4 CONTROL PROCEDURES

After notification and assessment of an incident, the IC may, if appropriate, implement any of the following general control procedures. The IC may implement and complete control procedures before notification to local and state regulating authorities so as to be as responsive as possible. As with the assessment procedures described above, this protocol applies primarily to emergency situations requiring rapid action. It may also be utilized, if appropriate in the judgment of the IC, to non-emergency situations. The IC can, based on his/her judgment:

- Order the evacuation of personnel from immediate danger and coordinate first-aid for injured personnel
- Initiate efforts to determine the character, exact source, amount and area extent of any released materials
- Authorize actions intended to reduce or stop the impact of the incident
- Provide personnel and equipment to assist emergency response personnel in order to improve their ability to respond.

3.3.5 INCIDENT CONTROL EQUIPMENT AND COMMUNICATION SYSTEMS

The following is a list of the primary incident control equipment and communications systems available at the Facility. This equipment will be strategically located around the Facility in areas where their use is required to respond to incidents. This equipment includes:

- Controlled entrance gate
- Telephones
- Two-way communication radios
- Over pack and empty drums
- Absorption and solidifying agents

- A water supply well that could be available for fire fighters
- First-aid stations
- Trauma kit
- Respirators
- Fire extinguishers
- Dozers, tractors and other similar equipment used at SKB

3.4 INCIDENT REPORTING PROCEDURES

Following response and/or containment of an incident, the IC will prepare an Incident Report for submission to the MPCA, Dakota County and the city of Rosemount. The Incident Report will also be included in the SKB Operating Records.

According to Minnesota Rules 7035.2605 Subp. 2, two weeks after the incident, SKB will submit a report to the MPCA, Dakota County and the city of Rosemount. If the incident is a release, explosion, or fire, the IC will also notify the commissioner of the MPCA within forty-eight hours of the incident, in accordance with the Minnesota Rules 7035.2595 Subp. 6. This report shall include:

- Date, time, place, type and summary of incident;
- Type and quantity of material(s) involved;
- Response measures taken, equipment or repair materials used, and sequence of events from incident occurrence to resolution and;
- Other information that would aid in the understanding of the incident.
- Summary of the required review of the emergency procedural manual.

3.5 COORDINATION AGREEMENTS

3.5.1 ARRANGEMENTS WITH PUBLIC SERVICE PROVIDERS

Facility personnel meet with Rosemount Fire and Rosemount Police on a regular basis. They are familiar with the activities that take place at the Facility.

- Rosemount Police Department;
- Rosemount Fire Department;

Facility personnel will offer orientation tours to personnel from the regulatory agencies and emergency service providers to familiarize them with the Facility and procedures in this plan.

3.5.2 ARRANGEMENTS WITH EQUIPMENT CONTRACTORS

It is possible that incidents can occur at the Facility for which outside equipment may be required to contain or resolve the incident. Types and duration of equipment needs could range from additional water trucks for dust control to earth-moving equipment. In addition, other ancillary items such as pumps, generators, piping and portable lighting could be required to resolve an incident. In this event equipment, will be contracted from a dealer or contractor with the necessary type of equipment (such as Ziegler Caterpillar Rental)

3.6 POTENTIAL CONTINGENCY ACTIONS

This Operational Contingency Action Plan provides information regarding the specific steps to be taken in response to various potential incidents that may occur at the Facility during its operating life. Each potential incident is addressed in terms of Potential Source, Potential Scope and Extent, and Actions to be Taken. The purpose of the discussions in this section is to identify the specific procedures that will be followed by Facility personnel when responding to these incidents. The list of incidents has been compiled through discussions and meetings with representatives of the MCPA, Dakota County and the city of Rosemount. These are incidents that may occur during operation of the Facility. In many cases, the probability of the incident actually occurring is very low. Other, unforeseen events which are not described here could also occur. If such an unforeseen event occurs, these incident response scenarios will be used as guidance in determining the proper response to such an incident.

Listed below are incidents that are considered as having the potential to occur given the type of operations at the Facility:

- Contingency Action Incidents

- A-1 Fires in Structures or Buffer Area
- A-2 Release of Toxic Smoke or Gases from Fire
- A-3 Container Spills and Leakage Outside of the Designated Waste Management Area
- A-4 Contamination of Storm water Management System
- A-5 Emergency Shutdown
- A-6 Leachate Requiring Treatment Before Discharge to a Wastewater Treatment Plant (WWTP) (First Occurrence)
- A-7 Leachate Quantities Exceeding Storage Capabilities of the Tanks
- A-8 Unusual Amounts of Leachate in the Secondary Leachate Collection System
- A-9 Puncture of the Liner System
- A-10 Release of Contaminants Detected in Groundwater Monitoring Wells in the Cell Berms
- A-11 Groundwater Contamination in Excess of MPCA Intervention Limits
- A-12 Leachate Storage Tank Leaks

3.6.1 CONTINGENCY ACTION INCIDENTS

3.6.1.1 A-1 POTENTIAL CONTINGENCY – FIRES IN STRUCTURES OR BUFFER AREAS

Potential Source – A fire at the Facility could occur in structures, vehicles (either a waste transport vehicle or piece of heavy equipment) or buffer areas. The potential for fire at the Facility is lower than would be expected at most commercial or industrial operations.

Potential Scope and Extent - The scope and extent of the fires could range from a minor fire in a trash receptacle to a fire causing significant damage to the administrative office, laboratory or container management building, a grass fire in the buffer area of the Facility, or a fire involving a vehicle or piece of heavy equipment. Given the nature of the waste accepted at the Facility, it is improbable that waste within a cell could support a fire. That event, however, is also considered as a potential incident. However, fires that are minor in extent and require only on-site efforts (e.g., fire extinguishers or garden hose) to control, such as a fire in a trash receptacle, will not cause this plan to be implemented.

Actions to be Taken - If a fire were to occur, the following actions would be taken as appropriate:

1. The first person to discover a fire will activate a fire alarm and assist any injured personnel, if necessary and if possible. Injuries will be managed as outlined in Potential Contingency A-1.
2. The first person on the scene will notify the IC and/or the administrative office, as available. The IC, administrative office or first person on the scene will notify the fire department and police department.

   The Rosemount Fire Department at:

   14425 Brazil Avenue
   Rosemount, MN 55068
   911 or (651) 423-2424; 423-3444

   The Rosemount Police Department at:

   2875 145th St. West
   Rosemount City Hall
   Rosemount, MN 55068
   911 or (651) 437-4211; (651) 423-4491

The following information will be supplied, where known:

- Location of fire
- Name of caller
- Name and address of facility
- Description of fire and source
- Identification of any special equipment known to be needed

The caller will stay on the telephone as long as necessary to provide any further information needed.

1. The IC will proceed to the fire scene and coordinate efforts until the fire department arrives.
2. If possible, the administrative office staff will dispatch a vehicle to the main gate to direct incoming fire equipment to the scene.
3. The IC and available personnel will assist the fire department as requested.

4. The IC will make a preliminary assessment and take corrective actions to ensure that further immediate fires do not occur.
5. The IC will notify the MPCA within forty-eight hours of a fire in accordance with Minnesota Rules 7035.2595 Subp. 6.
6. The IC will prepare an Incident Report as identified in this plan.

Fires occurring either in the Facility structures or grass buffer areas have the potential to disrupt routine operations. Minor fires that could occur in a trash receptacle or small grass fires will not affect Facility operations. As such, no special provisions are necessary to manage Facility operations if minor fires occur. More serious fires such as those in a building could have an impact on the operation of the Facility.

The degree of disruption will be dictated by the severity of the fire. Under the worst case situation, fires at the Facility could disrupt operations until necessary repairs, replacement or reconstruction takes place. If this were the case, all or any applicable portion of the Emergency Shutdown Procedures, as described in Potential Contingency A-6, could be implemented.

3.6.1.2 A-2 POTENTIAL CONTINGENCY – RELEASE OF TOXIC SMOKE OR GASES FROM A FIRE

Potential Source - The sources of noxious gases or smoke are from fires. Packaging material such as plastics, foams and rubber in the laboratory, container management building or in a containment cell could be a source as could certain types of waste materials. Fires from overheated equipment such as waste handling equipment, or waste transport equipment is also a possible source of toxic gases or smoke.

Potential Scope and Extent - Noxious gases or smoke could potentially be released from fires occurring in the laboratory, in the container management building, in a vehicle as a result of an equipment accident or overheating, or in one of the containment cells. Structural fires in the administration building and grass fires are considered earlier in this plan. The scope and extent of gases or smoke could range from minor incidents causing no disruption in operations to an incident which could require clearing the Facility of workers to avoid inhalation of the noxious gases or smoke. This contingency plan will be implemented whenever there is a release of toxic smoke or gas that requires off-site equipment for complete management. The primary credible cause or source of noxious gases will be fires, making the response scenarios for gases and smoke similar to those for fires.

<u>Actions to be Taken</u> - If this incident occurs, the following actions will be taken:

1. The first person to discover a fire producing toxic gases or smoke will activate a fire alarm and assist any injured personnel, if necessary and if possible. Injuries will be managed as outlined in Potential Contingency A-1.

2. The first person on the scene will notify the IC and/or the administrative office, as available.

3. The IC, administrative office or the first person on the scene will notify the fire department and police department.

   The Rosemount Fire Department at:

   14425 Brazil Avenue
   Rosemount, MN 55068
   911 or (651) 423-2424; (651) 423-3444

   and the Rosemount Police Department at:

   2875 145th St. West
   Rosemount City Hall
   Rosemount, MN 55068
   911 or (651) 437-4211; (651) 423-4491

   The caller will stay on the telephone as long as necessary to provide any further information needed.

4. The IC will then proceed to the fire scene and coordinate efforts until the fire department arrives.

5. As available, the administrative office staff will dispatch a vehicle to the main gate to direct incoming fire equipment to the scene.

6. The IC and available personnel will assist the fire department as requested.

7. The IC will make a preliminary assessment and take corrective actions to ensure that further immediate fires do not occur.

8. The IC will prepare an Incident Report as identified in this plan.

The release of toxic gases or smoke would likely disrupt Facility operations. Any disruption would be the result of activities associated with containing and eliminating the source of the toxic smoke or gas. If the source was a major fire in a building, significant disruption to operations could occur. The duration of the disruption would be a function of the time necessary to repair, replace or reconstruct the damaged equipment or structure. If a major disruption to operations was to occur, resulting in shutdown of the Facility, all or any applicable portion of the Emergency Shutdown Procedures (Potential Contingency A-6) may be implemented.

3.6.1.3 A-3 POTENTIAL CONTINGENCY – CONTAINER SPILLS AND LEAKAGE OUTSIDE OF THE DESIGNATED WASTE MANAGEMENT UNIT

Potential Source - Spills or leakage could potentially occur from any container or vehicle carrying waste or leachate.

Potential Scope and Extent - Spills or leaks could occur as a result of vehicle accidents, container failure or rupture during handling, or leachate spills during transfer operations. The scope and extent of any spill or leakage will be limited to the volume of the containers or trucks managed at the Facility. The majority of wastes will be solids. The waste will be delivered to the Facility in containers ranging in size from fifty-five gallon containers (typically the smallest containers will be fifty-five gallons but smaller containers will be allowed), to railroad cars. The Facility will work with its customers to reduce the presence of liquids in waste delivered to the Facility. It is possible, however, that liquids may separate from the solids during shipment. From experience, if liquid is present, it most probably would be water. Response to liquid spills would be different from response to dry spills. A container spill or leakage would include incidents primarily involving small quantities of waste and individual containers. Because of limitations on the types of wastes acceptable, the amount of liquid likely to separate would be very small compared to the capacity of the container. Further, waste with any potential for liquid separation will likely be shipped in drums making the extent of any spill limited even further. Leachate from the cells will likely be the largest volume of liquid waste handled on-site.

Actions to be Taken - This contingency action would be implemented for any spill or leakage if the container spill or leak occurs outside of the designated waste management unit (cells, container management building, leachate storage tanks). Even though the wastes managed at the Facility are non-hazardous, it is important that any spills be handled in an appropriate manner. Therefore, the following action will be taken:

For spills of solid industrial wastes:

1. The first person on the scene will, if possible, take immediate steps to determine the type of material spilled and, if applicable, attempt to contain the spilled material by use of hand tools. Efforts may include righting a tipped container and sweeping or vacuuming the spilled material.

Because most waste management activities, other than disposal, will take place in areas that have been paved, cleanup of solid wastes that may be spilled will be relatively simple. Solids that have been spilled will be collected using the appropriate equipment (e.g. shovel, broom, front-end loader, etc.). The waste will be removed and the area swept as required. In the event that solid waste is spilled outside a paved area, the waste removal will continue until no visible signs of the waste remains.

2. The personnel on the scene will notify the IC. The person will supply the following information, where known:

- Name of caller/incident reporter.
- Location of the incident.
- Description of the spill (type of material, volume, initial steps to contain).
- The caller/reporter will advise the administrative office and IC, as available, of the need for off-site equipment.

3. The IC will proceed to the scene and inspect the actions taken.

4. The IC will coordinate the spill containment and cleanup activities. The IC will utilize any on-site equipment he/she judges to be necessary to contain and clean up the spill. The on-site equipment that may be necessary would include dozers, front-end loaders, overpack containers, dumpsters and waste transport equipment.

5. If off-site equipment is determined to be necessary, the IC will notify the administrative office, as available.

6. The IC or administrative office staff will contact appropriate off-site contractors or equipment suppliers necessary to address the spill. Examples of off-site equipment that may be necessary include tow trucks to right an overturned vehicle, floor sweepers, or waste transfer equipment.

7. Following containment and cleanup, the IC will take immediate steps, if prudent, to avoid additional spills.

8. The IC will prepare an Incident Report as identified in this plan for any reportable spill or leakage of materials outside of the designated waste management unit as defined by CERCLA (40 CFR, Part 302). See Appendix B for a blank copy.

<u>For spills of liquid industrial wastes or leachates:</u>

1. For spills of liquid wastes or leachates, the first person on the scene will, if possible, take immediate steps to identify and, if appropriate, contain the leaked material. Efforts may include righting a tipped container, plugging a valve, spreading an absorption material on the waste or sweeping or vacuuming the leaked material.

   The clean-up could involve any or all of the following actions:

   - Collection of any remaining liquids (i.e., pump into containers, spreading of absorbent).
   - On paved areas; the liquids will be collected and, if needed, an absorbent material applied to the affected area. The absorbent will be collected and managed as a waste.
   - In unpaved areas; the remaining liquid will be collected and the affected soil removed until no visible sign of the waste remains.

2. The first person on the scene will notify the IC. The following information will be supplied to the IC, where known:

   - Name of caller/incident reporter.

- Location of the incident.
- Description of the spill (type of material, volume, initial steps to contain).
- The caller/reporter will advise the administrative office and/or IC, as available, of the need for off-site equipment.

If the first person on the scene determines that off-site equipment will be necessary to contain and clean up the material, the IC will be informed.

3. The IC will then proceed to the scene and inspect the containment and cleanup actions and coordinate further cleanup activities.

4. The IC or the administrative office staff will contact appropriate off-site contractors to address the spill. Examples of off-site equipment that may be necessary include tow trucks to right an overturned vehicle, floor sweepers or waste transfer equipment.

5. Following containment and cleanup, the IC will take immediate steps, if prudent, to avoid additional spills.

6. The IC will prepare an Incident Report as identified in this plan for any reportable spill or leakage of materials outside of the designated waste management unit as defined by CERCLA (40 CFR, Part 302). See Appendix B.

It is unlikely that a container spill or leak resulting from a vehicle accident, faulty, or tipped container would have a significant impact on Facility operations. Some temporary delay in routine operations may be experienced while personnel work to contain and clean up a spill.

3.6.1.4 A-4 POTENTIAL CONTINGENCY – CONTAMINATION OF STORMWATER MANAGEMENT SYSTEM

Potential Source - The stormwater management system could become contaminated if a waste spill were to occur during a rainstorm.

Potential Scope and Extent - Most likely, when introduced into the stormwater management system, the contamination would become so dilute that it would no longer be considered a contaminant. A Contingency Action Plan, however, has been developed for this incident. This event considers that waste has reached a stormwater retention area as a result of a spill during rainstorm events.

Actions to be Taken - The steps for this contingency are as follows:

1. The IC is notified that a spill has occurred during a rainstorm and that it is possible that contaminants have reached a stormwater retention area.

2. The IC will direct efforts to contain the spill. These efforts could include containment and cleanup of the spilled material by hand tools, floor sweepers, pumps, covering the wastes or by construction of temporary dikes to contain a spill. The specific actions taken will be determined by the IC based on his/her judgment concerning the volume of waste and the nature of the spilled material.

3. Following immediate efforts to contain the spill and thereby decrease the potential for further contamination of the stormwater retention area(s), the IC will initiate efforts to assess the nature and possible extent of the contamination. The IC may use the expertise of other company employees or retained consultants. The IC will initiate tests of the spill area and stormwater retention area(s) to determine the degree of contamination, if any. The tests will include analysis for any potential contaminants that the IC deems necessary, depending on the type of waste involved.

4. If the testing of the soils in the spill area or water quality in the stormwater retention area show that the contamination is not significant and is not above background levels established in the vicinity of the Site at that time, no further action will be necessary. The testing results will be maintained in the Facility Operating Records.

5. If the test results show contamination in the spill area, actions will be taken to further clean the area or collect contaminated soils for containment in a cell.

6. If the test results show that water quality in the stormwater retention area requires special management, the IC will prepare a report identifying the issues associated with the spill, test results and management alternatives. The IC will

consult with the MPCA, Dakota County and the city of Rosemount in determining the management alternative to implement.

7. Following resolution or implementation of a management alternative, the IC will prepare an Incident Report as identified in this plan.

3.6.1.5 A-5 POTENTIAL CONTINGENCY – EMERGENCY SHUTDOWN

Potential Source - Emergency shutdown procedures could be implemented due to activities not related to the Facility. Occurrences or situations unrelated to the Facility could include tornadoes, devastating fires or explosions at surrounding industries resulting in a release of smoke, fumes or gases or temporary disruption of transportation routes. Such incidents at nearby industries could require shutdown and/or evacuation of the Facility. Operations could also be suspended due to the failure of key equipment or an extended power outage.

Potential Scope and Extent - Waste will be delivered to the Facility primarily by truck. Disruption or closing of Highway 52 or Highway 55 could cause Facility operations to be suspended. The operations could also be suspended due to the failure of key equipment or extended power outage. In addition, fires or explosions at nearby industries which release toxic smoke or gases could cause an evacuation of the Facility, thereby temporarily suspending operations. The extent of this type of disruption would be a function of the length of time the transportation routes were affected. In the instance of an evacuation, the disruption would be for the length of time until air quality improved (for the case of containment of a fire) and/or it was considered no longer a threat to human health to be at the Facility.

Actions to be Taken - If an emergency shutdown is required, the following actions will be taken.

1. The IC is advised of the transportation route disruption or evacuation request. Such notice could be given by local fire or police or emergency service personnel of the city of Rosemount or Dakota County. The IC would assess the cause, duration and likely degree of disruption or evacuation that would result. The IC would also be advised of the failure of key equipment or of the Facility power supply.

2. If possible, the leachate collection pumps will be shut down and leachate discharge valves will be closed.

3. If the shutdown or evacuation is anticipated to be of a significant duration causing suspension of Facility operations, if possible, Facility records will be reviewed to determine those waste shipments anticipated to be received during the period of disruption.

4. If possible, the generators of anticipated shipments will be contacted by telephone and advised not to ship waste until further notice. If possible, commercial waste transporters will be contacted and advised not to ship waste to the Facility until further notice.

5. If conditions allow, the generators and commercial transporters will be advised from the Facility office. If conditions do not allow, they may be so advised from a remote location.

6. If an immediate evacuation is ordered, the IC will:

   - Determine the most appropriate evacuation route, and designate a safe meeting place
   - Advise all personnel to evacuate by radio or other communication avenues
   - Designate a pair of individuals to physically check all accessible areas of the Facility prior to evacuation
   - Take a head count at the meeting place
   - Notify emergency personnel of anyone that may not have made it out

7. The IC will prepare an Incident Report as identified in this plan.

3.6.1.6 A-6 POTENTIAL CONTINGENCY – LEACHATE REQUIRING TREATMENT PRIOR TO DISCHARGE TO WASTEWATER TREATMENT PLANT (WWTP) (FIRST OCCURRENCE

Potential Source - The leachate is generated in the containment cells. Although the leachate is anticipated to be of good quality, possible incidents could include instances where leachate may require pretreatment.

Potential Scope and Extent - The leachate is the result of the infiltration of precipitation into the waste contained in the cell. Because of the waste types accepted, the leachate is anticipated to be of a good quality. Leachate is collected and sampled and tested from each cell and pumped to a lift station where a composite sample is collected and tested. Each WWTP establishes standards for the quality of wastewater it will accept. Leachate will require pretreatment if it exceeds the WWTP standards. This pretreatment will be needed until the leachate returns to a quality that meets the WWTP standards.

Actions to be Taken - If leachate is determined to require treatment before discharge to the WWTP, the following actions will be taken:

1. Following a determination that leachate quality exceeds discharge standards at the point of release to the treatment plant, which is also the testing point, the IC and facility manager will be notified.

2. The IC will not authorize any discharge of leachate from the Facility.

3. The leachate in question will be retested to verify original leachate test results.

4. If, following the retest, the leachate quality proves to be within standards, the IC will take actions to attempt to determine the reason for the test discrepancy between samples.

5. The leachate discharge will resume as normal.

6. If the retest verifies that the leachate quality at the point of release to the treatment plant does exceed discharge standards, the IC will take action to determine the specific constituents that are in excess of discharge standards.

7. The IC will develop a plan for management of the leachate. Alternatives for managing the leachate could include pretreatment at the SKB facility or transporting the leachate to a WWTP capable of treating the leachate.

8. If transporting to an alternative WWTP is determined to be the appropriate action, the IC will contact the appropriate hauler for leachate transporting services.

9. If pretreatment is determined to be the appropriate alternative, in-tank treatment or another treatment unit capable of addressing the problem constituents will be employed.

10. The leachate will be pretreated and regulated before discharge.

11. The IC will submit an Incident Report to the agencies for the initial occurrence of this incident. The Incident Report will serve as notice to the agencies that the leachate is requiring pretreatment. No further Incident Reports will be filed with the agencies after the initial report. The IC will, however, prepare a report for the Operating Record if this incident reoccurs.

3.6.1.7 A-7 POTENTIAL CONTINGENCY - LEACHATE QUANTITIES EXCEEDING STORAGE CAPABILITIES OF TANKS

Potential Source - Under certain conditions the quantity of leachate collected may exceed the available storage space of the leachate storage tanks.

Potential Scope and Extent - Extreme precipitation events, beyond the design of the leachate storage system, are not likely to occur during the life of the Facility. The leachate storage tanks at the Facility are capable of storing the amount of leachate from a major storm such as the 100-year, 24-hour event. Storage of leachate from storms of larger intensity could exceed the available leachate storage capacity at the Facility. The scope and extent of this incident (leachate generation and collection rate exceeding the storage capacity) is dependent on a number of factors including amount of waste in the cell, available capacity in the tanks at the time of the event, discharge rates to the WWTP, and previous precipitation events.

The actions to be taken to address this incident likewise provide much flexibility to manage leachate volumes when they exceed the available capacity of the storage tanks.

This contingency action would be implemented until the storage tanks were sufficiently drawn down to a point where sufficient excess tank capacity was maintained. The amount of drawdown at the accelerated rate would be determined by the IC or Facility Manager and would be a function of volume of waste in the cell and recent and anticipated precipitation events.

Actions to be Taken - If leachate collection exceeds the capacity of the storage tanks, the following action would be taken:

1. The IC and/or facility manager will be made aware of the potential for leachate quantities in excess of the leachate tank's storage capacity.

2. The IC will prepare a report which identifies the cause of the incident, the current excess capacity of the tank storage, the anticipated volume of leachate requiring accelerated discharge and the period of time this accelerated discharge will take place. Additionally, the IC may use tanker trucks to dispose of leachate at an approved off-site disposal facility.

3. If it is decided that the leachate will be disposed of at the WWTP, the IC will place a request to the Metropolitan Council Environmental Services (MCES) and the Rosemount WWTP to discharge leachate at a rate exceeding the permitted discharge rate. If the MCES allows discharge at an increased rate, the Facility will discharge to the Rosemount WWTP the excess leachate at the rate established by the MCES.

4. The IC may also choose to transport the leachate off-site to an alternative wastewater treatment plant in St. Paul, Minnesota, or similar approved disposal facility. The IC will contact the trucking contractor to begin transporting leachate by tank trailer to a WWTP. It may be necessary, under extreme circumstances, to use the cell(s) as a temporary storage place. The leachate will remain in the cell until necessary, provided there is at least one foot of freeboard.

5. The IC will prepare an Incident Report as identified in this plan.

Implementation of this contingency action should not cause major disruption to or shutdown of Facility operations. The primary impact will be an increase in truck traffic if tank trucks are used to transport leachate and possible difficulties in gaining access to the containment cell due to the rain.

3.6.1.8 A-8 POTENTIAL CONTINGENCY – UNUSUAL AMOUNTS OF LEACHATE IN THE SECONDARY LEACHATE COLLECTION SYSTEM

Potential Source - Leaks in the primary liner system.

Potential Scope and Extent - The primary liner and leachate collection system could fail. The leachate that passes through the primary liner will be collected by the secondary liner system. Such a failure would likely occur only in one part of the cell allowing the primary liner to continue to function in other areas.

Actions to be Taken - If leachate volumes in the secondary leachate collection system of a given cell reach 40 gallons per acre per day (rate may be revised as the operational history of each cell is established), the following actions will be taken:

1. The IC will be made aware of the increased quantities of leachate detected in the secondary liner system.
2. The leachate will be withdrawn from the primary collection systems on a continuous basis during working hours until dry.
3. The liner will be inspected for punctures where possible.
4. The IC will prepare an Incident Report as identified in this plan.

3.6.1.9 A-9 POTENTIAL CONTINGENCY - PUNCTURE OF THE LINER SYSTEM

Potential Source - This contingency is to cover the event of damage to the liner system. This could be the result of contact by heavy equipment or puncture by an object being placed in the cell. The contingency would only be implemented when circumstances, including those described in Potential Contingency A-9, indicate the cell protective liner system has failed.

Potential Scope and Extent - To occur, this event would require one or more of the liner systems to be compromised. Damage to the liner maybe witnessed by Facility personnel or maybe discovered during routine inspections. Implementation of contingency A-9 may also indicate liner damage. Such a failure would be limited to a small area of the cell allowing the primary liner to function in other areas of the cell. This event would most likely take place in an active cell around the working face.

Actions to be Taken - The actions to be taken under this contingency are as follows:

1. The IC will be notified by the person discovering the damage (contingency A-9 may already be implemented).
2. The damaged area of the liner will be sealed with a temporary patch, if possible, to prevent further damage to the liner and prevent leachate from passing through the liner.
3. The IC will obtain a liner contractor to permanently repair the liner.
4. The IC will prepare an Incident Report as identified in this plan.

Implementation of this contingency action should not cause major disruption to or shutdown of Facility operations. The primary impact will be possible difficulties in gaining access to the containment cell due to the repair activities.

3.6.1.10 A-10 POTENTIAL CONTINGENCY – RELEASE OF CONTAMINANTS DETECTED IN GROUNDWATER MONITORING WELLS IN CELL BERMS

Potential Source - This contingency is to cover the event of leakage through all three liner systems of a cell. The contingency would only be implemented when circumstances, including those described in Potential Contingency A-9, indicate the cell protective liner system has failed.

Actions to be Taken - The actions to be taken under this contingency are as follows:

1. Prior to any notification to the IC the laboratory will re-evaluate their QA/QC procedures to assure that laboratory problems have not created a false positive reading that a contaminant had been detected. If it is determined that a false positive reading was detected, no further action will be taken.
2. The IC will be notified that increased contamination levels have been detected in the cell berm monitoring well(s).

3. If the IC determines that there is reason to believe that contaminants have been released from the cell that might enter the ground water, the IC will notify the MPCA, Dakota County and the city of Rosemount. The notification will suggest whether resampling is advised before the next regular sampling event.

4. If the analysis of the second round of groundwater samples, if undertaken, indicates that a release did not occur or verifies that contamination exists but is below intervention limits, the IC will notify the MPCA, Dakota County and the city of Rosemount. SKB will subsequently hold discussions with the MPCA, Dakota County and the city of Rosemount concerning any necessary course(s) of action.

5. If the analysis of the second round of groundwater samples, if undertaken, verifies that a contamination exists and is above the intervention limits, the Facility will take actions to determine the source and extent of the contamination. A report will be prepared assessing alternative actions to manage the contamination and prevent reoccurrence in the future. The report will be submitted to the MPCA, Dakota County and the city of Rosemount with a recommendation as to specific actions to be taken.

6. Following implementation of the action(s), the IC will prepare an Incident Report as identified in this plan.

3.6.1.11 A-11 POTENTIAL CONTINGENCY – GROUNDWATER CONTAMINATION IN EXCESS OF MPCA INTERVENTION LIMITS

Potential Source - There are two possible sources of contamination that could lead to groundwater quality that does not meet the requirements established by the MPCA intervention limits. One source is the release of contaminated leachate through the cell liner(s) or the leachate storage tank(s). The other source is contaminants from off-site migrating into the property (e.g., the U of MN plume). Any contamination migrating into the property from off-site should be detected in the upgradient monitoring wells. This source of contamination is not considered in this contingency item. Furthermore, there is a potential for contamination to originate from the "buffer area" around the Facility (including the rail siding and buildings). This potential, however, is considered very remote because waste will not remain in these areas. Therefore, this source is not considered in this contingency item.

Potential Scope and Extent – The Facility believes that if a release of leachate occurs, it is unlikely that the groundwater contamination will exceed MPCA intervention limits due to the leachate being of relatively good quality and the release's likely low quantity. This potential contingency response is prepared under the opposite assumption, that there would be a large release of contaminated leachate. This contingency assumes that all three liners have been breached, corrective action in the cell did not previously occur or occurred but did not remedy the situation, and leachate quality is much poorer than anticipated.

The generation of leachate in the cell is a function of precipitation. Therefore the amount of leachate generated will vary seasonally as will the amount of leachate that could be in a release. It is unlikely that this event would occur without prior indications of liner failure.

The second source, leakage from the storage tank(s), presumes failure of both the primary storage tank and the secondary spill containment boundary around the tanks. It also presumes that leachate is contaminated and that the spill is not noticed and is allowed to infiltrate the soil.
This contingency is unlikely to have occurred without other contingencies having been previously initiated. For example, the IC or designee most likely would have initiated the corrective actions identified in Potential Contingency A-11 in this section.

Actions to be Taken - The steps for this contingency action are as follows:

1. Prior to any notification to the IC or the regulatory agencies, the laboratory will re-evaluate their QA/QC procedures to ensure that laboratory problems have not created a false positive reading that a contaminant had been detected. If it is determined that a false positive reading was detected, no further action will be taken.
2. The IC would be notified that the groundwater quality is beyond MPCA intervention limits.
3. As required, the IC will send a letter to the MPCA, Dakota County and the city of Rosemount notifying them of the possible exceedance of the intervention limits and how the verification program will proceed.
4. The IC will implement the verification program. The well(s) in question should normally be resampled within one week of receiving the results from the laboratory.

5. If the test results reported in step 2 above were found to be in error, then the Facility would return to the previous monitoring schedule, notify the MPCA, Dakota County and the city of Rosemount of the error and prepare a report for the Operating Records.

6. If the test results were accurate and verified that groundwater intervention limits were exceeded at the downgradient well(s), the IC would evaluate the groundwater results to determine whether the source of the contamination was from on-or off-site.

7. If it was determined that the contamination was from off-site, the IC would notify the MPCA, Dakota County and the city of Rosemount. The IC would request that the intervention limits for that particular constituent be changed to reflect the new background values. The Facility would return to the previous monitoring schedule and also prepare a report for the Operating Records.

8. If it was determined that the contamination was from on-site, the IC would send a letter, with supporting documentation, to the MPCA, Dakota County and the city of Rosemount.

9. Appropriate contingency actions would begin. This may include, but is not limited to, data gathering, soil and water analysis and more frequent monitoring of the downgradient well(s).

10. Evaluation undertaken by The Facility indicates that this contingency could be remedied by the installation of recovery well(s) downgradient to the cell. If this circumstance should arise, the specific contingency action would be coordinated with the representatives of the MPCA, Dakota County and the city of Rosemount. The contingency action may be different than described in this section because of circumstances at that time. The following actions could be implemented, if appropriate:

    a. Facility personnel or advisors will begin efforts to update the capture-well analysis. The study will be designed to determine where the recovery well(s), if required, should be located and at what rate they should be pumped.

    b. Upon initiating step (a), the IC can begin an investigation as to the source or cause of the contamination.

    c. The results from the capture-well analysis developed in step (a) above will be presented to the regulatory agencies.

d. The results from the capture-well analysis will be implemented upon approval by the regulatory agencies. The IC will take the actions necessary to install recovery well(s), if necessary

e. Based on the current capture-well analysis for the Facility and leachate quality data from the industrial waste cells, it is considered unlikely that ground water removed through the recovery wells will need to be treated. If it is necessary to treat the ground water, either on-site treatment or treatment at an off-site wastewater treatment plant will be undertaken. If on-site treatment is done, or the water requires no treatment, the water may be discharged to a wastewater treatment plant, discharged under a NPDES permit, or utilized on-site.

f. As necessary, the IC will re-evaluate the situation to ensure that the recovery well(s) are capturing the entire plume. If it is determined the system is ineffective, the IC will return to step (a) (updating the capture-well analysis) and/or gather additional information. If it is determined that the recovery well(s) are capturing the entire plume, the well(s) will continue to be pumped until the contaminants are below the intervention limits. At this point an Incident Report will be filed. Status reports may also need to be filed with the MPCA, Dakota County and the city of Rosemount throughout the project.

3.6.1.12 A-12 POTENTIAL CONTINGENCY – LEACHATE STORAGE TANK LEAKS

Potential Source - Leaks and spills could potentially occur from ancillary equipment associated with the leachate storage tanks including piping and pumps. The leaked material would consist of leachate collected from the containment cells.

Potential Scope and Extent - The storage tanks are constructed within secondary containment structures. Possible failures involve leaking of one of the tanks, primarily through ancillary equipment, into the secondary containment structure or leaks occurring in leachate transfer piping from one tank to another. If this incident should occur, the primary objective would be to remove the leachate from the secondary structure and faulty tank, transfer it to another tank and repair the faulty tank or equipment. If the volume of the leachate that needs to be collected and/or transferred exceeds the capacity of the remaining storage tanks, other elements of this Contingency Action Plan would be implemented (Operational Contingency A 8).

<u>Actions to be Taken</u> - If tank or ancillary equipment leakage should occur, the following actions would be taken:

1. The first person to discover a leak will, if qualified, take actions to stop leachate flow to that tank by turning off valves or stopping pumps, etc. If that person is not qualified, the first action will be to inform a qualified person.
2. The administrative office or IC will be notified, as available. The caller/reporter will provide the following information, where known:
   - Name of caller/reporter
   - Location of the leak
   - Description of the leak (material, volume, severity, etc.)
3. Leachate in the faulty leachate storage tank will, if necessary, be transferred to another tank to the extent necessary to minimize further leakage into the secondary containment structure. Alternatively the leachate will be discharged to the WWTP or transported by truck to the metropolitan plant.
4. If discharge to the WWTP is determined to be appropriate and necessary by the IC and the discharge is estimated to be within the permitted discharge volumes, the leachate will be discharged consistent with normal operating procedures.
5. If discharge to the WWTP is determined to be appropriate and necessary by the IC but is estimated to exceed discharge volumes, the IC will contact the MCES and local WWTP requesting permission to discharge the estimated volume.
6. If permission is denied or if the IC determines trucking to an alternative WWTP is the appropriate response, the IC will contact the off-site trucking contractor for transport of the leachate to the designated WWTP.
7. After the tank has been sufficiently emptied, the IC will coordinate repairs to the faulty tank or equipment.
8. If it has been determined that the leak has gone outside of the designated waste management unit, Potential Contingency A-4 will be implemented.
9. Once the faulty tank or equipment is repaired, the tanks can be placed back into service.
10. The IC will prepare a report for the Operating Record as identified in this plan.

The release of leachate from a leachate storage tank or ancillary equipment will not likely disrupt routine operations. Because of the redundancy in storage tanks and the ability to withdraw leachate on a schedule, repairs to these components could be made without disrupting operations.

3.7 POST-CLOSURE CONTINGENCY ACTION PLAN

3.7.1 INTRODUCTION

This Post-Closure Contingency Action Plan has been prepared using the following regulatory agency rules and guidelines:

- Minnesota Rules: Chapters 7001; 7035; as amended November 21, 1988
- Dakota County Solid Waste Management Ordinance 110
- City of Rosemount Zoning Ordinance

The Post-Closure Contingency Action Plan addresses potential incidents that could occur during the post-closure period. The list of contingencies covered by this Post-Closure Contingency Action Plan were developed through discussions with the MPCA, Dakota County, and the city of Rosemount and is also based on the Operational Contingency Action Plan. The fact that a contingency is included does not mean that it is likely to occur. Rather, there is a potential, sometimes a very small potential, for it to occur. This plan identifies potential contingencies that could occur during the post-closure period.

The general contingency response guidelines and incident reporting procedures for post-closure contingencies are the same for the operational contingencies (see Section 2 of this report). During the post-closure period the Facility contact person will function in the same capacity as the IC's did during the operational phase of the Facility. The coordination arrangements with public service providers and equipment contractors, developed at the beginning of facility operations, will remain intact throughout the post-closure period.

3.7.2 POST-CLOSURE CONTINGENCY ACTION ITEMS

The following is a list of items that are considered credible post-closure events:

- PC-1 Leachate Requiring Treatment Prior to Discharge to the Publicly Owned Treatment Works

- PC-2 Unusual Amounts of Leachate in the Primary or Secondary Leachate Collection System
- PC-3 Release of Contaminants Detected in Groundwater Monitoring Wells
- PC-4 Groundwater Contamination in Excess of MPCA Intervention Limits
- PC-5 Erosion of Final Cover
- PC-6 Differential Settlement of Cell Caps
- PC-7 Leachate Spills or Leakage Outside of the Designated Waste Management Unit

3.7.2.1 PC-1 POTENTIAL POST-CLOSURE CONTINGENCY – LEACHATE REQUIRING TREATMENT PRIOR TO DISCHARGE TO WWTP

Potential Source - Leachate will be collected from the containment cells during the post-closure period. Although the leachate is anticipated to be of good quality, credible incidents can include instances where leachate may require pretreatment.

Potential Scope and Extent - Limited amounts of leachate will be generated due to the design of the cover system. The cover system is designed to retard infiltration of precipitation thereby limiting the amount of leachate generated. Precipitation falling on the cell prior to cover construction will be collected by the leachate system after closure. The leachate will be tested and if it is found to be beyond WWTP standards, will be pretreated.

Actions to be Taken - The actions to be taken under this contingency are as follows:

1. Following the determination that the leachate quality exceeds discharge standards at the point of release to the treatment plant, which is also the testing point, the Facility contact person will be notified.
2. The Facility contact person or designee will not authorize any further discharge to the WWTP.
3. The leachate in question will be retested to verify the original leachate test results.
4. If, following the retest, the leachate quality proves to be within the WWTP standards, the Facility contact person or designee will take actions to attempt to determine the reason for the discrepancy between samples.

5. Leachate discharge will resume as normal.
6. If the resample verifies the leachate quality does exceed discharge standards, the Facility contact person or designee will take action to determine the specific constituents that are in excess of discharge standards.
7. The Facility contact person will develop a plan for management of the leachate. Alternatives for managing the leachate could include pretreatment at SKB or transportation of the leachate to a WWTP capable of treating the leachate.
8. If transporting to an alternative WWTP is determined to be appropriate action, the Facility contact person or designee will contact the appropriate hauler for leachate transporting services.
9. If pretreatment is determined to be the appropriate alternative, in-tank treatment or another treatment unit capable of addressing the problem constituents will be employed.
10. The leachate will be pretreated and retested prior to discharge.
11. The Facility contact person or designee will prepare an Incident Report as identified in this plan and submit it to the agencies for the initial occurrence of this incident during the post-closure period. The Incident Report will serve as notice to the agencies that the leachate is requiring pretreatment. No further Incident Reports will be filed with the agencies after the initial report. The Facility contact person will, however, prepare a report for the Facility records if this incident reoccurs.

3.7.2.2 PC-2 POTENTIAL POST-CLOSURE CONTINGENCY – UNUSUAL AMOUNTS OF LEACHATE IN THE PRIMARY OR SECONDARY LEACHATE COLLECTION SYSTEM

Potential Source - Leachate will be collected from the containment cells during the post-closure period. Although the leachate is anticipated to be of good quality, credible incidents can include instances where leachate may require pretreatment.

Potential Scope and Extent - Leachate generation will be minimized due to the design of the final cover system. The final cover system is designed to eliminate or retard infiltration of precipitation, thereby limiting the amount of leachate generated. Precipitation falling on the cell prior to cover construction will be collected by the leachate system after closure. The leachate will be tested and if it is found to be beyond WWTP standards, will be pretreated.

<u>Actions to be Taken</u> - The actions to be taken under this contingency are as follows:

1. If the leachate quality exceeds discharge standards at the point of release to the treatment plant, which is also the testing point, the Facility contact person will be notified.
2. If the leachate is in need of pretreatment, the Facility contact person or designee will not authorize any further discharge to the WWTP. If the leachate does not require pretreatment, the Facility Manager will authorize discharge of the leachate.
3. If the leachate is in question, retest to verify the original leachate test results.
4. If, following the retest, the leachate quality proves to be within the WWTP standards, the Facility contact person or designee will take actions to attempt to determine the reason for the discrepancy between samples.
5. Leachate discharge will resume as normal.
6. If the resample verifies the leachate quality does exceed discharge standards, the Facility contact person or designee will take action to determine the specific constituents that are in excess of discharge standards.
7. The Facility contact person will develop a plan for management of the leachate. Alternatives for managing the leachate could include pretreatment at SKB or transportation of the leachate to a WWTP capable of treating the leachate.
8. If leachate transport to an alternative WWTP is determined to be the appropriate action, the Facility contact person or designee will contact the appropriate hauler for leachate transporting services.
9. If pretreatment is determined to be the appropriate alternative, in-tank treatment or another treatment unit capable of addressing the problem constituents will be employed.
10. The leachate will be pretreated and retested prior to discharge.
11. The Facility contact person or designee will prepare an Incident Report as identified in this plan and submit it to the agencies for the initial occurrence of this incident during the post-closure period. The Incident Report will serve as notice to the agencies that the leachate is requiring pretreatment. No further Incident Reports will be filed with the agencies after the initial report. The Facility contact person will, however, prepare a report for the Facility records if

this incident reoccurs.

3.7.2.3 PC-3 POTENTIAL POST-CLOSURE CONTINGENCY – RELEASE OF CONTAMINANTS DETECTED IN GROUNDWATER MONITORING WELLS

Potential Sources - This contingency is to cover the event of leakage through all three liner systems of a cell. The contingency would only be implemented when circumstances, including those described in Potential Contingency A-2, indicate the cell protective liner system has failed.

Potential Scope and Extent - To occur this event would require leakage through the liner. Liner types vary at Landfill. To occur, this event would require leakage through the three liners in the industrial or combustor ash cells: the primary 80-mil HDPE liner, the secondary 60-mil HDPE liner and the underlying (2 foot for Industrial and 3-foot for Ash) clay liner (bottom) and/or GCL. Liner within the C&D cell would require leakage through the geomembrane. The cell monitoring well would detect the release from the cells.

Actions to be Taken - The actions to be taken under this contingency are as follows:

1. Prior to any notification, the laboratory will re-evaluate their QA/QC procedures to assure that a laboratory problem has not created a false positive reading that a contaminant had been detected. If it is determined that a false positive reading was detected, no further action will be taken.
2. The Facility contact person will be notified that increased contamination levels have been detected in the monitoring well(s).
3. If the Facility contact person determines that there is a reason to believe that contaminants have been released from the cell that might enter the ground water, the Facility contact person will notify the MPCA, Dakota County, and the city of Rosemount. Resampling may be advised before the next regularly scheduled sampling event and will be determined through discussions with regulators
4. If the resampling, if undertaken, indicates a release did not occur or verifies that a release has occurred but intervention limits have not been exceeded, the Facility contact person will notify the MPCA, Dakota County, and the city of Rosemount. The Facility will subsequently hold discussions with the MPCA,

Dakota County, and the city of Rosemount concerning any necessary course(s) of action.

5. If the analysis of the second round of groundwater samples verifies that a release occurred and is above the intervention limits, The Facility will take actions to determine the source and extent of the release. A report will be prepared assessing alternative actions to manage the detected release and prevent reoccurrence in the future. The report will be submitted to the MPCA, Dakota County, and the city of Rosemount with a recommendation as to specific actions to be taken.

6. Following implementation of the corrective action, the Facility contact person or designee will prepare an Incident Report as identified in this plan.

3.7.2.4 PC-4 POTENTIAL POST-CLOSURE CONTINGENCY – GROUNDWATER CONTAMINATION IN EXCESS OF MPCA INTERVENTION LIMITS

Potential Source - There are two possible sources of contamination that could lead to groundwater quality that does not meet the requirements established by the MPCA intervention limits. One source is the release of contaminated leachate through the cell liners or the leachate storage tank(s). The other source is contaminants from off-site migrating into the property. Any contamination migrating into the property from off-site should be detected in the upgradient monitoring wells and this source of contamination is not considered in this contingency item.

Potential Scope and Extent - The Facility believes that if a release of leachate occurs, it is unlikely that the groundwater contamination will exceed MPCA intervention limits due to the leachate quality and the small volume that would be released. This contingency response is prepared under the opposite assumption, that there would be a large release of contaminated leachate.

This contingency assumes that all three liners have been breached, corrective action in the cell did not previously occur or occurred but did not remedy the situation, and leachate quality is much poorer than anticipated. The generation of leachate in the cell is a function of precipitation. Therefore the amount of leachate generated will vary seasonally as will the amount of leachate that could be released.

The second source, leakage from the storage tanks, presumes failure of both the primary storage tank and the secondary containment system around the tanks. It also presumes that leachate is contaminated and that the spill is not noticed and is allowed to infiltrate the soil.

This contingency is unlikely to occur without other contingencies being previously initiated. For example the Facility contact person or designee most likely would have initiated the Actions to be Taken identified in Potential Post-Closure Contingency PC-3.

<u>**Actions to be Taken**</u> - The steps for this contingency are as follows:

1. Prior to any notification, the laboratory will re-evaluate their QA/QC procedures to assure that a laboratory problem has not created a false positive reading that a contaminant had been detected. If it is determined that a false positive reading was detected, no further action will be taken.

2. The Facility contact person will be notified that the groundwater quality is beyond MPCA intervention limits.

3. As required, the Facility contact person or designee will send a letter to the MPCA, Dakota County, and the city of Rosemount notifying them of the possible exceedence of the intervention limits and how the verification program will proceed.

4. The Facility contact person or designee will implement the verification program. The well(s) in question should normally be resampled within one week of receiving the results from the laboratory.

5. If the resample shows that the initial results to be in error then The Facility would return to the previous monitoring schedule, notify the MPCA, Dakota County, and the City of Rosemount of the error and submit a report to the SKB files.

6. If the results were accurate and verified that the intervention limits were exceeded at the downgradient well(s), the Facility contact person would take action to determine whether the source of contamination was from on- or off-site.

7. If it was determined that the contamination was from off-site, the Facility contact person or designee would notify the MPCA, Dakota County, and the city of

Rosemount. The Facility contact person or designee would request that the intervention limits for that particular constituent be changed to reflect the new background values.

The Facility would return to the previous monitoring schedule and also submit a report to the SKB files.

8. If it was determined that the contamination was from on-site, the Facility contact person would send a letter, with supporting documentation, to the MPCA, Dakota County and the city of Rosemount.

9. Appropriate contingency actions would begin. These may include, but are not limited to, data gathering, soil and water analysis and more frequent monitoring of the downgradient well(s) based on MPCA recommendations.

   An evaluation indicates that this contingency could be remedied by the installation of recovery wells downgradient to the cells. If this circumstance should arise, the specific contingency action would be coordinated with representatives of the MPCA, Dakota County, and the city of Rosemount. The contingency action may be different than described in this section because of the circumstances at that time. The following actions could be implemented, if appropriate:

   a. Facility personnel or advisors will begin efforts to develop a capture-well analysis. The study will be designed to determine where the recovery well(s) should be located and at what rate they should be pumped.

   b. Upon initiating step (a), the Facility contact person or designee could begin an investigation as to the source or cause of the contamination.

   c. The results from the capture-well analysis developed in step (a) above will be presented to the regulatory agencies.

   d. The results from the capture-well analysis will be implemented upon approval by the MPCA. The Facility contact person or designee will take the actions necessary to install recovery well(s), if necessary.

   e. Based on the current capture-well analysis for the Facility, it is considered unlikely that ground water removed through the recovery wells will need to be treated. If it is necessary to treat the groundwater, either on-site treatment or treatment at an off-site wastewater treatment plant will be undertaken. If on-site treatment is performed or the water requires no treatment, the water may be discharged to a wastewater treatment plant, discharged under a NPDES permit, or utilized on-site.

f. As necessary, the Facility contact person or designee will re-evaluate the situation to ensure that the recovery well(s) are capturing the entire plume. If it is determined that the system is ineffective, the Facility contact person or designee will return to step (a) (updating the capture well analysis) and/or gather additional data. If it is determined that the recovery wells are capturing the entire plume, the wells will continue to be pumped until the contaminants are below the intervention limits. At this point an Incident Report will be filed. Status reports may also need to be filed with the MPCA throughout the project.

3.7.2.5 PC-5 POTENTIAL POST-CLOSURE CONTINGENCY – EROSION OF FINAL COVER

Potential Source - There are several factors that could indicate erosion of the soils on the final cell cover such as lack of vegetation, unusual storms and unexpected settlement.

Potential Scope and Extent - The erosion could occur over all or a portion of the final cell cover. The topsoil may erode if the vegetation cannot sustain itself. This could be due to a variety of factors including insufficient moisture, under nourished soils or slope. Furthermore, erosion may occur if there is a large storm of short duration that undermines the stability of the soils on the cover. And finally, the cover could erode due to differential settlement of waste within the cell. If the slope within the eroded area deviates outside of the 2 to 25 percent range, corrective measures will be taken.

Actions to be Taken - The actions to be taken under this contingency are as follows:

1. The Facility contact person or designee will be notified of the erosion.
2. The Facility contact person or designee will determine the extent of the erosion and initiate corrective actions. The Facility contact person will also take actions to assess the damage done to the barrier layer and drainage system, if any. This should be completed within one week of discovering the eroded area.
3. The Facility contact person or designee will determine what interim measures are necessary to minimize further erosion.

4. The management of the area in question will be altered such that erosion from a similar cause will not occur in the future provided that the cause was not beyond the design of the Facility. If the erosion was due to any event beyond the design of the Facility, the management of the area will remain the same because it is unlikely that a similar event would occur again.
5. The eroded area would be filled and graded with cell cover construction materials to the pre-erosion levels. The cell cover construction material will most likely originate from the site itself and have similar characteristics to the material initially emplaced. Earth moving equipment and a survey crew will be necessary to return the area to the proper grade. The area will also be reseeded and mulched. The corrective action will be completed as weather conditions permit.
6. An Incident Report will be completed as identified in this plan.

3.7.2.6 PC-6 POTENTIAL POST-CLOSURE CONTINGENCY – DIFFERENTIAL SETTLEMENT

Potential Source - Differential settlement of the cell cap could occur if waste contained in the cells did not completely subside by the time the final cover had been installed.

Potential Scope and Extent - The differential settlement will likely involve only a portion of the cell. The slope of the cap cannot be greater than 25 percent or less than 2 percent. Deviation from this design would cause corrective measures to be implemented.

Actions to be Taken - The steps in this contingency are as follows:

1. The Facility contact person will be notified that the slope of the cap has deviated out of the allowable 2 to 25 percent range.

2. The Facility contact person or designee will attempt to determine the cause of the differential settlement.

3. The Facility contact person or designee will implement actions to repair the differential settlement. Depending on the severity of the settlement, corrective actions may range from localized regrading and reseeding to the complete construction of an additional cap system.

Under the most severe differential settlement incidents, repair may be delayed during which time the settlement will be observed to allow for further and complete settlement of the containment cell cap. Following this period, corrective actions will be implemented to return the cap system to the original design standards.

4. The Facility contact person or designee will prepare an Incident Report as identified in this plan.

3.7.2.7 PC-7 POTENTIAL POST-CLOSURE CONTINGENCY – LEACHATE SPILLS OR LEAKS OUTSIDE OF DESIGNATED WASTE MANAGEMENT UNIT

Potential Source - Spills or leakage could potentially occur from any leachate container.

Potential Scope and Extent - The scope and extent of any spill or leakage will be limited to the volume of the transfer truck (approximately 2000 gallons).

Actions to be Taken - This contingency action would be implemented for any spill or leakage of leachate if the spill or leak occurs outside of the designated waste management unit (cells or leachate storage tanks). The following actions would be taken:

1. For spills of leachate, the person or persons on the scene will, if possible and appropriate, take immediate steps to contain the leachate. Efforts may include righting a tipped truck, plugging a valve, spreading an absorption material on the leachate or sweeping or vacuuming the leaked material.

2. The person or persons on the scene will notify the Facility contact person or designee. The following information will be supplied, where known:

   - Name of caller/incident reporter
   - Location of the incident
   - Description of the spill (type of material, volume, initial steps to contain)
   - The caller/reporter will advise the administrative office and/or contact person, as available, of the need for off-site equipment

3. The contact person will then proceed to the scene and inspect the containment and cleanup actions and coordinate further cleanup activities.

4. The contact person will contact appropriate off-site contractors to address the spill. Examples of off-site equipment which may be necessary includes; tow trucks to right overturned vehicles, vacuum trucks, or waste transfer equipment.

5. Following the containment and cleanup, the contact person will take immediate steps, if prudent, to avoid additional spills.

6. The contact person will prepare an Incident Report as identified in this plan for any reportable spill or leakage of materials outside of the designated waste management unit as defined by CERCLA (40 CFR, Part 302).

7. Notify Duty Officer.

It is unlikely that a container spill or leak resulting from a vehicle accident, faulty or tipped container would have a significant impact on the Facility.

3.8 FINANCIAL ASSURANCE PLAN

3.8.1 INTRODUCTION

This section contains cost estimates for cell and Facility closure, post-closure care, and corrective action costs during the operational and post-closure periods. As required by MPCA regulations (Minn. Rule 7035.2685 Subp. 2), these estimates will be reviewed annually to determine if adjustments need to be made in the amount of financial assurance provided.

The cell and facility closure items, post-closure care items and corrective action items for The Facility have been reviewed in the past by the MPCA, county and city representatives. These cost estimates are based on previous experience; however, they have been updated to reflect the current operating conditions. A number of the originally outlined corrective action items do not represent any additional cost to the Facility. An explanation of why there is no additional cost is presented in that section.

The corrective action items covered include events that are specifically identified in the Financial Assurance Rule (Minn. Rule 7035.2685 Subp. 3) as well as other events that are likely to occur.

A summary of the cost estimates are presented in Table 1a. The table indicates the financial assurance needed as per the Minnesota Solid Waste Rules.

The remainder of this section includes cost estimate explanations for Cell and Facility Closure, The Post-Closure Care Plan, and The Corrective Action items as identified in the Corrective Action Plan. Each item covered in these plans that has costs associated with it has cost estimate tables within Tables 1-3. In addition, as requested by the MPCA, a Present Value Cost for the closure cost estimate has been determined as outlined in the Financial Assurance Rule (Minn Rule 7035.2865 Subp. 1).

3.8.1.1 BONDS

SKB Environmental, Inc. has a performance bond that relates to the permitting and licensing of the Facility. This bond with Dakota County is for a sum of $200,000.00. This bond is in addition to the financial assurance mechanism that SKB Environmental, Inc. has secured to fulfill the MPCA permit conditions.

3.8.1.2 STANDBY TRUST FUND AND SURETY BONDS

In accordance with Minn. R. 7035.2725, SKB has established a standby trust with surety bonds guaranteeing payment into the standby trust fund. The value of the bonds as of August 31, 2012, is provided in the MPCA cover letter in Appendix C.

3.8.2 CELL AND FACILITY CLOSURE COST ESTIMATES

The Facility closure cost estimates are based on current operations and recent cell construction costs at this site and other similar facilities. Costs are based recent SKB project costs and generally include a 2.5% contingency. Examples of SKB construction costs are provided in Appendix A. Copies of the MPCA spreadsheet Payment Rate Estimating Table and the Expected Value Calculation table are provided in Table 4. The phasing plans are found on CI-08 and CI-09 in the permit application drawings. The Permit Renewal Application shows the base grades, the final cover grades, and the resulting material volumes for closure construction. Since actual facility operations may be different, the assumed closure cost for the Facility is considered an estimate.

SKB will prepare new closure cost estimates whenever a change in the closure plan would affect the cost of closure. SKB will annually adjust the latest closure costs estimates by using the discount factor provided by the MPCA. This annual adjustment is done as part of the requirements for the Facility Annual Report as required by Minn. Rules.

A summary of closure costs is presented on Tables 1a-f. The costs include closure of all landfill cells proposed to be in operation, closure certification, and Facility closure.

3.8.3 POST-CLOSURE CARE COST ESTIMATES

The costs are based on recent SKB projects and 2011 and 2012 dollars. Recurring expenses will be incurred each year for routine inspections and groundwater monitoring. The expense of maintenance activities are expected to vary from year to year.

SKB will prepare new post-closure cost estimates whenever a change in the post-closure plan would affect the costs. The cost estimates will be adjusted annually for according to the annual reporting requirements of the permit.

A summary of post-closure costs is presented in Table 3. The estimated total 20-year current value from the MPCA spreadsheet is $50,302

3.8.3.1 PERIODIC GENERAL INSPECTIONS OR EVENT TRIGGERED INSPECTIONS

Overview

Inspections will include investigation of the leachate storage tanks, the groundwater monitoring system, the stormwater drainage system, the condition of the cell caps, the fence and security system, the buildings and any portable equipment still on-site.

Assumptions

Cost estimates assume that the inspector will spend one day at the site to conduct each routine inspection, including documentation time. Inspections will occur twice each year and whenever a rain event greater than a 3-inch, 24-hour event occurs. This event has the probability to occur once a year during a 20-year closure period.

See Table 3 for Post-Closure cost estimates associates with this item.

3.8.3.2 OPERATION OF LEACHATE COLLECTION SYSTEM AND LEACHATE STORAGE TANKS

Overview
Leachate collection sumps will be inspected on a regular basis. Leachate will be transferred to the leachate tank by-pass lift station or leachate storage tanks. Leachate will be sampled and released to treatment as necessary.

Assumptions
Although the frequency of inspections will be determined by operating experience of closed cells, it is assumed that monthly or 12 visits per year during post-closure will be sufficient to maintain proper leachate levels in the cells.

See Table 3 for post-closure cost estimate associated with this item.

3.8.3.3 MAINTENANCE OF LEACHATE COLLECTION SYSTEM

Overview
Pumps from sumps that are not producing any leachate will be periodically removed and inspected to ensure that they are still operating properly. This inspection will occur at least every five years for each pump.

Assumption
- The estimate assumes that each year one pump will need to be repaired or replaced.

See Table 3 for post-closure cost estimate associated with this item.

3.8.3.4 MAINTENANCE OF LEACHATE STORAGE TANKS

Overview

Tanks may be periodically repainted and the concrete containment area will be periodically resealed.

Assumptions

- Repainting the tank may occur once during the post-closure period.
- Secondary containment resealing will occur three times during the post-closure period.

3.8.3.5 OPERATION OF GROUNDWATER MONITORING SYSTEM

Overview

The schedule and frequency of groundwater monitoring during the post-closure care period will be determined at the beginning of the post-closure period. However, cost estimates have been developed for annual monitoring of the groundwater. As per the Environmental Monitoring Plan (See Drawings CI-01A and CI-01B) and Section 2 in the Engineering Report, it is assumed that for post-closure the current approved groundwater sampling plan will continue.

Assumptions

- Wells U-5S, U-4S, U-5D, U-4D, D-1S, D-2S, D-3S, D-4S, D-5S2, D-7 and D-8 will be sampled 3 times per year.
- Wells D-1D, D-2D, D-3D, D-4D and D-5D will be sampled annually during the summer; and.
- Wells D-6, D-1VD, D-2VD, U-8, U-1, U-7S, U-2S, U-6D, U-7D and U-2D, will be monitored four times per year for water levels only:

Metals
(T = Total, D = Dissolved)

Aluminum (T)	Copper (D)	Nickel (T)
Arsenic (D)	Iron (D)	Potassium (T)
Barium (T)	Lead (D)	Sodium (D)
Cadmium (D)	Magnesium (D)	Selenium (T)
Calcium (D)	Manganese (D)	Zinc (D)
Chromium (D)	Mercury (D)	

Indicator Parameters

Alkalinity as CaCO3	PH	Total Dissolved Solids
Ammonia as N	Specific Conductance	Total Suspended Solids
Chloride (D)	Sulfate (D)	Total Organic Carbon
Color	Temperature	Total Organic Halogen
Appearance	Total Phenols	

See Table 3 for post-closure cost estimate associated with this item.

3.8.3.6 MAINTENANCE OF GROUNDWATER MONITORING SYSTEM

Overview

It is expected that the groundwater monitoring system will require some yearly maintenance. Maintenance items may include annual pump inspection and lubrication, cleaning of all discharge pipes, replacement of pumps, pump motors, electrical equipment, locks on the wells and/or replacement of the pad around the well.

Assumptions

- It is anticipated that one pump out of the 18 dedicated monitoring well pumps will need to be replaced every year over the post-closure care period.
- This assumes all wells will be inspected and/or operated once each year.

See Table 3 for post-closure cost estimate associated with this item.

3.8.3.7 MAINTENANCE OF STORMWATER DRAINAGE SYSTEM AND RETENTION AREAS

Overview

During the post-closure period, stormwater retention facilities such as the ditches and retention areas will be cleaned out and repaired, as needed.

Assumptions

- Estimate assumes that on the average, one visit per year will be necessary to complete all of the stormwater management maintenance tasks.

- Estimate assumes that 20 percent of on-site ditches (1,400 ft. total) will require cleaning each visit.

See Table 3 for post-closure cost estimate associated with this item.

3.8.3.8 MAINTENANCE OF VEGETATION ON FINAL COVER

Overview

During the post-closure period, the Site will be mowed two times per year to encourage active vegetation.

Assumptions

- The estimates use typical assumptions for the amount of revegetation and erosion repair that will be required.
- It is assumed that weed control will be completed at the same time the mowing is completed.

See Table 3 for post-closure cost estimate associated with this item.

3.8.3.9 MAINTENANCE OF SITE ACCESS AND ELECTRICAL ITEMS

Overview

During post-closure, site access features including gates, signs, lights and other electrical items will be repaired and replaced as needed.

Assumption

It is assumed that the fence and fence posts (costs covers gates and signs) will be repaired two times per year. These estimates were made using conservative assumptions of the frequency and quantity of repairs that will be necessary. It is assumed that electrical items, such as control panels and lights, will need maintenance with two visits per year.

See Table 3 for post-closure cost estimate associated with this item.

3.8.4 CORRECTIVE ACTION PLAN COST ESTIMATES

The Corrective Action Plan cost estimates have been reviewed and updated to be acceptable for 2013 dollars. The cost estimates for specific corrective action items are based on engineering experience and knowledge gained from implementing similar corrective action plans for other waste management facilities.

Because these corrective action items are required in part by the Minnesota Rule 7035.2685, Subpart 8 and speculative potential events which may occur at some future point, assumptions must be made concerning the severity of the incident. Many variables affect the degree of severity of the incident such as the real extent of the incident, its volume, location, duration, and contaminant levels. These variables are reflected in the cost estimates as appropriate assumptions associated with the various corrective actions.

Adjustments will be prepared to these cost estimates whenever one of the following factors exists: the industrial solid waste permit is reissued by the MPCA; an incident occurs for which no appropriate response was identified; or the Facility design, construction, or operations change, such that amendments to the plan are required. In addition, during the operating life and post-closure care period of the Facility, the cost estimates will be adjusted annually for inflation or for adjustments for risk increases or decreases. The adjustment will be done as part of the annual reporting requirements.

The cost estimates will be adjusted for inflation using an inflation factor provided by the MPCA or amended requirements of the MPCA.

The following corrective action items are addressed in these cost estimates:

1. Vandalism
2. Fire (Surface or Subsurface)
3. Explosions
4. Failure or Collapse of Artificial or Man-Made Dikes
5. Failure of Liner
6. Water Quality Violations (both Ground and Surface Water)
7. Surface Drainage Problems
8. Air Emission Violations
9. Severe Erosion

10. Leachate Piping System Failure
11. Leachate Storage System Failure
12. Exceedance of Leachate Quality Parameters at Wastewater Treatment Facility
13. Severe Settlement
14. Severe Rainfall, Wind
15. Leachate Spill
16. Failure of Final Cover System
17. Emergency Shutdown
18. Monitoring Well Failure
19. Emergency Shutdown
20. Unusual Amounts of Leachate in the Primary or Secondary Leachate Collection System
21. Release of Contaminants Detected in Groundwater Monitoring Wells

A summary of the corrective action items and their respective estimated costs are presented in Table 2. The estimated costs are the actual costs that are expected to occur if the corrective actions were implemented.

3.8.4.1 VANDALISM

Overview

Due to the existence of security fencing and the Facility's locale, the potential for major vandalism of on-site structures (inside and outside) is believed to be minimal. For purposes of the Corrective Action Plan, vandalism to on-site structures and/or equipment is the scenario addressed.

Assumptions

Vandalism of on-site buildings or equipment resulting in the need to repair or purchase replacement equipment.

3.8.4.2 FIRE (SURFACE OR SUBSURFACE)

Overview

Fires could occur in any of several areas associated with the Facility operations, including (1) within the office/laboratory building or container management building; (2) in the vehicles transporting waste; (3) within a containment cell; or (4) a grass fire on the site.

The potential for fires to occur at the Facility is not considered significant. The lack of flammable materials on-site and type of operations carried out indicate that fires are less likely to occur at the Facility than at other industrial facilities where raw materials, a manufacturing process or product storage exist that could support a fire.

Costs associated with responding to fires at the Facility range from the use of a fire extinguisher to the cost of calling out local fire departments to fight grass, vehicle or structural fires. Costs would be incurred for all ranges of fires, from recharging the fire extinguishers to costs associated with repair or replacement of a portion of a building destroyed by fire. Costs associated with extinguishing a surface or subsurface fire within a containment cell would require assistance from the local fire department. Resulting procedural changes in the acceptance and handling of waste would sufficiently prevent future occurrences.

The Corrective Action Plan establishes specific corrective actions to be implemented in the event of fires.

Assumption

- Grass fire on final cover spreads and damages control panels and exposed piping.

3.8.4.3 EXPLOSIONS

Overview

Explosions at the Facility could result from a waste stream with a flash point between 140^{0}F and 200^{0}F being subjected to an extreme source of heat or to have been improperly characterized by the generator and not tested by the Facility. As with fires, however, the potential for explosions is viewed as limited due to the nature of the Facility operations and on-site materials.

Costs associated with responding to explosions will be primarily the same costs as incurred in response to the source fire. Facility personnel will be prepared to respond to an explosion as outlined in the Corrective action Plan. The procedures used and equipment necessary are either available on-site or from local fire departments. The use of the equipment and procedures will be established as part of routine safety and emergency training for facility personnel. No costs will be incurred beyond, possibly, a temporary evacuation of the Facility. This cost is considered insignificant. In this regard, the costs associated with responding to an explosion are identified as operating costs not requiring the establishment of corrective action funds. Should such an incident occur, an Incident Report would be prepared as identified in the Corrective Action Plan.

If an event occurs involving a fire and/or explosion, the Emergency contact List located at the on-site office will be referenced. The local fire dispatcher will be notified immediately and other relevant contacts from the Emergency contact List. Access to the area will be controlled and all non-essential personnel will be cleared from the area. The operator will use a fire extinguisher or other immediate action, if it is deemed safe, to control the emergency until the local fire department arrives.

The operator will take all reasonable measures necessary to ensure that subsequent fires, explosions, or releases do not occur or spread to other areas of the site. These measures may include, but are not limited to, the possible removal of unaffected trucks and other mobile equipment from the area and the dowsing of adjacent areas with water.

Cleanup of fire residuals involving waste will be focused on collecting as much of the waste as possible for disposal in as timely a manner as possible. Procedures may require the use of sorbents, portable pumps, tank trucks, and/or soil removal equipment. Similarly, the type of personal protective equipment used will depend upon the type of material(s) involved.

3.8.4.4 FAILURE OR COLLAPSE OF ARTIFICIAL OR MAN-MADE DIKE

Overview

Four stormwater retention ponds are located at the Facility. Dike failure during a rainfall event is the likely scenario for occurrence of such an event. Facility operations should not be affected, other than the inability to properly manage stormwater runoff and should not have an impact on Facility operations.

Costs associated with the failure or collapse of a dike would be related to repairs to the dike to allow continued operation of the stormwater maintenance system.

Assumptions

- Earth moving equipment and other necessary equipment would be leased.
- The volume of material needed to make proper repairs is 1,100 cubic yards.
- Dike repair would be made using on-site and off-site soils.

3.8.4.5 FAILURE OF LINER

Overview

Realization of a liner failure would be the presence of unusual amounts of leachate in the secondary leachate collection system or the detection of contaminants in the groundwater monitoring wells (worse case). The first actions would be to pump the leachate from the leachate collection system as frequently as possible and to re-sample the wells in question to determine the validity of the initial sampling event results. If the results prove to be valid, the cause of the release will be investigated and a course of action taken. The actions taken may range from installing a new liner system over the existing waste surface to careful monitoring of the wells and leachate sumps to further delineate the extent of the release. Note, this is based on a worst-case scenario; this cost estimate will also cover other potential liner failures.

Assumptions

- Only two wells would need to be re-sampled.
- If the wells needed to be re-sampled, they would be sampled for the following parameters:

Metals
(T = Total, D = Dissolved)

Aluminum (T)	Copper (D)	Nickel (T)
Arsenic (D)	Iron (D)	Potassium (T)
Barium (T)	Lead (D)	Sodium (D)
Cadmium (D)	Magnesium (D)	Selenium (T)
Calcium (D)	Manganese (D)	Zinc (D)
Chromium (D)	Mercury (D)	

Indicator Parameters

Alkalinity as $CaCO_3$	PH	Total Dissolved Solids
Ammonia as N	Specific Conductance	Total Suspended Solids
Chloride (D)	Sulfate (D)	Total Organic Carbon
Color	Temperature	Total Organic Halogen
Appearance		Total Phenols

3.8.4.6 WATER QUALITY VIOLATIONS (BOTH GROUND AND SURFACE WATER)

3.8.4.6.1 GROUNDWATER

Overview

It is highly unlikely that a release will occur due to the triple liner system at the Facility. Furthermore, even if a release does occur, it will not noticeably affect the environment.

If this contingency did occur, corrective actions would have already been implemented through Item 5.

Assumptions

- The contaminant release is stopped once it is detected at the monitoring wells.
- The treatment system will require four purge wells.
- The purge wells will be drilled approximately 100 feet deep.
- The purge well and treatment system would operate for a period of five years.
- The costs are calculated for a five-year period.

3.8.4.6.2 SURFACE WATER

Overview

There is a small possibility that a waste may be spilled at an unconfined location during a rainstorm. An unconfined location is an area where there is a potential for rainfall to come into the area and thereafter run off into the stormwater management system. Most likely, if a spill were to occur, it would happen in the container management building or concrete dock area. From these areas the spill would not contaminate the stormwater management system.

The Facility is designed to accept only non-hazardous industrial waste. Therefore, the potential of a spill occurring that has the ability to threaten human health and the environment is remote.

The factors discussed above indicate that contamination of the stormwater system is a very remote possibility. Nonetheless, a contingency action plan has been developed.

Assumptions

- The spill is to such an extent that treatment is required.
- The spill would most likely occur around the buildings, parking lots or cell access roads (up to the edge of the cell block). The runoff from these areas goes to Stormwater Infiltration Areas.
- Pumps and portable piping would exist on the site (primary use would be for routing leachate).

- The water from the contaminated stormwater retention area will be pretreated by an on-site treatment unit. Once treated, the water will be returned to a stormwater retention area.
- If necessary, the vegetation and topsoil at the bottom of the retention area may be scraped and the area re-vegetated.

3.8.4.7 SURFACE DRAINAGE PROBLEMS

Overview

The on-site drainage system has been designed and constructed to handle stormwater generated from a 100-year, 24-hour storm event. Therefore, the potential for failure of any portion of the drainage system would be negligible. The Facility has in place an inspection and maintenance program established to insure proper maintenance and operation of the on-site drainage system. This corrective action scenario will address potential problems associated with the occurrence of a storm event exceeding the design event of a 100-year, 24-hour storm event.

Assumptions

- Damage to the surface drainage system would be due to the result of a 100-year, 24-hour storm event.
- Damage to the system includes the washout of the surface water collection system, resulting in the need to replace and repair a portion of the system.
- Earth moving equipment and other necessary equipment to complete repairs would be leased.
- The volume of material needed to make proper repairs is 550 cubic yards.
- Drainage system repairs would be made using on-site and off-site soils and materials purchased from off-site sources.
- Replacement of 24-inch diameter corrugated HDPE culverts.

3.8.4.8 AIR EMISSIONS VIOLATIONS

Some wastes that will be accepted at the Facility have the potential to become airborne under extremely adverse weather conditions. The extent to which this would occur depends on weather conditions and the physical properties of the waste. This can only occur while the site is open and will not occur after closure.

Should this incident occur, specific actions are outlined in the Corrective Action Plan. Actions include temporary storage of the waste, covering the waste with soil, foam or other suitable material or rescheduling the waste delivery.

Storage of waste until weather conditions improve can take place without incurring costs. Cover soil or foam will be on hand as normal routine operating procedures. Costs associated with these actions are identified by the Facility as normal operating costs not requiring the establishment of a contingency action plan.

Should this incident occur, a report would be prepared for the Facility Operating Record.

