a PPL company
220 West Main Street
Louisville, KY 40202

November 29, 2018

Kentucky Division of Water, Surface Water Permits Branch
300 Sower Boulevard, 3rd Floor
Frankfort, KY 40601

RE: KPDES No. KY0002038 Ghent Generating Station, Carroll County, KY
Agency Interest # AI 704

This letter and enclosures provide a complete technical update for the reissuance of the KPDES permit No. KY0002038 held by Kentucky Utilities Company (KU) for its Ghent fossil-fuel fired steam electric generating station. This information updates previous KPDES permit renewal submissions on December 28, 2006 and September 26, 2012. KPDES Form 1, Form C and other supporting documents have been updated with recent monitoring data and information on process changes, re-certified and are enclosed with other related support documents.

Significant process water management and ash pond-impoundment changes have been constructed or planned for construction at Ghent Station to comply with Coal Combustion Residuals (CCR) federal regulatory rules recently finalized by the USEPA, Kentucky Water Quality Standards (KyWQS) for KPDES discharges, and in anticipation of requirements for the USEPA ELG (Effluent Limitations Guidelines) final rule (under reconsideration by USEPA. Generally, these changes are required for:

- Wet-to-dry conversion of coal ash handling systems for management in a landfill constructed on-site. Fly ash is pneumatically collected in silos and moist-pugmilled for management to the landfill; bottom ash (including mill rejects/pyrites) is sluiced to remote submerged conveyors, dewatered and moist solids subsequently conveyed to the landfill (i.e., dry handling);
- Construction upgrades of (Flue Gas Desulfurization (FGD) gypsum dewatering equipment to accommodate marketing, on-site landfilling, and extensive re-piping work to segregate FGD process wastewaters for treatment;
- Construction of a FGD Process Waters Treatment System (PWTS: Physical-Chemical precipitation equipment including potential/future biological system final treatment) and plate-frame filtration equipment for dewatering treatment solids for management into the landfill;
- Construction of a new Process Pond to replace ash pond treatment of plant process flows including cooling tower blowdown flows, plant sumps, coal/limestone piles runoff waters, landfill leachate/CCR-contact runoff flow, and other low volume wastewaters currently

treated in four (4) CCR-impoundments which are being closed or re-constructed per the USEPA CCR Rule requirements;
- Construction of a high-rate, multiport diffuser for process water discharges from Outfall 001 to the Ohio River;
- Construction efforts to close, cap and install cap runoff monitoring stations for the Ash Treatment Basins ATB-1 and ATB-2;
- Closure of the sewage treatment system (Outfall 004) and connection to the local public sewage treatment plant/system (Carrollton Utilities).

As required by the ELG regulations, and further described in **Attachment 11** of this submission, KU is providing information to determine compliance applicability dates for first-time-KyWQS limits and the as soon as possible compliance deadline for ELG rule requirements that are not under reconsideration. EPA recently granted a petition to reconsider the new 2015 Steam-Electric ELG (Effluent Limitations Guidelines) regulations for FGD wastewaters and bottom ash transport water (scheduled for finalization in 2019), and revised applicability dates for any revised ELG discharge limits. However, nearly the same treatment technologies (as required for compliance with the ELG regulations) must be installed to assure that plant discharges meet current KyWQS limits (e.g. mercury, arsenic, etc.). Permittees are required to provide information 'for regulators to consider to determining the compliance deadlines, including time to expeditiously plan (including to raise capital), design, procure, and install equipment to comply with the requirements of the final rule'. Other information to be supplied includes impacts from CCR regulations, needs for initial commissioning periods for FGD wastewaters treatment equipment, and other factors as appropriate.

Due to the Ghent plant size, inter-related systems complexity, construction sequence challenges, and procurement of equipment/systems based upon still-developing technologies; KU requests an implementation schedule for compliance with KyWQS that also best positions the plant to meet future ELG requirements when the reconsideration of FGD standards is completed and the revised compliance deadlines are finalized. This construction work will:

- Segregate, recycle and treat FGD (Flue Gas Desulfurization) wastewaters with dedicated physical-chemical systems to meet KyWQS limits by end-of-2020 and ELG technology-based limits by a compliance date of December 31, 2023 (which will be revisited upon finalization of the USEPA reconsideration of these treatment requirements for these wastewaters);
- Install dry handling for all fly ash systems to eliminate the discharge of fly ash sluice waters (this work has already been completed);
- Install a recirculation system to recycle all bottom ash sluice waters, or install dry bottom ash handling systems, to prevent the discharge of bottom ash sluice waters by December 31, 2023.

Accordingly, this work will be performed in Phases defined here for identifying changes to plant KPDES outfall 001 (external), and new proposed internal outfall 008 and new proposed external outfalls 009, 010, 011, 012 and 013. Generally, most changes will ultimately occur associated with flows contributing to outfall 001 which, upon construction of a multiport diffuser in Q1-2020, will discharge to the Ohio River.

Contributing flows to these outfalls will vary according to three proposed phases of Plant flow configurations:

1. **EXISTING Operations (current *to anticipated Permit Effective date ~April 2019*)**

   Continued/temporary use of the existing ash pond ATB-1 (close/cap in Q4-2023). Contributing process flows to Outfall 001 from the existing pond include:

   a. Bottom Ash Sluice Flows & Solids;
   b. FGD-Gypsum Wastewaters – from Dewatering/filtration and inert fines FGD blowdowns (until future Process Water Treatment System (PWTS) constructed & operational);
   c. Units 1-4 Cooling Tower Blowdown Flows;
   d. Plant sumps & other low-volume wastewaters;
   e. Coal pile runoff;
   f. Landfill leachate & CCR-contact runoff flows;
   g. Ash ponds ATB-1 and ATB-2 stormwater runoff flows;
   h. **No** dewatering flows from ATB-1/ATB-2.

2. **TRANSITION Operations (Permit Effective date ~*April 2019 until Future Op's*)**

   North/Process Pond Wastewater Discharges Begin with Inflows Transitioned (switched) from ATB-1; Closure ATB-1/ATB-2 Dewatering Flows Begin; All Flows Discharge thru Existing Outfall 001 to Ohio River.

   Flows to existing Outfall 001 include:

   a. Bottom Ash Sluice Solids/Separation Wastewater Flows from Remote Submerged Flight Conveyors (solids managed for landfill or beneficial use);
   b. FGD-Gypsum Wastewaters – from Dewatering/filtration and inert fines FGD blowdowns until PWTS operations begin startup in Q3-2019, optimization/testing, and reliable/commercial operations in Q4-2019;
   c. Units 1-4 Cooling Tower Blowdown Flows;
   d. Plant sumps & other low-volume wastewaters;
   e. Coal pile runoff;
   f. Landfill Main Haul Road and DTLS Runoff waters combined with Landfill Leachate Pond flows (instead of being pumped to ATB-2);
   g. Ash ponds ATB-1 and ATB-2 stormwater runoff flows;
   h. ATB-1 Closure/Capping Work Begins with Initial Dewatering Flows (with de minimus TSS to New Process North Pond) - *ash ponds work to begin for final-grade, liners installed, dirt/vegetation capped, and stormwater runoff management controls/monitoring for completion by late 2023.*

3. **FUTURE Operations (*starting ~Q1-2020*)**
   Ohio River Diffuser for Outfall 001 Process Pond Discharges, Dewatering Flows Continue for ATB-1/ATB-2 Closures Work, New South Process Pond Constructed and ATB-1/ATB-2 Capping Work Completed by late 2023;
   Flows Include*:*

   a. Ohio River Diffuser (multiport, high-rate) completed for Outfall 001 Process Pond discharges and Outfall 009 stormwater runoff from ATB-1 cap flows (after December 2023 completion);
   b. All flows described above under Transition flows (except bottom ash sluice and FGD flows changed);
   c. ATB-1/ATB-2 Dewatering Flows (intermittent) for Closure/Capping Work Completion by late 2023 with Stormwater Runoff Flows to new Process Pond (Outfall 001) and (3) Capped Area Stormwater Runoff ponds (new Outfalls 009, 010, 011);
   d. Construction of the new South Process Pond (to be configured upstream of North Process Pond) by late 2023;
   e. Bottom Ash Sluice Waters (100% of water separated from solids) pumped to Process Channel to North/Process Pond but transport waters discharge elimination and conformance to ELG requirements planned by December 31, 2023;
   f. FGD-Gypsum Wastewaters – from Dewatering/filtration and inert fines FGD blowdowns with PWTS operations commenced but discharges conformance to ELG requirements planned by December 31, 2023 and Internal Outfall 008 for PWTS monitoring established *(until USEPA ELG reconsideration announcement, on-going analysis of installing a biological treatment system following the physical-chemical system under construction, will be communicated with KPDES staff).*

We request a mixing zone for any pollutant where a mixing zone is deemed appropriate as a result of the reasonable potential analysis that is conducted with the new data.

We also request a mixing zone/variance with respect to ORSANCO's water quality standard for mercury. Pursuant to ORSANCO's revised 2015 Pollution Control Standards, a mixing zone for mercury for existing sources is authorized where compliance with the standard is not economically or technically feasible. At a minimum, compliance with the 12 ng/L (ppt) ORSANCO standard cannot be ascertained until after the ash ponds dewatering flows are assessed, and the new wastewater treatment system is designed, installed and operational. Even then, it is not certain whether such systems are capable of attaining reductions sufficient to assure the ORSANCO standard is achieved at all times.

Lastly, we request a compliance schedule for meeting the Kentucky Water Quality Standard for mercury of 51 ng/L (ppt) for plant discharges. Outfall 001 consists of existing ash pond ATB-1 legacy wastewaters including ash sluice flows and FGD dewatering flows; although this permit renewal Form C data indicates a current discharge with a 41 ppt mercury content, seasonal/sampling variability aside, historic 2-year DMR monitoring data suggest that ~200 ppt should be expected at times. While the new PWTS-FGD wastewaters treatment system will

operate by late 2019 to reduce mercury concentrations below 51 ppt of new flows, the large volume of legacy wastewater will require a significant amount of time to manage. The pooled water adjacent the ATB-1 discharge structure is estimated to be ~50 million gallons and may require 6 months to 1-year to gradually comingle these legacy flows with treated wastewaters, while remaining in compliance with the limit for the blended flows. Therefore, KU-Ghent requests a compliance schedule until December 31, 2020 to achieve the 51 ppt standard for mercury at outfall 001.

As you are aware, KU-Ghent have already conducted the required 316(b) studies to assess impacts of cooling intake flows and those studies were submitted to your office in September 2018. Those studies confirm the current cooling tower use meets BTA for impingement and entrainment for the intake and KU requests that be confirmed in the Fact Sheet of the renewal permit.

Enclosed is a $7,000.00 check for the application filing fee (major industry). As discussed with KPDES staff, this technical update to the KPDES permit renewal application includes 1 set of Priority Pollutant Analyses recently sampled and analyzed during September 2017.

The total supporting documents enclosed include 12 attachments:

Attachment 1	KPDES Permit Application Synopsis;
Attachment 2	KPDES Form 1;
Attachment 3	Check to Kentucky State Treasurer for KPDES application filing fee;
Attachment 4	Copy of the USGS Topographic Map (noting the facility site and Outfalls);
Attachment 5	KPDES Form C;
Attachment 6	Sample results for the priority pollutant analysis required for Form C from the contracted commercial laboratory;
Attachment 7	Quarterly Metals Analyses Summarized for Two (2) Recent Years for KPDES monitored outfalls and as reported on Monthly DMRs;
Attachment 8	Stormwater Runoff Calculations;
Attachment 9	Stormwater Runoff Diagram(s);
Attachment 10	Water Balance Diagram(s): 30-Day Peak Monthly Process and Annual Daily **Average Rainfall** Conditions • *(E) Existing Conditions Diagram;* • *(T) Transition Conditions Diagram* • *(F) Future Conditions Diagram*
Attachment 11	Construction Activities Required at Ghent Generating Station Impacting the Schedule of Compliance with KY Water Quality Standards, USEPA CCR Rule and USEPA ELG Rule;
Attachment 12	Design Document for a High-Rate, Multiport Diffuser for Outfall 001 Discharges to the Ohio River.

If I may be of assistance or you have any questions concerning the attached information, please feel free to contact me at (502) 627-2997 (or my email is roger.medina@lge-ku.com).

Sincerely,

Roger J. Medina
Environmental Affairs, Sr. Chemical Engineer

Attachments (12)

ATTACHMENT 1

KU – Ghent Plant

KPDES Permit Application Synopsis

KENTUCKY UTILITIES COMPANY
GHENT STATION

KPDES Permit No. KY0002038 Application Synopsis – November 2018 Technical Update

Rev. November 29, 2018

Name and Address of Applicant

(Corporate)
Kentucky Utilities Company
P.O. Box 32010
Louisville, Kentucky 40232
c/o Roger J. Medina

(Facility)
Ghent Generating Station
9485 US Hwy. 42E, Box 338
Ghent, Kentucky 41045-8474
c/o Andy Batts

Description of Applicants' Operation

Fossil fuel fired steam electric power plant for the generation, transmission and distribution of electricity (SIC Code 4911 NAICS Code 221112).
Located on a 2,312 acre site along the Ohio River at mile mark 536.0.

Production Capacity of Facility

Generation of electric power is from four fossil fuel-fired units with the following nameplate generating capacity:
Unit 1 – 557 MW (coal)
Unit 2 – 556 MW (coal)
Unit 3 – 557 MW (coal)
Unit 4 – 556 MW (coal)
Total 2,266 MW

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Description of Submitted Outfalls

Note: See attached flow diagrams and rainfall runoff calculations for flow and acreage information

Ghent plant recent and planned construction activities, for compliance with the USEPA CCR regulations final rule, Kentucky Water Quality Standards, and in accordance with the ELG final rule, include:

- Final conversion of handling systems from wet-to-dry solids management in the Coal Combustion Residuals Transport (CCRT) facility to manage fly ash, bottom ash, and gypsum for transport to the landfill or marketing/trucking these CCR materials off-site for beneficial reuse. This includes significant tank/piping modifications of FGD wastewaters and systems associated with the gypsum dewatering vacuum belts (3). Bottom ash sluice waters management includes redesign/repairs to a Submerged Flight Conveyor (SFC) constructed to dewater sluice flows and facilitate 'dry' solids/truck/pipe-conveyor handling to the landfill (reliability problems currently being corrected);
- A Process Waters Treatment System (PWTS) for FGD wastewaters treatment (physical-chemical and potential/future biological technology) including piping to segregate and manage FGD blowdown, gypsum dewatering, reclaim, PWTS filtration/dewatering solids, and other related process flows;
- Close/cap the ATB-1 and ATB-2 Ash Ponds;
- Excavate/clean-close the Gypsum Stack Facility;
- A New Process Pond (North and South halves) to settle/mix/neutralize all plant wastewaters (within footprint of clean-closed Gypsum Stack Facility);
- A multiport, high-rate diffuser for enhanced mixing zone/ZID discharge of outfall 001/009 treated process wastewaters to the Ohio River – completion date expected 1st quarter 2020;
- Installing six (6) new outfall monitoring/sample structures for flows associated with PWTS, process ponds, ash pond closures/cap stormwater runoff, and landfill operations;
- Three (3) temporary ponds for management of the gypsum haul road runoff were installed to support excavation/reconstruction and closure of the on-site CCR impoundments – modifications for future service for runoff control through these ponds will occur after 2022.

Accordingly, this work will be performed in Phases defined here for purposes of identifying changes to plant KPDES outfall 001 and new proposed outfalls 008 thru 013. Contributing flows to these outfalls will vary according to three proposed phases 3 of plant flow configurations:

- **Phase 1** – ***Existing****: ATB-1 Ash Pond Discharge to Ohio River thru Outfall 001;*
- **Phase 2** – ***Transition****: ATB 1 dewatering begins and in-flows switched from ATB-1 to New Process Pond where both ponds discharge to existing Outfall 001 to Ohio River (~ 3months duration, but dewatering continues into Phase 3);*
- **Phase 3** – ***Future****: Multiport Diffuser to Ohio River for Process Pond Outfall 001 and ATB-1 Closed/Capped Runoff Flows Outfall 009 (FGD-PWTS Performance and Bottom Ash Sluice Waters Recirculation ELG Compliance Dates set December 31, 2023).*

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Outfall #001

EXISTING OPERATIONS (Phase 1):

The ATB-1 ash pond discharges to the External Outfall 001 (to the Ohio River) are managed thru the secondary pond and a sand filter system processes approximately 50% of the ATB-1 discharge. The filtered and unfiltered flows are recombined and drainage from some US-42 roadside stormwater runoff areas also combine into total flows to the existing Outfall 001. Current wastewater flows to Outfall 001 include:

- Units 1-4 cooling tower blowdown water flows (Internal Outfall 006). The cooling towers are periodically brominated to control bio-fouling of the condenser as provided for in the current permit;
- Units 1-4 FGD inerts/fines wastewaters (*PWTS under construction*) pumped from separate FGDs, and CCRT gypsum dewatering/filtration wastewaters;
- Units 1-4 bottom ash sluice waters (*directly sluiced bottom ash flows may continue to the ATB-1 until mid-2019 after SFC system redesign/repairs and reliability established*);
- **No** dewatering flows from ATB-1/ATB-2 (*until closure activities begin after KPDES renewal permit effective date*), which will coincide with the commencement of Phase 2;
- Landfill active area leachate/runoff flows *(flows routed through ATB-2, directly pumped flows may not begin until August 2019);*
- Units 1-4 basement/plant sumps;
- Coal pile runoff*;*
- Boiler chemical cleaning wastewaters (Internal Outfall #005);
- Demineralized-Boiler water treatment wastewaters (filter backwash & reverse osmosis reject waters);
- Boiler blowdowns & quench waters;
- Stormwater runoff from plant Areas 1.a-u including stormwaters runoff contacting CCRs or process materials *(some rerouted flows may not occur until August 2019, ATB-2 stormwater runoff flows directed into ATB-1);*
- Sand Filtration Backwash flows of ATB-1/secondary pond discharges are returned/pumped to the ATB-1;
- Direct precipitation upon the ATB-1, secondary pond, and gypsum stack facility areas (including associated perimeter areas draining inward).

The existing ATB-1 ash pond settles/mixes/neutralizes plant wastewaters; discharges are controlled thru a decant/stop-log structure into the secondary/polishing pond to Outfall 001 and then to the Ohio River. Total ATB-1 discharges, Filtered and Unfiltered by the sand-filtration system, recombine and also include some additional stormwater runoff from US-42 roadside and nearby areas; total flows pass the Outfall 001 monitoring/sampling point.

DIFFUSER: not-yet-constructed but final design/contracting underway,
Outfall 001 EXISTING flows to Ohio River via existing outfall pipe.

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Outfall #001 –cont'd

NEW: TRANSITION OPERATIONS (Phase 2)

External Outfall 001 (existing original location) discharges to the Ohio River from the New Process Pond and also existing ATB-1 (for ~three (3) months duration until flows can be switched from ATB-1 to New Process Pond); discharges are the same as EXISTING/above listing except as noted below:

- *Units 1-4 FGD wastewaters temporarily include both untreated and the new PWTS (i.e., Process Waters Treatment System: physical-chemical precipitation/filtration) trains 1-2 startup/testing effluent flows (starting mid-2019), but not-yet-optimized flows, of segregated FGD process wastewater and gypsum solids filtration flows;*
- Dewatering flows begin from ATB-1/ATB-2 to the New Process Pond *closure activities to begin upon permit effective date*);
- *Landfill active area leachate/runoff flows (flows currently routed through ATB-2, directly pumped flows may not begin until August 2019);*
- *ATB-1 discharge sand filtration backwash flows (to ATB-1 until mid-2019 when sand filters demolished and ATB-1 direct discharges stop);*
- *Stormwater runoff from plant Areas 1.a-u including stormwaters runoff contacting CCRs or process materials (some rerouted flows may not occur until August 2019). ATB-2 stormwater runoff flows directed into ATB-1;*

The existing ATB-1 ash pond settles/mixes/neutralizes plant wastewaters; discharges are controlled thru a decant/stop-log structure into the secondary/polishing pond to Outfall 001 and then to the Ohio River. Total ATB-1 discharges, Filtered and Unfiltered by the sand-filtration system, recombine and also include some additional stormwater runoff from US-42 roadside and nearby areas; total flows pass the Outfall 001 monitoring/sampling point.

During Phase 2, the New Process Pond will include the north pond only (~21 acres) and receive flows from the process channel (including the removal of deminimis suspended solids in a 'knockout chamber' for improved solids management/treatment). The South Process Pond will still be in construction until closure/capping of ATB-1 and ATB-2 with completion of the South Process Pond after Phase 2.

The New Process Pond External Outfall 001 will include a discharge structure equipped with an underflow baffle to retain floating solids, sampling access to a cipoleti-type weir and flow meter/recorder instrumentation to monitor all effluent flow from the pond.

Physically diverting the numerous wastewater pipes to the New Process Pond from the existing ATB-1 is expected to require several months duration (construction of pipe-racks, valves installations, equipment outage/opportunity delays, etc.). Therefore, both ponds will simultaneously discharge to the existing Outfall 001 sampling/monitoring point until approximately Q3-2019. Then, ATB-1 direct discharges of process wastewater to Outfall 001 will stop except for dewatering flows. It is projected that dewatering/pond-closure activities of ATB-1 will begin in Q2-2019 after KPDES permit renewal.

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DIFFUSER*: not-yet-constructed---Outfall 001 TRANSITION flows to Ohio River via existing outfall pipe.*

Outfall #001 –cont'd

NEW: FUTURE OPERATIONS (Phase 3)

External Outfall 001 (newly constructed location) discharges to the Ohio River from the New Process Pond (and also combines with External Outfall 009 stormwater runoff flows from the closed/capped ATB-1 Ash Pond); discharges from the New Process Pond are the same as EXISTING/above listing except as noted below:

- *Units 1-4 treated FGD wastewaters (from physical-chemical & future/potential biological systems treatment of all FGD process and solids dewatering flows);*
- *Units 1-4 bottom ash sluice waters discharged from submerged flight conveyors (SFC) to the New Process Pond from approximately Q2-2019 until 12/31/23. KU is evaluating whether to install sluice water recirculation systems, or alternatively convert to a dry-handling bottom ash system. KU will provide KDOW with an updated evaluation by November 1, 2020 (i.e., following the USEPA reconsideration finalization) regarding future management of bottom ash sluice waters for compliance with the ELG requirements;*
- *ATB-1 and ATB-2 dewatering wastewaters, which may be intermittent according to construction/pond-closure activities thru 2023;*
- *Landfill active area leachate/runoff flows;*
- *Stormwater runoff from plant Areas 1.a-u including stormwaters runoff contacting CCRs or process materials (some ATB-1/ATB-2 areas stormwaters runoff will continue until construction/closure activities allow to divert uncontaminated cap runoff flows to new outfalls as described below – flows may not be diverted until starting ~2021).*

In Phase 3, the plant New Process Pond will be comprised of a north pond (~21 acres), a south pond (~47 acres), and it will receive flows from a process channel which includes a suspended solids 'knockout chamber' for improved solids management/treatment for such process flows as the cooling tower blowdown flows, coal pile runoff pond, and plant sumps. The process pond is being constructed within the footprint of the previous gypsum stack facility, and is adjacent the ATB-1 ash pond which is planned for closure/capping in late 2023.

The new pond External Outfall 001 includes a discharge structure equipped with an underflow baffle to retain floating solids, sampling access to a cipoleti-type weir and flow meter/recorder instrumentation to monitor all effluent flow from the pond.

Upon closure/capping of ATB-1, stormwater flows will partially discharge to the secondary pond (which will have been clean-closed/refurbished) and discharge through new Outfall 009 to combine with Outfall 001 to the Ohio River.

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DIFFUSER*: Outfall 001 FUTURE flows combine with Outfall 009 flows and misc. US-42 adjacent property (non-process stormwater runoff flows) which subsequently discharge to the Ohio River via a multiport, high-rate diffuser expected to be in-operation in Q1-2020.*

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Outfall #002

EXISTING: External Outfall 002 discharges to the Ohio River include Units 1-2 misc. Equipment/systems non-contact cooling waters and East Plant areas uncontaminated stormwaters including:

- Units 1-2 misc. non-contact, once-thru cooling flows such as turbine lube oil/hydrogen/seal oil cooling systems, bearing water cooling, Unit 2 FGD oxidation blowers cooling, etc.;
- Return of unused service water flows (intake pump relief/diversion control);
- Stormwater runoff from roadways, pavement, gravel access areas, buildings, and roofs within the Units 1-2 East plant areas.

The miscellaneous equipment/systems non-contact cooling waters are periodically brominated to control bio-fouling of the condenser as provided for in the current permit.

Outfall #003

EXISTING: External Outfall 003 discharges to the Ohio River from Units 3-4 misc. Equipment/systems non-contact cooling waters and West Plant areas uncontaminated stormwaters; these flows include:

- Units 3-4 misc. non-contact, once-thru cooling flows such as turbine lube oil/hydrogen/seal oil cooling systems, bearing water cooling, Unit 2 FGD oxidation blowers cooling, etc.;
- Return of unused service water flows (intake pump relief/diversion control);
- Stormwater runoff from roadways, pavement, gravel access areas, buildings, and roofs within the Units 3-4 East plant areas.

The miscellaneous equipment/systems non-contact cooling waters are periodically brominated to control bio-fouling of the condenser as provided for in the current permit.

Outfall #004

REMOVED: Previously an Internal Outfall 004 to ATB-1, discharges were from the package plant for onsite treated sanitary wastes (i.e., a package Sewage Treatment Plant (STP) operated by KU staff). Sanitary wastes were connected to the Carrollton Utilities Publically Owned Treatment Plant (POTW) and the STP was closed/removed; the Outfall Inactivation notification was submitted to Kentucky Division of Water on April 23, 2015.

Outfall #005

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EXISTING: Internal Outfall 005 discharges to the Process Pond/Outfall 001 (previously to ATB-1) and is an intermittent flow (potentially once or twice per 5-yr period) of wastewater generated during the chemical cleaning of the boiler tubes from the units.

Outfall #006

EXISTING: Internal Outfall 006 (i.e., 006-1, 006-2, 006-3, 006-4) discharge to the Process Pond/Outfall 001 (previously to ATB-1) consists of Units 1 to 4 cooling tower blowdowns discharged thru Outfall 001 (i.e., New Process Pond/ATB-1) to the Ohio River.

The cooling towers are periodically brominated to control bio-fouling of the condenser as provided for in the current permit.

Outfall #007

EXISTING: External Outfall 007 from the Ohio River is the plant intake water used to supply the service water, cooling water, fire protection, and other systems.

Outfall #008

PROPOSED ***(By End-of Year 2019):*** *Internal Outfall 008 to the Process Pond/Outfall 001 will designate the monitoring/sample point of discharges from the Process Water Treatment System (PWTS) Treated Wastewater Effluent Tank; treated wastewaters will be subsequently pumped to the New Process Pond and discharged with combined wastewaters to Ohio River.*

PWTS system trains 1 and 2 startups to occur mid-2019, after 6 month troubleshooting and optimizing period, commercial operations begin December 2019. ELG reconsideration rules may change treatment requirements or if biological technology is mandated, an additional 36-42 months of design/procurement/installation/troubleshooting will be required (following the November 20, 2020 USEPA Reconsideration/finalization date), so an applicability date of December 31, 2023 is requested for setting limits and conditions for this outfall.

Outfall #009

PROPOSED ***(By End-of Year 2023):*** *External Outfall 009 to the Ohio River designates a new monitoring/sample structure to be constructed at the discharge of the existing ATB-1 Secondary Pond (after excavation/clean-closure and refurbishment with a liner) which*

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will collect stormwater runoff from the Northern part of the ATB-1 closed/capped area. During Q4-2023, the newly constructed outfall and refurbished pond will discharge these uncontaminated stormwaters to combine with the new External Outfall 001 (Process Pond Discharges) for discharge to the Ohio River.

Outfall #010

PROPOSED ***(By End-of Year 2023):*** *External Outfall 010 to Black Rock Creek designates a new monitoring/sample structure to be constructed by Q4-2023 at the existing pond decant/discharge pipe outlet (prior to discharges via unnamed tributaries to Black Rock Creek). The existing sediment pond below ATB-2 (aka, West Haul Road Runoff Pond) Pond will collect stormwater runoff from the Northwestern half of the ATB-2 closed/capped area (and stormwater runoff from portions of the west haul road as well).*

Outfall #011

PROPOSED ***(By End-of Year 2023):*** *External Outfall 011 to Agniels Creek designates a new monitoring/sample structure to be constructed by Q4-2023 at this new pond drainage pipe outlet (prior to discharges via unnamed tributaries to Agniels Creek). This new settling pond will be constructed within the Southeast part of the ATB-2 closure/cap to receive stormwater runoff from that part of the closed/capped ATB-2 slopes.*

Outfall #012

PROPOSED ***(By End-of Year 2019):*** *External Outfall 012 to Stephens Branch designates a new monitoring/sample structure constructed by Q4-2019 at this existing pond drainage pipe outlet. This existing settling pond collects landfill stormwater runoff and discharges to Stephens Branch creek are monitored under the current KDWM landfill permit.*

Outfall #013

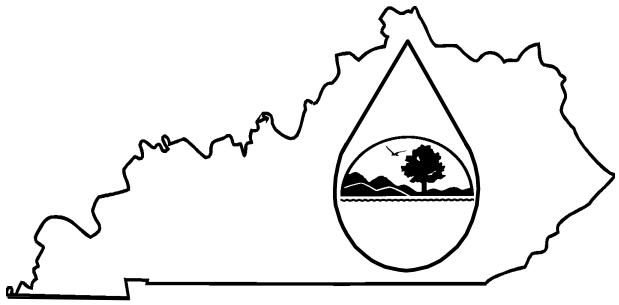
PROPOSED ***(By End-of Year 2019):*** *External Outfall 013 to Agniels Creek designates a new monitoring/sample structure constructed by Q4-2019 at this existing pond drainage pipe outlet (prior to discharges via unnamed tributaries to Agniels Creek). This existing settling pond is a temporary stormwater pond to manage stormwater runoff from future/undeveloped parts of the landfill and discharges are monitored under the current KDWM landfill permit.*

ATTACHMENT 2

Kentucky Division of Water

KPDES – Form 1

KPDES FORM 1



KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT APPLICATION

This is an application to: (check one)
- ☐ Apply for a new permit.
- ☒ Apply for reissuance of expiring permit.
- ☐ Apply for a construction permit.
- ☐ Modify an existing permit.
  Give reason for modification under Item II.A.