3.8.4.9 SEVERE EROSION

Overview

The erosion could occur over all or a portion of the final cell cover. The topsoil may erode if the vegetation cannot sustain itself. This could be due to a variety of factors, including insufficient moisture, insufficient nutrient content in the soils, or a steep slope. Furthermore, erosion may occur if there is a large storm of short duration that undermines the stability of the soils on the cover. Finally, the cover could erode due to differential settlement of waste within the cell.

Assumptions

- Erosion would be repaired using on-site and off-site soils.
- Earth moving equipment and other necessary equipment would be leased.
- Assume a 1-acre repair that is 1 foot deep.

3.4.8.10 LEACHATE PIPING SYSTEM FAILURE

The leachate piping associated with leachate storage and collection system is constructed within secondary containment structures. Possible credible failure involves leaking of the ancillary equipment into the secondary containment structure. If this incident should occur, the primary objective would be to remove the leachate from the secondary structure and faulty piping, transfer it to another tank, and repair the faulty piping or equipment.

Replacement of the leachate pumps associated with the collection system is a cost addressed under the post-closure care plan and is not considered as a part of the corrective action measure.

No additional costs are associated with this corrective action measure.

3.8.4.11 LEACHATE STORAGE TANK FAILURE

The storage tanks are constructed within secondary containment structures. Possible credible failure involves leaking of one of the tanks, primarily through ancillary equipment into the secondary containment structure. If this incident should occur, the primary objective would be to remove the leachate from the secondary structure and faulty tank, transfer it to another tank, and repair the faulty tank or equipment.

3.8.4.12 EXCEEDENCE OF LEACHATE QUALITY PARAMETERS AT WASTEWATER TREATMENT FACILITY

Overview

The leachate is the result of the infiltration of precipitation into the waste contained in the cell. Because of the waste types accepted, the leachate is anticipated to be of a good quality. Leachate is collected from each cell and pumped to a leachate storage tank where it is tested. Each WWTP establishes standards for the quality of wastewater it will accept. Leachate from the leachate tanks will require pretreatment, if it exceeds the WWTP standards. This pretreatment will be needed until the leachate returns to a quality that meets the WWTP standards.

Assumptions

- This contingency is for an event of short duration. If it becomes necessary to treat leachate on an ongoing basis, it will become part of the Facility daily routine operation.
- The type of leachate contamination will dictate the type of treatment necessary.
- The Facility could elect to transport leachate to another wastewater treatment facility or treat the leachate on-site.
- For estimation purposes, it is assumed the leachate treatment is conducted on-site.
- The amount of leachate to treat is 500,000 gallons.

3.8.4.13 SEVERE SETTLEMENT

Overview
The slopes on the caps cannot be greater than 25 percent or less than 2 percent. Deviation from the design would cause corrective measures to be implemented. The deviation may occur over the entire area of the cap or be localized to a smaller portion.

Assumptions
- If localized regrading and reseeding were required, the size of the area would be approximately 1 acre and 1 foot deep.

3.8.4.14 SEVERE RAINFALL, WIND

3.8.4.14.1 SEVERE RAINFALL

Overview
Extreme precipitation events, beyond the design of the leachate storage system, are not likely to occur during the life of the Facility. The leachate storage tanks at the Facility are capable of storing the amount of leachate from a major storm such as the 100-year, 24-hour event. Storage of leachate from storms of larger intensity could exceed the available leachate storage capacity at the Facility. The scope and extent of this incident (leachate generation and collection rate exceeding the storage capacity) are dependent on a number of factors, including amount of waste in the cell, current excess capacity in the tanks, discharge rates to the WWTP, and previous precipitation events.

The actions to be taken to address this incident likewise provide much flexibility to manage leachate volumes when they exceed the available capacity of the storage tanks.

This corrective action would be implemented until the storage tanks were sufficiently drawn down to a point where sufficient excess tank capacity was maintained. The amount of drawdown at the accelerated rate would be determined by the IC or Facility Manager and would be a function of volume of waste in the cell/subcell and recent and anticipated precipitation events.

Assumptions
- Excess leachate will be transported to St. Paul.

- Event creates 500,000 gallons of excess leachate.
- Leachate will be transported in leased tanker trucks.

3.8.4.14.2 SEVERE WIND

Some wastes that will be accepted at the Facility have the potential to become airborne under extremely windy conditions. The extent to which this would occur depends on weather conditions and the physical properties of the waste. Should advance knowledge of a severe wind event be known, the Facility will take steps to suspend disposal operations until weather conditions improve.

However, should this incident occur, specific actions are outlined in the Corrective Action Plan, including temporary storage of the waste, covering the waste with soil, foam or other suitable material, or rescheduling waste deliveries.

Storage of waste, until weather conditions improve, can take place without incurring costs. Cover soil or foam will be on hand as normal routine operating procedures. Costs associated with these actions are identified by the Facility as normal operating costs not requiring the establishment of a contingency action fund.

Should this incident occur, a report would be prepared for the Facility Operating Record.

3.8.4.15 LEACHATE SPILL

Overview

Opportunities for a leachate spill are minimal. There is a remote possibility that loading out of the 3M leachate or the transmission of the leachate through the gravity line could occur. However the volume of the leachate would expected to be minimal.

Costs associated with leachate leakage or spills occurring outside of designated waste management units are considered costs requiring the establishment of corrective action funds. The equipment necessary to respond to such leakage and spills will be available during the operational phase of the Facility but will not be available on-site after closure, and therefore off-site equipment may be necessary to respond to the leakage or spill.

The type of off-site equipment that may be necessary to respond to container spills and leakage includes a vacuum truck and possibly a tow truck and dump truck.

Assumptions

- The spilled or leaked material is of sufficient volume to require off-site equipment (i.e., dump truck and tow truck).
- The spill resulted from an overturned vehicle transporting 2,000 gallons of leachate.
- The spill occurred on the internal road but extended over the road shoulder.

3.8.4.16 FAILURE OF FINAL COVER SYSTEM

Failure of the final cover system could be determined by either (1) an increase in the amount of leachate being removed from the leachate collection system within a closed containment cell following the anticipated reduction in leachate generation following closure, or (2) physical evidence, if the source of failure is due to severe erosion, under conditions where the HDPE liner portion of the cap cover system is exposed and damaged due to severe erosion or differential settlement. Corrective actions measures outline a worst case situation in which the final cover system is breached and will require either repair and/or replacement. Therefore, an additional corrective action cost associated with this type of incident is not necessary.

3.8.4.17 EQUIPMENT FAILURE

Key equipment that could fail includes, but is not limited to, heavy equipment used for waste placement in the containment cells, equipment to transfer waste from the container management building to the cells, the leachate collection pumps or equipment associated with waste testing in the laboratory.

Because these pieces of equipment are primary components of the Facility operations, failure of any of these components could potentially disrupt operations. The Facility will be prepared to respond to equipment failures either with on-site equipment repairs or on-site or off-site equipment backup. These types of responses are identified by the Facility as normal operating costs not requiring establishment of specific corrective action funds.

Specific actions are outlined in the Corrective Action Plan to respond to equipment failures and should they occur, a report will be prepared for the Facility Operating Record.

3.8.4.18 MONITORING WELL FAILURE

Overview

Over the operating life and post-closure care period of the Facility, it is expected that problems associated with the collection of samples from the Facility's groundwater monitoring system will occur. These problems may range from monitoring well pump failure to collapse of the monitoring well screen or casing. To this degree, corrective measures associated with monitoring well failure will address the worst case scenario (i.e., collapse of well screen or casing). Well pump replacement is incorporated into the cost estimates developed for post-closure care of the Facility.

Assumptions

- There are 22 monitoring wells proposed across the site for post-closure, with each well having an expected life span of 30 years.
- Over the 40-year operating life of the Facility and the 20-year post-closure care period, it is estimated that 10 wells may need to be installed to replace any monitoring well that fails.

3.8.4.19 UNUSUAL AMOUNTS OF LEACHATE IN THE PRIMARY AND SECONDARY LEACHATE COLLECTION SYSTEM

Overview

It is highly unlikely that the primary liner and leachate collection system will completely fail. Furthermore, the amount of leachate generated during the post-closure period will be minimal. Even if the system partially fails, the primary liner and leachate collection system will continue to function. Furthermore, any leachate that passes through the primary liner will be collected by the secondary liner system. The secondary liner and leachate collection system will be completely functional.

Assumptions

- Collection systems are working properly and there is no evidence of a release.
- Leachate storage tanks have sufficient capacity to manage leachate and the Facility leachate discharge permit provides for sufficiently large discharges.
- Decision is made to inspect leachate sumps monthly for 10 years. Following this period, the post-closure care period of 20 years will include the inspections.
- Two monitoring wells will need to be sampled once each year for a period of two years.
- Event occurs at beginning of post-closure period.

3.8.4.20 EMERGENCY SHUTDOWN

An emergency shutdown procedure that is implemented due to activities not related to the Facility will not impose any extra cost on the Facility.

If emergency shutdown procedures are implemented due to Facility operations (e.g., the failure of key equipment) then there will be a cost to the Facility. The cost for this event would simply be the replacement cost of the failed equipment. A separate contingency item covers the failure of key equipment.

3.8.4.21 RELEASE OF CONTAMINANTS DETECTED IN GROUNDWATER MONITORING WELLS

Overview

The first action would be to determine if resampling of the wells in question would be necessary to determine the validity of the initial sampling event results. If the initial results are determined to be valid, the cause of the release will be investigated and a course of action taken. The actions taken may range from installing a new liner system over the existing liner system to careful monitoring of the wells and leachate sumps to further delineate the extent of the release.

Assumptions

- It is assumed that two monitoring wells will be re-sampled, if necessary.
- It is assumed that the analysis would encompass the following parameters:

Metals
(T = Total, D = Dissolved)

Aluminum (T)	Copper (D)	Nickel (T)
Arsenic (D)	Iron (D)	Potassium (T)
Barium (T)	Lead (D)	Sodium (D)
Cadmium (D)	Magnesium (D)	Selenium (T)
Calcium (D)	Manganese (D)	Zinc (D)
Chromium (D)	Mercury (D)	

Indicator Parameters

Alkalinity as $CaCO_3$	PH	Total Dissolved Solids
Ammonia as N	Specific Conductance	Total Suspended Solids
Chloride (D)	Sulfate (D)	Total Organic Carbon
Color	Temperature	Total Organic Halogen
Appearance		Total Phenols

3.9 PLAN AMENDMENTS

The Contingency Action Plan will be amended whenever the following occurs:

- The landfill permit is revised.
- The plan fails in an emergency.

- The landfill changes its design, construction, operation, maintenance, or other circumstances in a way that significantly changes the potential for fires, explosions, or releases of wastes or waste constituents, or charges the response necessary in an emergency.

TABLE 1a

CELL AND FACILITY CLOSURE
SUMMARY OF ESTIMATED COSTS
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY-SW-383
ROSEMOUNT, MINNESOTA

Closure Costs - Summary of Estimated Costs		
Construction Related Costs:		
Cell 2 - Final Closure Cost	$	1,303,211
Cell 3 - Final Closure Cost	$	2,460,972
Cell 4 - Final Closure Cost	$	917,271
Cell 5 - Final Closure Cost	$	2,684,696
Facility Structure Closure Costs	$	14,760
Total Closure Cost	**$**	**7,380,911**

Current Value in year 2013

TABLE 1b

CELL 2 - CLOSURE COST ESTIMATE[1]
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
1	Earthwork Associated With Final Cover / (sf)	749,232	$0.65	$ 487,001
2	LLDPE Membrane & Geocomposite / (sf)	749,232	$0.75	$ 561,924
3	Incidental Costs / (acre)	17.2	$ 472	$ 8,118
4	Surveying / (acre)	17	$ 1,800	$ 30,960
5	Quality Control/Engineer Oversight (acre)	17	$ 9,500	$ 163,400
Subtotal Closure Costs[2]				**$ 1,271,426**
2.5% Contingency				**$ 31,786**
Estimated Total Cell 2 Closure Costs				**$ 1,303,211**

1 All Costs are based on 2013 SKB price quote/estimates

TABLE 1c

CELL 3 - CLOSURE COST ESTIMATE[1]
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
1	Earthwork Associated With Final Cover / (sf)	1,437,480	$0.65	$ 934,362
2	LLDPE Membrane & Geocomposite / (sf)	1,437,480	$0.75	$ 1,078,110
3	Incidental Costs / (acre) [2]	33.0	$ 472	$ 15,576
4	Surveying / (acre)	33	$ 1,800	$ 59,400
5	Quality Control/Engineer Oversight (acre)	33	$ 9,500	$ 313,500
Subtotal Closure Costs[2]				**$ 2,400,948**
2.5% Contingency				**$ 60,024**
Estimated Total Cell 3 Closure Costs				**$ 2,460,972**

1 Costs for liner and drainage materials are based on 2013 contract with GSI Inc., and other contractor bids.

2 Assumes portion of sideslope covered prior to final closure
All Costs are based on SKB price quote/estimates

TABLE 1d

CELL 4 - CLOSURE COST ESTIMATE[1]
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
1	Earthwork Associated With Final Cover / (sf)	535,788	$0.65	$ 348,262
2	LLDPE Membrane & Geocomposite / (sf)	535,788	$0.75	$ 401,841
3	Incidental Costs / (acre)	12.3	$ 472	$ 5,806
4	Surveying / (acre)	12	$ 1,800	$ 22,140
5	Quality Control/Engineer Oversight (acre)	12	$ 9,500	$ 116,850
Subtotal Closure Costs[2]				**$ 894,899**
2.5% Contingency				**$ 22,372**
Estimated Total Cell 4 Closure Costs				**$ 917,271**

1 Costs for liner and drainage materials are based on 2013 contract with GSI Inc., and other contractor bids.

All Costs are based on SKB price quote/estimates

TABLE 1e

CELL 5 - CLOSURE COST ESTIMATE[1]
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
1	Earthwork Associated With Final Cover / (sf)	1,568,160	$0.65	$ 1,019,304
2	LLDPE Membrane & Geocomposite / (sf)	1,568,160	$0.75	$ 1,176,120
3	Incidental Costs / (acre) [2]	36.0	$ 472	$ 16,992
4	Surveying / (acre)	36	$ 1,800	$ 64,800
5	Quality Control/Engineer Oversight (acre)	36	$ 9,500	$ 342,000
Subtotal Closure Costs[2]				**$ 2,619,216**
2.5% Contingency				**$ 65,480**
Estimated Total Cell 5 Closure Costs				**$ 2,684,696**

1 Costs for liner and drainage materials are based on 2013 contract with GSI Inc., and other contractor bids.

2 Assumes portion of sideslope covered prior to final closure
All Costs are based on SKB price quote/estimates

TABLE 1f

FACILITY BUILDING CLOSURE COST ESTIMATE
SKB ROSEMOUNT INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

Item Description	*Quantity*	*Unit Cost*	*Extension*	
1 Container Management Building Cleaning (hrs)	80	60.00	$	4,800
2 Office building/Laboratory	80	60.00	$	4,800
2 Winterize/Close Buildings (hrs)	4	1200.00	$	4,800
Subtotal Closure Costs			**$**	**14,400**
2.5% Contingency			**$**	**360**
Estimated Total Facility Closure Costs			**$**	**14,760**

TABLE 2

CORRECTIVE ACTION COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
1	**Vandalism**			
	Remove Grafitti (40 hr x $55/hr)	40	$ 55.00	**$ 2,200**
	Fence Repair (assume 50 ft @ $20/ft)	50	$ 20.00	**$ 1,000**
	Building Repair (assume 1 windows @ $200/window	1	$ 200.00	**$ 200**
	Monitoring Point (Drilling, labor, parts)	1	$ 8,000.00	**$ 8,000**
	Side Slope Risers	5	$ 100	**$ 500**
			Subtotal	**$ 11,900**
2	**Fire (Surface or Subsurface) or Explosion**			
	- Fire Damage Clean-up (assume 200sf sq ft affected) (2 people 10 hrs ea @ $55/hr)	10	$ 110	**$ 1,100**
	- Fire Department Fee	1	$ 4,000	**$ 4,000**
	- Replace unspecific equip. damaged by fire including pipes, risers, etc.	1	$ 10,000	**$ 10,000**
			Subtotal	**$ 15,100**
3	**Failure or Collapse of Artificial or Man-made Dikes**			
	- On-site soil (1000CY @ $4.50/CY for excavation, placement and compaction)	1,000	$ 4.50	**$ 4,500**
	- Off-site soil (100CY @ $10/CY for excavation, placement and compaction)	100	$ 10	**$ 1,000**
	- Revegetation: 0.5 acre to be seeded, fertilized and mulched (0.5 acre x $425/acre)	1	$ 425	**$ 213**
			Subtotal	**$ 5,713**

TABLE 2

CORRECTIVE ACTION COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
4	**Failure of Liner**			
	Re-sampling event field sampling (2 wells)			**$ -**
	- Staff Geologist (4 hr/well @ $55/hr)	4	$ 55	**$ 220**
	- Technician (4 hr/well @ $55/hr)	4	$ 55	**$ 220**
	- Field Equipment Vehicle Usage ($55/day)	1	$ 55	**$ 55**
	- Per Diem / Misc.	1	$ 250	**$ 250**
	Laboratory Analysis			**$ -**
	- Trace Metals and Indicator Parameters ($700/sample)(1 sample event for 2 wells)	2	$ 700	**$ 1,400**
	- Investigate Cause: Engineer (40hr @ $55/hr)	40	$ 55	**$ 2,200**
	Design of Replacement Liner System			**$ -**
	Replacement Liner over existing waste (assume 1 acre repair)			**$ -**
	HDPE Liner system including all liner components and soil placement based on 2012 actual project costs/acre	1	$ 198,473	**$ 198,473**
			Subtotal	**$ 202,818**
5	**Water Quality Violation-Ground Water**			
	Ground Water			**$ -**
	- Purge Well Installation (2 wells x $15,000/well including all labor associated)	2	$ 15,000	**$ 30,000**
	- Submersible pumps (2-10 HP pumps @ $3200/ea)	2	$ 3,200	**$ 6,400**
	- Electrical Connections (one panel)	1	$ 27,000	**$ 27,000**
	- Piping system and installation (Assume HDPE pipe @ $33/lineal foot including installation approx 1000ft)	1,000	$ 33	**$ 33,000**
	- Flow meter installation and parts (4 @ $3,000/ea)	4	$ 3,000	**$ 12,000**
	- Pre-treatment system: Set up, Operation and disposal (1,000,000 gal/yr for 5 yr x$0.07 per gallon)	5,000,000	$ 0.08	**$ 400,000**
	- Groundwater Sampling (twice annually x 4 wells x $500/well sample + 1 field blank)	10	$ 500.00	**$ 5,000**
	Operation and maintenance of Purge Wells (Technician for 10 hrs/week x 52wks/yr x 5 yr @ $55/hr.)	2,600	$ 55.00	**$ 143,000**
			Subtotal	**$ 656,400**

TABLE 2

CORRECTIVE ACTION COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
6	**Water Quality Violation - Surface Water**			
	Initial Containment			**$ -**
	- Place Containment around spilled waste (solid) (2 technicians, 4 hrs @ $55/hr)	4	$ 55	**$ 220**
	- Replacement of Temporary Containment Dikes, if not Reusable (300 cy x $5.00 / CY)	300	$ 5	**$ 1,500**
	Sampling & Testing			**$ -**
	- Analytical for stormwater retention area (1 sample @ $500/sample)	1	$ 500	**$ 500**
	- Testing of soils in ditches and bottom of retention pond - (4 samples @ $500/sample)	4	$ 500	**$ 2,000**
	- Technician (10 hours @ $55/hr)	10	$ 55	**$ 550**
	- Shipping & Handling costs	1	$ 300	**$ 300**
	Clean-up and disposal of contaminated soils			**$ -**
	- On-site equip used (2 hr @ $300/hr)	2	$ 300	**$ 600**
	- Placement of spilled material in containment cells (20 CY @ $75/cy)	20	$ 75	**$ 1,500**
	- Remove contaminated soil from retention pond (50 CY @ $75/cy)	50	$ 75	**$ 3,750**
	Verification			**$ -**
	- Retest soil in spill area and retention area (5 samples @ $500/sample)	5	$ 500	**$ 2,500**
	- Technician (10 hours @ $55/hr)	10	$ 55	**$ 550**
	Restoration			**$ -**
	- Add topsoil to replace removed (70 CY @ $10/CY)	70	$ 10	**$ 700**
	- Silt Fence (1000 ft @ $0.25/lf)	1,000	$ 0.25	**$ 250**
	- Geotextile (1350 sf @ $0.19/sf)	1,350	$ 0.19	**$ 257**
	- Revegetate assume 1 acre	1	$ 425	**$ 425**
			Subtotal	**$ 15,602**
7	**Surface Drainage Problem**			
	- On-site soil cost (500 cy @ $4.50/cy for excavation, placement and compaction)	500	4.5	**$ 2,250**
	- Off-site soil costs (50 cy @ $10/cy for excavation, placement and compaction)	50	$ 10	**$ 500**
	- Heavy Equipment Mobilization	1	$ 3,000	**$ 3,000**
	- Replacement of 24" HDPE corrugated pipe (100 ft @ $38/ft)	100	$ 38	**$ 3,800**
	- Revegetation (assume 0.5 acre)	1	$ 425	**$ 213**
			Subtotal	**$ 9,763**

TABLE 2

CORRECTIVE ACTION COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
8	**Air Emission Violations**			
	- This is not considered a considerable risk for the industrial activity that occurs at the Site			
9	**Severe Erosion**			
	- On-site soil cost (500 cy @ $4.50/cy for excavation, placement and compaction)	500	$ 5	**$ 2,250**
	- Off-site soil costs (500 cy @ $10/cy for excavation, placement and compaction)	500	$ 10	**$ 5,000**
	- Heavy Equipment Mobilization	1	$ 3,000	**$ 3,000**
	- Revegetation (assume 1 acre)	1	$ 425	**$ 425**
			Subtotal	**$ 10,675**
10	**Leachate Piping System Failure**			
	- Cost is addressed in post closure plan			
11	**Leachate Above Ground Storage System Failure**			
	- Mobilization/Demobilization	1	$ 5,000.00	**$ 5,000**
	- Incidental Repair	2	$ 3,000.00	**$ 6,000**
	- 2 Repair Technicians @ $55/hr for 40 hours	80	$ 55.00	**$ 4,400**
	- Steel replacement panels	4	$ 1,000.00	**$ 4,000**
	- Concrete Containment area repair	2	$ 5,000.00	**$ 10,000**
	- Lift pump replacement	2	$ 3,200.00	**$ 6,400**
	- Control Panel Replacement	1	$ 15,000.00	**$ 15,000**
				$ 50,800
12	**Exceedence of Leachate Quality Parameters at WWTP**			
	Retest leachate (1 sample)	1	$ 500	**$ 500**
	- Develop Specifications and pre-treatment process	1	$ 10,000	**$ 10,000**
	- Pretreatment System	1	$ 5,000	**$ 5,000**
	- Operation and disposal (500,000 gal @ $0.008/gal)	500,000	$ 0.008	**$ 4,000**
	- Additional analytical expenses	1	$ 15,000	**$ 15,000**
			Subtotal	**$ 34,500**
13	**Severe Settlement**			
	Replacement Cover Costs (assume 2 acre area)			
	- 2012 SKB cover cost/acre	2	$ 78,122	**$ 156,244**
			Subtotal	**$ 156,244**
14	**Severe Rainfall, Wind**			
	- Leachate hauling from the facility to disposal (500,000gal @ $0.03/gal)	500,000	$0.03	**$ 15,000**
			Subtotal	**$ 15,000**

TABLE 2

CORRECTIVE ACTION COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
15	**Leachate Spill**			
	Initial Containment			
	- Place Containment around spilled waste (solid) (2 technicians, 5 hrs @ $55/hr)	10	$ 55	**$ 550**
	Sampling & Testing			
	- Analytical for stormwater retention area (1 sample @ $500/sample)	1	$ 500	**$ 500**
	- Technician (2 hr @ $55/hr)	2	$ 55	**$ 110**
	Clean-up and disposal of soil			
	- Off-site Equipment ($300/hr for 2 hr)	2	$ 300	**$ 600**
	- Dump truck for disposal ($120/hr for 6 hr)	6	$ 120	**$ 720**
	Verification			
	- Retest soil in spill area and retention area (1 samples @ $500/sample)	1	$ 500	**$ 500**
	- Technician (2hr @ $55/hr)	2	$ 55	**$ 110**
	Restoration			
	- Site prep (bobcat for 8 hrs @ $100/hr)	8	$ 100	**$ 800**
	- Re-vegetation (1 acre)	1	$ 425	**$ 425**
	- Top-soil (20cy @ $12/cy)	20	$ 12	**$ 240**
			Subtotal	**$ 4,555**
16	**Failure of Final Cover System**			
	- Covered in Severe Settlement			
17	**Equipment Failure**			
	- No associated additional costs assumed			

TABLE 2

CORRECTIVE ACTION COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
18	**Monitoring Well Failure**			
	Monitoring well replacement			
	- no additional cost associated, covered in WQ violation			
19	**Emergency Shutdown**			
	- No additional cost associated			
20	**Unusual Amounts of Leachate in Primary or Secondary Collection System**			
	- Additional Site Visits (12 visits/yr for 10 yrs, 8 hours/visit @ $55/hr)	960	$ 55	**$ 52,800**
	- Consultant Oversite Costs 140 hrs@ $110/hr)	140	$ 110	**$ 15,400**
			Subtotal	**$ 68,200**
21	**Release of Contaminants Detected in Monitoring Wells**			
	- Costs associated with sampling investigation and purge-system installation and operation accounted for in Groundwater quality violation.			
	- Costs associated with cover repair/replacement accounted for in liner leak			
			Subtotal Contingency Action	**$ 1,206,468**
2.5% Contingency				**$ 30,162**
			Estimated Total Contingency	**$ 1,236,630**
			Calculated Expected Value (60% of total CA Costs)	**$ 741,978**

TABLE 3

POST-CLOSURE ANNUAL COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*	*Extension*
1	**Periodic Inspection or Event Triggered General Inspection**			
	General Inspection (2 Routine inspections/yr + 4 hours per inspection)	8	$ 55	**$ 440**
2	**Operation of Leachate Collections System, Gravity Line and Leachate Storage Tanks**			
	- Inspection (1 inspection per year x 8 hours/ inspection)	8	$ 55	**$ 440**
	- Leachate Removal & Disposal (Based on 2013 HELP model closed condition Leachate estimate)	134,634	$ 0.0068	**$ 916**
	- Leachate analysis (quarterly @ $500/sample)	4	$ 500	**$ 2,000**
				$ 3,356
3	**Maintenance of Leachate Collection System**			
	- Inspection (accounted for in **item 2** above)	0	$ -	**$ -**
	- Pump replacement (1 pump every 2 year @ $1,800/pump)	0.5	$ 1,800	**$ 900**
	- Technician to replace pump	8	$ 55	**$ 440**
	- Jetting of all leachate lines	1	$ 3,000	**$ 3,000**
				$ 4,340
4	**Operation of Groundwater Monitoring System (according to current sample plan)**			
	- Staff Geologist (4 hours per well x 12 wells x 3 events/year *upgradient* + 3 hours /well x 5 wells x 1 event/year *downgradient* + 0.25 hours x 10 wells x 4 events / year *water levels only*)	174	$ 83	**$ 14,355**
	- Field Equipment/Vehicle Use (5 days x $55/day x 3 per year)	15	$ 55	**$ 825**
	- Laboratory Analysis (41 samples @ $ 500/sample)	41	$ 500	**$ 20,500**
				$ 35,680

TABLE 3

POST-CLOSURE ANNUAL COST ESTIMATE
SKB INDUSTRIAL WASTE FACILITY; SW-383
ROSEMOUNT, MINNESOTA

	Item Description	*Quantity*	*Unit Cost*		*Extension*	
5	**Maintenance of Groundwater Monitoring System**					
	- Pump replacement (1 pump/10 years)	0.1	$	1,600	**$**	**160**
	- Technician to replace pump	0.8	$	55	**$**	**44**
	- Well rehabilitation (1 every 10 years)	0.10	$	1,000	**$**	**100**
					$	**304**
6	**Maintenance of Stormwater Drainage and Retention**					
	- Area, Ditch, Culvert De-silting (1 visit/5yr for 8hr/visit x $55/hr)	2	$	55	**$**	**88**
	- Ditch and culvert repair-soil replacement ($12/lf)	120	$	12	**$**	**1,440**
	- Re-seed, mulch, fertilize (1 acre/5yr x 425/acre)	0.2	$	425	**$**	**85**
					$	**1,613**
7	**Maintenance of Final Cover Vegetation**					
	- Mowing (1 visit/year x 200 acres x $20/acre)	1	$	4,000	**$**	**4,000**
	- Revegetation of Cover (1 time/5year x 5 acre/visit)	1	$	425	**$**	**425**
	- Pest Control (1 visit/2yr x 4 hr/visit x $55/hr)	2	$	55	**$**	**110**
	- Final Cover Erosion Repair (1 visit/5yr x 1 acre/visit x $1100/acre)	0.2	$	1,100	**$**	**220**
					$	**4,755**
8	**Maintenance of Site Access and Electrical Items**					
	- Electrical Maintenance (1 visits/yr x 8 hr/visit x $150/hr)	8	$	150	**$**	**1,200**
	- Fence Maintenance (1 visits/5 yr w/50'/visit x $20/ft)	10	$	20	**$**	**200**
	- Fence Post Replacement (assume replace 4 fence posts/5yr)	1	$	24	**$**	**24**
					$	**1,424**
9	**Building and Road Maintenance**					
	- Building maintenance (assumes incidental maintenance such as exterior and interior repair) (assumes 5% of actual cost per year)	0.05	$	15,000	**$**	**750**
	- Road regrading (Inspection and repair of wash-outs/rutting est. once every 5 years @ approx. $1500/mile)	0.2	$	1,500	**$**	**300**
					$	**1,050**
Subtotal Annual Post-Closure Costs					**$**	**52,962**
Estimated Annual Total Post-Closure Costs					**$**	**52,962**

TABLE 4

2013 PAYMENT RATE ESTIMATING TABLE
SKB ENVIRONMENTAL-ROSEMOUNT INDUSTRIAL WASTE FACILITY
SW-383, 2013 PERMIT APPLICATION FOR RENEWAL
CALCULATED FEBRUARY 28, 2013

Projected Costs Over Post-Closure Care Period

2013 Annual Postclosure Care Cost Estimate $52,962

Inflation Factor = 1.72%
Discount Rate = 0.75%

Year	*n*	*Inflated Annual Cost*	*Inflated and Discounted Annual Cost*
2014	1	$53,872	$53,471
2015	2	$54,799	$53,986
2016	3	$55,742	$54,506
2017	4	$56,700	$55,031
2018	5	$57,676	$55,561
2019	6	$58,668	$56,096
2020	7	$59,677	$56,636
2021	8	$60,703	$57,181
2022	9	$61,747	$57,731
2023	10	$62,809	$58,287
2024	11	$63,890	$58,848
2025	12	$64,989	$59,415
2026	13	$66,106	$59,987
2027	14	$67,243	$60,565
2028	15	$68,400	$61,148
2029	16	$69,576	$61,736
2030	17	$70,773	$62,331
2031	18	$71,990	$62,931
2032	19	$73,229	$63,537
2033	20	$74,488	$64,148
Totals		**$1,273,078**	**$1,173,131**
		(Current Value -not discounted)	(Present Value -discounted)

Basis for this years payments	*Current Value*	*Present Value*
2013 Closure Cost Estimate	$7,380,911	$0
2013 Postclosure Care Cost Estimate	$1,273,078	NA
2013 Contingency Action (CA) Cost Estimate (expected value)	$741,978	NA
TOTAL	**$9,395,966**	**NA**

Value of Guarantee (letter of credit or surety bond) on December 31, 2012= $9,266,086

Present Value of Remaining Cost to be paid = $129,880
Operating Life in Months (never greater than 120 months) = 120 months
Your 2013 Monthly payment= $1,082

APPENDIX A

CONSTRUCTION COST SUPPORTING DOCUMENTATION

Cell Construction Cost Estimates

Liner Design

Primary Clay Liner Thickness	0	Feet
Primary GCL	1	Layers
Primary FML	1	Layers
Geonet (200 mil)	1	Feet
Primary Geotextile	0	Layers
Primary GeoComposite	1	Layers
Secondary Clay Liner Thickness	0	Feet
Secondary GCL	0	Layers
Secondary FML	1	Layers
Leachate Drainage Layer Thickness	0	Feet
Secondary Geotextile	0	Layers
Secondary GeoComposite	1	Layers
Protective Layer Thickness (Sand)	2	Feet

Cell Development Summary

Airspace generated	18,665,033	Cubic Yards
Cell Area	41	Acres
Cell Area	1,764,180	Square Feet
Area of Low Slope	954,142	Square Feet
Area of High Slope	853,780	Square Feet
Exterior Perimeter	5,313	Lineal Feet
Internal Perimeter		Lineal Feet
Average Excavation		Feet
Internal Mass Ex		Percentage
LCS Pipe Length	5,700	Feet
Contingency Factor	5%	

Item	Units	Unit Price	Quantities	Contingency	Totals
Mobilization / Demobilization	each	$ 37,804	7		$264,628
Clearing and Grubbing	Acre	$ 2,719	40.5	5%	$115,635
Excavation (Internal)	Cubic Yards	$ 1.00	202,576	5%	$212,705
Excavation (External)	Cubic Yards	$ 2.00	391,915	5%	$823,022
Excavate/Backfill Anchor Trench	Linear Feet	$ 4.97	5,313	5%	$27,725
Gravel for LCS Piping	Cubic Yards	$ 60.07	5,700	5%	$359,519
Structural Fill	Cubic Yards	$ 0.90	271,102	5%	$256,191
Clay Liner Placement	Cubic Yards	$ 4.00	-	5%	$0
Witness Zone Layer	Cubic Yards	$ 18.00		5%	$0
LCS Drainage Layer	Cubic Yards	$ 5.04	-	5%	$0
Protective Cover Layer (Sand)	Cubic Yards	$ 9.00	133,920	5%	$1,265,545
Borrow Area Work (Clear, Reseed, etc.)	Acre	$ 1,088		5%	$0
Screening Berm	Cubic Yards	$ 3.00		5%	$0
Stormwater Drainage Swale	Linear Feet	$ 1.59	5,313	5%	$8,870
Terrace Construction	Linear Feet	$ 10.00		5%	$0
Downstructure Construction	Linear Feet	$ 230.00		5%	$0
					$0
					$0
					$0
		Earthwork Subtotal			**$ 3,333,841**

Cell Construction Cost Estimates

60 mil smooth HDPE	Square Feet	$0.2666	954,142	0%	$254,374
60 mil textured HDPE	Square Feet	$0.2884	853,780	0%	$246,230
FML Installation	Square Feet	$0.1130	1,807,922	0%	$204,295
80 mil smooth HDPE	Square Feet	$0.3540	954,142	0%	$337,766
80 mil smooth HDPE installation	Square Feet	$0.1130	954,142	0%	$107,818
80 mil textured HDPE	Square Feet	$0.3933	853,780	0%	$335,792
80 mil textured HDPE installation	Square Feet	$0.1130	853,780	0%	$96,477
Geotextile	Square Feet	$0.0950		0%	$0
Geotextile Installation	Square Feet	$0.0670	-	0%	$0
Geotextile for LCS	Square Feet	$0.0950		0%	$0
Geonet	Square Feet	$0.1486	954,142	0%	$141,786
Geonet Installation	Square Feet	$0.0896	954,142	0%	$85,491
Geocomposite	Square Feet	$0.3050	2,661,702	0%	$811,819
Geocomposite Installation	Square Feet	$0.0900	2,661,702	0%	$239,553
GCL	Square Feet	$0.2900	1,807,922	0%	$524,297
GCL Installation	Square Feet	$0.0876	1,807,922	0%	$158,374
Mobilization/Demobilization	each	$0	7	0%	$0
Taxes	%	7.125%	-		$140,969
					$0
					$0
		Geosynthetics Subtotal			**$3,685,042**
Leachate Collection Pipe	Linear Feet	$38.47	5,700	5%	$230,243
Leachate Header Pipe	Linear Feet	$22.85	1,550	5%	$37,188
Pumps	each	$3,200	4	5%	$12,800
Electrical	each	$27,000	1	5%	$27,000
Sump Pad / Housing	each	$10,000		5%	$0
Sump	each	$15,000		5%	$0
Flow Meter	each	$3,000		5%	$0
Leachate Storage Tanks	gallon	$1.50	-	5%	$0
Temporary Piping	Linear Feet	$38.47	250	5%	$10,098
					$0
					$0
		Leachate Collection Systems Subtotal			**$317,330**
Gas Well Installation	each	$0	-	5%	$0
Gas Well Head	each	$0	-	5%	$0
Connector Header Piping	Linear Feet	$0	-	5%	$0
Main Header Piping	Linear Feet	$0	-	5%	$0
Condensate Traps	each	$0	-	5%	$0
Blower Station	each	$0	-	5%	$0
Flare	each	$0	-	5%	$0
Passive Vents	Linear Feet	$0	-	5%	$0
Temporary Piping	Linear Feet	$0.00	-	5%	$0
CQA - Gas System	each	0%	-		$5,000
					$0
					$0
	Gas Extraction Systems Subtotal - All Closure Areas				**$5,000**
Plywood - (Protection for Tie-In)	Linear Feet	$4.00		5%	$0
Survey	each	$2,000	7	5%	$14,700
Construction Drawings	each	$20,000	7	5%	$147,000
Construction Pumps & Dewatering	each	$500	7	5%	$3,675
Light Plant Rental	each	$2,500		5%	$0
CQA - Soils and Geosynthetic Reports	Acre	$12,500	41	5%	$531,563
Construction NOI & SWPPP	each	$2,500		5%	$0
					$0
					$0
		Miscellaneous Subtotal			**$696,938**
			TOTAL CELL DEVELOPMENT COSTS		**$8,038,150**
			Cost /Acre	**198472.8395**	
			Cost/CY Airscpace	**$0.43**	

Cell Construction Cost Estimates

SITE AND PERMIT COSTS		Use only one Column for each Project				
Project	Cost Estimate Per Unit	Hard Code Units to be Built	Replacement Years		Total needed in project	Notes
Land Acquisition (acres)				0		
Permitting				0		
Sed. Basins to be built				0		
Leachate Evaporation Ponds to be built				0		
Added Leachate Storage				0		
New Entrance and Facilities				0		
New Entrance Earthwork				0		
Intersection and Facilities				0		
Haul Roads (total miles)				0		
Borrow Area Reclaim(acres)				0		
Total GW Monitoring Wells				0		
Total Gas Monitoring wells				0		
Replace Leachate Pumps	$3,000		3	18,000	26	
Replace Scales				0		
Replace Blowers/Flare				0		
Relocate Power Lines	$1,524,419	1		1,524,419		
Relocate Gas Lines	$722,785	1		722,785		
Cell 4 Overliner	$726,208	1		726,208		Per Geoff Strack, 12/3/2012 - Cell 4 overliner is 440,539 sf. The profile is 2 feet of clay, textured 80 mil HDPE, drainage composite, 2 feet of sand. Clay cost is 440,539 sf * 2 feet/ 27 = 32,632 cy of clay @ $4/cy = $130,530. 80 mil textured cost is 440,539 * ($0.3933 (material) + $0.1130 (installation)) = $223,045. Drainage Composite Cost is 440,539 * ($0.0896 (material) + $0.0896 (installation)) = $78,945. Sand Cost is 32,632 cy of sand @ $9.00/cy = $293,688. Total Cost is $726,208
Cell 5 Overliner	$1,721,068	1		1,721,068		Per Geoff Strack, 12/3/2012 - Cell 5 overliner is 935,549 sf. The profile is 1 foot of sand, 80 mil HDPE, 3 feet of sand. Cost of sand is 935,549 sf / 27 = 34,650 @ $9/cy = $311,850. 80 mil textured cost is 935,549 * ($0.3933 (material) + $0.1130 (installation)) = $473,668. Cost of sand is 34,650 * 3 = 103,950 @ $9/cy = $935,550. Total Cost is $1,721,068
Other				0		
Other				0		
Annual Misc. Expense	$20,000		1	360,000		
			Total	**$5,072,480**		

Cell Development Costs	$8,038,150
Site and Permit Costs	$5,072,480
Future Capex	$13,110,630

Cell Capping Cost Estimates

Cap Design

Foundation Layer	1	Feet
Clay Cap Thickness	0	Feet
GCL Cap	0	Layers
FML Cap	1	Layers
Geotextile	0	Layers
GeoComposite	1	Layers
Drainage Layer Thickness	0	Feet
Root Zone LayerThickness	2.5	Feet
Topsoil Thickness	0.5	Feet

Site Capping Summary

Cell Area	150.7	Acres
Cell Area	6,564,492	Square Feet
Average Height	111	Feet
Area of Low Slope	2,178,008	Square Feet
Area of High Slope	4,623,354	Square Feet
Exterior Perimeter		Lineal Feet
Internal Perimeter		Lineal Feet
Contingency Factor	5%	

Item	Units	Unit Price	Quantities	Contingency	Totals
Mobilization / Demobilization	each	$ 30,000	1		$ 30,000
Soil Acquisition	Cubic Yards	$ 1.50	985,160	5%	$1,551,627
Clay Acquisition	Cubic Yards	$ -	-	5%	$0
Excavate/Backfill Anchor Trench	Lineal Feet	$ 3.50		5%	$0
Foundation Layer Placement	Cubic Yards	$ 3.50	251,902	5%	$925,741
Clay Cap Placement	Cubic Yards	$ 4.50	-	5%	$0
Drainage Layer	Cubic Yards	$ 18.00	-	5%	$0
Root Zone Layer	Cubic Yards	$ 2.25	629,756	5%	$1,487,798
Top Soil Layer	Cubic Yards	$ 3.50	125,951	5%	$462,870
Borrow Restoration	Acre	$ 1,100.00		5%	$0
Stormwater Drainage Swale	Lineal Feet	$ 12.00	-	5%	$0
Seed, Fertilize & Mulch	Acre	$ 425.00	151	5%	$67,250
					$0
					$0
		Earthwork Subtotal			**$ 4,525,286**
40 mil smooth LLDPE	Square Feet	$0.194	2,178,008	5%	$442,517
40 mil textured LLDPE	Square Feet	$0.217	4,623,354	5%	$1,053,917
FML Installation	Square Feet	$0.113	6,801,362	5%	$806,982
Geotextile	Square Feet	$0.113	-	5%	$0
Geotextile Installation	Square Feet	$0.072	-	5%	$0
Geonet	Square Feet	$0.149		5%	$0
Geonet Installation	Square Feet	$0.154	-	5%	$0
Geocomposite	Square Feet	$0.305	6,801,362	5%	$2,178,136
Geocomposite Installation	Square Feet	$0.090	6,801,362	5%	$642,729
GCL	Square Feet	$0.310	-	5%	$0
GCL Installation	Square Feet	$0.116	-	5%	$0
Mobilization/Demobilization	each	$0	1	5%	$0
Taxes	%	7.125%			$152,415
					$0
					$0
		Geosynthetics Subtotal			**$5,276,695**
Plywood - (Protection for Tie-In)	Lineal Feet	$4.00		5%	$0
Survey	Acre	$2,000	151	5%	$316,470
Construction Drawings	each	$20,000	1	5%	$21,000
Construction Pumps & Dewatering	each	$1,000	1	5%	$1,000
Light Plant Rental	each	$0	-	5%	$0
CQA - Soils and Geosynthetic Reports	acre	$10,000	151	5%	$1,582,350
Construction NOI & SWPPP	each	$3,500	1	5%	$3,500
					$0
					$0
		Miscellaneous Subtotal			**$1,924,320**

TOTAL CELL CAPPING COSTS **$11,726,302**

Cost/Acre **$77,812**

Total capping:		
lined areas		$11,726,302
unlined areas		$0
capping 3		$0
capping 4		$0
	1	$11,726,302
		$84,279
		$11,810,581

Cell Construction Cost Estimates

Liner Design

Primary Clay Liner Thickness	2	Feet
Primary GCL	1	Layers
Primary FML	1	Layers
Witness Zone Layer Thickness	0	Feet
Primary Geotextile	0	Layers
Primary GeoComposite	1	Layers
Secondary Clay Liner Thickness	0	Feet
Secondary GCL	0	Layers
Secondary FML	0	Layers
Leachate Drainage Layer Thickness	0	Feet
Secondary Geotextile	0	Layers
Secondary GeoComposite	0	Layers
Protective Layer Thickness (Sand)	1	Feet

Cell Development Summary

Airspace generated	1,334,848	Cubic Yards
Cell Area	16	Acres
Cell Area	710,028	Square Feet
Area of Low Slope	567,356	Square Feet
Area of High Slope	150,376	Square Feet
Exterior Perimeter	3,371	Lineal Feet
Internal Perimeter		Lineal Feet
Average Excavation		Feet
Internal Mass Ex		Percentage
LCS Pipe Length	3,000	Feet
Contingency Factor	5%	

Item	Units	Unit Price	Quantities	Contingency	Totals
Mobilization / Demobilization	each	$ 61,552	3		$184,656
Clearing and Grubbing	Acre	$ 3,000	3.5	5%	$11,025
Excavation (Internal)	Cubic Yards	$ 1.00	30,000	5%	$31,500
Excavation (External)	Cubic Yards	$ 2.20	-	5%	$0
Excavate/Backfill Anchor Trench	Linear Feet	$ 4.97	3,371	5%	$17,589
Gravel for LCS Piping	Cubic Yards	$ 60.07		5%	$0
Structural Fill	Cubic Yards	$ 2.95	32,913	5%	$101,948
Clay Liner Placement	Cubic Yards	$ 3.87	53,165	5%	$216,037
Witness Zone Layer	Cubic Yards	$ -	-	5%	$0
LCS Drainage Layer	Cubic Yards	$ 10.70	-	5%	$0
Protective Cover Layer	Cubic Yards	$ 10.70	26,583	5%	$298,656
Borrow Area Work (Clear, Reseed, etc.)	Acre	$ 1,088		5%	$0
Screening Berm	Cubic Yards	$ 3.00		5%	$0
Stormwater Drainage Swale	Linear Feet	$ 25.00		5%	$0
Terrace Construction	Linear Feet	$ 10.00		5%	$0
Downstructure Construction	Linear Feet	$ 230.00		5%	$0
					$0
					$0
					$0
		Earthwork Subtotal			$ 861,412

Cell Construction Cost Estimates

60 mil smooth HDPE	Square Feet	$0.2666	567,356	0%	$151,257
60 mil textured HDPE	Square Feet	$0.2884	150,376	0%	$43,369
FML Installation	Square Feet	$0.1130	717,732	0%	$81,104
Geotextile	Square Feet	$0.0950		0%	$0
Geotextile Installation	Square Feet	$0.0670	-	0%	$0
Geotextile for LCS	Square Feet	$0.0950		0%	$0
Geonet	Square Feet	$0.1486	-	0%	$0
Geonet Installation	Square Feet	$0.0896	-	0%	$0
Geocomposite	Square Feet	$0.3050	717,732	0%	$218,908
Geocomposite Installation	Square Feet	$0.0900	717,732	0%	$64,596
GCL	Square Feet	$0.2900	717,732	0%	$208,142
GCL Installation	Square Feet	$0.0876	717,732	0%	$62,873
Mobilization/Demobilization	each	$0	3	0%	$0
Taxes	%	6.875%	-		$42,740
					$0
					$0
		Geosynthetics Subtotal			**$872,990**
Leachate Collection Pipe	Linear Feet	$24.00	3,000	5%	$75,600
Leachate Header Pipe	Linear Feet	$45.00		5%	$0
Pumps	each	$3,200	2	5%	$6,400
Electrical	each	$1,200		5%	$0
Sump Pad / Housing	each	$10,000		5%	$0
Sump	each	$15,000		5%	$0
Flow Meter	each	$3,000		5%	$0
Leachate Storage Tanks	gallon	$1.50		5%	$0
Temporary Piping	Linear Feet	$24.00		5%	$0
					$0
					$0
		Leachate Collection Systems Subtotal			**$82,000**
Gas Well Installation	Linear Feet	$76.00	-	5%	$0
Gas Well Head	each	$900.00	-	5%	$0
Connector Header Piping	Linear Feet	$29	-	5%	$0
Main Header Piping	Linear Feet	$70	-	5%	$0
Condensate Traps	each	$4,500	-	5%	$0
Blower Station	each	$75,000	-	5%	$0
Flare	each	$125,000	-	5%	$0
Passive Vents	Linear Feet	$70	-	5%	$0
Temporary Piping	Linear Feet	$12.00	-	5%	$0
CQA - Gas System	each	10%	-		$5,000
					$0
					$0
	Gas Extraction Systems Subtotal - All Closure Areas				**$5,000**
Plywood - (Protection for Tie-In)	Linear Feet	$4.00		5%	$0
Survey	each	$2,000	3	5%	$6,300
Construction Drawings	each	$20,000	3	5%	$63,000
Construction Pumps & Dewatering	each	$500	3	5%	$1,575
Light Plant Rental	each	$2,500		5%	$0
CQA - Soils and Geosynthetic Reports	Acre	$10,000	16	5%	$171,150
Construction NOI & SWPPP	each	$2,500		5%	$0
					$0
					$0
		Miscellaneous Subtotal			**$242,025**
			TOTAL CELL DEVELOPMENT COSTS		**$2,063,427**
			Cost /Acre	**126590.6135**	
			Cost/CY Airspace	**$1.55**	

Cell Construction Cost Estimates

SITE AND PERMIT COSTS		Use only one Column for each Project				
Project	**Cost Estimate Per Unit**	**Hard Code Units to be Built**	**Replacement Years**		**Total needed in project**	**Notes**
Land Acquisition (acres)				0		
Permitting				0		
Sed. Basins to be built				0		
Leachate Evaporation Ponds to be built				0		
Added Leachate Storage				0		
New Entrance and Facilities				0		
New Entrance Earthwork				0		
Intersection and Facilities				0		
Haul Roads (total miles)				0		
Borrow Area Reclaim(acres)				0		
Total GW Monitoring Wells				0		
Total Gas Monitoring wells				0		
Replace Leachate Pumps				0		
Replace Scales				0		
Replace Blowers/Flare				0		
Relocate Power Lines				0		
Other				0		
Other				0		
Other				0		
Other				0		
Other				0		
Annual Misc. Expense	$20,000		1	360,000		
			Total	**$360,000**		

Cell Development Costs	$2,063,427
Site and Permit Costs	$360,000
Future Capex	$2,423,427

Cell Capping Cost Estimates

Cap Design

Foundation Layer	1	Feet
Clay Cap Thickness	0	Feet
GCL Cap	0	Layers
FML Cap	1	Layers
Geotextile	0	Layers
GeoComposite	1	Layers
Drainage Layer Thickness	0	Feet
Root Zone LayerThickness	1.5	Feet
Topsoil Thickness	0.5	Feet

Site Capping Summary

Cell Area	29.3	Acres
Cell Area	1,276,308	Square Feet
Average Height	37	Feet
Area of Low Slope	408,000	Square Feet
Area of High Slope	915,197	Square Feet
Exterior Perimeter		Lineal Feet
Internal Perimeter		Lineal Feet
Contingency Factor	5%	

Item	Units	Unit Price	Quantities	Contingency	Totals
Mobilization / Demobilization	each	$ 60,000	1		$ 60,000
Soil Acquisition	Cubic Yards	$ 1.50		5%	$0
Clay Acquisition	Cubic Yards	$ -	-	5%	$0
Excavate/Backfill Anchor Trench	Lineal Feet	$ 3.50		5%	$0
Foundation Layer Placement	Cubic Yards	$ 3.50	49,007	5%	$180,102
Clay Cap Placement	Cubic Yards	$ 4.50	-	5%	$0
Drainage Layer	Cubic Yards	$ 18.00	-	5%	$0
Root Zone Layer	Cubic Yards	$ 2.25	73,511	5%	$173,670
Top Soil Layer	Cubic Yards	$ 3.50	24,504	5%	$90,051
Borrow Restoration	Acre	$ 1,100.00		5%	$0
Stormwater Drainage Swale	Lineal Feet	$ 12.00	-	5%	$0
Seed, Fertilize & Mulch	Acre	$ 425.00	29	5%	$13,075
					$0
					$0
		Earthwork Subtotal			**$ 516,897**
40 mil smooth LLDPE	Square Feet	$0.194	408,000	5%	$82,895
40 mil textured LLDPE	Square Feet	$0.217	915,197	5%	$208,528
FML Installation	Square Feet	$0.130	1,323,197	5%	$180,616
Geotextile	Square Feet		-	5%	$0
Geotextile Installation	Square Feet	$0.072	-	5%	$0
Geonet	Square Feet		-	5%	$0
Geonet Installation	Square Feet	$0.154	-	5%	$0
Geocomposite	Square Feet	$0.305	1,323,197	5%	$423,754
Geocomposite Installation	Square Feet	$0.090	1,323,197	5%	$125,042
GCL	Square Feet		-	5%	$0
GCL Installation	Square Feet	$0.116	-	5%	$0
Mobilization/Demobilization	each	$4,000	1	5%	$4,000
Taxes	%	7.125%			$29,673
					$0
					$0
		Geosynthetics Subtotal			**$1,054,508**
Plywood - (Protection for Tie-In)	Lineal Feet	$4.00		5%	$0
Survey	Acre	$2,000	29	5%	$61,530
Construction Drawings	each	$20,000	1	5%	$21,000
Construction Pumps & Dewatering	each	$1,000	1	5%	$1,000
Light Plant Rental	each	$2,500	-	5%	$0
CQA - Soils and Geosynthetic Reports	acre	$10,000	29	5%	$307,650
Construction NOI & SWPPP	each	$3,500	-	5%	$0
					$0
					$0
		Miscellaneous Subtotal			**$391,180**

TOTAL CELL CAPPING COSTS **$1,962,586**

Cost /Acre **$66,982**

Total capping:		
lined areas		$1,962,586
unlined areas		$0
capping 3		$0
capping 4		$0
	1	$1,962,586
		$83,367
		$2,045,953

CONESTOGA-ROVERS & ASSOCIATES

2013 Fee Schedule

Principals: $171.00 - $196.00

Associates: $151.00 - $177.00

Specialist: $156.00 - $196.00

Engineers:
- Level A $100.00
- Level B $112.00
- Level C $122.00 - $143.00
- Level D $150.00 - $160.00
- Level E $165.00 - $175.00

Geologists/Hydrogeologists:
- Level A $100.00
- Level B $112.00
- Level C $122.00 - $143.00
- Level D $150.00 - $160.00
- Level E $165.00 - $175.00

Environmental Chemists/Scientists/Planners:
- Level A $95.00
- Level B $105.00
- Level C $118.00 - $128.00
- Level D $134.00 - $144.00
- Level E $163.00 - $173.00

Industrial Hygienists/Safety Professionals:
- Level A $95.00
- Level B $105.00
- Level C $118.00 - $128.00
- Level D $134.00 - $144.00
- Level E $163.00 - $173.00

Information Technologists:
- Level A $95.00
- Level B $105.00
- Level C $118.00 - $128.00
- Level D $134.00 - $144.00
- Level E $163.00 - $173.00

Database Analysts:
- Level A $81.00
- Level B $91.00
- Level C $106.00 - $126.00
- Level D $140.00 - $160.00
- Level E $165.00 - $175.00

Technicians/Technologists:
- Level A $74.00
- Level B $85.00
- Level C $100.00
- Level D $111.00 - $131.00
- Level E $142.00 - $152.00

Draft/CADD:
- Level A $67.00
- Level B $78.00
- Level C $90.00
- Level D $100.00
- Level E $110.00

Technical Apprentices: $74.00 - $85.00

Administrative Support: $58.00

APPENDIX B

INCIDENT COORDINATORS AND INCIDENT CHECKLIST

SKB ROSEMOUNT
INDUSTRIAL WASTE FACILITY

INCIDENT COORDINATOR LIST

Incident Coordinator:	**Jon Penheiter** **Facility Manager** **Cell: (612) 366-4834**
Alternate Incident Coordinator:	**Brad Pederson** **Operations Manager** **Cell: (612) 366-4369**
Alternate Incident Coordinator:	**John Domke** **Vice President** **Cell: (612) 366-4353**

RPT-F001

ACCIDENT REPORT FORM

VEHICLE / PROPERTY ACCIDENT REPORT

WASTE CONNECTIONS INC.
Connect with the Future

Reported to ESIS ☐ ESIS CLAIM # ____________________

TYPE OF ACCIDENT (COMPLETE BOXES):	☐ AUTOMOBILE LIABILITY	☐ DAMAGE TO WCI PROPERTY/THEFT	☐ DAMAGE TO WCI VEHICLES	☐ GENERAL LIABILITY

WCI District #: [ ][ ][ ][ ] District Name: ____________________

Vehicle Accident No.: [ ][ ] Year [ ][ ] Month [ ][ ] Day [ ] Unique Identifier (A,B,C, etc)
(Use Date of Loss)

Time am/pm	Location of Incident	Claimant Name	
City/State		Street Address	
WCI Vehicle Year/Make/Type/VIN		City/State/Zip	
Employee Name	SSN	Telephone: Work	Home:
Home Phone	Was Employee Injured? Yes ☐ No ☐	Vehicle Year / Vehicle Make	License Plate #
Employee Supervisor	Supervisor Phone Number	Insurance Company	
Date Form Completed ___/___/___	Person Completing Form	Passenger Name(s)	

Name of Witness(es) ____________________

Address ____________________

Work Phone ____________________ Home Phone ____________________

Were Photos Taken? Yes ☐ No ☐ If Not, Why Not? ____________________

Reported To Police? Yes ☐ No ☐ Report # ____________________

Which Agency ____________________

Citation Issued? Yes ☐ No ☐ Citation # ____________________

WCI Investigator ____________________ Phone # ____________________

Street Address(es)	
City/State/Zip	
Telephone: Work	Home:
Registered Owner of Claimant Vehicle	
Street Address	
City/State/Zip	
Telephone: Work	Home:
Any Third Party Claimant Injuries?	Yes ☐ No ☐

DESCRIPTION OF ACCIDENT --
Auto Liability: Include area of damage to the vehicle / General Liability: Include area of damage to property

____

____

____

____

____

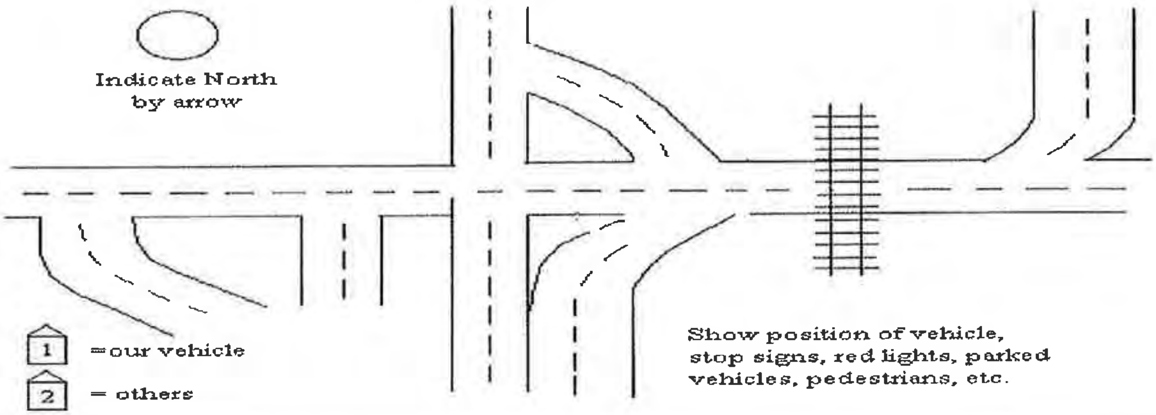
____

____

____

RPT-F001

Diagram of Incident



LENGTH OF SERVICE

Months Years
00 - No Employee Involved/Unknown

LOCATION

1 Residential Area
2 Commercial Area
3 Highway/Expressway
4 Landfill
5 WCI Property

PREVENTABLE BY WCI EMPLOYEE INVOLVED

1 Yes
2 No
3 Alleged
4 Waiting for Review
5 Probably Did Not Do/ Paid for Bus. Reasons
6 No Employees Involved/Unknown

TIME OF DAY

1 6-9 AM
2 9-12 Noon
3 12-3 PM
4 3-6 PM
5 6-9 PM
6 9-12 Midnight
7 12-3 AM
8 3-6 AM
9 Cumulative/Progressive
00 Unknown

LIGHT

1 Daylight
2 Dawn/Dusk
3 Dark – No Light
4 Dark – Artificial Light
5 Not Applicable/ Unknown

WEATHER

1 Clear
2 Raining
3 Snowing
4 Sleet
5 Fog/Smog
6 Other ___________
7 Not Applicable/Unknown

VEHICLE TYPE

1 REL
2 FEL
3 Side Loader
4 Roll-Off
5 Container Delivery
6 Satellite Collection
7 Tractor/Trailer
8 Sweeper
9 Tanker
10 Vacuum Truck
11 Landfill Equipment
12 Heavy Equipment
13 Pickup Truck
14 Light Truck
15 Automobile
16 Other (Specify)
17 Power Pull Truck
18 Toilet Service Truck
19 Flat bed 1 ton
20 Flat bed 3 ton
21 Not Applicable

ACCIDENT TYPE

1 Head On
2 Turning Accident
3 Sideswipe – WCI Hit Other
4 Sideswipe – Other Hit WCI
5 Rear-End – WCI Hit Other
6 Rear-End – Other Hit WCI
7 Hit Overhead Object
8 Hit Stationary Object
9 Hit Parked Vehicle
10 Backing
11 Right Angle
12 Towing/Pushing
13 Intersection
14 Object Fell/Flew From Truck
15 Hit Pedestrian
16 Chemical/Material Spill
17 Ran Off Road
18 Jacknife
19 Rollover
20 WCI/WCI Vehicle Collision
21 Hit/Damage to Curb, Parking Lot, etc.
22 Damage to Lawn/Water Pipe/Sprinkler
23 Roll Away Vehicle
24 Other ___________

ACCIDENT CAUSE/WCI VEHICLE

1 Fell Asleep at Wheel
2 Failure to Check Mirror
3 Following Too Close
4 Failure to Signal Intentions
5 Speed Too Fast for Conditions
6 Disregard Traffic Sign/Signal
7 Improper Passing
8 Improper Turning
9 Improper Backing
10 Improper Traffic Lane
11 Improper Parking
12 Did Not Look Left/Right/Left
13 Left Forks/Lids, Rails/Box Up
14 Misjudged Clearance
15 Failure to Secure Load
16 Unsafe Loading/Unloading
17 Mechanical Problem
18 Tire Blowout
19 Failure to Lockout/ Tagout
20 Other – description: ___________

GENERAL LIABILITY

1 Claimant Slipped/Fell on WCI Property
2 Claimant Slipped/Fell on Trash
3 Container/Compactor Injured Claimant
4 Claimant Injured in Container/Truck
5 Oil/Hoist Oil Leak or Spray
6 Container Damaged Property
7 Object Flew From Highway
8 WCI Equipment or Unlicensed Vehicle Damaged Claimant's Property/Person
9 Damage Done to Property Over a Period of Time
10 Damage or Injury Caused by WCI Product
11 Other ___________

Drivers Statement of Accident

Must be used in addition to WCI Vehicle/Property Accident Report, which is completed by the investigating supervisor

Description of Incident – In your own words, describe how the accident happened
If this accident involves another vehicle, include area of damage to vehicle
If this accident involves property, include area of damage to property

Driver's Signature

Date

APPENDIX C

MPCA COVER LETTER

Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

August 31, 2012

Mr. Richard O'Gara, President
SKB Environmental, Inc.
251 Starkey Street, PO Box 7216
St. Paul, MN 55107

RE: Hanover Insurance Company Surety Bond # 1952271 and U.S. Bank National Association Standby Trust Agreement for the SKB Environmental, Inc. Rosemount Industrial Waste Facility, SW-383

Dear Mr. O'Gara:

The Minnesota Pollution Control Agency (MPCA) received the above mentioned Surety Bond effective July 23, 2012, in the amount of $9,266,085.88 and coordinating Standby Trust Agreement as fulfillment of financial assurance requirements for the SKB Rosemount Industrial Waste Facility. The Bond, issued by Hanover Insurance Company, will replace your current funded trust account, #393100, with Bremer Trust, N.A. The MPCA has found the Bond and Standby Trust Agreement as listed above, to be worded and in compliance with Minnesota Financial Assurance Rules (Minn. R. 7035.2665), and the amounts found sufficient financial assurance coverage for the facility at this time. The Bond and Standby Trust Agreement are hereby approved and will be maintained in our safe. A copy is attached for your records.

With this approval of the new Surety Bond and Standby Trust Agreement, the previous Bremer Trust, N.A. funded trust account #393100 is hereby approved for cancellation in its entirety by the MPCA and all remaining funds in the trust account may now be returned to SKB Environmental, Inc. as they so specify. The original Trust Agreement and Successor Trustee documents will be returned to Bremer Trust, N.A. along with a copy of this letter as proof of cancellation approval by the MPCA.

If you have any questions regarding your financial assurance, please contact Johnna Benke of our staff at 651-757-2220.

Sincerely,

Jeff J. Smith
Division Director
Industrial Division

JJS/JB:wgp

cc: Jeff Harthun, Dakota County Environmental Management
Geoff Strack, SKB Environmental, Inc.
John Domke, SKB Environmental, Inc.
Randall A. Propp, Bremer Trust

Appendix B

Run-on/Run-off Calculations

CONESTOGA-ROVERS
& ASSOCIATES

285 Delaware Avenue, Suite 500, Buffalo, NY 14202
Telephone: (716) 856-2142 Fax: (716) 856-2160
http://www.craworld.com

MEMORANDUM

TO:	Geoff Stack, PE - SKB Margaret Zuckweiler, PE - CRA	REF. NO.:	075704-3063
FROM:	David Britton and Casey Cowan - CRA /jac/3	DATE:	March 26, 2013
CC:	Ron Frehner - CRA File		
RE:	**Design Memorandum** **Analysis of Stormwater Management Facilities** **2013 Permit Application Renewal to SKB Rosemount Landfill Permit; Dakota County, MN**		

1.0 INTRODUCTION AND BACKGROUND

Conestoga-Rovers & Associates, Inc. (CRA) has completed a hydrologic and hydraulic analysis for the proposed final closure condition at the SKB Rosemount facility. This memorandum summarizes the basis of design as currently permitted in 2008, and provides the calculations in support of the stormwater improvements associated with the proposed March 2013 application for permit renewal. The March 2013 permit renewal proposes expansion of Cell 6 and increase of final height of the landfill from 1,010 feet in elevation to 1,060 feet in elevation.

The current design of the final construction of the stormwater facilities are depicted on the Rosemount Landfill Permit Modification Drawings dated September 2008, the Permit Application dated April 2008, a SKB letter to the City of Rosemount dated July 3, 2008, and the current Minnesota Pollution Control Agency (MPCA) issued Permit dated October 3, 2008. The existing permitted design provided for on-site storage of all stormwater runoff under the 100-year, 24-hour design storm event.

2.0 STORMWATER MANAGEMENT IMPROVEMENTS

The stormwater management improvements are designed in conformance with the requirements set forth in the Comprehensive Surface Water Management Plan for the City of Rosemount, Minnesota. The method of analysis included USDA TR-55 and State guidance's to estimate rainfall intensity, flow rates, and storage requirements. A combination of drainage facilities are employed to control runoff under various design storm events from tributary areas which include those areas on the final closed landfill cells, the perimeter area outside the cells and off-site areas. Any stormwater contacting wastes is not included in the stormwater analysis as it is collected and treated as leachate.

Design strategies and assumptions:

- Stormwater management facilities are designed, in accordance with the City of Rosemount Comprehensive Surface Water Management Plan, to retain all surface water runoff that is resulting from the 100-year, 24-hour design storm event (6 inches of rainfall) under landfill final closure condition. The MPCA only requires managing the 25-year, 24-hour storm event (4.85 inches of rainfall).

- Stormwater runoff from the final closed landfill areas will be managed using a series of diversion swales, downchutes and ditches to collect and direct flows to a series of connected storage basins located along the perimeter of the site. The perimeter basins are connected by drainage ditches and culverts designed to convey and regulate all storm flows tributary to the project area.

- The storage basins are designed with both retention and detention capabilities to take advantage of the natural infiltration of the surrounding soils while providing for sedimentation transport control.

- Retention will be provided by setting the bottom of the stormwater basins below the outlet pipe inverts to capture storm flows and minimize discharge to adjoining downstream basins.

- The bottom elevations of the basins are above the current groundwater elevations of the site. Basins will be normally dry and stormwater will percolate into the underlying sandy soils.

- The permitted design did not account for pass-through stormwater related to off-site stormwater entering the site under the railroad tracks located along the northwest boundary. Off-site drainage flows will be regulated and conveyed as part of the perimeter stormwater management facilities and discharged downstream at a control structure located at 140th Street (Basin 6A). Based upon a review of aerial photographs and USGS mapping, low ponding areas are present upstream of the railroad tracks with elevations that are lower than the crossing pipe inverts. Railroad cross culverts are often provided to relieve surcharging and equalize the flow on either side of the embankments. These upstream off-site areas have been treated as ponds for modeling purposes. Provisions for storage capacity have been factored into the stormwater management facilities.

- The stormwater model includes a 3-inch per hour infiltration rate into soils under the basins, which is the maximum infiltration rate that the City of Rosemount standards for Type A soils will allow. The actual on-site soil infiltration rates are estimated higher than what was modeled; therefore, the volumes of the modeled stormwater basins are considered conservative. The average infiltration rates at SKB Rosemount have been estimated ranging between 5.45 inches per hour for silty sands and 20 inches per hour for sand (refer to Attachment 1).

  The soil infiltration rate (or basin exfiltration rate) was estimated from results of soil boring data analysis of the soils beneath the current and proposed stormwater basins. Hydraulic conductivities were assigned based on soil types. The hydraulic conductivity for soil types was based on known or assumed particle sizes. The hydraulic conductivities were then related to infiltration rates by the Green-Ampt Equation. See **Attachment 1** for additional discussion.

  Soil infiltration tests will be conducted as appropriate per City of Rosemount requirements to confirm that soils at the SKB Rosemount facility meet or exceed the infiltration estimates summarized in **Attachment 1**.

- Basin configuration and model are designed to empty within 48 hours of a design event.

A hydrologic model was created using Hydraflow software package (Autodesk, Inc. Version 8) to redefine runoff rates and to develop stormwater management improvements given the proposed site grading modifications. The design is prepared based on full development of the site for the proposed permit renewal application conditions. A topographic flyover survey was completed by Sidwell Co. in November 2012 to confirm site elevations and existing conditions of key structures. The proposed stormwater management facilities are presented in **Drawing CI-07 in Tab 6 of the Permit Renewal Application.** For reference purposes, a Watershed Area Map is presented in **Figure 1** and a watershed schematic of the hydrologic model is included in **Attachment 2**.

The stormwater management improvements have been designed to contain flows up to the 100-year, 24-hour storm event (6 inches of rainfall) while keeping the post development discharge less than the contributing off-site flows coming from the northwest under the 25-year and 100-year, 24-hour design storm event scenarios. An analysis of the 100-year, 24-hour storm was also completed to evaluate the performance of the stormwater ditches, downchutes, and culverts.

As modeled, runoff from the site has been divided into nine sub-catchment drainage areas entitled Areas A through Area G, Off-site Area B and Off-site Area C. Runoff from the on-site tributary areas either discharge to the perimeter ditch system via diversion berms on the landfill side slopes and downchutes, or drain directly to a perimeter collection ditch. All tributary areas will ultimately direct runoff to one of six interconnected basins (Basin 1, Basin 2, Basin 3, Basin 4, Basin 5, or Basin 6 (A,B,C)). The site has a natural slope that drains from the northwest boundary line at elevation 890 (Highway 55) to a low point along the south boundary line at elevation 820 (140th Street/Ehler's Path). Runoff from the perimeter ditches are routed between the basins along the boundary of the site beginning at Basin 1 and ending downstream at Basin 6A. All stormwater from tributary areas are managed on-site. Runoff from Off-site Area B is directed into Basin 5 via two existing railroad cross culverts, while Off-site Area C discharges via an existing culvert into a perimeter ditch between Basin 5 and Basin 6A. Off-site Area A is located downstream from the site (south of 140th Street/Ehlers's Path). Off-site drainage areas are depicted on **Figure 2.**

Stormwater diversion berms are located on the landfill (4V:1H) side slopes at least every 40 vertical feet and are sloped at 2% to meet MPCA slope guidance. The diversion berms tie in with downchutes that outlet into rip-rap lined energy dissipater pads at the toe of the landfill slope. These dissipater pads will reduce the velocity of the runoff and help to prevent erosive point discharges. A hydraulic analysis was completed using Hydroflow to adequately size the diversion berms, downchutes, and perimeter ditches. Calculated channel depths and velocities were then used to establish appropriate erosion control measures (**see Attachment 3**). Stormwater ditches or diversion berms that have velocities greater than 5 feet per second under the 100-year, 24-hour storm, will be lined with rip-rap.

Runoff from the perimeter ditches are ultimately routed southerly to Basin 6A prior to discharging off-site via a control structure that outlets to an existing 6-feet wide by 3-feet high box culvert. The existing box culvert discharges south across 140th Street to cropland. Refer to the drawings in Tab 6 of the Permit Renewal Application for details of the Basin 6A outlet structure. A new City ditch will be constructed along the north side of 140th Street as part of Basin 6 construction. Note that the outlet flows from Basin 6A are regulated to release no more than the combined peak discharge rate from off-site Areas B and C.

The hydrograph summary is provided in **Table 1**. The post development model results are listed in Table 2 and the calculations are included in **Attachment 2**.

Table 1 – Hydrograph Summary – 100 Year Storm Event

Description	Area Ac.	Runoff Volume (cf)	Peak Discharge cfs	Tributary to Basin
Area A	34.0	413,085	121.7	Basin 1
Area B	23.9	294,931	71.0	Basin 1
Area C	50.1	610,633	143.3	Basin 2
Area D	3.9	58,367	18.5	Basin 3
Area E	19.1	236,308	63.5	Basin 4
Area F	45.3	581,797	239.5	Basin 5
Area G	29.4	356,764	147.3	Basin 6A
Area H	24.7	290,261	114.8	Basin 6B/C
Total	*230.4 ac*	*2,842,146 cf*		
Offsite Area B	60	782,631	6.4	Basin 5
Offsite Area C	37	107,311	0.0	Ditch to Basin 6A
Total	*97 ac*	*889,942 cf*		

Table 2 – Post Development Stormwater Modeling Results

Description	**Basin 1**	**Basin 2**	**Basin 3**	**Basin 4**	**Basin 5**	**Basin 6C**	**Basin 6B**	**Basin 6A**
Design Outlet Elevation (ft)	881.0	873.0	870.0	866.0	860.0	886.0	824.0	826.2
Total Available Storage (cf)	890,584	529,284	78,432	396,694	731,740	22,427	158,755	443,163
Top of Bank Elevation (ft)	884	876	874	870	860	850.0	830	830
Basin Bottom Elevation (ft)	874	862	866	862	852	846	822	822
Spillway Structure Elev. (ft)	-	-	-	-	-	848 (Weir)	-	829 (weir)
25 Year Peak Disch. (cfs)	0.0	0.0	0.2	0.0	0.0	79.1	17.8	2.6
Max Water Surface Elev. (ft)	879.37	872.18	870.18	864.38	855.95	848.74	827.37	827.32
Required Basin Storage (cf)	330,929	299,006	25,478	118,079	360,918	12,894	79,338	219,924
Basin Freeboard (ft)	4.6	3.8	3.8	5.6	4.0	1.2	2.6	2.6
100 Year Peak Disch. (cfs)	2.8	6.1	4.9	1.6	0.0	112.2	24.3	5.3
Max Water Surface Elev. (ft)	881.07	874.08	872.00	866.75	858.71	849.07	828.66	828.63
Required Basin Storage (cf)	467,767	398,908	50,718	235,315	613,617	15,407	115,530	319,857
Basin Freeboard (ft)	2.9	1.9	2.0	3.2	1.2	0.9	1.3	1.3

Attachments:
Figure 1 – Watershed Area Map
Figure 2 – Offsite Drainage Areas
Attachment 1 – Summary of Site Soil Analysis
Attachment 2 – Modeling Results
Attachment 3 – Perimeter Ditch, Diversion Berms and Downchute Calculations

<u>FIGURE 1</u>

WATERSHED AREA MAP

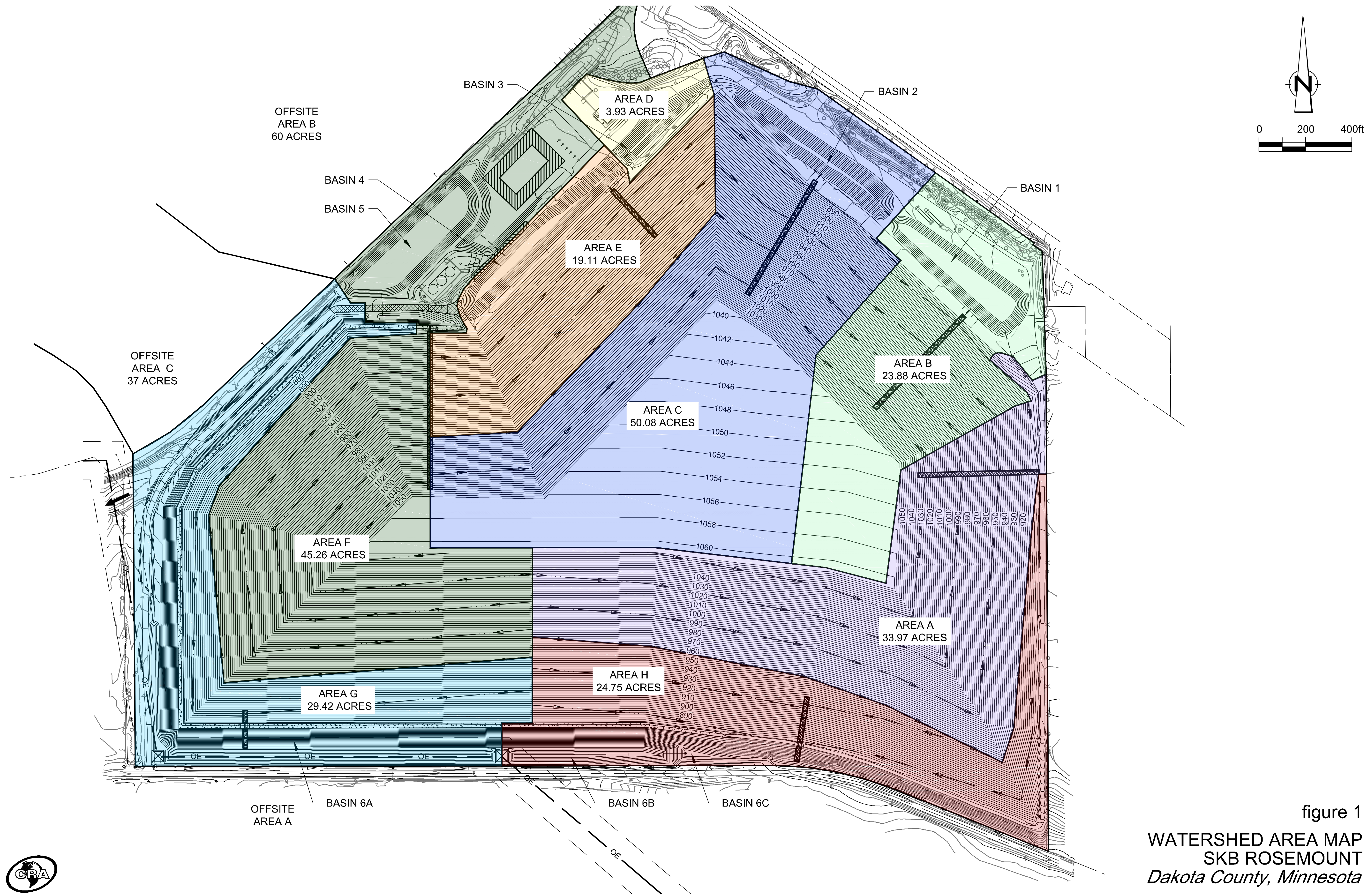


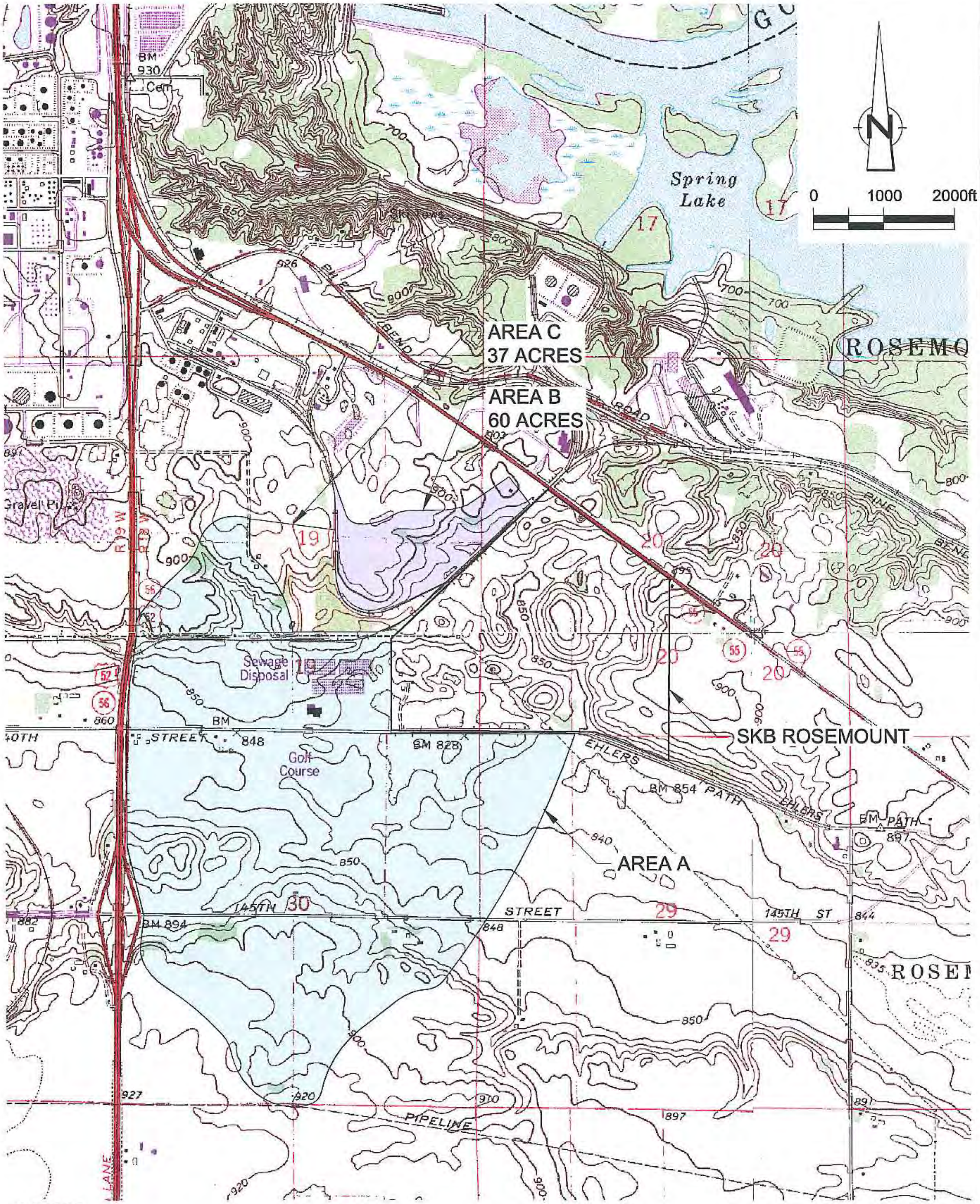
figure 1

WATERSHED AREA MAP
SKB ROSEMOUNT
Dakota County, Minnesota

75704-4000(027)CI-BU050 MAR 19/2013

FIGURE 2

OFFSITE DRAINAGE AREAS



SOURCE:
USGS 7.5 MINUTE SERIES, TOPO QUAD: INVER GROVE HEIGHTS, MINN 1993
ST. PAUL PARK, MINN 1993
COATES, MINN 1993
VERMILLION, MINN 1993

figure 2

OFF-SITE DRAINAGE AREAS
SKB ROSEMOUNT
Dakota County, Minnesota

75704-4000(027)CI-BU051 MAR 20/2013

ATTACHMENT 1

SUMMARY OF SITE SOIL ANALYSIS

Attachment 1

Green-Ampt Infiltration Calculations

Silty Sand

2 hr rainfall event

Variable	Value	Unit	
t_w	2.00	[hr]	
w	0.20	[in/hr]	
K_s	2.00E-03	[in/hr]	
theta_o	0.41	[ ]	
phi	0.43	[ ]	
psi_f	72.00	[in]	Depth to Wetting Front
F(t_p)	0.01	**[in]**	Cumulative Infiltration up to time of ponding
t_p	0.07	**[hr]**	Time to ponding
F(t_w)	0.11	**[in]**	Cumulative Infiltration during rainfall event duration
f(t_w)	5.45	**[in/hr]**	Instantaneous Infiltration Rate at end of rainfall event

Formula Used to Solve F(t_w)
2.00

Condition				
F(t) < F(t_p)	*Scenario 1*	t	See Below	[hr]
F(t) = F(t_p)	*Scenario 2*	t	0.07	[hr]
F(t) > F(t_p)	*Scenario 3*	t	See Below	[hr]
t < t_p	*Scenario 1*	f	0.20	[in/hr]
t_p <= t <= t_w	*Scenario 2*	f	See Below	[in/hr]
t > t_w	*Scenario 3*	f	-	[in/hr]
t <= t_w	*Scenario 1*	zprime_f	See Below	[in]
t > t_w	*Scenario 2*	zprime_f	0.40	[in]

Green-Ampt Infiltration Calculations

Sand

2 hr rainfall event

Variable	Value	Unit	
t_w	2.00	[hr]	
w	0.20	[in/hr]	
K_s	1.00E-01	[in/hr]	
theta_o	0.41	[ ]	
phi	0.43	[ ]	
psi_f	72.00	[in]	Depth to Wetting Front
F(t_p)	1.44	**[in]**	Cumulative Infiltration up to time of ponding
t_p	7.20	**[hr]**	Time to ponding
F(t_w)	0.40	**[in]**	Cumulative Infiltration during rainfall event duration
f(t_w)	5.45	**[in/hr]**	Instantaneous Infiltration Rate at end of rainfall event

Formula Used to Solve F(t_w)
23.55

Condition				
F(t) < F(t_p)	*Scenario 1*	t	See Below	[hr]
F(t) = F(t_p)	*Scenario 2*	t	7.20	[hr]
F(t) > F(t_p)	*Scenario 3*	t	See Below	[hr]
t < t_p	*Scenario 1*	f	0.20	[in/hr]
t_p <= t <= t_w	*Scenario 2*	f	See Below	[in/hr]
t > t_w	*Scenario 3*	f	-	[in/hr]
t <= t_w	*Scenario 1*	zprime_f	See Below	[in]
t > t_w	*Scenario 2*	zprime_f	0.40	[in]

Green-and-Ampt Example

Problem: Using the Green-and-Ampt model determine the total runoff and infiltration from a $2\,hr$ rainfall event with a $0.5\,cm\,hr^{-1}$ intensity. When does runoff begin? The soil's saturated hydraulic conductivity is $0.044\,cm\,hr^{-1}$, initial moisture content before infiltration begins is 0.25, porosity is 0.50, and the pressure head at the wetting front is $-22.4\,cm$. What's the infiltration rate at the end of the storm?

Solution:

The given parameters are $t_w = 2\,hr$, $w = 0.5\,cm\,hr^{-1}$, $K_s = 0.044\,cm\,hr^{-1}$, $\theta_0 = 0.25$, $\phi = 0.50$, and $\psi_f = -22.4\,cm$. First, calculate the cumulative amount of water that has infiltrated by the time of ponding,

$$F\left(t_p\right) = \frac{K_s \cdot \left|\psi_f\right| \cdot \left(\phi - \theta_0\right)}{w - K_s}$$

$$F\left(t_p\right) = \frac{\left(0.044\,cm\,hr^{-1}\right) \cdot \left|-22.4\,cm\right| \cdot \left(0.50 - 0.25\right)}{0.5\,cm\,hr^{-1} - 0.044\,cm\,hr^{-1}}$$

$$F\left(t_p\right) = 0.54\,cm$$

The time of ponding, t_p, is then calculated as

$$t_p = \frac{F\left(t_p\right)}{w} = \frac{0.54\,cm}{0.5\,cm\,hr^{-1}}$$

$$t_p = 1.08\,hr$$

Next, calculate the time t, infiltration rate f, and the depth of the wetting front z_f', using the following equations:

$$t = \begin{cases} F\left(t\right)/w & \text{for } F\left(t\right) < F\left(t_p\right) \\ t_p & \text{for } F\left(t\right) = F\left(t_p\right) \\ t_p + \dfrac{1}{K_s}\left[F\left(t\right) - F\left(t_p\right) + \left|\psi_f\right| \cdot \left(\phi - \theta_0\right) \cdot \ln\left(\dfrac{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right) + F\left(t_p\right)}{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right) + F\left(t\right)}\right)\right] & \text{for } F\left(t\right) > F\left(t_p\right) \end{cases}$$

$$f = \begin{cases} w & \text{for } t < t_p \\ K_s\left[1 + \dfrac{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right)}{F\left(t\right)}\right] & \text{for } t_p \le t \le t_w \\ 0 & \text{for } t > t_w \end{cases}$$

$$z'_f = \begin{cases} \dfrac{F(t)}{\phi - \theta_0} & \text{for } t \le t_w \\ \dfrac{F(t_w)}{\phi - \theta_0} & \text{for } t > t_w \end{cases}$$

To solve, increment F by small amounts and calculate the corresponding t, f, and z'_f values. Results are shown in the following table:

Cumulative Infiltration $F(cm)^*$	**Time** $t(hr)$	**Infiltration Rate** $f(cm\,hr^{-1})$	**Depth of Wetting Front** $z'_f(cm)$
0.000	$[F < F(t_p)]$ 0.0	$[t < t_p]$ $w = 0.50$	$[t \le t_w]$ 0.00
0.300	$[F < F(t_p)]$ 0.6	$[t < t_p]$ $w = 0.50$	$[t \le t_w]$ 1.20
0.540	$[F = F(t_p)]$ 1.08	$[t = t_p]$ 0.50	$[t \le t_w]$ 2.16
0.600	$[F > F(t_p)]$ 1.21	$[t_p \le t \le t_w]$ 0.45	$[t \le t_w]$ 2.40
0.700	$[F > F(t_p)]$ 1.44	$[t_p \le t \le t_w]$ 0.40	$[t \le t_w]$ 2.80
0.800	$[F > F(t_p)]$ 1.71	$[t_p \le t \le t_w]$ 0.35	$[t \le t_w]$ 3.20
0.895	$[F > F(t_p)]$ 1.99	$[t_p \le t \le t_w]$ 0.32	$[t \le t_w]$ 3.58
0.900	$[F > F(t_p)]$ 2.01	$[t > t_w]$ 0.00	$[t > t_w]$ 3.60
1.000	$[F > F(t_p)]$ > 2.00	$[t > t_w]$ 0.00	$[t > t_w]$ 3.60

***** Just pick these values

We find that the infiltration rate at the end of the storm $t = t_w = 2hr$ is $0.32\,cm\,hr^{-1}$. The following are sample calculations:

For $F = 0.3cm$, $F < F(t_p)$, and $t < t_p$:

$$t = \frac{F}{w} = \frac{0.3cm}{0.5\,cm\,hr^{-1}} = 0.6\,hr$$

$$f = w = 0.5\,cm\,hr^{-1}$$

$$z'_f = \frac{F}{\phi - \theta_0} = \frac{0.3cm}{0.5 - 0.25} = 1.20\,cm$$

For $F = 0.54\,cm$, $F = F\left(t_p\right)$, and $t_p \le t \le t_w$:

$$t = t_p = 1.08\,hr$$

$$f = f\left(t_p\right) = K_s\left[1 + \frac{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right)}{F}\right]$$

$$f = 0.044\,cm\,hr^{-1}\left[1 + \frac{\left|-22.4\,cm\right| \cdot \left(0.50 - 0.25\right)}{0.54\,cm}\right] = 0.5\,cm\,hr^{-1}$$

$$z'_f = \frac{F}{\phi - \theta_0} = \frac{0.54\,cm}{0.5 - 0.25} = 2.16\,cm$$

For $F = 0.6\,cm$, $F > F\left(t_p\right)$, and $t > t_p$:

$$t = t_p + \frac{1}{K_s}\left[F\left(t\right) - F\left(t_p\right) + \left|\psi_f\right| \cdot \left(\phi - \theta_0\right) \cdot \ln\left(\frac{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right) + F\left(t_p\right)}{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right) + F\left(t\right)}\right)\right]$$

$$t = 1.08\,hr + \frac{1}{0.044\,cm\,hr^{-1}}\left[\begin{array}{l} 0.6\,cm - 0.54\,cm + \left|-22.4\,cm\right| \cdot \left(0.50 - 0.25\right) \cdot \\ \ln\left(\dfrac{\left|-22.4\,cm\right| \cdot \left(0.50 - 0.25\right) + 0.54\,cm}{\left|-22.4\,cm\right| \cdot \left(0.50 - 0.25\right) + 0.6\,cm}\right) \end{array}\right]$$

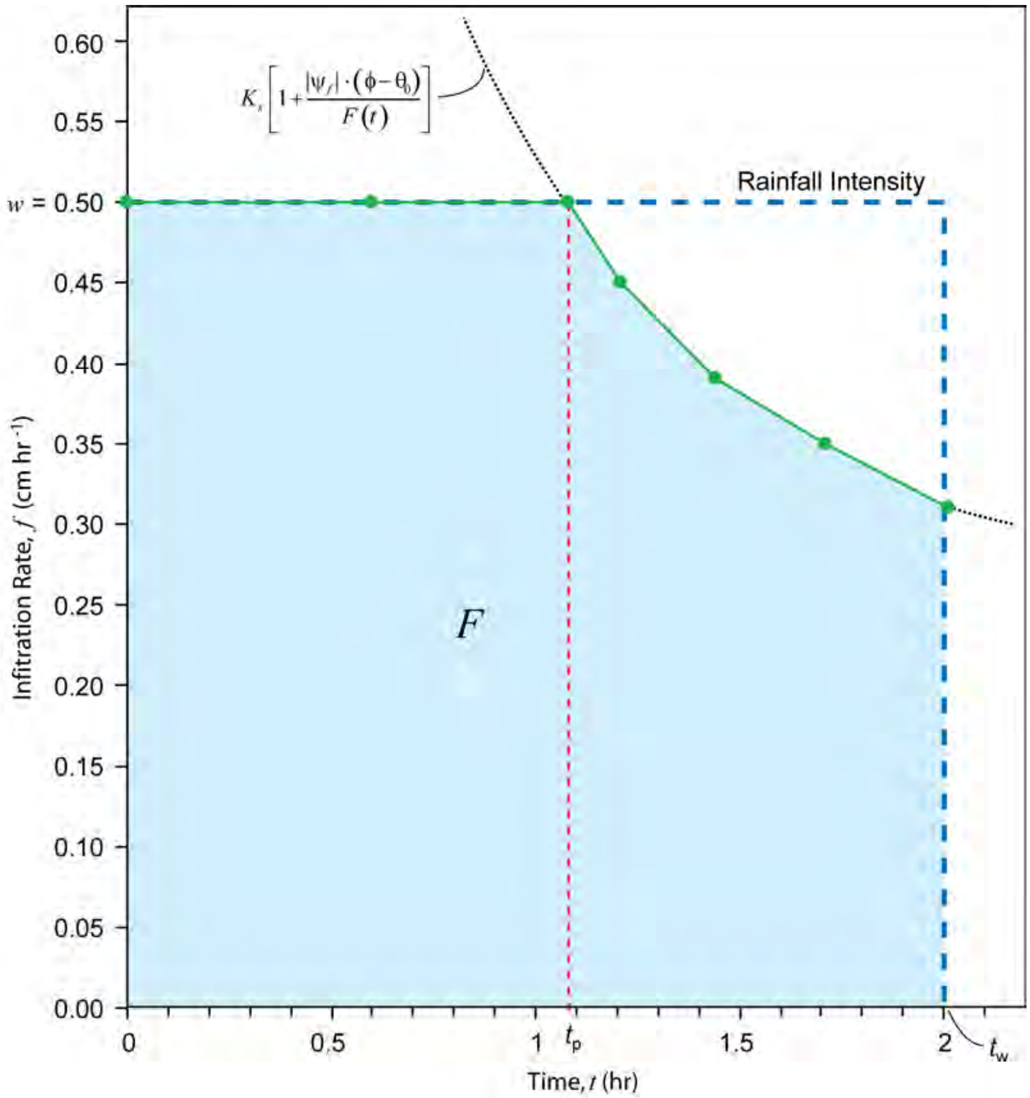
$$t = 1.21\,hr$$

$$f = K_s\left[1 + \frac{\left|\psi_f\right| \cdot \left(\phi - \theta_0\right)}{F}\right] = 0.044\,cm\,hr^{-1}\left[1 + \frac{\left|-22.4\,cm\right| \cdot \left(0.50 - 0.25\right)}{0.6\,cm}\right]$$

$$f = 0.45\,cm\,hr^{-1}$$

$$z'_f = \frac{F}{\phi - \theta_0} = \frac{0.6\,cm}{0.5 - 0.25} = 2.40\,cm$$

Plot the infiltration rate versus time:



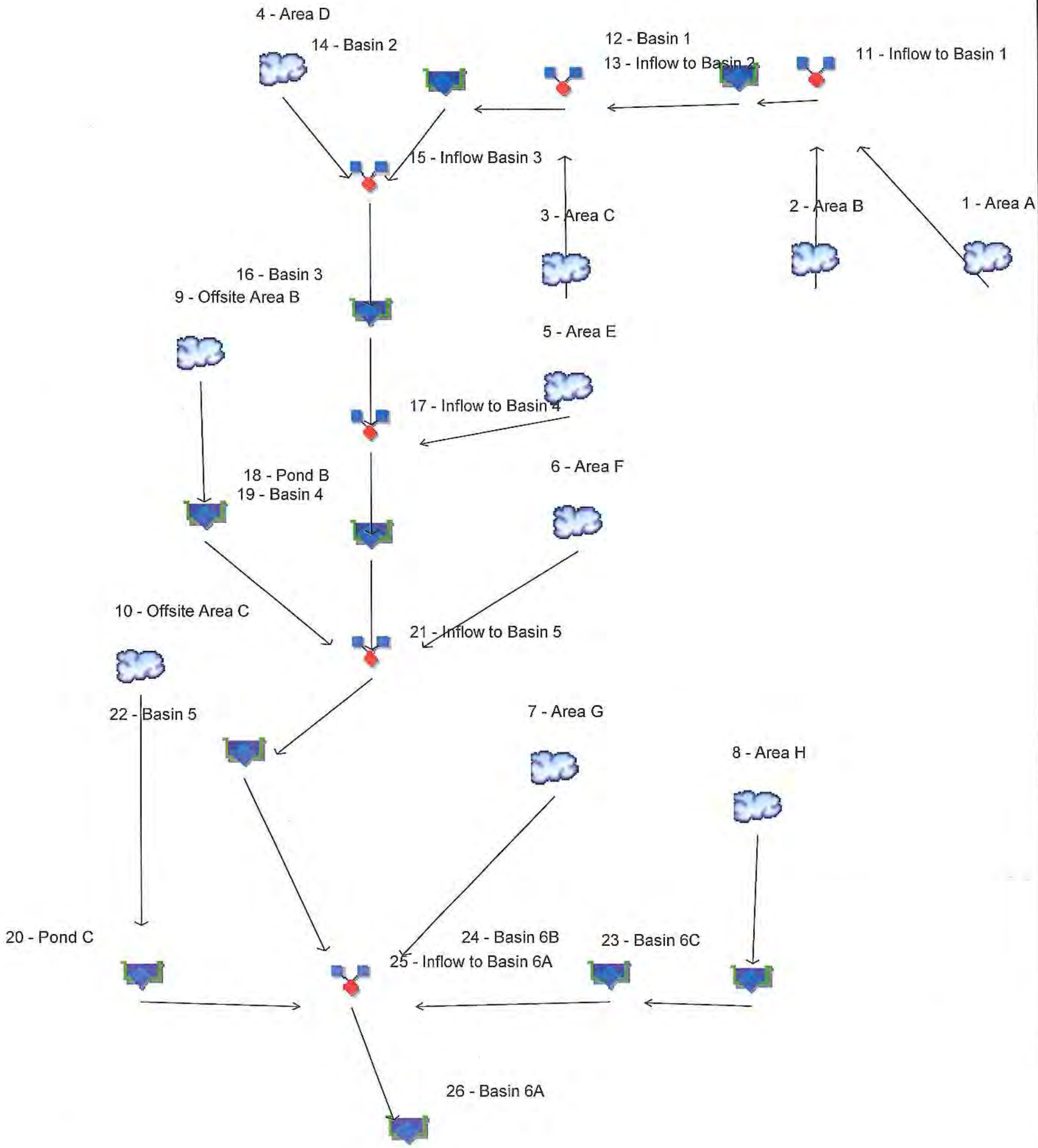
ATTACHMENT 2

MODELING RESULTS

Hydraflow Table of Contents

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Project: SCS Tc 3-7-2013.gpw	Tuesday, Mar 26, 2013

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	20.51	29.86	-------	-------	67.44	86.56	101.68	121.72	Area A
2	SCS Runoff	------	11.74	17.18	-------	-------	39.19	50.34	59.21	70.98	Area B
3	SCS Runoff	------	23.67	34.66	-------	-------	79.08	101.61	119.52	143.29	Area C
4	SCS Runoff	------	4.402	5.842	-------	-------	11.23	13.83	15.84	18.47	Area D
5	SCS Runoff	------	10.59	15.47	-------	-------	35.11	45.10	53.02	63.51	Area E
6	SCS Runoff	------	44.85	63.31	-------	-------	136.11	172.74	201.54	239.54	Area F
7	SCS Runoff	------	24.77	36.08	-------	-------	81.45	104.63	122.99	147.31	Area G
8	SCS Runoff	------	19.14	27.92	-------	-------	63.39	81.49	95.81	114.79	Area H
9	SCS Runoff	------	24.57	34.96	-------	-------	76.24	96.95	113.27	134.83	Offsite Area B
10	SCS Runoff	------	0.000	0.061	-------	-------	1.337	3.185	5.215	8.584	Offsite Area C
11	Combine	1, 2,	31.24	45.57	-------	-------	103.69	133.23	156.68	187.78	Inflow to Basin 1
12	Reservoir	11	0.000	0.000	-------	-------	0.000	0.000	0.000	2.820	Basin 1
13	Combine	3, 12	23.67	34.66	-------	-------	79.08	101.61	119.52	143.29	Inflow to Basin 2
14	Reservoir	13	0.000	0.000	-------	-------	0.000	0.000	0.409	6.115	Basin 2
15	Combine	4, 14	4.402	5.842	-------	-------	11.23	13.83	15.84	18.47	Inflow Basin 3
16	Reservoir	15	0.000	0.000	-------	-------	0.000	0.238	0.560	4.852	Basin 3
17	Combine	5, 16	10.59	15.47	-------	-------	35.11	45.10	53.02	63.60	Inflow to Basin 4
18	Reservoir	9	0.000	0.000	-------	-------	1.440	2.845	4.196	6.377	Pond B
19	Reservoir	17	0.000	0.000	-------	-------	0.000	0.000	0.000	1.599	Basin 4
20	Reservoir	10	0.000	0.000	-------	-------	0.000	0.000	0.000	0.000	Pond C
21	Combine	6, 18, 19,	44.85	63.31	-------	-------	136.11	172.74	201.54	239.54	Inflow to Basin 5
22	Reservoir	21	0.000	0.000	-------	-------	0.000	0.000	0.000	0.000	Basin 5
23	Reservoir	8	16.47	24.94	-------	-------	61.13	79.11	93.50	112.22	Basin 6C
24	Reservoir	23	0.531	2.032	-------	-------	12.63	17.84	21.26	24.34	Basin 6B
25	Combine	7, 20, 22, 24	24.77	36.08	-------	-------	83.72	109.41	132.09	161.29	Inflow to Basin 6A
26	Reservoir	25	0.000	0.000	-------	-------	0.578	2.623	4.103	5.248	Basin 6A

HYDROGRAPH SUMMARY

25 -YEAR EVENT

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	86.56	1	727	294,827	------	------	------	Area A
2	SCS Runoff	50.34	1	733	210,499	------	------	------	Area B
3	SCS Runoff	101.61	1	734	435,821	------	------	------	Area C
4	SCS Runoff	13.83	1	725	43,350	------	------	------	Area D
5	SCS Runoff	45.10	1	729	168,658	------	------	------	Area E
6	SCS Runoff	172.74	1	720	417,736	------	------	------	Area F
7	SCS Runoff	104.63	1	720	253,079	------	------	------	Area G
8	SCS Runoff	81.49	1	721	205,903	------	------	------	Area H
9	SCS Runoff	96.95	1	745	565,248	------	------	------	Offsite Area B
10	SCS Runoff	3.185	1	788	52,961	------	------	------	Offsite Area C
11	Combine	133.23	1	728	505,326	1, 2,	------	------	Inflow to Basin 1
12	Reservoir	0.000	1	736	0	11	879.37	330,929	Basin 1
13	Combine	101.61	1	734	435,821	3, 12	------	------	Inflow to Basin 2
14	Reservoir	0.000	1	749	0	13	872.18	299,006	Basin 2
15	Combine	13.83	1	725	43,350	4, 14	------	------	Inflow Basin 3
16	Reservoir	0.238	1	804	2,085	15	870.18	25,478	Basin 3
17	Combine	45.10	1	729	170,744	5, 16	------	------	Inflow to Basin 4
18	Reservoir	2.845	1	1418	203,311	9	861.52	471,393	Pond B
19	Reservoir	0.000	1	787	0	17	864.38	118,079	Basin 4
20	Reservoir	0.000	1	n/a	0	10	860.18	52,961	Pond C
21	Combine	172.74	1	720	621,045	6, 18, 19,	------	------	Inflow to Basin 5
22	Reservoir	0.000	1	729	0	21	855.95	360,918	Basin 5
23	Reservoir	79.11	1	723	201,974	8	848.74	12,894	Basin 6C
24	Reservoir	17.84	1	738	133,383	23	827.37	79,338	Basin 6B
25	Combine	109.41	1	721	386,462	7, 20, 22, 24	------	------	Inflow to Basin 6A
26	Reservoir	2.623	1	890	54,962	25	827.32	219,924	Basin 6A

Hydrograph Report

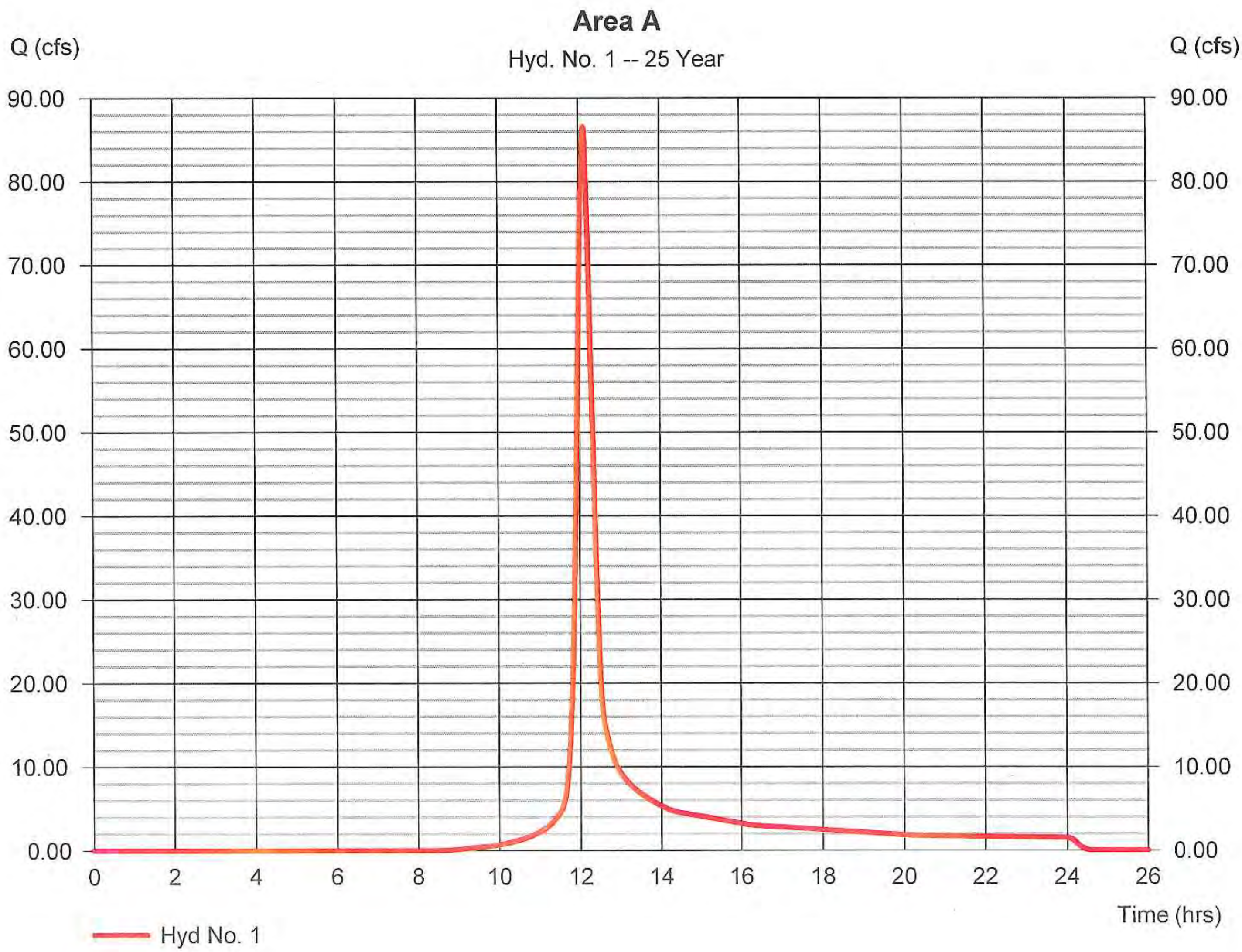
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 1

Area A

Hydrograph type	= SCS Runoff	Peak discharge	= 86.56 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 294,827 cuft
Drainage area	= 33.970 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(33.520 x 76) + (0.310 x 71) + (0.140 x 98)] / 33.970



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 1

Area A

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 116.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 25.00		0.00		0.00		
Travel Time (min)	**= 6.26**	**+**	**0.00**	**+**	**0.00**	**=**	**6.26**
Shallow Concentrated Flow							
Flow length (ft)	= 1500.00		0.00		0.00		
Watercourse slope (%)	= 2.00		0.00		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=2.28		0.00		0.00		
Travel Time (min)	**= 10.96**	**+**	**0.00**	**+**	**0.00**	**=**	**10.96**
Channel Flow							
X sectional flow area (sqft)	= 16.00		24.00		23.75		
Wetted perimeter (ft)	= 16.49		18.65		17.81		
Channel slope (%)	= 2.00		25.00		2.65		
Manning's n-value	= 0.040		0.040		0.040		
Velocity (ft/s)	=5.16						
			22.05				
					7.35		
Flow length (ft)	({0})1100.0		329.0		533.0		
Travel Time (min)	**= 3.55**	**+**	**0.25**	**+**	**1.21**	**=**	**5.01**
Total Travel Time, Tc							**22.20 min**

Hydrograph Report

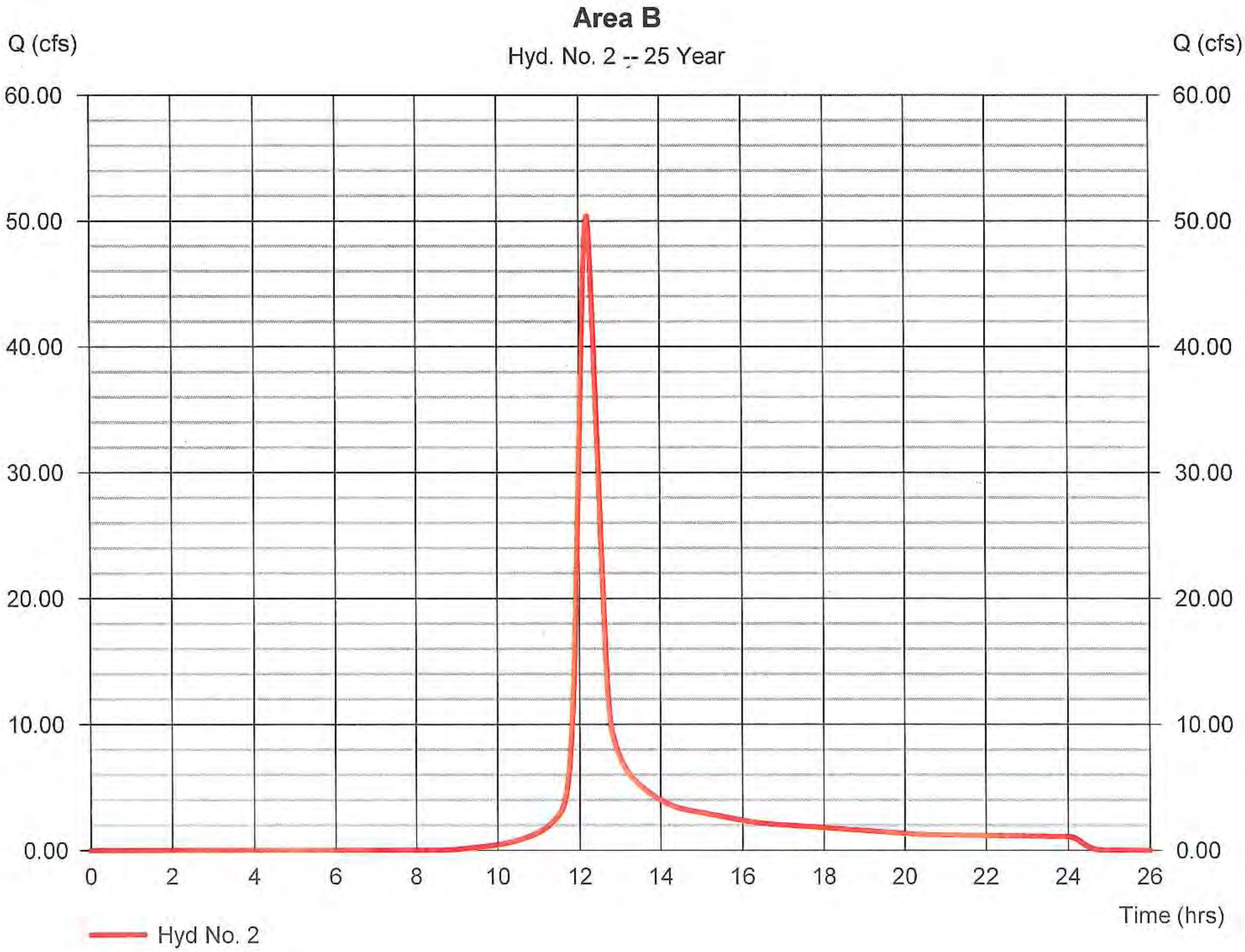
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 2

Area B

Hydrograph type	= SCS Runoff	Peak discharge	= 50.34 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 210,499 cuft
Drainage area	= 23.880 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.00 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.444 x 76) + (0.974 x 98) + (6.462 x 71)] / 23.880



TR55 Tc Worksheet

Hyd. No. 2

Area B

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 200.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 26.56**	**+**	**0.00**	**+**	**0.00**	**=**	**26.56**
Shallow Concentrated Flow							
Flow length (ft)	= 590.00		100.00		0.00		
Watercourse slope (%)	= 2.00		25.00		0.00		
Surface description	= Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=2.28		8.07		0.00		
Travel Time (min)	**= 4.31**	**+**	**0.21**	**+**	**0.00**	**=**	**4.52**
Channel Flow							
X sectional flow area (sqft)	= 16.00		24.00		0.00		
Wetted perimeter (ft)	= 16.49		18.65		0.00		
Channel slope (%)	= 2.00		25.00		0.00		
Manning's n-value	= 0.025		0.040		0.015		
Velocity (ft/s)	=8.26						
			22.05				
					0.00		
Flow length (ft)	({0})243.0		512.0		0.0		
Travel Time (min)	**= 0.49**	**+**	**0.39**	**+**	**0.00**	**=**	**0.88**

Total Travel Time, Tc .... 32.00 min

Hydrograph Report

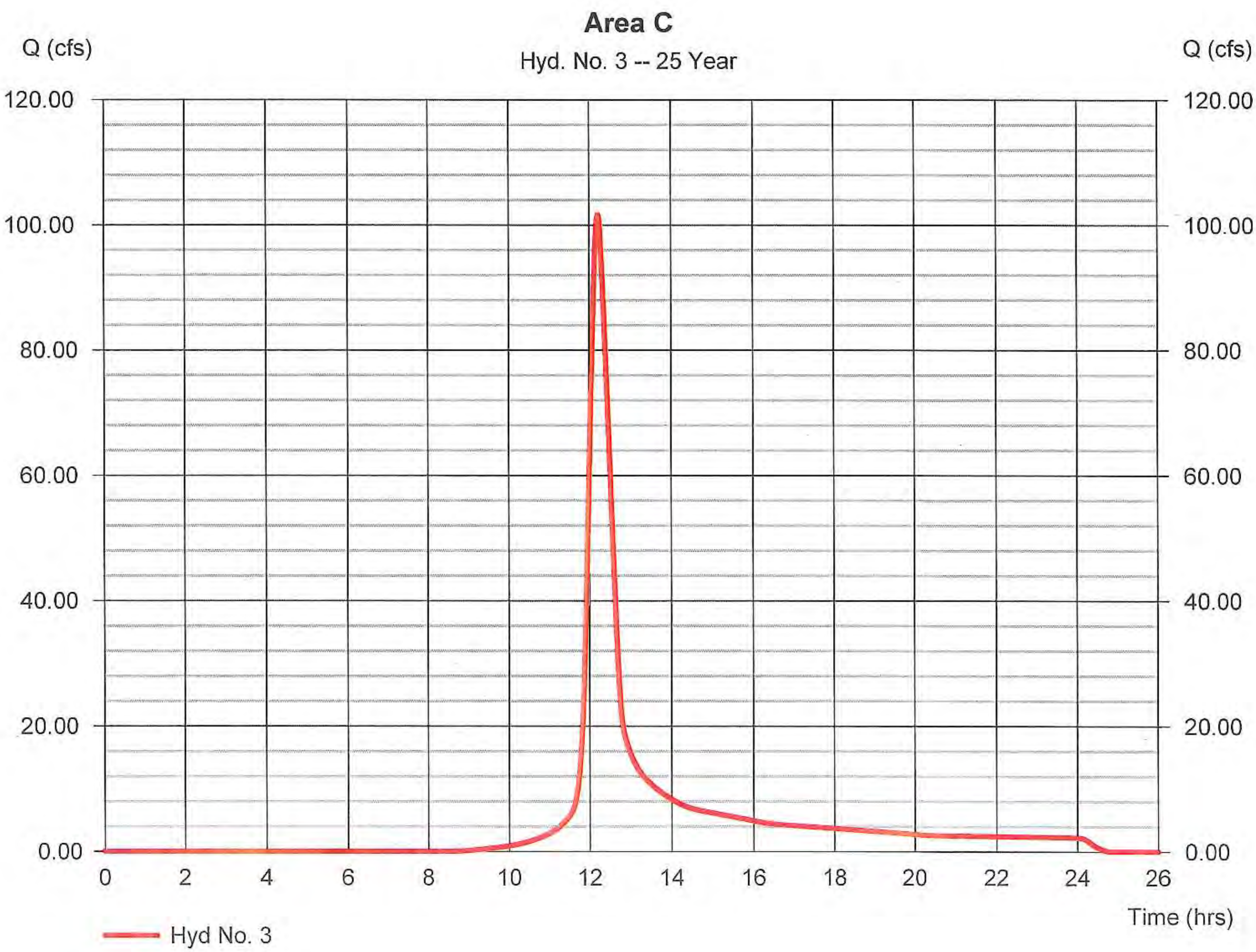
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 3

Area C

Hydrograph type	= SCS Runoff	Peak discharge	= 101.61 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 435,821 cuft
Drainage area	= 50.080 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.30 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(43.120 x 76) + (5.380 x 71) + (1.580 x 98)] / 50.080



TR55 Tc Worksheet

Hyd. No. 3

Area C

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	200.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.80		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	=	**26.56**	+	**0.00**	+	**0.00**	=	**26.56**
Shallow Concentrated Flow								
Flow length (ft)	=	116.00		0.00		0.00		
Watercourse slope (%)	=	25.00		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	8.07		0.00		0.00		
Travel Time (min)	=	**0.24**	+	**0.00**	+	**0.00**	=	**0.24**
Channel Flow								
X sectional flow area (sqft)	=	16.00		16.00		24.00		
Wetted perimeter (ft)	=	16.49		16.49		18.65		
Channel slope (%)	=	2.00		2.00		25.00		
Manning's n-value	=	0.025		0.040		0.040		
Velocity (ft/s)	=	8.26						
				5.16				
						22.05		
Flow length (ft)		({0})570.0		1210.0		530.0		
Travel Time (min)	=	**1.15**	+	**3.91**	+	**0.40**	=	**5.46**

Total Travel Time, Tc .... 32.30 min

Hydrograph Report

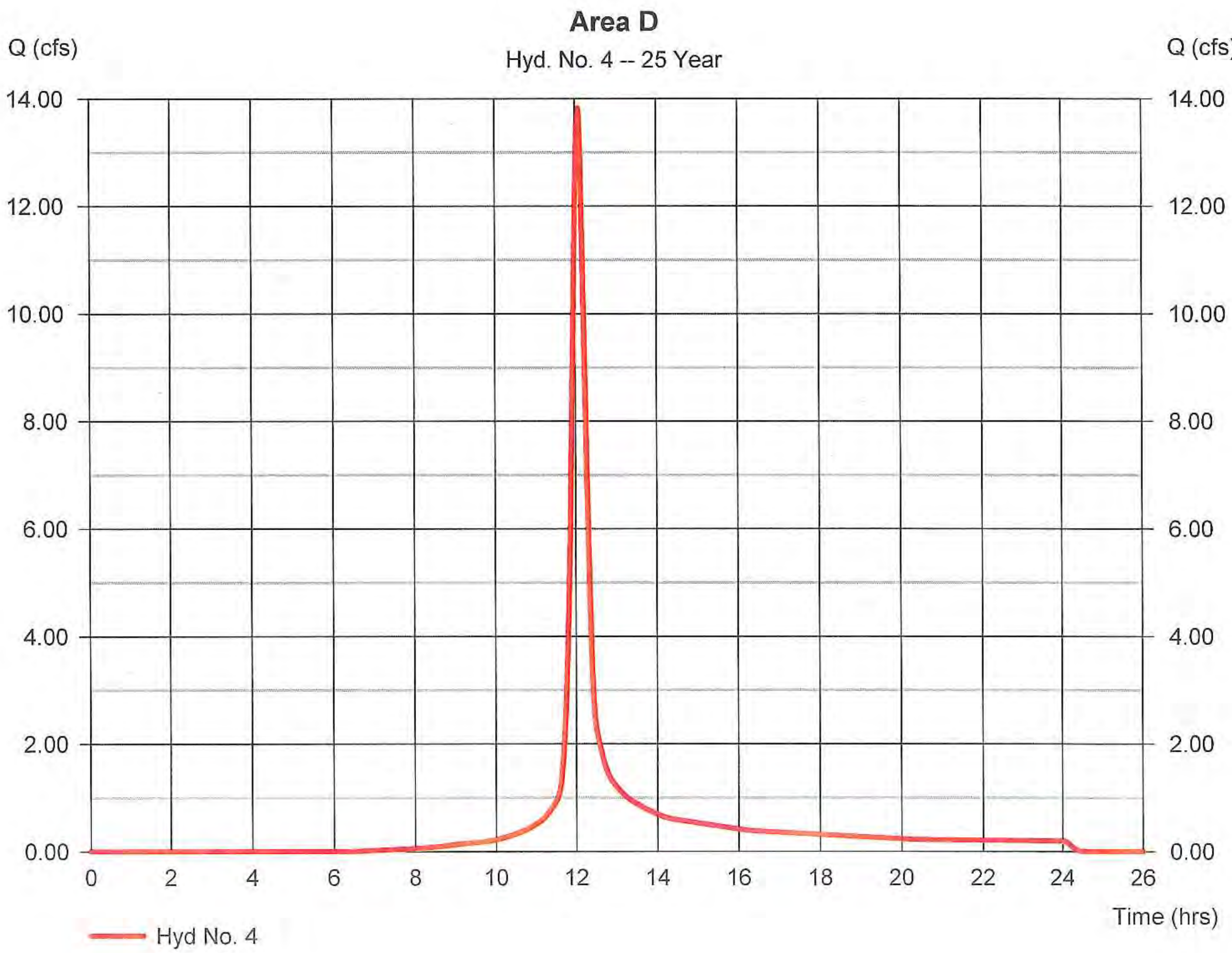
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 4

Area D

Hydrograph type	= SCS Runoff	Peak discharge	= 13.83 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 43,350 cuft
Drainage area	= 3.930 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.10 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.770 x 98) + (1.927 x 71) + (0.233 x 76)] / 3.930



TR55 Tc Worksheet

Hyd. No. 4

Area D

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 161.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 2.60		0.00		0.00		
Travel Time (min)	**= 20.11**	+	**0.00**	+	**0.00**	=	**20.11**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	+	**0.00**	+	**0.00**	=	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.025		0.025		0.015		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc .... **20.10 min**

Hydrograph Report

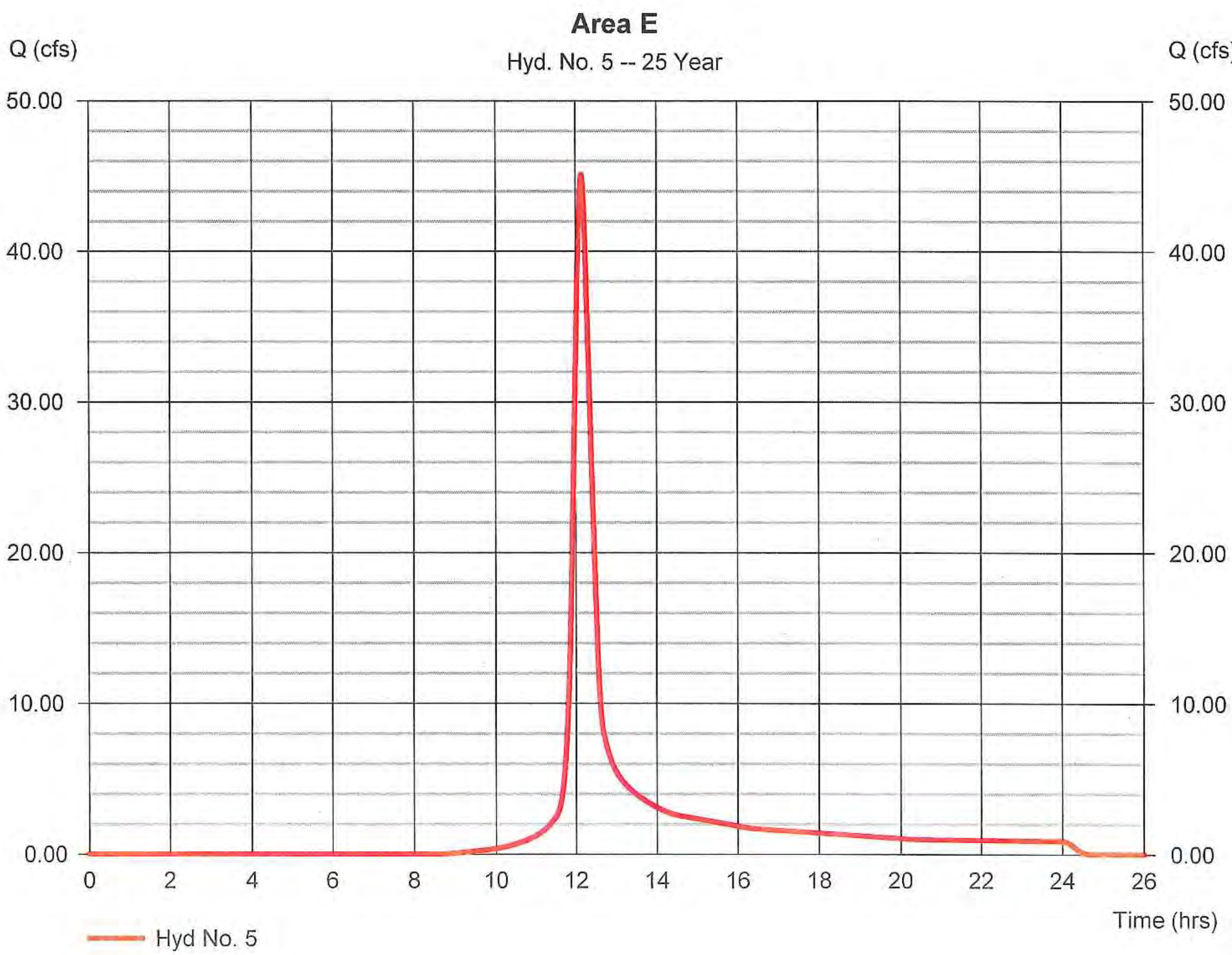
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 5

Area E

Hydrograph type	= SCS Runoff	Peak discharge	= 45.10 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 168,658 cuft
Drainage area	= 19.110 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 26.00 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(15.330 x 76) + (3.040 x 71) + (0.740 x 98)] / 19.110



TR55 Tc Worksheet

Hyd. No. 5

Area E

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	170.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.80		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**23.32**	**+**	**0.00**	**+**	**0.00**	**=**	**23.32**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	16.00		24.00		0.00		
Wetted perimeter (ft)	=	16.49		18.65		0.00		
Channel slope (%)	=	2.00		25.00		0.00		
Manning's n-value	=	0.025		0.040		0.040		
Velocity (ft/s)	=	8.26		22.05		0.00		
Flow length (ft)		({0})1241.0		250.0		0.0		
Travel Time (min)	**=**	**2.50**	**+**	**0.19**	**+**	**0.00**	**=**	**2.69**

Total Travel Time, Tc .... 26.00 min

Hydrograph Report

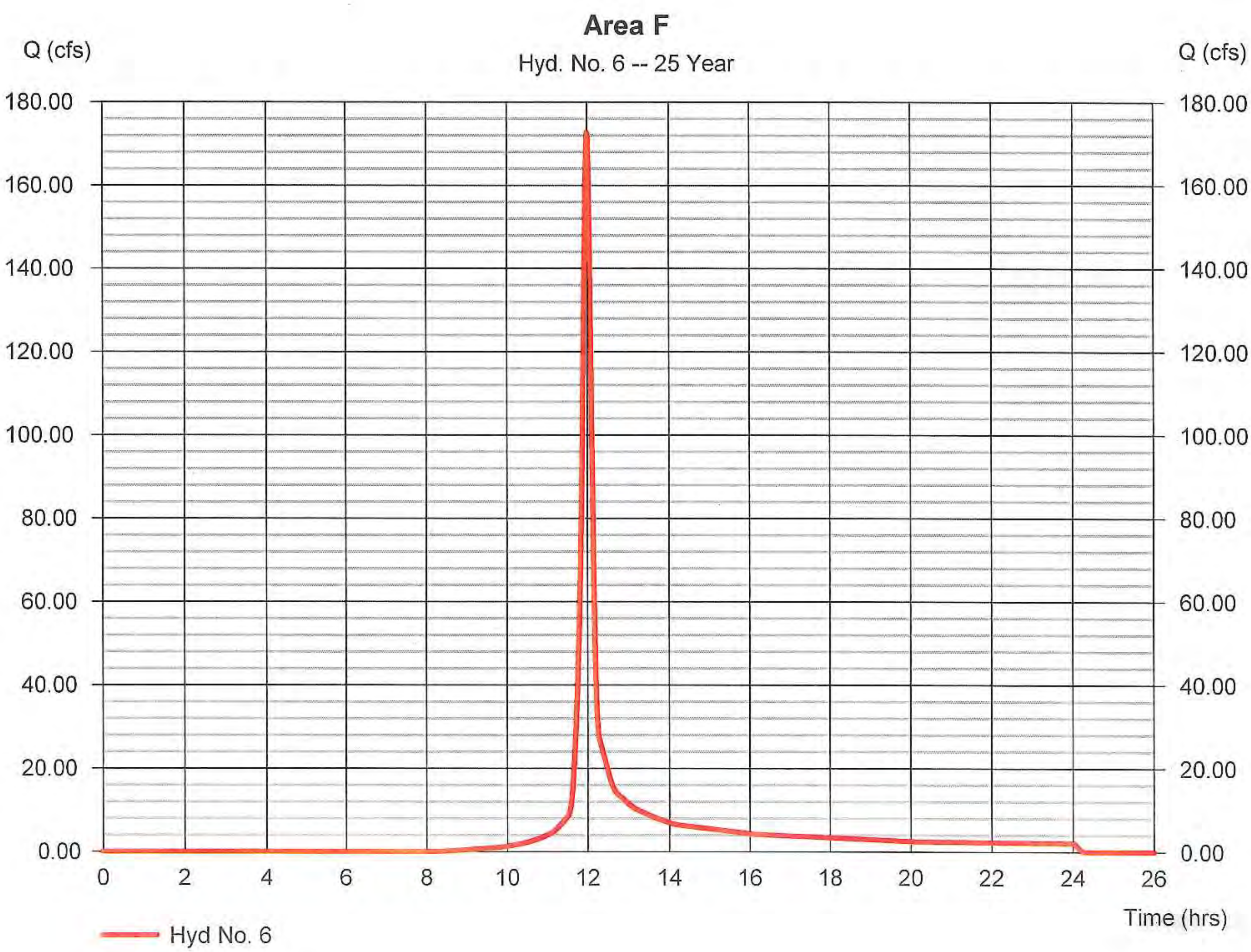
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 6

Area F

Hydrograph type	= SCS Runoff	Peak discharge	= 172.74 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 417,736 cuft
Drainage area	= 45.260 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(31.720 x 76) + (9.890 x 71) + (3.650 x 98)] / 45.260



TR55 Tc Worksheet

Hyd. No. 6

Area F

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 110.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 25.00		0.00		0.00		
Travel Time (min)	**= 5.99**	**+**	**0.00**	**+**	**0.00**	**=**	**5.99**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 16.00		16.00		24.00		
Wetted perimeter (ft)	= 16.49		16.49		18.65		
Channel slope (%)	= 2.00		2.00		25.00		
Manning's n-value	= 0.025		0.040		0.040		
Velocity (ft/s)	=8.26		5.16		22.05		
Flow length (ft)	({0})1500.0		650.0		360.0		
Travel Time (min)	**= 3.03**	**+**	**2.10**	**+**	**0.27**	**=**	**5.40**

Total Travel Time, Tc .... 11.40 min

Hydrograph Report

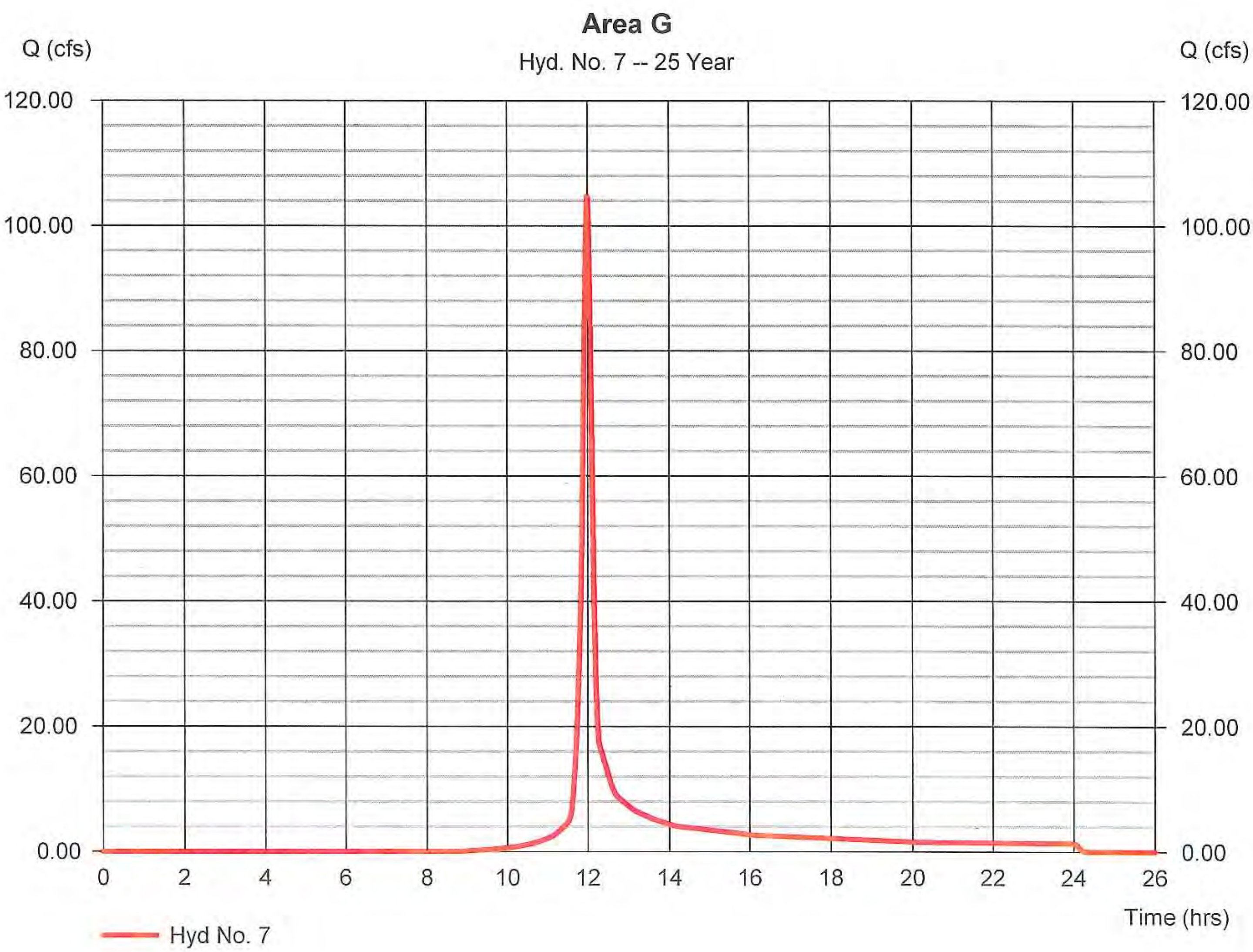
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 7

Area G

Hydrograph type	= SCS Runoff	Peak discharge	= 104.63 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 253,079 cuft
Drainage area	= 29.420 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(13.930 x 76) + (13.090 x 71) + (0.090 x 98) + (2.310 x 89)] / 29.420



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 7

Area G

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	86.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.80		0.00		0.00		
Land slope (%)	=	25.00		0.00		0.00		
Travel Time (min)	=	**4.92**	+	**0.00**	+	**0.00**	=	**4.92**
Shallow Concentrated Flow								
Flow length (ft)	=	620.00		0.00		0.00		
Watercourse slope (%)	=	2.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	2.28		0.00		0.00		
Travel Time (min)	=	**4.53**	+	**0.00**	+	**0.00**	=	**4.53**
Channel Flow								
X sectional flow area (sqft)	=	23.75		0.00		0.00		
Wetted perimeter (ft)	=	17.81		0.00		0.00		
Channel slope (%)	=	2.00		0.00		0.00		
Manning's n-value	=	0.025		0.040		0.015		
Velocity (ft/s)	=	10.22		0.00		0.00		
Flow length (ft)		({0})1242.0		0.0		0.0		
Travel Time (min)	=	**2.03**	+	**0.00**	+	**0.00**	=	**2.03**

Total Travel Time, Tc .... **11.50 min**

Hydrograph Report

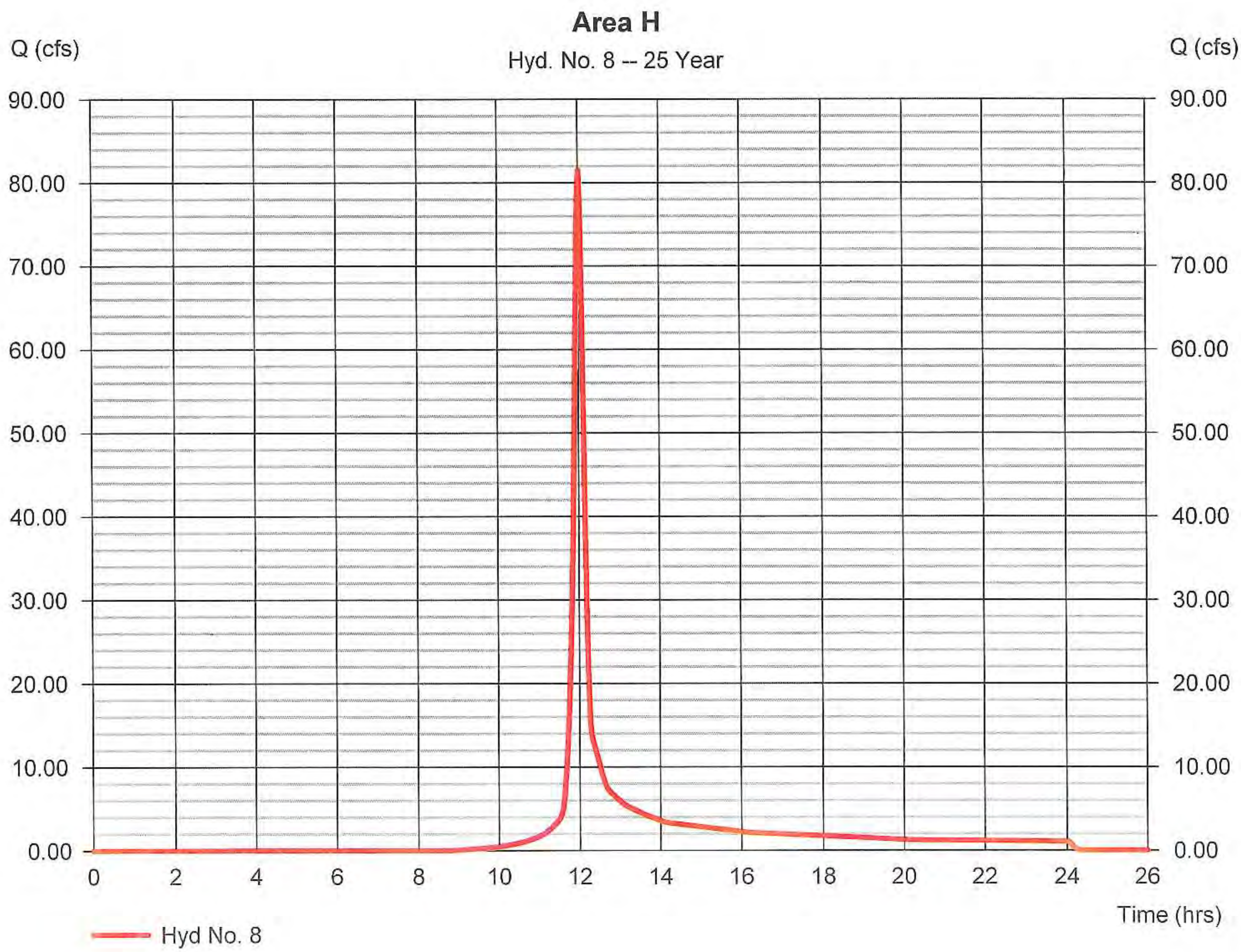
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 8

Area H

Hydrograph type	= SCS Runoff	Peak discharge	= 81.49 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 205,903 cuft
Drainage area	= 24.750 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.40 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.850 x 76) + (1.270 x 89) + (6.630 x 71)] / 24.750



TR55 Tc Worksheet

Hyd. No. 8

Area H

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.240		0.011		
Flow length (ft)	= 74.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 25.00		0.00		0.00		
Travel Time (min)	**= 4.37**	**+**	**0.00**	**+**	**0.00**	**=**	**4.37**
Shallow Concentrated Flow							
Flow length (ft)	= 408.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=1.61		0.00		0.00		
Travel Time (min)	**= 4.21**	**+**	**0.00**	**+**	**0.00**	**=**	**4.21**
Channel Flow							
X sectional flow area (sqft)	= 23.75		24.00		3.14		
Wetted perimeter (ft)	= 17.81		18.65		6.28		
Channel slope (%)	= 5.30		0.50		14.50		
Manning's n-value	= 0.025		0.025		0.010		
Velocity (ft/s)	=16.64						
			4.99				
					35.68		
Flow length (ft)	({0})412.0		1000.0		130.0		
Travel Time (min)	**= 0.41**	**+**	**3.34**	**+**	**0.06**	**=**	**3.81**

Total Travel Time, Tc .... 12.40 min

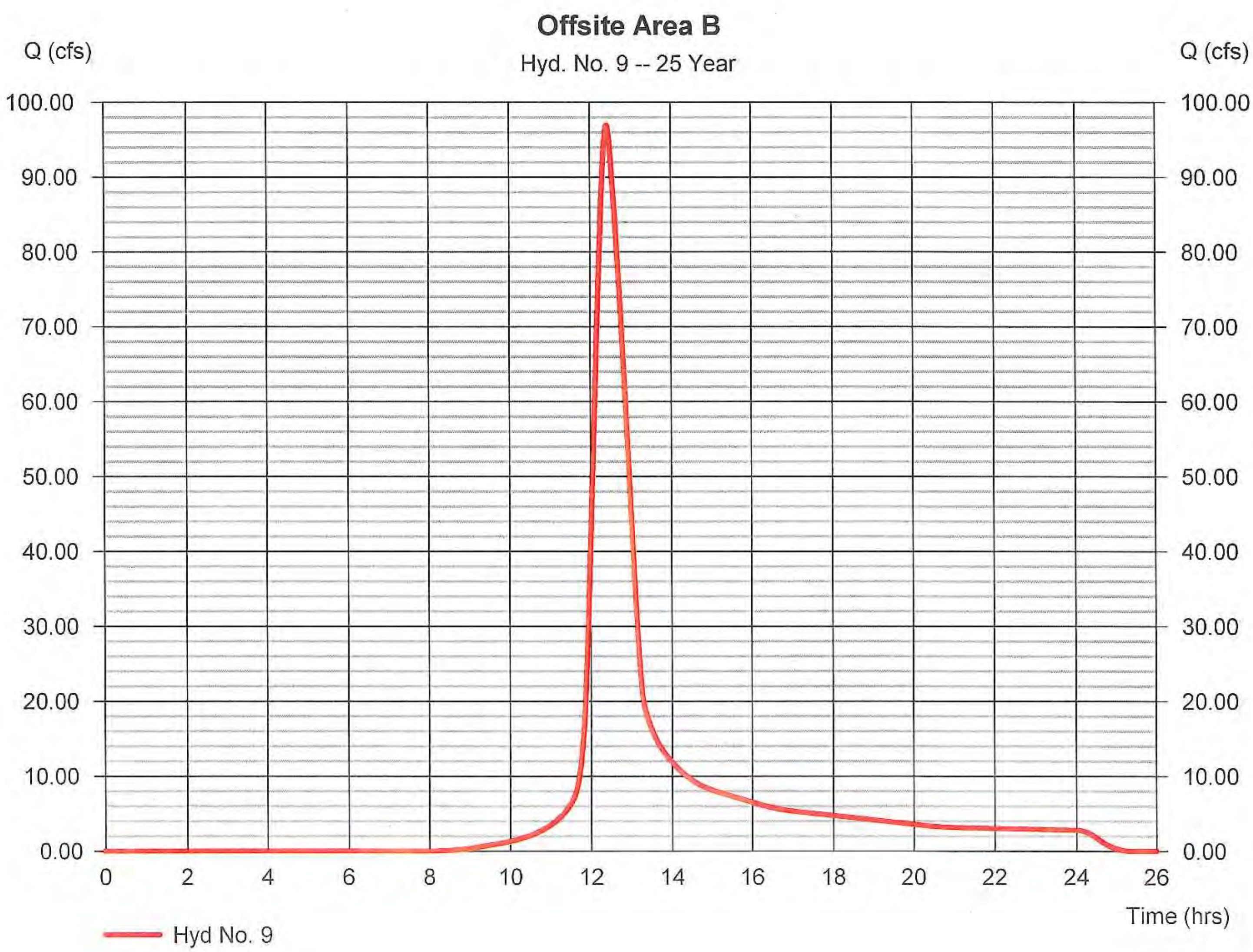
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 9