A complete application consists of this form and one of the following:
Form A, Form B, Form C, Form F, or Form SC

For additional information contact:
Surface Water Permits Branch (502) 564-3410

I. FACILITY LOCATION AND CONTACT INFORMATION	AGENCY USE							

A. Name of Business, Municipality, Company, Etc. Requesting Permit
Kentucky Utilities Company

B. Facility Name and Location	C. Primary Mailing Address (all facility correspondence will be sent to this address). **Include owner's mailing address (if different) in D.**
Facility Location Name: Ghent Generating Station	Facility Contact Name and Title: Mr. ☒ Ms. ☐ Kentucky Utilities Company Attention: Gary H. Revlett
Facility Location Address (i.e. street, road, etc., **not P.O. Box**): 9485 US Hwy 42E, P.O. Box 338	Mailing Address: P.O Box 32010
Facility Location City, State, Zip Code: Ghent, KY 41045-8474	Mailing City, State, Zip Code: Louisville, KY 40232
D. Owner's name (if not the same as in part A and C):	Facility Contact Telephone Number: 502-627-2997 (Roger Medina) roger.medina@lge-ku.com
Owner's Mailing Address:	Owner's Telephone Number (if different):

II. FACILITY DESCRIPTION

A. Provide a brief description of activities, products, etc: Fossil-fuel fired steam electric generating station

B. Standard Industrial Classification (SIC) Code and Description

Principal SIC Code & Description:	4911		
Other SIC Codes:			

III. FACILITY LOCATION

A. Attach a U.S. Geological Survey 7 ½ minute quadrangle map for the site. (See instructions)

B. County where facility is located:	City where facility is located (if applicable):
Carroll	Ghent

C. Body of water receiving discharge:
Ohio River

D. Facility Site Latitude (degrees, minutes, seconds):	Facility Site Longitude (degrees, minutes, seconds):
38 44' 52"	85 02' 14"

E. Method used to obtain latitude & longitude (see instructions): USGS Map

IV. OWNER/OPERATOR INFORMATION

A. Type of Ownership:
☐ Publicly Owned ☒ Privately Owned ☐ State Owned ☐ Both Public and Private Owned ☐ Federally owned

B. Operator Contact Information (See instructions)

Name of Treatment Plant Operator:	Telephone Number:
Package Sewage Treatment plant retired/removed by April 2015	
Operator Mailing Address (Street):	
Operator Mailing Address (City, State, Zip Code):	
Is the operator also the owner? Yes ☐ No ☐	Is the operator certified? If yes, list certification class and number below. Yes ☐ No ☐
Certification Class: NA	Certification Number: NA

V. EXISTING ENVIRONMENTAL PERMITS

Current NPDES Number:	Issue Date of Current Permit:	Expiration Date of Current Permit:
KY 0002038	August 3, 2001	June 30, 2007
Other DOW Operational Permit #:	Kentucky DMR Permit Number(s):	Sludge Disposal Permit Number:
NA	KY 0002038	NA
Other Existing Environmental Permit #:	Other Existing Environmental Permit #:	Other Existing Environmental Permit #:
NA	NA	NA

Which of the following additional environmental permit/registration categories will also apply to this facility?

CATEGORY	EXISTING PERMIT WITH NO.	PERMIT NEEDED WITH PLANNED APPLICATION DATE
Air Emission Source	KY Division for Air Quality Title V Permit V-12-028 R1	
Solid or Special Waste	KY Division for Waste Management Solid Waste Landfill 021-00024 and Permit-By-Rule	
Hazardous Waste - Registration or Permit	KY Division for Waste Management Registration ID# KYD-085-052-751	

VI. DISCHARGE MONITORING REPORTS (DMRs)

KPDES permit holders are required to submit DMRs to the Division of Water on a regular schedule (as defined by the KPDES permit). Information in this section serves to specifically identify the name and telephone number of the DMR official and the DMR mailing address (if different from the primary mailing address in Section I.C).

A. DMR Official (i.e., the department, office or individual designated as responsible for submitting DMR forms to the Division of Water):	William Michael Winkler, Mgr Environmental Programs, Environmental Affairs
DMR Official Telephone Number:	502-627-2338

B. DMR Mailing Address:
- Address the Division of Water will use to mail DMR forms (if different from mailing address in Section I.C), or
- Contact address if another individual, company, laboratory, etc. completes DMRs for you; e.g., contract laboratory address.

DMR Mailing Name:	
DMR Mailing Address:	
DMR Mailing City, State, Zip Code:	

VII. APPLICATION FILING FEE

KPDES regulations require that a permit applicant pay an application filing fee equal to twenty percent of the permit base fee. Please examine the base and filing fees listed in "Form 1 Instructions" and enclose a check payable to "Kentucky State Treasurer" for the appropriate amount. For permit renewals, please include the KPDES permit number on the check to ensure proper crediting. Please see the separate document "General Instructions" for an expanded description of the base fee amounts.

Facility Fee Category:	Filing Fee Enclosed:
Major Industry	$ 7,000.00

VIII. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

NAME AND OFFICIAL TITLE (type or print):	PHONE NUMBER: 502-627-4121
Mr. ☒ Ms. ☐ Donald Ralph Bowling Vice President Power Production	EMAIL: ralph.bowling@lge-ku.com
SIGNATURE Joseph M. Wideldt for D. Ralph Bowling	DATE: 11/29/18

Return completed application form and attachments to: **Surface Water Permits Branch, Division of Water, 200 Fair Oaks Lane, Frankfort, KY 40601. Direct questions to: Surface Water Permits Branch at (502) 564-3410.**

KPDES FORM 1 -- INSTRUCTIONS

Section A: General Instructions

With the exceptions described in Section C of these instructions, Federal and State laws prohibit you from the discharge of pollutants into the waters of the United States or waters of the Commonwealth.

Where to file

Return completed application forms to Surface Water Permits Branch, Division of Water, 200 Fair Oaks Lane, Frankfort, Kentucky 40601.

When to file

File the application at least 180 days prior to expiration of your current KPDES permit or at least 180 days prior to startup of a new facility.

Fees

Filing fees and five-year permit fees are listed in Section B. Filing Fees are not refundable.

Completion of Forms

Unless otherwise specified in the detailed instructions, each item in each form must be answered. To indicate that each item has been considered, enter "NA," for not applicable, if a particular item does not fit the circumstances or characteristics of your facility or activity. If more space is necessary to answer a question, attach a separate sheet entitled "Additional Information."

Section B: Completing Form 1

Listed below are explanations of select Form 1 questions. If further information is needed concerning any question, please **contact Division of Water, Surface Water Permits Branch at (502) 564-3410.**

I. Facility Location and Contact Information

A. Use the official or legal name of the business, company, municipality, etc. requesting permit. Do not use a colloquial name. Give the name, as it is legally referred to, of the person, firm, public organization, or any other entity that operates the facility described in this application. This may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation rather than the plant or site manager. This use of "operator" in many cases is not the same as the treatment plant Certified Operator.

B. The facility name should be the name by which the facility is commonly known and/or uniquely identified. Enter the facility's official or legal name. Do not use a colloquial name. The information given as the facility name and location address should be the for the actual location of the facility (i.e. road name, highway number, not the P O Box address). If there is no street address, identify the facility location by the most accurate alternative geographic information such as direction and distance to nearest intersection or permanent landmark (e.g., ½ mile east of intersection of KY 70 and US 127).

C. The primary mailing address should be the legal permittee of record and is the address where correspondence regarding the application, permit, etc. for the facility will be sent unless otherwise indicated. This often is not the address used to designate the location of the facility or activity. Give the name, title, and work telephone number of a person who is thorough familiar with the operation of the facility and with the facts reported in this application and who can be contacted by reviewing offices if necessary. The owner mailing address is to be provided in "D" if different from the primary mailing address. Discharge Monitoring Reports will be mailed to the address indicated in part VI.

D. If the applicant for the permit is not the owner of the facility, include the name of the owner of the facility. Include the mailing address of the owner of the facility if the owner is not the applicant for the permit.

II. Facility Description

A. Briefly describe the nature of the business and the activities being conducted that require a KPDES permit.

B. List, in descending order of significance, the four 4-digit standard industrial classification (SIC) codes that best describe your facility in terms of the principal products or services you produce or provide. Also, specify each classification in words. These classifications may differ from the SIC codes describing the operation generating the discharge. The SIC codes are numbers and descriptions of activities classified by the Executive Office of the President, Office of Management and Budget. These are found in the 1987 Edition of the Standard Industrial Classification (SIC) Manual. List the SIC codes(s) that best describe the products or services provided by the facility in descending order of importance. If an SIC code book is not available, please describe in detail the nature of the business and activities conducted so that an appropriate code can be assigned.

III. Facility Location

A. Attach a U.S. Geological Survey (USGS), 7 1/2 minute topographic quadrangle map(s) extending at least one mile beyond the property boundary of the discharge source. Depict or mark the facility and each of its intake and discharge structures. Also mark the locations of those wells, springs, surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant within one-quarter mile of the facility property boundary. USGS maps may be obtained from the University of Kentucky, Mines and Minerals Bldg. Room 104, Lexington, Kentucky 40506. Phone: (859) 257-3896.
B. List the county and, if applicable, city where facility is located.
C. List the body of water receiving discharge.
D. List the latitude and longitude for the facility site. The latitude/longitude reading for the site should be taken at the influent to the wastewater treatment plant, if applicable.
E. List the method used to obtain the latitude and longitude (i.e. topo map coordinates, GPS reading, etc.)
F. List the facility's Dun and Bradstreet Number if applicable.

IV. Owner/Operator Information

A. Place a check in the applicable type ownership as listed.
B. These sections must be completed by **all municipal and sanitary wastewater applicants**.

For those facilities that require a Certified Operator, enter the name of a Certified Operator who will operate the treatment plant, or enter the name of an operator who will be certified before commencement of discharge. The operator of the treatment plant is often someone other than the operator of the facility identified in Part I.
List the name and address of the person who operates the sewage treatment plant.
Indicate if the operator is also the owner.
The operator must be currently certified with the Division of Water. For information concerning those requirements,
Contact: Division of Compliance Assistance, Certification Section, at (502) 564-0323.
List the Operator's Certification Class and Certification Number.

V. List any existing environmental permits that the facility has or will be applying for. KPDES permits use an NPDES generated number.

VI. List the address where Discharge Monitoring Report (DMR) forms are to be mailed. Complete this section if you are requesting a different address than the address in Part I (C.)

VII. Application Filing Fee

The payment of a filing fee as listed below must accompany the application for a KPDES Permit. **Your check must be made payable to "Kentucky State Treasurer." For permit renewals, to ensure proper credit to your account, please include the KPDES permit number on the check.** This fee will be applied toward the final discharge permit fee. The filing fee is not refundable if the application is withdrawn or the permit is denied. Listed below are the facility categories, associated base five-year fees, and application filing fees. (See the separate "General Instructions" for definitions of facility categories.)

Facility Category	Five-Year Fee (100%)	Application Filing Fee (20%)
Major Industry	$7,000	$1,400
Minor Industry	$4,500	$900
Non-Process Industry	$2,200	$440
Large Non-POTW	$3,700	$740
Intermediate Non-POTW	$3,200	$640
Small Non-POTW	$2,200	$440
Agriculture	$1,200	$240
Surface Mining Operation	$3,300	$660
501(c)(3)	$100	$20

If this application is for a new project, see separate General Instructions for the applicable Construction Permit fee.
A permit application cannot be processed unless the application filing fee and (if applicable) construction permit fee is enclosed. Make your check payable to "Kentucky State Treasurer."

VIII. Certification

The permit application must be signed as follows:
Corporation: by a principal executive officer of at least the level of vice president.
Partnership or sole proprietorship: by a general partner or the proprietor respectively.
Municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official.

Section C—Activities Which Do Not Require KPDES Permits

You are not required to obtain a KPDES permit if your discharge is one of the following categories, as provided by the Clean Water Act (CWA) and KPDES regulations (401 KAR Chapter 5).

1. **Dredged or Fill Material: Discharges of dredged or fill material as defined at 33 CFR 323.2 into waters of the Commonwealth do not need KPDES permits if the dredging or filling is authorized by a permit issued by the U.S. Army Corp of Engineers.**

2. **Discharges into Publicly Owned Treatment Works (POTW): The introduction of sewage, industrial wastes, or other pollutants into a POTW does not need a KPDES permit. You must comply with all applicable pretreatment standards promulgated under Section 307 (b) of the CWA, which may be included in the permit issued to the POTW. If you have a plan or an agreement to switch to a POTW in the future, this does not relieve you of the obligation to apply for and receive a KPDES permit until you have stopped discharging pollutants into waters of the Commonwealth.**

3. **Dischargers into Privately Owned Treatment Works: Dischargers into privately owned treatment works do not have to apply for or obtain KPDES permits except as otherwise required by the Cabinet. The owner or operator of the treatment works itself, however, must apply for a permit and identify all users in its application.**

4. **Discharges from Agricultural and Silvicultural Activities: Most discharges from agricultural and silvicultural activities to waters of the Commonwealth do not require KPDES permits. These include runoff from orchards, cultivated crops, pastures, range lands, and forest lands. However, the discharge listed below DO require KPDES permits.**
   a. **Discharges from Concentrated Animal Feeding Operations**
   b. **Discharges from Concentrated Aquatic Animal Production Facilities.**
   c. **Discharges associated with approved Aquaculture Projects.**
   d. **Discharges from Silvicultural Point Sources. Nonpoint source silvicultural activities are excluded from KPDES permit requirements. However, some of these activities, such as stream crossings for roads, may involve point source discharge of dredged or fill material which may require a Section 404 permit. See 33 CFR 209.120.**
5. **Underground Injection Control Permits Under the Safe Drinking Water Act**

ATTACHMENT 3

Kentucky Division of Water

KPDES

Application Filing Fee Check to State Treasurer

VENDOR NO: 15166

ENDORSEMENT OF ATTACHED CHECK WILL ACKNOWLEDGE PAYMENT IN FULL OF ITEMS SET FORTH BELOW
KENTUCKY UTILITIES COMPANY

NO: 605793
DATE: 19-Nov-18

INVOICE NUMBER	INVOICE DATE	DESCRIPTION	DISCOUNT	NET AMOUNT
KENTUC111518	15-Nov-2018	RTN PATTY ROSE LGE4	0.00	7,000.00
TOTALS			0.00	7,000.00

PLEASE DETACH BEFORE PRESENTING CHECK

REMOVE DOCUMENT ALONG THIS PERFORATION

THIS DOCUMENT IS PRINTED IN TWO COLORS. DO NOT ACCEPT UNLESS BLUE AND GREEN ARE PRESENT.

KENTUCKY UTILITIES COMPANY
P.O. Box 32030
Louisville, KY 40232

DATE: 19-Nov-18
VOID 6 MONTHS AFTER THIS DATE

BANK OF AMERICA, N.A.
Controlled Disbursement
Atlanta, Dekalb County , Georgia

NO: 605793

64-1278
611 GA

CHECK AMOUNT
****$7,000.00

PAY Seven Thousand and 00/100 Dollars

TO THE ORDER OF:
KENTUCKY STATE TREASURER
SURFACE WATER PERMITS BRANCH
DIVISION OF WATER
300 SOWER BLVD
FRANKFORT KY 40601

MANUAL COUNTER SIGNATURE REQUIRED OVER $300,000

⑈00605793⑈ ⑆061112788⑆ 329 902 7583⑈

KENTUCKY UTILITIES COMPANY
P.O. Box 32030
Louisville, KY 40232

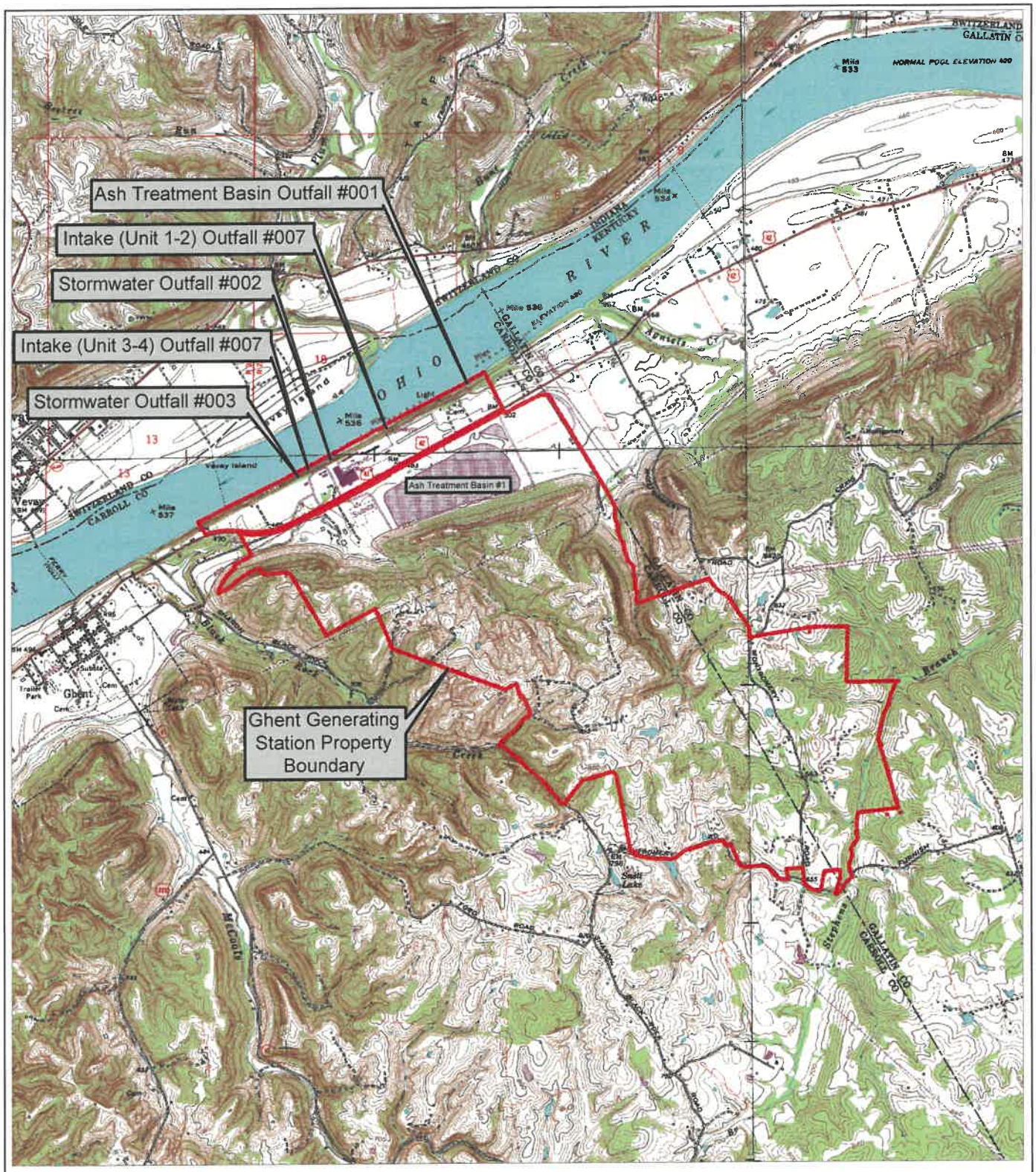
SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

KENTUCKY STATE TREASURER
SURFACE WATER PERMITS BRANCH
DIVISION OF WATER 300 SOWER BLVD
FRANKFORT KY US 40601

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

ATTACHMENT 4

USGS TOPOGRAPHIC MAP



GHENT GENERATING STATION

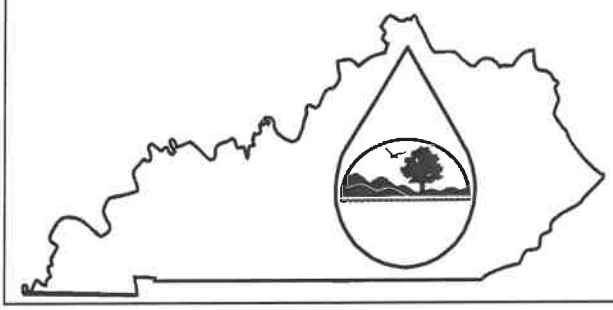
KENTUCKY UTILITIES COMPANY
GHENT, CARROLL COUNTY, KENTUCKY
SANDERS, KY-VEVAY SOUTH-VEVAY NORTH, IND-KY, IND-KY-FLORENCE, IND-KY, USGS QUADRANGLE MAPS
Scale: 1"=3500'

ATTACHMENT 5

Kentucky Division of Water

KPDES – Form C

KPDES FORM C



KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT APPLICATION

A complete application consists of this form and Form 1.
For additional information, contact Surface Water Permits Branch, (502) 564-3410.

Name of Facility:Ghent Generating Station	County: Carroll
I. OUTFALL LOCATION	AGENCY USE

For each outfall list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

Outfall No. (list)	LATITUDE			LONGITUDE			RECEIVING WATER (name)
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds	
001	38	45	19	85	01	25	Ohio River
002	38	44	59	85	02	15	Ohio River
003	38	44	56	85	02	23	Ohio River
007	38	45	02	85	02	09	(Intake)
009 (Proposed)	38	45	19	85	01	25	Ohio River
010 (Proposed)	38	44	33	85	01	54	Black Rock Creek to Ohio River
011 (Proposed)	38	44	13	85	00	42	Agniels Creek to Ohio River
012 (Proposed)	38	43	25	84	59	27	Stephens Branch to Ohio River
013 (Proposed)	38	43	56	85	00	20	Agniels Creek to Ohio River

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfall. If a water balance cannot be determined (e.g., for certain mining activities), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) all operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) the average flow contributed by each operation; and (3) the treatment received by the wastewater. Continue on additional sheets if necessary.

OUTFALL NO. (list)	OPERATION(S) CONTRIBUTING FLOW		TREATMENT	
	Operation (list)	Avg/Design Flow (include units)	Description	List Codes from Table C-1
Existing Operations (2018)				
001	**Combined Wastewaters of :**		Rapid Sand Filtration Neutralization Mixing, Settling	1-R 2-K 1-O, 1-U
	Fly Ash Sluice Waters	0.0 MGD		
	Bottom Ash Sluice + Flush Waters	3.4224 MGD		
	Flue Gas Desulfurization (FGD) Inert Fines + Dewatering+Flush Flows	2.1667 MGD		
	Plant Sumps	5.4164 MGD		
	Coal Yard Runoff & Washdowns	0.0898 MGD		
	Ash Pond Effluent Sand Filtration Backwash Flows (recycled-to-pond)	0.1392 MGD		
	Precipitation	0.6368 MGD		
	Internal Outfalls to 001			
	Metal Cleaning Wastes (005)	0.00 MGD	Chemical Precipitation	2-C
	Cooling Tower Blowdown (006)	11.4968 MGD	Disinfection (Other)	2-H
002	Cooling Non-Contact Water from Misc. Plant Heat Exchangers	11.6257 MGD	Disinfection (Other)	2-H
	Precipitation	0.0510 MGD		
003	Cooling Once-Thru Water from Misc. Plant Heat Exchangers	23.6480 MGD	Disinfection (Other)	2-H
	Precipitation	0.0693 MGD		
007 – Intake	Plant Intake	89.3670 MGD		
Transition Operations (2019)				
001	**Combined Wastewaters of :**		Rapid Sand Filtration Neutralization Mixing, Settling,	1-R 2-K 1-O, 1-U
	Fly Ash Sluice Waters	0.0 MGD		
	Bottom Ash Sluice + Flush Waters	3.4803 MGD		
	Flue Gas Desulfurization (FGD) Inert Fines + Dewatering+Flush Flows	2.1667 MGD		
	Plant Sumps	5.4164 MGD		
	Coal Yard Runoff & Washdowns	0.0898 MGD		
	Ash Pond Effluent Sand Filtration Backwash Flows (recycled-to-pond)	0.1392 MGD		
	Ash Ponds (ATB-1 &/or ATB-2) DeWatering Wastewaters	4.3848 MGD	Chemical Precipitation	2-C
	Precipitation	0.6368 MGD		
	Internal Outfalls to 001			
	Metal Cleaning Wastes (005)	0.00 MGD	Chemical Precipitation	2-C
	Cooling Tower Blowdown (006)	11.4968 MGD	Disinfection (Other)	2-H
002	Cooling Non-Contact Water from Misc. Plant Heat Exchangers	11.6257 MGD	Disinfection (Other)	2-H
	Precipitation	0.0510 MGD		
003	Cooling Once-Thru Water from Misc. Plant Heat Exchangers	23.6480 MGD	Disinfection (Other)	2-H
	Precipitation	0.0693 MGD		
007 – Intake	Plant Intake	89.4334 MGD		

Future Conditions (Beginning starting ~2020 to 2025) --- *Listed with Proposed Outfalls 008-013*				
001	**Combined Wastewaters of :**		Rapid Sand Filtration Neutralization Mixing, Settling	1-R 2-K 1-O, 1-U
	Fly Ash Sluice Waters	0.0 MGD		
	Bottom Ash Sluice Waters	3.3064 MGD		
	Flue Gas Desulfurization (FGD) Inert Fines + Dewatering+Flush Flows	2.1667 MGD		
	Plant Sumps	5.4164 MGD		
	Coal Yard Runoff & Washdowns	0.0898 MGD		
	Ash Pond Effluent Sand Filtration Backwash Flows (recycled-to-pond)	0.0 MGD		
	Ash Ponds (ATB-1 &/or ATB-2) DeWatering Wastewaters	4.3848 MGD	Chemical Precipitation	2-C
	Precipitation	0.6368 MGD		
	Internal Outfalls to 001			
	Metal Cleaning Wastes (005)	0.00 MGD		
	Cooling Tower Blowdown (006)	11.4968 MGD	Disinfection (Other)	2-H
002	Cooling Once-Thru Water from Misc. Plant Heat Exchangers	11.6257 MGD	Disinfection (Other)	2-H
	Precipitation	0.0510 MGD		
003	Cooling Once-Thru Water from Misc. Plant Heat Exchangers	23.6480 MGD	Disinfection (Other)	2-H
	Precipitation	0.0693 MGD		
007 – Intake	Plant Intake	89.4480 MGD		
008 – FGD (Internal)	FGD Treated Wastewaters	2.1667 MGD	Chemical Precipitation Neutralization Mixing, Settling	2-C 2-K 1-O, 1-U
009 – ATB-1 N/Cap Storm	Northern Capped Areas of ATB-1 (Ash Treatment Basin 1) Stormwaters	0.0514 MGD	Settling	1-U
0010 – ATB-2 N/Cap Storm	Northern Capped Areas of ATB-2 (Ash Treatment Basin 2) Stormwaters	0.2193 MGD	Settling	1-U
011 – ATB-2 S/Cap Storm	Southern Capped Areas of ATB-2 (Ash Treatment Basin 2)	0.0900 MGD	Settling	1-U
012 – Landfill S/Storm	Active/Southern Landfill Stormwaters Runoff	0.0674 MGD	Settling	1-U
013 – ATB-1 Cap Storm	Undeveloped/Northern Landfill Areas Stormwaters Runoff	0.0510 MGD	Settling	1-U

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES (Continued)

C. Except for storm water runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ Yes (Complete the following table.) ☒ No (Go to Section III.)

OUTFALL NUMBER (list)	OPERATIONS CONTRIBUTING FLOW (list)	FREQUENCY		FLOW				
		Days Per Week (specify average)	Months Per Year (specify average)	Flow Rate (in mgd)		Total volume (specify with units)		Duration (in days)
				Long-Term Average	Maximum Daily	Long-Term Average	Maximum Daily	

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☒ Yes (Complete Item III-B) List effluent guideline category: : 40 CFR Part 423

☐ No (Go to Section IV)

B. Are the limitations in the applicable effluent guideline expressed in terms of production (or other measures of operation)?

☐ Yes (Complete Item III-C) ☒ No (Go to Section IV)

C. If you answered "Yes" to Item III-B, list the quantity which represents the actual measurement of your maximum level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

AVERAGE DAILY PRODUCTION			Affected Outfalls (list outfall numbers)
Quantity Per Day	Units of Measure	Operation, Product, Material, Etc. (specify)	

IV. IMPROVEMENTS

A. Are you now required by any federal, state or local authority to meet any implementation schedule for the construction, upgrading, or operation of wastewater equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders and grant or loan conditions.

☐ Yes (Complete the following table) ☒ No (Go to Item IV-B)

IDENTIFICATION OF CONDITION AGREEMENT, ETC.	AFFECTED OUTFALLS		BRIEF DESCRIPTION OF PROJECT	FINAL COMPLIANCE DATE	
	No.	Source of Discharge		Required	Projected

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs (or other environmental projects which may affect your discharges) you now have under way or which you plan. Indicate whether each program is now under way or planned, and indicate your actual or planned schedules for construction.

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding – Complete one set of tables for each outfall – Annotate the outfall number in the space provided.
NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered 5-18.