Offsite Area B

Hydrograph type	= SCS Runoff	Peak discharge	= 96.95 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 565,248 cuft
Drainage area	= 60.000 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 9

Offsite Area B

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 1.25		0.00		0.00		
Travel Time (min)	**= 33.65**	**+**	**0.00**	**+**	**0.00**	**=**	**33.65**
Shallow Concentrated Flow							
Flow length (ft)	= 700.00		0.00		0.00		
Watercourse slope (%)	= 1.25		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.80		0.00		0.00		
Travel Time (min)	**= 6.47**	**+**	**0.00**	**+**	**0.00**	**=**	**6.47**
Channel Flow							
X sectional flow area (sqft)	= 5.00		0.00		0.00		
Wetted perimeter (ft)	= 8.32		0.00		0.00		
Channel slope (%)	= 1.50		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=4.32		0.00		0.00		
Flow length (ft)	({0})3000.0		0.0		0.0		
Travel Time (min)	**= 11.56**	**+**	**0.00**	**+**	**0.00**	**=**	**11.56**

Total Travel Time, Tc .... 51.70 min

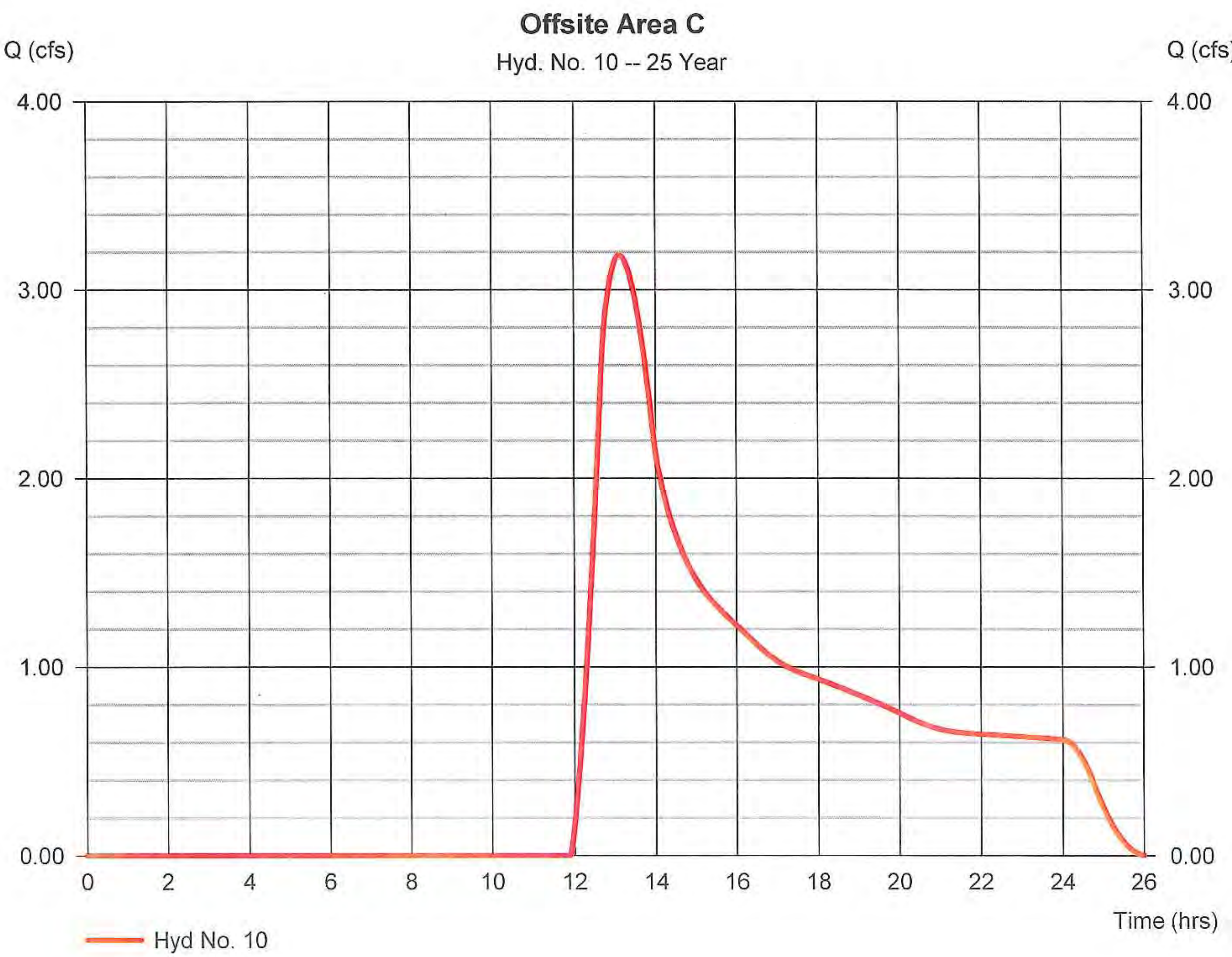
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 10

Offsite Area C

Hydrograph type	= SCS Runoff	Peak discharge	= 3.185 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.13 hrs
Time interval	= 1 min	Hyd. volume	= 52,961 cuft
Drainage area	= 37.000 ac	Curve number	= 45
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 79.40 min
Total precip.	= 4.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 10

Offsite Area C

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.80		0.00		0.00		
Land slope (%)	= 1.25		0.00		0.00		
Travel Time (min)	**= 66.72**	**+**	**0.00**	**+**	**0.00**	**=**	**66.72**
Shallow Concentrated Flow							
Flow length (ft)	= 700.00		0.00		0.00		
Watercourse slope (%)	= 2.80		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.70		0.00		0.00		
Travel Time (min)	**= 4.32**	**+**	**0.00**	**+**	**0.00**	**=**	**4.32**
Channel Flow							
X sectional flow area (sqft)	= 5.00		0.00		0.00		
Wetted perimeter (ft)	= 8.32		0.00		0.00		
Channel slope (%)	= 2.00		0.00		0.00		
Manning's n-value	= 0.025		0.015		0.015		
Velocity (ft/s)	=5.99		0.00		0.00		
Flow length (ft)	({0})3000.0		0.0		0.0		
Travel Time (min)	**= 8.34**	**+**	**0.00**	**+**	**0.00**	**=**	**8.34**

Total Travel Time, Tc .... 79.40 min

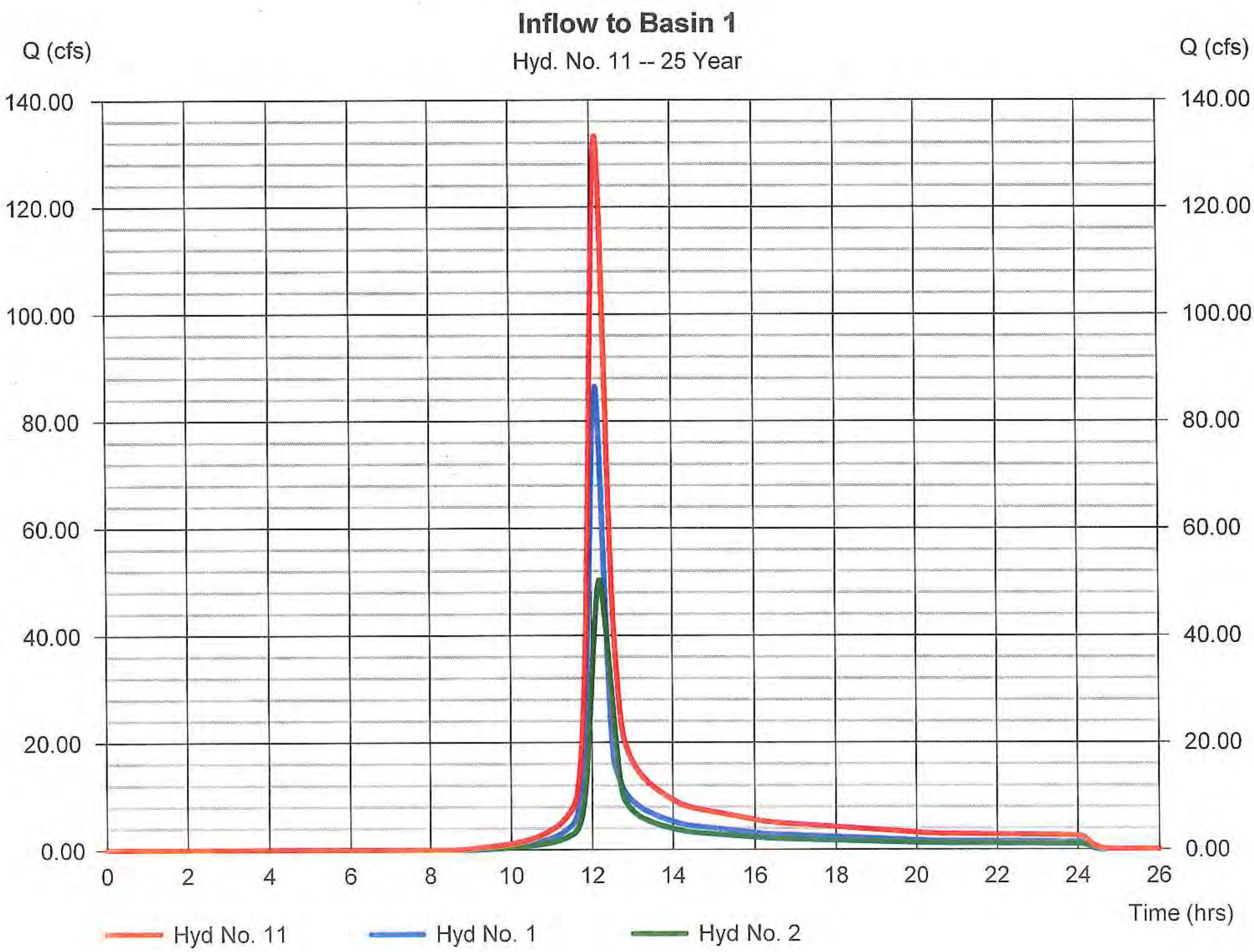
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 11

Inflow to Basin 1

Hydrograph type	= Combine	Peak discharge	= 133.23 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 505,326 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 57.850 ac



Hydrograph Report

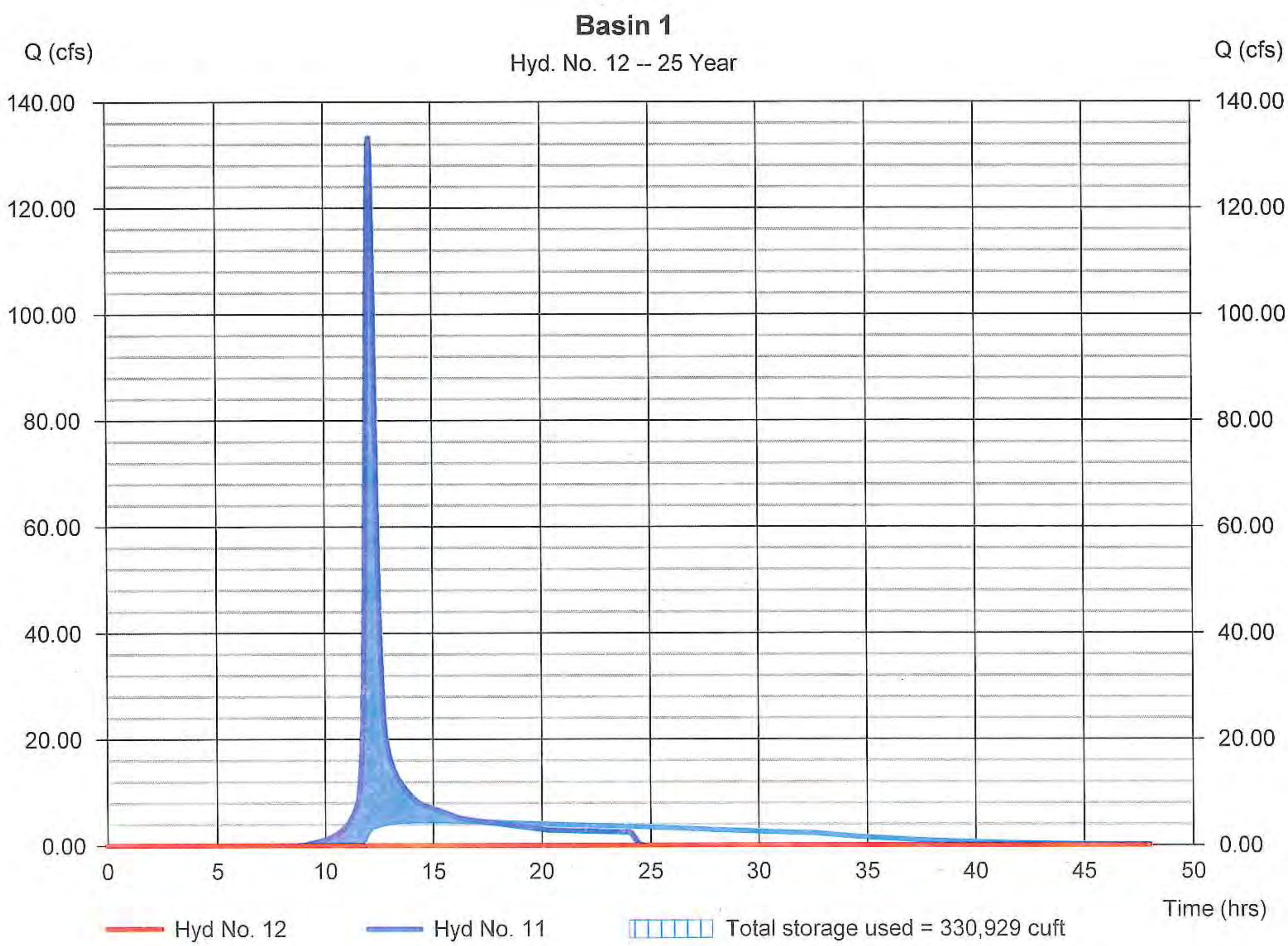
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 12

Basin 1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 11 - Inflow to Basin 1	Max. Elevation	= 879.37 ft
Reservoir name	= Basin 1	Max. Storage	= 330,929 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Pond No. 1 - Basin 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 874.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	874.00	50,307	0	0
4.00	878.00	66,810	233,432	233,432
6.00	880.00	75,484	142,192	375,623
12.00	886.00	96,621	514,961	890,584

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	Inactive	Inactive	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 876.00	0.00	0.00	0.00
Length (ft)	= 80.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 881.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	874.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
4.00	233,432	878.00	0.00	---	---	---	0.00	---	---	---	4.640	---	4.640
6.00	375,623	880.00	0.00	---	---	---	0.00	---	---	---	5.242	---	5.242
12.00	890,584	886.00	45.35 ic	---	---	---	45.30 s	---	---	---	6.710	---	52.00

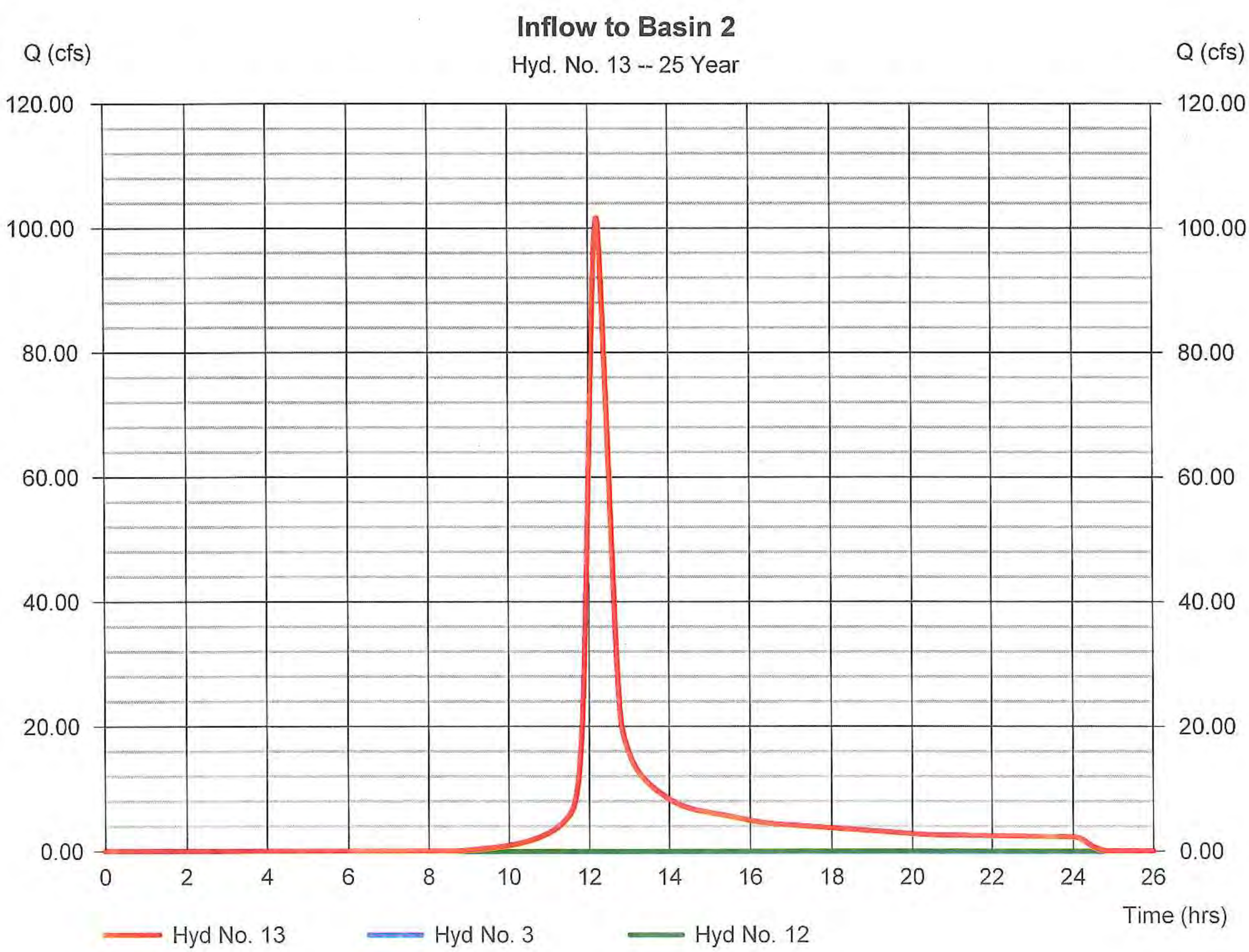
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 13

Inflow to Basin 2

Hydrograph type	= Combine	Peak discharge	= 101.61 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 435,821 cuft
Inflow hyds.	= 3, 12	Contrib. drain. area	= 50.080 ac



Hydrograph Report

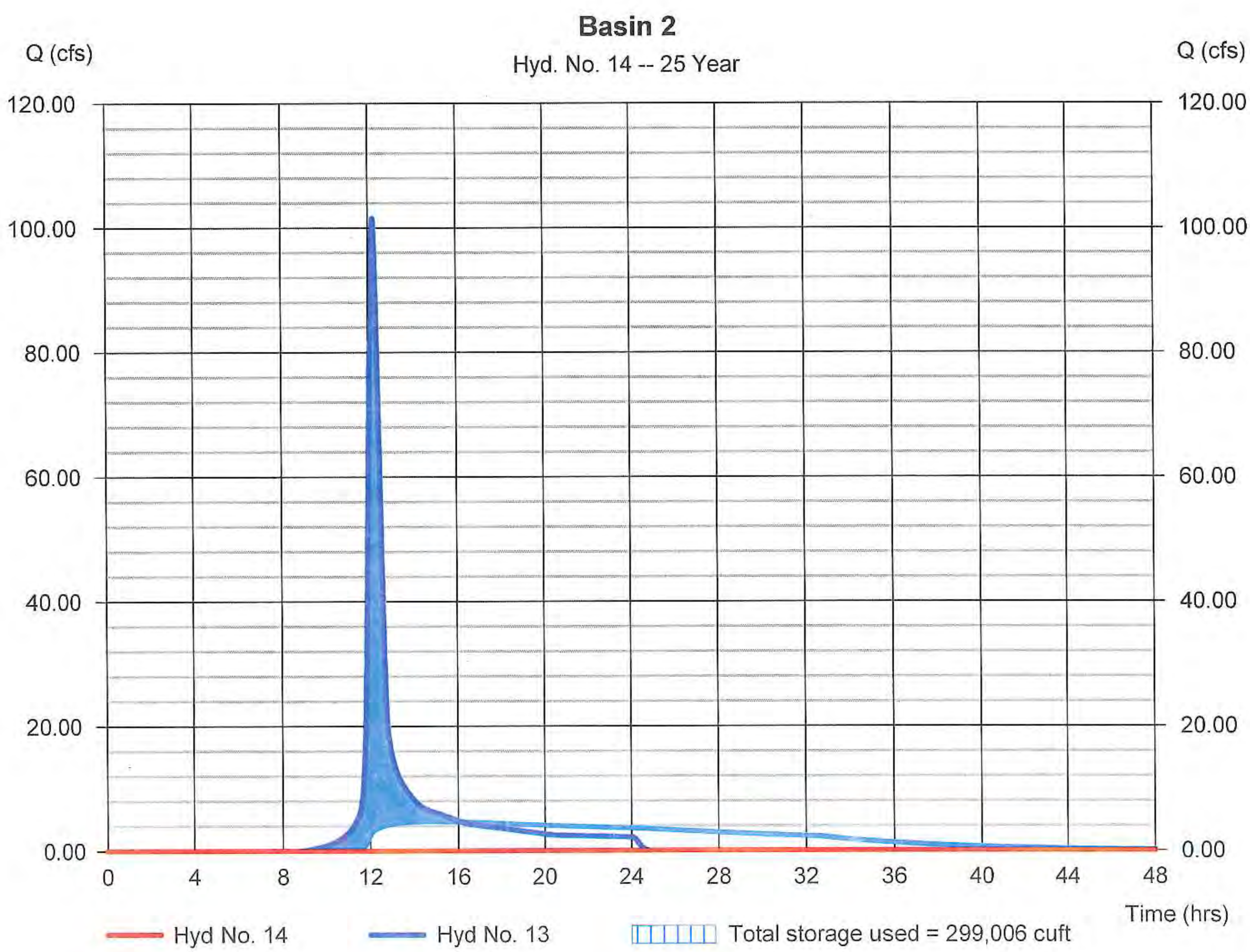
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 14

Basin 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.48 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 13 - Inflow to Basin 2	Max. Elevation	= 872.18 ft
Reservoir name	= Basin 2	Max. Storage	= 299,006 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Pond No. 3 - Basin 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 862.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	862.00	8,405	0	0
8.00	870.00	42,357	185,662	185,662
12.00	874.00	62,345	208,099	393,762
14.00	876.00	73,340	135,523	529,284

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	Inactive	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 873.00	0.00	0.00	0.00
Length (ft)	= 250.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 878.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 3.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	862.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
8.00	185,662	870.00	0.00	---	---	---	0.00	---	---	---	2.941	---	2.941
12.00	393,762	874.00	5.36 ic	---	---	---	0.00	---	---	---	4.329	---	9.688
14.00	529,284	876.00	21.39 ic	---	---	---	0.00	---	---	---	5.093	---	26.48

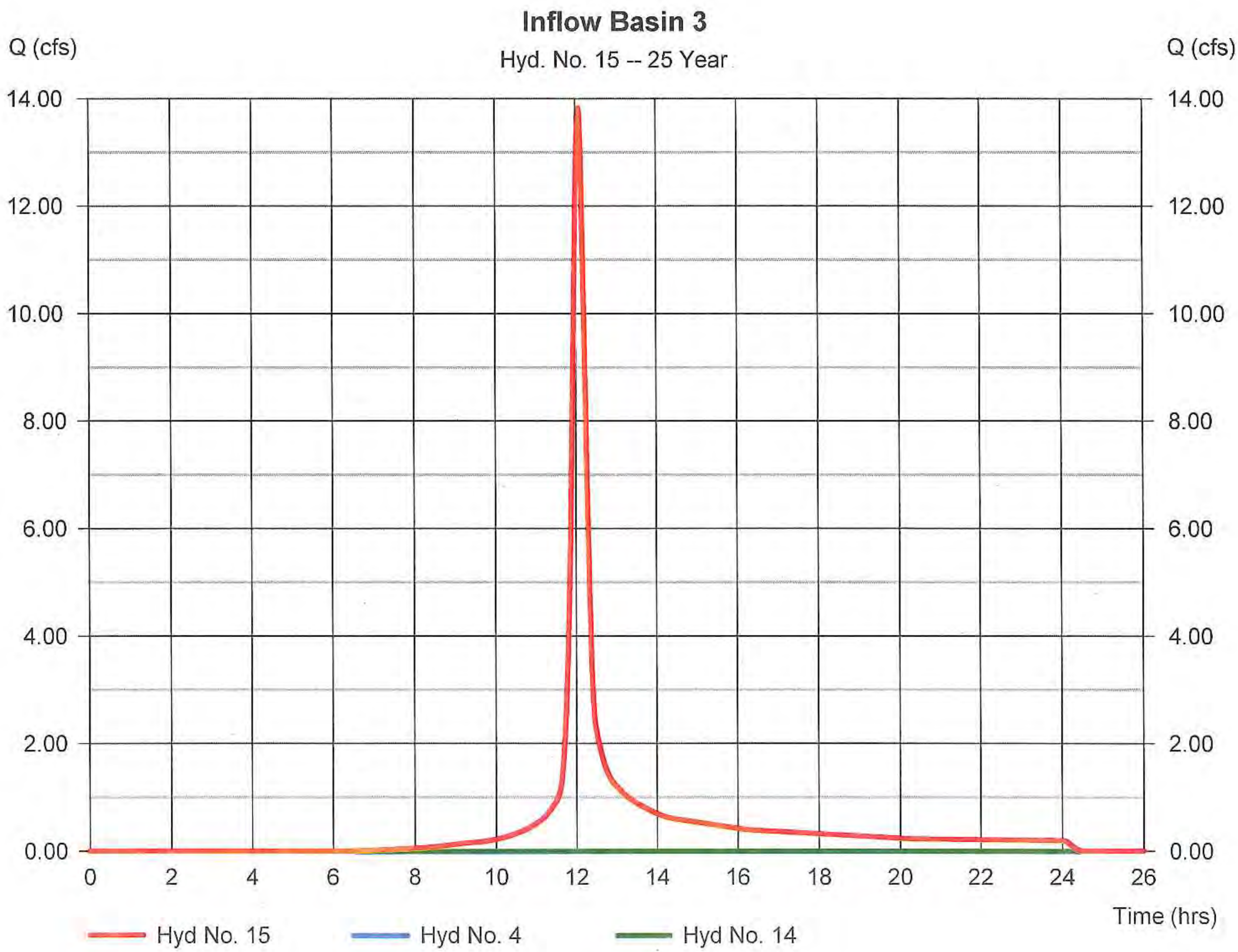
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 15

Inflow Basin 3

Hydrograph type	= Combine	Peak discharge	= 13.83 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 43,350 cuft
Inflow hyds.	= 4, 14	Contrib. drain. area	= 3.930 ac



Hydrograph Report

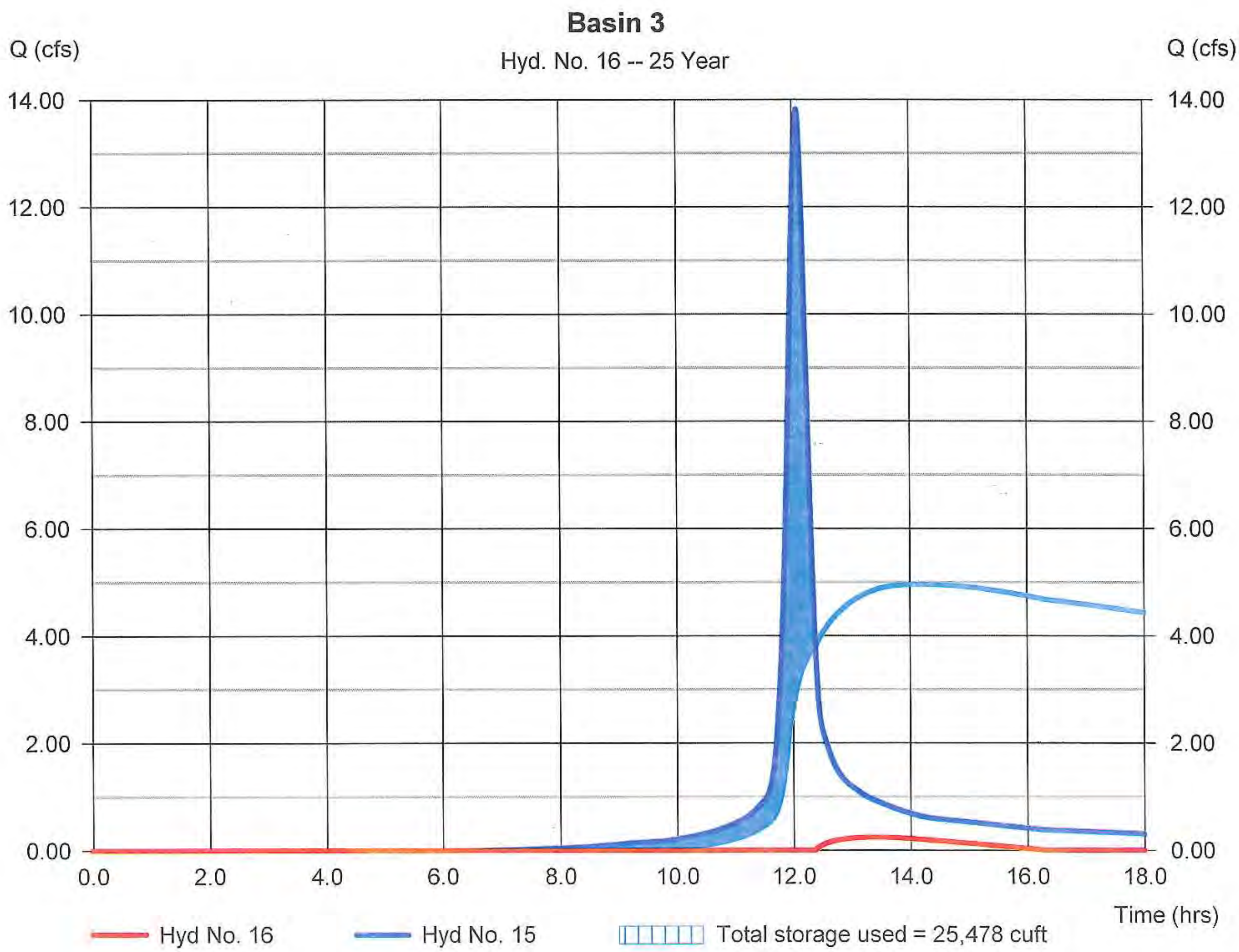
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 16

Basin 3

Hydrograph type	= Reservoir	Peak discharge	= 0.238 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.40 hrs
Time interval	= 1 min	Hyd. volume	= 2,085 cuft
Inflow hyd. No.	= 15 - Inflow Basin 3	Max. Elevation	= 870.18 ft
Reservoir name	= Basin 3	Max. Storage	= 25,478 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Pond No. 4 - Basin 3

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 866.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	866.00	2,623	0	0
4.00	870.00	9,580	22,952	22,952
8.00	874.00	18,663	55,480	78,432

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	Inactive	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 870.00	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 0.10	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 871.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 3.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	866.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
4.00	22,952	870.00	0.00	---	---	---	0.00	---	---	---	0.665	---	0.665
8.00	78,432	874.00	22.10 oc	---	---	---	0.00	---	---	---	1.296	---	23.40

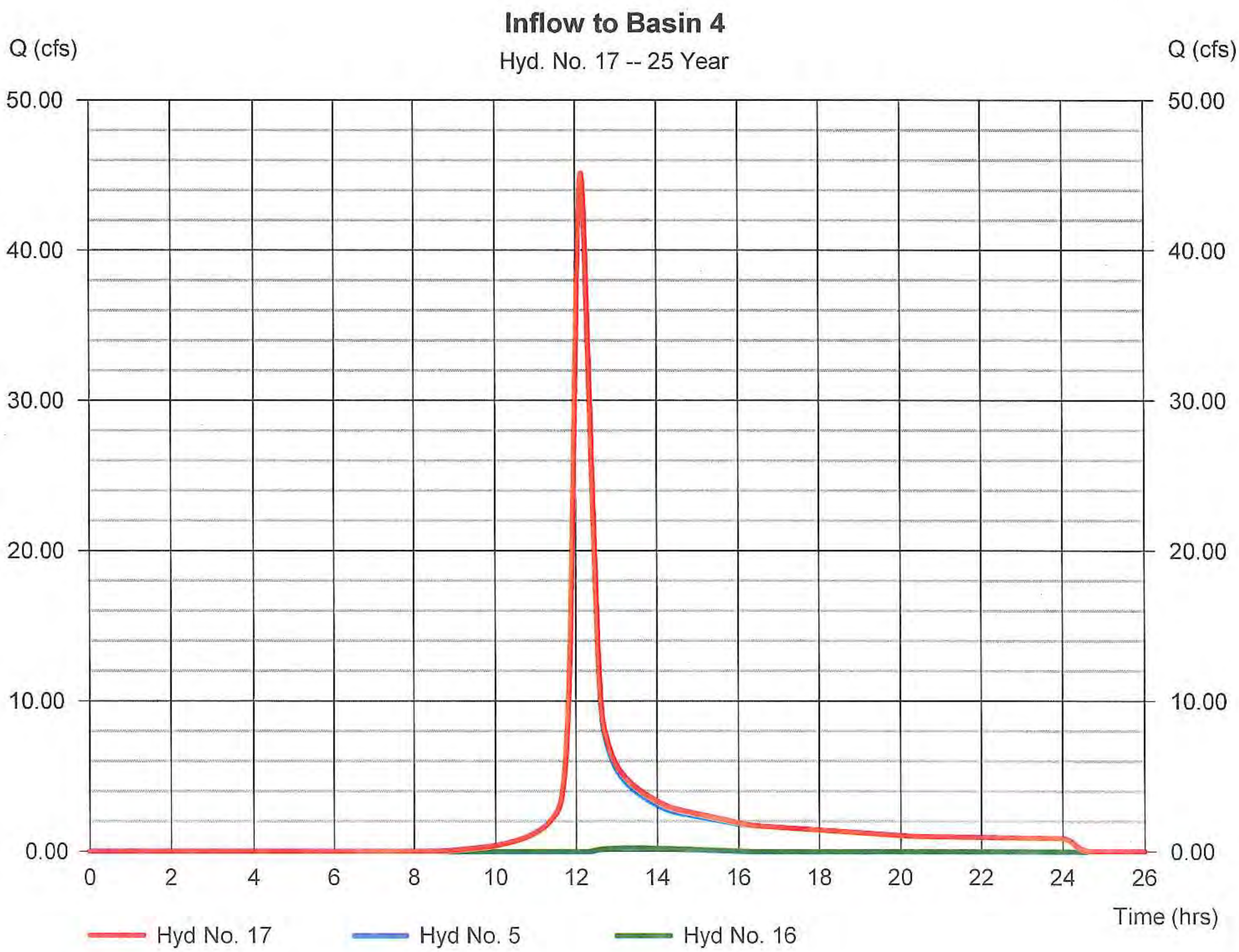
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 17

Inflow to Basin 4

Hydrograph type	= Combine	Peak discharge	= 45.10 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 170,744 cuft
Inflow hyds.	= 5, 16	Contrib. drain. area	= 19.110 ac



Hydrograph Report

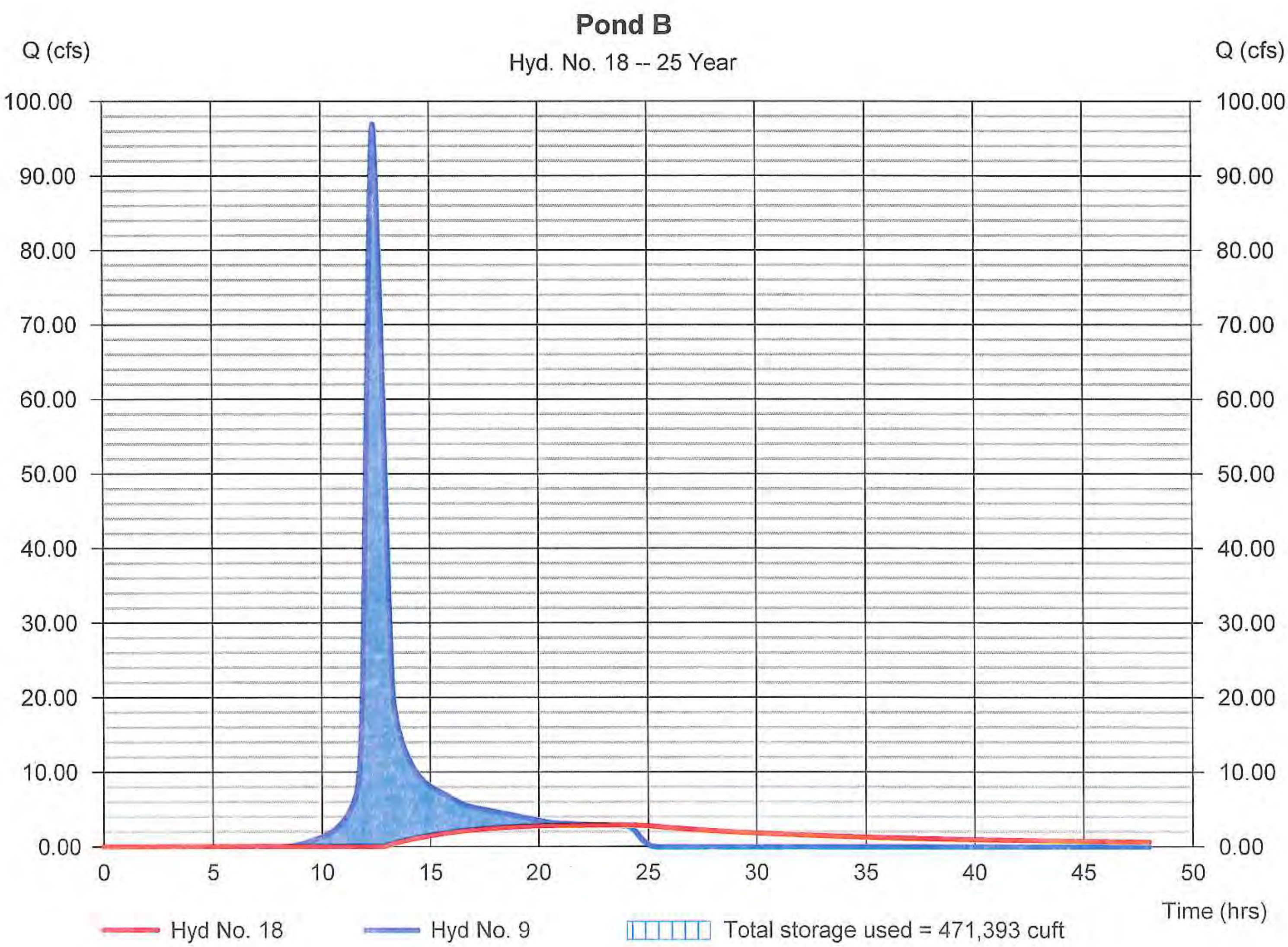
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 18

Pond B

Hydrograph type	= Reservoir	Peak discharge	= 2.845 cfs
Storm frequency	= 25 yrs	Time to peak	= 23.63 hrs
Time interval	= 1 min	Hyd. volume	= 203,311 cuft
Inflow hyd. No.	= 9 - Offsite Area B	Max. Elevation	= 861.52 ft
Reservoir name	= Area B Pond	Max. Storage	= 471,393 cuft

Storage Indication method used.



Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Pond No. 9 - Area B Pond

Pond Data

Trapezoid -Bottom L x W = 1000.0 x 300.0 ft, Side slope = 5.00:1, Bottom elev. = 860.00 ft, Depth = 3.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	860.00	300,000	0	0
0.30	860.30	303,909	90,586	90,586
0.60	860.60	307,836	91,761	182,347
0.90	860.90	311,781	92,942	275,289
1.20	861.20	315,744	94,128	369,418
1.50	861.50	319,725	95,320	464,738
1.80	861.80	323,724	96,517	561,254
2.10	862.10	327,741	97,719	658,974
2.40	862.40	331,776	98,927	757,901
2.70	862.70	335,829	100,140	858,041
3.00	863.00	339,900	101,359	959,400

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	48.00	0.00	0.00
Span (in)	= 36.00	48.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 860.90	863.30	0.00	0.00
Length (ft)	= 60.00	70.00	0.00	0.00
Slope (%)	= 0.83	3.14	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	860.00	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.30	90,586	860.30	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.60	182,347	860.60	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.90	275,289	860.90	0.00	0.00	---	---	---	---	---	---	---	---	0.000
1.20	369,418	861.20	0.69 ic	0.00	---	---	---	---	---	---	---	---	0.688
1.50	464,738	861.50	2.66 ic	0.00	---	---	---	---	---	---	---	---	2.662
1.80	561,254	861.80	5.78 ic	0.00	---	---	---	---	---	---	---	---	5.779
2.10	658,974	862.10	9.85 ic	0.00	---	---	---	---	---	---	---	---	9.852
2.40	757,901	862.40	14.43 oc	0.00	---	---	---	---	---	---	---	---	14.43
2.70	858,041	862.70	18.34 oc	0.00	---	---	---	---	---	---	---	---	18.34
3.00	959,400	863.00	22.04 oc	0.00	---	---	---	---	---	---	---	---	22.04

Hydrograph Report

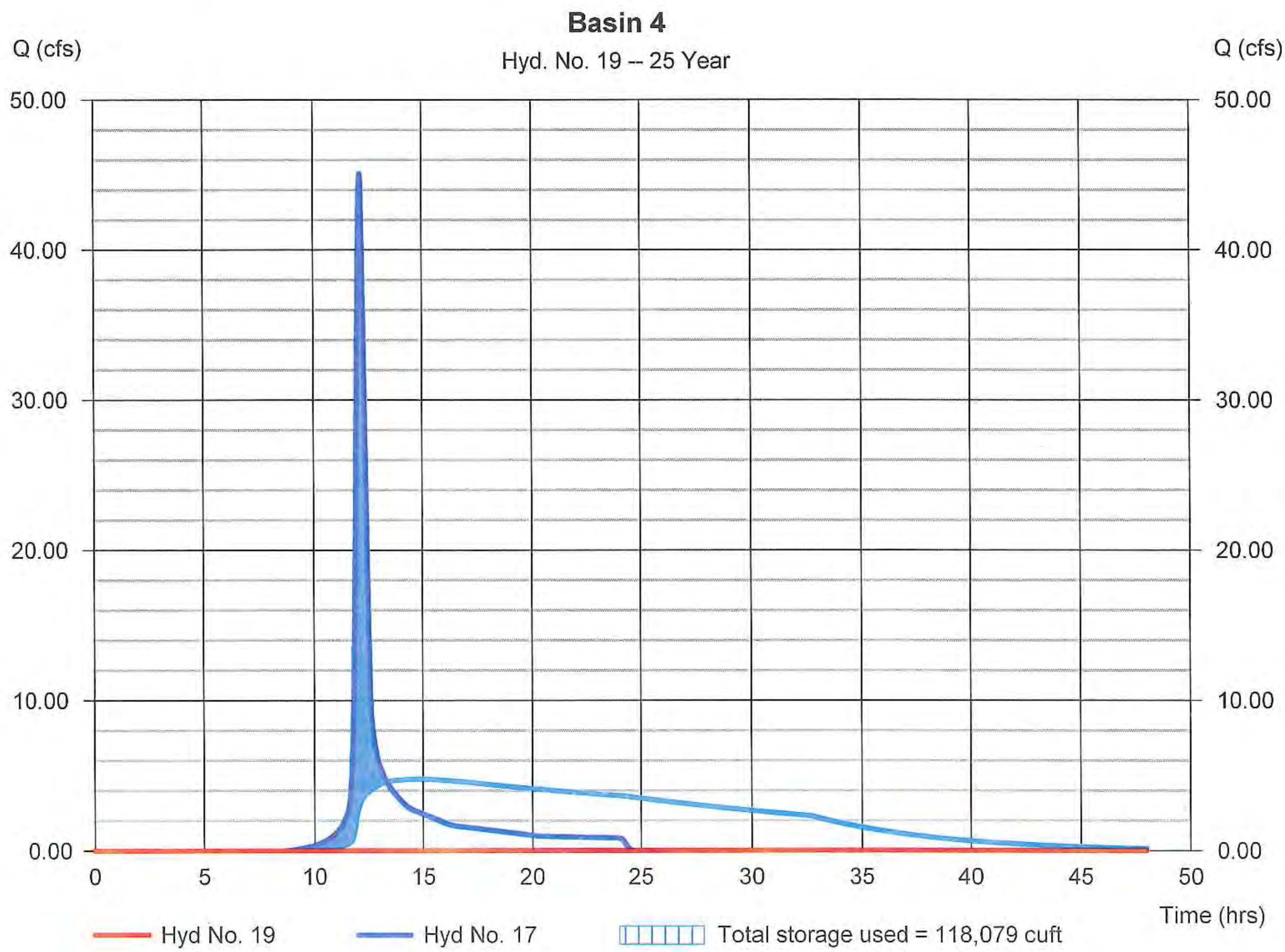
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 19

Basin 4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.12 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 17 - Inflow to Basin 4	Max. Elevation	= 864.38 ft
Reservoir name	= Basin 4	Max. Storage	= 118,079 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Pond No. 5 - Basin 4

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 862.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	862.00	30,505	0	0
8.00	870.00	71,551	396,694	396,694

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 866.00	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 0.10	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 870.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 3.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	862.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
8.00	396,694	870.00	22.10 oc	---	---	---	0.00	---	---	---	4.969	---	27.07

Hydrograph Report

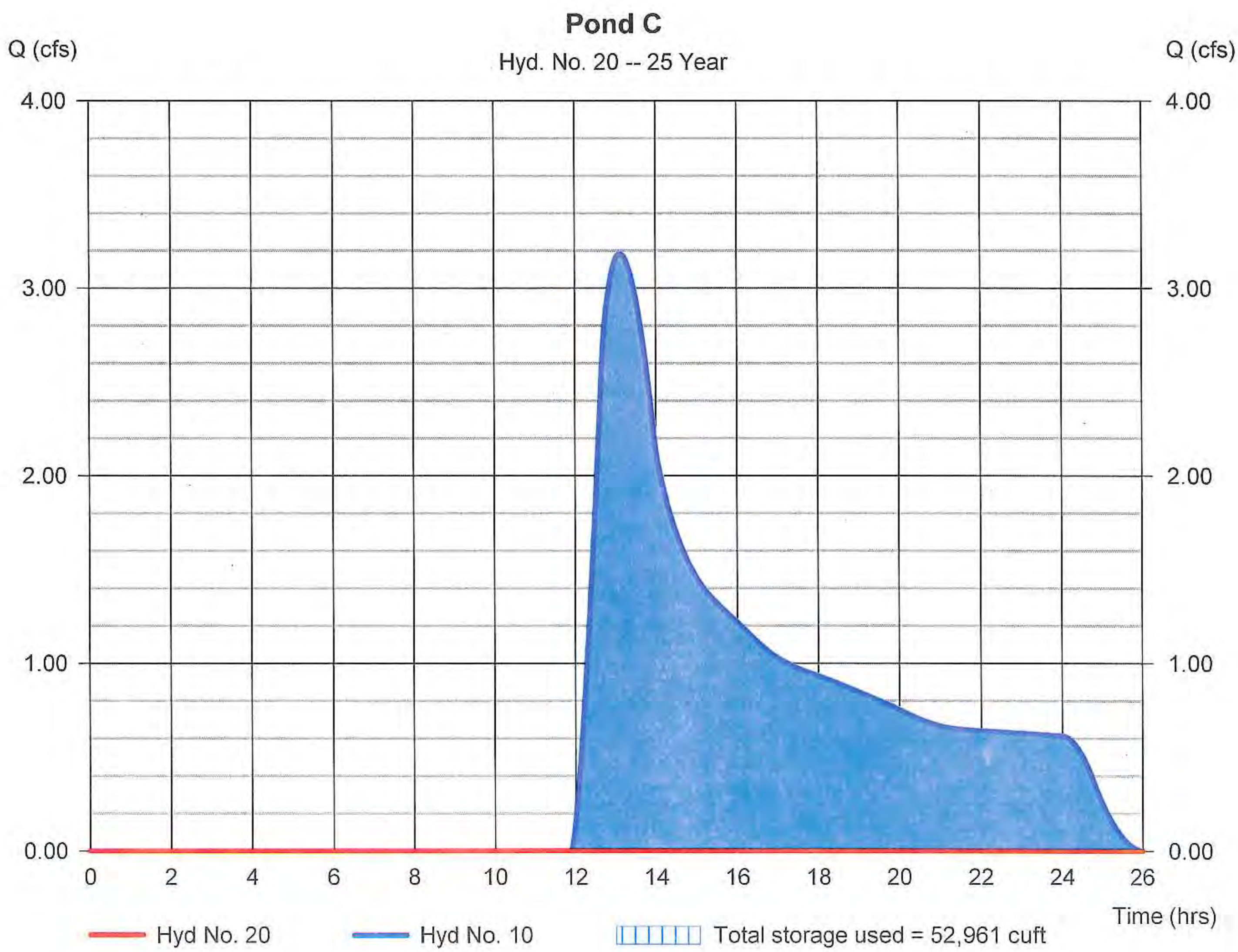
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 20

Pond C

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 10 - Offsite Area C	Max. Elevation	= 860.18 ft
Reservoir name	= Area C Pond	Max. Storage	= 52,961 cuft

Storage Indication method used.



Pond No. 10 - Area C Pond

Pond Data

Trapezoid -Bottom L x W = 1000.0 x 300.0 ft, Side slope = 5.00:1, Bottom elev. = 860.00 ft, Depth = 3.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	860.00	300,000	0	0
0.30	860.30	303,909	90,586	90,586
0.60	860.60	307,836	91,761	182,347
0.90	860.90	311,781	92,942	275,289
1.20	861.20	315,744	94,128	369,418
1.50	861.50	319,725	95,320	464,738
1.80	861.80	323,724	96,517	561,254
2.10	862.10	327,741	97,719	658,974
2.40	862.40	331,776	98,927	757,901
2.70	862.70	335,829	100,140	858,041
3.00	863.00	339,900	101,359	959,400

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 863.30	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 2.20	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	860.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.30	90,586	860.30	0.00	---	---	---	---	---	---	---	---	---	0.000
0.60	182,347	860.60	0.00	---	---	---	---	---	---	---	---	---	0.000
0.90	275,289	860.90	0.00	---	---	---	---	---	---	---	---	---	0.000
1.20	369,418	861.20	0.00	---	---	---	---	---	---	---	---	---	0.000
1.50	464,738	861.50	0.00	---	---	---	---	---	---	---	---	---	0.000
1.80	561,254	861.80	0.00	---	---	---	---	---	---	---	---	---	0.000
2.10	658,974	862.10	0.00	---	---	---	---	---	---	---	---	---	0.000
2.40	757,901	862.40	0.00	---	---	---	---	---	---	---	---	---	0.000
2.70	858,041	862.70	0.00	---	---	---	---	---	---	---	---	---	0.000
3.00	959,400	863.00	0.00	---	---	---	---	---	---	---	---	---	0.000

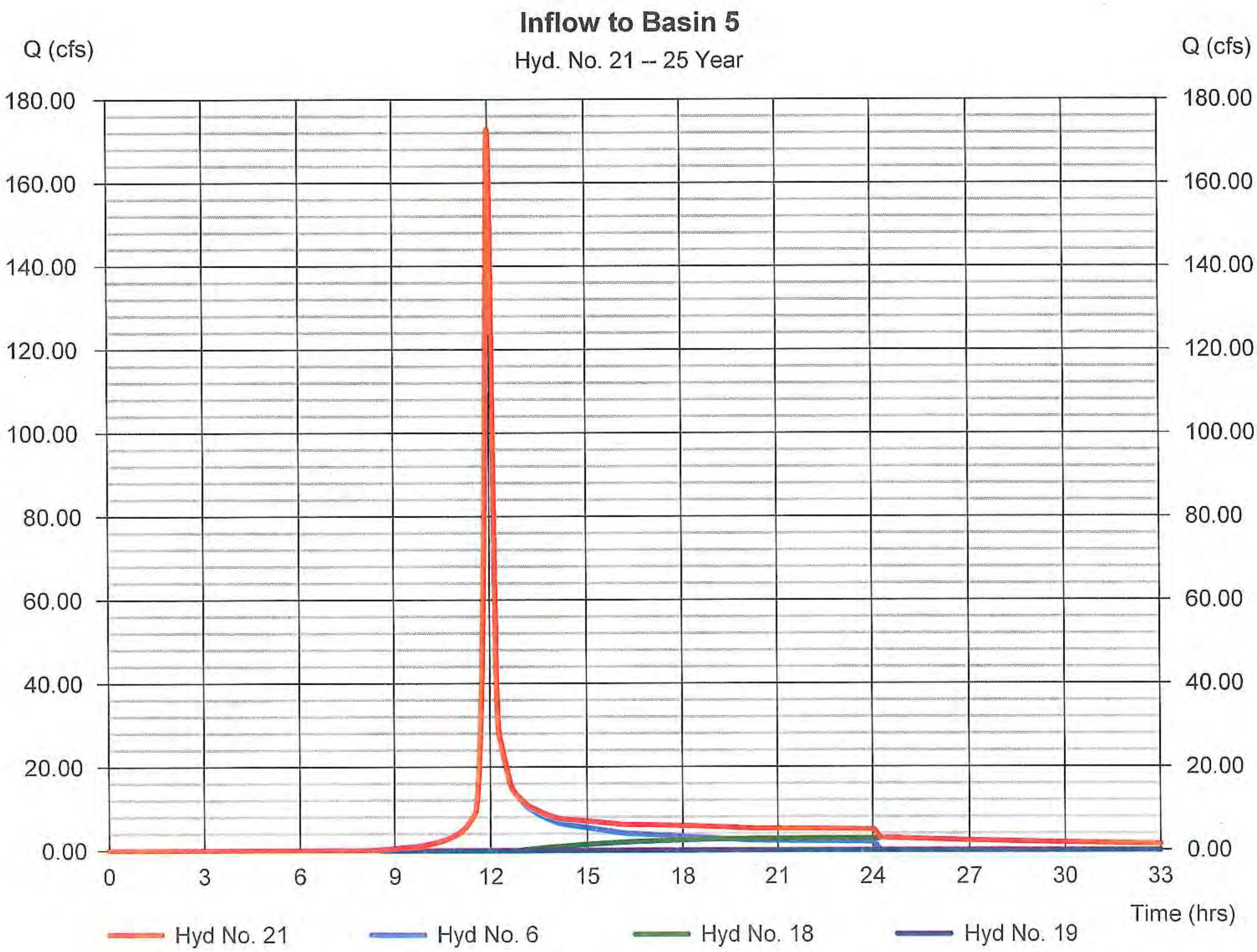
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 21

Inflow to Basin 5

Hydrograph type	= Combine	Peak discharge	= 172.74 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 621,045 cuft
Inflow hyds.	= 6, 18, 19	Contrib. drain. area	= 45.260 ac



Hydrograph Report

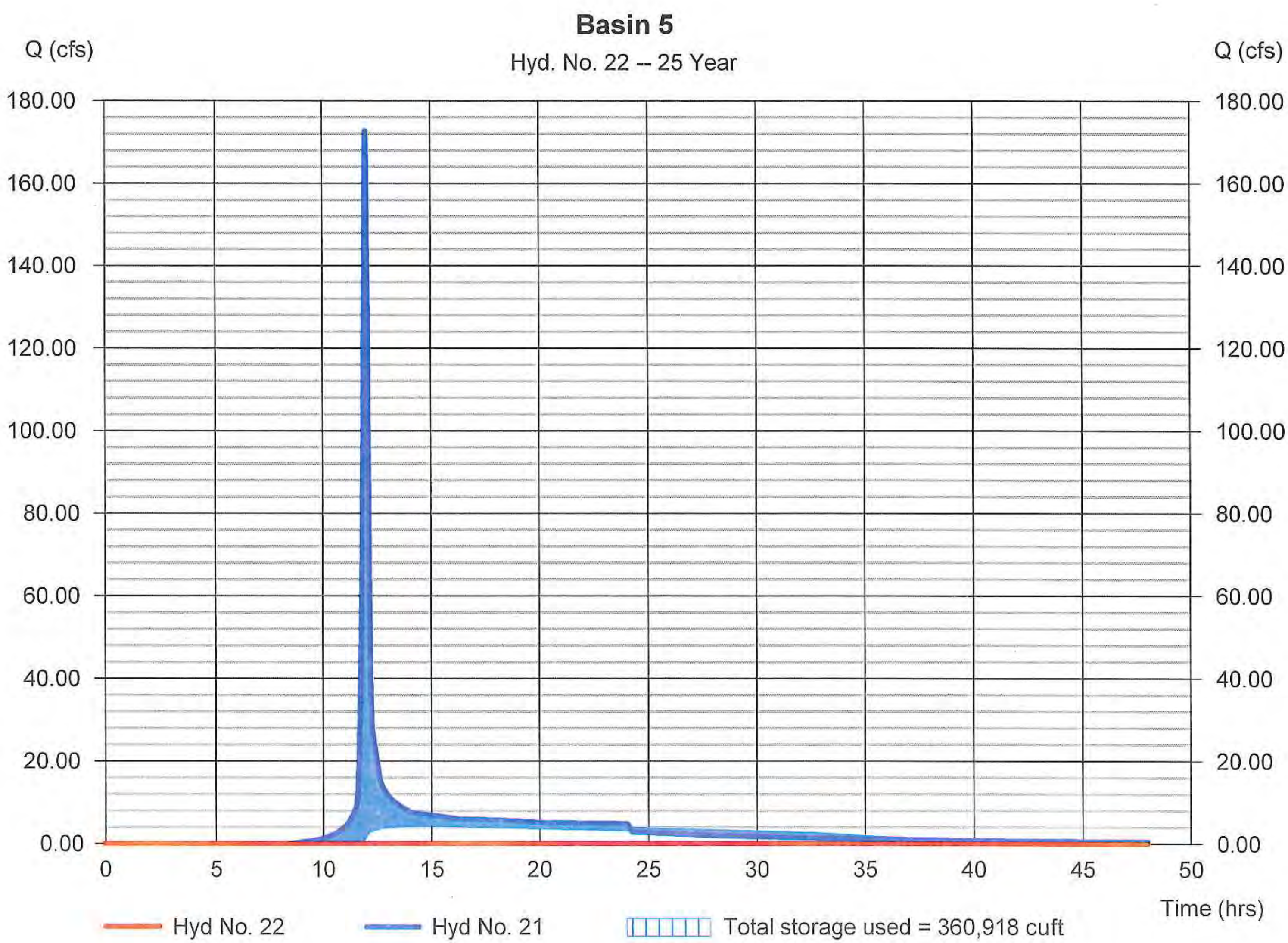
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 22

Basin 5

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 21 - Inflow to Basin 5	Max. Elevation	= 855.95 ft
Reservoir name	= Basin 5	Max. Storage	= 360,918 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Pond No. 6 - Basin 5

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 852.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	852.00	74,075	0	0
8.00	860.00	110,062	731,740	731,740

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	Inactive	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 860.00	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 864.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 3.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	852.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
8.00	731,740	860.00	0.00	---	---	---	0.00	---	---	---	7.643	---	7.643

Hydrograph Report

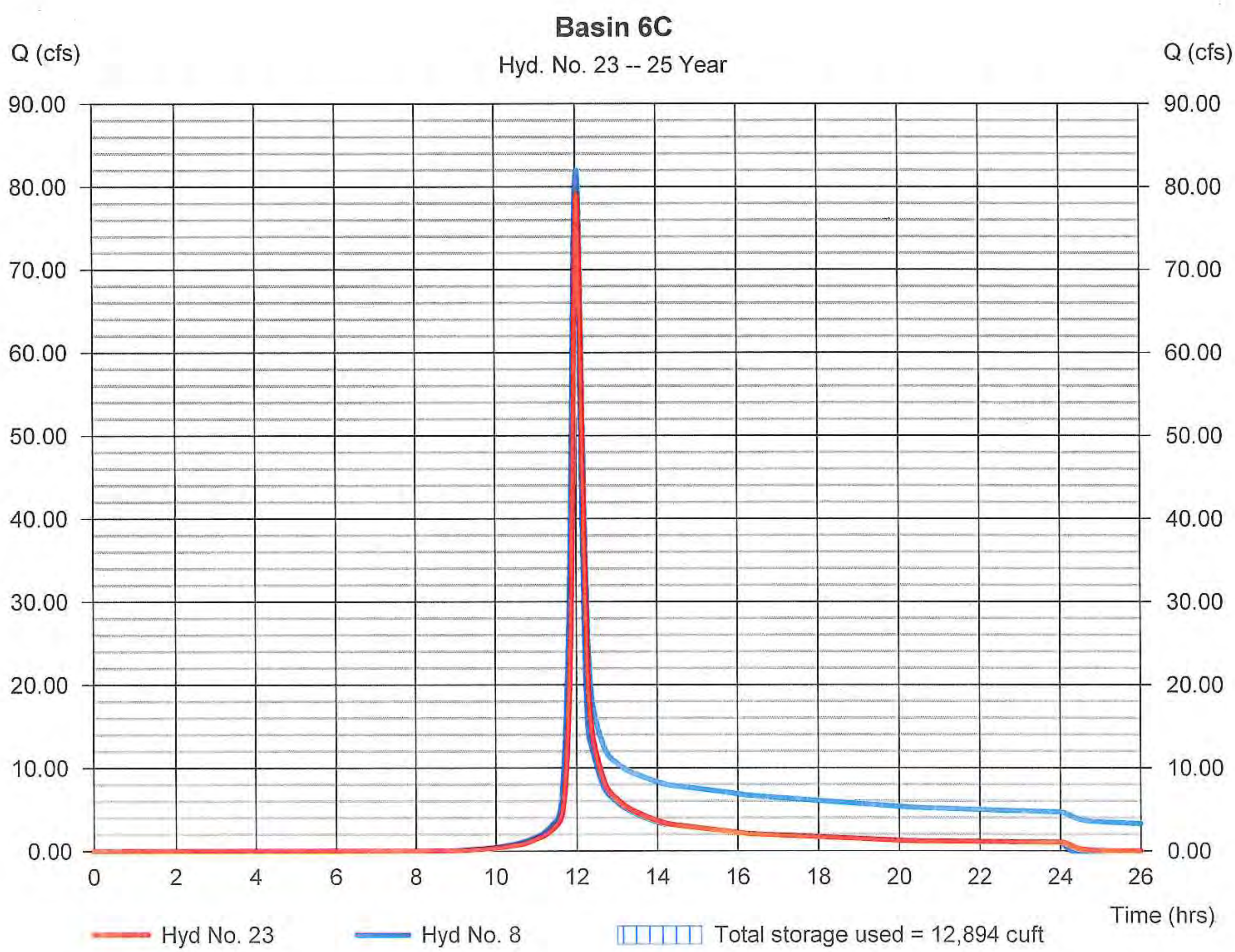
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 23

Basin 6C

Hydrograph type	= Reservoir	Peak discharge	= 79.11 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 201,974 cuft
Inflow hyd. No.	= 8 - Area H	Max. Elevation	= 848.74 ft
Reservoir name	= Basin 6C	Max. Storage	= 12,894 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Pond No. 11 - Basin 6C

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 846.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	846.00	2,315	0	0
2.00	848.00	5,280	7,393	7,393
4.00	850.00	10,005	15,034	22,427

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	0.00	0.00	6.00
Span (in)	= 36.00	0.00	0.00	6.00
No. Barrels	= 1	1	0	32
Invert El. (ft)	= 831.00	0.00	0.00	846.00
Length (ft)	= 140.00	0.00	0.00	2.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	Inactive	0.00	0.00
Crest El. (ft)	= 848.00	848.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 3.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	846.00	0.00	---	---	0.00	0.00	0.00	---	---	0.000	---	0.000
2.00	7,393	848.00	125.04 ic	---	---	28.52	0.00	0.00	---	---	0.367	---	28.89
4.00	22,427	850.00	138.18 ic	---	---	10.27	127.90 s	0.00	---	---	0.695	---	138.87

Hydrograph Report

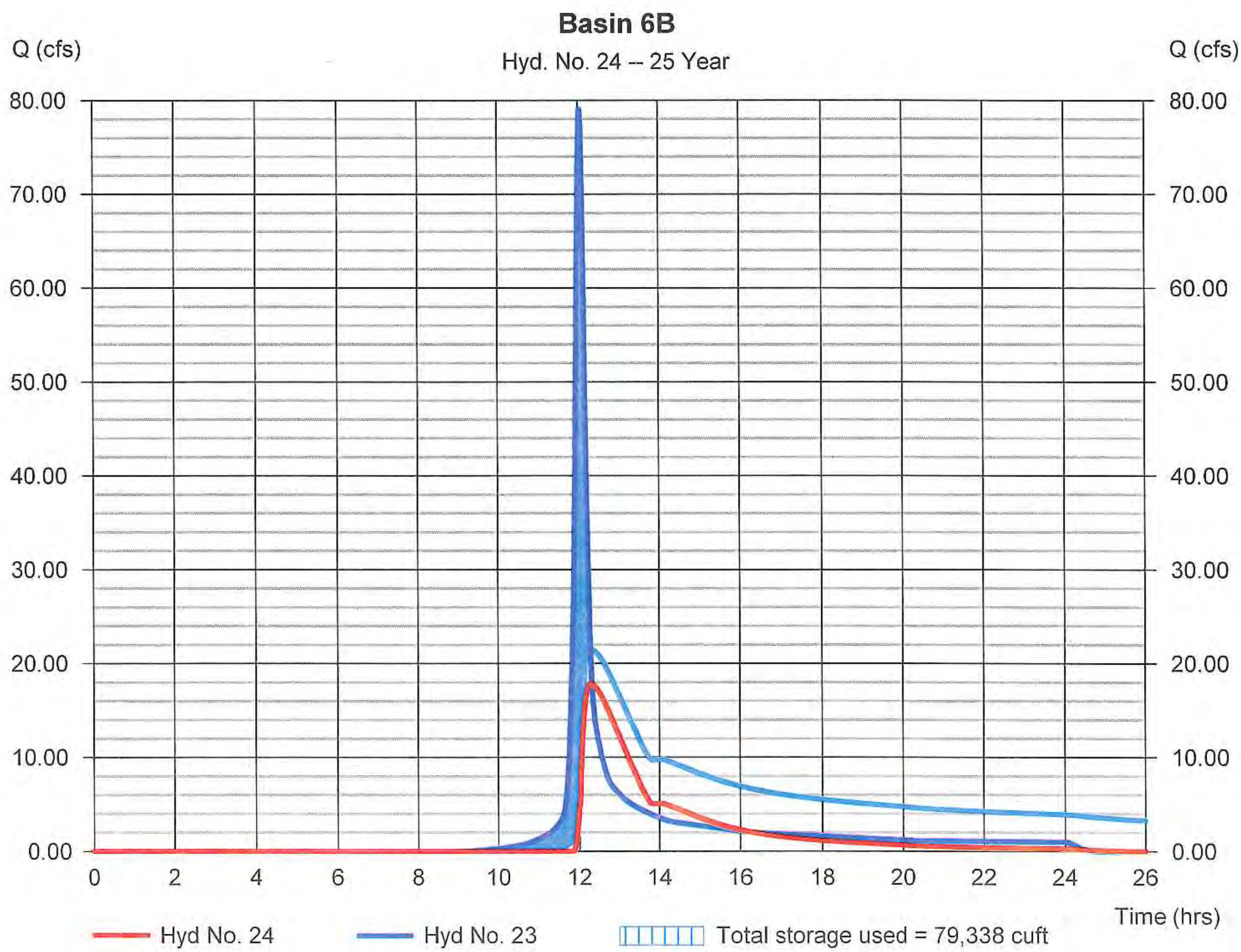
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 24

Basin 6B

Hydrograph type	= Reservoir	Peak discharge	= 17.84 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 133,383 cuft
Inflow hyd. No.	= 23 - Basin 6C	Max. Elevation	= 827.37 ft
Reservoir name	= Basin 6B	Max. Storage	= 79,338 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Pond No. 8 - Basin 6B

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 822.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	822.00	4,839	0	0
2.00	824.00	11,287	15,676	15,676
4.00	826.00	19,962	30,837	46,513
6.00	828.00	28,125	47,850	94,362
8.00	830.00	36,454	64,393	158,755

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 824.00	0.00	0.00	0.00
Length (ft)	= 120.00	0.00	0.00	0.00
Slope (%)	= 0.10	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 3.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	822.00	0.00	---	---	---	---	---	---	---	0.000	---	0.000
2.00	15,676	824.00	0.00	---	---	---	---	---	---	---	0.784	---	0.784
4.00	46,513	826.00	5.06 oc	---	---	---	---	---	---	---	1.386	---	6.446
6.00	94,362	828.00	21.27 oc	---	---	---	---	---	---	---	1.953	---	23.22
8.00	158,755	830.00	29.65 oc	---	---	---	---	---	---	---	2.532	---	32.18

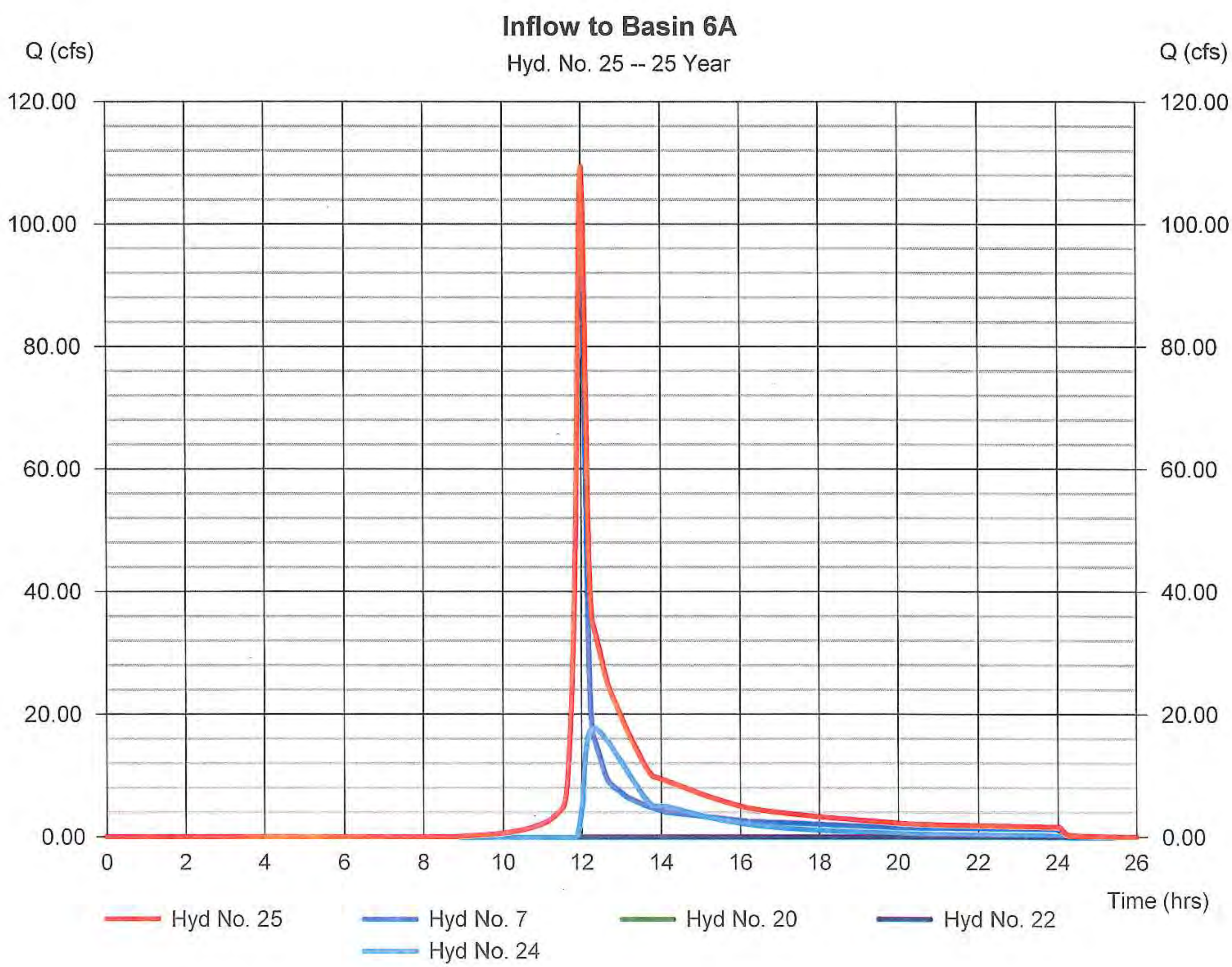
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 25

Inflow to Basin 6A

Hydrograph type	= Combine	Peak discharge	= 109.41 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 386,462 cuft
Inflow hyds.	= 7, 20, 22, 24	Contrib. drain. area	= 29.420 ac



Hydrograph Report

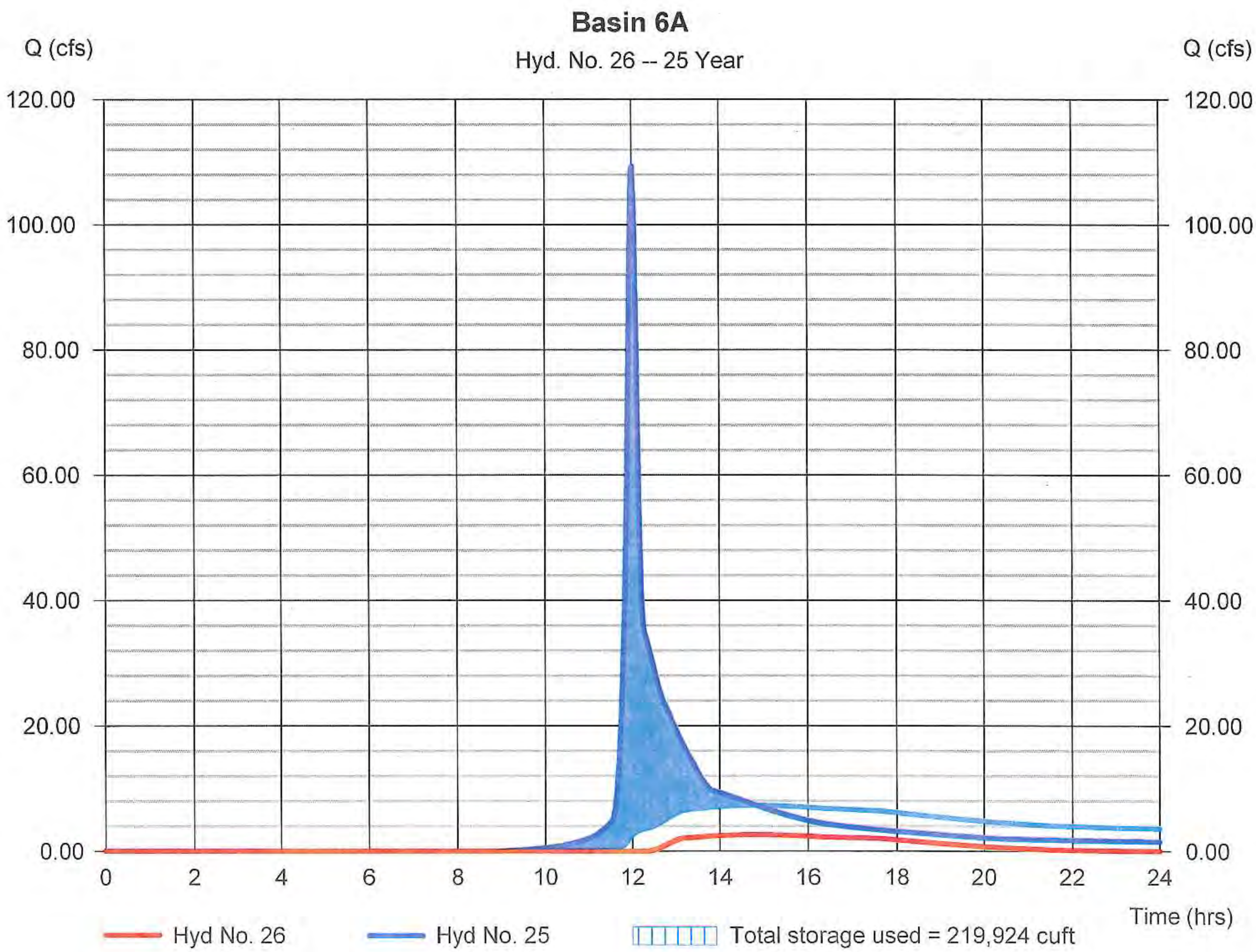
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 26

Basin 6A

Hydrograph type	= Reservoir	Peak discharge	= 2.623 cfs
Storm frequency	= 25 yrs	Time to peak	= 14.83 hrs
Time interval	= 1 min	Hyd. volume	= 54,962 cuft
Inflow hyd. No.	= 25 - Inflow to Basin 6A	Max. Elevation	= 827.32 ft
Reservoir name	= Basin 6A	Max. Storage	= 219,924 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 7 - Basin 6A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 822.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	822.00	17,267	0	0
2.00	824.00	33,699	50,054	50,054
4.00	826.00	51,767	84,814	134,867
6.00	828.00	77,800	128,673	263,541
8.00	830.00	102,403	179,623	443,163

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	Inactive	Inactive	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 826.20	0.00	0.00	0.00
Length (ft)	= 31.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 829.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 3.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	822.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
2.00	50,054	824.00	0.00	---	---	---	0.00	---	---	---	2.340	---	2.340
4.00	134,867	826.00	0.00	---	---	---	0.00	---	---	---	3.595	---	3.595
6.00	263,541	828.00	4.23 oc	---	---	---	0.00	---	---	---	5.403	---	9.636
8.00	443,163	830.00	6.87 ic	---	---	---	49.95	---	---	---	7.111	---	63.93

HYDROGRAPH SUMMARY

100 -YEAR EVENT

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	121.72	1	727	413,085	------	------	------	Area A
2	SCS Runoff	70.98	1	732	294,931	------	------	------	Area B
3	SCS Runoff	143.29	1	733	610,633	------	------	------	Area C
4	SCS Runoff	18.47	1	725	58,367	------	------	------	Area D
5	SCS Runoff	63.51	1	729	236,308	------	------	------	Area E
6	SCS Runoff	239.54	1	720	581,797	------	------	------	Area F
7	SCS Runoff	147.31	1	720	356,764	------	------	------	Area G
8	SCS Runoff	114.79	1	721	290,261	------	------	------	Area H
9	SCS Runoff	134.83	1	745	782,631	------	------	------	Offsite Area B
10	SCS Runoff	8.584	1	774	107,311	------	------	------	Offsite Area C
11	Combine	187.78	1	728	708,016	1, 2,	------	------	Inflow to Basin 1
12	Reservoir	2.820	1	930	54,032	11	881.07	467,767	Basin 1
13	Combine	143.29	1	733	664,664	3, 12	------	------	Inflow to Basin 2
14	Reservoir	6.115	1	918	130,129	13	874.08	398,908	Basin 2
15	Combine	18.47	1	725	188,496	4, 14	------	------	Inflow Basin 3
16	Reservoir	4.852	1	1005	124,144	15	872.00	50,718	Basin 3
17	Combine	63.60	1	729	360,452	5, 16	------	------	Inflow to Basin 4
18	Reservoir	6.377	1	1064	408,084	9	861.85	577,310	Pond B
19	Reservoir	1.599	1	1191	35,608	17	866.75	235,315	Basin 4
20	Reservoir	0.000	1	n/a	0	10	860.35	107,311	Pond C
21	Combine	239.54	1	720	1,025,489	6, 18, 19,	------	------	Inflow to Basin 5
22	Reservoir	0.000	1	825	0	21	858.71	613,617	Basin 5
23	Reservoir	112.22	1	722	285,359	8	849.07	15,407	Basin 6C
24	Reservoir	24.34	1	738	209,196	23	828.66	115,530	Basin 6B
25	Combine	161.29	1	721	565,961	7, 20, 22, 24	------	------	Inflow to Basin 6A
26	Reservoir	5.248	1	858	158,039	25	828.63	319,857	Basin 6A

Hydrograph Report

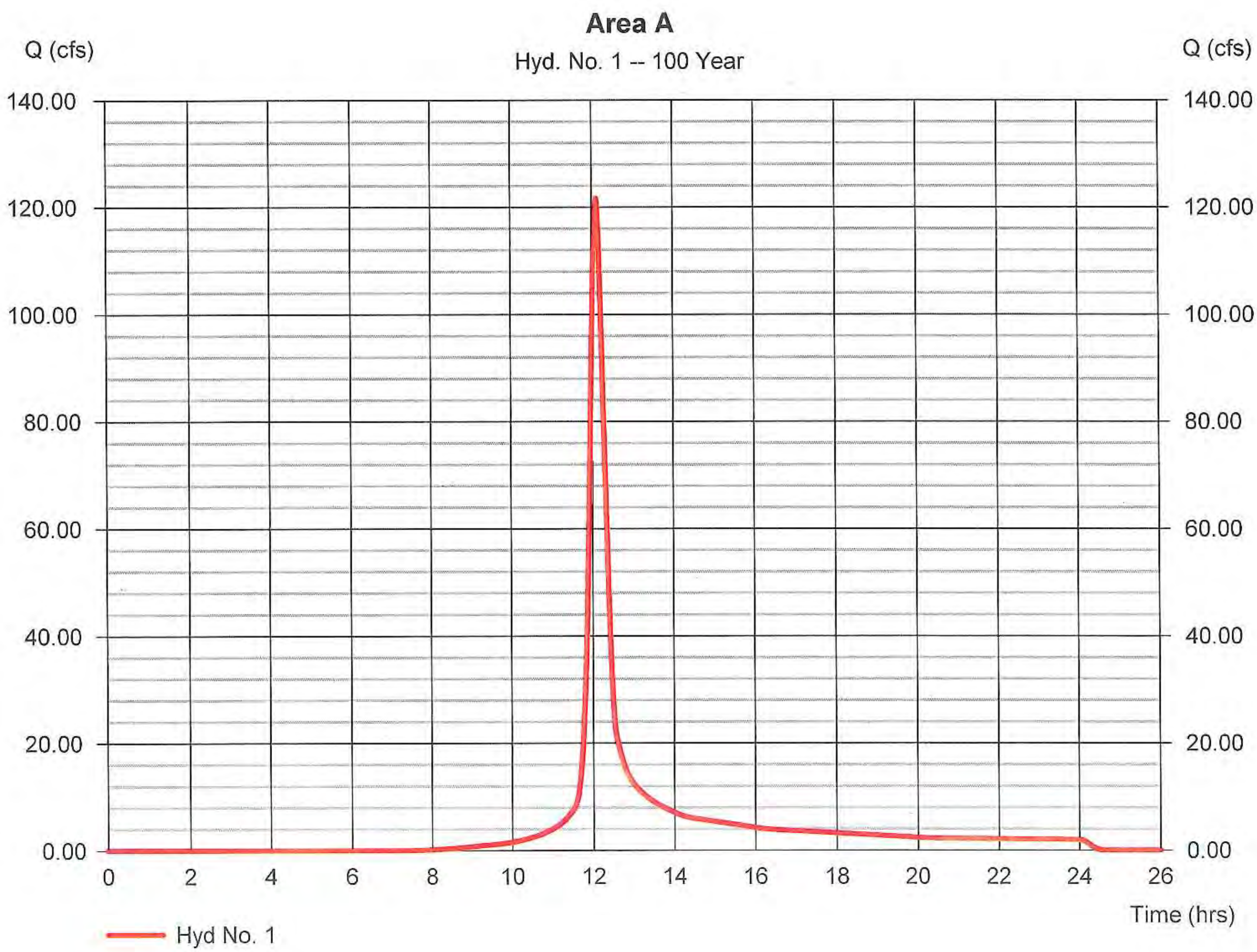
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 1

Area A

Hydrograph type	= SCS Runoff	Peak discharge	= 121.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 413,085 cuft
Drainage area	= 33.970 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(33.520 x 76) + (0.310 x 71) + (0.140 x 98)] / 33.970



Hydrograph Report

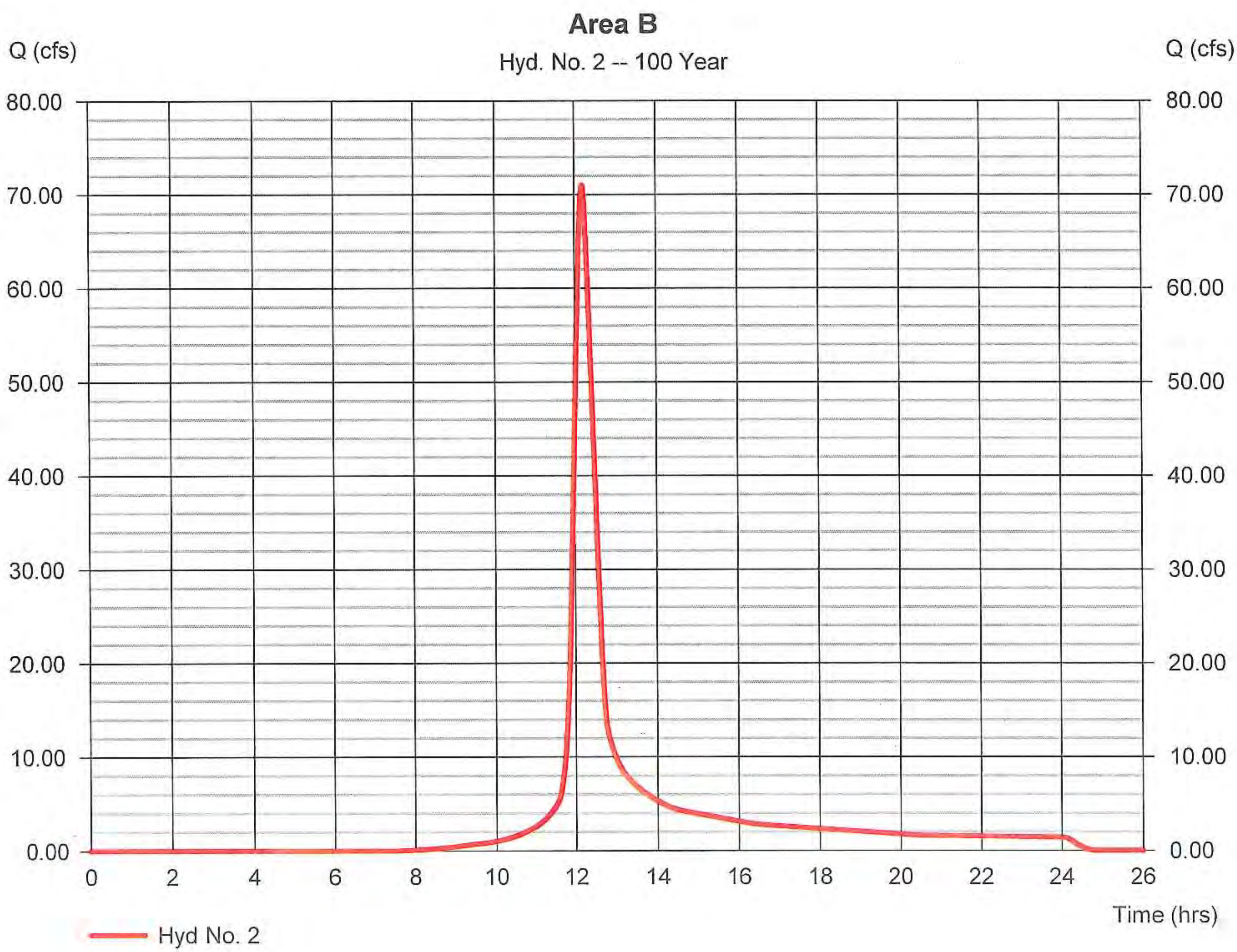
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 2

Area B

Hydrograph type	= SCS Runoff	Peak discharge	= 70.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 294,931 cuft
Drainage area	= 23.880 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.00 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.444 x 76) + (0.974 x 98) + (6.462 x 71)] / 23.880



Hydrograph Report

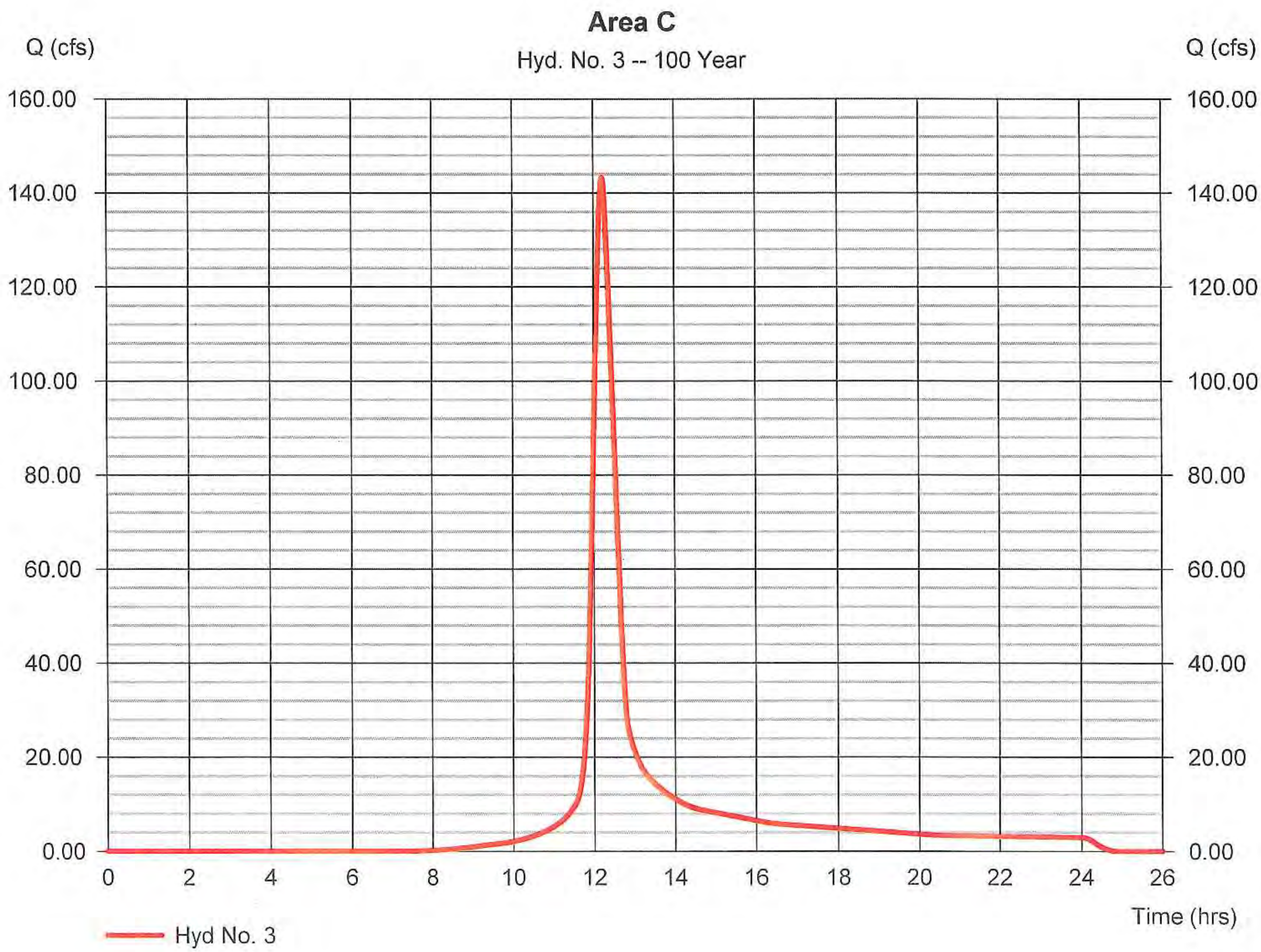
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 3

Area C

Hydrograph type	= SCS Runoff	Peak discharge	= 143.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 610,633 cuft
Drainage area	= 50.080 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 32.30 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(43.120 x 76) + (5.380 x 71) + (1.580 x 98)] / 50.080



Hydrograph Report

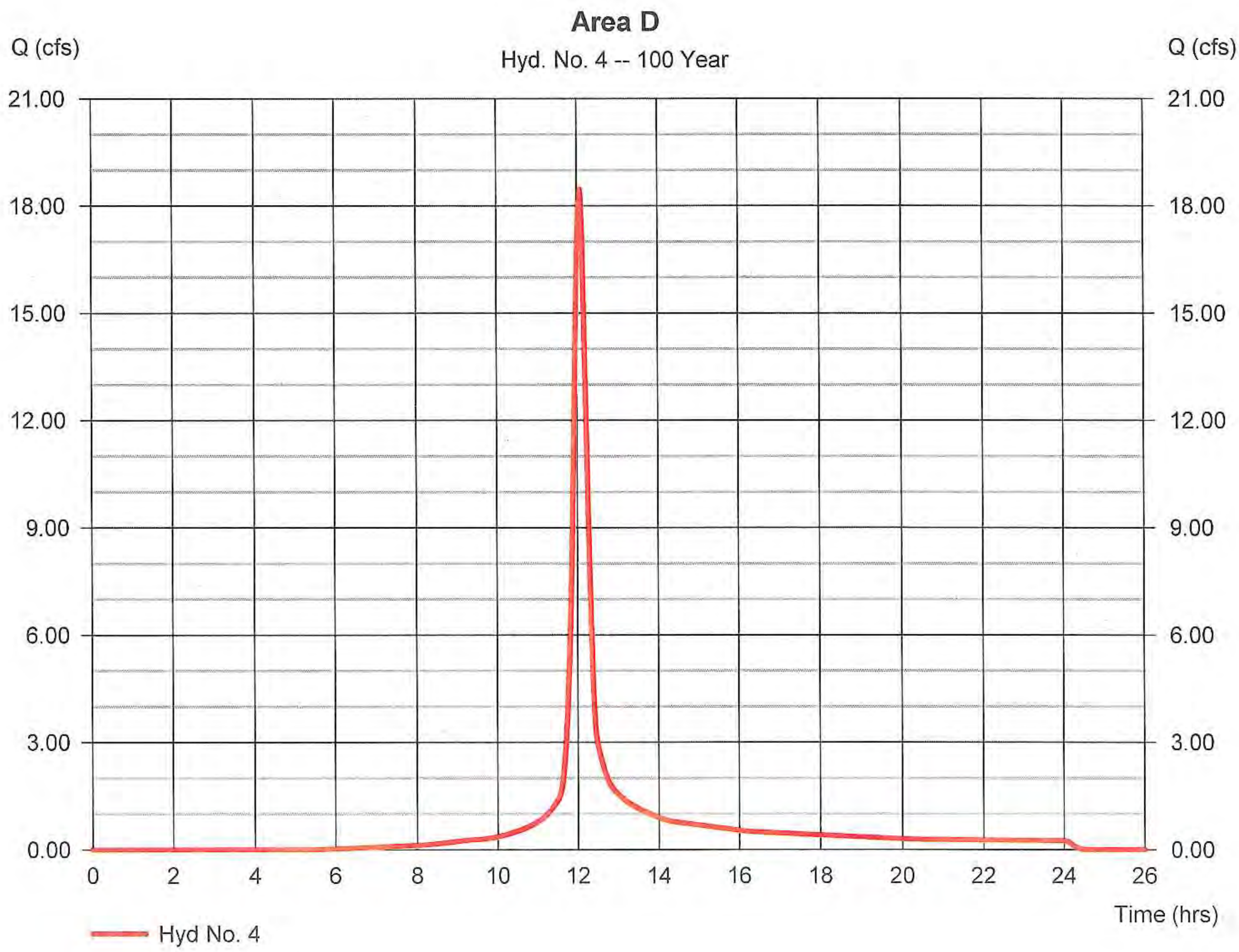
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 4

Area D

Hydrograph type	= SCS Runoff	Peak discharge	= 18.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 58,367 cuft
Drainage area	= 3.930 ac	Curve number	= 83*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.10 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.770 x 98) + (1.927 x 71) + (0.233 x 76)] / 3.930



Hydrograph Report

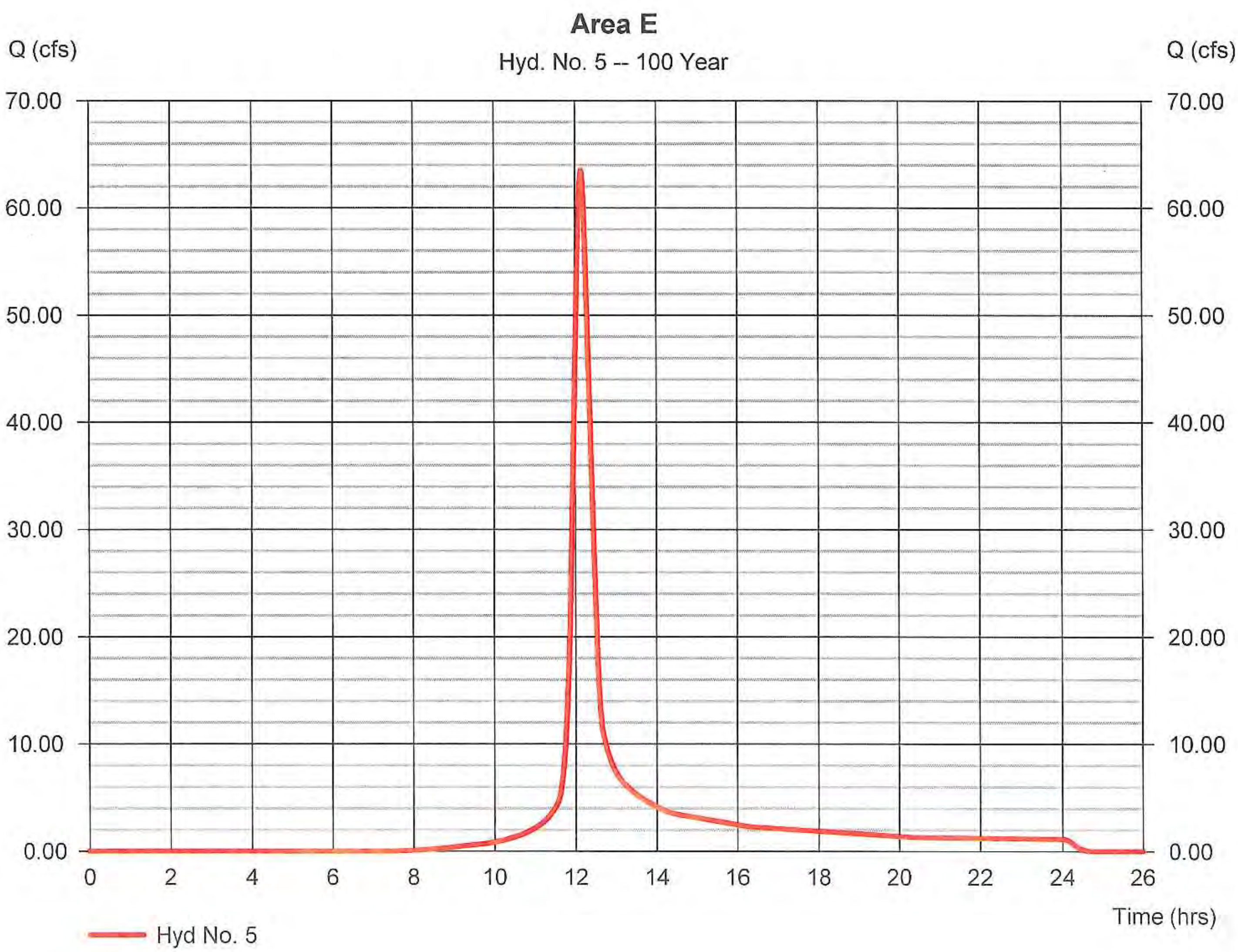
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 5

Area E

Hydrograph type	= SCS Runoff	Peak discharge	= 63.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 236,308 cuft
Drainage area	= 19.110 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 26.00 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(15.330 x 76) + (3.040 x 71) + (0.740 x 98)] / 19.110



Hydrograph Report

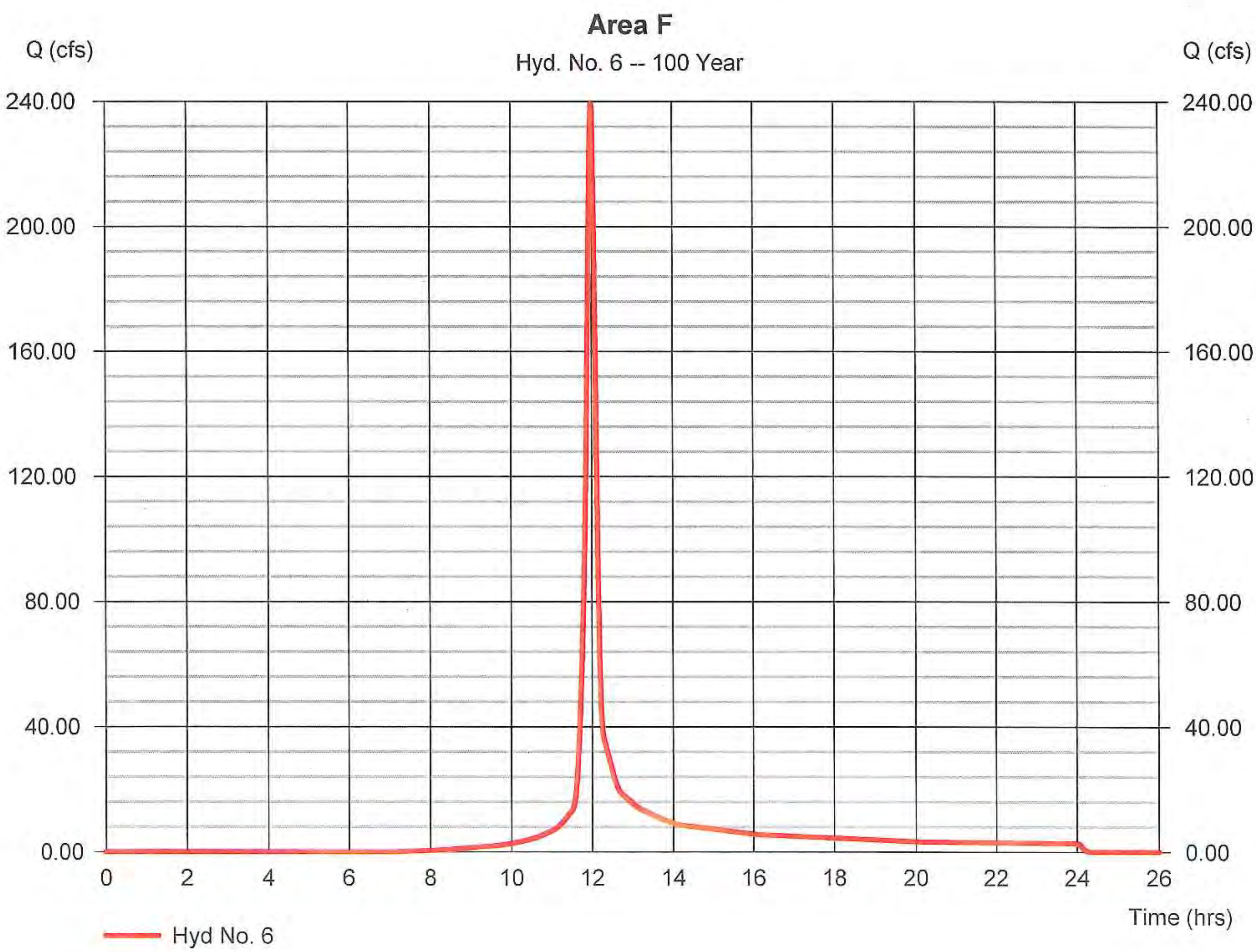
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 6

Area F

Hydrograph type	= SCS Runoff	Peak discharge	= 239.54 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 581,797 cuft
Drainage area	= 45.260 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.40 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(31.720 x 76) + (9.890 x 71) + (3.650 x 98)] / 45.260



Hydrograph Report

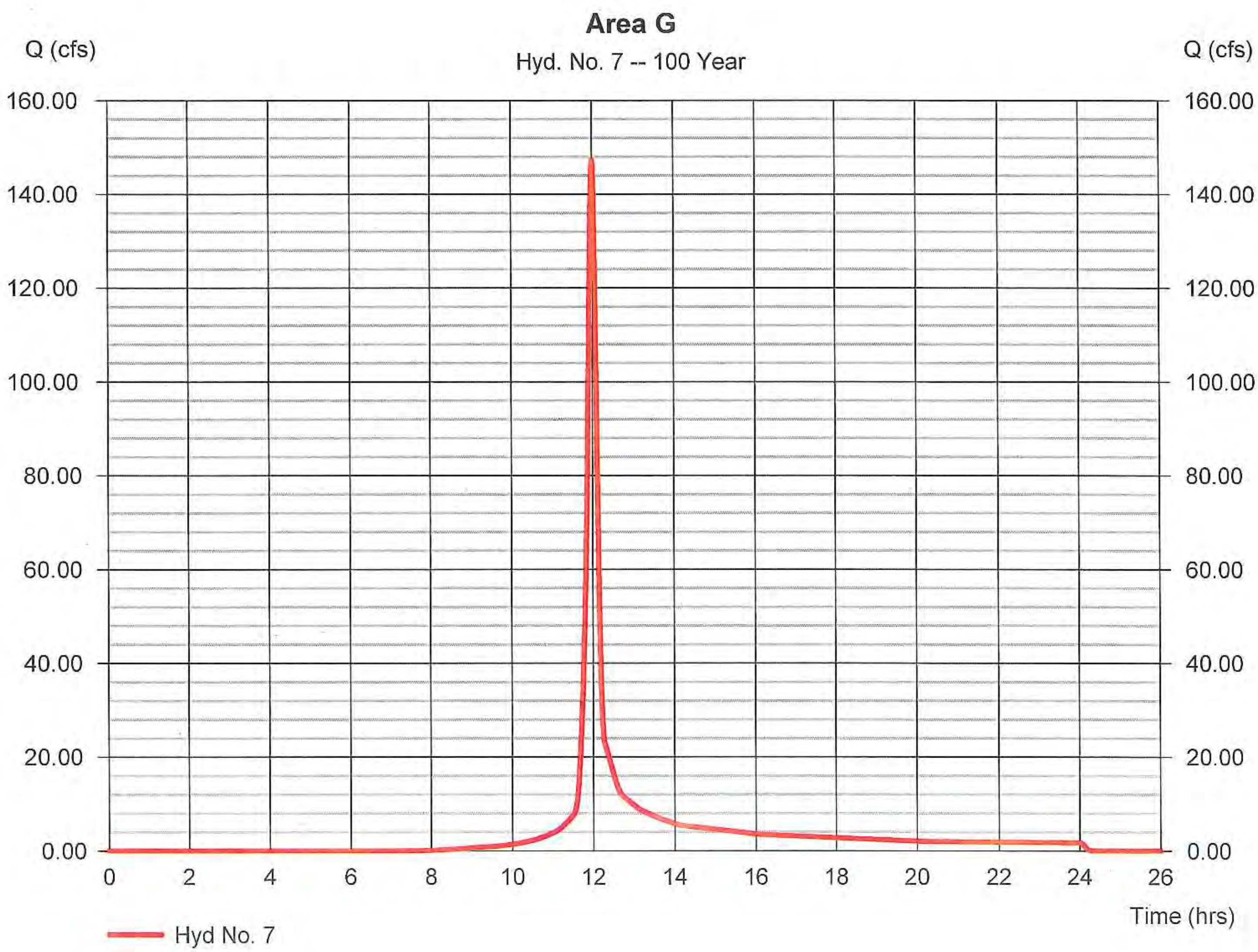
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 7

Area G

Hydrograph type	= SCS Runoff	Peak discharge	= 147.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 356,764 cuft
Drainage area	= 29.420 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(13.930 x 76) + (13.090 x 71) + (0.090 x 98) + (2.310 x 89)] / 29.420



Hydrograph Report

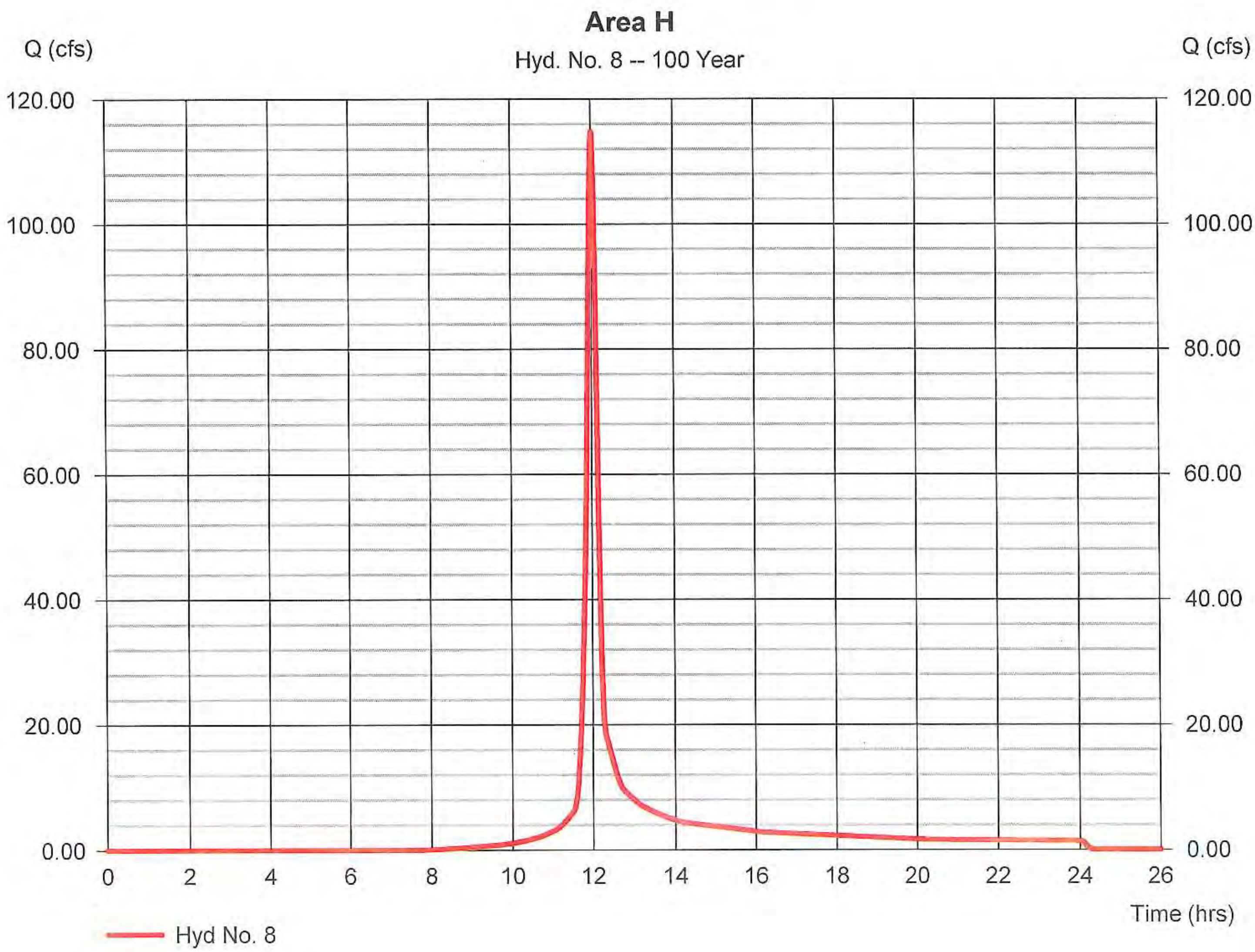
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 8

Area H

Hydrograph type	= SCS Runoff	Peak discharge	= 114.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 290,261 cuft
Drainage area	= 24.750 ac	Curve number	= 75*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.40 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.850 x 76) + (1.270 x 89) + (6.630 x 71)] / 24.750



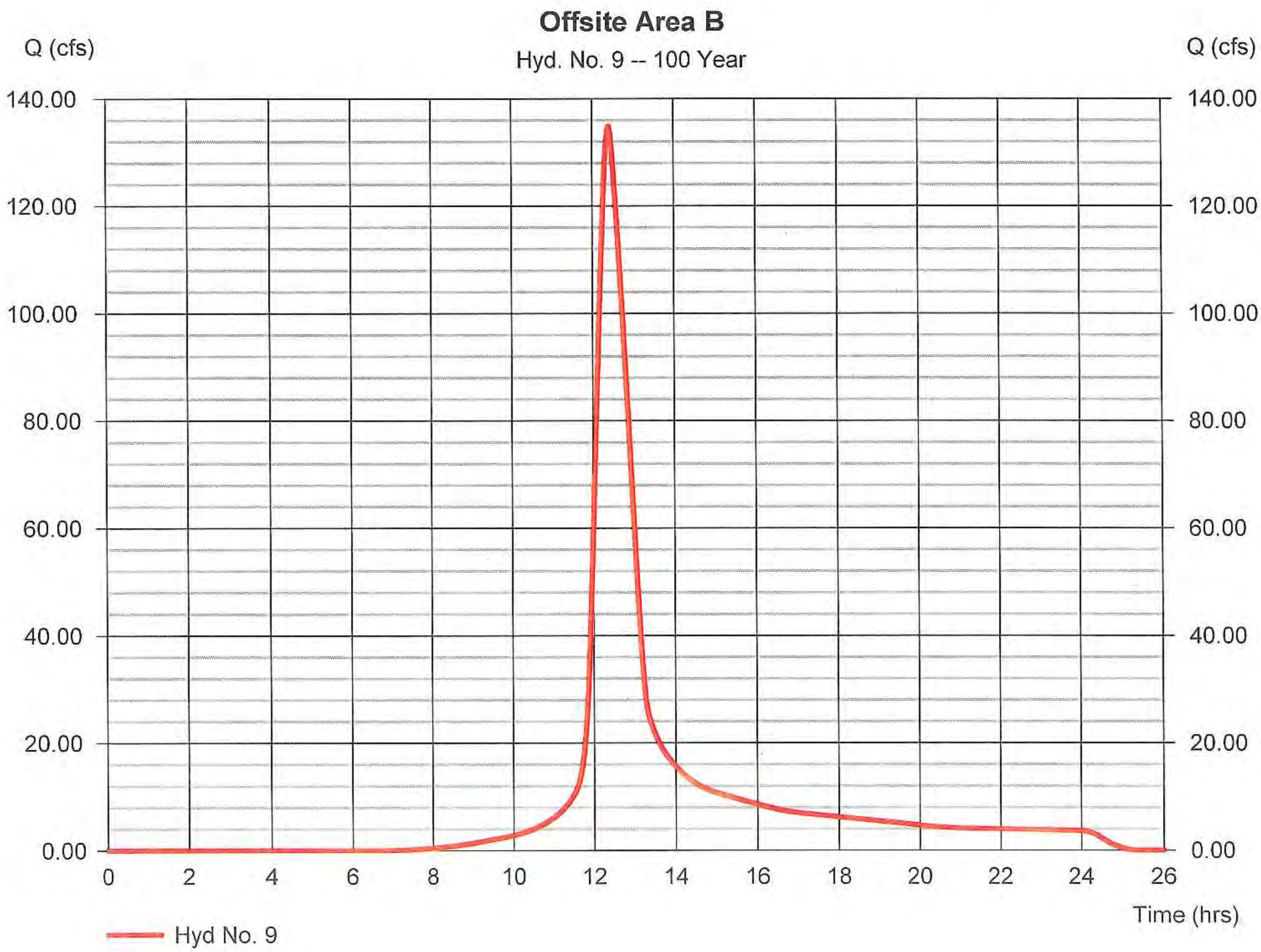
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 9

Offsite Area B

Hydrograph type	= SCS Runoff	Peak discharge	= 134.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.42 hrs
Time interval	= 1 min	Hyd. volume	= 782,631 cuft
Drainage area	= 60.000 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 51.70 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



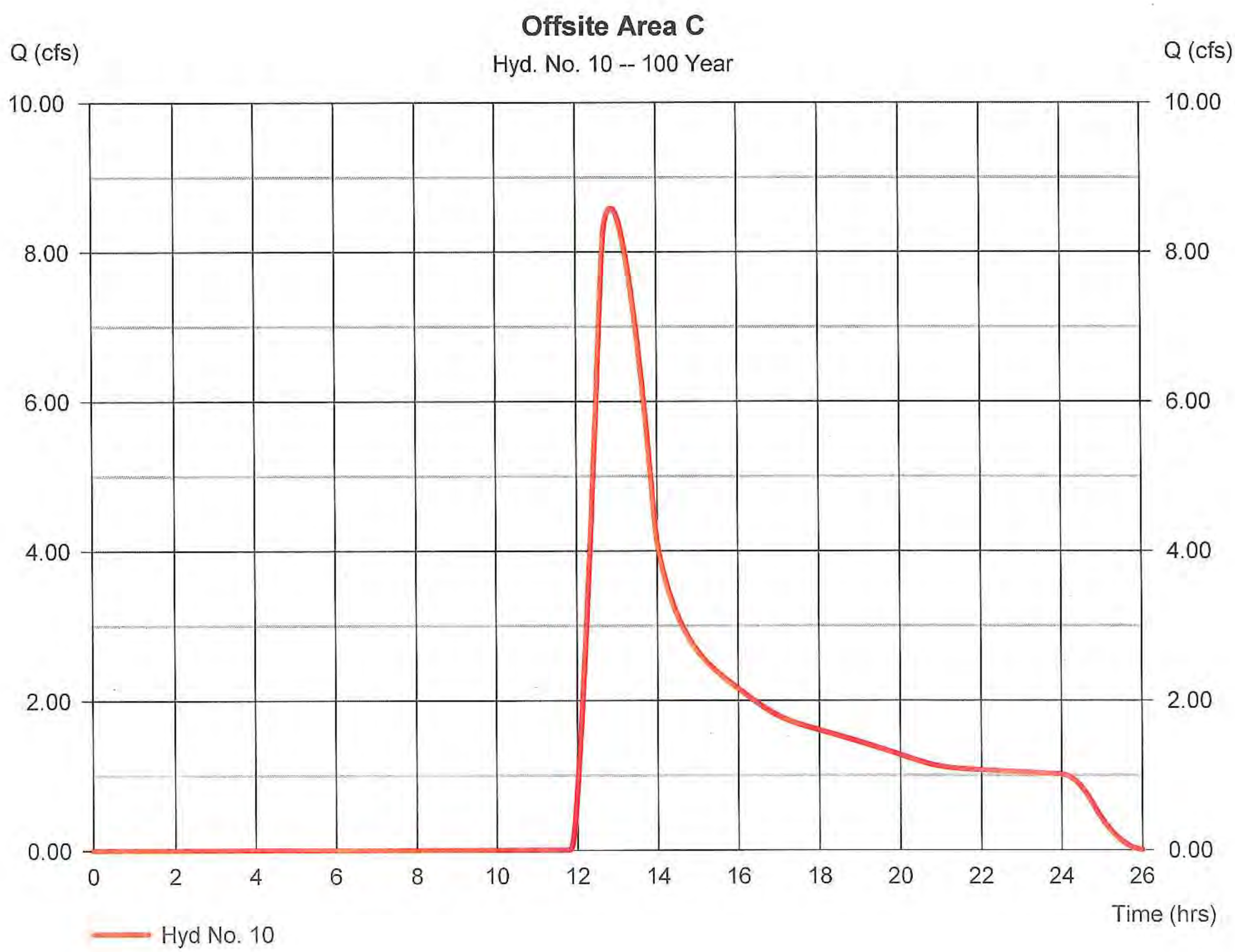
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 10

Offsite Area C

Hydrograph type	= SCS Runoff	Peak discharge	= 8.584 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.90 hrs
Time interval	= 1 min	Hyd. volume	= 107,311 cuft
Drainage area	= 37.000 ac	Curve number	= 45
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 79.40 min
Total precip.	= 6.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



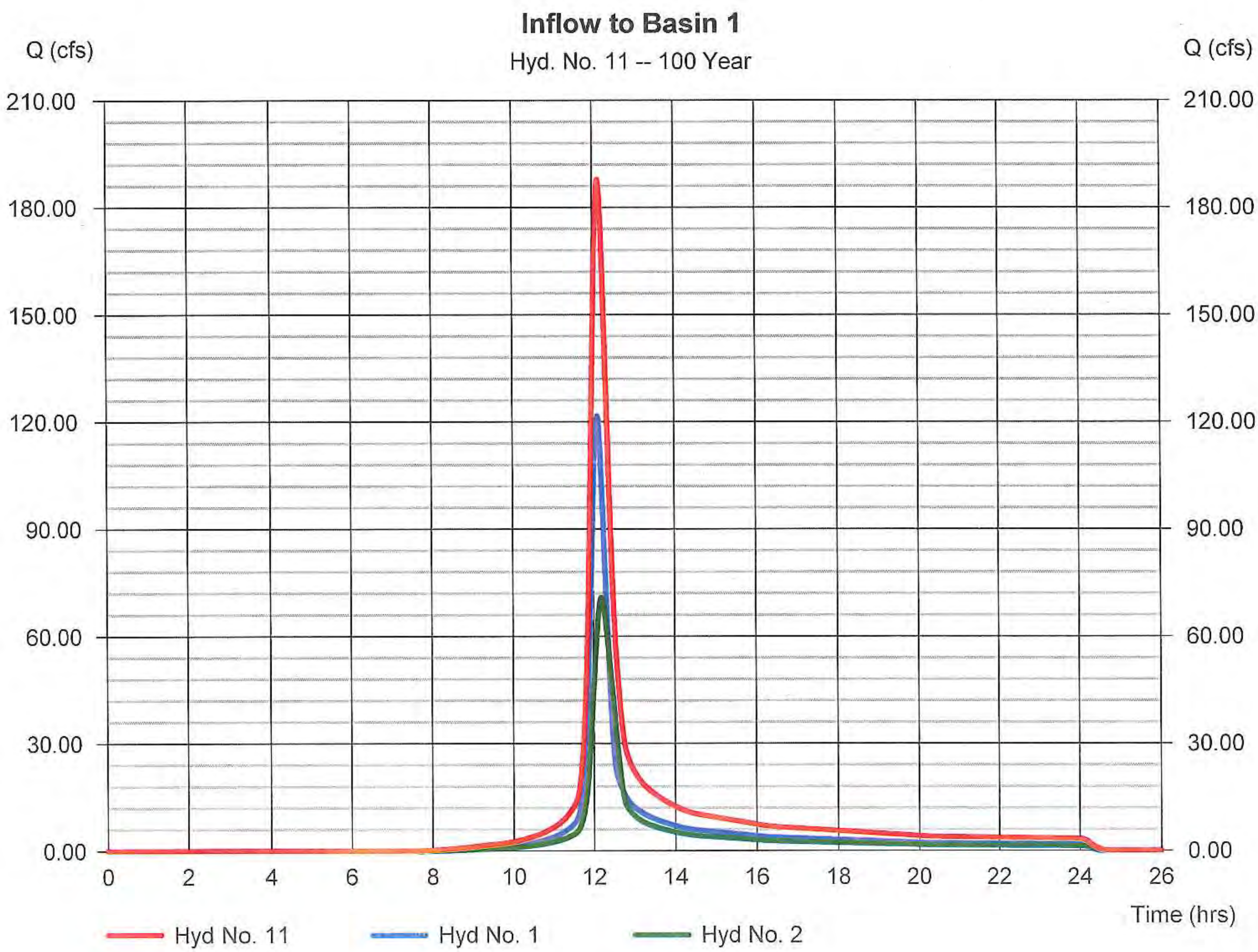
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 11

Inflow to Basin 1

Hydrograph type	= Combine	Peak discharge	= 187.78 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 708,016 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 57.850 ac



Hydrograph Report

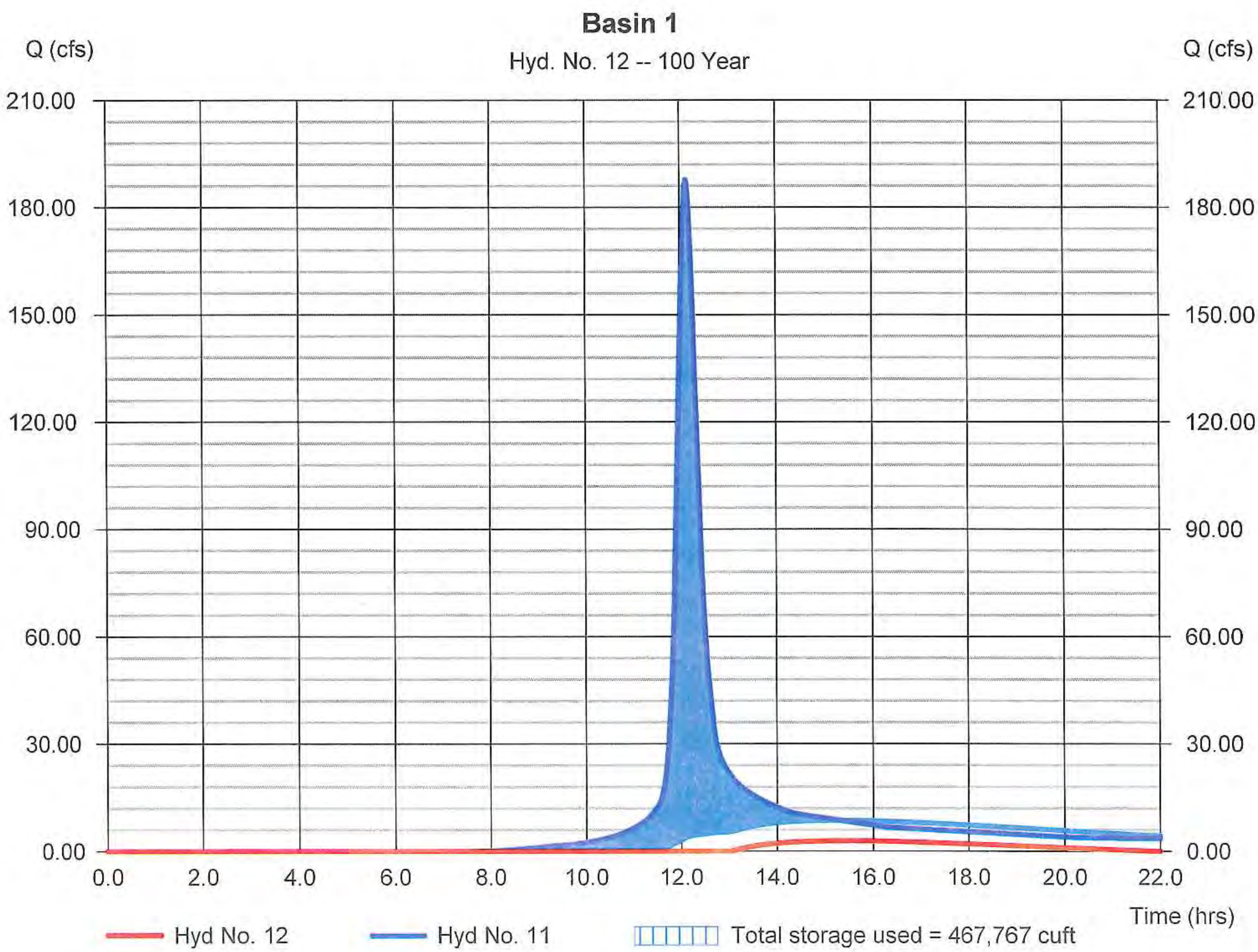
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 12

Basin 1

Hydrograph type	= Reservoir	Peak discharge	= 2.820 cfs
Storm frequency	= 100 yrs	Time to peak	= 15.50 hrs
Time interval	= 1 min	Hyd. volume	= 54,032 cuft
Inflow hyd. No.	= 11 - Inflow to Basin 1	Max. Elevation	= 881.07 ft
Reservoir name	= Basin 1	Max. Storage	= 467,767 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



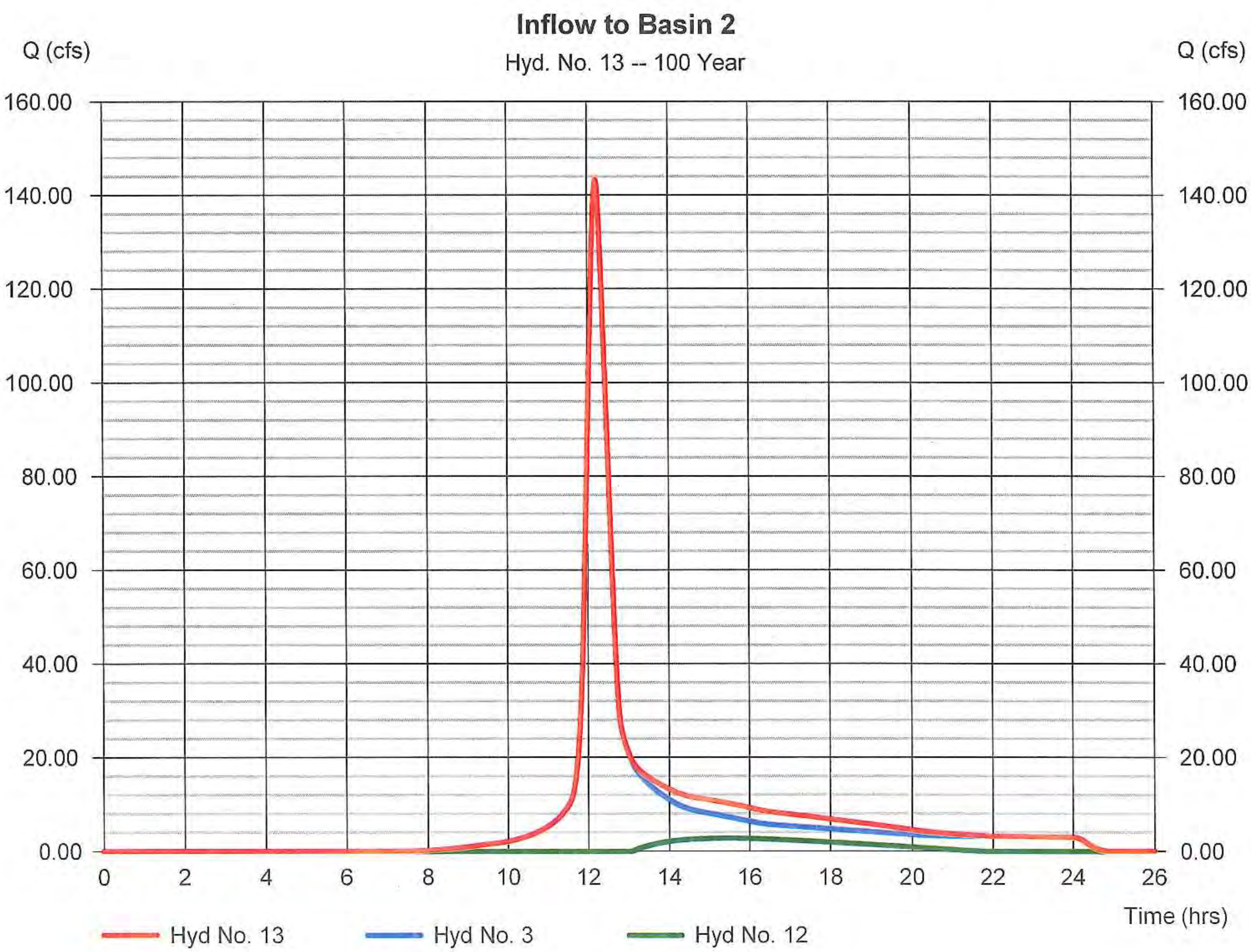
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 13

Inflow to Basin 2

Hydrograph type	= Combine	Peak discharge	= 143.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 664,664 cuft
Inflow hyds.	= 3, 12	Contrib. drain. area	= 50.080 ac



Hydrograph Report

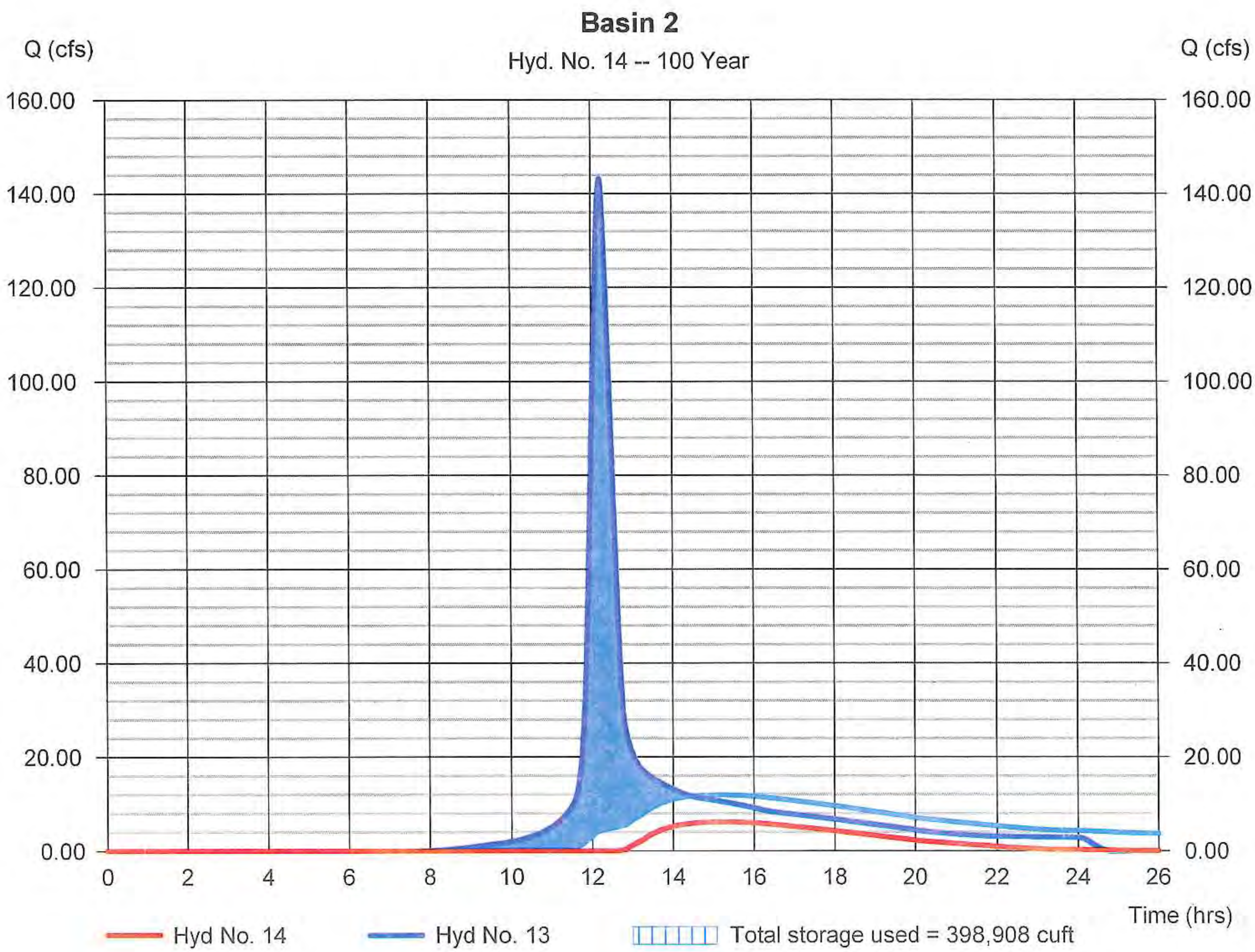
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 14

Basin 2

Hydrograph type	= Reservoir	Peak discharge	= 6.115 cfs
Storm frequency	= 100 yrs	Time to peak	= 15.30 hrs
Time interval	= 1 min	Hyd. volume	= 130,129 cuft
Inflow hyd. No.	= 13 - Inflow to Basin 2	Max. Elevation	= 874.08 ft
Reservoir name	= Basin 2	Max. Storage	= 398,908 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



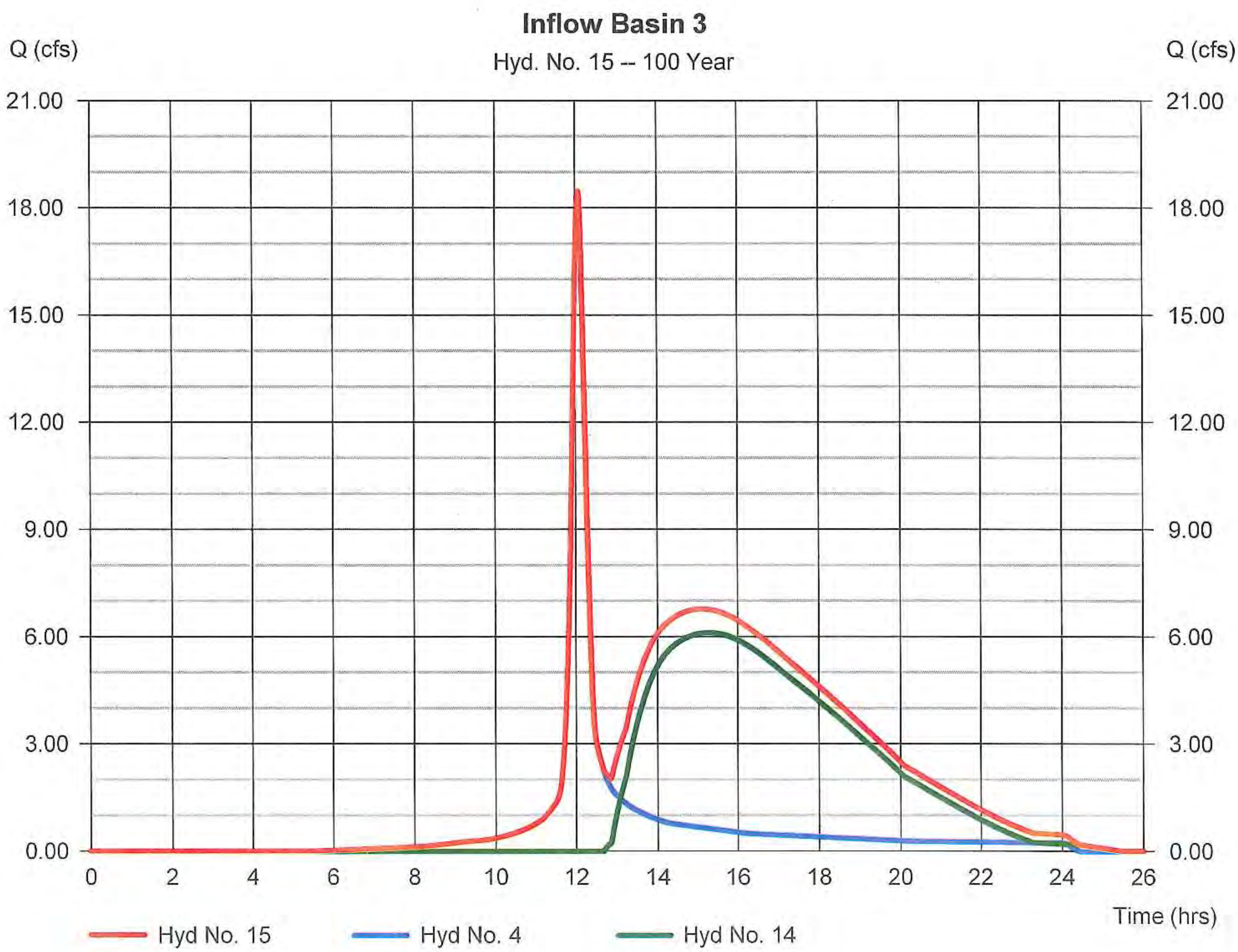
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 15

Inflow Basin 3

Hydrograph type	= Combine	Peak discharge	= 18.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 188,496 cuft
Inflow hyds.	= 4, 14	Contrib. drain. area	= 3.930 ac



Hydrograph Report

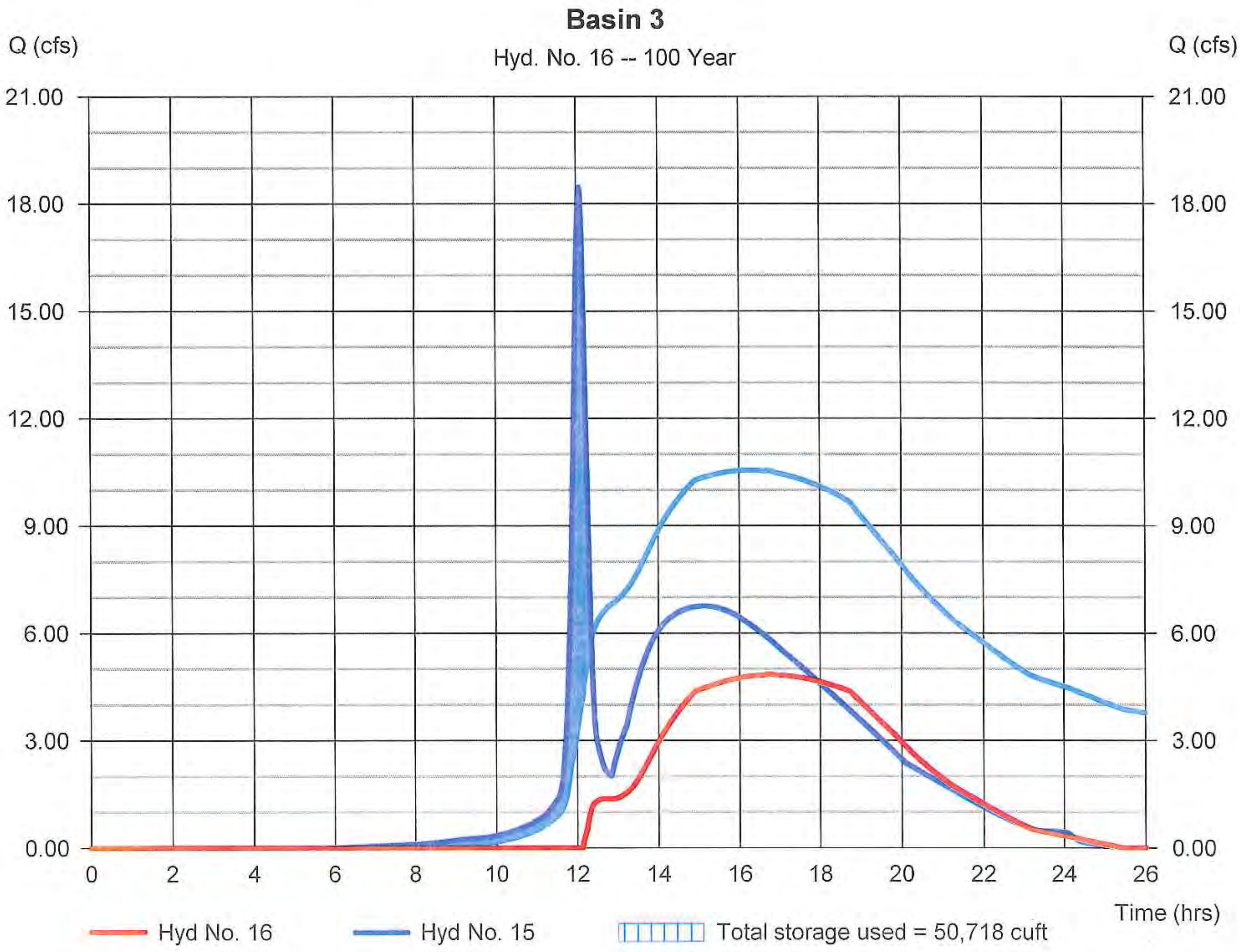
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 16

Basin 3

Hydrograph type	= Reservoir	Peak discharge	= 4.852 cfs
Storm frequency	= 100 yrs	Time to peak	= 16.75 hrs
Time interval	= 1 min	Hyd. volume	= 124,144 cuft
Inflow hyd. No.	= 15 - Inflow Basin 3	Max. Elevation	= 872.00 ft
Reservoir name	= Basin 3	Max. Storage	= 50,718 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



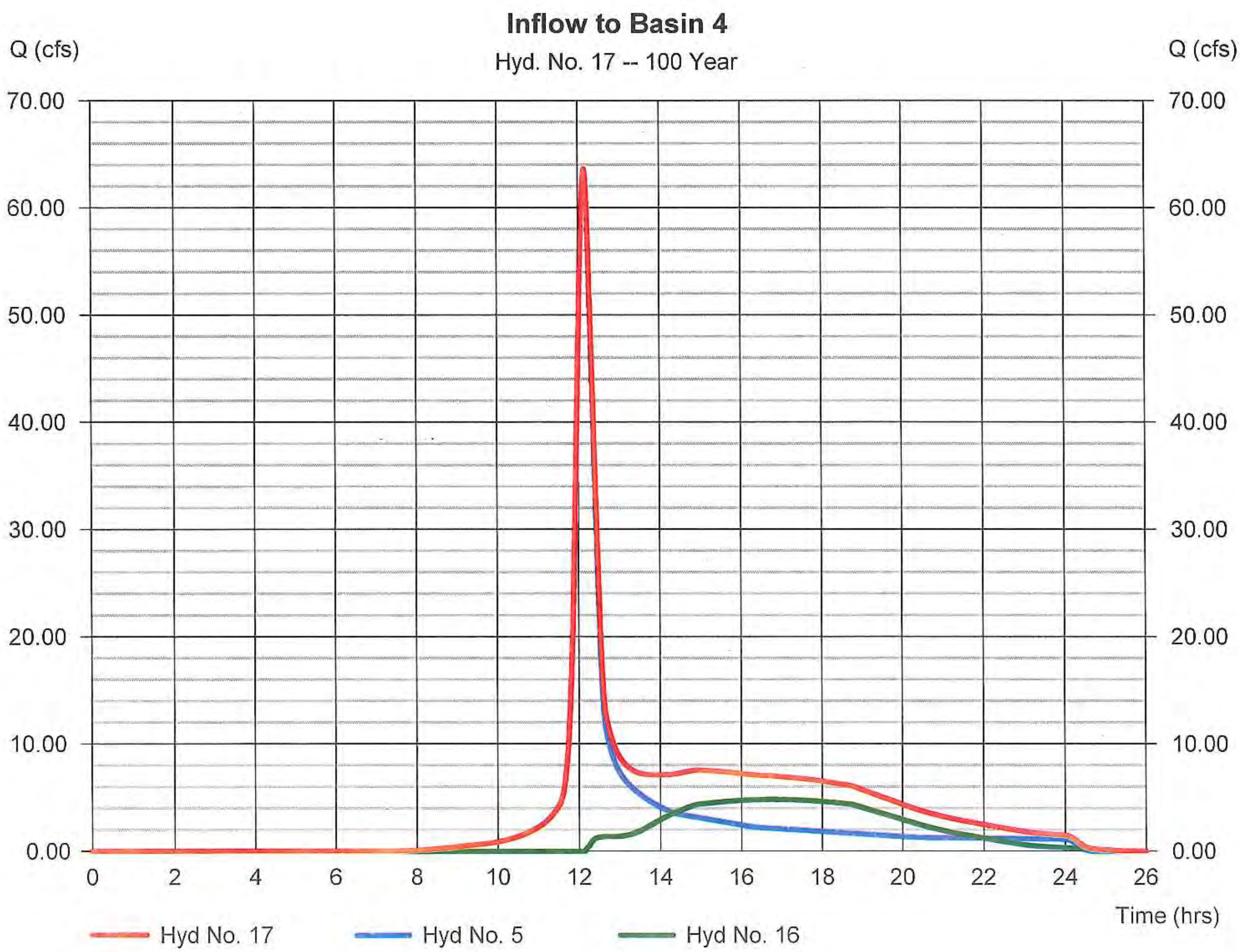
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 17

Inflow to Basin 4

Hydrograph type	= Combine	Peak discharge	= 63.60 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 360,452 cuft
Inflow hyds.	= 5, 16	Contrib. drain. area	= 19.110 ac



Hydrograph Report

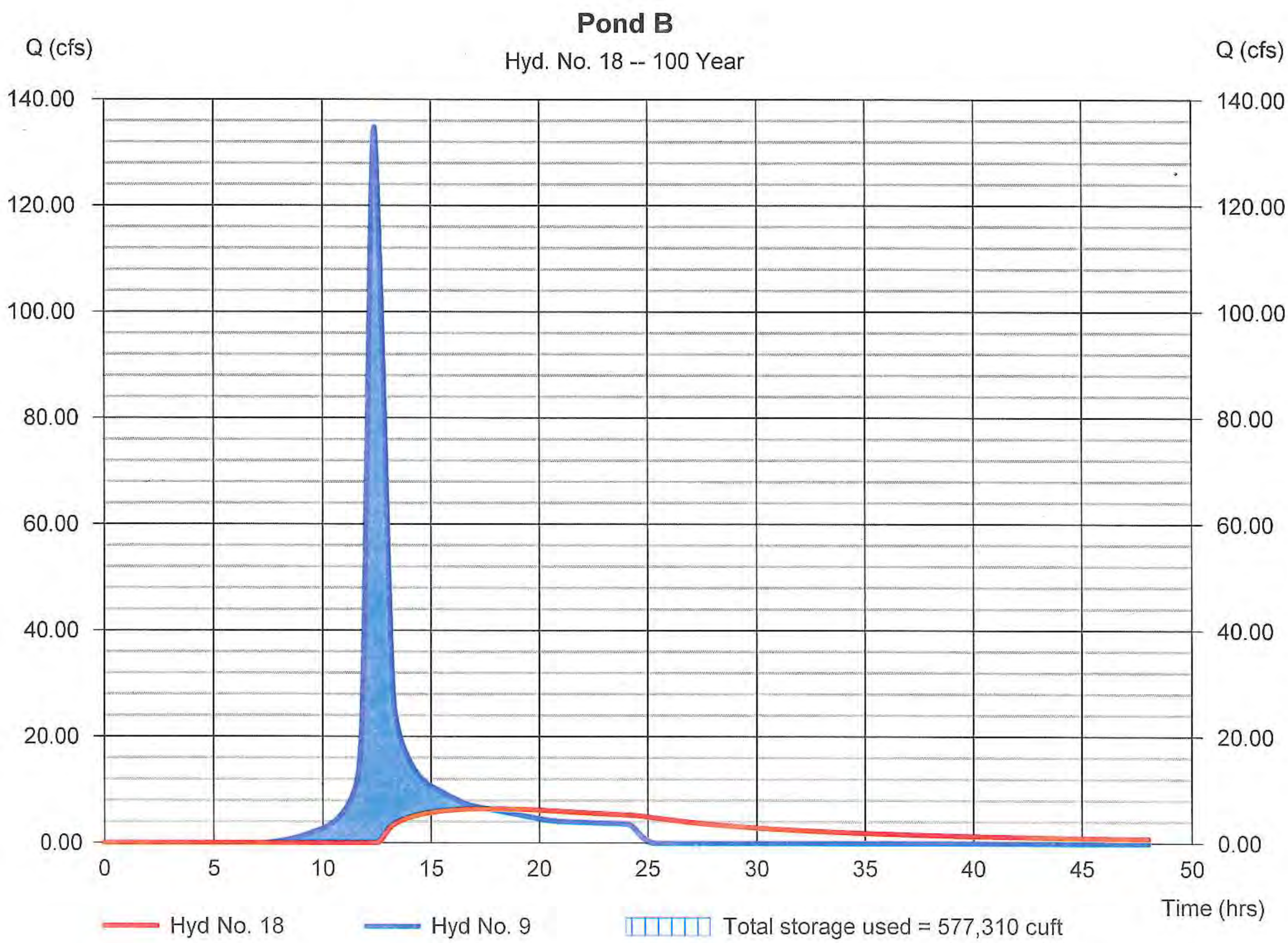
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 18

Pond B

Hydrograph type	= Reservoir	Peak discharge	= 6.377 cfs
Storm frequency	= 100 yrs	Time to peak	= 17.73 hrs
Time interval	= 1 min	Hyd. volume	= 408,084 cuft
Inflow hyd. No.	= 9 - Offsite Area B	Max. Elevation	= 861.85 ft
Reservoir name	= Area B Pond	Max. Storage	= 577,310 cuft

Storage Indication method used.