D. Use the space below to list any of the pollutants (refer to SARA Title III, Section 313) listed in Table C-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

POLLUTANT	SOURCE	POLLUTANT	SOURCE
Ammonia & Ammonium Hydroxide, Sodium Phosphate (dibasic & tribasic)	Boiler/Feedwater System pH Control & Buffering	Sodium Hypochlorite, Calcium Hypochlorite, Hydrochloric Acid, Sodium BiSulfite	Cooling Tower Treatment Intake, Cooling Tower and Reverse Osmosis (RO) System Dechlorination-Pre-Treatment
Sodium Hydroxide & Sulfuric Acid	Demineralizer Regenerant Chemicals	Phosphoric Acid	RO System Membrane Cleaner
Aluminum Sulfate	Boiler Water Treatment	Quat-DIMAC Ammonium-Chloride	Cooling System Zebra Mussel Biocide Periodic Treatments

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

A. Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ Yes (List all such pollutants below) ☒ No (Go to Item VII)

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge of or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☒ Yes (Identify the test(s) and describe their purposes below) ☐ No (Go to Section VIII)

Toxicity Control & Biomonitoring Program Testing was incorporated into the current KPDES for Outfall 001 discharge including: -
1. a 48-hour static toxicity test with Ceriodaphnia sp.;
2. a 48-hour static toxicity test with fathead minnow

These tests were performed at least annually and indicated full compliance with the KPDES toxicity limits.

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☒ Yes (list the name, address, and telephone number of, and pollutants analyzed by each such laboratory or firm below) ☐ No (Go to Section IX)

NAME	ADDRESS	TELEPHONE (Area code & number)	POLLUTANTS ANALYZED (list)
Microbac-Laboratories Kentucky Testing Laboratory Division	3323 Gilmore Industrial Blvd Louisville, KY 40213	502-962-6400	Biomonitoring and chemical composition analyses

IX. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

NAME AND OFFICIAL TITLE (type or print):	TELEPHONE NUMBER (area code and number):
Donald Ralph Bowling Vice President Power Production	502-627-4121
SIGNATURE Joseph M. Widelot for D. Ralph Bowling	DATE 11/29/18

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages. (See instructions)

Ghent – Ash Treatment Basin

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3 of Form C) — **OUTFALL NO. 001**

Part A – You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No of Analyses
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
a. Biochemical Oxygen Demand (BOD)	<5.0				<5.0		1	mg/L		<5.0		1
b. Chemical Oxygen Demand (COD)	<25				<25		1	mg/L		<25		1
c. Total Organic Carbon (TOC)	3.5				3.5		1	mg/L		2.8		1
d. Total Suspended Solids (TSS)	11				11		1	mg/L		9		1
e. Ammonia (as N)	<0.25				<0.25		1	mg/L		<0.25		1
f. Flow (in units of MGD)	VALUE	24.9	VALUE		VALUE		1		MGD	VALUE	51.7	1
g. Temperature (winter)	VALUE	26.6	VALUE		VALUE		1		°c	VALUE	24.6	1
h. Temperature (summer)			VALUE		VALUE				°c	VALUE		
i. pH	MINIMUM	MAXIMUM 7.06	MINIMUM	MAXIMUM			1		STANDARD UNITS			

Part B - In the MARK "X" column, place an "X" in the Believed Present column for each pollutant you know or have reason to believe is present. Place an "X" in the Believed Absent column for each pollutant you believe to be absent. If you mark the Believed Present column for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		6. INTAKE (optional)		
	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
a. Bromide (24959-67-9)	X		1.1				1.1		1	mg/L		< 0.50		1
b. Chloride	X		150				150		1	mg/L		30		1
c. Chlorine, Total Residual	X		< 0.020 *				< 0.020 *		1	mg/L		< 0.020 *		1
d. Color	X		< 25				< 25		1	ADMI		29		1
e. Fecal ☐ Coliform Or E.coli ☒	X		488.4				488.4		1	MPN/100 ml		10.9		1
f. Fluoride (16984-48-8)	X		1.8				1.8		1	mg/L		< 0.50		1
g. Hardness (as $CaCO_3$)	X		980				980		1	mg/L		170		1
h. Nitrate – Nitrite (as N)	X		1.8				1.8		1	mg/L		< 0.75		1
i. Nitrogen, Total Organic (as N)	X		0.58				0.58		1	mg/L		< 0.40		1
j. Oil and Grease	X		< 5.0				< 5.0		1	mg/L		< 5.0		1
k. Phosphorous (as P), Total 7723-14-0	X		0.15				0.15		1	mg/L		0.059		1
l. Radioactivity														
(1) Alpha, Total	X		11.9				11.9		1	pCi/L		< 2.96		1
(2) Beta, Total	X		41.3				41.3		1	pCi/L		3.29		1
(3) Radium Total	X		0.728				0.728		1	pCi/L		0.417		1
(4) Radium, 226, Total	X		0.728				0.728		1	pCi/L		< 2.94		1
(5) Strontium-90, Total	X		<1.31				<1.31		1	pCi/L		< 1.16		1
(6 Uranium	X		14.6				14.6		1	ug/L		0.836		1

* Total Residual Chlorine analysis reflects that no oxidants added (per KPDES permit)

Part B - Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	5. INTAKE (optional) a. Long-Term Avg. Value (1) Concentration	5. INTAKE (optional) a. Long-Term Avg. Value (2) Mass	5. INTAKE (optional) b. No. of Analyses
m. Sulfate (as SO_4) (14808-79-8)	X		520				520		1	mg/L		76		1
n. Sulfide (as S)	X		< 0.50				< 0.50		1	mg/L		< 0.50		1
o. Sulfite (as SO_4) (14286-46-3)	X		< 2.0				< 2.0		1	mg/L		< 2.0		1
p. Surfactants	X		< 0.20				< 0.20		1	mg/L MBAS		< 0.20		1
q. Aluminum, Total (7429-90)	X		0.28				0.28		1	mg/L		0.15		1
r. Barium, Total (7440-39-3)	X		0.11				0.11		1	mg/L		0.051		1
s. Boron, Total (7440-42-8)	X		8.5				8.5		1	mg/L		0.24		1
t. Cobalt, Total (7440-48-4)	X		0.00071				0.00071		1	mg/L		0.00032		1
u. Iron, Total (7439-89-6)	X		0.36				0.36		1	mg/L		0.25		1
v. Magnesium Total (7439-96-4)	X		85				85		1	mg/L		15		1
w. Molybdenum Total (7439-98-7)	X		0.75				0.75		1	mg/L		0.018		1
x. Manganese, Total (7439-96-6)	X		0.043				0.043		1	mg/L		0.060		1
y. Tin, Total (7440-31-5)	X		<0.00050				<0.00050		1	mg/L		<0.00050		1
z. Titanium, Total (7440-32-6)	X		0.0018				0.0018		1	mg/L		0.0013		1

Part C – If you are a primary industry and this outfall contains process wastewater, refer to Table C-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in the **Testing Required** column for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark this column (secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions), mark "X" in the **Believed Present** column for each pollutant you know or have reason to believe is present. Mark "X" in the **Believed Absent** column for each pollutant you believe to be absent. If you mark either the **Testing Required** or **Believed Present** columns for any pollutant, you must provide the result of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table (all seven pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT						d. No. of Analyses	4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass		a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
METALS, CYANIDE AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)	X			0.0023				0.0023		1	mg/L		0.00023		1
2M. Arsenic, Total (7440-38-2)	X			0.010				0.010		1	mg/L		<0.0050		1
3M. Beryllium Total (7440-41-7)	X			<0.00020				<0.00020		1	mg/L		<0.00020		1
4M. Cadmium Total (7440-43-9)	X			0.0012				0.0012		1	mg/L		<0.00020		1
5M. Chromium Total (7440-43-9)	X			0.019				0.019		1	mg/L		<0.0018		1
6M. Copper Total (7550-50-8)	X			0.013				0.013		1	mg/L		0.0018		1
7M. Lead Total (7439-92-1)	X			0.00039				0.00039		1	mg/L		0.00039		1
8M. Mercury Total (7439-97-6)	X			**41.4**				**41.4**		1	**ng/L**		**< 5.00**		1
9M. Nickel, Total (7440-02-0)	X			0.017				0.017		1	mg/L		0.0018		1
10M. Selenium, Total (7782-49-2)	X			0.0053				0.0053		1	mg/L		<0.00050		1
11M. Silver, Total (7440-28-0)	X			<0.00030				<0.00030		1	mg/L		<0.00030		1

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X" a. Testing Required	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	3. EFFLUENT a. Maximum Daily Value (2) Mass	3. EFFLUENT b. Maximum 30-Day Value (if available) (1) Concentration	3. EFFLUENT b. Maximum 30-Day Value (if available) (2) Mass	3. EFFLUENT c. Long-Term Avg. Value (if available) (1) Concentration	3. EFFLUENT c. Long-Term Avg. Value (if available) (2) Mass	3. EFFLUENT d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	5. INTAKE (optional) a. Long-Term Avg Value (1) Concentration	5. INTAKE (optional) a. Long-Term Avg Value (2) Mass	5. INTAKE (optional) b. No. of Analyses
METALS, CYANIDE AND TOTAL PHENOLS (Continued)															
12M. Thallium, Total (7440-28-0)	X			0.00062				0.00062		1	mg/L		<0.00010		1
13M. Zinc, Total (7440-66-6)	X			0.018				0.018		1	mg/L		0.0037		1
14M. Cyanide, Total (57-12-5)	X			< 0.0050				< 0.0050		1	mg/L		< 0.0050		1
15M. Phenols, Total	X			< 0.010				< 0.010		1	mg/L		< 0.010		1
DIOXIN															
2,3,7,8 Tetra-chlorodibenzo, P, Dioxin (1784-01-6)			X	DESCRIBE RESULTS:											
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	X			BDL						1	mg/L		BDL		1
2V. Acrylonitrile (107-13-1)	X			BDL						1	mg/L		BDL		1
3V. Benzene (71-43-2)	X			BDL						1	mg/L		BDL		1
5V. Bromoform (75-25-2)	X			BDL						1	mg/L		BDL		1
6V. Carbon Tetrachloride (56-23-5)	X			BDL						1	mg/L		BDL		1
7V. Chloro-benzene (108-90-7)	X			BDL						1	mg/L		BDL		1
8V. Chlorodibro-momethane (124-48-1)	X			BDL						1	mg/L		BDL		1

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT						d. No. of Analyses	4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)			a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
9V. Chloroethane (74-00-3)	X			BDL						1	mg/L		BDL		1
10V. 2-Chloro-ethylvinyl Ether (110-75-8)	X			BDL						1	mg/L		BDL		1
11V. Chloroform (67-66-3)	X			BDL						1	mg/L		BDL		1
12V. Dichloro-bromomethane (75-71-8)	X			BDL						1	mg/L		BDL		1
14V. 1,1-Dichloroethane (75-34-3)	X			BDL						1	mg/L		BDL		1
15V. 1,2-Dichloroethane (107-06-2)	X			BDL						1	mg/L		BDL		1
16V. 1,1-Dichlorethylene (75-35-4)	X			BDL						1	mg/L		BDL		1
17V. 1,2-Di-chloropropane (78-87-5)	X			BDL						1	mg/L		BDL		1
18V. 1,3-Dichloropro-pylene (452-75-6)	X			BDL						1	mg/L		BDL		1
19V. Ethyl-benzene (100-41-4)	X			BDL						1	mg/L		BDL		1
20V. Methyl Bromide (74-83-9)	X			BDL						1	mg/L		BDL		1

Part C – Continued															
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
21V. Methyl Chloride (74-87-3)	X			BDL						1	mg/L		BDL		1
22V. Methylene Chloride (75-00-2)	X			BDL						1	mg/L		BDL		1
23V. 1,1,2,2-Tetrachloro-ethane (79-34-5)	X			BDL						1	mg/L		BDL		1
24V. Tetrachloro-ethylene (127-18-4)	X			BDL						1	mg/L		BDL		1
25V. Toluene (108-88-3)	X			BDL						1	mg/L		BDL		1
26V. 1,2-Trans-Dichloro-ethylene (156-60-5)	X			BDL						1	mg/L		BDL		1
27V. 1,1,1-Tri-chloroethane (71-55-6)	X			BDL						1	mg/L		BDL		1
28V. 1,1,2-Tri-chloroethane (79-00-5)	X			BDL						1	mg/L		BDL		1
29V. Trichloro-ethylene (79-01-6)	X			BDL						1	mg/L		BDL		1
30V. Vinyl Chloride (75-01-4)	X			BDL						1	mg/L		BDL		1

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT						d. No. of Analyses	4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)			a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – ACID COMPOUNDS															
1A. 2-Chloro-phenol (95-57-8)	X			BDL						1	mg/L		BDL		1
2A. 2,4-Dichlor-Orophenol (120-83-2)	X			BDL						1	mg/L		BDL		1
3A. 2,4-Dimeth-ylphenol (105-67-9)	X			BDL						1	mg/L		BDL		1
4A. 4,6-Dinitro-o-cresol (534-52-1)	X			BDL						1	mg/L		BDL		1
5A. 2,4-Dinitro-phenol (51-28-5)	X			BDL						1	mg/L		BDL		1
6A. 2-Nitro-phenol (88-75-5)	X			BDL						1	mg/L		BDL		1
7A. 4-Nitro-phenol (100-02-7)	X			BDL						1	mg/L		BDL		1
8A. P-chloro-m-cresol (59-50-7)	X			BDL						1	mg/L		BDL		1
9A. Pentachloro-phenol (87-88-5)	X			BDL						1	mg/L		BDL		1
10A. Phenol (108-05-2)	X			BDL						1	mg/L		BDL		1
11A. 2,4,6-Tri-chlorophenol (88-06-2)	X			BDL						1	mg/L		BDL		1
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS															
1B. Acena-phthene (83-32-9)	X			BDL						1	mg/L		BDL		1

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
2B. Acenaphtylene (208-96-8)	X			BDL						1	mg/L		BDL		1
3B. Anthracene (120-12-7)	X			BDL						1	mg/L		BDL		1
4B. Benzidine (92-87-5)	X			BDL						1	mg/L		BDL		1
5B. Benzo(a)-anthracene (56-55-3)	X			BDL						1	mg/L		BDL		1
6B. Benzo(a)-pyrene (50-32-8)	X			BDL						1	mg/L		BDL		1
7B. 3,4-Benzo-fluoranthene (205-99-2)	X			BDL						1	mg/L		BDL		1
8B. Benzo(ghl) perylene (191-24-2)	X			BDL						1	mg/L		BDL		1
9B. Benzo(k)-fluoranthene (207-08-9)	X			BDL						1	mg/L		BDL		1
10B. Bis(2-chlor-oethoxy)-methane (111-91-1)	X			BDL						1	mg/L		BDL		1
11B. Bis (2-chlor-oisopropyl)-Ether	X			BDL						1	mg/L		BDL		1
12B. Bis (2-ethyl-hexyl)-phthalate (117-81-7)	X			BDL						1	mg/L		BDL		1

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
13B. 4-Bromo-phenyl Phenyl ether (101-55-3)	X			BDL						1	mg/L		BDL		1
14B. Butyl-benzyl phthalate (85-68-7)	X			BDL						1	mg/L		BDL		1
15B. 2-Chloro-naphthalene (7005-72-3)	X			BDL						1	mg/L		BDL		1
16B. 4-Chloro-phenyl phenyl ether (7005-72-3)	X			BDL						1	mg/L		BDL		1
17B. Chrysene (218-01-9)	X			BDL						1	mg/L		BDL		1
18B. Dibenzo-(a,h) Anthracene (53-70-3)	X			BDL						1	mg/L		BDL		1
19B. 1,2-Dichloro-benzene (95-50-1)	X			BDL						1	mg/L		BDL		1
20B. 1,3-Dichloro-Benzene (541-73-1)	X			BDL						1	mg/L		BDL		1
21B. 1,4-Dichloro-benzene (106-46-7)	X			BDL						1	mg/L		BDL		1
22B. 3,3-Dichloro-benzidene (91-94-1)	X			BDL						1	mg/L		BDL		1
23B. Diethyl Phthalate (84-66-2)	X			BDL						1	mg/L		BDL		1

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
24B. Dimethyl Phthalate (131-11-3)	X			BDL						1	mg/L		BDL		1
25B. Di-N-butyl Phthalate (84-74-2)	X			BDL						1	mg/L		BDL		1
26B. 2,4-Dinitro-toluene (121-14-2)	X			BDL						1	mg/L		BDL		1
27B. 2,6-Dinitro-toluene (606-20-2)	X			BDL						1	mg/L		BDL		1
28B. Di-n-octyl Phthalate (117-84-0)	X			BDL						1	mg/L		BDL		1
29B. 1,2-diphenyl-hydrazine (as azonbenzene) (122-66-7)	X			BDL						1	mg/L		BDL		1
30B. Fluoranthene (208-44-0)	X			BDL						1	mg/L		BDL		1
31B. Fluorene (86-73-7)	X			BDL						1	mg/L		BDL		1
32B. Hexachloro-benzene (118-71-1)	X			BDL						1	mg/L		BDL		1
33B. Hexachloro-butadiene (87-68-3)	X			BDL						1	mg/L		BDL		1
34B. Hexachloro-cyclopenta-diene (77-47-4)	X			BDL						1	mg/L		BDL		1

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
35B. Hexachloroethane (67-72-1)	X			BDL						1	mg/L		BDL		1
36B. Indneo-(1,2,3-oc)-Pyrene (193-39-5)	X			BDL						1	mg/L		BDL		1
37B. Isophorone (78-59-1)	X			BDL						1	mg/L		BDL		1
38B. Napthalene (91-20-3)	X			BDL						1	mg/L		BDL		1
39B. Nitrobenzene (98-95-3)	X			BDL						1	mg/L		BDL		1
40B. N-Nitrosodimethylamine (62-75-9)	X			BDL						1	mg/L		BDL		1
41B. N-nitrosodi-n-propylamine (621-64-7)	X			BDL						1	mg/L		BDL		1
42B. N-nitrosodiphenylamine (86-30-6)	X			BDL						1	mg/L		BDL		1
43B. Phenanthrene (85-01-8)	X			BDL						1	mg/L		BDL		1
44B. Pyrene (129-00-0)	X			BDL						1	mg/L		BDL		1
45B. 1,2,4 Trichlorobenzene (120-82-1)	X			BDL						1	mg/L		BDL		1

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)			X												
2P. α-BHC (319-84-6)			X												
3P. β-BHC (58-89-9)			X												
4P. gamma-BHC (58-89-9)			X												
5P. δ-BHC (319-86-8)			X												
6P. Chlordane (57-74-9)			X												
7P. 4,4'-DDT (50-29-3)			X												
8P. 4,4'-DDE (72-55-9)			X												
9P. 4,4'-DDD (72-54-8)			X												
10P. Dieldrin (60-57-1)			X												
11P. α-Endosulfan (115-29-7)			X												
12P. β-Endosulfan (115-29-7)			X												
13P. Endosulfan Sulfate (1031-07-8)			X												
14P. Endrin (72-20-8)			X												

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
15P. Endrin Aldehyde (7421-93-4)			X												
16P Heptachlor (76-44-8)			X												
17P. Heptaclor Epoxide (1024-57-3)			X												
18P. PCB-1242 (53469-21-9)			X												
19P. PCB-1254 (11097-69-1)			X												
20P. PCB-1221 (11104-28-2)			X												
21P. PCB-1232 (11141-16-5)			X												
22P. PCB-1248 (12672-29-6)			X												
23P. PCB-1260 (11096-82-5)			X												
24P. PCB-1016 (12674-11-2)			X												
25P. Toxaphene (8001-35-2)			X												

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages. (See instructions)

Ghent – Misc.Once-Thru Cooling & East Plant Stormdrains

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3 of Form C) — **OUTFALL NO. 002**

Part A – You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT						3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No of Analyses
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
a. Biochemical Oxygen Demand (BOD)	<5.0				<5.0		1	mg/L				
b. Chemical Oxygen Demand (COD)	<25				<25		1	mg/L				
c. Total Organic Carbon (TOC)	2.7				2.7		1	mg/L				
d. Total Suspended Solids (TSS)	<5				<5		1	mg/L				
e. Ammonia (as N)	<0.25				<0.25		1	mg/L				
f. Flow (in units of MGD)	VALUE	39.3	VALUE		VALUE		1	MGD		VALUE		
g. Temperature (winter)	VALUE	27.6	VALUE		VALUE		1	°c		VALUE		
h. Temperature (summer)			VALUE		VALUE			°c		VALUE		
i. pH	MINIMUM	MAXIMUM 7.42	MINIMUM	MAXIMUM			1	STANDARD UNITS				

Part B - In the MARK "X" column, place an "X" in the Believed Present column for each pollutant you know or have reason to believe is present. Place an "X" in the Believed Absent column for each pollutant you believe to be absent. If you mark the Believed Present column for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	6. INTAKE (optional) a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	6. INTAKE (optional) b. No. of Analyses
a. Bromide (24959-67-9)	X		< 0.50				< 0.50		1	mg/L				
b. Chloride	X		31				31		1	mg/L				
c. Chlorine, Total Residual	X		< 0.020 *				< 0.020 *		1	mg/L				
d. Color	X		< 25				< 25		1	ADMI				
e. Fecal ☐ Coliform Or E.coli ☒	X		14.8				14.8		1	MPN/100 ml				
f. Fluoride (16984-48-8)	X		< 0.50				< 0.50		1	mg/L				
g. Hardness (as $CaCO_3$)	X		180				180		1	mg/L				
h. Nitrate – Nitrite (as N)	X		<0.75				<0.75		1	mg/L				
i. Nitrogen, Total Organic (as N)	X		< 0.40				< 0.40		1	mg/L				
j. Oil and Grease	X		< 5.0				< 5.0		1	mg/L				
k. Phosphorous (as P), Total 7723-14-0	X		0.067				0.067		1	mg/L				
l. Radioactivity														
(1) Alpha, Total	X		<2.87				<2.87		1	pCi/L		<0.296		
(2) Beta, Total	X		5.49				5.49		1	pCi/L		3.29		
(3) Radium Total	X		<0.850				<0.850		1	pCi/L		0.417		
(4) Radium, 226, Total	X		<0.493				<0.493		1	pCi/L		<0.294		
(5) Strontium-90, Total	X		<1.31				<1.31		1	pCi/L		<1.16		
(6 Uranium	X		1.02				1.02		1	ug/L		0.836		

* Total Residual Chlorine analysis reflects that no oxidants added (per KPDES permit)

Part B - Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value (1) Concentration	a. Long-Term Avg. Value (2) Mass	b. No. of Analyses
m. Sulfate (as SO_4) (14808-79-8)	X		86				86		1	mg/L				
n. Sulfide (as S)	X		< 0.50				< 0.50		1	mg/L				
o. Sulfite (as SO_4) (14286-46-3)	X		< 2.0				< 2.0		1	mg/L				
p. Surfactants	X		< 0.20				< 0.20		1	mg/L MBAS				
q. Aluminum, Total (7429-90)	X		0.14				0.14		1	mg/L				
r. Barium, Total (7440-39-3)	X		0.052				0.052		1	mg/L				
s. Boron, Total (7440-42-8)	X		0.35				0.35		1	mg/L				
t. Cobalt, Total (7440-48-4)	X		0.00030				0.00030		1	mg/L				
u. Iron, Total (7439-89-6)	X		0.23				0.23		1	mg/L				
v. Magnesium Total (7439-96-4)	X		16				16		1	mg/L				
w. Molybdenum Total (7439-98-7)	X		0.028				0.028		1	mg/L				
x. Manganese, Total (7439-96-6)	X		0.055				0.055		1	mg/L				
y. Tin, Total (7440-31-5)	X		<0.00050				<0.00050		1	mg/L				
z. Titanium, Total (7440-32-6)	X		0.00053				0.00053		1	mg/L				

Part C – If you are a primary industry and this outfall contains process wastewater, refer to Table C-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in the **Testing Required** column for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark this column (secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions), mark "X" in the **Believed Present** column for each pollutant you know or have reason to believe is present. Mark "X" in the **Believed Absent** column for each pollutant you believe to be absent. If you mark either the **Testing Required** or **Believed Present** columns for any pollutant, you must provide the result of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table (all seven pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT						d. No. of Analyses	4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)			a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
METALS, CYANIDE AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)	X			0.00030				0.00030		1	mg/L				
2M. Arsenic, Total (7440-38-2)	X			<0.0050				<0.0050		1	mg/L				
3M. Beryllium Total (7440-41-7)	X			<0.00020				<0.00020		1	mg/L				
4M. Cadmium Total (7440-43-9)	X			<0.00020				<0.00020		1	mg/L				
5M. Chromium Total (7440-43-9)	X			<0.0018				<0.0018		1	mg/L				
6M. Copper Total (7550-50-8)	X			0.0049				0.0049		1	mg/L				
7M. Lead Total (7439-92-1)	X			0.00038				0.00038		1	mg/L				
8M. Mercury Total (7439-97-6)	X			**< 5.0**				**< 5.0**		1	**ng/L**				
9M. Nickel, Total (7440-02-0)	X			0.0022				0.0022		1	mg/L				
10M. Selenium, Total (7782-49-2)	X			<0.00050				<0.00050		1	mg/L				
11M. Silver, Total (7440-28-0)	X			<0.00030				<0.00030		1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X" a. Testing Required	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	3. EFFLUENT a. Maximum Daily Value (2) Mass	3. EFFLUENT b. Maximum 30-Day Value (if available) (1) Concentration	3. EFFLUENT b. Maximum 30-Day Value (if available) (2) Mass	3. EFFLUENT c. Long-Term Avg. Value (if available) (1) Concentration	3. EFFLUENT c. Long-Term Avg. Value (if available) (2) Mass	3. EFFLUENT d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	5. INTAKE (optional) a. Long-Term Avg Value (1) Concentration	5. INTAKE (optional) a. Long-Term Avg Value (2) Mass	5. INTAKE (optional) b. No. of Analyses
METALS, CYANIDE AND TOTAL PHENOLS (Continued)															
12M. Thallium, Total (7440-28-0)	X			<0.00010				<0.00010		1	mg/L				
13M. Zinc, Total (7440-66-6)	X			0.0069				0.0069		1	mg/L				
14M. Cyanide, Total (57-12-5)	X			< 0.0050				< 0.0050		1	mg/L				
15M. Phenols, Total	X			< 0.010				< 0.010		1	mg/L				
DIOXIN															
2,3,7,8 Tetra-chlorodibenzo, P, Dioxin (1784-01-6)			X	DESCRIBE RESULTS:											
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	X			BDL						1	mg/L				
2V. Acrylonitrile (107-13-1)	X			BDL						1	mg/L				
3V. Benzene (71-43-2)	X			BDL						1	mg/L				
5V. Bromoform (75-25-2)	X			BDL						1	mg/L				
6V. Carbon Tetrachloride (56-23-5)	X			BDL						1	mg/L				
7V. Chloro-benzene (108-90-7)	X			BDL						1	mg/L				
8V. Chlorodibro-momethane (124-48-1)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
9V. Chloroethane (74-00-3)	X			BDL						1	mg/L				
10V. 2-Chloro-ethylvinyl Ether (110-75-8)	X			BDL						1	mg/L				
11V. Chloroform (67-66-3)	X			BDL						1	mg/L				
12V. Dichloro-bromomethane (75-71-8)	X			BDL						1	mg/L				
14V. 1,1-Dichloroethane (75-34-3)	X			BDL						1	mg/L				
15V. 1,2-Dichloroethane (107-06-2)	X			BDL						1	mg/L				
16V. 1,1-Dichlorethylene (75-35-4)	X			BDL						1	mg/L				
17V. 1,2-Di-chloropropane (78-87-5)	X			BDL						1	mg/L				
18V. 1,3-Dichloropro-pylene (452-75-6)	X			BDL						1	mg/L				
19V. Ethyl-benzene (100-41-4)	X			BDL						1	mg/L				
20V. Methyl Bromide (74-83-9)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
21V. Methyl Chloride (74-87-3)	X			BDL						1	mg/L				
22V. Methylene Chloride (75-00-2)	X			BDL						1	mg/L				
23V. 1,1,2,2-Tetrachloro-ethane (79-34-5)	X			BDL						1	mg/L				
24V. Tetrachloro-ethylene (127-18-4)	X			BDL						1	mg/L				
25V. Toluene (108-88-3)	X			BDL						1	mg/L				
26V. 1,2-Trans-Dichloro-ethylene (156-60-5)	X			BDL						1	mg/L				
27V. 1,1,1-Tri-chloroethane (71-55-6)	X			BDL						1	mg/L				
28V. 1,1,2-Tri-chloroethane (79-00-5)	X			BDL						1	mg/L				
29V. Trichloro-ethylene (79-01-6)	X			BDL						1	mg/L				
30V. Vinyl Chloride (75-01-4)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – ACID COMPOUNDS															
1A. 2-Chloro-phenol (95-57-8)	X			BDL						1	mg/L				
2A. 2,4-Dichlor-Orophenol (120-83-2)	X			BDL						1	mg/L				
3A. 2,4-Dimeth-ylphenol (105-67-9)	X			BDL						1	mg/L				
4A. 4,6-Dinitro-o-cresol (534-52-1)	X			BDL						1	mg/L				
5A. 2,4-Dinitro-phenol (51-28-5)	X			BDL						1	mg/L				
6A. 2-Nitro-phenol (88-75-5)	X			BDL						1	mg/L				
7A. 4-Nitro-phenol (100-02-7)	X			BDL						1	mg/L				
8A. P-chloro-m-cresol (59-50-7)	X			BDL						1	mg/L				
9A. Pentachloro-phenol (87-88-5)	X			BDL						1	mg/L				
10A. Phenol (108-05-2)	X			BDL						1	mg/L				
11A. 2,4,6-Tri-chlorophenol (88-06-2)	X			BDL						1	mg/L				
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS															
1B. Acena-phthene (83-32-9)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
2B. Acenaphtylene (208-96-8)	X			BDL						1	mg/L				
3B. Anthracene (120-12-7)	X			BDL						1	mg/L				
4B. Benzidine (92-87-5)	X			BDL						1	mg/L				
5B. Benzo(a)-anthracene (56-55-3)	X			BDL						1	mg/L				
6B. Benzo(a)-pyrene (50-32-8)	X			BDL						1	mg/L				
7B. 3,4-Benzofluoranthene (205-99-2)	X			BDL						1	mg/L				
8B. Benzo(ghl) perylene (191-24-2)	X			BDL						1	mg/L				
9B. Benzo(k)-fluoranthene (207-08-9)	X			BDL						1	mg/L				
10B. Bis(2-chloroethoxy)-methane (111-91-1)	X			BDL						1	mg/L				
11B. Bis (2-chloroisopropyl)-Ether	X			BDL						1	mg/L				
12B. Bis (2-ethylhexyl)-phthalate (117-81-7)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
13B. 4-Bromo-phenyl Phenyl ether (101-55-3)	X			BDL						1	mg/L				
14B. Butyl-benzyl phthalate (85-68-7)	X			BDL						1	mg/L				
15B. 2-Chloro-naphthalene (7005-72-3)	X			BDL						1	mg/L				
16B. 4-Chloro-phenyl phenyl ether (7005-72-3)	X			BDL						1	mg/L				
17B. Chrysene (218-01-9)	X			BDL						1	mg/L				
18B. Dibenzo-(a,h) Anthracene (53-70-3)	X			BDL						1	mg/L				
19B. 1,2-Dichloro-benzene (95-50-1)	X			BDL						1	mg/L				
20B. 1,3-Dichloro-Benzene (541-73-1)	X			BDL						1	mg/L				
21B. 1,4-Dichloro-benzene (106-46-7)	X			BDL						1	mg/L				
22B. 3,3-Dichloro-benzidene (91-94-1)	X			BDL						1	mg/L				
23B. Diethyl Phthalate (84-66-2)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
24B. Dimethyl Phthalate (131-11-3)	X			BDL						1	mg/L				
25B. Di-N-butyl Phthalate (84-74-2)	X			BDL						1	mg/L				
26B. 2,4-Dinitro-toluene (121-14-2)	X			BDL						1	mg/L				
27B. 2,6-Dinitro-toluene (606-20-2)	X			BDL						1	mg/L				
28B. Di-n-octyl Phthalate (117-84-0)	X			BDL						1	mg/L				
29B. 1,2-diphenyl-hydrazine (as azonbenzene) (122-66-7)	X			BDL						1	mg/L				
30B. Fluoranthene (208-44-0)	X			BDL						1	mg/L				
31B. Fluorene (86-73-7)	X			BDL						1	mg/L				
32B. Hexachloro-benzene (118-71-1)	X			BDL						1	mg/L				
33B. Hexachloro-butadiene (87-68-3)	X			BDL						1	mg/L				
34B. Hexachloro-cyclopenta-diene (77-47-4)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
35B. Hexachloroethane (67-72-1)	X			BDL						1	mg/L				
36B. Indneo-(1,2,3-oc)-Pyrene (193-39-5)	X			BDL						1	mg/L				
37B. Isophorone (78-59-1)	X			BDL						1	mg/L				
38B. Napthalene (91-20-3)	X			BDL						1	mg/L				
39B. Nitrobenzene (98-95-3)	X			BDL						1	mg/L				
40B. N-Nitrosodimethylamine (62-75-9)	X			BDL						1	mg/L				
41B. N-nitrosodi-n-propylamine (621-64-7)	X			BDL						1	mg/L				
42B. N-nitrosodiphenylamine (86-30-6)	X			BDL						1	mg/L				
43B. Phenanthrene (85-01-8)	X			BDL						1	mg/L				
44B. Pyrene (129-00-0)	X			BDL						1	mg/L				
45B. 1,2,4 Trichlorobenzene (120-82-1)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)			X												
2P. α-BHC (319-84-6)			X												
3P. β-BHC (58-89-9)			X												
4P. gamma-BHC (58-89-9)			X												
5P. δ-BHC (319-86-8)			X												
6P. Chlordane (57-74-9)			X												
7P. 4,4'-DDT (50-29-3)			X												
8P. 4,4'-DDE (72-55-9)			X												
9P. 4,4'-DDD (72-54-8)			X												
10P. Dieldrin (60-57-1)			X												
11P. α-Endosulfan (115-29-7)			X												
12P. β-Endosulfan (115-29-7)			X												
13P. Endosulfan Sulfate (1031-07-8)			X												
14P. Endrin (72-20-8)			X												