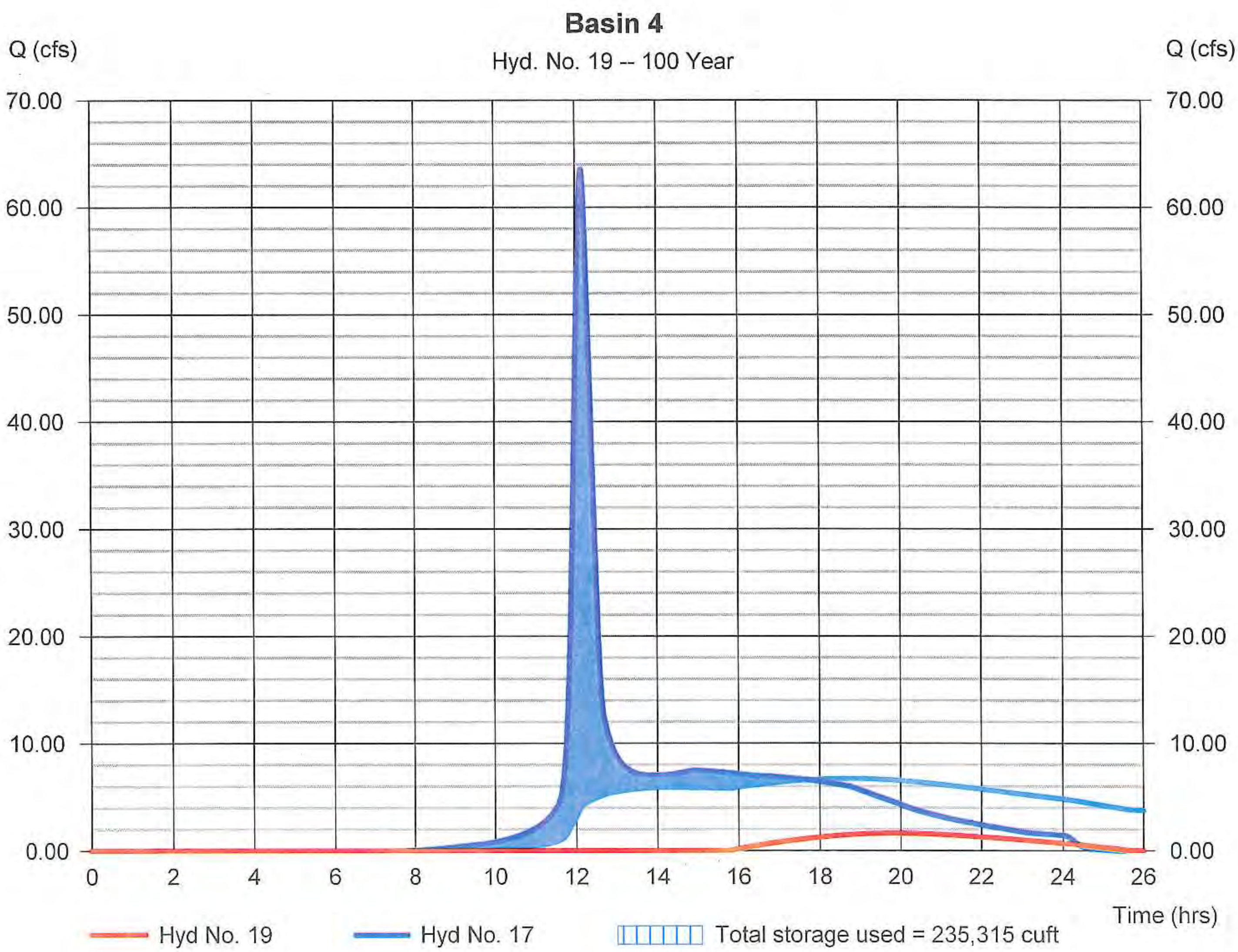
Hydrograph Report

Hyd. No. 19

Basin 4

Hydrograph type	= Reservoir	Peak discharge	= 1.599 cfs
Storm frequency	= 100 yrs	Time to peak	= 19.85 hrs
Time interval	= 1 min	Hyd. volume	= 35,608 cuft
Inflow hyd. No.	= 17 - Inflow to Basin 4	Max. Elevation	= 866.75 ft
Reservoir name	= Basin 4	Max. Storage	= 235,315 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

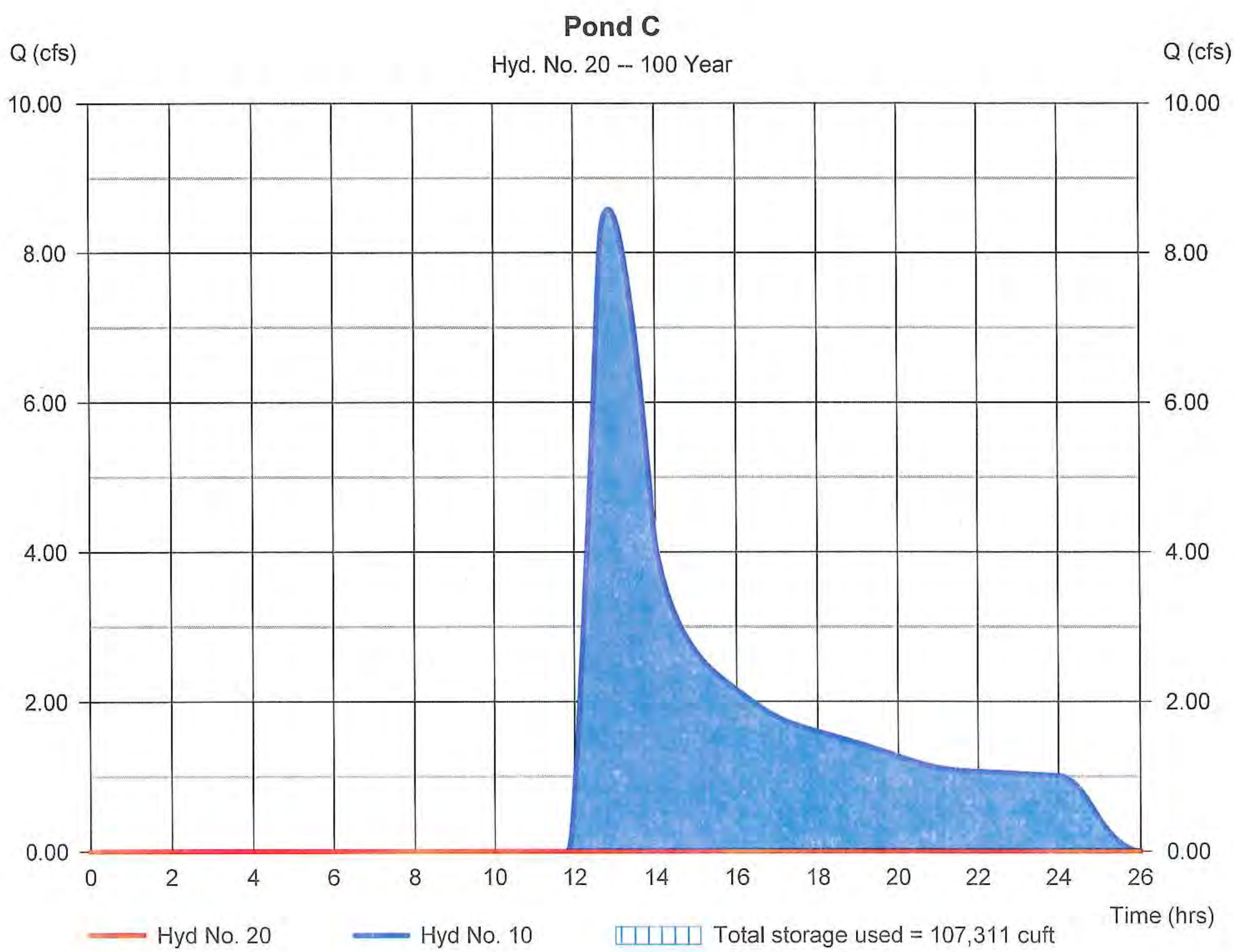
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 20

Pond C

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 10 - Offsite Area C	Max. Elevation	= 860.35 ft
Reservoir name	= Area C Pond	Max. Storage	= 107,311 cuft

Storage Indication method used.



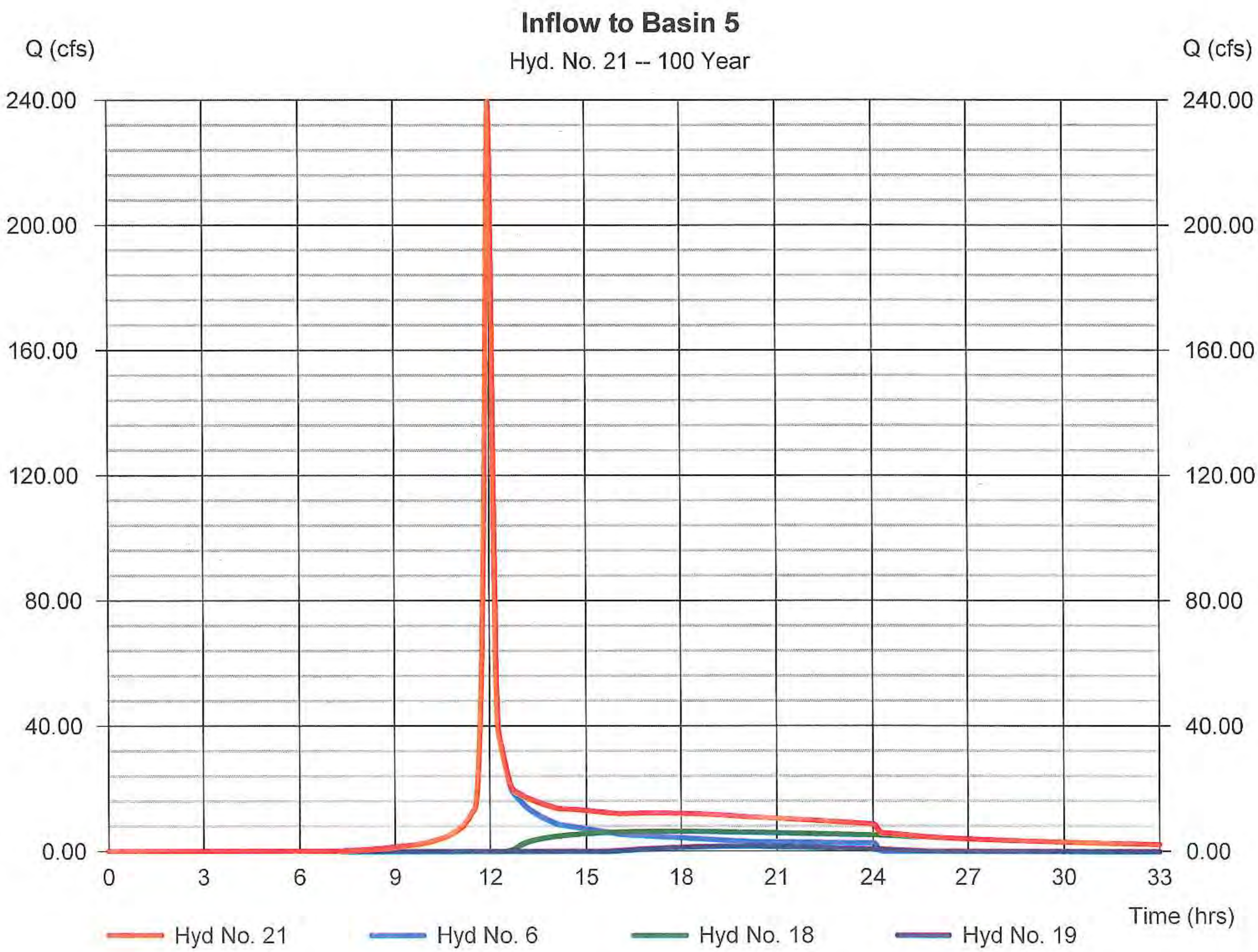
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 21

Inflow to Basin 5

Hydrograph type	= Combine	Peak discharge	= 239.54 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 1,025,489 cuft
Inflow hyds.	= 6, 18, 19	Contrib. drain. area	= 45.260 ac



Hydrograph Report

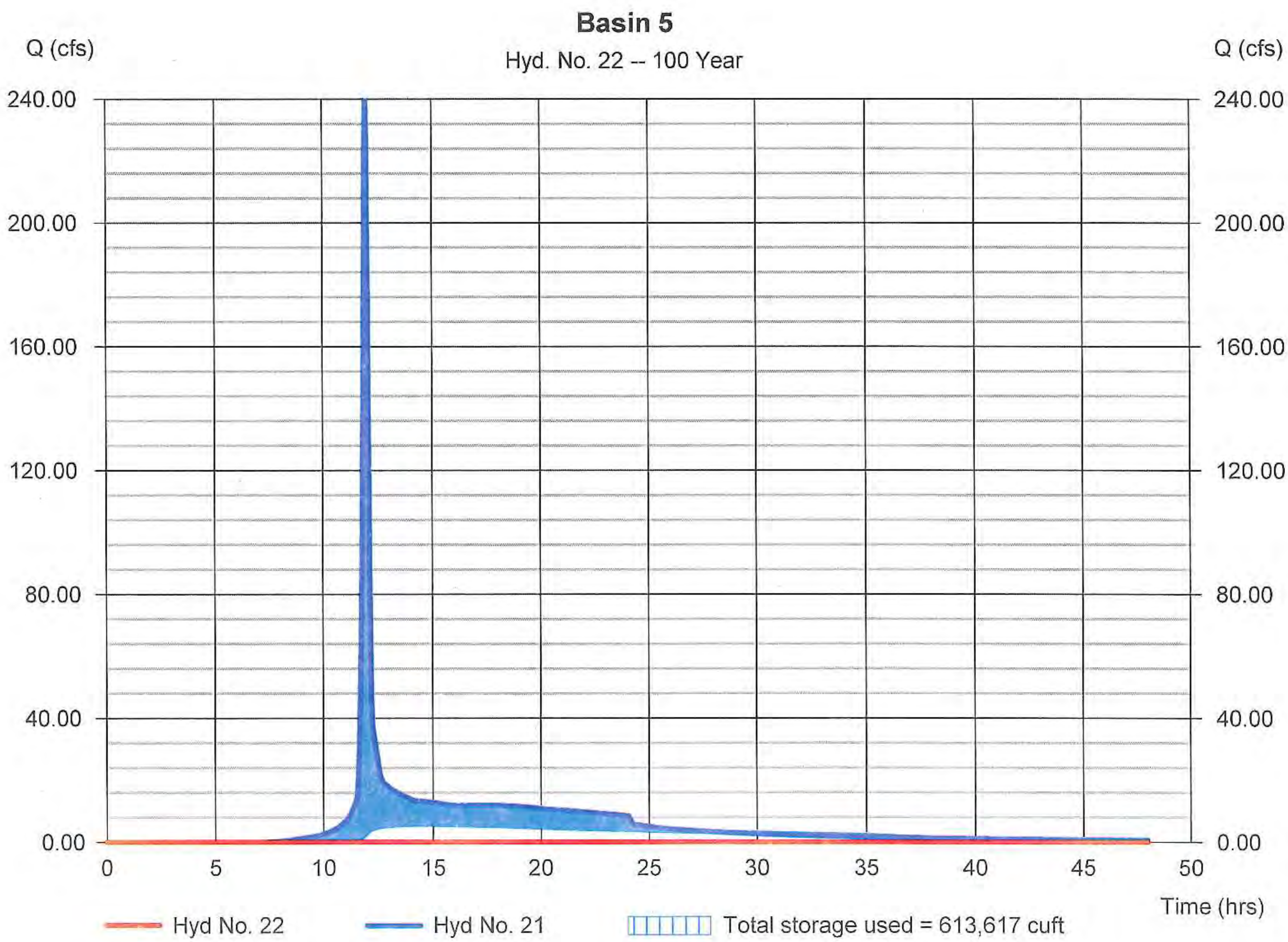
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 22

Basin 5

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.75 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 21 - Inflow to Basin 5	Max. Elevation	= 858.71 ft
Reservoir name	= Basin 5	Max. Storage	= 613,617 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

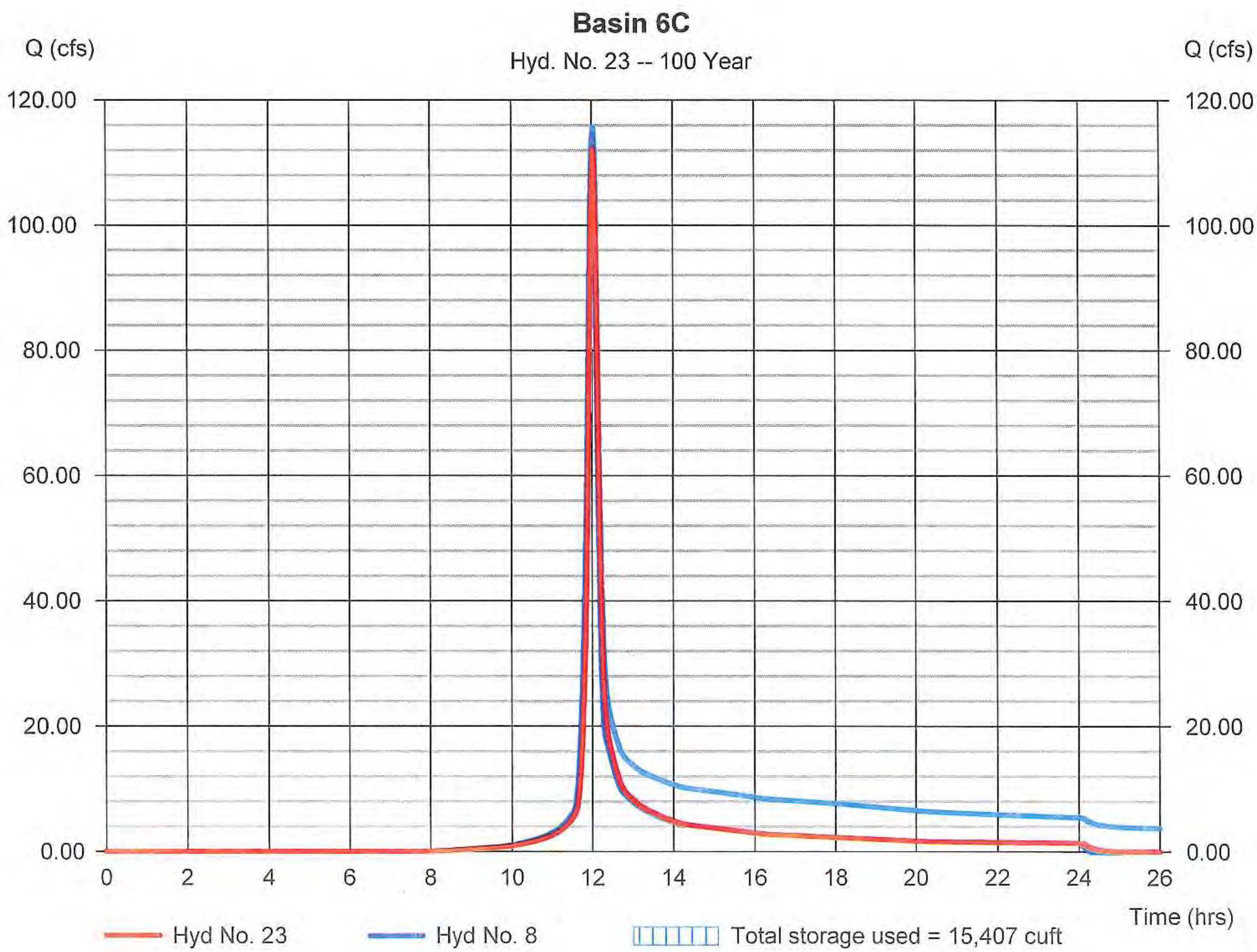
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 23

Basin 6C

Hydrograph type	= Reservoir	Peak discharge	= 112.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 285,359 cuft
Inflow hyd. No.	= 8 - Area H	Max. Elevation	= 849.07 ft
Reservoir name	= Basin 6C	Max. Storage	= 15,407 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

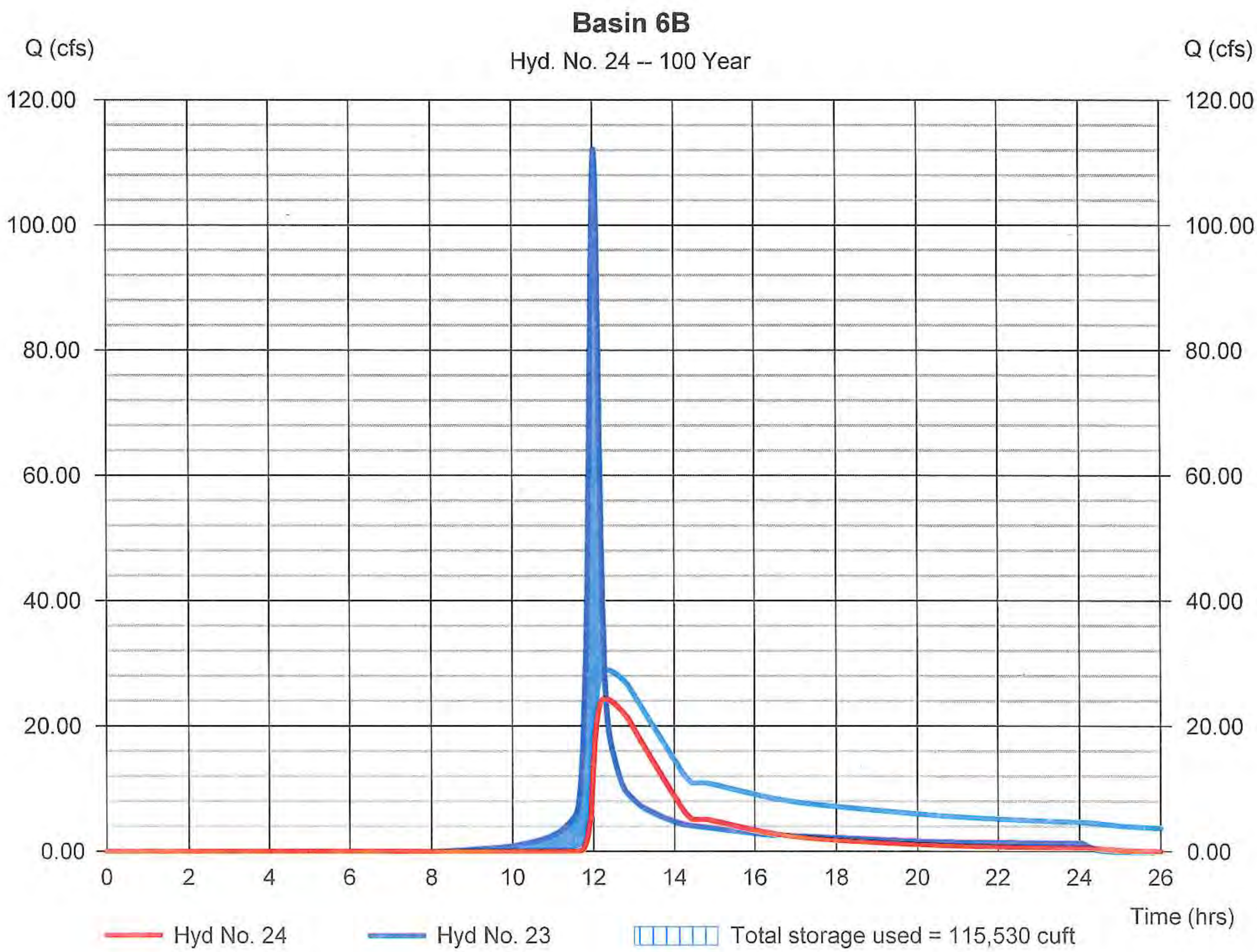
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 24

Basin 6B

Hydrograph type	= Reservoir	Peak discharge	= 24.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.30 hrs
Time interval	= 1 min	Hyd. volume	= 209,196 cuft
Inflow hyd. No.	= 23 - Basin 6C	Max. Elevation	= 828.66 ft
Reservoir name	= Basin 6B	Max. Storage	= 115,530 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



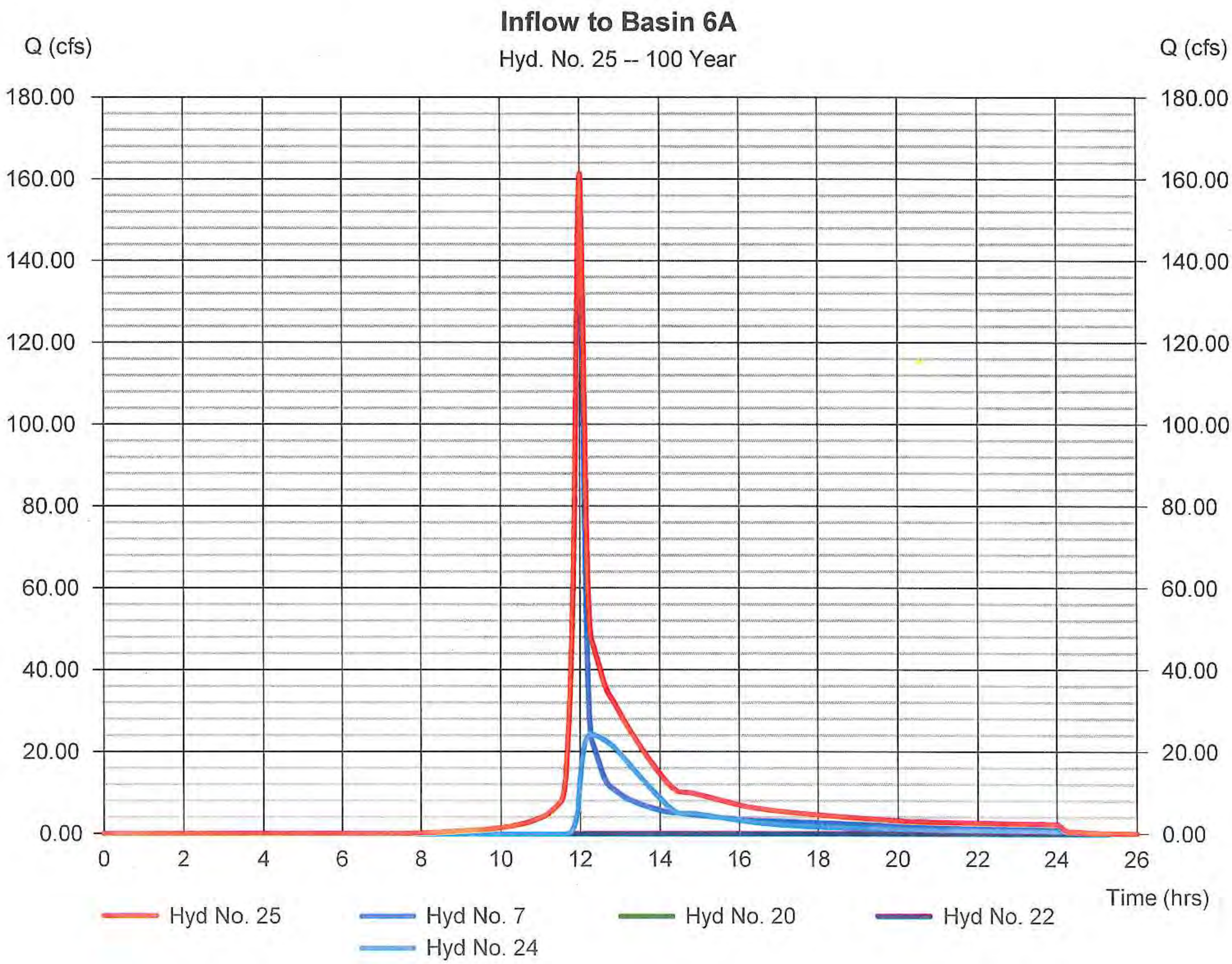
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Hyd. No. 25

Inflow to Basin 6A

Hydrograph type	= Combine	Peak discharge	= 161.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 565,961 cuft
Inflow hyds.	= 7, 20, 22, 24	Contrib. drain. area	= 29.420 ac



Hydrograph Report

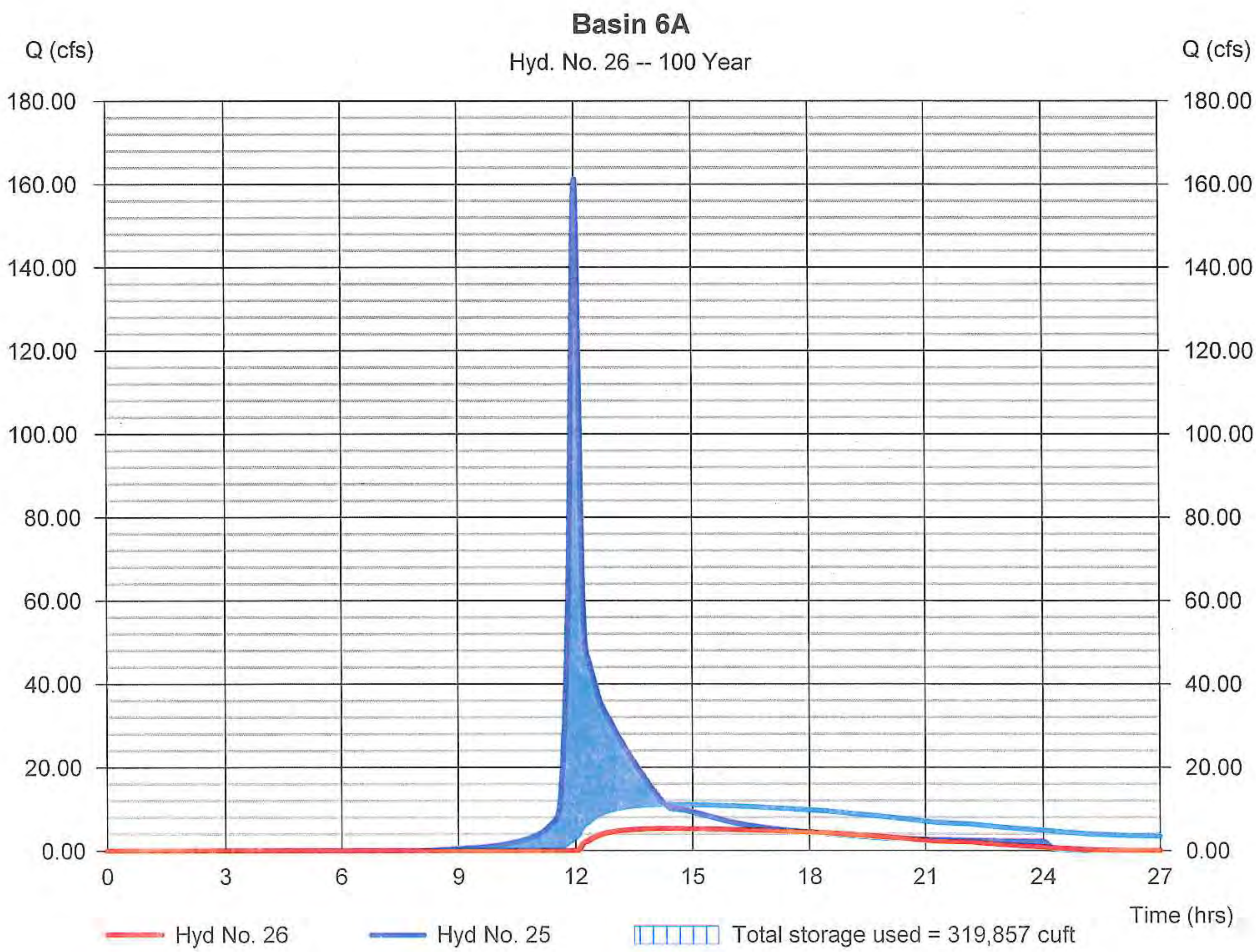
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Tuesday, Mar 26, 2013

Hyd. No. 26

Basin 6A

Hydrograph type	= Reservoir	Peak discharge	= 5.248 cfs
Storm frequency	= 100 yrs	Time to peak	= 14.30 hrs
Time interval	= 1 min	Hyd. volume	= 158,039 cuft
Inflow hyd. No.	= 25 - Inflow to Basin 6A	Max. Elevation	= 828.63 ft
Reservoir name	= Basin 6A	Max. Storage	= 319,857 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Tuesday, Mar 26, 2013

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	44.3665	9.4000	0.8118	--------
3	0.0000	0.0000	0.0000	--------
5	58.6964	10.7000	0.8123	--------
10	69.4052	11.4000	0.8150	--------
25	84.1542	12.0000	0.8170	--------
50	96.0484	12.4000	0.8190	--------
100	107.7257	12.7000	0.8204	--------

File name: Hydro 35 Rosemount.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.09	4.00	3.32	2.85	2.51	2.25	2.04	1.87	1.73	1.61	1.51	1.42
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.27	5.01	4.20	3.64	3.22	2.89	2.63	2.42	2.24	2.09	1.96	1.85
10	7.10	5.72	4.82	4.18	3.71	3.34	3.04	2.80	2.59	2.42	2.27	2.14
25	8.31	6.74	5.70	4.96	4.40	3.97	3.62	3.34	3.09	2.89	2.71	2.56
50	9.26	7.53	6.38	5.56	4.95	4.46	4.07	3.75	3.48	3.25	3.05	2.88
100	10.20	8.31	7.06	6.16	5.48	4.95	4.52	4.17	3.87	3.61	3.39	3.20

Tc = time in minutes. Values may exceed 60.

Precip. file name: C:\Users\mroth\Desktop\075704- SKB Rosemount\Dakota County, MN.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.40	2.80	0.00	0.00	4.20	4.85	5.35	6.00
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

ATTACHMENT 3

PERIMETER DITCH, DIVERSION BERMS
AND DOWNCHUTE CALCULATIONS

CRA
CONESTOGA-ROVERS & ASSOCIATES

PROJECT No.: 075704-4000
PROJECT NAME: SKB Rosemount
DATE: March 20, 2013

DESIGNED BY: MPR
CHECKED BY:
PAGE 1 OF 1

Channel Summary- Hydraulic Conditions

Confirm capacity of drainage channel/ ditch system under peak flow from the 100 year - 24 hour storm event.

Typical Diversion Berm

Typical berm spaced at 40 feet vertical separation.
4:1 side slopes, 2 foot minimum depth, grass lined
n= 0.026, slope 2% (typ.)
Grass lined channel from highest point 1500 feet, and continue with Turf Reinforcement or Rip Rap to the Down Chute to limit the velocity to 5 ft/sec.

Diversion Berm
(Worst Case)

Top Diversion Berm with the largest Contributing Area C- 16 Acres.
4:1 side slopes, 2 foot minimum depth, rip rap lined
n= 0.040, slope 2% (typ.)

Down Chute

Typical Down Chute with the largest contributing area, Area C .
3:1 side slopes, 2 foot minimum depth, rip rap lined
n= 0.040, slope 25% (typ.)

Area A Ditch

Ditch draining Area A Down Chute, conveyance ditch to Basin 1.
3:1 side slopes, 2.5 foot minimum depth, rip rap lined
n= 0.040, slope 2.65% (typ.)

Summary Table

Drainage Channel Description	Peak Flow (cfs)	Channel Depth (ft)	Channel Velocity (fps)	Channel Capacity (cfs)	Slope (ft/ft)	Shear Stress (lb/ft^2)
Typical Diversion Berm	19.45	1.0	4.99	126.7	0.0200	1.25
Diversion Berm	47.56	1.65	4.53	82.37	0.0200	2.06
Down Chute	117.6	0.95	14.64	527.5	0.2500	14.82
Area A Ditch	129.78	2.25	6.88	174	0.0265	3.72

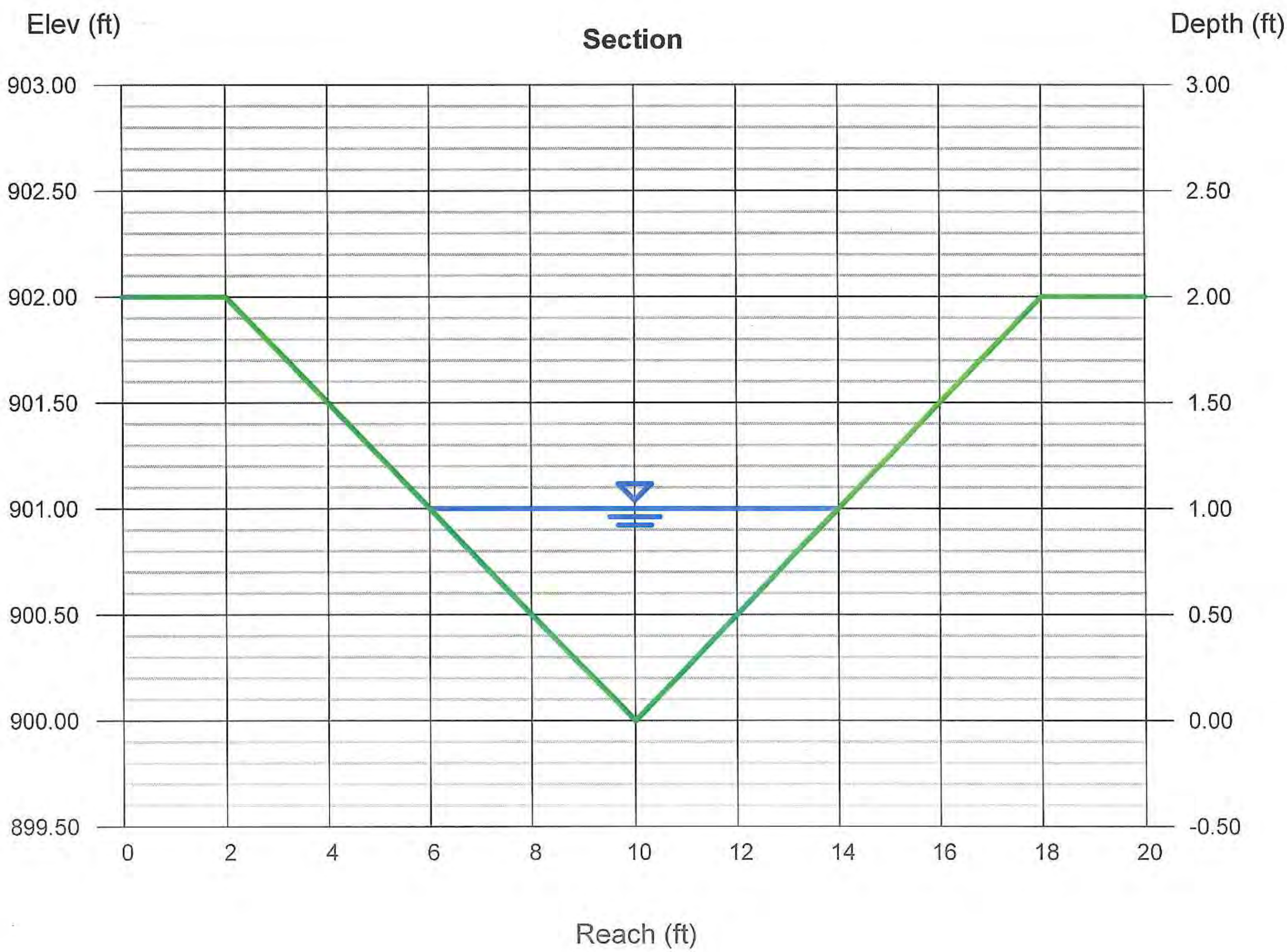
Flow Calculations based upon computations from Hydraflow Express extension Version 8.0, Autodesk, Inc.

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Mar 20 2013

Typical Diversion Berm Channel

Triangular		**Highlighted**	
Side Slopes (z:1)	= 4.00, 4.00	Depth (ft)	= 1.00
Total Depth (ft)	= 2.00	Q (cfs)	= 19.96
		Area (sqft)	= 4.00
Invert Elev (ft)	= 900.00	Velocity (ft/s)	= 4.99
Slope (%)	= 2.00	Wetted Perim (ft)	= 8.25
N-Value	= 0.026	Crit Depth, Yc (ft)	= 0.98
		Top Width (ft)	= 8.00
Calculations		EGL (ft)	= 1.39
Compute by:	Q vs Depth		
No. Increments	= 20		



Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
0.10	0.043	0.040	1.07	0.82	0.01	0.80
0.20	0.273	0.160	1.71	1.65	0.10	1.60
0.30	0.805	0.360	2.23	2.47	0.20	2.40
0.40	1.733	0.640	2.71	3.30	0.31	3.20
0.50	3.142	1.000	3.14	4.12	0.42	4.00
0.60	5.110	1.440	3.55	4.95	0.53	4.80
0.70	7.708	1.960	3.93	5.77	0.64	5.60
0.80	11.01	2.560	4.30	6.60	0.75	6.40
0.90	15.07	3.240	4.65	7.42	0.87	7.20
1.00	19.96	4.000	4.99	8.25	0.98	8.00
1.10	25.73	4.840	5.32	9.07	1.10	8.80
1.20	32.45	5.760	5.63	9.90	1.21	9.60
1.30	40.17	6.760	5.94	10.72	1.33	10.40
1.40	48.95	7.840	6.24	11.54	1.45	11.20
1.50	58.84	9.000	6.54	12.37	1.57	12.00
1.60	69.89	10.24	6.83	13.19	1.69	12.80
1.70	82.16	11.56	7.11	14.02	1.81	13.60
1.80	95.69	12.96	7.38	14.84	1.93	14.40
1.90	110.5	14.44	7.65	15.67	2.00	15.20
2.00	126.7	16.00	7.92	16.49	2.00	16.00

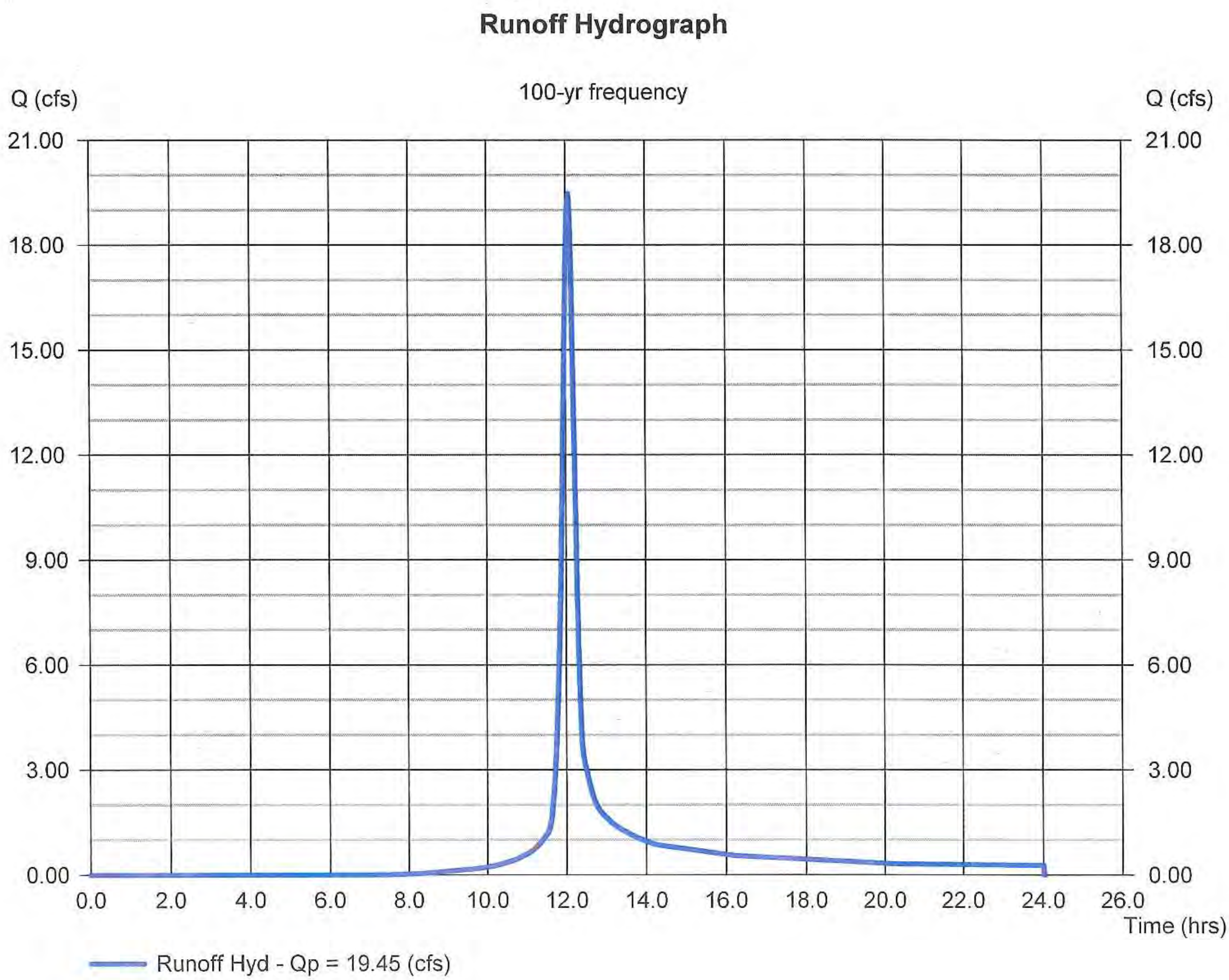
Hydrology Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. | Wednesday, Mar 20 2013

Typical Diversion Berms

Hydrograph type	= SCS	Peak discharge (cfs)	= 19.45
Storm frequency (yrs)	= 100	Time interval (min)	= 1
Drainage area (ac)	= 4.750	Curve number (CN)	= 76
Basin Slope (%)	= *See Worksheet*	Hydraulic length (ft)	= *See Worksheet*
Tc method	= TR55	Time of conc. (min)	= 17
Total precip. (in)	= 6.00	Storm Distribution	= Type II
Storm duration (hrs)	= 24	Shape factor	= 484

Hydrograph Volume = 57,419 (cuft); 1.318 (acft)



TR55 Tc Worksheet

Hydraflow Express by Intelisolve

SCS

Typical Diversion Berms

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	130.0		0.0		0.0		
Two-year 24-hr precip. ((in))	=	2.80		0.00		0.00		
Land slope (%)	=	25.00		0.00		0.00		
Travel Time (min)	**=**	**6.85**	**+**	**0.00**	**+**	**0.00**	**=**	**6.85**
Shallow Concentrated Flow								
Flow length (ft)	=	1452.00		0.00		0.00		
Watercourse slope (%)	=	2.00		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	2.28		0.00		0.00		
Travel Time (min)	**=**	**10.61**	**+**	**0.00**	**+**	**0.00**	**=**	**10.61**
Channel Flow								
X sectional flow area ((sqft))	=	0.00		0.00		0.00		
Wetted perimeter ((ft))	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.025		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	**=**	**0**	**+**	**0**	**+**	**0**	**=**	**0.00**

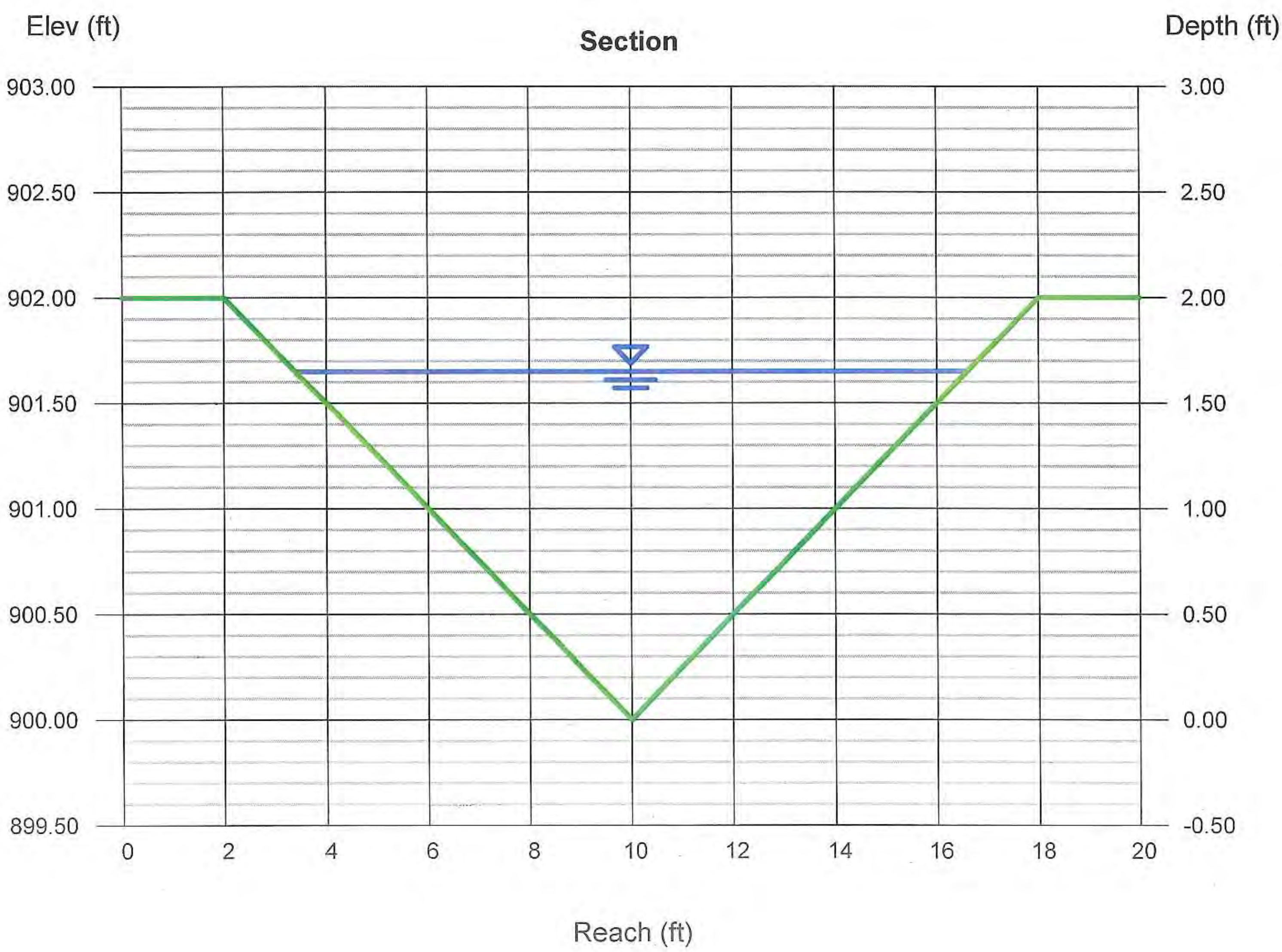
Total Travel Time, Tc .... 17.00 min

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. — Wednesday, Mar 20 2013

Diversion Berm Channel (Worst Case)

Triangular		**Highlighted**	
Side Slopes (z:1)	= 4.00, 4.00	Depth (ft)	= 1.65
Total Depth (ft)	= 2.00	Q (cfs)	= 49.32
		Area (sqft)	= 10.89
Invert Elev (ft)	= 900.00	Velocity (ft/s)	= 4.53
Slope (%)	= 2.00	Wetted Perim (ft)	= 13.61
N-Value	= 0.040	Crit Depth, Yc (ft)	= 1.52
		Top Width (ft)	= 13.20
Calculations		EGL (ft)	= 1.97
Compute by:	Q vs Depth		
No. Increments	= 40		



Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
0.05	0.004	0.010	0.44	0.41	0.01	0.40
0.10	0.028	0.040	0.70	0.82	0.04	0.80
0.15	0.082	0.090	0.91	1.24	0.08	1.20
0.20	0.177	0.160	1.11	1.65	0.13	1.60
0.25	0.322	0.250	1.29	2.06	0.17	2.00
0.30	0.523	0.360	1.45	2.47	0.21	2.40
0.35	0.789	0.490	1.61	2.89	0.26	2.80
0.40	1.126	0.640	1.76	3.30	0.30	3.20
0.45	1.542	0.810	1.90	3.71	0.35	3.60
0.50	2.042	1.000	2.04	4.12	0.40	4.00
0.55	2.633	1.210	2.18	4.54	0.44	4.40
0.60	3.321	1.440	2.31	4.95	0.49	4.80
0.65	4.112	1.690	2.43	5.36	0.54	5.20
0.70	5.010	1.960	2.56	5.77	0.59	5.60
0.75	6.022	2.250	2.68	6.18	0.63	6.00
0.80	7.153	2.560	2.79	6.60	0.68	6.40
0.85	8.409	2.890	2.91	7.01	0.73	6.80
0.90	9.793	3.240	3.02	7.42	0.78	7.20
0.95	11.31	3.610	3.13	7.83	0.83	7.60
1.00	12.97	4.000	3.24	8.25	0.87	8.00
1.05	14.77	4.410	3.35	8.66	0.92	8.40
1.10	16.72	4.840	3.46	9.07	0.97	8.80
1.15	18.83	5.290	3.56	9.48	1.02	9.20
1.20	21.09	5.760	3.66	9.90	1.07	9.60
1.25	23.52	6.250	3.76	10.31	1.12	10.00
1.30	26.11	6.760	3.86	10.72	1.17	10.40
1.35	28.88	7.290	3.96	11.13	1.22	10.80
1.40	31.82	7.840	4.06	11.54	1.27	11.20
1.45	34.94	8.410	4.15	11.96	1.32	11.60
1.50	38.25	9.000	4.25	12.37	1.37	12.00
1.55	41.74	9.610	4.34	12.78	1.42	12.40
1.60	45.43	10.24	4.44	13.19	1.47	12.80
1.65	49.32	10.89	4.53	13.61	1.52	13.20

Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
1.70	53.40	11.56	4.62	14.02	1.57	13.60
1.75	57.70	12.25	4.71	14.43	1.62	14.00
1.80	62.20	12.96	4.80	14.84	1.67	14.40
1.85	66.91	13.69	4.89	15.26	1.72	14.80
1.90	71.85	14.44	4.98	15.67	1.78	15.20
1.95	77.00	15.21	5.06	16.08	1.83	15.60
2.00	82.38	16.00	5.15	16.49	1.88	16.00

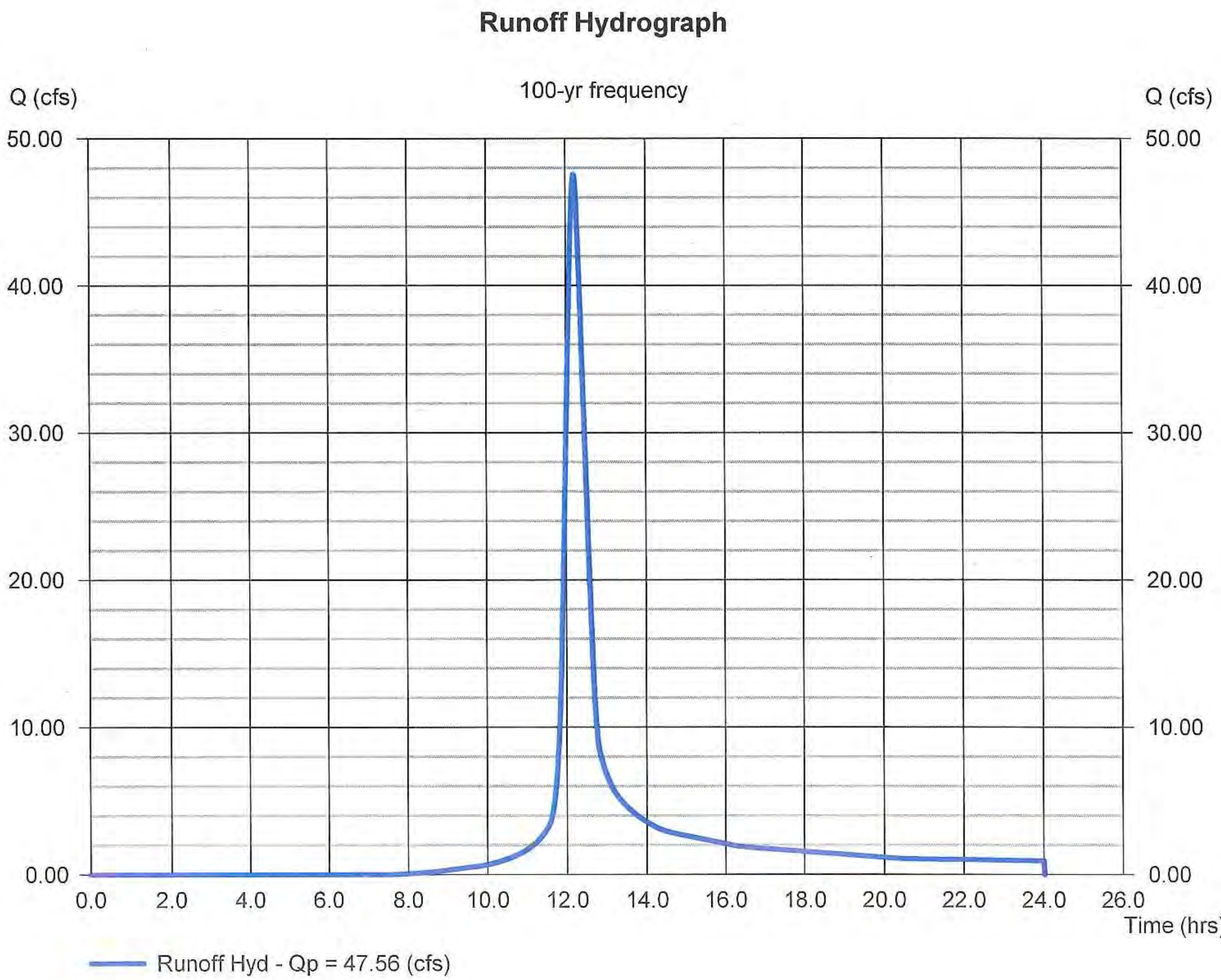
Hydrology Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Mar 20 2013

Diversion Berms (Worst Case)

Hydrograph type	= SCS	Peak discharge (cfs)	= 47.56
Storm frequency (yrs)	= 100	Time interval (min)	= 1
Drainage area (ac)	= 16.000	Curve number (CN)	= 76
Basin Slope (%)	= *See Worksheet*	Hydraulic length (ft)	= *See Worksheet*
Tc method	= TR55	Time of conc. (min)	= 32
Total precip. (in)	= 6.00	Storm Distribution	= Type II
Storm duration (hrs)	= 24	Shape factor	= 484

Hydrograph Volume = 196,358 (cuft); 4.508 (acft)



TR55 Tc Worksheet

Hydraflow Express by Intelisolve

SCS

Diversion Berms (Worst Case)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	200.0		0.0		0.0		
Two-year 24-hr precip. ((in))	=	2.80		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**26.56**	**+**	**0.00**	**+**	**0.00**	**=**	**26.56**
Shallow Concentrated Flow								
Flow length (ft)	=	90.00		0.00		0.00		
Watercourse slope (%)	=	25.00		2.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	8.07		2.28		0.00		
Travel Time (min)	**=**	**0.19**	**+**	**0.00**	**+**	**0.00**	**=**	**0.19**
Channel Flow								
X sectional flow area ((sqft))	=	18.00		0.00		0.00		
Wetted perimeter ((ft))	=	17.50		0.00		0.00		
Channel slope (%)	=	2.00		0.00		0.00		
Manning's n-value	=	0.040		0.015		0.015		
Velocity (ft/s)	=	5.37		0.00		0.00		
Flow length (ft)	=	1780.0		0.0		0.0		
Travel Time (min)	**=**	**5.5262480.000**			**+**	**0**	**=**	**5.53**

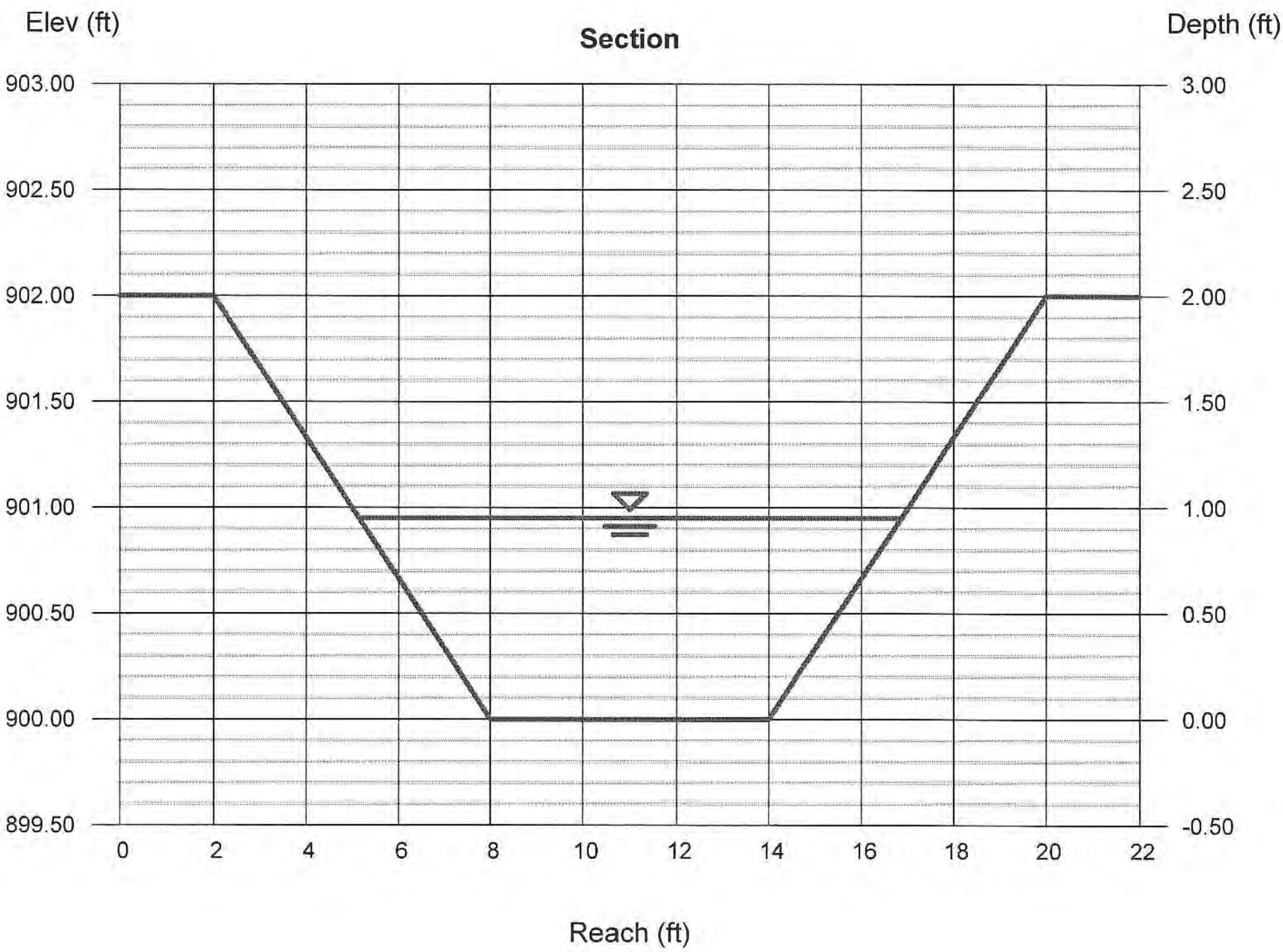
Total Travel Time, Tc .... 32.00 min

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Friday, Mar 1 2013

Down Chute Channel

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 6.00	Depth (ft)	= 0.95
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 123.12
Total Depth (ft)	= 2.00	Area (sqft)	= 8.41
Invert Elev (ft)	= 900.00	Velocity (ft/s)	= 14.64
Slope (%)	= 25.00	Wetted Perim (ft)	= 12.01
N-Value	= 0.040	Crit Depth, Yc (ft)	= 1.67
		Top Width (ft)	= 11.70
Calculations		EGL (ft)	= 4.28
Compute by:	Q vs Depth		
No. Increments	= 40		



Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
0.05	0.761	0.308	2.47	6.32	0.01	6.30
0.10	2.434	0.630	3.86	6.63	0.08	6.60
0.15	4.825	0.968	4.99	6.95	0.17	6.90
0.20	7.861	1.320	5.96	7.26	0.26	7.20
0.25	11.51	1.688	6.82	7.58	0.36	7.50
0.30	15.74	2.070	7.60	7.90	0.45	7.80
0.35	20.55	2.468	8.33	8.21	0.55	8.10
0.40	25.93	2.880	9.00	8.53	0.64	8.40
0.45	31.88	3.308	9.64	8.85	0.74	8.70
0.50	38.39	3.750	10.24	9.16	0.83	9.00
0.55	45.47	4.208	10.81	9.48	0.93	9.30
0.60	53.12	4.680	11.35	9.79	1.02	9.60
0.65	61.34	5.168	11.87	10.11	1.11	9.90
0.70	70.15	5.670	12.37	10.43	1.21	10.20
0.75	79.54	6.188	12.86	10.74	1.30	10.50
0.80	89.53	6.720	13.32	11.06	1.39	10.80
0.85	100.1	7.268	13.78	11.38	1.49	11.10
0.90	111.3	7.830	14.22	11.69	1.58	11.40
0.95	123.1	8.408	14.64	12.01	1.67	11.70
1.00	135.6	9.000	15.06	12.32	1.76	12.00
1.05	148.6	9.608	15.47	12.64	1.86	12.30
1.10	162.3	10.23	15.87	12.96	1.95	12.60
1.15	176.7	10.87	16.26	13.27	2.00	12.90
1.20	191.7	11.52	16.64	13.59	2.00	13.20
1.25	207.3	12.19	17.01	13.91	2.00	13.50
1.30	223.7	12.87	17.38	14.22	2.00	13.80
1.35	240.7	13.57	17.74	14.54	2.00	14.10
1.40	258.4	14.28	18.09	14.85	2.00	14.40
1.45	276.8	15.01	18.44	15.17	2.00	14.70
1.50	295.9	15.75	18.78	15.49	2.00	15.00
1.55	315.7	16.51	19.12	15.80	2.00	15.30
1.60	336.2	17.28	19.46	16.12	2.00	15.60
1.65	357.5	18.07	19.79	16.44	2.00	15.90

Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
1.70	379.5	18.87	20.11	16.75	2.00	16.20
1.75	402.2	19.69	20.43	17.07	2.00	16.50
1.80	425.7	20.52	20.75	17.38	2.00	16.80
1.85	450.0	21.37	21.06	17.70	2.00	17.10
1.90	475.1	22.23	21.37	18.02	2.00	17.40
1.95	500.9	23.11	21.68	18.33	2.00	17.70
2.00	527.5	24.00	21.98	18.65	2.00	18.00

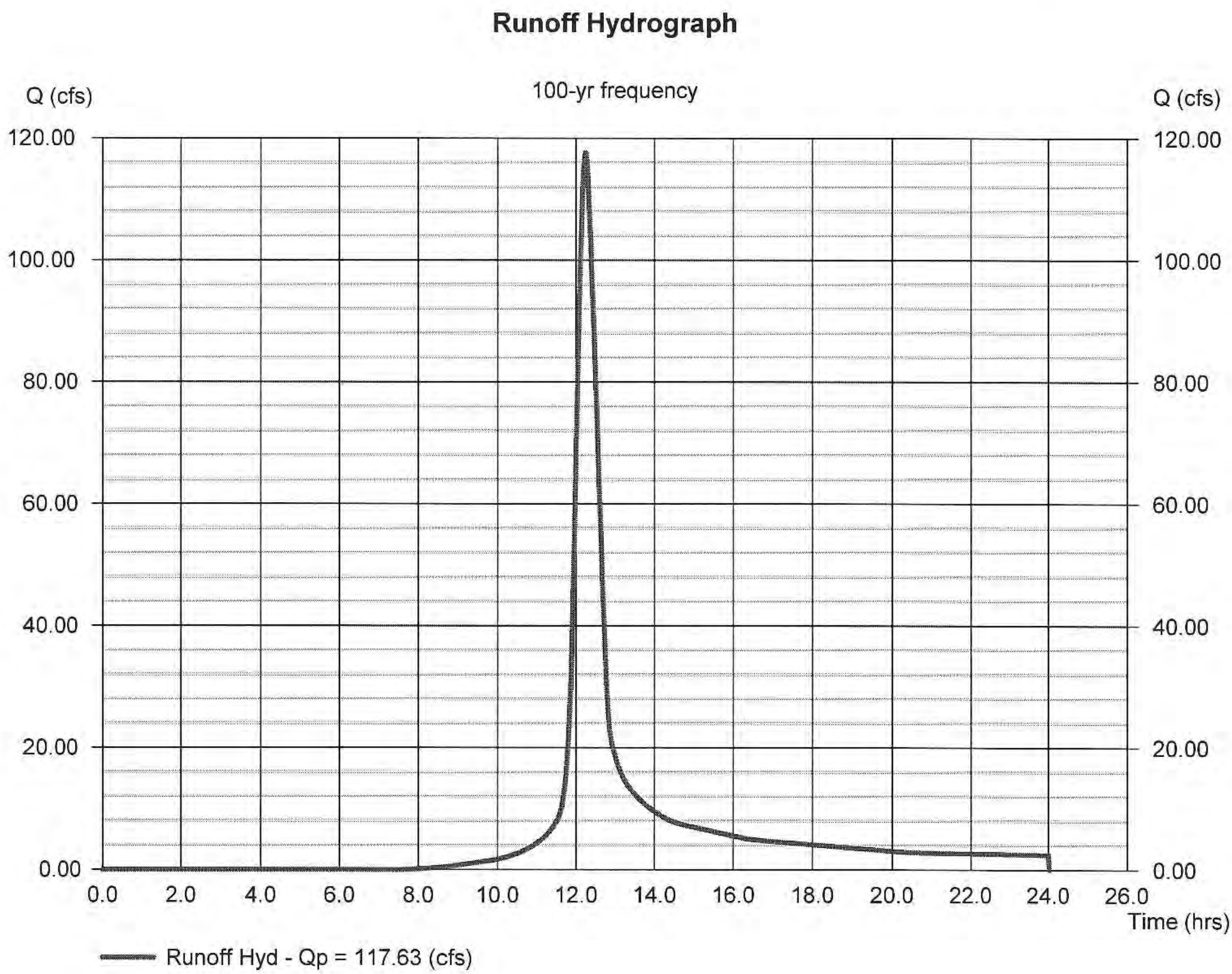
Hydrology Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. — Friday, Mar 1 2013

Down Chute Flows

Hydrograph type	= SCS	Peak discharge (cfs)	= 117.63
Storm frequency (yrs)	= 100	Time interval (min)	= 1
Drainage area (ac)	= 42.400	Curve number (CN)	= 76
Basin Slope (%)	= *See Worksheet*	Hydraulic length (ft)	= *See Worksheet*
Tc method	= TR55	Time of conc. (min)	= 35
Total precip. (in)	= 6.00	Storm Distribution	= Type II
Storm duration (hrs)	= 24	Shape factor	= 484

Hydrograph Volume = 516,598 (cuft); 11.859 (acft)



TR55 Tc Worksheet

Hydraflow Express by Intelisolve

SCS

Down Chute Flows

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	200.0		0.0		0.0		
Two-year 24-hr precip. ((in))	=	2.80		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	**=**	**26.56**	**+**	**0.00**	**+**	**0.00**	**=**	**26.56**
Shallow Concentrated Flow								
Flow length (ft)	=	90.00		890.00		0.00		
Watercourse slope (%)	=	25.00		2.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	8.07		2.28		0.00		
Travel Time (min)	**=**	**0.19**	**+**	**6.50**	**+**	**0.00**	**=**	**6.69**
Channel Flow								
X sectional flow area ((sqft))	=	18.00		24.00		0.00		
Wetted perimeter ((ft))	=	17.50		18.64		0.00		
Channel slope (%)	=	2.00		25.00		0.00		
Manning's n-value	=	0.025		0.015		0.015		
Velocity (ft/s)	=	8.59		58.83		0.00		
Flow length (ft)	=	890.0		500.0		0.0		
Travel Time (min)	**=**	**1.7269530.000.1416480.00**					**=**	**1.87**

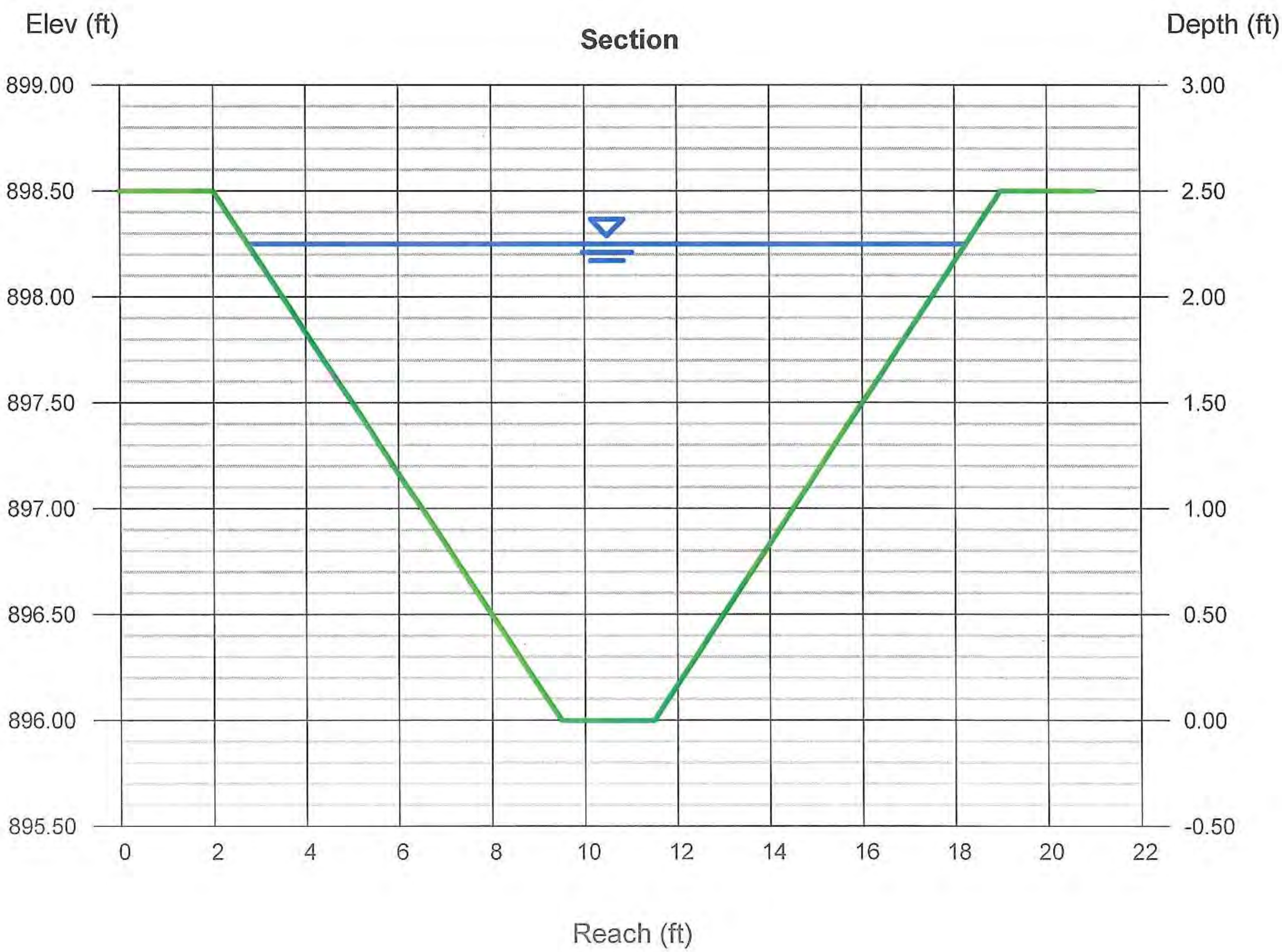
Total Travel Time, Tc .... 35.00 min

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Tuesday, Mar 19 2013

Area A Ditch

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 2.00	Depth (ft)	= 2.25
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 135.43
Total Depth (ft)	= 2.50	Area (sqft)	= 19.69
Invert Elev (ft)	= 896.00	Velocity (ft/s)	= 6.88
Slope (%)	= 2.65	Wetted Perim (ft)	= 16.23
N-Value	= 0.040	Crit Depth, Yc (ft)	= 2.26
		Top Width (ft)	= 15.50
Calculations		EGL (ft)	= 2.99
Compute by:	Q vs Depth		
No. Increments	= 40		



Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
0.06	0.122	0.137	0.90	2.40	0.01	2.38
0.13	0.403	0.297	1.36	2.79	0.05	2.75
0.19	0.823	0.480	1.71	3.19	0.11	3.13
0.25	1.383	0.688	2.01	3.58	0.16	3.50
0.31	2.088	0.918	2.27	3.98	0.22	3.88
0.38	2.945	1.172	2.51	4.37	0.28	4.25
0.44	3.961	1.449	2.73	4.77	0.35	4.63
0.50	5.144	1.750	2.94	5.16	0.41	5.00
0.56	6.500	2.074	3.13	5.56	0.47	5.38
0.63	8.039	2.422	3.32	5.95	0.53	5.75
0.69	9.768	2.793	3.50	6.35	0.60	6.13
0.75	11.69	3.188	3.67	6.74	0.66	6.50
0.81	13.83	3.605	3.83	7.14	0.73	6.88
0.88	16.17	4.047	4.00	7.53	0.79	7.25
0.94	18.73	4.512	4.15	7.93	0.85	7.63
1.00	21.52	5.000	4.30	8.32	0.92	8.00
1.06	24.55	5.512	4.45	8.72	0.99	8.38
1.13	27.81	6.047	4.60	9.12	1.05	8.75
1.19	31.33	6.605	4.74	9.51	1.12	9.13
1.25	35.09	7.188	4.88	9.91	1.18	9.50
1.31	39.13	7.793	5.02	10.30	1.25	9.88
1.38	43.43	8.422	5.16	10.70	1.32	10.25
1.44	48.00	9.074	5.29	11.09	1.38	10.63
1.50	52.86	9.750	5.42	11.49	1.45	11.00
1.56	58.00	10.45	5.55	11.88	1.52	11.38
1.63	63.44	11.17	5.68	12.28	1.58	11.75
1.69	69.18	11.92	5.80	12.67	1.65	12.13
1.75	75.23	12.69	5.93	13.07	1.72	12.50
1.81	81.59	13.48	6.05	13.46	1.79	12.88
1.88	88.28	14.30	6.17	13.86	1.85	13.25
1.94	95.28	15.14	6.29	14.25	1.92	13.63
2.00	102.6	16.00	6.41	14.65	1.99	14.00
2.06	110.3	16.89	6.53	15.04	2.06	14.38

Depth	Q	Area	Veloc	Wp	Yc	TopWidth
(ft)	(cfs)	(sqft)	(ft/s)	(ft)	(ft)	(ft)
2.13	118.3	17.80	6.65	15.44	2.13	14.75
2.19	126.7	18.73	6.76	15.83	2.19	15.13
2.25	135.4	19.69	6.88	16.23	2.26	15.50
2.31	144.5	20.67	6.99	16.63	2.33	15.88
2.38	154.0	21.67	7.10	17.02	2.40	16.25
2.44	163.8	22.70	7.22	17.42	2.47	16.63
2.50	174.0	23.75	7.33	17.81	2.50	17.00

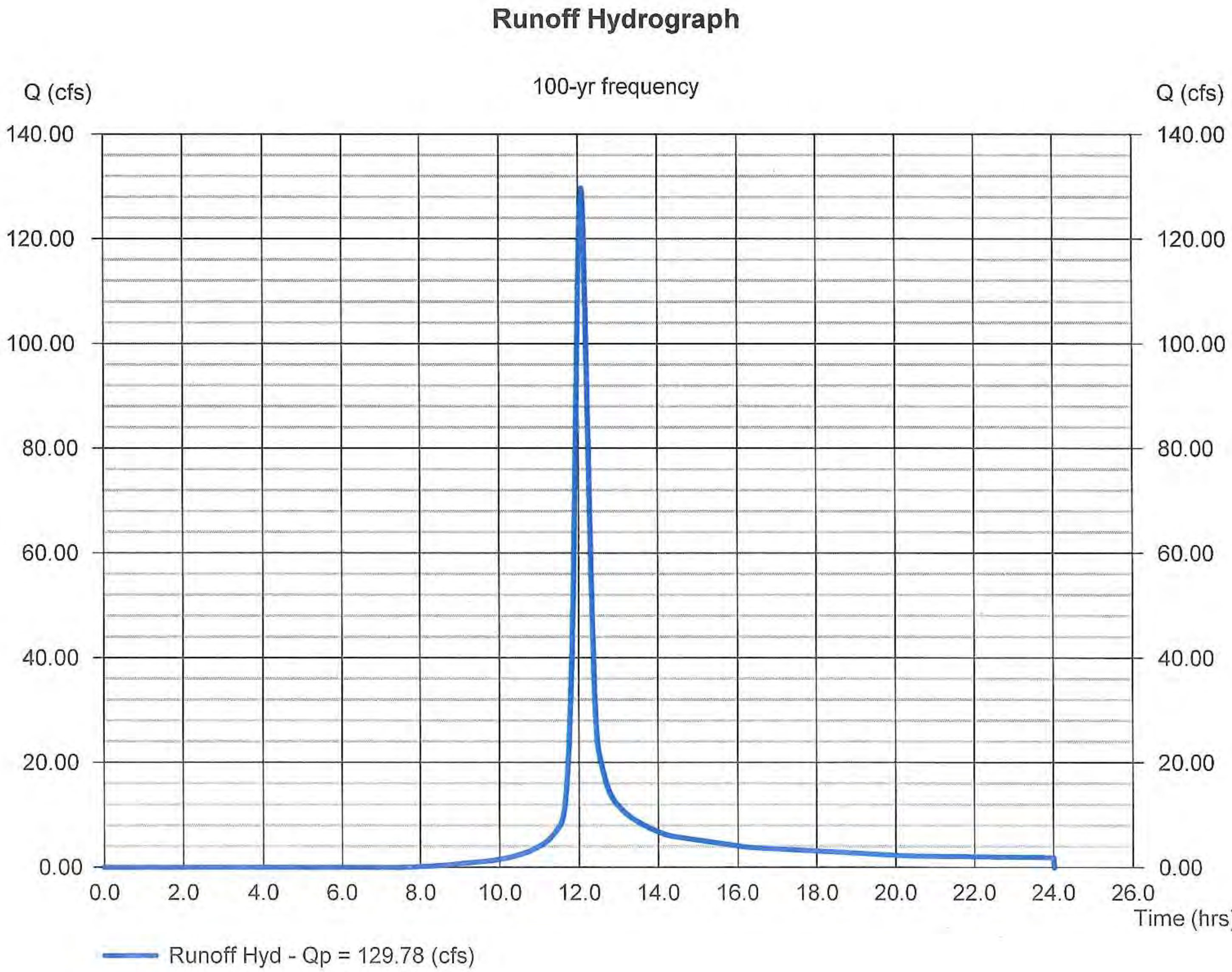
Hydrology Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. — Tuesday, Mar 19 2013

Area A Landfill Runoff

Hydrograph type	= SCS	Peak discharge (cfs)	= 129.78
Storm frequency (yrs)	= 100	Time interval (min)	= 1
Drainage area (ac)	= 33.030	Curve number (CN)	= 76
Basin Slope (%)	= *See Worksheet*	Hydraulic length (ft)	= *See Worksheet*
Tc method	= TR55	Time of conc. (min)	= 20
Total precip. (in)	= 6.00	Storm Distribution	= Type II
Storm duration (hrs)	= 24	Shape factor	= 484

Hydrograph Volume = 403,707 (cuft); 9.268 (acft)



TR55 Tc Worksheet

Hydraflow Express by Intelisolve

SCS

Area A Landfill Runoff

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	116.0		0.0		0.0		
Two-year 24-hr precip. ((in))	=	2.80		0.00		0.00		
Land slope (%)	=	25.00		0.00		0.00		
Travel Time (min)	**=**	**6.26**	**+**	**0.00**	**+**	**0.00**	**=**	**6.26**
Shallow Concentrated Flow								
Flow length (ft)	=	1330.00		0.00		0.00		
Watercourse slope (%)	=	2.00		0.00		0.00		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=	2.28		0.00		0.00		
Travel Time (min)	**=**	**9.71**	**+**	**0.00**	**+**	**0.00**	**=**	**9.71**
Channel Flow								
X sectional flow area ((sqft))	=	18.00		24.00		0.00		
Wetted perimeter ((ft))	=	17.50		18.64		0.00		
Channel slope (%)	=	2.00		25.00		0.00		
Manning's n-value	=	0.040		0.040		0.015		
Velocity (ft/s)	=	5.37		22.06		0.00		
Flow length (ft)	=	1330.0		329.0		0.0		
Travel Time (min)	**=**	**4.1291630.000.24854580.00**					**=**	**4.38**

Total Travel Time, Tc .... **20.00 min**

Appendix C

Criteria for Classification of Solid Waste Disposal Facilities and Practices

Part 257 Revision Introduction

PART 257—CRITERIA FOR CLASSIFICATION OF SOLID WASTE DISPOSAL FACILITIES AND PRACTICES

▲ 1. The authority citation for part 257 continues to read as follows:

Authority: 42 U.S.C. 6907(a)(3), 6912(a)(1), 6944(a); 33 U.S.C. 1345(d) and (e).

▲ 2. Section 257.1 is amended by:

a. Adding a sentence at the end of paragraph (a) introductory text;
b. Revising paragraphs (a)(1) and (2); and
c. Adding paragraph (c)(12).

The revisions and additions read as follows:

§ 257.1 Scope and purpose.

(a) Unless otherwise provided, the criteria in §§ 257.50 through 257.107 are adopted for determining which CCR landfills and CCR surface impoundments pose a reasonable probability of adverse effects on health or the environment under sections 1008(a)(3) and 4004(a) of the Act.

(b)

(1) Facilities failing to satisfy any of the criteria in §§ 257.1 through 257.4 or §§ 257.5 through 257.30 or §§ 257.50 through 257.107 are considered open

(2) Practices failing to satisfy any of the criteria in §§ 257.1 through 257.4 or §§ 257.5 through 257.30 or §§ 257.50 through 257.107 constitute open dumping, which is prohibited under section 4005 of the Act.

(c)

(12) Except as otherwise specifically provided in subpart D of this part, the criteria in subpart A of this part do not apply to CCR landfills, CCR surface impoundments, and lateral expansions of CCR units, as those terms are defined in subpart D of this part. Such units are instead subject to subpart D of this part.

▲ 3. Section 257.2 is amended by adding in alphabetical order definitions for ''CCR landfill'' and ''CCR surface impoundment'' to read as follows:

§ 257.2 Definitions.

CCR landfill means an area of land or an excavation that receives CCR and which is not a surface impoundment, an underground injection well, a salt dome CCR landfill also includes sand and gravel pits and quarries that receive CCR, CCR piles, and any practice that does not meet the definition of a beneficial use of CCR.

CCR surface impoundment means a natural topographic depression, man- made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR.

▲ 4. Part 257 is amended by:

a. Adding and reserving subpart C; and
b. Adding subpart D.

The additions read as follows:

Subpart C—[Reserved]

Part 257 Revision Introduction

▲ 5. Amend part 257 by adding ''Appendix III to Part 257'' and ''Appendix IV to Part 257'' to read as follows:

Appendix III to Part 257—Constituents for Detection Monitoring

Common Name[1]
Boron
Calcium
Chloride
Fluoride
pH
Sulfate
Total Dissolved Solids (TDS)

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

Appendix IV to Part 257—Constituents for Assessment Monitoring

Common Name[1]
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Fluoride
Lead
Lithium
Mercury
Molybdenum
Selenium
Thallium
Radium 226 and 228 combined

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

Subpart D Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments
§ 257.50-52

§ 257.50 Scope and purpose.

(a) This subpart establishes minimum national criteria for purposes of determining which solid waste disposal facilities and solid waste management practices do not pose a reasonable probability of adverse effects on health or the environment under sections 1008(a)(3) and 4004(a) of the Resource Conservation and Recovery Act.

(b) This subpart applies to owners and operators of new and existing landfills and surface impoundments, including any lateral expansions of such units that dispose or otherwise engage in solid waste management of CCR generated from the combustion of coal at electric utilities and independent power producers. Unless otherwise provided in this subpart, these requirements also apply to disposal units located off-site of the electric utility or independent power producer. This subpart also applies to any practice that does not meet the definition of a beneficial use of CCR.

(c) This subpart also applies to inactive CCR surface impoundments at active electric utilities or independent power producers, regardless of the fuel currently used at the facility to produce electricity.

(d) This subpart does not apply to CCR landfills that have ceased receiving CCR prior to October 19, 2015.

(e) This subpart does not apply to electric utilities or independent power producers that have ceased producing electricity prior to October 19, 2015.

(f) This subpart does not apply to wastes, including fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated at facilities that are not part of an electric utility or independent power producer, such as manufacturing facilities, universities, and hospitals. This subpart also does not apply to fly ash, bottom ash, boiler slag, and flue gas desulfurization materials, generated primarily from the combustion of fuels (including other fossil fuels) other than coal, for the purpose of generating electricity unless the fuel burned consists of more than fifty percent (50%) coal on a total heat input or mass input basis, whichever results in the greater mass feed rate of coal.

(g) This subpart does not apply to practices that meet the definition of a beneficial use of CCR.

(h) This subpart does not apply to CCR placement at active or abandoned underground or surface coal mines.

(i) This subpart does not apply to municipal solid waste landfills that receive CCR.

§ 257.51 Effective date of this subpart.

The requirements of this subpart take effect on October 19, 2015.

§ 257.52 Applicability of other regulations.

(a) Compliance with the requirements of this subpart does not affect the need for the owner or operator of a CCR landfill, CCR surface impoundment, or lateral expansion of a CCR unit to comply with all other applicable federal, state, tribal, or local laws or other requirements.

(b) Any CCR landfill, CCR surface impoundment, or lateral expansion of a CCR unit continues to be subject to the requirements in §§ 257.3–1, 257.3–2, and 257.3–3.

Subpart D
§ 257.53 Definitions

The following definitions apply to this subpart. Terms not defined in this section have the meaning given by RCRA.

Acre foot means the volume of one acre of surface area to a depth of one foot.

Active facility or active electric utilities or independent power producers means any facility subject to the requirements of this subpart that is in operation on October 14, 2015. An electric utility or independent power producer is in operation if it is generating electricity that is provided to electric power transmission systems or to electric power distribution systems on or after October 14, 2015. An off-site disposal facility is in operation if it is accepting or managing CCR on or after October 14, 2015.

Active life or in operation means the period of operation beginning with the initial placement of CCR in the CCR unit and ending at completion of closure activities in accordance with § 257.102.

Active portion means that part of the CCR unit that has received or is receiving CCR or non-CCR waste and that has not completed closure in accordance with § 257.102.

Aquifer means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of groundwater to wells or springs.

Area-capacity curves means graphic curves which readily show the reservoir water surface area, in acres, at different elevations from the bottom of the reservoir to the maximum water surface, and the capacity or volume, in acre-feet, of the water contained in the reservoir at various elevations.

Areas susceptible to mass movement means those areas of influence (i.e., areas characterized as having an active or substantial possibility of mass movement) where, because of natural or human-induced events, the movement of earthen material at, beneath, or adjacent to the CCR unit results in the downslope transport of soil and rock material by means of gravitational influence. Areas of mass movement include, but are not limited to, landslides, avalanches, debris slides and flows, soil fluctuation, block sliding, and rock fall.

Beneficial use of CCR means the CCR meet **all** of the following conditions:
(1) The CCR must provide a functional benefit;
(2) The CCR must substitute for the use of a virgin material, conserving natural resources that would otherwise need to be obtained through practices, such as extraction;
(3) The use of the CCR must meet relevant product specifications, regulatory standards or design standards when available, and when such standards are not available, the CCR is not used in excess quantities; and
(4) When unencapsulated use of CCR involving placement on the land of 12,400 tons or more in non-roadway applications, the user must demonstrate and keep records, and provide such documentation upon request, that environmental releases to groundwater, surface water, soil and air are comparable to or lower than those from analogous products made without CCR, or that environmental releases to groundwater, surface water, soil and air will be at or below relevant regulatory and health-based benchmarks for human and ecological receptors during use.

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§ 257.53 Definitions

Closed means placement of CCR in a CCR unit has ceased, and the owner or operator has completed closure of the CCR unit in accordance with § 257.102 and has initiated post-closure care in accordance with § 257.104.

Coal combustion residuals (CCR) means fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers.

CCR fugitive dust means solid airborne particulate matter that contains or is derived from CCR, emitted from any source other than a stack or chimney.

CCR landfill or landfill means an area of land or an excavation that receives CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface coal mine, or a cave. For purposes of this subpart, a CCR landfill also includes sand and gravel pits and quarries that receive CCR, CCR piles, and any practice that does not meet the definition of a beneficial use of CCR.

CCR pile or pile means any non- containerized accumulation of solid,non-flowing CCR that is placed on the land. CCR that is beneficially used off- site is not a CCR pile.

CCR surface impoundment or impoundment means a natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR.

CCR unit means any CCR landfill, CCR surface impoundment, or lateral expansion of a CCR unit, or a combination of more than one of these units, based on the context of the paragraph(s) in which it is used. This term includes both new and existing units, unless otherwise specified.

Dike means an embankment, berm, or ridge of either natural or man-made materials used to prevent the movement of liquids, sludges, solids, or other materials.

Displacement means the relative movement of any two sides of a fault measured in any direction.

Disposal means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste as defined in section 1004(27) of the Resource Conservation and Recovery Act into or on any land or water so that such solid waste, or constituent thereof, may enter the environment or be emitted into the air or discharged into any waters, including groundwaters. For purposes of this subpart, disposal does not include the storage or the beneficial use of CCR.

Downstream toe means the junction of the downstream slope or face of the CCR surface impoundment with the ground surface.

Encapsulated beneficial use means a beneficial use of CCR that binds the CCR into a solid matrix that minimizes its mobilization into the surrounding environment.

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§ 257.53 Definitions

Existing CCR landfill means a CCR landfill that receives CCR both before and after October 14, 2015, or for which construction commenced prior to October 14, 2015 and receives CCR on or after October 14, 2015. A CCR landfill has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous on-site, physical construction program had begun prior to October 14, 2015.

Existing CCR surface impoundment means a CCR surface impoundment that receives CCR both before and after October 14, 2015, or for which construction commenced prior to October 14, 2015 and receives CCR on or after October 14, 2015. A CCR surface impoundment has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous on-site, physical construction program had begun prior to October 14, 2015.

Facility means all contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing, disposing, or otherwise conducting solid waste management of CCR. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

Factor of safety (Safety factor) means the ratio of the forces tending to resist the failure of a structure to the forces tending to cause such failure as determined by accepted engineering practice.

Fault means a fracture or a zone of fractures in any material along which strata on one side have been displaced with respect to that on the other side.

Flood hydrograph means a graph showing, for a given point on a stream, the discharge, height, or other characteristic of a flood as a function of time.

Freeboard means the vertical distance between the lowest point on the crest of the impoundment dike and the surface of the waste contained therein.

Free liquids means liquids that readily separate from the solid portion of a waste under ambient temperature and pressure.

Groundwater means water below the land surface in a zone of saturation.

Hazard potential classification means the possible adverse incremental consequences that result from the release of water or stored contents due to failure of the diked CCR surface impoundment or mis-operation of the diked CCR surface impoundment or its appurtenances. The hazardous potential classifications include high hazard potential CCR surface impoundment, significant hazard potential CCR surface impoundment, and low hazard potential CCR surface impoundment, which terms mean:

(1) High hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.

(2) Low hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis- operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the surface impoundment owner's property.

(3) Significant hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

Height means the vertical measurement from the downstream toe of the CCR surface impoundment at its lowest point to the lowest elevation of the crest of the CCR surface impoundment.

Holocene means the most recent epoch of the Quaternary period, extending from the end of the Pleistocene Epoch, at 11,700 years before present, to present.

Hydraulic conductivity means the rate at which water can move through a permeable medium (i.e., the coefficient of permeability).

Inactive CCR surface impoundment means a CCR surface impoundment that no longer receives CCR on or after October 14, 2015 and still contains both CCR and liquids on or after October 14, 2015.

Incised CCR surface impoundment means a CCR surface impoundment which is constructed by excavating entirely below the natural ground surface, holds an accumulation of CCR entirely below the adjacent natural ground surface, and does not consist of any constructed diked portion.

Indian country or Indian lands means:

(1) All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running throughout the reservation;

(2) All dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or without the limits of the State; and

(3) All Indian allotments, the Indian titles to which have not been extinguished, including rights of way running through the s ame.

Indian Tribe or Tribe means any Indian tribe, band, nation, or community recognized by the Secretary of the Interior and exercising substantial governmental duties and powers on Indian lands.

Inflow design flood means the flood hydrograph that is used in the design or modification of the CCR surface impoundments and its appurtenant works.

In operation means the same as active life.

Karst terrain means an area where karst topography, with its characteristic erosional surface and subterranean features, is developed as the result of dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features present in karst terranes include, but are not limited to, dolines, collapse shafts (sinkholes), sinking streams, caves, seeps, large springs, and blind valleys.

Lateral expansion means a horizontal expansion of the waste boundaries of an existing CCR landfill or existing CCR surface impoundment made after October 14, 2015.

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Liquefaction factor of safety means the factor of safety (safety factor) determined using analysis under liquefaction conditions.

Lithified earth material means all rock, including all naturally occurring and naturally formed aggregates or masses of minerals or small particles of older rock that formed by crystallization of magma or by induration of loose sediments. This term does not include man-made materials, such as fill, concrete, and asphalt, or unconsolidated earth materials, soil, or regolith lying at or near the earth surface.

Maximum horizontal acceleration in lithified earth material means the maximum expected horizontal acceleration at the ground surface as depicted on a seismic hazard map, with a 98% or greater probability that the acceleration will not be exceeded in 50 years, or the maximum expected horizontal acceleration based on a site- specific seismic risk assessment.

New CCR landfill means a CCR landfill or lateral expansion of a CCR landfill that first receives CCR or commences construction after October 14, 2015. A new CCR landfill has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous on-site, physical construction program had begun after October 14, 2015. Overfills are also considered new CCR landfills.

New CCR surface impoundment means a CCR surface impoundment or lateral expansion of an existing or new CCR surface impoundment that first receives CCR or commences construction after October 14, 2015. A new CCR surface impoundment has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous on-site, physical construction program had begun after October 14, 2015.

Operator means the person(s) responsible for the overall operation of a CCR unit.

Overfill means a new CCR landfill constructed over a closed CCR surface impoundment.

Owner means the person(s) who owns a CCR unit or part of a CCR unit.

Poor foundation conditions mean those areas where features exist which indicate that a natural or human- induced event may result in inadequate foundation support for the structural components of an existing or new CCR unit. For example, failure to maintain static and seismic factors of safety as required in §§ 257.73(e) and 257.74(e) would cause a poor foundation condition.

Probable maximum flood means the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin.

Qualified person means a person or persons trained to recognize specific appearances of structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit by visual observation and, if applicable, to monitor instrumentation.

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Qualified professional engineer means an individual who is licensed by a state as a Professional Engineer to practice one or more disciplines of engineering and who is qualified by education, technical knowledge and experience to make the specific technical certifications required under this subpart. Professional engineers making these certifications must be currently licensed in the state where the CCR unit(s) is located.

Recognized and generally accepted good engineering practices means engineering maintenance or operation activities based on established codes, widely accepted standards, published technical reports, or a practice widely recommended throughout the industry. Such practices generally detail approved ways to perform specific engineering, inspection, or mechanical integrity activities.

Retrofit means to remove all CCR and contaminated soils and sediments from the CCR surface impoundment, and to ensure the unit complies with the requirements in § 257.72

Representative sample means a sample of a universe or whole (e.g., waste pile, lagoon, and groundwater) which can be expected to exhibit the average properties of the universe or whole. See EPA publication SW–846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Chapter 9 (available at http:// www.epa.gov/epawaste/hazard/ testmethods/sw846/online/index.htm) for a discussion and examples of representative samples.

Run-off means any rainwater, leachate, or other liquid that drains over land from any part of a CCR landfill or lateral expansion of a CCR landfill.

Run-on means any rainwater, leachate, or other liquid that drains over land onto any part of a CCR landfill or lateral expansion of a CCR landfill.

Sand and gravel pit or quarry means an excavation for the extraction of aggregate, minerals or metals. The term sand and gravel pit and/or quarry does not include subsurface or surface coal mines.

Seismic factor of safety means the factor of safety (safety factor) determined using analysis under earthquake conditions using the peak ground acceleration for a seismic event with a 2% probability of exceedance in 50 years, equivalent to a return period of approximately 2,500 years, based on the U.S. Geological Survey (USGS) seismic hazard maps for seismic events with this return period for the region where the CCR surface impoundment is located.

Seismic impact zone means an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years.

Slope protection means engineered or non-engineered measures installed on the upstream or downstream slope of the CCR surface impoundment to protect the slope against wave action or erosion, including but not limited to rock riprap, wooden pile, or concrete revetments, vegetated wave berms, concrete facing, gabions, geotextiles, or fascines.

Solid waste management or management means the systematic administration of the activities which provide for the collection, source separation, storage, transportation, processing, treatment, or disposal of solid waste.

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State means any of the fifty States in addition to the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

State Director means the chief administrative officer of the lead state agency responsible for implementing the state program regulating disposal in CCR landfills, CCR surface impoundments, and all lateral expansions of a CCR unit.

Static factor of safety means the factor of safety (safety factor) determined using analysis under the long-term, maximum storage pool loading condition, the maximum surcharge pool loading condition, and under the end-of- construction loading condition.

Structural components mean liners, leachate collection and removal systems, final covers, run-on and run-off systems, inflow design flood control systems, and any other component used in the construction and operation of the CCR unit that is necessary to ensure the integrity of the unit and that the contents of the unit are not released into the environment.

Unstable area means a location that is susceptible to natural or human- induced events or forces capable of impairing the integrity, including structural components of some or all of the CCR unit that are responsible for preventing releases from such unit. Unstable areas can include poor foundation conditions, areas susceptible to mass movements, and karst terrains.

Uppermost aquifer means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural ground surface to which the aquifer rises during the wet season.

Waste boundary means a vertical surface located at the hydraulically downgradient limit of the CCR unit. The vertical surface extends down into the uppermost aquifer.

Subpart D Location Restrictions
257.60 Placement above the uppermost aquifer

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate by the dates specified in paragraph (c) of this section that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

(b) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.

(c) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (c)(1) or (2) of this section.

(1) For an existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.

(2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.

(3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by § 257.105(e).

(4) An owner or operator of an existing CCR surface impoundment who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (c)(1) of this section is subject to the requirements of § 257.101(b)(1).

(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in§ 257.105(e), the notification requirements specified in § 257.106(e), and the internet requirements specified in § 257.107(e).

Subpart D Location Restrictions

§ 257.61 Wetlands

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in § 232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (5) of this section.

(1) Where applicable under section 404 of the Clean Water Act or applicable state wetlands laws, a clear and objective rebuttal of the presumption that an alternative to the CCR unit is reasonably available that does not involve wetlands.

(2) The construction and operation of the CCR unit will not cause or contribute to any of the following:
(i) A violation of any applicable state or federal water quality standard;
(ii) A violation of any applicable toxic effluent standard or prohibition under section 307 of the Clean Water Act;
(iii) Jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat, protected under the Endangered Species Act of 1973; and
(iv) A violation of any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 for the protection of a marine sanctuary.

(3) The CCR unit will not cause or contribute to significant degradation of wetlands by addressing all of the following factors:
(i) Erosion, stability, and migration potential of native wetland soils, muds and deposits used to support the CCR unit;
(ii) Erosion, stability, and migration potential of dredged and fill materials used to support the CCR unit;
(iii) The volume and chemical nature of the CCR;
(iv) Impacts on fish, wildlife, and other aquatic resources and their habitat from release of CCR;
(v) The potential effects of catastrophic release of CCR to the wetland and the resulting impacts on the environment; and
(vi) Any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected.

(4) To the extent required under section 404 of the Clean Water Act or applicable state wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent reasonable as required by paragraphs (a)(1) through (3) of this section, then minimizing unavoidable impacts to the maximum extent reasonable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and reasonable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands); and

(5) Sufficient information is available to make a reasoned determination with respect to the demonstrations in paragraphs (a)(1) through (4) of this section.

Subpart D Location Restrictions

§ 257.61 Wetlands

(b) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.

(c) The owner or operator of the CCR unit must complete the demonstrations required by paragraph (a) of this section by the date specified in either paragraph (c)(1) or (2) of this section.

(1) For an existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.

(2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.

(3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by § 257.105(e).

(4) An owner or operator of an existing CCR surface impoundment who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (c)(1) of this section is subject to the requirements of § 257.101(b)(1).

(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstrations showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.

(d) The owner or operator must comply with the recordkeeping requirements specified in § 257.105(e), the notification requirements specified in § 257.106(e), and the Internet requirements specified in § 257.107(e).

Subpart D Location Restrictions

§ 257.62 Fault areas

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

(b) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.

(c) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (c)(1) or (2) of this section.

(1) For an existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.

(2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.

(3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by § 257.105(e).

(4) An owner or operator of an existing CCR surface impoundment who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (c)(1) of this section is subject to the requirements of § 257.101(b)(1).

(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(e), the notification requirements specified in § 257.106(e), and the Internet requirements specified in § 257.107(e).

Subpart D Location Restrictions

§ 257.63 Seismic impact zones

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

(b) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.

(c) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (c)(1) or (2) of this section.

(1) For an existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.

(2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.

(3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by § 257.105(e).

(4) An owner or operator of an existing CCR surface impoundment who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (c)(1) of this section is subject to the requirements of § 257.101(b)(1).

(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(e), the notification requirements specified in § 257.106(e), and the Internet requirements specified in § 257.107(e).

Subpart D Location Restrictions

§ 257.64 Unstable areas

(a) An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

(b) The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:

(1) On-site or local soil conditions that may result in significant differential settling;

(2) On-site or local geologic or geomorphologic features; and

(3) On-site or local human-made features or events (both surface and subsurface).

(c) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.

(d) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (d)(1) or (2) of this section.

(1) For an existing CCR landfill or existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.

(2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.

(3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by § 257.105(e).

(4) An owner or operator of an existing CCR surface impoundment or existing CCR landfill who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (d)(1) of this section is subject to the requirements of § 257.101(b)(1) or (d)(1), respectively.

(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.

(e) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(e), the notification requirements specified in § 257.106(e), and the Internet requirements specified in § 257.107(e).

Subpart D Design Criteria
§ 257.70 Design criteria for new CCR landfills and any lateral expansion of a CCR landfill

(a)

(1) New CCR landfills and any lateral expansion of a CCR landfill must be designed, constructed, operated, and maintained with either a composite liner that meets the requirements of paragraph (b) of this section or an alternative composite liner that meets the requirements in paragraph (c) of this section, and a leachate collection and removal system that meets the requirements of paragraph (d) of this section.

(2) Prior to construction of an overfill the underlying surface impoundment must meet the requirements of § 257.102(d).

(b) A composite liner must consist of two components; the upper component consisting of, at a minimum, a 30-mil geomembrane liner (GM), and the lower component consisting of at least a two- foot layer of compacted soil with a hydraulic conductivity of no more than $1x10^{-7}$ centimeters per second (cm/ sec). GM components consisting of high density polyethylene (HDPE) must be at least 60-mil thick. The GM or upper liner component must be installed in direct and uniform contact with the compacted soil or lower liner component. The composite liner must be:

(1) Constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrogeologic forces), physical contact with the CCR or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;

(2) Constructed of materials that provide appropriate shear resistance of the upper and lower component interface to prevent sliding of the upper component including on slopes;

(3) Placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, or uplift; and

(4) Installed to cover all surrounding earth likely to be in contact with the CCR or leachate.

(c) If the owner or operator elects to install an alternative composite liner, all of the following requirements must be met:

(1) An alternative composite liner must consist of two components; the upper component consisting of, at a minimum, a 30-mil GM, and a lower component, that is not a geomembrane, with a liquid flow rate no greater than the liquid flow rate of two feet of compacted soil with a hydraulic conductivity of no more than 1x10-7 cm/sec. GM components consisting of high density polyethylene (HDPE) must be at least 60-mil thick. If the lower component of the alternative liner is compacted soil, the GM must be installed in direct and uniform contact with the compacted soil.

(2) The owner or operator must obtain certification from a qualified professional engineer that the liquid flow rate through the lower component of the alternative composite liner

is no greater than the liquid flow rate through two feet of compacted soil with a hydraulic conductivity of 1x10-7 cm/ sec. The hydraulic conductivity for the two feet of compacted soil used in the comparison shall be no greater than 1x10-7 cm/sec. The hydraulic conductivity of any alternative to the two feet of compacted soil must be determined using recognized and generally accepted methods. The liquid flow rate comparison must be made using Equation 1 of this section, which is derived from Darcy's Law for gravity flow through porous media.

$$\text{(Eq. 1)} \qquad \frac{Q}{A} = q = k\left(\frac{h}{t} + 1\right)$$

Where,
Q = flow rate (cubic centimeters/second);
A = surface area of the liner (squared centimeters);
q = flow rate per unit area (cubic centimeters/ second/squared centimeter);
k = hydraulic conductivity of the liner (centimeters/second);
h = hydraulic head above the liner (centimeters); and
t = thickness of the liner (centimeters).

(3) The alternative composite liner must meet the requirements specified in paragraphs (b)(1) through (4) of this section.

(d) The leachate collection and removal system must be designed, constructed, operated, and maintained to collect and remove leachate from the landfill during the active life and post-closure care period. The leachate collection and removal system must be:

(1) Designed and operated to maintain less than a 30-centimeter depth of leachate over the composite liner or alternative composite liner;

(2) Constructed of materials that are chemically resistant to the CCR and any non-CCR waste managed in the CCR unit and the leachate expected to be generated, and of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying waste, waste cover materials, and equipment used at the CCR unit; and

(3) Designed and operated to minimize clogging during the active life and post-closure care period.

(e) Prior to construction of the CCR landfill or any lateral expansion of a CCR landfill, the owner or operator must obtain a certification from a qualified professional engineer that the design of the composite liner (or, if applicable, alternative composite liner) and the leachate collection and removal system meets the requirements of this section.

Subpart D Design Criteria
§ 257.70 Design criteria for new CCR landfills and any lateral expansion of a CCR landfill

(f) Upon completion of construction of the CCR landfill or any lateral expansion of a CCR landfill, the owner or operator must obtain a certification from a qualified professional engineer that the composite liner (or, if applicable, alternative composite liner) and the leachate collection and removal system has been constructed in accordance with the requirements of this section.

(g) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(f), the notification requirements specified in § 257.106(f), and the Internet requirements specified in § 257.107(f).

Subpart D Design Criteria
§ 257.71 Liner design criteria for existing CCR surface impoundments

(a)

(1) No later than October 17, 2016, the owner or operator of an existing CCR surface impoundment must document whether or not such unit was constructed with any one of the following:

(i) A liner consisting of a minimum of two feet of compacted soil with a hydraulic conductivity of no more than 1x10-7 cm/sec;
(ii) A composite liner that meets the requirements of § 257.70(b); or
(iii) An alternative composite liner that meets the requirements of § 257.70(c).

(2) The hydraulic conductivity of the compacted soil must be determined using recognized and generally accepted methods.

(3) An existing CCR surface impoundment is considered to be an existing unlined CCR surface impoundment if either:

(i) The owner or operator of the CCR unit determines that the CCR unit is not constructed with a liner that meets the requirements of paragraphs (a)(1)(i), (ii), or (iii) of this section; or
(ii) The owner or operator of the CCR unit fails to document whether the CCR unit was constructed with a liner that meets the requirements of paragraphs (a)(1)(i), (ii), or (iii) of this section.

(4) All existing unlined CCR surface impoundments are subject to the requirements of §257.101(a).

(b) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer attesting that the documentation as to whether a CCR unit meets the requirements of paragraph (a) of this section is accurate.

(c) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(f), the notification requirements specified in § 257.106(f), and the Internet requirements specified in § 257.107(f).

Subpart D Design Criteria

§ 257.72 Liner design criteria for new CCR surface impoundments and any lateral expansion of a CCR surface impoundment

(a) New CCR surface impoundments and lateral expansions of existing and new CCR surface impoundments must be designed, constructed, operated, and maintained with either a composite liner or an alternative composite liner that meets the requirements of § 257.70(b) or (c).

(b) Any liner specified in this section must be installed to cover all surrounding earth likely to be in contact with CCR. Dikes shall not be constructed on top of the composite liner.

(c) Prior to construction of the CCR surface impoundment or any lateral expansion of a CCR surface impoundment, the owner or operator must obtain certification from a qualified professional engineer that the design of the composite liner or, if applicable, the design of an alternative composite liner complies with the requirements of this section.

(d) Upon completion, the owner or operator must obtain certification from a qualified professional engineer that the composite liner or if applicable, the alternative composite liner has been constructed in accordance with the requirements of this section.

(e) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(f), the notification requirements specified in § 257.106(f), and the Internet requirements specified in § 257.107(f).

Subpart D Design Criteria
§ 257.73 Structural integrity criteria for existing CCR surface impoundments

(a) The requirements of paragraphs (a)(1) through (4) of this section apply to all existing CCR surface impoundments, except for those existing CCR surface impoundments that are incised CCR units. If an incised CCR surface impoundment is subsequently modified (e.g., a dike is constructed) such that the CCR unit no longer meets the definition of an incised CCR unit, the CCR unit is subject to the requirements of paragraphs (a)(1) through (4) of this section.

(1) No later than, December 17, 2015, the owner or operator of the CCR unit must place on or immediately adjacent to the CCR unit a permanent identification marker, at least six feet high showing the identification number of the CCR unit, if one has been assigned by the state, the name associated with the CCR unit and the name of the owner or operator of the CCR unit.

(2) Periodic hazard potential classification assessments.

(i) The owner or operator of the CCR unit must conduct initial and periodic hazard potential classification assessments of the CCR unit according to the timeframes specified in paragraph (f) of this section. The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

(ii) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial hazard potential classification and each subsequent periodic classification specified in paragraph (a)(2)(i) of this section was conducted in accordance with the requirements of this section.

(3) Emergency Action Plan (EAP)

(i) Development of the plan. No later than April 17, 2017, the owner or operator of a CCR unit determined to be either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment under paragraph (a)(2) of this section must prepare and maintain a written EAP. At a minimum, the EAP must:

(A) Define the events or circumstances involving the CCR unit that represent a safety emergency, along with a description of the procedures that will be followed to detect a safety emergency in a timely manner;

(B) Define responsible persons, their respective responsibilities, and notification procedures in the event of a safety emergency involving the CCR unit;

(C) Provide contact information of emergency responders;

(D) Include a map which delineates the downstream area which would be affected in the event of a CCR unit failure and a physical description of the CCR unit; and

(E) Include provisions for an annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders.

(ii) Amendment of the plan.

(A) The owner or operator of a CCR unit subject to the requirements of paragraph (a)(3)(i) of this section may amend the written EAP at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(f)(6). The owner or operator must amend the written EAP whenever there is a change in conditions that would substantially affect the EAP in effect.

(B) The written EAP must be evaluated, at a minimum, every five years to ensure the information required in paragraph (a)(3)(i) of this section is accurate. As necessary, the EAP must be updated and a revised EAP placed in the facility's operating record as required by § 257.105(f)(6).

(iii) Changes in hazard potential classification.

(A) If the owner or operator of a CCR unit determines during a periodic hazard potential assessment that the CCR unit is no longer classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR unit is no longer subject to the requirement to prepare and maintain a written EAP beginning on the date the periodic hazard potential assessment documentation is placed in the facility's operating record as required by § 257.105(f)(5).

(B) If the owner or operator of a CCR unit classified as a low hazard potential CCR surface impoundment subsequently determines that the CCR unit is properly re-classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR unit must prepare a written EAP for the CCR unit as required by paragraph (a)(3)(i) of this section within six months of completing such periodic hazard potential assessment.

(iv) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the written EAP, and any subsequent amendment of the EAP, meets the requirements of paragraph (a)(3) of this section.

(v) Activation of the EAP. The EAP must be implemented once events or circumstances involving the CCR unit that represent a safety emergency are detected, including conditions identified during periodic structural stability assessments, annual inspections, and inspections by a qualified person.

(4) The CCR unit and surrounding areas must be designed, constructed, operated, and maintained with vegetated slopes of dikes not to exceed a height of 6 inches above the slope of the dike, except for slopes which are protected with an alternate form(s) of slope protection.

(b) The requirements of paragraphs (c) through (e) of this section apply to an owner or operator of an existing CCR surface impoundment that either:

(1) Has a height of five feet or more and a storage volume of 20 acre-feet or more; or

(2) Has a height of 20 feet or more.

(c)

(1) No later than October 17, 2016, the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xi) of this section.

(i) The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.
(ii) The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 71⁄2 minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.
(iii) A statement of the purpose for which the CCR unit is being used.
(iv) The name and size in acres of the watershed within which the CCR unit is located.
(v) A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.
(vi) A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

(vii) At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

(viii) A description of the type, purpose, and location of existing instrumentation.

(ix) Area-capacity curves for the CCR unit.

(x) A description of each spillway and diversion design features and capacities and calculations used in their determination.

(xi) The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

(xii) Any record or knowledge of structural instability of the CCR unit.

(2) Changes to the history of construction. If there is a significant change to any information compiled under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(9).

(d) Periodic structural stability assessments.

(1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with:

(i) Stable foundations and abutments;

(ii) Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown;

(iii) Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit;

(iv) Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection;

(v) A single spillway or a combination of spillways configured as specified in paragraph (d)(1)(v)(A) of this section. The combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in paragraph (d)(1)(v)(B) of this section.

(A) All spillways must be either:

(1) Of non-erodible construction and designed to carry sustained flows; or

(2) Earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

(vi) Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure; and

(vii) For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

(2) The periodic assessment described in paragraph (d)(1) of this section must identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

(3) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment was conducted in accordance with the requirements of this section.

Subpart D Design Criteria
§ 257.73 Structural integrity criteria for existing CCR surface impoundments

(e) Periodic safety factor assessments.

(1) The owner or operator must conduct an initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in paragraphs (e)(1)(i) through (iv)of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions.

The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.
(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.
(iii) The calculated seismic factor of safety must equal or exceed 1.00.

(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

(2) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment specified in paragraph (e)(1) of this section meets the requirements of this section.

(f) Timeframes for periodic assessments

(1) Initial assessments. Except as provided by paragraph (f)(2) of this section, the owner or operator of the CCR unit must complete the initial assessments required by paragraphs (a)(2), (d), and (e) of this section no later than October 17, 2016. The owner or operator has completed an initial assessment when the owner or operator has placed the assessment required by paragraphs (a)(2), (d), and (e) of this section in the facility's operating record as required by § 257.105(f)(5), (10), and (12).

(2) Use of a previously completed assessment(s) in lieu of the initial assessment(s). The owner or operator of the CCR unit may elect to use a previously completed assessment to serve as the initial assessment required by paragraphs (a)(2), (d), and (e) of this section provided that the previously completed assessment(s):

(i) Was completed no earlier than 42 months prior to October 17, 2016; and
(ii) Meets the applicable requirements of paragraphs (a)(2), (d), and (e) of this section.

(3) Frequency for conducting periodic assessments. The owner or operator of the CCR unit must conduct and complete the assessments required by paragraphs (a)(2), (d), and (e) of this section every five years. The date of completing the initial assessment is the basis for establishing the deadline to complete the first subsequent assessment. If the owner or operator elects to use a previously completed assessment(s) in lieu of the initial assessment as provided by paragraph (f)(2) of this section, the date of the report for the previously completed assessment is the basis for establishing the deadline to complete the first subsequent assessment. The owner or operator may complete any required assessment prior to the required deadline provided the owner or operator places the completed assessment(s) into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent assessments is based on the date of completing the previous assessment. For purposes of this paragraph (f)(3), the owner or operator has completed an assessment when the relevant assessment(s) required by paragraphs (a)(2), (d), and (e) of this section has been placed in the facility's operating record as required by § 257.105(f)(5), (10), and (12).

(4) Closure of the CCR unit. An owner or operator of a CCR unit who either fails to complete a timely safety factor assessment or fails to demonstrate minimum safety factors as required by paragraph (e) of this section is subject to the requirements of §257.101(b)(2).

(g) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(f), the notification requirements specified in § 257.106(f), and the internet requirements specified in § 257.107(f).

Subpart D Design Criteria

§ 257.74 Structural integrity criteria for new CCR surface impoundments and any lateral expansion of a CCR surface impoundment

(a) The requirements of paragraphs (a)(1) through (4) of this section apply to all new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, except for those new CCR surface impoundments that are incised CCR units. If an incised CCR surface impoundment is subsequently modified (e.g., a dike is constructed) such that the CCR unit no longer meets the definition of an incised CCR unit, the CCR unit is subject to the requirements of paragraphs (a)(1) through (4) of this section.

(1) No later than the initial receipt of CCR, the owner or operator of the CCR unit must place on or immediately adjacent to the CCR unit a permanent identification marker, at least six feet high showing the identification number of the CCR unit, if one has been assigned by the state, the name associated with the CCR unit and the name of the owner or operator of the CCR unit.

(2) Periodic hazard potential classification assessments.

(i) The owner or operator of the CCR unit must conduct initial and periodic hazard potential classification assessments of the CCR unit according to the timeframes specified in paragraph (f) of this section. The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

(ii) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial hazard potential classification and each subsequent periodic classification specified in paragraph (a)(2)(i) of this section was conducted in accordance with the requirements of this section.

(3) Emergency Action Plan (EAP)—(i) Development of the plan. Prior to the initial receipt of CCR in the CCR unit, the owner or operator of a CCR unit determined to be either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment under paragraph (a)(2) of this section must prepare and maintain a written EAP. At a minimum, the EAP must:

(A) Define the events or circumstances involving the CCR unit that represent a safety emergency, along with a description of the procedures that will be followed to detect a safety emergency in a timely manner;

(B) Define responsible persons, their respective responsibilities, and notification procedures in the event of a safety emergency involving the CCR unit;

(C) Provide contact information of emergency responders;

(D) Include a map which delineates the downstream area which would be affected in the event of a CCR unit failure and a physical description of the CCR unit; and

(E) Include provisions for an annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders.

(ii) Amendment of the plan.

(A) The owner or operator of a CCR unit subject to the requirements of paragraph (a)(3)(i) of this section may amend the written EAP at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(f)(6). The owner or operator must amend the written EAP whenever there is a change in conditions that would substantially affect the EAP in effect.

(B) The written EAP must be evaluated, at a minimum, every five years to ensure the information required in paragraph (a)(3)(i) of this section is accurate. As necessary, the EAP must be updated and a revised EAP placed in the facility's operating record as required by § 257.105(f)(6).

(iii) Changes in hazard potential classification.

(A) If the owner or operator of a CCR unit determines during a periodic hazard potential assessment that the CCR unit is no longer classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR unit is no longer subject to the requirement to prepare and maintain a written EAP beginning on the date the periodic hazard potential assessment documentation is placed in the facility's operating record as required by § 257.105(f)(5).

(B) If the owner or operator of a CCR unit classified as a low hazard potential CCR surface impoundment subsequently determines that the CCR unit is properly re-classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR unit must prepare a written EAP for the CCR unit as required by paragraph (a)(3)(i) of this section within six months of completing such periodic hazard potential assessment.

(iv) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the written EAP, and any subsequent amendment of the EAP, meets the requirements of paragraph (a)(3) of this section.

(v) Activation of the EAP. The EAP must be implemented once events or circumstances involving the CCR unit that represent a safety emergency are detected, including conditions identified during periodic structural stability assessments, annual inspections, and inspections by a qualified person.

(4) The CCR unit and surrounding areas must be designed, constructed, operated, and maintained with vegetated slopes of dikes not to exceed a height of six inches above the slope of the dike, except for slopes which are protected with an alternate form(s) of slope protection.

(b) The requirements of paragraphs (c) through (e) of this section apply to an owner or operator of a new CCR surface impoundment and any lateral expansion of a CCR surface impoundment that either:

(1) Has a height of five feet or more and a storage volume of 20 acre-feet or more; or
(2) Has a height of 20 feet or more.

(c)

(1) No later than the initial receipt of CCR in the CCR unit, the owner or operator unit must compile the design and construction plans for the CCR unit, which must include, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xi) of this section.

(i) The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.
(ii) The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 71⁄2 minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.
(iii) A statement of the purpose for which the CCR unit is being used.
(iv) The name and size in acres of the watershed within which the CCR unit is located.
(v) A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.
(vi) A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the dates of construction of each successive stage of construction of the CCR unit.

(vii) At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.
(viii) A description of the type, purpose, and location of existing instrumentation.
(ix) Area-capacity curves for the CCR unit.
(x) A description of each spillway and diversion design features and capacities and calculations used in their determination.
(xi) The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.
(xii) Any record or knowledge of structural instability of the CCR unit.

(2) Changes in the design and construction. If there is a significant change to any information compiled under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(13).

(d) Periodic structural stability assessments.

(1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with:

(i) Stable foundations and abutments;
(ii) Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown;
(iii) Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit;
(iv) Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection;
(v) A single spillway or a combination of spillways configured as specified in paragraph (d)(1)(v)(A) of this section. The combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in paragraph (d)(1)(v)(B) of this section.

§ 257.74 Structural integrity criteria for new CCR surface impoundments and any lateral expansion of a CCR surface impoundment

(A) All spillways must be either:

(1) Of non-erodible construction and designed to carry sustained flows; or

(2) Earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

(vi) Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure; and

(vii) For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

(2) The periodic assessment described in paragraph (d)(1) of this section must identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

(3) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment was conducted in accordance with the requirements of this section.

§ 257.74 Structural integrity criteria for new CCR surface impoundments and any lateral expansion of a CCR surface impoundment

(e) Periodic safety factor assessments.

(1) The owner or operator must conduct an initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in paragraphs (e)(1)(i) through (v)of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the end-of-construction loading condition must equal or exceed 1.30. The assessment of this loading condition is only required for the initial safety factor assessment and is not required for subsequent assessments.

(ii) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.

(iii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.

(iv) The calculated seismic factor of safety must equal or exceed 1.00.

(v) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

(2) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial assessment and each subsequent periodic assessment specified in paragraph (e)(1) of this section meets the requirements of this section.

(f) Timeframes for periodic assessments

(1) Initial assessments. Except as provided by paragraph (f)(2) of this section, the owner or operator of the CCR unit must complete the initial assessments required by paragraphs (a)(2), (d), and (e) of this section prior to the initial receipt of CCR in the unit. The owner or operator has completed an initial assessment when the owner or operator has placed the assessment required by paragraphs (a)(2), (d), and (e) of this section in the facility's operating record as required by § 257.105(f)(5), (10), and (12).

(2) Frequency for conducting periodic assessments. The owner or operator of the CCR unit must conduct and complete the assessments required by paragraphs (a)(2), (d), and (e) of this section every five years. The date of completing the initial assessment is the basis for establishing the deadline to complete the first subsequent assessment. The owner or operator may complete any required assessment prior to the required deadline provided the owner or operator places the completed assessment(s) into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent assessments is based on the date of completing the previous assessment. For purposes of this paragraph (f)(2), the owner or operator has completed an assessment when the relevant assessment(s) required by paragraphs (a)(2), (d), and (e) of this section has been placed in the facility's operating record as required by § 257.105(f)(5), (10), and (12).

(3) Failure to document minimum safety factors during the initial assessment. Until the date an owner or operator of a CCR unit documents that the calculated factors of safety achieve the minimum safety factors specified in paragraphs (e)(1)(i) through (v) of this section, the owner or operator is prohibited from placing CCR in such unit.

(4) Closure of the CCR unit. An owner or operator of a CCR unit who either fails to complete a timely periodic safety factor assessment or fails to demonstrate minimum safety factors as required by paragraph (e) of this section is subject to the requirements of § 257.101(c).

(g) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(f), the notification requirements specified in § 257.106(f), and the internet requirements specified in § 257.107(f).

Subpart D Operating Criteria
§ 257.80 Air criteria

(a) The owner or operator of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit must adopt measures that will effectively minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR units, roads, and other CCR management and material handling activities.

(b) CCR fugitive dust control plan. The owner or operator of the CCR unit must prepare and operate in accordance with a CCR fugitive dust control plan as specified in paragraphs (b)(1) through (7) of this section. This requirement applies in addition to, not in place of, any applicable standards under the Occupational Safety and Health Act.

(1) The CCR fugitive dust control plan must identify and describe the CCR fugitive dust control measures the owner or operator will use to minimize CCR from becoming airborne at the facility. The owner or operator must select, and include in the CCR fugitive dust control plan, the CCR fugitive dust control measures that are most appropriate for site conditions, along with an explanation of how the measures selected are applicable and appropriate for site conditions. Examples of control measures that may be appropriate include: Locating CCR inside an enclosure or partial enclosure; operating a water spray or fogging system; reducing fall distances at material drop points; using wind barriers, compaction, or vegetative covers; establishing and enforcing reduced vehicle speed limits; paving and sweeping roads; covering trucks transporting CCR; reducing or halting operations during high wind events; or applying a daily cover.

(2) If the owner or operator operates a CCR landfill or any lateral expansion of a CCR landfill, the CCR fugitive dust control plan must include procedures to emplace CCR as conditioned CCR. Conditioned CCR means wetting CCR with water to a moisture content that will prevent wind dispersal, but will not result in free liquids. In lieu of water, CCR conditioning may be accomplished with an appropriate chemical dust suppression agent.

(3) The CCR fugitive dust control plan must include procedures to log citizen complaints received by the owner or operator involving CCR fugitive dust events at the facility.

(4) The CCR fugitive dust control plan must include a description of the procedures the owner or operator will follow to periodically assess the effectiveness of the control plan.

(5) The owner or operator of a CCR unit must prepare an initial CCR fugitive dust control plan for the facility no later than October 19, 2015, or by initial receipt of CCR in any CCR unit at the facility if the owner or operator becomes subject to this subpart after October 19, 2015. The owner or operator has completed the initial CCR fugitive dust control plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(1).

(6) Amendment of the plan. The owner or operator of a CCR unit subject to the requirements of this section may amend the written CCR fugitive dust control plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(1). The owner or operator must amend the written plan whenever there is a change in conditions that would substantially affect the written plan in effect, such as the construction and operation of a new CCR unit.

(7) The owner or operator must obtain a certification from a qualified professional engineer that the initial CCR fugitive dust control plan, or any subsequent amendment of it, meets the requirements of this section.

(c) Annual CCR fugitive dust control report. The owner or operator of a CCR unit must prepare an annual CCR fugitive dust control report that includes a description of the actions taken by the owner or operator to control CCR fugitive dust, a record of all citizen complaints, and a summary of any corrective measures taken. The initial annual report must be completed no later than 14 months after placing the initial CCR fugitive dust control plan in the facility's operating record. The deadline for completing a subsequent report is one year after the date of completing the previous report. For purposes of this paragraph (c), the owner or operator has completed the annual CCR fugitive dust control report when the plan has been placed in the facility's operating record as required by § 257.105(g)(2).

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

Operating Criteria
§ 257.81 Run-on and run-off controls for CCR landfills

(a) The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must design, construct, operate, and maintain:

(1) A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and

(2) A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

(b) Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

(c) Run-on and run-off control system plan

(1) Content of the plan. The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(3).

(2) Amendment of the plan. The owner or operator may amend the written run-on and run-off control system plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(3). The owner or operator must amend the written run-on and run- off control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

(3) Timeframes for preparing the initial plan

(i) Existing CCR landfills. The owner or operator of the CCR unit must prepare the initial run-on and run- off control system plan no later than October 17, 2016.

(ii) New CCR landfills and any lateral expansion of a CCR landfill. The owner or operator must prepare the initial run-on and run-off control system plan no later than the date of initial receipt of CCR in the CCR unit.

(4) Frequency for revising the plan. The owner or operator of the CCR unit must prepare periodic run-on and run- off control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating recordwithin a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed a periodic run-on and run-off control

system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(3).

(5) The owner or operator must obtain a certification from a qualified professional engineer stating that the initial and periodic run-on and run-off control system plans meet the requirements of this section.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

Operating Criteria

§ 257.82 Hydrologic and hydraulic capacity requirements for CCR surface impoundments

(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.

(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.

(3) The inflow design flood is:

(i) For a high hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the probable maximum flood;

(ii) For a significant hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the 1,000-year flood;

(iii) For a low hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the 100-year flood; or

(iv) For an incised CCR surface impoundment, the 25-year flood.

(b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

(c) Inflow design flood control system plan

(1) Content of the plan. The owner or operator must prepare initial and periodic inflow design flood control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the inflow design flood control system has been designed and constructed to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(4).

(2) Amendment of the plan. The owner or operator of the CCR unit may amend the written inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by § 257.105(g)(4). The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

(3) Timeframes for preparing the initial plan

(i) Existing CCR surface impoundments. The owner or operator of the CCR unit must prepare the initial inflow design flood control system plan no later than October 17, 2016.

(ii) New CCR surface impoundments and any lateral expansion of a CCR surface impoundment. The owner or operator must prepare the initial inflow design flood control system plan no later than the date of initial receipt of CCR in the CCR unit.

(4) Frequency for revising the plan. The owner or operator must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first periodic plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed an inflow design flood control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(4).

(5) The owner or operator must obtain a certification from a qualified professional engineer stating that the initial and periodic inflow design flood control system plans meet the requirements of this section.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

Operating Criteria
§ 257.83 Inspection requirements for CCR surface impoundments

(a) Inspections by a qualified person.

(1) All CCR surface impoundments and any lateral expansion of a CCR surface impoundment must be examined by a qualified person as follows:

(i) At intervals not exceeding seven days, inspect for any appearances of actual or potential structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit;

(ii) At intervals not exceeding seven days, inspect the discharge of all outlets of hydraulic structures which pass underneath the base of the surface impoundment or through the dike of the CCR unit for abnormal discoloration, flow or discharge of debris or sediment; and

(iii) At intervals not exceeding 30 days, monitor all CCR unit instrumentation.

(iv) The results of the inspection by a qualified person must be recorded in the facility's operating record as required by § 257.105(g)(5).

(2) Timeframes for inspections by a qualified person

(i) Existing CCR surface impoundments. The owner or operator of the CCR unit must initiate the inspections required under paragraph (a) of this section no later than October 19, 2015.

(ii) New CCR surface impoundments and any lateral expansion of a CCR surface impoundment. The owner or operator of the CCR unit must initiate the inspections required under paragraph (a) of this section upon initial receipt of CCR by the CCR unit.

(b) Annual inspections by a qualified professional engineer.

(1) If the existing or new CCR surface impoundment or any lateral expansion of the CCR surface impoundment is subject to the periodic structural stability assessment requirements under § 257.73(d) or § 257.74(d), the CCR unit must additionally be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., CCR unit design and construction information required by §§ 257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under §§ 257.73(d) and 257.74(d), the results of inspections by a qualified person, and results of previous annual inspections);

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures; and

(iii) A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation.

(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:

(i) Any changes in geometry of the impounding structure since the previous annual inspection;
(ii) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;
(iii) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;
(iv) The storage capacity of the impounding structure at the time of the inspection;
(v) The approximate volume of the impounded water and CCR at the time of the inspection;
(vi) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures; and
(vii) Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection.

(3) Timeframes for conducting the initial inspection

(i) Existing CCR surface impoundments. The owner or operator of the CCR unit must complete the initial inspection required by paragraphs (b)(1) and (2) of this section no later than January 18, 2016.

(ii) New CCR surface impoundments and any lateral expansion of a CCR surface impoundment. The owner or operator of the CCR unit must complete the initial annual inspection required by paragraphs (b)(1) and (2) of this section is completed no later than 14 months following the date of initial receipt of CCR in the CCR unit.

Operating Criteria
§ 257.83 Inspection requirements for CCR surface impoundments

(4) Frequency of inspections.

(i) Except as provided for in paragraph (b)(4)(ii) of this section, the owner or operator of the CCR unit must conduct the inspection required by paragraphs (b)(1) and (2) of this section on an annual basis. The date of completing the initial inspection report is the basis for establishing the deadline to complete the first subsequent inspection. Any required inspection may be conducted prior to the required deadline provided the owner or operator places the completed inspection report into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent inspection reports is based on the date of completing the previous inspection report. For purposes of this section, the owner or operator has completed an inspection when the inspection report has been placed in the facility's operating record as required by § 257.105(g)(6).

(ii) In any calendar year in which both the periodic inspection by a qualified professional engineer and the quinquennial (occurring every five years) structural stability assessment by a qualified professional engineer required by §§ 257.73(d) and 257.74(d) are required to be completed, the annual inspection is not required, provided the structural stability assessment is completed during the calendar year. If the annual inspection is not conducted in a year as provided by this paragraph (b)(4)(ii), the deadline for completing the next annual inspection is one year from the date of completing the quinquennial structural stability assessment.

(5) If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

(c) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

Operating Criteria
§ 257.84 Inspection requirements for CCR landfills

(a) Inspections by a qualified person.

(1) All CCR landfills and any lateral expansion of a CCR landfill must be examined by a qualified person as follows:

(i) At intervals not exceeding seven days, inspect for any appearances of actual or potential structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the CCR unit; and

(ii) The results of the inspection by a qualified person must be recorded in the facility's operating record as required by § 257.105(g)(8).

(2) Timeframes for inspections by a qualified person

(i) Existing CCR landfills. The owner or operator of the CCR unit must initiate the inspections required under paragraph (a) of this section no later than October 19, 2015.

(ii) New CCR landfills and any lateral expansion of a CCR landfill. The owner or operator of the CCR unit must initiate the inspections required under paragraph (a) of this section upon initial receipt of CCR by the CCR unit.

(b) Annual inspections by a qualified professional engineer.

(1) Existing and new CCR landfills and any lateral expansion of a CCR landfill must be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.

(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:

(i) Any changes in geometry of the structure since the previous annual inspection;

(ii) The approximate volume of CCR contained in the unit at the time of the inspection;

(iii) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and

(iv) Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

(3) Timeframes for conducting the initial inspection

(i) Existing CCR landfills. The owner or operator of the CCR unit must complete the initial inspection required by paragraphs (b)(1) and (2) of this section no later than January 18, 2016.

(ii) New CCR landfills and any lateral expansion of a CCR landfill. The owner or operator of the CCR unit must complete the initial annual inspection required by paragraphs (b)(1) and (2) of this section no later than 14 months following the date of initial receipt of CCR in the CCR unit.

(4) Frequency of inspections. The owner or operator of the CCR unit must conduct the inspection required by paragraphs (b)(1) and (2) of this section on an annual basis. The date of completing the initial inspection report is the basis for establishing the deadline to complete the first subsequent inspection. Any required inspection may be conducted prior to the required deadline provided the owner or operator places the completed inspection report into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent inspection reports is based on the date of completing the previous inspection report. For purposes of this section, the owner or operator has completed an inspection when the inspection report has been placed in the facility's operating record as required by § 257.105(g)(9).

(5) If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

(c) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(g), the notification requirements specified in § 257.106(g), and the internet requirements specified in § 257.107(g).

Groundwater Monitoring and Corrective Action
§ 257.90 Applicability

(a) Except as provided for in § 257.100 for inactive CCR surface impoundments, all CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under §§ 257.90 through 257.98.

(b) Initial timeframes

(1) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2017, the owner or operator of the CCR unit must be in compliance with the following groundwater monitoring requirements:

(i) Install the groundwater monitoring system as required by § 257.91;
(ii) Develop the groundwater sampling and analysis program to include selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by § 257.93;
(iii) Initiate the detection monitoring program to include obtaining a minimum of eight independent samples for each background and downgradient well as required by § 257.94(b); and
(iv) Begin evaluating the groundwater monitoring data for statistically significant increases over background levels for the constituents listed in appendix III of this part as required by § 257.94.

(2) New CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units. Prior to initial receipt of CCR by the CCR unit, the owner or operator must be in compliance with the groundwater monitoring requirements specified in paragraph (b)(1)(i) and (ii) of this section. In addition, the owner or operator of the CCR unit must initiate the detection monitoring program to include obtaining a minimum of eight independent samples for each background well as required by § 257.94(b).

(c) Once a groundwater monitoring system and groundwater monitoring program has been established at the CCR unit as required by this subpart, the owner or operator must conduct groundwater monitoring and, if necessary, corrective action throughout the active life and post-closure care period of the CCR unit.

(d) In the event of a release from a CCR unit, the owner or operator must immediately take all necessary measures to control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of contaminants into the environment. The owner or operator of the CCR unit must comply with all applicable requirements in §§ 257.96, 257.97, and 257.98.

Groundwater Monitoring and Corrective Action
§ 257.90 Applicability

(e) Annual groundwater monitoring and corrective action report. For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1). At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:

(1) A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

(2) Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

(3) In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

(4) A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and

(5) Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.

(f) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the internet requirements specified in § 257.107(h).

Groundwater Monitoring and Corrective Action

§ 257.91 Groundwater monitoring systems

(a) Performance standard. The owner or operator of a CCR unit must install a groundwater monitoring system that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield groundwater samples from the uppermost aquifer that:

(1) Accurately represent the quality of background groundwater that has not been affected by leakage from a CCR unit. A determination of background quality may include sampling of wells that are not hydraulically upgradient of the CCR management area where:

(i) Hydrogeologic conditions do not allow the owner or operator of the CCR unit to determine what wells are hydraulically upgradient; or

(ii) Sampling at other wells will provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells; and

(2) Accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer. All potential contaminant pathways must be monitored.

(b) The number, spacing, and depths of monitoring systems shall be determined based upon site-specific technical information that must include thorough characterization of:

(1) Aquifer thickness, groundwater flow rate, groundwater flow direction including seasonal and temporal fluctuations in groundwater flow; and

(2) Saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials comprising the uppermost aquifer, and materials comprising the confining unit defining the lower boundary of the uppermost aquifer, including, but not limited to, thicknesses, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.

(c) The groundwater monitoring system must include the minimum number of monitoring wells necessary to meet the performance standards specified in paragraph (a) of this section, based on the site-specific information specified in paragraph (b) of this section. The groundwater monitoring system must contain:

(1) A minimum of one upgradient and three downgradient monitoring wells; and

(2) Additional monitoring wells as necessary to accurately represent the quality of background groundwater that has not been affected by leakage from the CCR unit and the quality of groundwater passing the waste boundary of the CCR unit.

(d) The owner or operator of multiple CCR units may install a multiunit groundwater monitoring system instead of separate groundwater monitoring systems for each CCR unit.

Groundwater Monitoring and Corrective Action
§ 257.91 Groundwater monitoring systems

(1) The multiunit groundwater monitoring system must be equally as capable of detecting monitored constituents at the waste boundary of the CCR unit as the individual groundwater monitoring system specified in paragraphs (a) through (c) of this section for each CCR unit based on the following factors:

(i) Number, spacing, and orientation of each CCR unit;
(ii) Hydrogeologic setting;
(iii) Site history; and
(iv) Engineering design of the CCR unit.

(2) If the owner or operator elects to install a multiunit groundwater monitoring system, and if the multiunit system includes at least one existing unlined CCR surface impoundment as determined by § 257.71(a), and if at any time after October 19, 2015 the owner or operator determines in any sampling event that the concentrations of one or more constituents listed in appendix IV to this part are detected at statistically significant levels above the groundwater protection standard established under § 257.95(h) for the multiunit system, then all unlined CCR surface impoundments comprising the multiunit groundwater monitoring system are subject to the closure requirements under § 257.101(a) to retrofit or close.

(e) Monitoring wells must be cased in a manner that maintains the integrity of the monitoring well borehole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable collection of groundwater samples. The annular space (i.e., the space between the borehole and well casing) above the sampling depth must be sealed to prevent contamination of samples and the groundwater.

(1) The owner or operator of the CCR unit must document and include in the operating record the design, installation, development, and decommissioning of any monitoring wells, piezometers and other measurement, sampling, and analytical devices. The qualified professional engineer must be given access to this documentation when completing the groundwater monitoring system certification required under paragraph (f) of this section.

(2) The monitoring wells, piezometers, and other measurement, sampling, and analytical devices must be operated and maintained so that they perform to the design specifications throughout the life of the monitoring program.

(f) The owner or operator must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system has been designed and constructed to meet the requirements of this section. If the groundwater monitoring system includes the minimum number of monitoring wells specified in paragraph (c)(1) of this section, the certification must document the basis supporting this determination.

(g) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the internet requirements specified in § 257.107(h).