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
15P. Endrin Aldehyde (7421-93-4)			X												
16P Heptachlor (76-44-8)			X												
17P. Heptaclor Epoxide (1024-57-3)			X												
18P. PCB-1242 (53469-21-9)			X												
19P. PCB-1254 (11097-69-1)			X												
20P. PCB-1221 (11104-28-2)			X												
21P. PCB-1232 (11141-16-5)			X												
22P. PCB-1248 (12672-29-6)			X												
23P. PCB-1260 (11096-82-5)			X												
24P. PCB-1016 (12674-11-2)			X												
25P. Toxaphene (8001-35-2)			X												

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages. (See instructions)

Ghent – Misc. Once-Thru Cooling & West Plant Stormdrains

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3 of Form C) — **OUTFALL NO. 003**

Part A – You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No of Analyses
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
a. Biochemical Oxygen Demand (BOD)	<5.0				<5.0		1	mg/L				
b. Chemical Oxygen Demand (COD)	<25				<25		1	mg/L				
c. Total Organic Carbon (TOC)	2.7				2.7		1	mg/L				
d. Total Suspended Solids (TSS)	7				7		1	mg/L				
e. Ammonia (as N)	<0.25				<0.25		1	mg/L				
f. Flow (in units of MGD)	VALUE	37.4	VALUE		VALUE		1	MGD		VALUE		
g. Temperature (winter)	VALUE	25.7	VALUE		VALUE		1	°c		VALUE		
h. Temperature (summer)			VALUE		VALUE			°c		VALUE		
i. pH	MINIMUM	MAXIMUM 7.68	MINIMUM	MAXIMUM			1	STANDARD UNITS				

Part B - In the MARK "X" column, place an "X" in the Believed Present column for each pollutant you know or have reason to believe is present. Place an "X" in the Believed Absent column for each pollutant you believe to be absent. If you mark the Believed Present column for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	6. INTAKE (optional) a. Long-Term Avg Value (1) Concentration	6. INTAKE (optional) a. Long-Term Avg Value (2) Mass	6. INTAKE (optional) b. No. of Analyses
a. Bromide (24959-67-9)	X		< 0.50				< 0.50		1	mg/L				
b. Chloride	X		30				30		1	mg/L				
c. Chlorine, Total Residual	X		< 0.020 *				< 0.020 *		1	mg/L				
d. Color	X		< 25				< 25		1	ADMI				
e. Fecal ☐ Coliform Or E.coli ☒	X		14.6				14.6		1	MPN/100 ml				
f. Fluoride (16984-48-8)	X		< 0.50				< 0.50		1	mg/L				
g. Hardness (as $CaCO_3$)	X		170				170		1	mg/L				
h. Nitrate – Nitrite (as N)	X		< 0.75				< 0.75		1	mg/L				
i. Nitrogen, Total Organic (as N)	X		< 0.40				< 0.40		1	mg/L				
j. Oil and Grease	X		< 5.0				< 5.0		1	mg/L				
k. Phosphorous (as P), Total 7723-14-0	X		0.067				0.067		1	mg/L				
l. Radioactivity														
(1) Alpha, Total	X		<2.85				<2.85		1	pCi/L				
(2) Beta, Total	X		2.34				2.34		1	pCi/L				
(3) Radium Total	X		<1.11				<1.11		1	pCi/L				
(4) Radium, 226, Total	X		<0.516				<0.516		1	pCi/L				
(5) Strontium-90, Total	X		<0.747				<0.747		1	pCi/L				
(6 Uranium	X		0.829				0.829		1	ug/L				

* Total Residual Chlorine analysis reflects that no oxidants added (per KPDES permit)

Part B - Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value (1) Concentration	a. Long-Term Avg. Value (2) Mass	b. No. of Analyses
m. Sulfate (as SO_4) (14808-79-8)	X		77				77		1	mg/L				
n. Sulfide (as S)	X		< 0.50				< 0.50		1	mg/L				
o. Sulfite (as SO_4) (14286-46-3)	X		< 2.0				< 2.0		1	mg/L				
p. Surfactants	X		< 0.20				< 0.20		1	mg/L MBAS				
q. Aluminum, Total (7429-90)	X		0.12				0.12		1	mg/L				
r. Barium, Total (7440-39-3)	X		0.052				0.052		1	mg/L				
s. Boron, Total (7440-42-8)	X		0.25				0.25		1	mg/L				
t. Cobalt, Total (7440-48-4)	X		0.00029				0.00029		1	mg/L				
u. Iron, Total (7439-89-6)	X		0.20				0.20		1	mg/L				
v. Magnesium Total (7439-96-4)	X		15				15		1	mg/L				
w. Molybdenum Total (7439-98-7)	X		0.018				0.018		1	mg/L				
x. Manganese, Total (7439-96-6)	X		0.056				0.056		1	mg/L				
y. Tin, Total (7440-31-5)	X		<0.00050				<0.00050		1	mg/L				
z. Titanium, Total (7440-32-6)	X		<0.00030				<0.00030		1	mg/L				

Part C – If you are a primary industry and this outfall contains process wastewater, refer to Table C-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in the **Testing Required** column for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark this column (secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions), mark "X" in the **Believed Present** column for each pollutant you know or have reason to believe is present. Mark "X. in the **Believed Absent** column for each pollutant you believe to be absent. If you mark either the **Testing Required** or **Believed Present** columns for any pollutant, you must provide the result of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table (all seven pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
METALS, CYANIDE AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)	X			0.00030				0.00030		1	mg/L				
2M. Arsenic, Total (7440-38-2)	X			<0.0050				<0.0050		1	mg/L				
3M. Beryllium Total (7440-41-7)	X			<0.00020				<0.00020		1	mg/L				
4M. Cadmium Total (7440-43-9)	X			<0.00020				<0.00020		1	mg/L				
5M. Chromium Total (7440-43-9)	X			<0.0018				<0.0018		1	mg/L				
6M. Copper Total (7550-50-8)	X			0.0028				0.0028		1	mg/L				
7M. Lead Total (7439-92-1)	X			0.00045				0.00045		1	mg/L				
8M. Mercury Total (7439-97-6)	X			**< 5.0**				**< 5.0**		1	**ng/L**				
9M. Nickel, Total (7440-02-0)	X			0.0018				0.0018		1	mg/L				
10M. Selenium, Total (7782-49-2)	X			<0.00050				<0.00050		1	mg/L				
11M. Silver, Total (7440-28-0)	X			<0.00030				<0.00030		1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X" a. Testing Required	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	3. EFFLUENT a. Maximum Daily Value (2) Mass	3. EFFLUENT b. Maximum 30-Day Value (if available) (1) Concentration	3. EFFLUENT b. Maximum 30-Day Value (if available) (2) Mass	3. EFFLUENT c. Long-Term Avg. Value (if available) (1) Concentration	3. EFFLUENT c. Long-Term Avg. Value (if available) (2) Mass	3. EFFLUENT d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	5. INTAKE (optional) a. Long-Term Avg Value (1) Concentration	5. INTAKE (optional) a. Long-Term Avg Value (2) Mass	5. INTAKE (optional) b. No. of Analyses
METALS, CYANIDE AND TOTAL PHENOLS (Continued)															
12M. Thallium, Total (7440-28-0)	X			<0.00010				<0.00010		1	mg/L				
13M. Zinc, Total (7440-66-6)	X			0.0069				0.0069		1	mg/L				
14M. Cyanide, Total (57-12-5)	X			< 0.0050				< 0.0050		1	mg/L				
15M. Phenols, Total	X			< 0.010				< 0.010		1	mg/L				
DIOXIN															
2,3,7,8 Tetra-chlorodibenzo, P, Dioxin (1784-01-6)			X	DESCRIBE RESULTS:											
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	X			BDL						1	mg/L				
2V. Acrylonitrile (107-13-1)	X			BDL						1	mg/L				
3V. Benzene (71-43-2)	X			BDL						1	mg/L				
5V. Bromoform (75-25-2)	X			BDL						1	mg/L				
6V. Carbon Tetrachloride (56-23-5)	X			BDL						1	mg/L				
7V. Chloro-benzene (108-90-7)	X			BDL						1	mg/L				
8V. Chlorodibro-momethane (124-48-1)	X			BDL						1	mg/L				

Part C – Continued															
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
9V. Chloroethane (74-00-3)	X			BDL						1	mg/L				
10V. 2-Chloro-ethylvinyl Ether (110-75-8)	X			BDL						1	mg/L				
11V. Chloroform (67-66-3)	X			BDL						1	mg/L				
12V. Dichloro-bromomethane (75-71-8)	X			BDL						1	mg/L				
14V. 1,1-Dichloroethane (75-34-3)	X			BDL						1	mg/L				
15V. 1,2-Dichloroethane (107-06-2)	X			BDL						1	mg/L				
16V. 1,1-Dichlorethylene (75-35-4)	X			BDL						1	mg/L				
17V. 1,2-Di-chloropropane (78-87-5)	X			BDL						1	mg/L				
18V. 1,3-Dichloropro-pylene (452-75-6)	X			BDL						1	mg/L				
19V. Ethyl-benzene (100-41-4)	X			BDL						1	mg/L				
20V. Methyl Bromide (74-83-9)	X			BDL						1	mg/L				

Part C – Continued															
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
21V. Methyl Chloride (74-87-3)	X			BDL						1	mg/L				
22V. Methylene Chloride (75-00-2)	X			BDL						1	mg/L				
23V. 1,1,2,2-Tetrachloro-ethane (79-34-5)	X			BDL						1	mg/L				
24V. Tetrachloro-ethylene (127-18-4)	X			BDL						1	mg/L				
25V. Toluene (108-88-3)	X			BDL						1	mg/L				
26V. 1,2-Trans-Dichloro-ethylene (156-60-5)	X			BDL						1	mg/L				
27V. 1,1,1-Tri-chloroethane (71-55-6)	X			BDL						1	mg/L				
28V. 1,1,2-Tri-chloroethane (79-00-5)	X			BDL						1	mg/L				
29V. Trichloro-ethylene (79-01-6)	X			BDL						1	mg/L				
30V. Vinyl Chloride (75-01-4)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses	
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass		
GC/MS FRACTION – ACID COMPOUNDS																
1A. 2-Chloro-phenol (95-57-8)	X			BDL						1	mg/L					
2A. 2,4-Dichlor-Orophenol (120-83-2)	X			BDL						1	mg/L					
3A. 2,4-Dimeth-ylphenol (105-67-9)	X			BDL						1	mg/L					
4A. 4,6-Dinitro-o-cresol (534-52-1)	X			BDL						1	mg/L					
5A. 2,4-Dinitro-phenol (51-28-5)	X			BDL						1	mg/L					
6A. 2-Nitro-phenol (88-75-5)	X			BDL						1	mg/L					
7A. 4-Nitro-phenol (100-02-7)	X			BDL						1	mg/L					
8A. P-chloro-m-cresol (59-50-7)	X			BDL						1	mg/L					
9A. Pentachloro-phenol (87-88-5)	X			BDL						1	mg/L					
10A. Phenol (108-05-2)	X			BDL						1	mg/L					
11A. 2,4,6-Tri-chlorophenol (88-06-2)	X			BDL						1	mg/L					
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS																
1B. Acena-phthene (83-32-9)	X			BDL						1	mg/L					

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses	
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass		
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)																
2B. Acenaphtylene (208-96-8)	X			BDL						1	mg/L					
3B. Anthracene (120-12-7)	X			BDL						1	mg/L					
4B. Benzidine (92-87-5)	X			BDL						1	mg/L					
5B. Benzo(a)-anthracene (56-55-3)	X			BDL						1	mg/L					
6B. Benzo(a)-pyrene (50-32-8)	X			BDL						1	mg/L					
7B. 3,4-Benzofluoranthene (205-99-2)	X			BDL						1	mg/L					
8B. Benzo(ghl) perylene (191-24-2)	X			BDL						1	mg/L					
9B. Benzo(k)-fluoranthene (207-08-9)	X			BDL						1	mg/L					
10B. Bis(2-chloroethoxy)-methane (111-91-1)	X			BDL						1	mg/L					
11B. Bis (2-chloroisopropyl)-Ether	X			BDL						1	mg/L					
12B. Bis (2-ethylhexyl)-phthalate (117-81-7)	X			BDL						1	mg/L					

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
13B. 4-Bromo-phenyl Phenyl ether (101-55-3)	X			BDL						1	mg/L				
14B. Butyl-benzyl phthalate (85-68-7)	X			BDL						1	mg/L				
15B. 2-Chloro-naphthalene (7005-72-3)	X			BDL						1	mg/L				
16B. 4-Chloro-phenyl phenyl ether (7005-72-3)	X			BDL						1	mg/L				
17B. Chrysene (218-01-9)	X			BDL						1	mg/L				
18B. Dibenzo-(a,h) Anthracene (53-70-3)	X			BDL						1	mg/L				
19B. 1,2-Dichloro-benzene (95-50-1)	X			BDL						1	mg/L				
20B. 1,3-Dichloro-Benzene (541-73-1)	X			BDL						1	mg/L				
21B. 1,4-Dichloro-benzene (106-46-7)	X			BDL						1	mg/L				
22B. 3,3-Dichloro-benzidene (91-94-1)	X			BDL						1	mg/L				
23B. Diethyl Phthalate (84-66-2)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
24B. Dimethyl Phthalate (131-11-3)	X			BDL						1	mg/L				
25B. Di-N-butyl Phthalate (84-74-2)	X			BDL						1	mg/L				
26B. 2,4-Dinitro-toluene (121-14-2)	X			BDL						1	mg/L				
27B. 2,6-Dinitro-toluene (606-20-2)	X			BDL						1	mg/L				
28B. Di-n-octyl Phthalate (117-84-0)	X			BDL						1	mg/L				
29B. 1,2-diphenyl-hydrazine (as azonbenzene) (122-66-7)	X			BDL						1	mg/L				
30B. Fluoranthene (208-44-0)	X			BDL						1	mg/L				
31B. Fluorene (86-73-7)	X			BDL						1	mg/L				
32B. Hexachloro-benzene (118-71-1)	X			BDL						1	mg/L				
33B. Hexachloro-butadiene (87-68-3)	X			BDL						1	mg/L				
34B. Hexachloro-cyclopenta-diene (77-47-4)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT						d. No. of Analyses	4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)			a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
35B. Hexachloroethane (67-72-1)	X			BDL						1	mg/L				
36B. Indneo-(1,2,3-oc)-Pyrene (193-39-5)	X			BDL						1	mg/L				
37B. Isophorone (78-59-1)	X			BDL						1	mg/L				
38B. Napthalene (91-20-3)	X			BDL						1	mg/L				
39B. Nitrobenzene (98-95-3)	X			BDL						1	mg/L				
40B. N-Nitrosodimethylamine (62-75-9)	X			BDL						1	mg/L				
41B. N-nitrosodi-n-propylamine (621-64-7)	X			BDL						1	mg/L				
42B. N-nitrosodiphenylamine (86-30-6)	X			BDL						1	mg/L				
43B. Phenanthrene (85-01-8)	X			BDL						1	mg/L				
44B. Pyrene (129-00-0)	X			BDL						1	mg/L				
45B. 1,2,4 Trichlorobenzene (120-82-1)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)			X												
2P. α-BHC (319-84-6)			X												
3P. β-BHC (58-89-9)			X												
4P. gamma-BHC (58-89-9)			X												
5P. δ-BHC (319-86-8)			X												
6P. Chlordane (57-74-9)			X												
7P. 4,4'-DDT (50-29-3)			X												
8P. 4,4'-DDE (72-55-9)			X												
9P. 4,4'-DDD (72-54-8)			X												
10P. Dieldrin (60-57-1)			X												
11P. α-Endosulfan (115-29-7)			X												
12P. β-Endosulfan (115-29-7)			X												
13P. Endosulfan Sulfate (1031-07-8)			X												
14P. Endrin (72-20-8)			X												

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
15P. Endrin Aldehyde (7421-93-4)			X												
16P Heptachlor (76-44-8)			X												
17P. Heptaclor Epoxide (1024-57-3)			X												
18P. PCB-1242 (53469-21-9)			X												
19P. PCB-1254 (11097-69-1)			X												
20P. PCB-1221 (11104-28-2)			X												
21P. PCB-1232 (11141-16-5)			X												
22P. PCB-1248 (12672-29-6)			X												
23P. PCB-1260 (11096-82-5)			X												
24P. PCB-1016 (12674-11-2)			X												
25P. Toxaphene (8001-35-2)			X												

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (use the same format) instead of completing these pages. (See instructions)

Ghent – Unit 2 Cooling Tower Blowdown

V. INTAKE AND EFFLUENT CHARACTERISTICS (Continued from page 3 of Form C) — **OUTFALL NO. 006-2**

Part A – You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No of Analyses
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
a. Biochemical Oxygen Demand (BOD)	<5.0				<5.0		1	mg/L				
b. Chemical Oxygen Demand (COD)	37				37		1	mg/L				
c. Total Organic Carbon (TOC)	13				13		1	mg/L				
d. Total Suspended Solids (TSS)	55				55		1	mg/L				
e. Ammonia (as N)	<0.25				<0.25		1	mg/L				
f. Flow (in units of MGD)	VALUE	1.2	VALUE		VALUE		1		MGD	VALUE		
g. Temperature (winter)	VALUE	37.2	VALUE		VALUE		1		°c	VALUE		
h. Temperature (summer)			VALUE		VALUE				°c	VALUE		
i. pH	MINIMUM	MAXIMUM 7.75	MINIMUM	MAXIMUM			1		STANDARD UNITS			

Part B - In the MARK "X" column, place an "X" in the Believed Present column for each pollutant you know or have reason to believe is present. Place an "X" in the Believed Absent column for each pollutant you believe to be absent. If you mark the Believed Present column for any pollutant, you must provide the results of at least one analysis for that pollutant. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (if available)	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	6. INTAKE (optional) a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	6. INTAKE (optional) b. No. of Analyses
a. Bromide (24959-67-9)	X		1.1				1.1		1	mg/L				
b. Chloride	X		150				150		1	mg/L				
c. Chlorine, Total Residual	X		0.18 *				0.18 *		1	mg/L				
d. Color	X		< 25				< 25		1	ADMI				
e. Fecal ☐ Coliform Or E.coli ☒	X		6.3				6.3		1	MPN/100 ml				
f. Fluoride (16984-48-8)	X		1.1				1.1		1	mg/L				
g. Hardness (as $CaCO_3$)	X		890				890		1	mg/L				
h. Nitrate – Nitrite (as N)	X		3.8				3.8		1	mg/L				
i. Nitrogen, Total Organic (as N)	X		1.5				1.5		1	mg/L				
j. Oil and Grease	X		< 6.7				< 6.7		1	mg/L				
k. Phosphorous (as P), Total 7723-14-0	X		0.92				0.92		1	mg/L				
l. Radioactivity														
(1) Alpha, Total	X		<5.57				<5.57		1	pCi/L				
(2) Beta, Total	X		18.1				18.1		1	pCi/L				
(3) Radium Total	X		<0.743				<0.743		1	pCi/L				
(4) Radium, 226, Total	X		<0.324				<0.324		1	pCi/L				
(5) Strontium-90, Total	X		<1.18				<1.18		1	pCi/L				
(6 Uranium	X		4.67				4.67		1	ug/L				

* Total Residual Chlorine analysis reflects all oxidants present, although no oxidants added (per KPDES permit) – also, as applicable here, Microbac Laboratories have acknowledged analytical interferences such as oxidized manganese are known to cause high bias/false positive test results.

Part B - Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X" a. Believed Present	2. MARK "X" b. Believed Absent	3. EFFLUENT a. Maximum Daily Value (1) Concentration	3. EFFLUENT a. Maximum Daily Value (2) Mass	3. EFFLUENT b. Maximum 30-Day Value (if available) (1) Concentration	3. EFFLUENT b. Maximum 30-Day Value (if available) (2) Mass	3. EFFLUENT c. Long-Term Avg. Value (if available) (1) Concentration	3. EFFLUENT c. Long-Term Avg. Value (if available) (2) Mass	3. EFFLUENT d. No. of Analyses	4. UNITS a. Concentration	4. UNITS b. Mass	5. INTAKE (optional) a. Long-Term Avg. Value (1) Concentration	5. INTAKE (optional) a. Long-Term Avg. Value (2) Mass	5. INTAKE (optional) b. No. of Analyses
m. Sulfate (as SO_4) (14808-79-8)	X		330				330		1	mg/L				
n. Sulfide (as S)	X		< 0.50				< 0.50		1	mg/L				
o. Sulfite (as SO_4) (14286-46-3)	X		< 2.0				< 2.0		1	mg/L				
p. Surfactants	X		< 0.20				< 0.20		1	mg/L MBAS				
q. Aluminum, Total (7429-90)	X		0.71				0.71		1	mg/L				
r. Barium, Total (7440-39-3)	X		0.26				0.26		1	mg/L				
s. Boron, Total (7440-42-8)	X		2.2				2.2		1	mg/L				
t. Cobalt, Total (7440-48-4)	X		0.0017				0.0017		1	mg/L				
u. Iron, Total (7439-89-6)	X		1.3				1.3		1	mg/L				
v. Magnesium Total (7439-96-4)	X		72				72		1	mg/L				
w. Molybdenum Total (7439-98-7)	X		0.15				0.15		1	mg/L				
x. Manganese, Total (7439-96-6)	X		0.22				0.22		1	mg/L				
y. Tin, Total (7440-31-5)	X		<0.00050				<0.00050		1	mg/L				
z. Titanium, Total (7440-32-6)	X		0.0089				0.0089		1	mg/L				

Part C – If you are a primary industry and this outfall contains process wastewater, refer to Table C-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in the **Testing Required** column for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark this column (secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions), mark "X" in the **Believed Present** column for each pollutant you know or have reason to believe is present. Mark "X" in the **Believed Absent** column for each pollutant you believe to be absent. If you mark either the **Testing Required** or **Believed Present** columns for any pollutant, you must provide the result of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table (all seven pages) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
METALS, CYANIDE AND TOTAL PHENOLS															
1M. Antimony Total (7440-36-0)	X			0.0015				0.0015		1	mg/L				
2M. Arsenic, Total (7440-38-2)	X			0.0078				0.0078		1	mg/L				
3M. Beryllium Total (7440-41-7)	X			<0.00020				<0.00020		1	mg/L				
4M. Cadmium Total (7440-43-9)	X			<0.00020				<0.00020		1	mg/L				
5M. Chromium Total (7440-43-9)	X			0.0064				0.0064		1	mg/L				
6M. Copper Total (7550-50-8)	X			0.22				0.22		1	mg/L				
7M. Lead Total (7439-92-1)	X			0.0021				0.0021		1	mg/L				
8M. Mercury Total (7439-97-6)	X			**8.61**				**8.61**		1	**ng/L**				
9M. Nickel, Total (7440-02-0)	X			0.011				0.011		1	mg/L				
10M. Selenium, Total (7782-49-2)	X			<0.00050				<0.00050		1	mg/L				
11M. Silver, Total (7440-28-0)	X			<0.00030				<0.00030		1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
METALS, CYANIDE AND TOTAL PHENOLS (Continued)															
12M. Thallium, Total (7440-28-0)	X			0.00015				0.00015		1	mg/L				
13M. Zinc, Total (7440-66-6)	X			0.029				0.029		1	mg/L				
14M. Cyanide, Total (57-12-5)	X			< 0.0050				< 0.0050		1	mg/L				
15M. Phenols, Total	X			< 0.010				< 0.010		1	mg/L				
DIOXIN															
2,3,7,8 Tetra-chlorodibenzo, P, Dioxin (1784-01-6)			X	DESCRIBE RESULTS:											
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	X			BDL						1	mg/L				
2V. Acrylonitrile (107-13-1)	X			BDL						1	mg/L				
3V. Benzene (71-43-2)	X			BDL						1	mg/L				
5V. Bromoform (75-25-2)	X			BDL						1	mg/L				
6V. Carbon Tetrachloride (56-23-5)	X			BDL						1	mg/L				
7V. Chloro-benzene (108-90-7)	X			BDL						1	mg/L				
8V. Chlorodibro-momethane (124-48-1)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
9V. Chloroethane (74-00-3)	X			BDL						1	mg/L				
10V. 2-Chloro-ethylvinyl Ether (110-75-8)	X			BDL						1	mg/L				
11V. Chloroform (67-66-3)	X			BDL						1	mg/L				
12V. Dichloro-bromomethane (75-71-8)	X			BDL						1	mg/L				
14V. 1,1-Dichloroethane (75-34-3)	X			BDL						1	mg/L				
15V. 1,2-Dichloroethane (107-06-2)	X			BDL						1	mg/L				
16V. 1,1-Dichlorethylene (75-35-4)	X			BDL						1	mg/L				
17V. 1,2-Di-chloropropane (78-87-5)	X			BDL						1	mg/L				
18V. 1,3-Dichloropro-pylene (452-75-6)	X			BDL						1	mg/L				
19V. Ethyl-benzene (100-41-4)	X			BDL						1	mg/L				
20V. Methyl Bromide (74-83-9)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
21V. Methyl Chloride (74-87-3)	X			BDL						1	mg/L				
22V. Methylene Chloride (75-00-2)	X			BDL						1	mg/L				
23V. 1,1,2,2-Tetrachloro-ethane (79-34-5)	X			BDL						1	mg/L				
24V. Tetrachloro-ethylene (127-18-4)	X			BDL						1	mg/L				
25V. Toluene (108-88-3)	X			BDL						1	mg/L				
26V. 1,2-Trans-Dichloro-ethylene (156-60-5)	X			BDL						1	mg/L				
27V. 1,1,1-Tri-chloroethane (71-55-6)	X			BDL						1	mg/L				
28V. 1,1,2-Tri-chloroethane (79-00-5)	X			BDL						1	mg/L				
29V. Trichloro-ethylene (79-01-6)	X			BDL						1	mg/L				
30V. Vinyl Chloride (75-01-4)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
GC/MS FRACTION – ACID COMPOUNDS															
1A. 2-Chloro-phenol (95-57-8)	X			BDL						1	mg/L				
2A. 2,4-Dichlor-Orophenol (120-83-2)	X			BDL						1	mg/L				
3A. 2,4-Dimeth-ylphenol (105-67-9)	X			BDL						1	mg/L				
4A. 4,6-Dinitro-o-cresol (534-52-1)	X			BDL						1	mg/L				
5A. 2,4-Dinitro-phenol (51-28-5)	X			BDL						1	mg/L				
6A. 2-Nitro-phenol (88-75-5)	X			BDL						1	mg/L				
7A. 4-Nitro-phenol (100-02-7)	X			BDL						1	mg/L				
8A. P-chloro-m-cresol (59-50-7)	X			BDL						1	mg/L				
9A. Pentachloro-phenol (87-88-5)	X			BDL						1	mg/L				
10A. Phenol (108-05-2)	X			BDL						1	mg/L				
11A. 2,4,6-Tri-chlorophenol (88-06-2)	X			BDL						1	mg/L				
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS															
1B. Acena-phthene (83-32-9)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
2B. Acenaphtylene (208-96-8)	X			BDL						1	mg/L				
3B. Anthracene (120-12-7)	X			BDL						1	mg/L				
4B. Benzidine (92-87-5)	X			BDL						1	mg/L				
5B. Benzo(a)-anthracene (56-55-3)	X			BDL						1	mg/L				
6B. Benzo(a)-pyrene (50-32-8)	X			BDL						1	mg/L				
7B. 3,4-Benzofluoranthene (205-99-2)	X			BDL						1	mg/L				
8B. Benzo(ghl) perylene (191-24-2)	X			BDL						1	mg/L				
9B. Benzo(k)-fluoranthene (207-08-9)	X			BDL						1	mg/L				
10B. Bis(2-chloroethoxy)-methane (111-91-1)	X			BDL						1	mg/L				
11B. Bis (2-chloroisopropyl)-Ether	X			BDL						1	mg/L				
12B. Bis (2-ethylhexyl)-phthalate (117-81-7)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
13B. 4-Bromo-phenyl Phenyl ether (101-55-3)	X			BDL						1	mg/L				
14B. Butyl-benzyl phthalate (85-68-7)	X			BDL						1	mg/L				
15B. 2-Chloro-naphthalene (7005-72-3)	X			BDL						1	mg/L				
16B. 4-Chloro-phenyl phenyl ether (7005-72-3)	X			BDL						1	mg/L				
17B. Chrysene (218-01-9)	X			BDL						1	mg/L				
18B. Dibenzo-(a,h) Anthracene (53-70-3)	X			BDL						1	mg/L				
19B. 1,2-Dichloro-benzene (95-50-1)	X			BDL						1	mg/L				
20B. 1,3-Dichloro-Benzene (541-73-1)	X			BDL						1	mg/L				
21B. 1,4-Dichloro-benzene (106-46-7)	X			BDL						1	mg/L				
22B. 3,3-Dichloro-benzidene (91-94-1)	X			BDL						1	mg/L				
23B. Diethyl Phthalate (84-66-2)	X			BDL						1	mg/L				

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
24B. Dimethyl Phthalate (131-11-3)	X			BDL						1	mg/L				
25B. Di-N-butyl Phthalate (84-74-2)	X			BDL						1	mg/L				
26B. 2,4-Dinitro-toluene (121-14-2)	X			BDL						1	mg/L				
27B. 2,6-Dinitro-toluene (606-20-2)	X			BDL						1	mg/L				
28B. Di-n-octyl Phthalate (117-84-0)	X			BDL						1	mg/L				
29B. 1,2-diphenyl-hydrazine (as azonbenzene) (122-66-7)	X			BDL						1	mg/L				
30B. Fluoranthene (208-44-0)	X			BDL						1	mg/L				
31B. Fluorene (86-73-7)	X			BDL						1	mg/L				
32B. Hexachloro-benzene (118-71-1)	X			BDL						1	mg/L				
33B. Hexachloro-butadiene (87-68-3)	X			BDL						1	mg/L				
34B. Hexachloro-cyclopenta-diene (77-47-4)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value (1) Concentration	a. Maximum Daily Value (2) Mass	b. Maximum 30-Day Value (if available) (1) Concentration	b. Maximum 30-Day Value (if available) (2) Mass	c. Long-Term Avg. Value (if available) (1) Concentration	c. Long-Term Avg. Value (if available) (2) Mass	d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value (1) Concentration	a. Long-Term Avg Value (2) Mass	b. No. of Analyses
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (Continued)															
35B. Hexachloroethane (67-72-1)	X			BDL						1	mg/L				
36B. Indneo-(1,2,3-oc)-Pyrene (193-39-5)	X			BDL						1	mg/L				
37B. Isophorone (78-59-1)	X			BDL						1	mg/L				
38B. Napthalene (91-20-3)	X			BDL						1	mg/L				
39B. Nitrobenzene (98-95-3)	X			BDL						1	mg/L				
40B. N-Nitrosodimethylamine (62-75-9)	X			BDL						1	mg/L				
41B. N-nitrosodi-n-propylamine (621-64-7)	X			BDL						1	mg/L				
42B. N-nitrosodiphenylamine (86-30-6)	X			BDL						1	mg/L				
43B. Phenanthrene (85-01-8)	X			BDL						1	mg/L				
44B. Pyrene (129-00-0)	X			BDL						1	mg/L				
45B. 1,2,4 Trichlorobenzene (120-82-1)	X			BDL						1	mg/L				

Part C – Continued

1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg. Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)			X												
2P. α-BHC (319-84-6)			X												
3P. β-BHC (58-89-9)			X												
4P. gamma-BHC (58-89-9)			X												
5P. δ-BHC (319-86-8)			X												
6P. Chlordane (57-74-9)			X												
7P. 4,4'-DDT (50-29-3)			X												
8P. 4,4'-DDE (72-55-9)			X												
9P. 4,4'-DDD (72-54-8)			X												
10P. Dieldrin (60-57-1)			X												
11P. α-Endosulfan (115-29-7)			X												
12P. β-Endosulfan (115-29-7)			X												
13P. Endosulfan Sulfate (1031-07-8)			X												
14P. Endrin (72-20-8)			X												

Part C – Continued																
1. POLLUTANT And CAS NO. (if available)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (optional)			
	a. Testing Required	a. Believed Present	b. Believed Absent	a. Maximum Daily Value		b. Maximum 30-Day Value (if available)		c. Long-Term Avg. Value (if available)		d. No. of Analyses	a. Concentration	b. Mass	a. Long-Term Avg Value		b. No. of Analyses
				(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass	
GC/MS FRACTION – PESTICIDES															
15P. Endrin Aldehyde (7421-93-4)			X												
16P Heptachlor (76-44-8)			X												
17P. Heptaclor Epoxide (1024-57-3)			X												
18P. PCB-1242 (53469-21-9)			X												
19P. PCB-1254 (11097-69-1)			X												
20P. PCB-1221 (11104-28-2)			X												
21P. PCB-1232 (11141-16-5)			X												
22P. PCB-1248 (12672-29-6)			X												
23P. PCB-1260 (11096-82-5)			X												
24P. PCB-1016 (12674-11-2)			X												
25P. Toxaphene (8001-35-2)			X												

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM
FORM C -- INSTRUCTIONS

Listed below are explanations of select Form C questions. If further information is needed concerning any questions, please contact the Division of Water, at (502) 564-3410.

I. OUTFALL LOCATION

Use the map you provided for Item III of Form 1 to determine the latitude and longitude of each of your outfalls and the name of the receiving water.

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. The line drawing should show generally the route taken by water in your facility from intake to discharge. Show all operations contributing wastewater, including process and production areas, sanitary flows, cooling water, and storm water runoff. Group similar operations into a single unit and label to correspond to the more detailed listing in Item II.B. The water balance should show average flows. Show all significant losses of water to products, atmosphere, and discharge. Use actual measurements whenever available. Otherwise, use your best estimate.

B. List all sources of wastewater to each outfall. Operations may be described in general terms (for example, "dye-making reactor" or "distillation tower"). Estimate the flow contributed by each source if no data are available. For storm water, use any reasonable measure of duration, volume, or frequency. For each treatment unit, indicate its size, flow rate, and retention time; and describe the ultimate disposal of any solid or liquid wastes not discharged. Treatment units should be listed in order. Select the proper code from Table C-1 to fill in the treatment code for each treatment unit. Insert "XX" for the treatment code if no code corresponds to a treatment unit you have listed.

If the permit application is for a privately-owned treatment works, you must also identify all of your contributors in an attached listing.

C. A discharge is intermittent unless it occurs without interruption during the operating hours of the facility, except for shutdowns for maintenance, process changes, or other similar activities. A discharge is seasonal if it occurs during certain parts of the year. Fill in every applicable column in this item for each source of intermittent or seasonal discharge. Base your answers on actual data whenever available, otherwise, provide your best estimate. Report the highest daily for flow rate and total volume in the "Maximum Daily" columns. Report the average of all daily values measured during days when discharge occurred within the last year in the "Long Term Average" columns.

III. PRODUCTION

A. All effluent guidelines promulgated by EPA appear in the Federal Register and are published annually in 40 CFR Subchapter N. A guideline applies to you if you have any operations contributing process wastewater in any subcategory covered by a BPT, BCT, or BAT guideline. If you are unsure whether you are covered by a promulgated effluent guideline, check with the Department for Environmental Protection, Division of Water. You must check "yes" if an applicable effluent guideline has been promulgated, even if the guideline limitations are being contested in court. If you believe that promulgated effluent guideline has been remanded for reconsideration by a court and does not apply to your operation, you may check "no."

B. An effluent guideline is expressed in terms of production (or other measure of operation) if the limitation is expressed as mass of pollutant per operational parameter, for example, "pounds of BOD per cubic foot of logs from which bark is removed," or "pounds of TSS per megawatt hour of electrical energy consumed by smelting furnace." An example of a guideline not expressed in terms of a measure of operation is one that limits the concentration of pollutants.

C. This item must be completed only if you check "yes" to Item III.B. The production information requested here is necessary to apply effluent guidelines to your facility and you may not claim it as confidential. However, you do not have to indicate how the reported information was calculated.

Report quantities in the units of measurements used in the applicable effluent guidelines. The figures provided must be a measure of actual operation over a one month period, such as the production for the highest month during the last twelve months, or the monthly average production for the highest year of the last five years, or other reasonable measure of actual operation. But these figures may not be based on design capacity or on predictions of future increases in operation.

If you have two or more substantially identical outfalls, request permission from the Division of Water to sample and analyze only one outfall and submit the results of the analysis for other substantially identical outfalls. If your request is granted, identify on a separate sheet attached to the application form the outfall tested, and describe why the outfalls not tested are substantially identical to the tested outfall.

IV. IMPROVEMENTS

A. If you check "yes" to this question, complete all parts of the chart or attach a copy of any previous submission you have made to the Department for Environmental Protection containing the same information.

V. INTAKE AND EFFLUENT CHARACTERISTICS

This item requires you to collect and report data on the pollutants discharged for each of your outfalls. Each part of this item addresses a different set of pollutants and must be completed in accordance with the specific instructions for that part. The following general instructions apply to the entire item.

GENERAL INSTRUCTIONS

In the "Mark X" columns of Parts B and C mark only one box per pollutant. Part D requires you to list any of a group of pollutants which you believe to be present, with a brief explanation of why you believe it to be present. See specific instruction on the form and below for Parts A through D.

Base your determination that a pollutant is present in or absent from your discharge on your knowledge of your raw materials, maintenance chemicals, intermediate and final products and byproducts, and any previous analyses known to you of your effluent or of any similar effluent. (For example, if you manufacture pesticides, you should expect those pesticides to be present in contaminated storm water runoff.) If you would expect a pollutant to be present solely as a result of its presence in your intake water, you must mark "Believed Present" but "X" in that "Intake" column.

REPORTING

All levels must be reported as concentration and as total mass. Use the following abbreviations in the columns headed "Units" (column 3, Part A, and column 4, Parts B and C).

CONCENTRATIONS		MASS	
ppm	parts per million	lbs.	Pounds
mg/l	milligrams per liter	ton	Tons (english tons)
ppb	parts per billion	mg	Milligrams
µg/l	micrograms per liter	g	Grams
		kg	Kilograms
		T	Tonnes (metric tons)
		MGD	Million Gallons Per Day

If you measure only one daily value, complete only the "Maximum Daily Values" columns and insert "1" into the "Number of Analyses" columns (columns 2-a and 2-d, Part A, and columns 3-a and 3-d, Parts B and C).

For composite samples, the daily value is the total mass or average concentration found in a composite sample taken over the operating hours of the facility during a 24-hour period. For grab samples, the daily value is the arithmetic or flow-weighted total mass or average concentration found in a series of at least four grab samples taken over the operating hours of the facility during a 24-hour period.

If you measure more than one daily value for a pollutant, determine the average of all values within the last year and report the concentration and mass under the "Long-Term Average Values" columns (column 2-c, Part A, and column 3-c, Parts B and C). Also report the total number of daily values under the "Number of Analyses" columns (column 2-d, Part A, and column 3-d, Parts B and C). Determine the average of all daily values taken during each calendar month, and report the highest average under the "Maximum 30-Day Values" columns (2-b, Part A, and column 3-b, Parts B and C).

SAMPLING

The collection of the samples for the reported analyses should be supervised by a person experienced in performing sampling of industrial wastewater. You may contact the Department for Environmental Protection or appropriate regional office for detailed guidance on sampling techniques and for answers to specific questions. Any specific requirements contained in the applicable analytical methods should be followed for sample containers, sample preservation, holding times, the collection of duplicate samples, etc. The time when you sample should be representative of your normal operation, to the extent feasible, with all processes which contribute wastewater in normal operation, and with your treatment system operating properly with no system upsets.

ANALYSIS

Use test methods promulgated in 40 CFR Part 136; however, if none have been promulgated for a particular pollutant, use any suitable methods for measuring the level of the pollutant in your discharge provided that you submit a description of the methods or a reference to a published method. Your description should include the sample holding times, preservation techniques, and the quality control measures used.

REPORTING OF INTAKE DATA

You are not required to report data under the "Intake" columns unless you wish to demonstrate your eligibility for a "net" effluent limitation for one or more pollutants, that is, effluent limitations adjusted by subtracting the average level of the pollutant(s) present in your intake water. 401 KAR 5:065, Section 3(7), allows net limitations only in certain circumstances. To demonstrate your eligibility, report the average of the results of analysis on your intake water in the "Intake" columns (if your water is treated before use, test the water after it is treated), and attach a separate sheet containing the following for each pollutant:

1. A statement that the intake and discharge are from the same water body (Otherwise, you are not eligible for net limitations);
2. A statement of the extent to which the level of the pollutant is reduced by treatment of your wastewater (Your limitations will be adjusted only to the extent that the pollutant is not removed);
3. When applicable (for example, when the pollutant represents a class of compounds), a demonstration of the extent to which the pollutants in the intake vary physically, chemically, or biologically from the pollutants contained in your discharge. (Your limitations will be adjusted only to the extent that the intake pollutants do not vary from the discharged pollutants.)

SPECIFIC INSTRUCTIONS

A. This part must be completed by all applicants for all outfalls, including outfalls containing only noncontact cooling water or storm runoff. However, at your request, the Division of Water may waive the requirements to test for one or more of these pollutants upon a determination that testing for the pollutant(s) is not appropriate for your effluents.

Use grab samples for pH and temperature. Use composite samples for all pollutants in this part. See discussion in General Instructions to Item V for definitions of the columns in Part A. The "Long-Term Average Values" column (column 2-c) and "Maximum 30-Day Values" column (column 2-b) are not compulsory but should be filled out if data are available.

B. This part must be completed by all applicants for all outfalls including those containing only noncontact cooling water or storm runoff.

Use composite samples for all pollutants you analyze in this part, except use grab samples for residual chlorine, oil and grease, fecal coliform, and E.coli. The "Long-Term Average Values" column (column 3-b) are not compulsory but should be filled out if data are available.

C. Table C-2 lists the 34 "primary" industry categories in the left-hand column. For each outfall, if any of your processes which contribute wastewater falls into one of those categories, you must mark "X" in "Testing Required" column (column 2-a) and test for: (A) all of the toxic metals, cyanide, and total phenols; and (B) the organic toxic pollutants contained in the gas chromatography/mass spectrometry (GC/MS) fractions indicated in Table C-2 as applicable to your category, unless you qualify as a small business (see below). The organic toxic pollutants are listed by GC/MS fractions on pages V-4 through V-10 in Part V-C. For example, the Organic Chemical industry has an "X" in all four fractions; therefore, applicants in this category must test for all organic toxic pollutants in Part V-C. If you are applying for a permit for a privately owned treatment works, determine your testing contributors. The industry category you use for testing requirements is not used to categorize you for any other purpose.

For all other cases (secondary industries, non-process wastewater outfalls, and non-required GC/MS fractions), you must mark "X" in either the "Believed Present" column (column 2-b) or the "Believed Absent" column (column 2-c) for each

pollutant, and test for those you believe present (those marked "X" in column 2-b). If you qualify as a small business (see below) you are exempt from testing for the organic toxic pollutants listed on page V-4 through V-10 in Part C. For pollutants in intake water, see discussion in General Instructions to this item. The "Long-Term Average Values" column (column 3-c) and "Maximum 30-Day Values" column (column 3-b) are not compulsory but should be filled out if data are available.

Use grab samples for total phenols and cyanide. Use composite samples for all other pollutants in this part.

Mark "Testing Required" for dioxin if you use or manufacture one of the following compounds:

A. 2,4,5-trichlorophenoxy acetic acid (2,4,5-T);
B. 2-(2,4,5-trichlorophenoxy) propanoic acid (Silvex, 2,4,5,-TP);
C. 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate (Erbon);
D. 0, 0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate (Ronnel);
E. 2,4,5-trichlorophenol (TCP); or
F. Hexachlorophene (HCP)

If you mark "Testing Required" or "Believed Present" you must perform a screening analysis for dioxins, using gas chromotography with an electron capture detector. A TCDD standard for quantification is not required. Describe the results of this analysis in the space provided, for example, "no measurable baseline deflection at the retention time of TCDD" or "a measurable peak within the tolerances of the retention time of TCDD." You may be required to perform a quantitative analysis if you report a positive result.

The Engineering and Analysis Division of EPA has collected and analyzed samples from some facilities for the pollutants listed in Part C in the course of its BAT guidelines development program. If your effluents were sampled and analyzed as part of this program in the last three years, you may use this data to answer Part C. This may be done provided that no process change or change in raw materials, process or operating practices has occurred since the samples were taken which would make the analyses unrepresentative of your current discharge.

Small Business Exemption

If you qualify as a "small business," under 401 KAR 5:060, Section 2(8) you are exempt from the reporting requirements for the organic toxic pollutants listed on pages 9 through 18 in Part C. If your facility is a coal mine with a probable total annual production of less than 100,000 tons, you may submit past production data or estimated future production (such as a schedule of estimated total production under 30 CFR Section 795.14(c)) instead of conducting analyses for the organic toxic pollutants. If your facility is not a coal mine, and if your gross total annual sales for the most recent three years average less than $100,000 per year (in second quarter 1980 dollars), you may submit sales data for those years instead of conducting analyses for the organic toxic pollutants.

The production or sales data must be for the facility that is the source of the discharge. The data should not be limited to production or sales for the process or processes that contribute to the discharge, unless those are the only processes of your facility. For sales data, in situations involving intra-corporate transfers of goods and services, the transfer price per unit should approximate market prices for those goods and services as closely as possible. Sales figures for years after 1980 should be indexed to the second quarter of 1980 by using the gross national product prices deflator (second quarter of 1980 = 100). This index is available in "National Income and Product Accounts of the United States" (U.S. Department of Commerce, Bureau of Economic Analysis).

D. List any pollutants in Table C-3 that you believe to be present and explain why you believe them to be present. No analysis is required, but if you have analytical data, you must report it also.

NOTE: Under 40 CFR 117.12(a)(2), certain discharges of hazardous substances (listed in Table C-3 of these instructions) may be exempted from the requirements of Section 311 of the Clean Water Act (33 USC Section 1321), which establishes reporting requirements, civil penalties, and liability for cleanup costs for spills of oil and hazardous substances. A discharge of a particular substance may be exempted if the origin, source, and amount of the discharged substance are identified in the KPDES permit application or in the permit, if the permit contains a requirement for treatment of the discharge, and if the treatment is in place. To apply for an exclusion of the discharge of any hazardous substance from the requirement of Section 311, attach additional sheets of paper to your form, setting forth the following information:

A. the substance and the amount of each substance which may be discharged;
B. the origin and source of the discharge of the substance;
C. the treatment which is provided or to be provided for the discharge by:

1. an on-site treatment system separate from any treatment system treating your normal discharge;
2. a treatment system designed to treat your normal discharge and which is additionally capable of treating the amount of the substance identified under paragraph 1 above; or

3. any combination of the above.

See 40 CFR Section 117.12(a)(2) and (c), published on August 29, 1979, or contact the Division of Water for further information on exclusions from Section 311.

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

A. You may not claim this information as confidential. However, you do not have to distinguish between use of production of the pollutants or list the amounts. Under KPDES regulations, your permit will contain limits to control all pollutants you report in answer to this question, as well as pollutants reported in Item V and VI.B at levels exceeding the technology-based limits appropriate to your facility. Your permit will also require you to report to the Department for Environmental Protection if you begin or expect to begin to use or manufacture any toxic pollutant as an immediate or final product or byproduct which you did not report here. Your permit may be modified at that time if necessary to control that pollutant.

B. Consider only those variations which may result in the concentrations of pollutants in effluents which exceed twice the maximum values you reported in Item V. These variations may be part of your routing operations, or part of your regular cleaning cycles.

Under KPDES regulations, your permit will contain limits to control any pollutant that you report in this item at levels exceeding the technology-based limits appropriate to your facility. Your permit will also require you to report to the Department for Environmental Protection if you know or have reason to believe that any toxic pollutant two times the maximum values reported in Item V-C or in this item. Your permit may be modified at that time if necessary to control the pollutant.

Do not consider variations that are the result of bypasses or upsets. Increased levels of pollutants that are discharged as a result of bypasses or upsets are regulated separately under KPDES regulations.

C. Variation exemptions to be described here include:

Changes in raw or intermediate materials
Changes in process equipment or materials;
Changes in product lines;
Significant chemical reactions among pollutants in waste streams; and
Significant variation in removal efficiencies of pollution control equipment.

You may indicate other types of variations as well, except those that are the result of bypasses or upsets. You may be required to further investigate or document variations you report here.

Base your prediction on expected levels of these pollutants upon your knowledge of your processes, raw materials, past and projected product ranges, etc., or upon any testing of your effluent which indicates the range of variability that can be expected over the next five years.

EXAMPLE: Outfall 001 discharges water used to clean six 500-gallon tanks. These tanks are used for formulation of dispersions of synthetic resins in water (adhesives). Use of toxic pollutants which can be expected in the next 5 years is:

1. copper acetate inhibitor, 1/2 lb. per tank;
2. dibutyl phthalate, 50 lbs. per tank;
3. toluene, 5 lbs. per tank; and
4. antimony oxide, 1 lb. per tank.

Based on normal cleaning, an average of 1% and a maximum of 3% of the contents of each tank is collected and discharged once every two weeks in the 150 gallons of water used for cleaning. Treatment (pH adjustment, flocculation, filtration) removes 85% of metals and 50% of organic compounds.

IX. CERTIFICATION

The certification is to be signed as follows:

Corporation: by a principal officer of at least the level of vice president.

Partnership or sole proprietorship: by a general partner or the proprietor, respectively.

Municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official.

TABLE C-1
CODES FOR TREATMENT UNITS
(For use with Form C, Item II, Part B)

PHYSICAL TREATMENT PROCESSES

1-A	Ammonia Stripping	1-M	Grit Removal
1-B	Dialysis	1-N	Microstraining
1-C	Diatomaceous Earth Filtration	1-O	Mixing
1-D	Distillation	1-P	Moving Bed Filters
1-E	Electrodialysis	1-Q	Multimedia Filtration
1-F	Evaporation	1-R	Rapid Sand Filtration
1-G	Flocculation	1-S	Reverse Osmosis (Hyperfiltration)
1-H	Flotation	1-T	Screening
1-I	Foam Fractionation	1-U	Sedimentation (Settling)
1-J	Freezing	1-V	Slow Sand Filtration
1-K	Gas-Phase Separation	1-W	Solvent Extraction
1-L	Grinding (Comminutors)	1-X	Sorption

CHEMICAL TREATMENT PROCESSES

2-A	Carbon Adsorption	2-G	Disinfection (Ozone)
2-B	Chemical Oxidation	2-H	Disinfection (Other)
2-C	Chemical Precipitation	2-I	Electrochemical Treatment
2-D	Coagulation	2-J	Ion Exchange
2-E	Dechlorination	2-K	Neutralization
2-F	Disinfection (Chlorine)	2-L	Reduction

BIOLOGICAL TREATMENT PROCESSES

3-A	Activated Sludge	3-E	Pre-Aeration
3-B	Aerated Lagoons	3-F	Spray Irrigation/Land Application
3-C	Anaerobic Treatment	3-G	Stabilization Ponds
3-D	Nitrification-Denitrification	3-H	Trickling Filtration

OTHER PROCESSES

4-A	Discharge to Surface Water	4-C	Reuse/Recycle of Treated Effluent
4-B	Ocean Discharge Through Outfall	4-D	Underground Injection

SLUDGE TREATMENT AND DISPOSAL PROCESSES

5-A	Aerobic Digestion	5-M	Heat Drying
5-B	Anaerobic Digestion	5-N	Heat Treatment
5-C	Belt Filtration	5-O	Incineration
5-D	Centrifugation	5-P	Land Application
5-E	Chemical Conditioning	5-Q	Landfill
5-F	Chlorine Treatment	5-R	Pressure Filtration
5-G	Composting	5-S	Pyrolysis
5-H	Drying Beds	5-T	Sludge Lagoons
5-I	Elutriation	5-U	Vacuum Filtration
5-J	Flotation Thickening	5-V	Vibration
5-K	Freezing	5-W	Wet Oxidation
5-L	Gravity Thickening		

TABLE C-2
TESTING REQUIREMENTS FOR ORGANIC TOXIC POLLUTANTS BY INDUSTRY CATEGORY*
(For use with Form C, Item V, Part C)

INDUSTRY CATEGORY	GC/MS FRACTION[1] Volatile	Acid	Base/Neutral	Pesticide
Adhesives and sealants	x	x	x	-
Aluminum forming	x	x	x	-
Auto and other laundries	x	x	x	x
Battery manufacturing	x	-	x	-
Coal mining	-*	-*	-*	-*
Coil coating	x	x	x	-
Copper forming	x	x	x	-
Electric and electronic compounds	x	x	x	x
Electroplating	x	x	x	-
Explosives manufacturing	-	x	x	-
Foundries	x	x	x	-
Gum and wood chemicals	x	x	x	-
Inorganic chemicals manufacturing	x	x	x	-
Iron and steel manufacturing	x	x	x	-
Leather tanning and finishing	x	x	x	-*
Mechanical products manufacturing	x	x	x	-
Nonferrous metals manufacturing	x	x	x	x
Ore mining	x	x	x	x
Organic chemicals manufacturing	x	x	x	x
Paint and ink formulation	x	x	x	-*
Pesticides	x	x	x	x
Petroleum refining	x	-	-	-
Pharmaceutical preparation	x	x	x	-
hotographic equipment and supplies	x	x	x	-*
Plastic and synthetic materials manufacturing	x	x	x	x
Plastic processing	x	-	-	-
Porcelain enameling	-*	-*	-*	-*
Printing and publishing	x	x	x	x
Pulp and paperboard mills	x	x	x	x
Rubber Processing	x	x	x	-
Soap and detergent manufacturing	x	x	x	-
Steam electric power plants	x	x	x	-
Textile mills	x	x	x	x
Timber products processing	x	x	x	x

***See note at conclusion of 40 CFR Part 122, Appendix D (1983) for explanation of effect of suspensions on testing requirements for primary industry categories. See Note 1 at 46 FR 2045, Jan. 8, 1981; Note 2 at 46 FR22585, Apr. 20, 1981; and Note 3 at FR 35090, July 1, 1981.**

1 The pollutants in each fraction are listed in item V-C.

x = Testing required.

- = Testing not required.