Groundwater Monitoring and Corrective Action
§ 257.92 [Reserved]

Groundwater Monitoring and Corrective Action

§ 257.93 Groundwater sampling and analysis requirements

(a) The groundwater monitoring program must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of groundwater quality at the background and downgradient wells required by § 257.91. The owner or operator of the CCR unit must develop a sampling and analysis program that includes procedures and techniques for:

(1) Sample collection;
(2) Sample preservation and shipment;
(3) Analytical procedures;
(4) Chain of custody control; and
(5) Quality assurance and quality control.

(b) The groundwater monitoring program must include sampling and analytical methods that are appropriate for groundwater sampling and that accurately measure hazardous constituents and other monitoring parameters in groundwater samples. For purposes of §§ 257.90 through 257.98, the term constituent refers to both hazardous constituents and other monitoring parameters listed in either appendix III or IV of this part.

(c) Groundwater elevations must be measured in each well immediately prior to purging, each time groundwater is sampled. The owner or operator of the CCR unit must determine the rate and direction of groundwater flow each time groundwater is sampled. Groundwater elevations in wells which monitor the same CCR management area must be measured within a period of time short enough to avoid temporal variations in groundwater flow which could preclude accurate determination of groundwater flow rate and direction.

(d) The owner or operator of the CCR unit must establish background groundwater quality in a hydraulically upgradient or background well(s) for each of the constituents required in the particular groundwater monitoring program that applies to the CCR unit as determined under § 257.94(a) or § 257.95(a). Background groundwater quality may be established at wells that are not located hydraulically upgradient from the CCR unit if it meets the requirements of § 257.91(a)(1).

(e) The number of samples collected when conducting detection monitoring and assessment monitoring (for both downgradient and background wells) must be consistent with the statistical procedures chosen under paragraph (f) of this section and the performance standards under paragraph (g) of this section. The sampling procedures shall be those specified under § 257.94(b) through (d) for detection monitoring, § 257.95(b) through (d) for assessment monitoring, and § 257.96(b) for corrective action.

(f) The owner or operator of the CCR unit must select one of the statistical methods specified in paragraphs (f)(1) through (5) of this section to be used in evaluating groundwater monitoring data for each specified constituent. The statistical test chosen shall be conducted separately for each constituent in each monitoring well.

(1) A parametric analysis of variance followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

(2) An analysis of variance based on ranks followed by multiple comparison procedures to identify statistically significant evidence of contamination. The method must include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

(3) A tolerance or prediction interval procedure, in which an interval for each constituent is established from the distribution of the background data and the level of each constituent in each compliance well is compared to the upper tolerance or prediction limit.

(4) A control chart approach that gives control limits for each constituent.

(5) Another statistical test method that meets the performance standards of paragraph (g) of this section.

(6) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the CCR management area. The certification must include a narrative description of the statistical method selected to evaluate the groundwater monitoring data.

(g) Any statistical method chosen under paragraph (f) of this section shall comply with the following performance standards, as appropriate, based on the statistical test method used:

(1) The statistical method used to evaluate groundwater monitoring data shall be appropriate for the distribution of constituents. Normal distributions of data values shall use parametric methods. Non-normal distributions shall use non-parametric methods. If the distribution of the constituents is shown by the owner or operator of the CCR unit to be inappropriate for a normal theory test, then the data must be transformed or a distribution-free (non-parametric) theory test must be used. If the distributions for the constituents differ, more than one statistical method may be needed.

(2) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a groundwater protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparison procedure is used, the Type I experiment wise error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons must be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts.

(3) If a control chart approach is used to evaluate groundwater monitoring data, the specific type of control chart and its associated parameter values shall be such that this approach is at least as effective as any other approach in this section for evaluating groundwater data. The parameter values shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(4) If a tolerance interval or a predictional interval is used to evaluate groundwater monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval must contain, shall be such that this approach is at least as effective as any other approach in this section for evaluating groundwater data. These parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(5) The statistical method must account for data below the limit of detection with one or more statistical procedures that shall at least as effective as any other approach in this section for evaluating groundwater data. Any practical quantitation limit that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

(6) If necessary, the statistical method must include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(h) The owner or operator of the CCR unit must determine whether or not there is a statistically significant increase over background values for each constituent required in the particular groundwater monitoring program that applies to the CCR unit, as determined under § 257.94(a) or § 257.95(a).

(1) In determining whether a statistically significant increase has occurred, the owner or operator must compare the groundwater quality of each constituent at each monitoring well designated pursuant to § 257.91(a)(2) or (d)(1) to the background value of that constituent, according to the statistical procedures and performance standards specified under paragraphs (f) and (g) of this section.

(2) Within 90 days after completing sampling and analysis, the owner or operator must determine whether there has been a statistically significant increase over background for any constituent at each monitoring well.

(i) The owner or operator must measure ‘‘total recoverable metals’’ concentrations in measuring groundwater quality. Measurement of total recoverable metals captures both the particulate fraction and dissolved fraction of metals in natural waters. Groundwater samples shall not be field- filtered prior to analysis.

§ 257.93 Groundwater sampling and analysis requirements

(j) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the Internet requirements specified in § 257.107(h).

<u>Groundwater Monitoring and Corrective Action</u>
<u>§ 257.94 Detection monitoring program</u>

(a) The owner or operator of a CCR unit must conduct detection monitoring at all groundwater monitoring wells consistent with this section. At a minimum, a detection monitoring program must include groundwater monitoring for all constituents listed in appendix III to this part.

(b) Except as provided in paragraph (d) of this section, the monitoring frequency for the constituents listed in appendix III to this part shall be at least semiannual during the active life of the CCR unit and the post-closure period. For existing CCR landfills and existing CCR surface impoundments, a minimum of eight independent samples from each background and downgradient well must be collected and analyzed for the constituents listed in appendix III and IV to this part no later than October 17, 2017. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, a minimum of eight independent samples for each background well must be collected and analyzed for the constituents listed in appendices III and IV to this part during the first six months of sampling.

(c) The number of samples collected and analyzed for each background well and downgradient well during subsequent semiannual sampling events must be consistent with § 257.93(e), and must account for any unique characteristics of the site, but must be at least one sample from each background and downgradient well.

(d) The owner or operator of a CCR unit may demonstrate the need for an alternative monitoring frequency for repeated sampling and analysis for constituents listed in appendix III to this part during the active life and the post-closure care period based on the availability of groundwater. If there is not adequate groundwater flow to sample wells semiannually, the alternative frequency shall be no less than annual. The need to vary monitoring frequency must be evaluated on a site-specific basis. The demonstration must be supported by, at a minimum, the information specified in paragraphs (d)(1) and (2) of this section.

(1) Information documenting that the need for less frequent sampling. The alternative frequency must be based on consideration of the following factors:

(i) Lithology of the aquifer and unsaturated zone;
(ii) Hydraulic conductivity of the aquifer and unsaturated zone; and
(iii) Groundwater flow rates.

(2) Information documenting that the alternative frequency will be no less effective in ensuring that any leakage from the CCR unit will be discovered within a timeframe that will not materially delay establishment of an assessment monitoring program.

(3) The owner or operator must obtain a certification from a qualified professional engineer stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Groundwater Monitoring and Corrective Action
§ 257.94 Detection monitoring program

(e) If the owner or operator of the CCR unit determines, pursuant to § 257.93(h) that there is a statistically significant increase over background levels for one or more of the constituents listed in appendix III to this part at any monitoring well at the waste boundary specified under § 257.91(a)(2), the owner or operator must:

(1) Except as provided for in paragraph (e)(2) of this section, within 90 days of detecting a statistically significant increase over background levels for any constituent, establish an assessment monitoring program meeting the requirements of § 257.95.

(2) The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under this section. If a successful demonstration is not completed within the 90-day period, the owner or operator of the CCR unit must initiate an assessment monitoring program as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

(3) The owner or operator of a CCR unit must prepare a notification stating that an assessment monitoring program has been established. The owner or operator has completed the notification when the notification is placed in the facility's operating record as required by § 257.105(h)(5).

(f) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the Internet requirements specified in § 257.107(h).

Groundwater Monitoring and Corrective Action
§ 257.95 Assessment monitoring program

(a) Assessment monitoring is required whenever a statistically significant increase over background levels has been detected for one or more of the constituents listed in appendix III to this part.

(b) Within 90 days of triggering an assessment monitoring program, and annually thereafter, the owner or operator of the CCR unit must sample and analyze the groundwater for all constituents listed in appendix IV to this part. The number of samples collected and analyzed for each well during each sampling event must be consistent with § 257.93(e), and must account for any unique characteristics of the site, but must be at least one sample from each well.

(c) The owner or operator of a CCR unit may demonstrate the need for an alternative monitoring frequency for repeated sampling and analysis for constituents listed in appendix IV to this part during the active life and the post-closure care period based on the availability of groundwater. If there is not adequate groundwater flow to sample wells semiannually, the alternative frequency shall be no less than annual. The need to vary monitoring frequency must be evaluated on a site-specific basis. The demonstration must be supported by, at a minimum, the information specified in paragraphs (c)(1) and (2) of this section.

(1) Information documenting that the need for less frequent sampling. The alternative frequency must be based on consideration of the following factors:
(i) Lithology of the aquifer and unsaturated zone;
(ii) Hydraulic conductivity of the aquifer and unsaturated zone; and
(iii) Groundwater flow rates.

(2) Information documenting that the alternative frequency will be no less effective in ensuring that any leakage from the CCR unit will be discovered within a timeframe that will not materially delay the initiation of any necessary remediation measures.

(3) The owner or operator must obtain a certification from a qualified professional engineer stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer in the annual groundwater monitoring and corrective action report required by § 257.90(e).

(d) After obtaining the results from the initial and subsequent sampling events required in paragraph (b) of this section, the owner or operator must:

(1) Within 90 days of obtaining the results, and on at least a semiannual basis thereafter, resample all wells that were installed pursuant to the requirements of § 257.91, conduct analyses for all parameters in appendix III to this part and for those constituents in appendix IV to this part that are detected in response to paragraph (b) of this section, and record their concentrations in the facility operating record. The number of samples collected and analyzed for each background well and downgradient well during subsequent semiannual sampling events must be consistent with § 257.93(e), and must account for any unique characteristics of the site, but must be at least one sample from each background and downgradient well;

(2) Establish groundwater protection standards for all constituents detected pursuant to paragraph (b) or (d) of this section. The groundwater protection standards must be established in accordance with paragraph (h) of this section; and

(3) Include the recorded concentrations required by paragraph (d)(1) of this section, identify the background concentrations established under § 257.94(b), and identify the groundwater protection standards established under paragraph (d)(2) of this section in the annual groundwater monitoring and corrective action report required by § 257.90(e).

(e) If the concentrations of all constituents listed in appendices III and IV to this part are shown to be at or below background values, using the statistical procedures in § 257.93(g), for two consecutive sampling events, the owner or operator may return to detection monitoring of the CCR unit. The owner or operator must prepare a notification stating that detection monitoring is resuming for the CCR unit. The owner or operator has completed the notification when the notification is placed in the facility's operating record as required by § 257.105(h)(7).

(f) If the concentrations of any constituent in Appendices III and IV to this part are above background values, but all concentrations are below the groundwater protection standard established under paragraph (h) of this section, using the statistical procedures in § 257.93(g), the owner or operator must continue assessment monitoring in accordance with this section.

(g) If one or more constituents in Appendix IV to this part are detected at statistically significant levels above the groundwater protection standard established under paragraph (h) of this section in any sampling event, the owner or operator must prepare a notification identifying the constituents in appendix IV to this part that have exceeded the groundwater protection standard. The owner or operator has completed the notification when the notification is placed in the facility's operating record as required by § 257.105(h)(8). The owner or operator of the CCR unit also must:

(1) Characterize the nature and extent of the release and any relevant site conditions that may affect the remedy ultimately selected. The characterization must be sufficient to support a complete and accurate assessment of the corrective measures necessary to effectively clean up all releases from the CCR unit pursuant to § 257.96. Characterization of the release includes the following minimum measures:

(i) Install additional monitoring wells necessary to define the contaminant plume(s);
(ii) Collect data on the nature and estimated quantity of material released including specific information on the constituents listed in appendix IV of this part and the levels at which they are present in the material released;
(iii) Install at least one additional monitoring well at the facility boundary in the direction of contaminant migration and sample this well in accordance with paragraph (d)(1) of this section; and
(iv) Sample all wells in accordance with paragraph (d)(1) of this section to characterize the nature and extent of the release.

(2) Notify all persons who own the land or reside on the land that directly overlies any part of the plume of contamination if contaminants have migrated off-site if indicated by sampling of wells in accordance with paragraph (g)(1) of this section. The owner or operator has completed the notifications when they are placed in the facility's operating record as required by § 257.105(h)(8).

(3) Within 90 days of finding that any of the constituents listed in appendix IV to this part have been detected at a statistically significant level exceeding the groundwater protection standards the owner or operator must either:

(i) Initiate an assessment of corrective measures as required by § 257.96; or
(ii) Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to this section, and may return to detection monitoring if the constituents in appendices III and IV to this part are at or below background as specified in paragraph (e) of this section. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

(4) If a successful demonstration has not been made at the end of the 90 day period provided by paragraph (g)(3)(ii) of this section, the owner or operator of the CCR unit must initiate the assessment of corrective measures requirements under § 257.96.

(5) If an assessment of corrective measures is required under § 257.96 by either paragraph (g)(3)(i) or (g)(4) of this section, and if the CCR unit is an existing unlined CCR surface impoundment as determined by § 257.71(a), then the CCR unit is subject to the closure requirements under § 257.101(a) to retrofit or close. In addition, the owner or operator must prepare a notification stating that an assessment of corrective measures has been initiated.

(h) The owner or operator of the CCR unit must establish a groundwater protection standard for each constituent in appendix IV to this part detected in the groundwater. The groundwater protection standard shall be:

(1) For constituents for which a maximum contaminant level (MCL) has been established under §§ 141.62 and 141.66 of this title, the MCL for that constituent;

(2) For constituents for which an MCL has not been established, the background concentration for the constituent established from wells in accordance with § 257.91; or

(3) For constituents for which the background level is higher than the MCL identified under paragraph (h)(1) of this section, the background concentration.

(i) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the Internet requirements specified in § 257.107(h).

Groundwater Monitoring and Corrective Action
§ 257.96 Assessment of corrective measures

(a) Within 90 days of finding that any constituent listed in appendix IV to this part has been detected at a statistically significant level exceeding the groundwater protection standard defined under § 257.95(h), or immediately upon detection of a release from a CCR unit, the owner or operator must initiate an assessment of corrective measures to prevent further releases, to remediate any releases and to restore affected area to original conditions. The assessment of corrective measures must be completed within 90 days, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer attesting that the demonstration is accurate. The 90-day deadline to complete the assessment of corrective measures may be extended for no longer than 60 days. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

(b) The owner or operator of the CCR unit must continue to monitor groundwater in accordance with the assessment monitoring program as specified in § 257.95.

(c) The assessment under paragraph (a) of this section must include an analysis of the effectiveness of potential corrective measures in meeting all of the requirements and objectives of the remedy as described under § 257.97 addressing at least the following:

(1) The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;

(2) The time required to begin and complete the remedy;

(3) The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

(d) The owner or operator must place the completed assessment of corrective measures in the facility's operating record. The assessment has been completed when it is placed in the facility's operating record as required by § 257.105(h)(10).

(e) The owner or operator must discuss the results of the corrective measures assessment at least 30 days prior to the selection of remedy, in a public meeting with interested and affected parties.

(f) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the Internet requirements specified in § 257.107(h).

Groundwater Monitoring and Corrective Action
§ 257.97 Selection of remedy

(a) Based on the results of the corrective measures assessment conducted under § 257.96, the owner or operator must, as soon as feasible, select a remedy that, at a minimum, meets the standards listed in paragraph (b) of this section. This requirement applies to, not in place of, any applicable standards under the Occupational Safety and Health Act. The owner or operator must prepare a semiannual report describing the progress in selecting and designing the remedy. Upon selection of a remedy, the owner or operator must prepare a final report describing the selected remedy and how it meets the standards specified in paragraph (b) of this section. The owner or operator must obtain a certification from a qualified professional engineer that the remedy selected meets the requirements of this section. The report has been completed when it is placed in the operating record as required by § 257.105(h)(12).

(b) Remedies must:

(1) Be protective of human health and the environment;

(2) Attain the groundwater protection standard as specified pursuant to § 257.95(h);

(3) Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in appendix IV to this part into the environment;

(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;

(5) Comply with standards for management of wastes as specified in § 257.98(d).

(c) In selecting a remedy that meets the standards of paragraph (b) of this section, the owner or operator of the CCR unit shall consider the following evaluation factors:

(1) The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on consideration of the following:

(i) Magnitude of reduction of existing risks;

(ii) Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy;

(iii) The type and degree of long-term management required, including monitoring, operation, and maintenance;

(iv) Short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminant;

(v) Time until full protection is achieved;

(vi) Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment;
(vii) Long-term reliability of the engineering and institutional controls; and
(viii) Potential need for replacement of the remedy.

(2) The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the following factors:
(i) The extent to which containment practices will reduce further releases; and
(ii) The extent to which treatment technologies may be used.

(3) The ease or difficulty of implementing a potential remedy(s) based on consideration of the following types of factors:

(i) Degree of difficulty associated with constructing the technology;
(ii) Expected operational reliability of the technologies;
(iii) Need to coordinate with and obtain necessary approvals and permits from other agencies;
(iv) Availability of necessary equipment and specialists; and
(v) Available capacity and location of needed treatment, storage, and disposal services.

(4) The degree to which community concerns are addressed by a potential remedy(s).

(d) The owner or operator must specify as part of the selected remedy a schedule(s) for implementing and completing remedial activities. Such a schedule must require the completion of remedial activities within a reasonable period of time taking into consideration the factors set forth in paragraphs (d)(1) through (6) of this section. The owner or operator of the CCR unit must consider the following factors in determining the schedule of remedial activities:

(1) Extent and nature of contamination, as determined by the characterization required under § 257.95(g);

(2) Reasonable probabilities of remedial technologies in achieving compliance with the groundwater protection standards established under § 257.95(h) and other objectives of the remedy;

(3) Availability of treatment or disposal capacity for CCR managed during implementation of the remedy;

(4) Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy;

(5) Resource value of the aquifer including:
(i) Current and future uses;
(ii) Proximity and withdrawal rate of users;
(iii) Groundwater quantity and quality;

(iv) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to CCR constituents;

(v) The hydrogeologic characteristic of the facility and surrounding land; and

(vi) The availability of alternative water supplies; and

(6) Other relevant factors.

(e) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the Internet requirements specified in § 257.107(h).

Groundwater Monitoring and Corrective Action
§ 257.98 Implementation of the corrective action program

(a) Within 90 days of selecting a remedy under § 257.97, the owner or operator must initiate remedial activities. Based on the schedule established under § 257.97(d) for implementation and completion of remedial activities the owner or operator must:

(1) Establish and implement a corrective action groundwater monitoring program that:

(i) At a minimum, meets the requirements of an assessment monitoring program under § 257.95;
(ii) Documents the effectiveness of the corrective action remedy; and
(iii) Demonstrates compliance with the groundwater protection standard pursuant to paragraph (c) of this section.

(2) Implement the corrective action remedy selected under § 257.97; and

(3) Take any interim measures necessary to reduce the contaminants leaching from the CCR unit, and/or potential exposures to human or ecological receptors. Interim measures must, to the greatest extent feasible, be consistent with the objectives of and contribute to the performance of any remedy that may be required pursuant to § 257.97. The following factors must be considered by an owner or operator in determining whether interim measures are necessary:

(i) Time required to develop and implement a final remedy;
(ii) Actual or potential exposure of nearby populations or environmental receptors to any of the constituents listed in appendix IV of this part;
(iii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;
(iv) Further degradation of the groundwater that may occur if remedial action is not initiated expeditiously;
(v) Weather conditions that may cause any of the constituents listed in appendix IV to this part to migrate or be released;
(vi) Potential for exposure to any of the constituents listed in appendix IV to this part as a result of an accident or failure of a container or handling system; and
(vii) Other situations that may pose threats to human health and the environment.

(b) If an owner or operator of the CCR unit, determines, at any time, that compliance with the requirements of § 257.97(b) is not being achieved through the remedy selected, the owner or operator must implement other methods or techniques that could feasibly achieve compliance with the requirements.

(c) Remedies selected pursuant to § 257.97 shall be considered complete when:

(1) The owner or operator of the CCR unit demonstrates compliance with the groundwater protection standards established under § 257.95(h) has been achieved at all points within the plume of contamination that lie beyond the groundwater monitoring well system established under § 257.91.

(2) Compliance with the groundwater protection standards established under § 257.95(h) has been achieved by demonstrating that concentrations of constituents listed in appendix IV to this part have not exceeded the groundwater protection standard(s) for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g).

(3) All actions required to complete the remedy have been satisfied.

(d) All CCR that are managed pursuant to a remedy required under § 257.97, or an interim measure required under paragraph (a)(3) of this section, shall be managed in a manner that complies with all applicable RCRA requirements.

(e) Upon completion of the remedy, the owner or operator must prepare a notification stating that the remedy has been completed. The owner or operator must obtain a certification from a qualified professional engineer attesting that the remedy has been completed in compliance with the requirements of paragraph (c) of this section. The report has been completed when it is placed in the operating record as required by § 257.105(h)(13).

(f) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the internet requirements specified in § 257.107(h).

Closure and Post Closure Care
§ 257.100 Inactive CCR surface impoundments

(a) Except as provided by paragraph (b) of this section, inactive CCR surface impoundments are subject to all of the requirements of this subpart applicable to existing CCR surface impoundments.

(b) An owner or operator of an inactive CCR surface impoundment that completes closure of such CCR unit, and meets all of the requirements of either paragraphs (b)(1) through (4) of this section or paragraph (b)(5) of this section no later than April 17, 2018, is exempt from all other requirements of this subpart.

(1) Closure by leaving CCR in place. If the owner or operator of the inactive CCR surface impoundment elects to close the CCR surface impoundment by leaving CCR in place, the owner or operator must ensure that, at a minimum, the CCR unit is closed in a manner that will:

(i) Control, minimize or eliminate, to the maximum extent feasible, post- closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;
(ii) Preclude the probability of future impoundment of water, sediment, or slurry;
(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system; and
(iv) Minimize the need for further maintenance of the CCR unit.

(2) The owner or operator of the inactive CCR surface impoundment must meet the requirements of paragraphs (b)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (b)(3) of this section.

(i) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.
(ii) Remaining wastes must be stabilized sufficient to support the final cover system.

(3) The owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (b)(3)(i) of this section, or the requirements of an alternative final cover system specified in paragraph (b)(3)(ii) of this section.

(i) The final cover system must be designed and constructed to meet the criteria specified in paragraphs (b)(3)(i)(A) through (D) of this section.

(A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$ centimeters/second, whichever is less.
(B) The infiltration of liquids through the CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.

(C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.

(D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

(ii) The owner or operator may select an alternative final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria in paragraphs (b)(3)(ii)(A) through (C) of this section.

(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (b)(3)(i)(A) and (B) of this section.

(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (b)(3)(i)(C) of this section.

(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

(4) The owner or operator of the CCR surface impoundment must obtain a written certification from a qualified professional engineer stating that the design of the final cover system meets either the requirements of paragraphs (b)(3)(i) or (ii) of this section.

(5) Closure through removal of CCR. The owner or operator may alternatively elect to close an inactive CCR surface impoundment by removing and decontaminating all areas affected by releases from the CCR surface impoundment. CCR removal and decontamination of the CCR surface impoundment are complete when all CCR in the inactive CCR surface impoundment is removed, including the bottom liner of the CCR unit.

(6) The owner or operator of the CCR surface impoundment must obtain a written certification from a qualified professional engineer that closure of the CCR surface impoundment under either paragraphs (b)(1) through (4) or (b)(5) of this section is technically feasible within the timeframe in paragraph (b) of this section.

(7) If the owner or operator of the CCR surface impoundment fails to complete closure of the inactive CCR surface impoundment within the timeframe in paragraph (b) of this section, the CCR unit must comply with all of the requirements applicable to existing CCR surface impoundments under this subpart.

(c) Required notices and progress reports. An owner or operator of an inactive CCR surface impoundment that closes in accordance with paragraph (b) of this section must complete the notices and progress reports specified in paragraphs (c)(1) through (3) of this section.

Closure and Post Closure Care
§ 257.100 Inactive CCR surface impoundments

(1) No later than December 17, 2015, the owner or operator must prepare and place in the facility's operating record a notification of intent to initiate closure of the CCR surface impoundment. The notification must state that the CCR surface impoundment is an inactive CCR surface impoundment closing under the requirements of paragraph (b) of this section. The notification must also include a narrative description of how the CCR surface impoundment will be closed, a schedule for completing closure activities, and the required certifications under paragraphs (b)(4) and (6) of this section, if applicable.

(2) The owner or operator must prepare periodic progress reports summarizing the progress of closure implementation, including a description of the actions completed to date, any problems encountered and a description of the actions taken to resolve the problems, and projected closure activities for the upcoming year. The annual progress reports must be completed according to the following schedule:

(i) The first annual progress report must be prepared no later than 13 months after completing the notification of intent to initiate closure required by paragraph (c)(1) of this section.
(ii) The second annual progress report must be prepared no later than 12 months after completing the first progress report required by paragraph (c)(2)(i) of this section.
(iii) The owner or operator has completed the progress reports specified in paragraph (c)(2) of this section when the reports are placed in the facility's operating record as required by § 257.105(i)(2).

(3) The owner or operator must prepare and place in the facility's operating record a notification of completion of closure of the CCR surface impoundment. The notification must be submitted within 60 days of completing closure of the CCR surface impoundment and must include a written certification from a qualified professional engineer stating that the CCR surface impoundment was closed in accordance with the requirements of either paragraph (b)(1) through (4) or (b)(5) of this section.

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(i), the notification requirements specified in § 257.106(i), and the internet requirements specified in § 257.107(i).

Closure and Post Closure Care
§ 257.101 Closure or retrofit of CCR units

(a) The owner or operator of an existing unlined CCR surface impoundment, as determined under § 257.71(a), is subject to the requirements of paragraph (a)(1) of this section.

(1) Except as provided by paragraph (a)(3) of this section, if at any time after October 19, 2015 an owner or operator of an existing unlined CCR surface impoundment determines in any sampling event that the concentrations of one or more constituents listed in appendix IV to this part are detected at statistically significant levels above the groundwater protection standard established under § 257.95(h) for such CCR unit, within six months of making such determination, the owner or operator of the existing unlined CCR surface impoundment must cease placing CCR and non-CCR waste streams into such CCR surface impoundment and either retrofit or close the CCR unit in accordance with the requirements of § 257.102.

(2) An owner or operator of an existing unlined CCR surface impoundment that closes in accordance with paragraph (a)(1) of this section must include a statement in the notification required under § 257.102(g) or (k)(5) that the CCR surface impoundment is closing or retrofitting under the requirements of paragraph (a)(1) of this section.

(3) The timeframe specified in paragraph (a)(1) of this section does not apply if the owner or operator complies with the alternative closure procedures specified in § 257.103.

(4) At any time after the initiation of closure under paragraph (a)(1) of this section, the owner or operator may cease closure activities and initiate a retrofit of the CCR unit in accordance with the requirements of § 257.102(k).

(b) The owner or operator of an existing CCR surface impoundment is subject to the requirements of paragraph (b)(1) of this section.

(1) Except as provided by paragraph (b)(4) of this section, within six months of determining that an existing CCR surface impoundment has not demonstrated compliance with any location standard specified in §§ 257.60(a), 257.61(a), 257.62(a), 257.63(a), and 257.64(a), the owner or operator of the CCR surface impoundment must cease placing CCR and non-CCR waste streams into such CCR unit and close the CCR unit in accordance with the requirements of § 257.102.

(2) Within six months of either failing to complete the initial or any subsequent periodic safety factor assessment required by § 257.73(e) by the deadlines specified in § 257.73(f)(1) through (3) or failing to document that the calculated factors of safety for the existing CCR surface impoundment achieve the minimum safety factors specified in § 257.73(e)(1)(i) through (iv), the owner or operator of the CCR surface impoundment must cease placing CCR and non-CCR waste streams into such CCR unit and close the CCR unit in accordance with the requirements of § 257.102.

(3) An owner or operator of an existing CCR surface impoundment that closes in accordance with paragraphs (b)(1) or (2) of this section must include a statement in the notification required under § 257.102(g) that the CCR surface impoundment is closing under the requirements of paragraphs (b)(1) or (2) of this section.

(4) The timeframe specified in paragraph (b)(1) of this section does not apply if the owner or operator complies with the alternative closure procedures specified in § 257.103.

(c) The owner or operator of a new CCR surface impoundment is subject to the requirements of paragraph (c)(1) of this section.

(1) Within six months of either failing to complete the initial or any subsequent periodic safety factor assessment required by § 257.74(e) by the deadlines specified in § 257.74(f)(1) through (3) or failing to document that the calculated factors of safety for the new CCR surface impoundment achieve the minimum safety factors specified in § 257.74(e)(1)(i) through (v), the owner or operator of the CCR surface impoundment must cease placing CCR and non-CCR wastestreams into such CCR unit and close the CCR unit in accordance with the requirements of § 257.102.

(2) An owner or operator of an new CCR surface impoundment that closes in accordance with paragraph (c)(1) of this section must include a statement in the notification required under § 257.102(g) that the CCR surface impoundment is closing under the requirements of paragraph (c)(1) of this section.

(d) The owner or operator of an existing CCR landfill is subject to the requirements of paragraph (d)(1) of this section.

(1) Except as provided by paragraph (d)(3) of this section, within six months of determining that an existing CCR landfill has not demonstrated compliance with the location restriction for unstable areas specified in § 257.64(a), the owner or operator of the CCR unit must cease placing CCR and non-CCR waste streams into such CCR landfill and close the CCR unit in accordance with the requirements of § 257.102.

(2) An owner or operator of an existing CCR landfill that closes in accordance with paragraph (d)(1) of this section must include a statement in the notification required under § 257.102(g) that the CCR landfill is closing under the requirements of paragraph (d)(1) of this section.

(3) The timeframe specified in paragraph (d)(1) of this section does not apply if the owner or operator complies with the alternative closure procedures specified in § 257.103.

Closure and Post Closure Care

§ 257.102 Criteria for conducting the closure or retrofit of CCR units

(a) Closure of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR unit, as described in paragraphs (b) through (j) of this section. Retrofit of a CCR surface impoundment must be completed in accordance with the requirements in paragraph (k) of this section.

(b) Written closure plan

(1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section.

(i) A narrative description of how the CCR unit will be closed in accordance with this section.

(ii) If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section.

(iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d)of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.

(iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.

(v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.

(vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section.

(2) Timeframes for preparing the initial written closure plan

(i) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2016, the owner or operator of the CCR unit must prepare an initial written closure plan consistent with the requirements specified in paragraph (b)(1) of this section.

(ii) New CCR landfills and new CCR surface impoundments, and any lateral expansion of a CCR unit. No later than the date of the initial receipt of CCR in the CCR unit, the owner or operator must prepare an initial written closure plan consistent with the requirements specified in paragraph (b)(1) of this section.

(iii) The owner or operator has completed the written closure plan when the plan, including the certification required by paragraph (b)(4) of this section, has been placed in the facility's operating record as required by § 257.105(i)(4).

(3) Amendment of a written closure plan.

(i) The owner or operator may amend the initial or any subsequent written closure plan developed pursuant to paragraph (b)(1) of this section at any time.

(ii) The owner or operator must amend the written closure plan whenever:

(A) There is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect; or

(B) Before or after closure activities have commenced, unanticipated events necessitate a revision of the written closure plan.

(iii) The owner or operator must amend the closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written closure plan. If a written closure plan is revised after closure activities have commenced for a CCR unit, the owner or operator must amend the current closure plan no later than 30 days following the triggering event.

(4) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this section.

(c) Closure by removal of CCR. An owner or operator may elect to close a CCR unit by removing and decontaminating all areas affected by releases from the CCR unit. CCR removal and decontamination of the CCR unit are complete when constituent concentrations throughout the CCR unit and any areas affected by releases from the CCR unit have been removed and groundwater monitoring concentrations do not exceed the groundwater protection standard established pursuant to § 257.95(h) for constituents listed in appendix IV to this part.

(d) Closure performance standard when leaving CCR in place

(1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:

(i) Control, minimize or eliminate, to the maximum extent feasible, post- closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;

(ii) Preclude the probability of future impoundment of water, sediment, or slurry;

(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;

(iv) Minimize the need for further maintenance of the CCR unit; and

(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

(2) Drainage and stabilization of CCR surface impoundments. The owner or operator of a CCR surface impoundment or any lateral expansion of a CCR surface impoundment must meet the requirements of paragraphs (d)(2)(i) and (ii) of this section prior to installing the final cover system required under paragraph (d)(3) of this section.

(i) Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residues.

(ii) Remaining wastes must be stabilized sufficient to support the final cover system.

(3) Final cover system. If a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.

(i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.

(A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$ cm/sec, whichever is less.

(B) The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.

(C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.

(D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

(ii) The owner or operator may select an alternative final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria in paragraphs (f)(3)(ii)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.

(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.

(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.

(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

(iii) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the design of the final cover system meets the requirements of this section.

(e) Initiation of closure activities. Except as provided for in paragraph (e)(4) of this section and § 257.103, the owner or operator of a CCR unit must commence closure of the CCR unit no later than the applicable timeframes specified in either paragraph (e)(1) or (2) of this section.

(1) The owner or operator must commence closure of the CCR unit no later than 30 days after the date on which the CCR unit either:

(i) Receives the known final receipt of waste, either CCR or any non-CCR waste stream; or

(ii) Removes the known final volume of CCR from the CCR unit for the purpose of beneficial use of CCR.

(2)

(i) Except as provided by paragraph (e)(2)(ii) of this section, the owner or operator must commence closure of a CCR unit that has not received CCR or any non-CCR waste stream or is no longer removing CCR for the purpose of beneficial use within two years of the last receipt of waste or within two years of the last removal of CCR material for the purpose of beneficial use.

(ii) Notwithstanding paragraph (e)(2)(i) of this section, the owner or operator of the CCR unit may secure an additional two years to initiate closure of the idle unit provided the owner or operator provides written documentation that the CCR unit will continue to accept wastes or will start removing CCR for the purpose of beneficial use. The documentation must be supported by, at a minimum, the information specified in paragraphs (e)(2)(ii)(A) and (B) of this section. The owner or operator may obtain two-year extensions provided the owner or operator continues to be able to demonstrate that there is reasonable likelihood that the CCR unit will accept wastes in the foreseeable future or will remove CCR from the unit for the purpose of beneficial use. The owner or operator must place each completed demonstration, if more than one time extension is sought, in the facility's operating record as required by § 257.105(i)(5) prior to the end of any two-year period.

(A) Information documenting that the CCR unit has remaining storage or disposal capacity or that the CCR unit can have CCR removed for the purpose of beneficial use; and

(B) Information demonstrating that there is a reasonable likelihood that the CCR unit will resume receiving CCR or non-CCR waste streams in the foreseeable future or that CCR can be removed for the purpose of beneficial use. The narrative must include a best estimate as to when the CCR unit will resume receiving CCR or non-CCR waste streams. The situations listed in paragraphs (e)(2)(ii)(B)(1) through (4) of this section are examples of situations that would support a determination that the CCR unit will resume receiving CCR or non-CCR waste streams in the foreseeable future.

(1) Normal plant operations include periods during which the CCR unit does not receive CCR or non-CCR waste streams, such as the alternating use of two or more CCR units whereby at any point in time one CCR unit is receiving CCR while CCR is being removed from a second CCR unit after its dewatering.

(2) The CCR unit is dedicated to a coal-fired boiler unit that is temporarily idled (e.g., CCR is not being generated) and there is a reasonable likelihood that the coal-fired boiler will resume operations in the future.

(3)The CCR unit is dedicated to an operating coal-fired boiler (i.e., CCR is being generated); however, no CCR are being placed in the CCR unit because the CCR are being entirely diverted to beneficial uses, but there is a reasonable likelihood that the CCR unit will again be used in the foreseeable future.

(4) The CCR unit currently receives only non-CCR waste streams and those non-CCR waste streams are not generated for an extended period of time, but there is a reasonable likelihood that the CCR unit will again receive non-CCR waste streams in the future.

(iii) In order to obtain additional time extension(s) to initiate closure of a CCR unit beyond the two years provided by paragraph (e)(2)(i) of this section, the owner or operator of the CCR unit must include with the demonstration required by paragraph (e)(2)(ii) of this section the following statement signed by the owner or operator or an authorized representative:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

(3) For purposes of this subpart, closure of the CCR unit has commenced if the owner or operator has ceased placing waste and completes any of the following actions or activities:
   (i) Taken any steps necessary to implement the written closure plan required by paragraph (b) of this section;
   (ii) Submitted a completed application for any required state or agency permit or permit modification; or
   (iii) Taken any steps necessary to comply with any state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR unit.

(4) The timeframes specified in paragraphs (e)(1) and (2) of this section do not apply to any of the following owners or operators:
   (i) An owner or operator of an inactive CCR surface impoundment closing the CCR unit as required by § 257.100(b);
   (ii) An owner or operator of an existing unlined CCR surface impoundment closing the CCR unit as required by § 257.101(a);
   (iii) An owner or operator of an existing CCR surface impoundment closing the CCR unit as required by § 257.101(b);
   (iv) An owner or operator of a new CCR surface impoundment closing the CCR unit as required by § 257.101(c); or
   (v) An owner or operator of an existing CCR landfill closing the CCR unit as required by § 257.101(d).

(f) Completion of closure activities.

(1) Except as provided for in paragraph (f)(2) of this section, the owner or operator must complete closure of the CCR unit:

   (i) For existing and new CCR landfills and any lateral expansion of a CCR landfill, within six months of commencing closure activities.
   (ii) For existing and new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, within five years of commencing closure activities.

(2)

(i) Extensions of closure timeframes. The timeframes for completing closure of a CCR unit specified under paragraphs (f)(1) of this section may be extended if the owner or operator can demonstrate that it was not feasible to complete closure of the CCR unit within the required timeframes due to factors beyond the facility's control. If the owner or operator is seeking a time extension beyond the time specified in the written closure plan as required by paragraph (b)(1) of this section, the demonstration must include a narrative discussion providing the basis for additional time beyond that specified in the closure plan. The owner or operator must place each completed demonstration, if more than one time extension is sought, in the facility's operating record as required by § 257.105(i)(6) prior to the end of any two-year period. Factors that may support such a demonstration include:

(A) Complications stemming from the climate and weather, such as unusual amounts of precipitation or a significantly shortened construction season;
(B) Time required to dewater a surface impoundment due to the volume of CCR contained in the CCR unit or the characteristics of the CCR in the unit;
(C) The geology and terrain surrounding the CCR unit will affect the amount of material needed to close the CCR unit; or

(D) Time required or delays caused by the need to coordinate with and obtain necessary approvals and permits from a state or other agency.

(ii) Maximum time extensions.
(A) CCR surface impoundments of 40 acres or smaller may extend the time to complete closure by no longer than two years.
(B) CCR surface impoundments larger than 40 acres may extend the timeframe to complete closure of the CCR unit multiple times, in two-year increments. For each two-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of five two-year extensions may be obtained for any CCR surface impoundment.
(C) CCR landfills may extend the timeframe to complete closure of the CCR unit multiple times, in one-year increments. For each one-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of two one-year extensions may be obtained for any CCR landfill.

(iii) In order to obtain additional time extension(s) to complete closure of a CCR unit beyond the times provided by paragraph (f)(1) of this section, the owner or operator of the CCR unit must include with the demonstration required by paragraph (f)(2)(i) of this section the following statement signed by the owner or operator or an authorized representative:

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this demonstration and all attached documents, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

(3) Upon completion, the owner or operator of the CCR unit must obtain a certification from a qualified professional engineer verifying that closure has been completed in accordance with the closure plan specified in paragraph (b) of this section and the requirements of this section.

(g) No later than the date the owner or operator initiates closure of a CCR unit, the owner or operator must prepare a notification of intent to close a CCR unit. The notification must include the certification by a qualified professional engineer for the design of the final cover system as required by § 257.102(d)(3)(iii), if applicable. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by § 257.105(i)(7).

(h) Within 30 days of completion of closure of the CCR unit, the owner or operator must prepare a notification of closure of a CCR unit. The notification must include the certification by a qualified professional engineer as required by § 257.102(f)(3). The owner or operator has completed the notification when it has been placed in the facility's operating record as required by § 257.105(i)(8).

(i) Deed notations.

(1) Except as provided by paragraph (i)(4) of this section, following closure of a CCR unit, the owner or operator must record a notation on the deed to the property, or some other instrument that is normally examined during title search.

(2) The notation on the deed must in perpetuity notify any potential purchaser of the property that:

(i) The land has been used as a CCR unit; and

(ii) Its use is restricted under the post- closure care requirements as provided by § 257.104(d)(1)(iii).

(3) Within 30 days of recording a notation on the deed to the property, the owner or operator must prepare a notification stating that the notation has been recorded. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by § 257.105(i)(9).

(4) An owner or operator that closes a CCR unit in accordance with paragraph (c) of this section is not subject to the requirements of paragraphs (i)(1) through (3) of this section.

(j) The owner or operator of the CCR unit must comply with the closure recordkeeping requirements specified in § 257.105(i), the closure notification requirements specified in § 257.106(i), and the closure Internet requirements specified in § 257.107(i).

(k) Criteria to retrofit an existing CCR surface impoundment.

(1) To retrofit an existing CCR surface impoundment, the owner or operator must:

(i) First remove all CCR, including any contaminated soils and sediments from the CCR unit; and

(ii) Comply with the requirements in § 257.72.

(iii) A CCR surface impoundment undergoing a retrofit remains subject to all other requirements of this subpart, including the requirement to conduct any necessary corrective action.

(2) Written retrofit plan

(i) Content of the plan. The owner or operator must prepare a written retrofit plan that describes the steps necessary to retrofit the CCR unit consistent with recognized and generally accepted good engineering practices. The written retrofit plan must include, at a minimum, all of the following information:

(A) A narrative description of the specific measures that will be taken to retrofit the CCR unit in accordance with this section.

(B) A description of the procedures to remove all CCR and contaminated soils and sediments from the CCR unit.

(C) An estimate of the maximum amount of CCR that will be removed as part of the retrofit operation.

(D) An estimate of the largest area of the CCR unit that will be affected by the retrofit operation.

(E) A schedule for completing all activities necessary to satisfy the retrofit criteria in this section, including an estimate of the year in which retrofit activities of the CCR unit will be completed.

(ii) Timeframes for preparing the initial written retrofit plan.

(A) No later than 60 days prior to date of initiating retrofit activities, the owner or operator must prepare an initial written retrofit plan consistent with the requirements specified in paragraph (k)(2) of this section. For purposes of this subpart, initiation of retrofit activities has commenced if the owner or operator has ceased placing waste in the unit and completes any of the following actions or activities:

(1) Taken any steps necessary to implement the written retrofit plan;

(2) Submitted a completed application for any required state or agency permit or permit modification; or

(3) Taken any steps necessary to comply with any state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the retrofit of a CCR unit.

(B) The owner or operator has completed the written retrofit plan when the plan, including the certification required by paragraph (k)(2)(iv) of this section, has been placed in the facility's operating record as required by § 257.105(j)(1).

(iii) Amendment of a written retrofit plan.

(A) The owner or operator may amend the initial or any subsequent written retrofit plan at any time.

(B) The owner or operator must amend the written retrofit plan whenever:

(1) There is a change in the operation of the CCR unit that would substantially affect the written retrofit plan in effect; or

(2) Before or after retrofit activities have commenced, unanticipated events necessitate a revision of the written retrofit plan.

(C) The owner or operator must amend the retrofit plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the revision of an existing written retrofit plan. If a written retrofit plan is revised after retrofit activities have commenced for a CCR unit, the owner or operator must amend the current retrofit plan no later than 30 days following the triggering event.

(iv) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the activities outlined in the written retrofit plan, including any amendment of the plan, meet the requirements of this section.

(3) Deadline for completion of activities related to the retrofit of a CCR unit. Any CCR surface impoundment that is being retrofitted must complete all retrofit activities within the same time frames and procedures specified for the closure of a CCR surface impoundment in § 257.102(f) or, where applicable, § 257.103.

(4) Upon completion, the owner or operator must obtain a certification from a qualified professional engineer verifying that the retrofit activities have been completed in accordance with the retrofit plan specified in paragraph (k)(2) of this section and the requirements of this section.

(5) No later than the date the owner or operator initiates the retrofit of a CCR unit, the owner or operator must prepare a notification of intent to retrofit a CCR unit. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by § 257.105(j)(5).

(6) Within 30 days of completing the retrofit activities specified in paragraph (k)(1) of this section, the owner or operator must prepare a notification of completion of retrofit activities. The notification must include the certification by a qualified professional engineer as required by paragraph (k)(4) of this section. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by § 257.105(j)(6).

(7) At any time after the initiation of a CCR unit retrofit, the owner or operator may cease the retrofit and initiate closure of the CCR unit in accordance with the requirements of § 257.102.

(8) The owner or operator of the CCR unit must comply with the retrofit recordkeeping requirements specified in § 257.105(j), the retrofit notification requirements specified in § 257.106(j), and the retrofit Internet requirements specified in § 257.107(j).

Closure and Post Closure Care
§ 257.103 Alternative closure requirements

The owner or operator of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit that is subject to closure pursuant to § 257.101(a), (b)(1), or (d) may continue to receive CCR in the unit provided the owner or operator meets the requirements of either paragraph (a) or (b) of this section.

(a)

(1) No alternative CCR disposal capacity. Notwithstanding the provisions of § 257.101(a), (b)(1), or (d), a CCR unit may continue to receive CCR if the owner or operator of the CCR unit certifies that the CCR must continue to be managed in that CCR unit due to the absence of alternative disposal capacity both on-site and off-site of the facility. To qualify under this paragraph (a)(1), the owner or operator of the CCR unit must document that all of the following conditions have been met:

(i) No alternative disposal capacity is available on-site or off-site. An increase in costs or the inconvenience of existing capacity is not sufficient to support qualification under this section;

(ii) The owner or operator has made, and continues to make, efforts to obtain additional capacity. Qualification under this subsection lasts only as long as no alternative capacity is available. Once alternative capacity is identified, the owner or operator must arrange to use such capacity as soon as feasible;

(iii) The owner or operator must remain in compliance with all other requirements of this subpart, including the requirement to conduct any necessary corrective action; and

(iv) The owner or operator must prepare an annual progress report documenting the continued lack of alternative capacity and the progress towards the development of alternative CCR disposal capacity.

(2) Once alternative capacity is available, the CCR unit must cease receiving CCR and initiate closure following the timeframes in § 257.102(e) and (f).

(3) If no alternative capacity is identified within five years after the initial certification, the CCR unit must cease receiving CCR and close in accordance with the timeframes in § 257.102(e) and (f).

(b)

(1) Permanent cessation of a coal- fired boiler(s) by a date certain. Notwithstanding the provisions of § 257.101(a), (b)(1), and (d), a CCR unit may continue to receive CCR if the owner or operator certifies that the facility will cease operation of the coal- fired boilers within the timeframes specified in paragraphs (b)(2) through (4) of this section, but in the interim period (prior to closure of the coal-fired boiler), the facility must continue to use the CCR unit due to the absence of alternative disposal capacity both on- site and off-site of the facility. To qualify under this paragraph (b)(1), the owner or operator of the CCR unit must document that all of the following conditions have been met:

(i) No alternative disposal capacity is available on-site or off-site. An increase in costs or the inconvenience of existing capacity is not sufficient to support qualification under this section.

(ii) The owner or operator must remain in compliance with all other requirements of this subpart, including the requirement to conduct any necessary corrective action; and

(iii) The owner or operator must prepare an annual progress report documenting the continued lack of alternative capacity and the progress towards the closure of the coal-fired boiler.

(2) For a CCR surface impoundment that is 40 acres or smaller, the coal-fired boiler must cease operation and the CCR surface impoundment must have completed closure no later than October 17, 2023.

(3) For a CCR surface impoundment that is larger than 40 acres, the coal- fired boiler must cease operation, and the CCR surface impoundment must complete closure no later than October 17, 2028.

(4) For a CCR landfill, the coal-fired boiler must cease operation, and the CCR landfill must complete closure no later than April 19, 2021.

(c) Required notices and progress reports. An owner or operator of a CCR unit that closes in accordance with paragraphs (a) or (b) of this section must complete the notices and progress reports specified in paragraphs (c)(1) through (3) of this section.

(1) Within six months of becoming subject to closure pursuant to § 257.101(a), (b)(1), or (d), the owner or operator must prepare and place in the facility's operating record a notification of intent to comply with the alternative closure requirements of this section. The notification must describe why the CCR unit qualifies for the alternative closure provisions under either paragraph (a) or (b) of this section, in addition to providing the documentation and certifications required by paragraph (a) or (b) of this section.

(2) The owner or operator must prepare the periodic progress reports required by paragraphs (a)(1)(iv) or (b)(1)(iii), in addition to describing any problems encountered and a description of the actions taken to resolve the problems. The annual progress reports must be completed according to the following schedule:

(i) The first annual progress report must be prepared no later than 13 months after completing the notification of intent to comply with the alternative closure requirements required by paragraph (c)(1) of this section.

(ii) The second annual progress report must be prepared no later than 12 months after completing the first annual progress report. Additional annual progress reports must be prepared within 12 months of completing the previous annual progress report.

(iii) The owner or operator has completed the progress reports specified in paragraph (c)(2) of this section when the reports are placed in the facility's operating record as required by § 257.105(i)(10).

(3) An owner or operator of a CCR unit must also prepare the notification of intent to close a CCR unit as required by § 257.102(g).

(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(i), the notification requirements specified in § 257.106(i), and the Internet requirements specified in § 257.107(i).

<u>Closure and Post Closure Care</u>

<u>§ 257.104 Post-closure care requirements.</u>

(a) Applicability.

(1) Except as provided by either paragraph (a)(2) or (3) of this section, § 257.104 applies to the owners or operators of CCR landfills, CCR surface impoundments, and all lateral expansions of CCR units that are subject to the closure criteria under § 257.102.

(2) An owner or operator of a CCR unit that elects to close a CCR unit by removing CCR as provided by § 257.102(c) is not subject to the post- closure care criteria under this section.

(3) An owner or operator of an inactive CCR surface impoundment that elects to close a CCR unit pursuant to the requirements under § 257.100(b) is not subject to the post-closure care criteria under this section.

(b) Post-closure care maintenance requirements. Following closure of the CCR unit, the owner or operator must conduct post-closure care for the CCR unit, which must consist of at least the following:

(1) Maintaining the integrity and effectiveness of the final cover system, including making repairs to the final cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(2) If the CCR unit is subject to the design criteria under § 257.70, maintaining the integrity and effectiveness of the leachate collection and removal system and operating the leachate collection and removal system in accordance with the requirements of § 257.70; and

(3) Maintaining the groundwater monitoring system and monitoring the groundwater in accordance with the requirements of §§ 257.90 through 257.98.

(c) Post-closure care period.

(1) Except as provided by paragraph (c)(2) of this section, the owner or operator of the CCR unit must conduct post-closure care for 30 years.

(2) If at the end of the post-closure care period the owner or operator of the CCR unit is operating under assessment monitoring in accordance with § 257.95, the owner or operator must continue to conduct post-closure care until the owner or operator returns to detection monitoring in accordance with § 257.95.

Closure and Post Closure Care
§ 257.104 Post-closure care requirements.

(d) Written post-closure plan

(1) Content of the plan. The owner or operator of a CCR unit must prepare a written post-closure plan that includes, at a minimum, the information specified in paragraphs (d)(1)(i) through (iii) of this section.

(i) A description of the monitoring and maintenance activities required in paragraph (b) of this section for the CCR unit, and the frequency at which these activities will be performed;

(ii) The name, address, telephone number, and email address of the person or office to contact about the facility during the post-closure care period; and

(iii) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other component of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this subpart. Any other disturbance is allowed if the owner or operator of the CCR unit demonstrates that disturbance of the final cover, liner, or other component of the containment system, including any removal of CCR, will not increase the potential threat to human health or the environment. The demonstration must be certified by a qualified professional engineer, and notification shall be provided to the State Director that the demonstration has been placed in the operating record and on the owners or operator's publicly accessible Internet site.

(2) Deadline to prepare the initial written post-closure plan

(i) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2016, the owner or operator of the CCR unit must prepare an initial written post-closure plan consistent with the requirements specified in paragraph (d)(1) of this section.

(ii) New CCR landfills, new CCR surface impoundments, and any lateral expansion of a CCR unit. No later than the date of the initial receipt of CCR in the CCR unit, the owner or operator must prepare an initial written post- closure plan consistent with the requirements specified in paragraph (d)(1) of this section.

(iii) The owner or operator has completed the written post-closure plan when the plan, including the certification required by paragraph (d)(4) of this section, has been placed in the facility's operating record as required by § 257.105(i)(4).

(3) Amendment of a written post- closure plan.

(i) The owner or operator may amend the initial or any subsequent written post-closure plan developed pursuant to paragraph (d)(1) of this section at any time.

(ii) The owner or operator must amend the written closure plan whenever:

(A) There is a change in the operation of the CCR unit that would substantially affect the written post-closure plan in effect; or

(B) After post-closure activities have commenced, unanticipated events necessitate a revision of the written post-closure plan.

(iii) The owner or operator must amend the written post-closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written post-closure plan. If a written post-closure plan is revised after post-closure activities have commenced for a CCR unit, the owner or operator must amend the written post-closure plan no later than 30 days following the triggering event.

(4) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written post-closure plan meets the requirements of this section.

(e) Notification of completion of post- closure care period. No later than 60 days following the completion of the post-closure care period, the owner or operator of the CCR unit must prepare a notification verifying that post-closure care has been completed. The notification must include the certification by a qualified professional engineer verifying that post-closure care has been completed in accordance with the closure plan specified in paragraph (d) of this section and the requirements of this section. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by § 257.105(i)(13).

(f) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(i), the notification requirements specified in § 257.106(i), and the Internet requirements specified in § 257.107(i).

Recordkeeping, Notification, and Posting of Information to the Internet

§ 257.105 Recordkeeping requirements

(a) Each owner or operator of a CCR unit subject to the requirements of this subpart must maintain files of all information required by this section in a written operating record at their facility.

(b) Unless specified otherwise, each file must be retained for at least five years following the date of each occurrence, measurement, maintenance, corrective action, report, record, or study.

(c) An owner or operator of more than one CCR unit subject to the provisions of this subpart may comply with the requirements of this section in one recordkeeping system provided the system identifies each file by the name of each CCR unit. The files may be maintained on microfilm, on a computer, on computer disks, on a storage system accessible by a computer, on magnetic tape disks, or on microfiche.

(d) The owner or operator of a CCR unit must submit to the State Director and/or appropriate Tribal authority any demonstration or documentation required by this subpart, if requested, when such information is not otherwise available on the owner or operator's publicly accessible Internet site.

(e) Location restrictions. The owner or operator of a CCR unit subject to this subpart must place the demonstrations documenting whether or not the CCR unit is in compliance with the requirements under §§ 257.60(a), 257.61(a), 257.62(a), 257.63(a), and 257.64(a), as it becomes available, in the facility's operating record.

(f) Design criteria. The owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record:

  (1) The design and construction certifications as required by § 257.70(e) and (f).

  (2) The documentation of liner type as required by § 257.71(a).

  (3) The design and construction certifications as required by § 257.72(c) and (d).

  (4) Documentation prepared by the owner or operator stating that the permanent identification marker was installed as required by §§ 257.73(a)(1) and 257.74(a)(1).

  (5) The initial and periodic hazard potential classification assessments as required by §§ 257.73(a)(2) and 257.74(a)(2).

  (6) The emergency action plan (EAP), and any amendment of the EAP, as required by §§ 257.73(a)(3) and 257.74(a)(3), except that only the most recent EAP must be maintained in the facility's operating record irrespective of the time requirement specified in paragraph (b) of this section.

  (7) Documentation prepared by the owner or operator recording the annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders as required by § 257.73(a)(3)(i)(E) and 257.74(a)(3)(i)(E).

(8) Documentation prepared by the owner or operator recording all activations of the emergency action plan as required by §§ 257.73(a)(3)(v) and 257.74(a)(3)(v).

(9) The history of construction, and any revisions of it, as required by § 257.73(c), except that these files must be maintained until the CCR unit completes closure of the unit in accordance with § 257.102.

(10) The initial and periodic structural stability assessments as required by §§ 257.73(d) and 257.74(d).

(11) Documentation detailing the corrective measures taken to remedy the deficiency or release as required by §§ 257.73(d)(2) and 257.74(d)(2).

(12) The initial and periodic safety factor assessments as required by §§ 257.73(e) and 257.74(e).

(13) The design and construction plans, and any revisions of it, as required by § 257.74(c), except that these files must be maintained until the CCR unit completes closure of the unit in accordance with § 257.102.

(g) Operating criteria. The owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record:

(1) The CCR fugitive dust control plan, and any subsequent amendment of the plan, required by § 257.80(b), except that only the most recent control plan must be maintained in the facility's operating record irrespective of the time requirement specified in paragraph (b) of this section.

(2) The annual CCR fugitive dust control report required by § 257.80(c).

(3) The initial and periodic run-on and run-off control system plans as required by § 257.81(c).

(4) The initial and periodic inflow design flood control system plan as required by § 257.82(c).

(5) Documentation recording the results of each inspection and instrumentation monitoring by a qualified person as required by § 257.83(a).

(6) The periodic inspection report as required by § 257.83(b)(2).

(7) Documentation detailing the corrective measures taken to remedy the deficiency or release as required by §§ 257.83(b)(5) and 257.84(b)(5).

(8) Documentation recording the results of the weekly inspection by a qualified person as required by § 257.84(a).

(9) The periodic inspection report as required by § 257.84(b)(2).

(h) Groundwater monitoring and corrective action. The owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record:

(1) The annual groundwater monitoring and corrective action report as required by § 257.90(e).

(2) Documentation of the design, installation, development, and decommissioning of any monitoring wells, piezometers and other measurement, sampling, and analytical devices as required by § 257.91(e)(1).

(3) The groundwater monitoring system certification as required by § 257.91(f).

(4) The selection of a statistical method certification as required by § 257.93(f)(6).

(5) Within 30 days of establishing an assessment monitoring program, the notification as required by § 257.94(e)(3).

(6) The results of appendices III and IV to this part constituent concentrations as required by § 257.95(d)(1).

(7) Within 30 days of returning to a detection monitoring program, the notification as required by § 257.95(e).

(8) Within 30 days of detecting one or more constituents in appendix IV to this part at statistically significant levels above the groundwater protection standard, the notifications as required by § 257.95(g).

(9) Within 30 days of initiating the assessment of corrective measures requirements, the notification as required by § 257.95(g)(5).

(10) The completed assessment of corrective measures as required by § 257.96(d).

(11) Documentation prepared by the owner or operator recording the public meeting for the corrective measures assessment as required by § 257.96(e).

(12) The semiannual report describing the progress in selecting and designing the remedy and the selection of remedy report as required by § 257.97(a), except that the selection of remedy report must be maintained until the remedy has been completed.

(13) Within 30 days of completing the remedy, the notification as required by § 257.98(e).

Recordkeeping, Notification, and Posting of Information to the Internet
§ 257.105 Recordkeeping requirements

(i) Closure and post-closure care. The owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record:

(1) The notification of intent to initiate closure of the CCR unit as required by § 257.100(c)(1).

(2) The annual progress reports of closure implementation as required by § 257.100(c)(2)(i) and (ii).

(3) The notification of closure completion as required by § 257.100(c)(3).

(4) The written closure plan, and any amendment of the plan, as required by § 257.102(b), except that only the most recent closure plan must be maintained in the facility's operating record irrespective of the time requirement specified in paragraph (b) of this section.

(5) The written demonstration(s), including the certification required by § 257.102(e)(2)(iii), for a time extension for initiating closure as required by § 257.102(e)(2)(ii).

(6) The written demonstration(s), including the certification required by § 257.102(f)(2)(iii), for a time extension for completing closure as required by § 257.102(f)(2)(i).

(7) The notification of intent to close a CCR unit as required by § 257.102(g).

(8) The notification of completion of closure of a CCR unit as required by § 257.102(h).

(9) The notification recording a notation on the deed as required by § 257.102(i).

(10) The notification of intent to comply with the alternative closure requirements as required by § 257.103(c)(1).

(11) The annual progress reports under the alternative closure requirements as required by § 257.103(c)(2).

(12) The written post-closure plan, and any amendment of the plan, as required by § 257.104(d), except that only the most recent closure plan must be maintained in the facility's operating record irrespective of the time requirement specified in paragraph (b) of this section.

(13) The notification of completion of post-closure care period as required by § 257.104(e).

Recordkeeping, Notification, and Posting of Information to the Internet
§ 257.105 Recordkeeping requirements

(j) Retrofit criteria. The owner or operator of a CCR unit subject to this subpart must place the following information, as it becomes available, in the facility's operating record:

(1) The written retrofit plan, and any amendment of the plan, as required by § 257.102(k)(2), except that only the most recent retrofit plan must be maintained in the facility's operating record irrespective of the time requirement specified in paragraph (b) of this section.

(2) The notification of intent that the retrofit activities will proceed in accordance with the alternative procedures in § 257.103.

(3) The annual progress reports required under the alternative requirements as required by § 257.103.

(4) The written demonstration(s), including the certification in § 257.102(f)(2)(iii), for a time extension for completing retrofit activities as required by § 257.102(k)(3).

(5) The notification of intent to initiate retrofit of a CCR unit as required by § 257.102(k)(5).

(6) The notification of completion of retrofit activities as required by § 257.102(k)(6).

Recordkeeping, Notification, and Posting of Information to the Internet
§ 257.106 Notification requirements

(a) The notifications required under paragraphs (e) through (i) of this section must be sent to the relevant State Director and/or appropriate Tribal authority before the close of business on the day the notification is required to be completed. For purposes of this section, before the close of business means the notification must be postmarked or sent by electronic mail (email). If a notification deadline falls on a weekend or federal holiday, the notification deadline is automatically extended to the next business day.

(b) If any CCR unit is located in its entirety within Indian Country, the notifications of this section must be sent to the appropriate Tribal authority. If any CCR unit is located in part within Indian Country, the notifications of this section must be sent both to the appropriate State Director and Tribal authority.

(c) Notifications may be combined as long as the deadline requirement for each notification is met.

(d) Unless otherwise required in this section, the notifications specified in this section must be sent to the State Director and/or appropriate Tribal authority within 30 days of placing in the operating record the information required by § 257.105.

(e) Location restrictions. The owner or operator of a CCR unit subject to the requirements of this subpart must notify the State Director and/or appropriate Tribal authority that each demonstration specified under § 257.105(e) has been placed in the operating record and on the owner or operator's publicly accessible internet site.

(f) Design criteria. The owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator's publicly accessible internet site. The owner or operator must:

(1) Within 60 days of commencing construction of a new CCR unit, provide notification of the availability of the design certification specified under § 257.105(f)(1) or (3). If the owner or operator of the CCR unit elects to install an alternative composite liner, the owner or operator must also submit to the State Director and/or appropriate Tribal authority a copy of the alternative composite liner design.

(2) No later than the date of initial receipt of CCR by a new CCR unit, provide notification of the availability of the construction certification specified under § 257.105(f)(1) or (3).

(3) Provide notification of the availability of the documentation of liner type specified under § 257.105(f)(2).

(4) Provide notification of the availability of the initial and periodic hazard potential classification assessments specified under § 257.105(f)(5).

(5) Provide notification of the availability of emergency action plan (EAP), and any revisions of the EAP, specified under § 257.105(f)(6).

(6) Provide notification of the availability of documentation prepared by the owner or operator recording the annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders specified under § 257.105(f)(7).

(7) Provide notification of documentation prepared by the owner or operator recording all activations of the emergency action plan specified under § 257.105(f)(8).

(8) Provide notification of the availability of the history of construction, and any revision of it, specified under § 257.105(f)(9).

(9) Provide notification of the availability of the initial and periodic structural stability assessments specified under § 257.105(f)(10).

(10) Provide notification of the availability of the documentation detailing the corrective measures taken to remedy the deficiency or release specified under § 257.105(f)(11).

(11) Provide notification of the availability of the initial and periodic safety factor assessments specified under § 257.105(f)(12).

(12) Provide notification of the availability of the design and construction plans, and any revision of them, specified under § 257.105(f)(13).

(g) Operating criteria. The owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator’s publicly accessible internet site. The owner or operator must:

(1) Provide notification of the availability of the CCR fugitive dust control plan, or any subsequent amendment of the plan, specified under § 257.105(g)(1).

(2) Provide notification of the availability of the annual CCR fugitive dust control report specified under § 257.105(g)(2).

(3) Provide notification of the availability of the initial and periodic run-on and run-off control system plans specified under § 257.105(g)(3).

(4) Provide notification of the availability of the initial and periodic inflow design flood control system plans specified under § 257.105(g)(4).

(5) Provide notification of the availability of the periodic inspection reports specified under § 257.105(g)(6).

(6) Provide notification of the availability of the documentation detailing the corrective measures taken to remedy the deficiency or release specified under § 257.105(g)(7).

(7) Provide notification of the availability of the periodic inspection reports specified under § 257.105(g)(9).

(h) Groundwater monitoring and corrective action. The owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator's publicly accessible internet site. The owner or operator must:

(1) Provide notification of the availability of the annual groundwater monitoring and corrective action report specified under § 257.105(h)(1).

(2) Provide notification of the availability of the groundwater monitoring system certification specified under § 257.105(h)(3).

(3) Provide notification of the availability of the selection of a statistical method certification specified under § 257.105(h)(4).

(4) Provide notification that an assessment monitoring programs has been established specified under § 257.105(h)(5).

(5) Provide notification that the CCR unit is returning to a detection monitoring program specified under § 257.105(h)(7).

(6) Provide notification that one or more constituents in appendix IV to this part have been detected at statistically significant levels above the groundwater protection standard and the notifications to land owners specified under § 257.105(h)(8).

(7) Provide notification that an assessment of corrective measures has been initiated specified under § 257.105(h)(9).

(8) Provide notification of the availability of assessment of corrective measures specified under § 257.105(h)(10).

(9) Provide notification of the availability of the semiannual report describing the progress in selecting and designing the remedy and the selection of remedy report specified under § 257.105(h)(12).

(10) Provide notification of the completion of the remedy specified under § 257.105(h)(13).

(i) Closure and post-closure care. The owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator's publicly accessible Internet site. The owner or operator must:

(1) Provide notification of the intent to initiate closure of the CCR unit specified under § 257.105(i)(1).

(2) Provide notification of the availability of the annual progress reports of closure implementation specified under § 257.105(i)(2).

(3) Provide notification of closure completion specified under § 257.105(i)(3).

(4) Provide notification of the availability of the written closure plan, and any amendment of the plan, specified under § 257.105(i)(4).

(5) Provide notification of the availability of the demonstration(s) for a time extension for initiating closure specified under § 257.105(i)(5).

(6) Provide notification of the availability of the demonstration(s) for a time extension for completing closure specified under § 257.105(i)(6).

(7) Provide notification of intent to close a CCR unit specified under § 257.105(i)(7).

(8) Provide notification of completion of closure of a CCR unit specified under § 257.105(i)(8).

(9) Provide notification of the deed notation as required by § 257.105(i)(9).

(10) Provide notification of intent to comply with the alternative closure requirements specified under § 257.105(i)(10).

(11) The annual progress reports under the alternative closure requirements as required by § 257.105(i)(11).

(12) Provide notification of the availability of the written post-closure plan, and any amendment of the plan, specified under § 257.105(i)(12).

(13) Provide notification of completion of post-closure care specified under § 257.105(i)(13).

(j) Retrofit criteria. The owner or operator of a CCR unit subject to this subpart must notify the State Director and/or appropriate Tribal authority when information has been placed in the operating record and on the owner or operator's publicly accessible Internet site. The owner or operator must:

(1) Provide notification of the availability of the written retrofit plan, and any amendment of the plan, specified under § 257.105(j)(1).

(2) Provide notification of intent to comply with the alternative retrofit requirements specified under § 257.105(j)(2).

(3) The annual progress reports under the alternative retrofit requirements as required by § 257.105(j)(3).

(4) Provide notification of the availability of the demonstration(s) for a time extension for completing retrofit activities specified under § 257.105(j)(4).

(5) Provide notification of intent to initiate retrofit of a CCR unit specified under § 257.105(j)(5).

(6) Provide notification of completion of retrofit activities specified under § 257.105(j)(6).

Recordkeeping, Notification, and Posting of Information to the Internet
§ 257.107 Publicly Accessible Internet Site Requirements

(a) Each owner or operator of a CCR unit subject to the requirements of this subpart must maintain a publicly accessible Internet site (CCR Web site) containing the information specified in this section. The owner or operator's Web site must be titled ''CCR Rule Compliance Data and Information.''

(b) An owner or operator of more than one CCR unit subject to the provisions of this subpart may comply with the requirements of this section by using the same Internet site for multiple CCR units provided the CCR Web site clearly delineates information by the name or identification number of each unit.

(c) Unless otherwise required in this section, the information required to be posted to the CCR Web site must be made available to the public for at least five years following the date on which the information was first posted to the CCR Web site.

(d) Unless otherwise required in this section, the information must be posted to the CCR Web site within 30 days of placing the pertinent information required by § 257.105 in the operating record.

(e) Location restrictions. The owner or operator of a CCR unit subject to this subpart must place each demonstration specified under § 257.105(e) on the owner or operator's CCR Web site.

(f) Design criteria. The owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator's CCR Web site:

(1) Within 60 days of commencing construction of a new unit, the design certification specified under § 257.105(f)(1) or (3).

(2) No later than the date of initial receipt of CCR by a new CCR unit, the construction certification specified under § 257.105(f)(1) or (3).

(3) The documentation of liner type specified under § 257.105(f)(2).

(4) The initial and periodic hazard potential classification assessments specified under § 257.105(f)(5).

(5) The emergency action plan (EAP) specified under § 257.105(f)(6), except that only the most recent EAP must be maintained on the CCR Web site irrespective of the time requirement specified in paragraph (c) of this section.

(6) Documentation prepared by the owner or operator recording the annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders specified under § 257.105(f)(7).

(7) Documentation prepared by the owner or operator recording any activation of the emergency action plan specified under § 257.105(f)(8).

(8) The history of construction, and any revisions of it, specified under § 257.105(f)(9).

(9) The initial and periodic structural stability assessments specified under § 257.105(f)(10).

(10) The documentation detailing the corrective measures taken to remedy the deficiency or release specified under § 257.105(f)(11).

(11) The initial and periodic safety factor assessments specified under § 257.105(f)(12).

(12) The design and construction plans, and any revisions of them, specified under § 257.105(f)(13).

(g) Operating criteria. The owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator's CCR Web site:

(1) The CCR fugitive dust control plan, or any subsequent amendment of the plan, specified under § 257.105(g)(1) except that only the most recent plan must be maintained on the CCR Web site irrespective of the time requirement specified in paragraph (c) of this section.

(2) The annual CCR fugitive dust control report specified under § 257.105(g)(2).

(3) The initial and periodic run-on and run-off control system plans specified under § 257.105(g)(3).

(4) The initial and periodic inflow design flood control system plans specified under § 257.105(g)(4).

(5) The periodic inspection reports

(6) The documentation detailing the corrective measures taken to remedy the deficiency or release specified under § 257.105(g)(7).

(7) The periodic inspection reports specified under § 257.105(g)(9).

(h) Groundwater monitoring and corrective action. The owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator's CCR Web site:

(1) The annual groundwater monitoring and corrective action report specified under § 257.105(h)(1).

(2) The groundwater monitoring system certification specified under § 257.105(h)(3).

(3) The selection of a statistical method certification specified under § 257.105(h)(4).

(4) The notification that an assessment monitoring programs has been established specified under § 257.105(h)(5).

(5) The notification that the CCR unit is returning to a detection monitoring program specified under § 257.105(h)(7).

(6) The notification that one or more constituents in Appendix IV to this part have been detected at statistically significant levels above the groundwater protection standard and the notifications to land owners specified under § 257.105(h)(8).

(7) The notification that an assessment of corrective measures has been initiated specified under § 257.105(h)(9).The assessment of corrective measures specified under § 257.105(h)(10).

(8) The assessment of corrective measures specified under § 257.105(h)(10).

(9) The semiannual reports describing the progress in selecting and designing remedy and the selection of remedy report specified under § 257.105(h)(12), except that the selection of the remedy report must be maintained until the remedy has been completed.

(10) The notification that the remedy has been completed specified under § 257.105(h)(13).

(i) Closure and post-closure care. The owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator’s CCR Web site:

(1) The notification of intent to initiate closure of the CCR unit specified under §257.105(i)(1).

(2) The annual progress reports of closure implementation specified under § 257.105(i)(2).

(3) The notification of closure completion specified under § 257.105(i)(3).

(4) The written closure plan, and any amendment of the plan, specified under § 257.105(i)(4).

(5) Demonstration(s) for a time extension for initiating closure specified under § 257.105(i)(5).

(6) The demonstration(s) for a time extension for completing closure specified under § 257.105(i)(6).

(7) The notification of intent to close a CCR unit specified under § 257.105(i)(7).

(8) The notification of completion of closure of a CCR unit specified under § 257.105(i)(8).

(9) The notification recording a notation on the deed as required by § 257.105(i)(9).

(10) The notification of intent to comply with the alternative closure requirements as required by § 257.105(i)(10).

(11) The annual progress reports under the alternative closure requirements as required by § 257.105(i)(11).

(12) The written post-closure plan, and any amendment of the plan, specified under § 257.105(i)(12).

(13) The notification of completion of post-closure care specified under § 257.105(i)(13).

(j) Retrofit criteria. The owner or operator of a CCR unit subject to this subpart must place the following information on the owner or operator's CCR Web site:

(1) The written retrofit plan, and any amendment of the plan, specified under § 257.105(j)(1).

(2) The notification of intent to comply with the alternative retrofit requirements as required by § 257.105(j)(2).

(3) The annual progress reports under the alternative retrofit requirements as required by § 257.105(j)(3).

(4) The demonstration(s) for a time extension for completing retrofit activities specified under § 257.105(j)(4).

(5) The notification of intent to retrofit a CCR unit specified under § 257.105(j)(5).

(6) The notification of completion of retrofit activities specified under § 257.105(j)(6).

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