TOXIC POLLUTANTS AND HAZARDOUS SUBSTANCES REQUIRED TO BE IDENTIFIED BY APPLICANTS IF EXPECTED TO BE PRESENT

(For use with Form C, Item V, Part D)

TOXIC POLLUTANT

Asbestos

HAZARDOUS SUBSTANCES

1.	Acetaldehyde	35.	Ammonium thiocyanate	69.	Calcium chromate
2.	Acetic Acid	36.	Ammonium thiosulfate	70.	Calcium cyanide
3.	Acetic anhydride	37.	Amyl acetate	71.	Calcium dodecylbenzenesulfonate
4.	Acetone cyanohydrin	38.	Aniline	72.	Calcium hypochlorite
5.	Acetyl bromide	39.	Antimony pentachloride	73.	Captan
6.	Acetyl chloride	40.	Antimony potassium tartrate	74.	Carbaryl
7.	Acrolein	41.	Antimony tribromide	75.	Carbofuran
8.	Acrylonitrile	42.	Antimony trichloride	76.	Carbon disulfide
9.	Adipic acid	43.	Antimony trifluoride	77.	Carbon tetrachloride
10.	Aldrin	44.	Antimony trioxide	78.	Chlordane
11.	Allyl alcohol	45.	Arsenic disulfide	79.	Chlorine
12.	Allyl chloride	46.	Arsenic pentoxide	80.	Chlorobenzene
13.	Aluminum sulfate	47.	Arsenic trichloride	81.	Chloroform
14.	Ammonia	48.	Arsenic trioxide	82.	Chloropyrifos
15.	Ammonium acetate	49.	Arsenic trisulfide	83.	Chlorosulfonic acid
16.	Ammonium benzoate	50.	Barium cyanide	84.	Chromic acetate
17.	Ammonium bicarbonate	51.	Benzene	85.	Chromic acid
18.	Ammonium bichromate	52.	Benzoic acid	86.	Chromic sulfate
19.	Ammonium bifluoride	53.	Benzonitrile	87.	Chromous chloride
20.	Ammonium bisulfite	54.	Benzoyl chloride	88.	Cobaltous bromide
21.	Ammonium carbamate	55.	Benzyl chloride	89.	Cobaltous formate
22.	Ammonium carbonate	56.	Beryllium chloride	90.	Cobaltous sulfamate
23.	Ammonium chloride	57.	Beryllium fluoride	91.	Coumaphos
24.	Ammonium chromate	58.	Beryllium nitrate	92.	Cresol
25.	Ammonium citrate	59.	Butylacetate	93.	Crotonaldehyde
26.	Ammonium fluoroborate	60.	n-Butylphthalate	94.	Cupric acetate
27.	Ammonium fluoride	61.	Butylamine	95.	Cupric acetoarsenite
28.	Ammonium hydroxide	62.	Butyric acid	96.	Cupric chloride
29.	Ammonium oxalate	63.	Cadmium acetate	97.	Cupric nitrate
30.	Ammonium silicofluoride	64.	Cadmium bromide	98.	Cupric oxalate
31.	Ammonium sulfamate	65.	Cadmium chloride	99.	Cupric sulfate
32.	Ammonium sulfide	66.	Cadmium arsenate	100.	Cupric sulfate ammoniated
33.	Ammonium sulfite	67.	Calcium arsenite	101.	Cupric tartrate
34.	Ammonium tartrate	68.	Calcium carbide	102.	Cyanogen chloride

HAZARDOUS SUBSTANCES (continued)

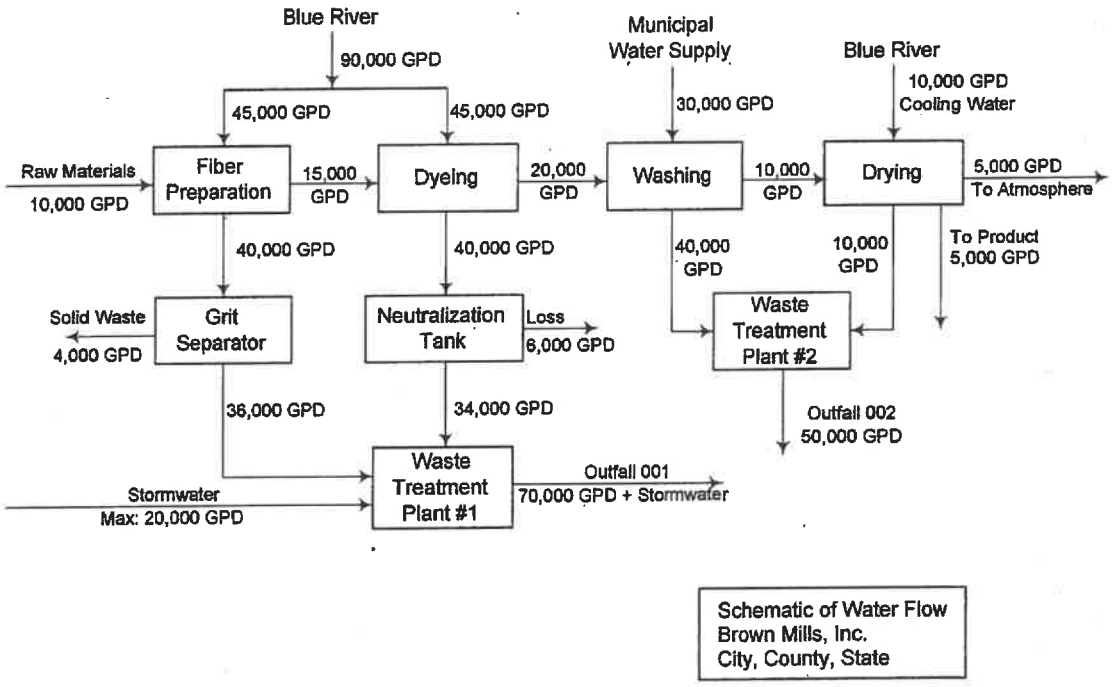
103.	Cyclohexane	134.	Ethylene dichloride	165.	Lead iodide
104.	2,4-D acid (2,4-Dichlorophenoxyacetic acid)	135.	Ethylene diaminetetracetic acid (EDTA)	166.	Lead nitrate
105.	2,4-D esters (2,4-Dichlorophenoxyacetic acid esters)	136.	Ferric ammonium citrate	167.	Lead stearate
106.	DDT	137.	Ferric ammonium oxalate	168.	Lead sulfate
107.	Diazinon	138.	Ferric chloride	169.	Lead sulfide
108.	Dicamba	139.	Ferric fluoride	170.	Lead thiocyanate
109.	Dichlobenil	140.	Ferric nitrate	171.	Lindane
110.	Dichlone	141.	Ferric sulfate	172.	Lithium chromate
111.	Dichlorobenzene	142.	Ferrous ammonium sulfate	173.	Malathion
112.	Dichloropropane	143.	Ferrous chloride	174.	Maleic acid
113.	Dichloropropene	144.	Ferrous sulfate	175.	Maleic anhydride
114.	Dichloropropene-dichloropropane mix	145.	Formaldehyde	176.	Mercaptodimethur
115.	2,2-Dichloropropionic acid	146.	Formic acid	177.	Mercuric cyanide
116.	Dichlorvos	147.	Fumaric acid	178.	Mercuric nitrate
117.	Dieldrin	148.	Furfural	179.	Mercuric sulfate
118.	Diethylamine	149.	Guthion	180.	Mercuric thiocyanate
119.	Dimethylamine	150.	Heptachlor	181.	Mercurous nitrate
120.	Dinitrobenzene	151.	Hexachlorocyclopentadiene	182.	Methoxychlor
121.	Dinitrophenol	152.	Hydrochloric acid	183.	Methyl mercaptan
122.	Dinitrotoluene	153.	Hydrofluoric acid	184.	Methyl methacrylate
123.	Diquat	154.	Hydrogen cyanide	185.	Methyl parathion
124.	Disulfoton	155.	Hydrogen sulfite	186.	Mevinphos
125.	Diuron	156.	Isoprene	187.	Mexacarbate
126.	Dodecylbenzesulfonic acid	157.	Isopropanolamine dodecylbenzenesulfonate	188.	Monoethylamine
127.	Endosulfan	158.	Kelthane	189.	Monomethylamine
128.	Endrin	159.	Kepone	190.	Naled
129.	Epichlorohydrin	160.	Lead acetate	191.	Naphthalene
130.	Ethion	161.	Lead arsenate	192.	Naphthenic acid
131.	Ethylbenzene	162.	Lead chloride	193.	Nickel ammonium sulfate
132.	Ethylenediamine	163.	Lead fluoborate	194.	Nickel chloride
133.	Ethylene dibromide	164.	Lead fluorite	195.	Nickel hydroxide

HAZARDOUS SUBSTANCES (continued)

196.	Nickel nitrate	221.	Propargite	246.	Sodium phosphate (tribasic)
197.	Nickel sulfate	222.	Propionic acid	247.	Sodium selenite
198.	Nitric acid	223.	Propionic anhydride	248.	Strontium choromate
199.	Nitrobenzene	224.	Propylene oxide	249.	Strychnine
200.	Nitrogen dioxide	225.	Pyrethrins	250.	Styrene
201.	Nitrophenol	226.	Quinoline	251.	Sulfuric acid
202.	Nitrotoluene	227.	Resorcinol	252.	Sulfur monochloride
203.	Paraformaldehyde	228.	Selenium oxide	253.	2,4,5-T acid (2,4,5-Trichlorophenoxy acetic acid)
204.	Parathion	229.	Silver nitrate	254.	2,4,5-T amines (2,4,5-Trichlorophenoxy acetic acid amines)
205.	Pentachlorophenol	230.	Sodium	255.	2,4,5-T esters (2,4,5-Trichlorophenoxy acetic acid esters)
206.	Phenol	231.	Sodium arsenate	256.	2,4,5-salts (2,4,5-Trichlorophenoxy acetic acid salts)
207.	Phosgene	232.	Sodium arsenite	257.	2,4,5-TP acid (2,4,5-Trichlorophenoxy propanoic acid)
208.	Phosphoric acid	233.	Sodium bichromate	258.	2,4,5-TP acid esters (2,4,5-Trichlorophenoxy propanoic acid esters)
209.	Phosphorus	234.	Sodium bifluoride	259.	TDE (Tetrachlorodiphenyl ethane)
210.	Phosphorus oxychloride	235.	Sodium bisulfite	260.	Tetraethyl lead
211.	Phosphorus pentasulfide	236.	Sodium chromate	261.	Tetraethyl pyrophosphate
212.	Phosphorus trichloride	237.	Sodium cyanide	262.	Thallium sulfate
213.	Polychlorinated biphenyls (PCB)	238.	Sodium dodecylbenzenesulfonate	263.	Toluene
214.	Potassium arsenate	239.	Sodium fluoride	264.	Toxaphene
215.	Potassium arsenite	240.	Sodium hydrosulfide	265.	Trichlorofon
216.	Potassium bichromate	241.	Sodium hydroxide	266.	Trichloroethylene
217.	Potassium chromate	242.	Sodium hypochlorite	267.	Trichlorophenol
218.	Potassium cyanide	243.	Sodium methylate	268.	Triethanolamine dodecylbenzenesulfonate
219.	Potassium hydroxide	244.	Sodium nitrate	269.	Triethylamine
220.	Potassium permanganate	245.	Sodium phosphate (dibasic)	270.	Trimethylamine
271.	Uranyl acetate	280.	Zinc ammonium chloride	289.	Zinc nitrate
272.	Uranyl nitrate	281.	Zinc borate	290.	Zinc phenolsulfonate
273.	Vanadium pentoxide	282.	Zinc bromide	291.	Zinc phosphate
274.	Vanadyl sulfate	283.	Zinc carbonate	292.	Zinc silicofluoride
275.	Vinyl acetate	284.	Zinc chloride	293.	Zinc sulfate
276.	Vinylidene chloride	285.	Zinc cyanide	294.	Zirconium nitrate
277.	Xylene	286.	Zinc fluoride	295.	Zirconium potassium fluoride
278.	Xylenol	287.	Zinc formate	296.	Zirconium sulfate
279.	Zinc acetate	288.	Zinc hydrosulfonate	297.	Zirconium tetrachloride

EXAMPLE

LINE DRAWING



Schematic of Water Flow
Brown Mills, Inc.
City, County, State

ATTACHMENT 6

LABORATORY RESULTS

(FORM C SUPPORT DATA)

MICROBAC®

CERTIFICATE OF ANALYSIS

7091256

LG&E - KU ENERGY LLC.
Andy Batts
220 West Main St., P.O. Box 32010
Louisville, KY 40232

Date Reported	10/25/2017
Date Due	10/25/2017
Date Received	09/22/2017
Customer #	EL056

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**										**Sampled** 09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Chlorine, Total Residual			<0.020	mg/L			HACH 8167	0.020		09/22/2017 0:58	LWM
Flow by Calculation			24.9	MGD			EPA 600			09/22/2017 0:58	LWM
pH - Field			7.06	SU			SM 4500 H+ B	1.00		09/22/2017 0:58	LWM
Temperature at pH - Field			26.6	deg C			SM 2550B	1.0		09/22/2017 0:58	LWM
E. coli			488.4	MPN/100mL			SM9223B (Colilert-18)			09/22/2017 15:25	AYC
BOD, 5 Day			<5.0	mg/L			SM 5210 B	5.0		09/22/2017 17:51	CJL
COD			<25	mg/L			SM 5220D	25		09/27/2017 15:35	DJR
Nitrogen, Nitrate + Nitrite			1.8	mg/L			EPA 300.0	0.75		09/27/2017 17:27	LJC
Phosphorus, Total			0.15	mg/L			EPA 365.1	0.050		09/28/2017 12:53	DJR
Solids, Total Suspended			11	mg/L			USGS I-3765-85	5		09/26/2017 16:20	JAR
Sulfide			<0.50	mg/L			SM 4500 S2 D	0.50		09/23/2017 16:28	CJL
Sulfite		H1	<2.0	mg/L			SM 4500 SO3 B	2.0		09/22/2017 15:40	VAS
Surfactants, MBAS							SM 5540C				
MBAS (as LAS MW 340)			<0.20	mg/L				0.20		09/23/2017 11:01	JAR
Total Organic Carbon			3.5	mg/L			SM 5310C	0.50		09/29/2017 18:01	KNY
Color, ADMI											
Color, ADMI			<25	ADMI			SM 2120E	25		09/22/2017 19:20	CJL
pH (at Color determination)			7.59	SU			SM 2120E	1.00		09/22/2017 19:20	CJL
Total Organic Nitrogen Package											
Nitrogen, Ammonia			<0.25	mg/L			SM 4500 NH3 G	0.25		10/03/2017 10:12	DJR
Total Organic Nitrogen			0.58	mg/L			Calculated	0.40		10/03/2017 10:12	DJR
Bromide			1.1	mg/L			EPA 300.0	0.50		09/27/2017 18:38	LJC
Chloride			150	mg/L			EPA 300.0	0.50		09/27/2017 18:38	LJC
Fluoride			1.8	mg/L			EPA 300.0	0.50		09/27/2017 18:38	LJC
Sulfate			520	mg/L			EPA 300.0	7.0		09/28/2017 10:29	LJC
Total Organic Nitrogen Package											
Nitrogen, Total Kjeldahl			0.58	mg/L			SM 4500 NH3 G	0.40		09/28/2017 9:35	DJR

MICROBAC®

CERTIFICATE OF ANALYSIS

7091256

LG&E - KU ENERGY LLC.
Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**										**Sampled** 09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Gross Alpha			See attached	pCi/L		15	SM 7110B	3.0		10/24/2017 8:00	GEL
Gross Beta			See attached	pCi/L			SM 7110B	4.0		10/24/2017 8:00	GEL
Hardness Pkg. By ICP											
Calcium			250	mg/L			EPA 200.7	5.0		09/26/2017 17:39	EML
Magnesium		M3	85	mg/L			EPA 200.7	0.20		09/26/2017 16:28	EML
Hardness, Total as CaCO3			980	mg/L			SM 2340B	12		09/26/2017 17:39	EML
Total Mercury by CVAFS							EPA 1631E				
Mercury			41.4	ng/L				5.00		09/29/2017 17:32	CGL
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Aluminum			0.28	mg/L				0.025	0.012	09/28/2017 13:34	CGL
Antimony		J	0.0023	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Arsenic			0.010	mg/L				0.0050		09/28/2017 13:34	CGL
Barium			0.11	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Beryllium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Boron			8.5	mg/L				1.2	0.20	09/29/2017 14:58	CGL
Cadmium		J	0.0012	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Chromium			0.019	mg/L				0.0050	0.0018	09/28/2017 13:34	CGL
Cobalt		J	0.00071	mg/L				0.0050	0.00010	09/28/2017 13:34	CGL
Copper			0.013	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Iron		J	0.36	mg/L				0.50	0.0040	09/28/2017 13:34	CGL
Lead		J	0.00039	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Manganese			0.043	mg/L				0.0050	0.00030	09/28/2017 13:34	CGL
Molybdenum			0.75	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Nickel			0.017	mg/L				0.0050	0.00020	09/28/2017 13:34	CGL
Selenium			0.0053	mg/L				0.0050	0.00050	09/28/2017 13:34	CGL
Silver			<0.00030	mg/L				0.0050	0.00030	10/03/2017 12:27	CGL
Thallium		J	0.00062	mg/L				0.0050	0.00010	09/28/2017 13:34	CGL
Tin			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:34	CGL

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CERTIFICATE OF ANALYSIS

7091256

LG&E - KU ENERGY LLC.
Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**										**Sampled** 09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Titanium		J	0.0018	mg/L				0.15	0.00030	09/28/2017 13:34	CGL
Zinc			0.018	mg/L				0.010	0.0022	09/29/2017 15:03	CGL
Volatile Organic Compounds - 624							EPA 624				
Vinyl Chloride			<0.0020	mg/L				0.0020		09/26/2017 16:56	LJC
Chloromethane		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Bromomethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Chloroethane		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Trichlorofluoromethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,1-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Methylene Chloride			<0.010	mg/L				0.010		09/26/2017 16:56	LJC
Acrolein			<0.025	mg/L				0.025		09/26/2017 16:56	LJC
Acrylonitrile			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
trans-1,2-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,1-Dichloroethane		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Chloroform			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,1,1-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Carbon Tetrachloride			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Benzene		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,2-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Trichloroethene		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,2-Dichloropropane		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Dichlorobromomethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
2-Chloroethyl Vinyl Ether			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
cis-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Toluene		M1	<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
trans-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,1,2-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**									**Sampled**	09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Volatile Organic Compounds - 624							EPA 624				
Dibromochloromethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Tetrachloroethene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Chlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Ethylbenzene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Bromoform			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,1,2,2-Tetrachloroethane			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,3-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,4-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
1,2-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 16:56	LJC
Radium 226			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Radium 228			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Strontium - 90			See attached	pCi/g			SM 7500-SR B (Modified)			10/24/2017 8:00	GEL
Uranium			See attached	mg/L		0.03	EPA 200.8	0.0010		10/24/2017 8:00	GEL
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
1,2,4-Trichlorobenzene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
1,2-Diphenylhydrazine			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,2′-oxybis(1-chloropropane)			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,4,5-Trichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,4,6-Trichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,4-Dichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,4-Dimethylphenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,4-Dinitrophenol			<0.053	mg/L				0.053		09/28/2017 18:17	CGL
2,4-Dinitrotoluene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,6-Dichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2,6-Dinitrotoluene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**									**Sampled**	09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
2-Chloronaphthalene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2-Chlorophenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2-Methylnaphthalene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2-Methylphenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2-Nitroaniline			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
2-Nitrophenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
3,3´-Dichlorobenzidine			<0.053	mg/L				0.053		09/28/2017 18:17	CGL
3/4-Methylphenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
3-Nitroaniline			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
4,6-Dinitro-2-methylphenol			<0.026	mg/L				0.026		09/28/2017 18:17	CGL
4-Bromophenyl phenyl ether			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
4-Chloro-3-methylphenol			<0.021	mg/L				0.021		09/28/2017 18:17	CGL
4-Chloroaniline			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
4-Chlorophenyl phenyl ether			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
4-Nitroaniline			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
4-Nitrophenol			<0.053	mg/L				0.053		09/28/2017 18:17	CGL
Acenaphthene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Acenaphthylene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Acetophenone			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Aniline			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Anthracene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Benzidine			<0.053	mg/L				0.053		09/28/2017 18:17	CGL
Benzo[a]anthracene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Benzo[a]pyrene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Benzo[b]fluoranthene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Benzo[g,h,i]perylene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Benzo[k]fluoranthene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**									**Sampled**	09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Benzoic acid			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Benzyl alcohol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Bis(2-chloroethoxy)methane			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Bis(2-chloroethyl)ether			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Bis(2-ethylhexyl)phthalate			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Butyl benzyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Carbazole			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Chrysene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Dibenz[a,h]anthracene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Dibenzofuran			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Diethyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Dimethyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Di-n-butyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Di-n-octyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Fluoranthene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Fluorene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Hexachlorobenzene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Hexachlorobutadiene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Hexachlorocyclopentadiene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Hexachloroethane			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Indeno[1,2,3cd]pyrene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Isophorone			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Naphthalene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Nitrobenzene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
N-Nitrosodimethylamine			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
N-Nitrosodi-n-propylamine			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
N-Nitrosodiphenylamine			<0.011	mg/L				0.011		09/28/2017 18:17	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 01 **Outfall 001 - Ash Pond Discharge**										**Sampled** 09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Pentachlorophenol			<0.053	mg/L				0.053		09/28/2017 18:17	CGL
Phenanthrene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Phenol			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Pyrene			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Pyridine			<0.011	mg/L				0.011		09/28/2017 18:17	CGL
Oil & Grease (HEM) by SPE			<5.0	mg/L			EPA 1664B	5.0		10/03/2017 6:16	CGL
Total Cyanide			<0.0050	mg/L			SM 4500-CN C/E-1999	0.0050		10/02/2017 14:18	CGL
Total Phenolics			<0.010	mg/L			EPA 420.4 Rev 1.0	0.010		10/02/2017 15:22	CGL
Sample: 02 **Outfall 001 - LL Mercury Blank**										**Sampled** 09/22/2017 @ 8:58	
Sampled By Wayne Mills											
Total Mercury by CVAFS							EPA 1631E				
Mercury			0.556	ng/L				0.500		09/29/2017 17:35	CGL
Sample: 03 **Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater**										**Sampled** 09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Chlorine, Total Residual			<0.020	mg/L			HACH 8167	0.020		09/22/2017 9:27	LWM
Flow by Calculation			39.3	MGD			EPA 600			09/22/2017 9:27	LWM
pH - Field			7.42	SU			SM 4500 H+ B	1.00		09/22/2017 9:27	LWM
Temperature at pH - Field			27.6	deg C			SM 2550B	1.0		09/22/2017 9:27	LWM
E. coli			14.8	MPN/100mL			SM9223B (Colilert-18)			09/22/2017 15:25	AYC
BOD, 5 Day			<5.0	mg/L			SM 5210 B	5.0		09/22/2017 17:51	CJL
COD			<25	mg/L			SM 5220D	25		09/27/2017 17:00	DJR
Nitrogen, Nitrate + Nitrite			<0.75	mg/L			EPA 300.0	0.75		09/27/2017 17:42	LJC
Phosphorus, Total			0.067	mg/L			EPA 365.1	0.050		09/28/2017 12:54	DJR
Solids, Total Suspended			<5	mg/L			USGS I-3765-85	5		09/27/2017 14:30	JAR
Sulfide			<0.50	mg/L			SM 4500 S2 D	0.50		09/23/2017 16:28	CJL
Sulfite		H1	<2.0	mg/L			SM 4500 SO3 B	2.0		09/22/2017 15:40	VAS

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 03 **Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Surfactants, MBAS							SM 5540C				
MBAS (as LAS MW 340)			<0.20	mg/L				0.20		09/23/2017 11:01	JAR
Total Organic Carbon			2.7	mg/L			SM 5310C	0.50		09/29/2017 18:17	KNY
Color, ADMI											
Color, ADMI			<25	ADMI			SM 2120E	25		09/22/2017 19:20	CJL
pH (at Color determination)			7.82	SU			SM 2120E	1.00		09/22/2017 19:20	CJL
Total Organic Nitrogen Package											
Nitrogen, Ammonia			<0.25	mg/L			SM 4500 NH3 G	0.25		10/03/2017 10:14	DJR
Total Organic Nitrogen			<0.40	mg/L			Calculated	0.40		10/03/2017 10:14	DJR
Bromide			<0.50	mg/L			EPA 300.0	0.50		09/27/2017 18:53	LJC
Chloride			31	mg/L			EPA 300.0	0.50		09/27/2017 18:53	LJC
Fluoride			<0.50	mg/L			EPA 300.0	0.50		09/27/2017 18:53	LJC
Sulfate			86	mg/L			EPA 300.0	0.50		09/27/2017 18:53	LJC
Total Organic Nitrogen Package											
Nitrogen, Total Kjeldahl			<0.40	mg/L			SM 4500 NH3 G	0.40		09/28/2017 9:37	DJR
Gross Alpha			See attached	pCi/L		15	SM 7110B	3.0		10/24/2017 8:00	GEL
Gross Beta			See attached	pCi/L			SM 7110B	4.0		10/24/2017 8:00	GEL
Hardness Pkg. By ICP											
Calcium			46	mg/L			EPA 200.7	0.50		09/26/2017 17:18	EML
Magnesium			16	mg/L			EPA 200.7	0.20		09/26/2017 17:18	EML
Hardness, Total as CaCO3			180	mg/L			SM 2340B	1.2		09/26/2017 17:18	EML
Total Mercury by CVAFS							EPA 1631E				
Mercury			<5.00	ng/L				5.00		09/29/2017 17:37	CGL
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Aluminum			0.14	mg/L				0.025	0.012	09/28/2017 13:38	CGL
Antimony		J	0.00030	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Arsenic			<0.0050	mg/L				0.0050		09/28/2017 13:38	CGL
Barium			0.052	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL

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Sampled By Wayne Mills											
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Beryllium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Boron			0.35	mg/L				0.025	0.0040	09/29/2017 15:07	CGL
Cadmium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Chromium			<0.0018	mg/L				0.0050	0.0018	09/28/2017 13:38	CGL
Cobalt		J	0.00030	mg/L				0.0050	0.00010	09/28/2017 13:38	CGL
Copper		J	0.0049	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Iron		J	0.23	mg/L				0.50	0.0040	09/28/2017 13:38	CGL
Lead		J	0.00038	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Manganese			0.055	mg/L				0.0050	0.00030	09/28/2017 13:38	CGL
Molybdenum			0.028	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Nickel		J	0.0022	mg/L				0.0050	0.00020	09/28/2017 13:38	CGL
Selenium			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:38	CGL
Silver			<0.00030	mg/L				0.0050	0.00030	10/03/2017 12:32	CGL
Thallium			<0.00010	mg/L				0.0050	0.00010	09/28/2017 13:38	CGL
Tin			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:38	CGL
Titanium		J	0.00053	mg/L				0.15	0.00030	09/28/2017 13:38	CGL
Zinc		J	0.0069	mg/L				0.010	0.0022	09/28/2017 13:38	CGL
Volatile Organic Compounds - 624							EPA 624				
Vinyl Chloride			<0.0020	mg/L				0.0020		09/26/2017 20:22	LJC
Chloromethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Bromomethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Chloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Trichlorofluoromethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,1-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Methylene Chloride			<0.010	mg/L				0.010		09/26/2017 20:22	LJC
Acrolein			<0.025	mg/L				0.025		09/26/2017 20:22	LJC

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Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 03 **Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Volatile Organic Compounds - 624							EPA 624				
Acrylonitrile			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
trans-1,2-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,1-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Chloroform			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,1,1-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Carbon Tetrachloride			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Benzene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,2-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Trichloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,2-Dichloropropane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Dichlorobromomethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
2-Chloroethyl Vinyl Ether			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
cis-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Toluene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
trans-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,1,2-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Dibromochloromethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Tetrachloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Chlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Ethylbenzene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Bromoform			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,1,2,2-Tetrachloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,3-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,4-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
1,2-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:22	LJC
Radium 226			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 03 **Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Radium 228			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Strontium - 90			See attached	pCi/g			SM 7500-SR B (Modified)			10/24/2017 8:00	GEL
Uranium			See attached	mg/L		0.03	EPA 200.8	0.0010		10/24/2017 8:00	GEL
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
1,2,4-Trichlorobenzene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
1,2-Diphenylhydrazine			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,2´-oxybis(1-chloropropane)			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,4,5-Trichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,4,6-Trichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,4-Dichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,4-Dimethylphenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,4-Dinitrophenol			<0.054	mg/L				0.054		09/28/2017 18:39	CGL
2,4-Dinitrotoluene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,6-Dichlorophenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2,6-Dinitrotoluene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2-Chloronaphthalene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2-Chlorophenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2-Methylnaphthalene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2-Methylphenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2-Nitroaniline			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
2-Nitrophenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
3,3´-Dichlorobenzidine			<0.054	mg/L				0.054		09/28/2017 18:39	CGL
3/4-Methylphenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
3-Nitroaniline			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
4,6-Dinitro-2-methylphenol			<0.027	mg/L				0.027		09/28/2017 18:39	CGL
4-Bromophenyl phenyl ether			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
4-Chloro-3-methylphenol			<0.022	mg/L				0.022		09/28/2017 18:39	CGL

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Sample: 03 **Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
4-Chloroaniline			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
4-Chlorophenyl phenyl ether			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
4-Nitroaniline			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
4-Nitrophenol			<0.054	mg/L				0.054		09/28/2017 18:39	CGL
Acenaphthene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Acenaphthylene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Acetophenone			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Aniline			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Anthracene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzidine			<0.054	mg/L				0.054		09/28/2017 18:39	CGL
Benzo[a]anthracene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzo[a]pyrene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzo[b]fluoranthene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzo[g,h,i]perylene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzo[k]fluoranthene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzoic acid			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Benzyl alcohol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Bis(2-chloroethoxy)methane			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Bis(2-chloroethyl)ether			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Bis(2-ethylhexyl)phthalate			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Butyl benzyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Carbazole			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Chrysene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Dibenz[a,h]anthracene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Dibenzofuran			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Diethyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:39	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 03 **Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Dimethyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Di-n-butyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Di-n-octyl phthalate			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Fluoranthene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Fluorene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Hexachlorobenzene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Hexachlorobutadiene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Hexachlorocyclopentadiene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Hexachloroethane			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Indeno[1,2,3cd]pyrene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Isophorone			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Naphthalene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Nitrobenzene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
N-Nitrosodimethylamine			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
N-Nitrosodi-n-propylamine			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
N-Nitrosodiphenylamine			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Pentachlorophenol			<0.054	mg/L				0.054		09/28/2017 18:39	CGL
Phenanthrene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Phenol			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Pyrene			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Pyridine			<0.011	mg/L				0.011		09/28/2017 18:39	CGL
Oil & Grease (HEM) by SPE			<5.0	mg/L			EPA 1664B	5.0		10/03/2017 6:16	CGL
Total Cyanide			<0.0050	mg/L			SM 4500-CN C/E-1999	0.0050		10/02/2017 14:19	CGL
Total Phenolics			<0.010	mg/L			EPA 420.4 Rev 1.0	0.010		10/02/2017 15:22	CGL
Sample: 04 **Outfall 002 - LL Mercury Blank**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 04 **Outfall 002 - LL Mercury Blank**									**Sampled**	09/22/2017 @ 9:27	
Sampled By Wayne Mills											
Total Mercury by CVAFS							EPA 1631E				
Mercury			<0.500	ng/L				0.500		09/29/2017 17:44	CGL
Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**									**Sampled**	09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Chlorine, Total Residual			<0.020	mg/L			HACH 8167	0.020		09/22/2017 11:10	LWM
Flow by Calculation			37.4	MGD			EPA 600			09/22/2017 11:10	LWM
pH - Field			7.68	SU			SM 4500 H+ B	1.00		09/22/2017 11:10	LWM
Temperature at pH - Field			25.7	deg C			SM 2550B	1.0		09/22/2017 11:10	LWM
E. coli			14.6	MPN/100mL			SM9223B (Colilert-18)			09/22/2017 15:25	AYC
BOD, 5 Day			<5.0	mg/L			SM 5210 B	5.0		09/22/2017 17:51	CJL
COD		M2	<25	mg/L			SM 5220D	25		09/27/2017 17:00	DJR
Nitrogen, Nitrate + Nitrite			<0.75	mg/L			EPA 300.0	0.75		09/27/2017 17:56	LJC
Phosphorus, Total			0.067	mg/L			EPA 365.1	0.050		09/28/2017 12:56	DJR
Solids, Total Suspended			7	mg/L			USGS I-3765-85	5		09/27/2017 14:30	JAR
Sulfide			<0.50	mg/L			SM 4500 S2 D	0.50		09/23/2017 16:28	CJL
Sulfite		H1	<2.0	mg/L			SM 4500 SO3 B	2.0		09/22/2017 15:40	VAS
Surfactants, MBAS							SM 5540C				
MBAS (as LAS MW 340)			<0.20	mg/L				0.20		09/23/2017 11:01	JAR
Total Organic Carbon			2.7	mg/L			SM 5310C	0.50		09/29/2017 18:54	KNY
Color, ADMI											
Color, ADMI			<25	ADMI			SM 2120E	25		09/22/2017 19:20	CJL
pH (at Color determination)			7.77	SU			SM 2120E	1.00		09/22/2017 19:20	CJL
Total Organic Nitrogen Package											
Nitrogen, Ammonia			<0.25	mg/L			SM 4500 NH3 G	0.25		10/03/2017 10:16	DJR
Total Organic Nitrogen			<0.40	mg/L			Calculated	0.40		10/03/2017 10:16	DJR
Bromide			<0.50	mg/L			EPA 300.0	0.50		09/27/2017 20:04	LJC
Chloride			30	mg/L			EPA 300.0	0.50		09/27/2017 20:04	LJC
Fluoride			<0.50	mg/L			EPA 300.0	0.50		09/27/2017 20:04	LJC

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**										**Sampled** 09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Sulfate			77	mg/L			EPA 300.0	0.50		09/27/2017 20:04	LJC
Total Organic Nitrogen Package											
Nitrogen, Total Kjeldahl			<0.40	mg/L			SM 4500 NH3 G	0.40		09/28/2017 9:39	DJR
Gross Alpha			See attached	pCi/L		15	SM 7110B	3.0		10/24/2017 8:00	GEL
Gross Beta			See attached	pCi/L			SM 7110B	4.0		10/24/2017 8:00	GEL
Hardness Pkg. By ICP											
Calcium			44	mg/L			EPA 200.7	0.50		09/26/2017 17:24	EML
Magnesium			15	mg/L			EPA 200.7	0.20		09/26/2017 17:24	EML
Hardness, Total as CaCO3			170	mg/L			SM 2340B	1.2		09/26/2017 17:24	EML
Total Mercury by CVAFS							EPA 1631E				
Mercury			<5.00	ng/L				5.00		09/29/2017 17:46	CGL
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Aluminum			0.12	mg/L				0.025	0.012	09/28/2017 13:43	CGL
Antimony		J	0.00030	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Arsenic			<0.0050	mg/L				0.0050		09/28/2017 13:43	CGL
Barium			0.052	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Beryllium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Boron			0.25	mg/L				0.025	0.0040	09/29/2017 15:12	CGL
Cadmium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Chromium			<0.0018	mg/L				0.0050	0.0018	09/28/2017 13:43	CGL
Cobalt		J	0.00029	mg/L				0.0050	0.00010	09/28/2017 13:43	CGL
Copper		J	0.0028	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Iron		J	0.20	mg/L				0.50	0.0040	09/28/2017 13:43	CGL
Lead		J	0.00045	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Manganese			0.056	mg/L				0.0050	0.00030	09/28/2017 13:43	CGL
Molybdenum			0.018	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL
Nickel		J	0.0018	mg/L				0.0050	0.00020	09/28/2017 13:43	CGL

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Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**										**Sampled** 09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Selenium			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:43	CGL
Silver			<0.00030	mg/L				0.0050	0.00030	10/03/2017 12:36	CGL
Thallium			<0.00010	mg/L				0.0050	0.00010	09/28/2017 13:43	CGL
Tin			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:43	CGL
Titanium			<0.00030	mg/L				0.15	0.00030	09/28/2017 13:43	CGL
Zinc		J	0.0069	mg/L				0.010	0.0022	09/29/2017 15:12	CGL
Volatile Organic Compounds - 624							EPA 624				
Vinyl Chloride			<0.0020	mg/L				0.0020		09/26/2017 20:52	LJC
Chloromethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Bromomethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Chloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Trichlorofluoromethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,1-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Methylene Chloride			<0.010	mg/L				0.010		09/26/2017 20:52	LJC
Acrolein			<0.025	mg/L				0.025		09/26/2017 20:52	LJC
Acrylonitrile			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
trans-1,2-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,1-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Chloroform			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,1,1-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Carbon Tetrachloride			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Benzene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,2-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Trichloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,2-Dichloropropane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Dichlorobromomethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC

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LG&E - KU ENERGY LLC.
Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**									**Sampled**	09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Volatile Organic Compounds - 624							EPA 624				
2-Chloroethyl Vinyl Ether			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
cis-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Toluene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
trans-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,1,2-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Dibromochloromethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Tetrachloroethene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Chlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Ethylbenzene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Bromoform			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,1,2,2-Tetrachloroethane			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,3-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,4-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
1,2-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 20:52	LJC
Radium 226			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Radium 228			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Strontium - 90			See attached	pCi/g			SM 7500-SR B (Modified)			10/24/2017 8:00	GEL
Uranium			See attached	mg/L		0.03	EPA 200.8	0.0010		10/24/2017 8:00	GEL
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
1,2,4-Trichlorobenzene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
1,2-Diphenylhydrazine			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,2´-oxybis(1-chloropropane)			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,4,5-Trichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,4,6-Trichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,4-Dichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**									**Sampled**	09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
2,4-Dimethylphenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,4-Dinitrophenol			<0.051	mg/L				0.051		09/29/2017 15:27	CGL
2,4-Dinitrotoluene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,6-Dichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2,6-Dinitrotoluene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2-Chloronaphthalene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2-Chlorophenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2-Methylnaphthalene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2-Methylphenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
2-Nitrophenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
3,3´-Dichlorobenzidine			<0.051	mg/L				0.051		09/29/2017 15:27	CGL
3/4-Methylphenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
3-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
4,6-Dinitro-2-methylphenol			<0.025	mg/L				0.025		09/29/2017 15:27	CGL
4-Bromophenyl phenyl ether			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
4-Chloro-3-methylphenol			<0.020	mg/L				0.020		09/29/2017 15:27	CGL
4-Chloroaniline			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
4-Chlorophenyl phenyl ether			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
4-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
4-Nitrophenol			<0.051	mg/L				0.051		09/29/2017 15:27	CGL
Acenaphthene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Acenaphthylene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Acetophenone			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Aniline			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Anthracene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**									**Sampled**	09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Benzidine			<0.051	mg/L				0.051		09/29/2017 15:27	CGL
Benzo[a]anthracene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Benzo[a]pyrene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Benzo[b]fluoranthene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Benzo[g,h,i]perylene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Benzo[k]fluoranthene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Benzoic acid			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Benzyl alcohol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Bis(2-chloroethoxy)methane			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Bis(2-chloroethyl)ether			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Bis(2-ethylhexyl)phthalate			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Butyl benzyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Carbazole			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Chrysene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Dibenz[a,h]anthracene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Dibenzofuran			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Diethyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Dimethyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Di-n-butyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Di-n-octyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Fluoranthene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Fluorene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Hexachlorobenzene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Hexachlorobutadiene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Hexachlorocyclopentadiene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Hexachloroethane			<0.010	mg/L				0.010		09/29/2017 15:27	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 05 **Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**										**Sampled** 09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Indeno[1,2,3cd]pyrene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Isophorone			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Naphthalene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Nitrobenzene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
N-Nitrosodimethylamine			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
N-Nitrosodi-n-propylamine			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
N-Nitrosodiphenylamine			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Pentachlorophenol			<0.051	mg/L				0.051		09/29/2017 15:27	CGL
Phenanthrene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Phenol			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Pyrene			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Pyridine			<0.010	mg/L				0.010		09/29/2017 15:27	CGL
Oil & Grease (HEM) by SPE			<5.0	mg/L			EPA 1664B	5.0		10/03/2017 6:16	CGL
Total Cyanide			<0.0050	mg/L			SM 4500-CN C/E-1999	0.0050		10/02/2017 14:21	CGL
Total Phenolics			<0.010	mg/L			EPA 420.4 Rev 1.0	0.010		10/02/2017 15:22	CGL
Sample: 06 **Outfall 003 - LL Mercury Blank**										**Sampled** 09/22/2017 @ 11:10	
Sampled By Wayne Mills											
Total Mercury by CVAFS							EPA 1631E				
Mercury			<0.500	ng/L				0.500		09/29/2017 17:49	CGL
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**										**Sampled** 09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Chlorine, Total Residual			0.18	mg/L			HACH 8167	0.020		09/22/2017 11:00	LWM
Flow by Calculation			1.2	MGD			EPA 600			09/22/2017 11:00	LWM
pH - Field			7.75	SU			SM 4500 H+ B	1.00		09/22/2017 11:00	LWM
Temperature at pH - Field			37.2	deg C			SM 2550B	1.0		09/22/2017 11:00	LWM
E. coli			6.3	MPN/100mL			SM9223B (Colilert-18)			09/22/2017 15:25	AYC

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**									**Sampled**	09/22/2017 @ 11:00	
Sampled By Wayne Mills											
BOD, 5 Day			<5.0	mg/L			SM 5210 B	5.0		09/22/2017 17:51	CJL
COD			37	mg/L			SM 5220D	25		09/27/2017 17:00	DJR
Nitrogen, Nitrate + Nitrite			3.8	mg/L			EPA 300.0	0.75		09/27/2017 18:10	LJC
Phosphorus, Total			0.92	mg/L			EPA 365.1	0.050		09/28/2017 12:57	DJR
Solids, Total Suspended			55	mg/L			USGS I-3765-85	5		09/27/2017 14:30	JAR
Sulfide			<0.50	mg/L			SM 4500 S2 D	0.50		09/23/2017 16:28	CJL
Sulfite		H1	<2.0	mg/L			SM 4500 SO3 B	2.0		09/22/2017 15:40	VAS
Surfactants, MBAS							SM 5540C				
MBAS (as LAS MW 340)			<0.20	mg/L				0.20		09/23/2017 11:01	JAR
Total Organic Carbon			13	mg/L			SM 5310C	5.0		10/02/2017 9:33	KNY
Color, ADMI											
Color, ADMI			<25	ADMI			SM 2120E	25		09/22/2017 19:20	CJL
pH (at Color determination)			7.99	SU			SM 2120E	1.00		09/22/2017 19:20	CJL
Total Organic Nitrogen Package											
Nitrogen, Ammonia			<0.25	mg/L			SM 4500 NH3 G	0.25		10/03/2017 10:18	DJR
Total Organic Nitrogen			1.5	mg/L			Calculated	0.40		10/03/2017 10:18	DJR
Bromide			1.1	mg/L			EPA 300.0	0.50		09/27/2017 20:18	LJC
Chloride			150	mg/L			EPA 300.0	0.50		09/27/2017 20:18	LJC
Fluoride			1.1	mg/L			EPA 300.0	0.50		09/27/2017 20:18	LJC
Sulfate			330	mg/L			EPA 300.0	7.5		09/28/2017 11:16	LJC
Sulfate			4400	mg/L			EPA 300.0	2.5		09/27/2017 18:10	LJC
Total Organic Nitrogen Package											
Nitrogen, Total Kjeldahl			1.5	mg/L			SM 4500 NH3 G	0.40		09/28/2017 9:41	DJR
Gross Alpha			See attached	pCi/L		15	SM 7110B	3.0		10/24/2017 8:00	GEL
Gross Beta			See attached	pCi/L			SM 7110B	4.0		10/24/2017 8:00	GEL
Hardness Pkg. By ICP											
Calcium			240	mg/L			EPA 200.7	5.0		09/26/2017 17:49	EML
Magnesium			72	mg/L			EPA 200.7	0.20		09/26/2017 17:29	EML

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**									**Sampled**	09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Hardness, Total as CaCO3			890	mg/L			SM 2340B	12		09/26/2017 17:49	EML
Total Mercury by CVAFS							EPA 1631E				
Mercury			8.61	ng/L				0.500		09/29/2017 17:51	CGL
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Aluminum			0.71	mg/L				0.025	0.012	09/28/2017 13:48	CGL
Antimony		J	0.0015	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Arsenic			0.0078	mg/L				0.0050		09/28/2017 13:48	CGL
Barium			0.26	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Beryllium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Boron			2.2	mg/L				0.25	0.040	09/29/2017 15:16	CGL
Cadmium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Chromium			0.0064	mg/L				0.0050	0.0018	09/28/2017 13:48	CGL
Cobalt		J	0.0017	mg/L				0.0050	0.00010	09/28/2017 13:48	CGL
Copper			0.22	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Iron			1.3	mg/L				0.50	0.0040	09/28/2017 13:48	CGL
Lead		J	0.0021	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Manganese			0.22	mg/L				0.0050	0.00030	09/28/2017 13:48	CGL
Molybdenum			0.15	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Nickel			0.011	mg/L				0.0050	0.00020	09/28/2017 13:48	CGL
Selenium			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:48	CGL
Silver			<0.00030	mg/L				0.0050	0.00030	10/03/2017 12:41	CGL
Thallium		J	0.00015	mg/L				0.0050	0.00010	09/28/2017 13:48	CGL
Tin			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:48	CGL
Titanium		J	0.0089	mg/L				0.15	0.00030	09/28/2017 13:48	CGL
Zinc			0.029	mg/L				0.010	0.0022	09/29/2017 15:21	CGL
Volatile Organic Compounds - 624							EPA 624				
Vinyl Chloride			<0.0020	mg/L				0.0020		09/26/2017 21:21	LJC
Chloromethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC

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Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**									**Sampled**	09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Volatile Organic Compounds - 624							EPA 624				
Bromomethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Chloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Trichlorofluoromethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,1-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Methylene Chloride			<0.010	mg/L				0.010		09/26/2017 21:21	LJC
Acrolein			<0.025	mg/L				0.025		09/26/2017 21:21	LJC
Acrylonitrile			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
trans-1,2-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,1-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Chloroform			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,1,1-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Carbon Tetrachloride			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Benzene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,2-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Trichloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,2-Dichloropropane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Dichlorobromomethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
2-Chloroethyl Vinyl Ether			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
cis-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Toluene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
trans-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,1,2-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Dibromochloromethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Tetrachloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Chlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Ethylbenzene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Bromoform			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC

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LG&E - KU ENERGY LLC.
Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**									**Sampled**	09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Volatile Organic Compounds - 624							EPA 624				
1,1,2,2-Tetrachloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,3-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,4-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
1,2-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:21	LJC
Radium 226			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Radium 228			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Strontium - 90			See attached	pCi/g			SM 7500-SR B (Modified)			10/24/2017 8:00	GEL
Uranium			See attached	mg/L		0.03	EPA 200.8	0.0010		10/24/2017 8:00	GEL
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
1,2,4-Trichlorobenzene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
1,2-Diphenylhydrazine			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,2´-oxybis(1-chloropropane)			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,4,5-Trichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,4,6-Trichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,4-Dichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,4-Dimethylphenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,4-Dinitrophenol			<0.051	mg/L				0.051		09/29/2017 15:49	CGL
2,4-Dinitrotoluene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,6-Dichlorophenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2,6-Dinitrotoluene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2-Chloronaphthalene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2-Chlorophenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2-Methylnaphthalene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2-Methylphenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
2-Nitrophenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**									**Sampled**	09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
3,3´-Dichlorobenzidine			<0.051	mg/L				0.051		09/29/2017 15:49	CGL
3/4-Methylphenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
3-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
4,6-Dinitro-2-methylphenol			<0.025	mg/L				0.025		09/29/2017 15:49	CGL
4-Bromophenyl phenyl ether			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
4-Chloro-3-methylphenol			<0.020	mg/L				0.020		09/29/2017 15:49	CGL
4-Chloroaniline			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
4-Chlorophenyl phenyl ether			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
4-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
4-Nitrophenol			<0.051	mg/L				0.051		09/29/2017 15:49	CGL
Acenaphthene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Acenaphthylene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Acetophenone			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Aniline			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Anthracene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzidine			<0.051	mg/L				0.051		09/29/2017 15:49	CGL
Benzo[a]anthracene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzo[a]pyrene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzo[b]fluoranthene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzo[g,h,i]perylene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzo[k]fluoranthene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzoic acid			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Benzyl alcohol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Bis(2-chloroethoxy)methane			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Bis(2-chloroethyl)ether			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Bis(2-ethylhexyl)phthalate			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Butyl benzyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:49	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**									**Sampled**	09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Carbazole			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Chrysene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Dibenz[a,h]anthracene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Dibenzofuran			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Diethyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Dimethyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Di-n-butyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Di-n-octyl phthalate			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Fluoranthene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Fluorene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Hexachlorobenzene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Hexachlorobutadiene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Hexachlorocyclopentadiene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Hexachloroethane			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Indeno[1,2,3cd]pyrene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Isophorone			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Naphthalene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Nitrobenzene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
N-Nitrosodimethylamine			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
N-Nitrosodi-n-propylamine			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
N-Nitrosodiphenylamine			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Pentachlorophenol			<0.051	mg/L				0.051		09/29/2017 15:49	CGL
Phenanthrene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Phenol			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Pyrene			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Pyridine			<0.010	mg/L				0.010		09/29/2017 15:49	CGL
Oil & Grease (HEM) by SPE			<5.0	mg/L			EPA 1664B	5.0		10/03/2017 6:16	CGL

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Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 07 **Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**										**Sampled** 09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Total Cyanide			<0.0050	mg/L			SM 4500-CN C/E-1999	0.0050		10/02/2017 14:22	CGL
Total Phenolics			<0.010	mg/L			EPA 420.4 Rev 1.0	0.010		10/02/2017 15:22	CGL
Sample: 08 **Outfall 006 - LL Mercury Blank**										**Sampled** 09/22/2017 @ 11:00	
Sampled By Wayne Mills											
Total Mercury by CVAFS							EPA 1631E				
Mercury			<0.500	ng/L				0.500		09/29/2017 17:53	CGL
Sample: 09 **Outfall 007 - Plant Intake - Ohio River**										**Sampled** 09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Chlorine, Total Residual			<0.020	mg/L			HACH 8167	0.020		09/22/2017 10:43	LWM
Flow by Calculation			51.7	MGD			EPA 600			09/22/2017 10:43	LWM
pH - Field			7.56	SU			SM 4500 H+ B	1.00		09/22/2017 10:43	LWM
Temperature at pH - Field			24.6	deg C			SM 2550B	1.0		09/22/2017 10:43	LWM
E. coli			10.9	MPN/100mL			SM9223B (Colilert-18)			09/22/2017 15:25	AYC
BOD, 5 Day			<5.0	mg/L			SM 5210 B	5.0		09/22/2017 17:51	CJL
COD			<25	mg/L			SM 5220D	25		09/27/2017 17:00	DJR
Nitrogen, Nitrate + Nitrite			<0.75	mg/L			EPA 300.0	0.75		09/27/2017 18:24	LJC
Phosphorus, Total			0.059	mg/L			EPA 365.1	0.050		09/28/2017 12:58	DJR
Solids, Total Suspended			9	mg/L			USGS I-3765-85	5		09/27/2017 14:30	JAR
Sulfide			<0.50	mg/L			SM 4500 S2 D	0.50		09/23/2017 16:28	CJL
Sulfite		H1	<2.0	mg/L			SM 4500 SO3 B	2.0		09/22/2017 15:40	VAS
Surfactants, MBAS							SM 5540C				
MBAS (as LAS MW 340)			<0.20	mg/L				0.20		09/23/2017 11:01	JAR
Total Organic Carbon			2.8	mg/L			SM 5310C	0.50		09/29/2017 19:25	KNY
Color, ADMI											
Color, ADMI			29	ADMI			SM 2120E	25		09/22/2017 19:20	CJL
pH (at Color determination)			7.88	SU			SM 2120E	1.00		09/22/2017 19:20	CJL
Total Organic Nitrogen Package											
Nitrogen, Ammonia			<0.25	mg/L			SM 4500 NH3 G	0.25		10/03/2017 10:24	DJR
Total Organic Nitrogen			<0.40	mg/L			Calculated	0.40		10/03/2017 10:24	DJR

Microbac Laboratories, Inc.
3323 Gilmore Industrial Blvd. Louisville, KY 40213 502.962.6400 Fax: 502.962.6411
Evansville 812.464.9000 | Lexington 859.276.3506 | Paducah 270.898.3637 | Hazard 606.487. 0511

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 09 **Outfall 007 - Plant Intake - Ohio River**									**Sampled**	09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Bromide			<0.50	mg/L			EPA 300.0	0.50		09/27/2017 20:32	LJC
Chloride			30	mg/L			EPA 300.0	0.50		09/27/2017 20:32	LJC
Fluoride			<0.50	mg/L			EPA 300.0	0.50		09/27/2017 20:32	LJC
Sulfate			76	mg/L			EPA 300.0	0.50		09/27/2017 20:32	LJC
Total Organic Nitrogen Package											
Nitrogen, Total Kjeldahl			<0.40	mg/L			SM 4500 NH3 G	0.40		09/28/2017 9:43	DJR
Gross Alpha			See attached	pCi/L		15	SM 7110B	3.0		10/24/2017 8:00	GEL
Gross Beta			See attached	pCi/L			SM 7110B	4.0		10/24/2017 8:00	GEL
Hardness Pkg. By ICP											
Calcium			45	mg/L			EPA 200.7	0.50		09/26/2017 17:34	EML
Magnesium			15	mg/L			EPA 200.7	0.20		09/26/2017 17:34	EML
Hardness, Total as CaCO3			170	mg/L			SM 2340B	1.2		09/26/2017 17:34	EML
Total Mercury by CVAFS							EPA 1631E				
Mercury			<5.00	ng/L				5.00		09/29/2017 17:56	CGL
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Aluminum			0.15	mg/L				0.025	0.012	09/28/2017 13:52	CGL
Antimony		J	0.00023	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Arsenic			<0.0050	mg/L				0.0050		09/28/2017 13:52	CGL
Barium			0.051	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Beryllium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Boron			0.24	mg/L				0.025	0.0040	09/29/2017 15:26	CGL
Cadmium			<0.00020	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Chromium			<0.0018	mg/L				0.0050	0.0018	09/28/2017 13:52	CGL
Cobalt		J	0.00032	mg/L				0.0050	0.00010	09/28/2017 13:52	CGL
Copper		J	0.0018	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Iron		J	0.25	mg/L				0.50	0.0040	09/28/2017 13:52	CGL
Lead		J	0.00039	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Manganese			0.060	mg/L				0.0050	0.00030	09/28/2017 13:52	CGL

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Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 09 **Outfall 007 - Plant Intake - Ohio River**										**Sampled** 09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Total Recoverable Metals by ICP/MS							EPA 200.8 Rev 5.4				
Molybdenum			0.018	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Nickel		J	0.0018	mg/L				0.0050	0.00020	09/28/2017 13:52	CGL
Selenium			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:52	CGL
Silver			<0.00030	mg/L				0.0050	0.00030	10/03/2017 12:45	CGL
Thallium			<0.00010	mg/L				0.0050	0.00010	09/28/2017 13:52	CGL
Tin			<0.00050	mg/L				0.0050	0.00050	09/28/2017 13:52	CGL
Titanium		J	0.0013	mg/L				0.15	0.00030	09/28/2017 13:52	CGL
Zinc		J	0.0037	mg/L				0.010	0.0022	09/28/2017 13:52	CGL
Volatile Organic Compounds - 624							EPA 624				
Vinyl Chloride			<0.0020	mg/L				0.0020		09/26/2017 21:50	LJC
Chloromethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Bromomethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Chloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Trichlorofluoromethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,1-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Methylene Chloride			<0.010	mg/L				0.010		09/26/2017 21:50	LJC
Acrolein			<0.025	mg/L				0.025		09/26/2017 21:50	LJC
Acrylonitrile			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
trans-1,2-Dichloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,1-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Chloroform			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,1,1-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Carbon Tetrachloride			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Benzene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,2-Dichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Trichloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,2-Dichloropropane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC

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Sample: 09 **Outfall 007 - Plant Intake - Ohio River**									**Sampled**	09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Volatile Organic Compounds - 624							EPA 624				
Dichlorobromomethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
2-Chloroethyl Vinyl Ether			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
cis-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Toluene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
trans-1,3-Dichloropropene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,1,2-Trichloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Dibromochloromethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Tetrachloroethene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Chlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Ethylbenzene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Bromoform			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,1,2,2-Tetrachloroethane			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,3-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,4-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
1,2-Dichlorobenzene			<0.0050	mg/L				0.0050		09/26/2017 21:50	LJC
Radium 226			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Radium 228			See attached	pCi/L			EPA 903.1/904.0	1.0		10/24/2017 8:00	GEL
Strontium - 90			See attached	pCi/g			SM 7500-SR B (Modified)			10/24/2017 8:00	GEL
Uranium			See attached	mg/L		0.03	EPA 200.8	0.0010		10/24/2017 8:00	GEL
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
1,2,4-Trichlorobenzene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
1,2-Diphenylhydrazine			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,2´-oxybis(1-chloropropane)			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,4,5-Trichlorophenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,4,6-Trichlorophenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL

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MICROBAC®

CERTIFICATE OF ANALYSIS

7091256

LG&E - KU ENERGY LLC.
Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 09 **Outfall 007 - Plant Intake - Ohio River**									**Sampled**	09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
2,4-Dichlorophenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,4-Dimethylphenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,4-Dinitrophenol			<0.052	mg/L				0.052		09/29/2017 16:10	CGL
2,4-Dinitrotoluene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,6-Dichlorophenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2,6-Dinitrotoluene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2-Chloronaphthalene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2-Chlorophenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2-Methylnaphthalene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2-Methylphenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
2-Nitrophenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
3,3´-Dichlorobenzidine			<0.052	mg/L				0.052		09/29/2017 16:10	CGL
3/4-Methylphenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
3-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
4,6-Dinitro-2-methylphenol			<0.026	mg/L				0.026		09/29/2017 16:10	CGL
4-Bromophenyl phenyl ether			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
4-Chloro-3-methylphenol			<0.021	mg/L				0.021		09/29/2017 16:10	CGL
4-Chloroaniline			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
4-Chlorophenyl phenyl ether			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
4-Nitroaniline			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
4-Nitrophenol			<0.052	mg/L				0.052		09/29/2017 16:10	CGL
Acenaphthene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Acenaphthylene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Acetophenone			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Aniline			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Anthracene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL

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Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 09 **Outfall 007 - Plant Intake - Ohio River**									**Sampled**	09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Benzidine			<0.052	mg/L				0.052		09/29/2017 16:10	CGL
Benzo[a]anthracene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Benzo[a]pyrene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Benzo[b]fluoranthene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Benzo[g,h,i]perylene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Benzo[k]fluoranthene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Benzoic acid			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Benzyl alcohol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Bis(2-chloroethoxy)methane			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Bis(2-chloroethyl)ether			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Bis(2-ethylhexyl)phthalate			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Butyl benzyl phthalate			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Carbazole			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Chrysene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Dibenz[a,h]anthracene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Dibenzofuran			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Diethyl phthalate			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Dimethyl phthalate			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Di-n-butyl phthalate			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Di-n-octyl phthalate			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Fluoranthene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Fluorene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Hexachlorobenzene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Hexachlorobutadiene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Hexachlorocyclopentadiene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Hexachloroethane			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Indeno[1,2,3cd]pyrene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL

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Ghent - Form C - KPDES Renewal

Analysis	OOC	Qualifier	Result	Units	Min	Max	Method	Rpt Limit	MDL	Analysis Date	Tech
Sample: 09 **Outfall 007 - Plant Intake - Ohio River**									**Sampled**	09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Semivolatile Organic Compounds							EPA 625 Rev 7/95				
Isophorone			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Naphthalene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Nitrobenzene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
N-Nitrosodimethylamine			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
N-Nitrosodi-n-propylamine			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
N-Nitrosodiphenylamine			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Pentachlorophenol			<0.052	mg/L				0.052		09/29/2017 16:10	CGL
Phenanthrene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Phenol			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Pyrene			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Pyridine			<0.010	mg/L				0.010		09/29/2017 16:10	CGL
Oil & Grease (HEM) by SPE			<5.0	mg/L			EPA 1664B	5.0		10/02/2017 6:23	CGL
Total Cyanide			<0.0050	mg/L			SM 4500-CN C/E-1999	0.0050		10/02/2017 14:23	CGL
Total Phenolics			<0.010	mg/L			EPA 420.4 Rev 1.0	0.010		10/02/2017 15:22	CGL
Sample: 10 **Outfall 007 - LL Mercury Blank**									**Sampled**	09/22/2017 @ 10:43	
Sampled By Wayne Mills											
Total Mercury by CVAFS							EPA 1631E				
Mercury			<0.500	ng/L				0.500		09/29/2017 18:03	CGL

Calculations

Analyte results that are indicated to have a “Calculated” method are derived from the calculation of the unrounded, raw analyte concentrations. The final, raw value is then rounded to the correct number of significant figures. Any apparent mathematical discrepancies are the result of the addition of unrounded results.

Qualifier Definitions

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Ghent - Form C - KPDES Renewal

H1 Sample received outside of holding time for these analytes.
J The analyte was positively identified, but the quantitation was below the RL
M1 Matrix Spike recovery outside Control Limits due to sample matrix interference; biased high.
M2 Matrix spike recovery outside Control Limits due to sample matrix interference; biased low.
M3 Analyte in the parent sample for the Matrix Spike was >4x the concentration of the spike solution which renders the spike amount insignificant. Matrix spike recoveries do not impact the quality of the parent sample data for this analyte.

Case Narrative Comments for Microbac Laboratories, Inc. - Chicagoland

The Matrix Spike and Matrix Spike Duplicate performed on the following sample failed the accuracy criteria for 3,3'-dichlorobenzidine with a low bias. The precision criteria were met. This data is indicative of a bias related to sample matrix.

Laboratory ID	Sample Name
17I1757-03	7091256-03 (Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Palnt Stormwater)

The following analyses were subcontracted to a qualified laboratory:

Laboratory	Analysis	Method
Microbac Laboratories, Inc. - Chicagoland	Total Cyanide	SM 4500-CN C/E-1999
	Semivolatile Organic Compounds	EPA 625 Rev 7/95
	Total Phenolics	EPA 420.4 Rev 1.0
	Oil & Grease (HEM) by SPE	EPA 1664B
	Total Recoverable Metals by ICP/MS	EPA 200.8 Rev 5.4
	Total Mercury by CVAFS	EPA 1631E

Project Requested Certification(s):

Certificate ID	Agency
90147	Kentucky Wastewater Laboratory Certification Program (j)

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LG&E - KU ENERGY LLC.
Andy Batts

Date Due 10/25/2017
Date Received 09/22/2017

Ghent - Form C - KPDES Renewal

THIS REPORT HAS BEEN REVIEWED AND APPROVED FOR RELEASE:

Joan Heinsohn A.M.

David Lester, Managing Director

As regulatory limits change frequently, Microbac advises the recipient of this report to confirm such limits with the appropriate Federal, state, or local authorities before acting in reliance on the regulatory limits provided.

For any feedback concerning our services, please contact David Lester, Managing Director at 502.962.6400 or Rob Crookston, President at president@microbac.com.

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Route **Freq.**

LG&E - KU ENERGY LLC.
Andy Batts
220 West Main St., P.O. Box 32010
Louisville KY, 40232
Ghent - Form C - KPDES Renewal

Cust. # EL056
Phone (502) 347-4018
Fax (502) 627-2550
Email andy.batts@lge-ku.com
Acct. Mgr. JOAN HEINSOHN

Project Form C - KPDES Renewal
Cust. P.O. 620738
Permit #
Permit Expires:

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: 01 Outfall 001 - Ash Pond Discharge		9-22-17 @ 8:38			Sample Date/Time/Field Results/Meter ID		
CHLORINE, TOTAL RESIDUAL-FIELD	HACH 8167			0.01	mg/L		
COLOR, ADMI - PKG	varies				NA		
ENVIRONMENTAL FEE	----				---		
FLOW BY MEASUREMENT & CALC. - MGD	EPA 600			24.9	MGD		
HARDNESS PKG. By ICP - [CALC] 200.7	varies				NA		
HOLD - SEE JOAN	HOLD				---		
NITROGEN, TOTAL ORGANIC - CALC. PKG.	varies				NA		
PH, FIELD	SM 4500 H+ B			7.06	SU		
SAMPLING LABOR - HOURLY	----				Hours		
TEMPERATURE AT PH READING, ° C - FIELD	SM 2550B			26.6	deg C		
SVOC - 625	EPA 625	A-1 LITER AMBER-4°C			mg/L		
BOD, 5 DAY	SM 5210 B	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SOLIDS, TOTAL SUSPENDED	USGS I-3765-85	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SURFACTANTS, MBAS	SM 5540C	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
BROMIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
CHLORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
FLUORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
SULFATE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		
RADIUM 226	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
RADIUM 228	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
URANIUM - 200.8	EPA 200.8	B-1 LITER PLASTIC - DW METALS-HNO3			mg/L		
ALUMINUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ANTIMONY - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ARSENIC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BARIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BERYLLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BORON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CADMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CHROMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COBALT - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COPPER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
GROSS ALPHA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
GROSS BETA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
IRON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
LEAD - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MANGANESE - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MOLYBDENUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NICKEL - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SELENIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: **01 Outfall 001 - Ash Pond Discharge**					Sample Date/Time/Field Results/Meter ID		
.....continued							
SILVER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
STRONTIUM-90	SM 7500-SR B (Modified)	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/g		
THALLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TIN - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TITANIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ZINC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
PHENOLICS, TOT. RECOVERABLE	EPA 420.4	C-1 LITER AMBER PHENOL-H2SO4			mg/L		
OIL AND GREASE, TOTAL	EPA 1664B	C-1 LITER O&G-H2SO4			mg/L		
COD	SM 5220D	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, NITRATE + NITRITE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
PHOSPHORUS, TOTAL - 365.1	EPA 365.1	C-250 ML PLASTIC - H2SO4			mg/L		
TOTAL ORGANIC CARBON	SM 5310C	C-40 ML AMBER VOA VIALS-H2SO4			mg/L		
E. COLI - COLILERT 18 - SM 9223B-MPN WW	SM9223B (Colilert-18)	D-STERILE BAC-T CUP-NA2S2O3			MPN/100mL		
VOC - 624	EPA 624	O-40 ML VOA VIALS-HCL			mg/L		
CYANIDE, TOTAL	SM 4500 CN E	O-CYANIDE-NAOH 250 ML			mg/L		
SULFIDE	SM 4500 S2 D	O-SULFIDE-NAOH/ZNC4H6O4			mg/L		
SULFITE	SM 4500 SO3 B	O-SULFITE-EDTA-ZERO HEADSPACE			mg/L		
COLOR, ADMI - PKG							
COLOR, ADMI	SM 2120E	A-1 LITER AMBER-4°C			ADMI		
COLOR, ADMI, pH	SM 2120E	A-1 LITER AMBER-4°C			SU		
HARDNESS PKG. By ICP - [CALC] 200.7							
CALCIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
Hardness Calc. (sub-analysis)	SM 2340B	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MAGNESIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NITROGEN, TOTAL ORGANIC - CALC. PKG.							
NITROGEN, AMMONIA	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL KJELDAHL	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL ORGANIC- Calc (sub analysis)	Calculated				mg/L		
Sample: **02 Outfall 001 - LL Mercury Blank**					Sample Date/Time/Field Results/Meter ID		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: 03 Outfall 002 - Units 1-2 Misc. Equipment - Once thru Cooling & Paint Stormwater				Sample Date/Time/Field Results/Meter ID 9-23-17 9:27			
CHLORINE, TOTAL RESIDUAL-FIELD	HACH 8167			0.00	mg/L		
COLOR, ADMI - PKG	varies				NA		
ENVIRONMENTAL FEE	----				---		
FLOW BY MEASUREMENT & CALC. - MGD	EPA 600			39.3	MGD		
HARDNESS PKG. By ICP - [CALC] 200.7	varies				NA		
NITROGEN, TOTAL ORGANIC - CALC. PKG.	varies				NA		
PH, FIELD	SM 4500 H+ B			7.42	SU		
TEMPERATURE AT PH READING, ° C - FIELD	SM 2550B			27.6	deg C		
SVOC - 625	EPA 625	A-1 LITER AMBER-4°C			mg/L		
BOD, 5 DAY	SM 5210 B	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SOLIDS, TOTAL SUSPENDED	USGS I-3765-85	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SURFACTANTS, MBAS	SM 5540C	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
BROMIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
CHLORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
FLUORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
SULFATE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		
RADIUM 226	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
RADIUM 228	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
URANIUM - 200.8	EPA 200.8	B-1 LITER PLASTIC - DW METALS-HNO3			mg/L		
ALUMINUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ANTIMONY - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ARSENIC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BARIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BERYLLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BORON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CADMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CHROMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COBALT - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COPPER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
GROSS ALPHA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
GROSS BETA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
IRON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
LEAD - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MANGANESE - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MOLYBDENUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NICKEL - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SELENIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SILVER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
STRONTIUM-90	SM 7500-SR B (Modified)	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/g		
THALLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TIN - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TITANIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ZINC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
PHENOLICS, TOT. RECOVERABLE	EPA 420.4	C-1 LITER AMBER PHENOL-H2SO4			mg/L		
OIL AND GREASE, TOTAL	EPA 1664B	C-1 LITER O&G-H2SO4			mg/L		
COD	SM 5220D	C-250 ML PLASTIC - H2SO4			mg/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: **03 Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Paint Stormwater** ....continued					Sample Date/Time/Field Results/Meter ID		
NITROGEN, NITRATE + NITRITE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
PHOSPHORUS, TOTAL - 365.1	EPA 365.1	C-250 ML PLASTIC - H2SO4			mg/L		
TOTAL ORGANIC CARBON	SM 5310C	C-40 ML AMBER VOA VIALS-H2SO4			mg/L		
E. COLI - COLILERT 18 - SM 9223B-MPN WW	SM9223B (Colilert-18)	D-STERILE BAC-T CUP-NA2S2O3			MPN/100mL		
VOC - 624	EPA 624	O-40 ML VOA VIALS-HCL			mg/L		
CYANIDE, TOTAL	SM 4500 CN E	O-CYANIDE-NAOH 250 ML			mg/L		
SULFIDE	SM 4500 S2 D	O-SULFIDE-NAOH/ZNC4H6O4			mg/L		
SULFITE	SM 4500 SO3 B	O-SULFITE-EDTA-ZERO HEADSPACE			mg/L		
COLOR, ADMI - PKG							
COLOR, ADMI	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			ADMI		
COLOR, ADMI, pH	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			SU		
HARDNESS PKG. By ICP - [CALC] 200.7							
CALCIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
Hardness Calc. (sub-analysis)	SM 2340B	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MAGNESIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NITROGEN, TOTAL ORGANIC - CALC. PKG.							
NITROGEN, AMMONIA	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL KJELDAHL	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL ORGANIC- Calc (sub analysis)	Calculated				mg/L		
Sample: **04 Outfall 002 - LL Mercury Blank**					Sample Date/Time/Field Results/Meter ID		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: **05 Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**				Sample Date/Time/Field Results/Meter ID: 9-22-17 11:10			
CHLORINE, TOTAL RESIDUAL-FIELD	HACH 8167			0.00	mg/L		
COLOR, ADMI - PKG	varies				NA		
ENVIRONMENTAL FEE	----				---		
FLOW BY MEASUREMENT & CALC. - MGD	EPA 600			37.4	MGD		
HARDNESS PKG. By ICP - [CALC] 200.7	varies				NA		
NITROGEN, TOTAL ORGANIC - CALC. PKG.	varies				NA		
PH, FIELD	SM 4500 H+ B			7.68	SU		
TEMPERATURE AT PH READING, ° C - FIELD	SM 2550B			25.7	deg C		
SVOC - 625	EPA 625	A-1 LITER AMBER-4°C			mg/L		
BOD, 5 DAY	SM 5210 B	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SOLIDS, TOTAL SUSPENDED	USGS I-3765-85	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SURFACTANTS, MBAS	SM 5540C	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
BROMIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
CHLORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
FLUORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
SULFATE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		
RADIUM 226	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
RADIUM 228	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
URANIUM - 200.8	EPA 200.8	B-1 LITER PLASTIC - DW METALS-HNO3			mg/L		
ALUMINUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ANTIMONY - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ARSENIC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BARIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BERYLLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BORON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CADMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CHROMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COBALT - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COPPER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
GROSS ALPHA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
GROSS BETA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
IRON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
LEAD - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MANGANESE - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MOLYBDENUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NICKEL - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SELENIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SILVER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
STRONTIUM-90	SM 7500-SR B (Modified)	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/g		
THALLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TIN - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TITANIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ZINC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
PHENOLICS, TOT. RECOVERABLE	EPA 420.4	C-1 LITER AMBER PHENOL-H2SO4			mg/L		
OIL AND GREASE, TOTAL	EPA 1664B	C-1 LITER O&G-H2SO4			mg/L		
COD	SM 5220D	C-250 ML PLASTIC - H2SO4			mg/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: **05 Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters**					Sample Date/Time/Field Results/Meter ID		
.....continued							
NITROGEN, NITRATE + NITRITE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
PHOSPHORUS, TOTAL - 365.1	EPA 365.1	C-250 ML PLASTIC - H2SO4			mg/L		
TOTAL ORGANIC CARBON	SM 5310C	C-40 ML AMBER VOA VIALS-H2SO4			mg/L		
E. COLI - COLILERT 18 - SM 9223B-MPN WW	SM9223B (Colilert-18)	D-STERILE BAC-T CUP-NA2S2O3			MPN/100mL		
VOC - 624	EPA 624	O-40 ML VOA VIALS-HCL			mg/L		
CYANIDE, TOTAL	SM 4500 CN E	O-CYANIDE-NAOH 250 ML			mg/L		
SULFIDE	SM 4500 S2 D	O-SULFIDE-NAOH/ZNC4H6O4			mg/L		
SULFITE	SM 4500 SO3 B	O-SULFITE-EDTA-ZERO HEADSPACE			mg/L		
COLOR, ADMI - PKG							
COLOR, ADMI	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			ADMI		
COLOR, ADMI, pH	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			SU		
HARDNESS PKG. By ICP - [CALC] 200.7							
CALCIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
Hardness Calc. (sub-analysis)	SM 2340B	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MAGNESIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NITROGEN, TOTAL ORGANIC - CALC. PKG.							
NITROGEN, AMMONIA	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL KJELDAHL	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL ORGANIC- Calc (sub analysis)	Calculated				mg/L		
Sample: **06 Outfall 003 - LL Mercury Blank**					Sample Date/Time/Field Results/Meter ID		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: 07 Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown 9-22-17 @ 11:00					Sample Date/Time/Field Results/Meter ID		
CHLORINE, TOTAL RESIDUAL-FIELD	HACH 8167			.18	mg/L		
COLOR, ADMI - PKG	varies				NA		
ENVIRONMENTAL FEE	----				---		
FLOW BY MEASUREMENT & CALC. - MGD	EPA 600			1.2	MGD		
HARDNESS PKG. By ICP - [CALC] 200.7	varies				NA		
NITROGEN, TOTAL ORGANIC - CALC. PKG.	varies				NA		
PH, FIELD	SM 4500 H+ B			7,75	SU		
TEMPERATURE AT PH READING, ° C - FIELD	SM 2550B			37,2	deg C		
SVOC - 625	EPA 625	A-1 LITER AMBER-4°C			mg/L		
BOD, 5 DAY	SM 5210 B	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SOLIDS, TOTAL SUSPENDED	USGS I-3765-85	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SURFACTANTS, MBAS	SM 5540C	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
BROMIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
CHLORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
FLUORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
SULFATE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		
RADIUM 226	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
RADIUM 228	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
URANIUM - 200.8	EPA 200.8	B-1 LITER PLASTIC - DW METALS-HNO3			mg/L		
ALUMINUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ANTIMONY - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ARSENIC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BARIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BERYLLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BORON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CADMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CHROMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COBALT - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COPPER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
GROSS ALPHA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
GROSS BETA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
IRON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
LEAD - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MANGANESE - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MOLYBDENUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NICKEL - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SELENIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SILVER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
STRONTIUM-90	SM 7500-SR B (Modified)	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/g		
THALLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TIN - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TITANIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ZINC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
PHENOLICS, TOT. RECOVERABLE	EPA 420.4	C-1 LITER AMBER PHENOL-H2SO4			mg/L		
OIL AND GREASE, TOTAL	EPA 1664B	C-1 LITER O&G-H2SO4			mg/L		
COD	SM 5220D	C-250 ML PLASTIC - H2SO4			mg/L		

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: **07 Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown**					**Sample Date/Time/Field Results/Meter ID**		
.....continued							
NITROGEN, NITRATE + NITRITE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
PHOSPHORUS, TOTAL - 365.1	EPA 365.1	C-250 ML PLASTIC - H2SO4			mg/L		
TOTAL ORGANIC CARBON	SM 5310C	C-40 ML AMBER VOA VIALS-H2SO4			mg/L		
E. COLI - COLILERT 18 - SM 9223B-MPN WW	SM9223B (Colilert-18)	D-STERILE BAC-T CUP-NA2S2O3			MPN/100mL		
VOC - 624	EPA 624	O-40 ML VOA VIALS-HCL			mg/L		
CYANIDE, TOTAL	SM 4500 CN E	O-CYANIDE-NAOH 250 ML			mg/L		
SULFIDE	SM 4500 S2 D	O-SULFIDE-NAOH/ZNC4H6O4			mg/L		
SULFITE	SM 4500 SO3 B	O-SULFITE-EDTA-ZERO HEADSPACE			mg/L		
COLOR, ADMI - PKG							
COLOR, ADMI	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			ADMI		
COLOR, ADMI, pH	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			SU		
HARDNESS PKG. By ICP - [CALC] 200.7							
CALCIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
Hardness Calc. (sub-analysis)	SM 2340B	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MAGNESIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NITROGEN, TOTAL ORGANIC - CALC. PKG.							
NITROGEN, AMMONIA	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL KJELDAHL	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL ORGANIC- Calc (sub analysis)	Calculated				mg/L		
Sample: **08 Outfall 006 - LL Mercury Blank**					**Sample Date/Time/Field Results/Meter ID**		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		

CL-14 TRC .35

CL-14 TRC CORRECTED FOR MANGANESE .17

CL-14 TRC = .18 mg/L

P-91 pH Dup 7.74 @ 37.4

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CHAIN OF CUSTODY FOR WORK ORDER

7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: **09 Outfall 007 - Plant Intake - Ohio River**				Sample Date/Time/Field Results/Meter ID: 9-22-17 10:43			
CHLORINE, TOTAL RESIDUAL-FIELD	HACH 8167			0.00	mg/L		
COLOR, ADMI - PKG	varies				NA		
ENVIRONMENTAL FEE	----				---		
FLOW BY MEASUREMENT & CALC. - MGD	EPA 600			51.7	MGD		
HARDNESS PKG. By ICP - [CALC] 200.7	varies				NA		
NITROGEN, TOTAL ORGANIC - CALC. PKG.	varies				NA		
PH, FIELD	SM 4500 H+ B			7.56	SU		
TEMPERATURE AT PH READING, ° C - FIELD	SM 2550B			24.6	deg C		
SVOC - 625	EPA 625	A-1 LITER AMBER-4°C			mg/L		
BOD, 5 DAY	SM 5210 B	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SOLIDS, TOTAL SUSPENDED	USGS I-3765-85	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
SURFACTANTS, MBAS	SM 5540C	A-1 LITER PLASTIC - GEN CHEM-4°C			mg/L		
BROMIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
CHLORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
FLUORIDE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
SULFATE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		
RADIUM 226	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
RADIUM 228	EPA 903.1/904.0	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
URANIUM - 200.8	EPA 200.8	B-1 LITER PLASTIC - DW METALS-HNO3			mg/L		
ALUMINUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ANTIMONY - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ARSENIC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BARIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BERYLLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
BORON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CADMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
CHROMIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COBALT - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
COPPER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
GROSS ALPHA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
GROSS BETA	SM 7110B	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/L		
IRON - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
LEAD - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MANGANESE - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MOLYBDENUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NICKEL - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SELENIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
SILVER - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
STRONTIUM-90	SM 7500-SR B (Modified)	B-1 LITER PLASTIC - DW METALS-HNO3			pCi/g		
THALLIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TIN - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
TITANIUM - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
ZINC - ICPMS 200.8	EPA 200.8	B-250 ML PLASTIC-METALS-HNO3			mg/L		
PHENOLICS, TOT. RECOVERABLE	EPA 420.4	C-1 LITER AMBER PHENOL-H2SO4			mg/L		
OIL AND GREASE, TOTAL	EPA 1664B	C-1 LITER O&G-H2SO4			mg/L		
COD	SM 5220D	C-250 ML PLASTIC - H2SO4			mg/L		

MICROBAC®
3323 Gilmore Industrial Blvd. Louisville, KY 40213 502.962.6400 Fax: 502.962.6411
Evansville 812.464.9000 Lexington 859.276.3506 Paducah 270.898.3637 Hazard 606.487.0511

CHAIN OF CUSTODY FOR WORK ORDER 7091256

Ghent - Form C - KPDES Renewal

Analysis	Method	Container/Preservative	Suppressed on COA	# Bottles	Units	Min	Max
Instructions							
Sample: 09 Outfall 007 - Plant Intake - Ohio River					Sample Date/Time/Field Results/Meter ID		
.....continued							
NITROGEN, NITRATE + NITRITE - 300.0	EPA 300.0	A-50 ML PLASTIC DIGITUBE-4°C			mg/L		
PHOSPHORUS, TOTAL - 365.1	EPA 365.1	C-250 ML PLASTIC - H2SO4			mg/L		
TOTAL ORGANIC CARBON	SM 5310C	C-40 ML AMBER VOA VIALS-H2SO4			mg/L		
E. COLI - COLILERT 18 - SM 9223B-MPN WW	SM9223B (Colilert-18)	D-STERILE BAC-T CUP-NA2S2O3			MPN/100mL		
VOC - 624	EPA 624	O-40 ML VOA VIALS-HCL			mg/L		
CYANIDE, TOTAL	SM 4500 CN E	O-CYANIDE-NAOH 250 ML			mg/L		
SULFIDE	SM 4500 S2 D	O-SULFIDE-NAOH/ZNC4H6O4			mg/L		
SULFITE	SM 4500 SO3 B	O-SULFITE-EDTA-ZERO HEADSPACE			mg/L		
COLOR, ADMI - PKG							
COLOR, ADMI	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			ADMI		
COLOR, ADMI, pH	SM 2120E	A-1 LITER PLASTIC - GEN CHEM-4°C			SU		
HARDNESS PKG. By ICP - [CALC] 200.7							
CALCIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
Hardness Calc. (sub-analysis)	SM 2340B	B-250 ML PLASTIC-METALS-HNO3			mg/L		
MAGNESIUM - ICP 200.7	EPA 200.7	B-250 ML PLASTIC-METALS-HNO3			mg/L		
NITROGEN, TOTAL ORGANIC - CALC. PKG.							
NITROGEN, AMMONIA	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL KJELDAHL	SM 4500 NH3 G	C-250 ML PLASTIC - H2SO4			mg/L		
NITROGEN, TOTAL ORGANIC- Calc (sub analysis)	Calculated				mg/L		
Sample: 10 Outfall 007 - LL Mercury Blank					Sample Date/Time/Field Results/Meter ID		
MERCURY - 1631 E	EPA 1631E	A-MERCURY LOW LEVEL-ULTRA CLEAN			ng/L		

NOTES:

Sampled By: Wayne Mills

Relinq. Date/Time/Sign: Wayne Mills 9-22-17 13:57 Rec'd Date/Time/Sign:

Relinq. Date/Time/Sign: Rec'd Date/Time/Sign:

Relinq. Date/Time/Sign: Rec'd Date/Time/Sign:

Relinq. Date/Time/Sign: Rec'd by Lab Date/Time/Sign: 9/22/17 13:57

SAMPLE RECEIPT DOCUMENTATION Cooler/Sample Temp (Deg C): LEX_____ EVV_____ PAD_____ LOU 1.6 HAZ_____

COC & proper paperwork provided & complete / COC, samples, & bottles are in agreement: YES / NO

Appropriate bottles provided intact with sufficient volume / Samples are within hold time / Samples properly preserved : YES / NO

Chain of Custody seal intact? Y Samples on Ice? Y Number of bottles 130 ? Thermometer ID T-20

Notes, Correspondence, Subcontracting, & Non-Conformance Documentation (All Non-Conformances must be documented & client notified) :

GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

October 24, 2017

Ms. Joan Heinsohn
Company: Microbac Laboratories, Inc Kentucky Division
3323 Gilmore Industrial Boulevard
Louisville, Kentucky 40213

Re: Radiochemistry Analysis
Work Order: 433581

Dear Ms. Heinsohn:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on September 26, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Hope Taylor
Project Manager

Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 − (843) 556−8171 − www.gel.com

Certificate of Analysis Report
for

MBAC001 Microbac Laboratories

Client SDG: 433581 GEL Work Order: 433581

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

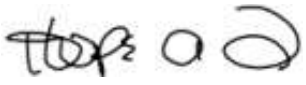
** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Hope Taylor.

Reviewed by 

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-01	Project:	MBAC00116
Sample ID:	433581001	Client ID:	MBAC001
Matrix:	Water		
Collect Date:	22-SEP-17 12:00		
Receive Date:	26-SEP-17		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS												
200.2/200.8 Uranium "As Received"												
Uranium		14.6	0.067	0.200	ug/L	1.00	1	SKJ	10/17/17	0208	1703922	1
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid "As Received"												
Alpha		11.9	4.24	3.00	pCi/L			BXG2	10/04/17	1637	1705372	2
Beta		41.3	4.29	4.00	pCi/L							
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	ND	0.771	1.00	pCi/L			JXC9	10/04/17	1048	1703996	3
GFPC, Sr90, liquid "As Received"												
Strontium-90	U	ND	1.31	2.00	pCi/L			KSD1	10/10/17	1045	1706150	4
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226		0.728	0.437	1.00	pCi/L			MXH8	10/01/17	0845	1703999	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 200.2	ICP-MS 200.2 PREP	SXW1	09/27/17	1045	1703921

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 200.8	
2	EPA 900.0/SW846 9310	
3	EPA 904.0/SW846 9320 Modified	
4	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
5	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			77.3	(15%-125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			93	(25%-125%)

Notes:

GEL LABORATORIES LLC
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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-01	Project:	MBAC00116
Sample ID:	433581001	Client ID:	MBAC001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-03	Project:	MBAC00116
Sample ID:	433581002	Client ID:	MBAC001
Matrix:	Water		
Collect Date:	22-SEP-17 12:00		
Receive Date:	26-SEP-17		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS												
200.2/200.8 Uranium "As Received"												
Uranium		1.02	0.067	0.200	ug/L	1.00	1	SKJ	10/17/17	0232	1703922	1
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid "As Received"												
Alpha	U	ND	2.87	3.00	pCi/L			BXG2	10/03/17	1134	1705372	2
Beta		5.49	1.65	4.00	pCi/L							
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	ND	0.357	1.00	pCi/L			JXC9	10/04/17	1048	1703996	3
GFPC, Sr90, liquid "As Received"												
Strontium-90	U	ND	1.31	2.00	pCi/L			KSD1	10/09/17	1344	1706150	4
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	ND	0.493	1.00	pCi/L			MXH8	10/01/17	0915	1703999	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 200.2	ICP-MS 200.2 PREP	SXW1	09/27/17	1045	1703921

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 200.8	
2	EPA 900.0/SW846 9310	
3	EPA 904.0/SW846 9320 Modified	
4	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
5	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			93	(15%-125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			68.8	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-03	Project:	MBAC00116
Sample ID:	433581002	Client ID:	MBAC001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-05	Project:	MBAC00116
Sample ID:	433581003	Client ID:	MBAC001
Matrix:	Water		
Collect Date:	22-SEP-17 12:00		
Receive Date:	26-SEP-17		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS												
200.2/200.8 Uranium "As Received"												
Uranium		0.829	0.067	0.200	ug/L	1.00	1	SKJ	10/17/17	0236	1703922	1
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid "As Received"												
Alpha	U	ND	2.85	3.00	pCi/L			BXG2	10/03/17	1134	1705372	2
Beta		2.34	1.96	4.00	pCi/L							
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	ND	0.595	1.00	pCi/L			JXC9	10/04/17	1048	1703996	3
GFPC, Sr90, liquid "As Received"												
Strontium-90	U	ND	0.747	2.00	pCi/L			KSD1	10/09/17	1344	1706150	4
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	ND	0.516	1.00	pCi/L			MXH8	10/01/17	0915	1703999	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 200.2	ICP-MS 200.2 PREP	SXW1	09/27/17	1045	1703921

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 200.8	
2	EPA 900.0/SW846 9310	
3	EPA 904.0/SW846 9320 Modified	
4	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
5	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			81.5	(15%-125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			108	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-05	Project:	MBAC00116
Sample ID:	433581003	Client ID:	MBAC001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-07	Project:	MBAC00116
Sample ID:	433581004	Client ID:	MBAC001
Matrix:	Water		
Collect Date:	22-SEP-17 12:00		
Receive Date:	26-SEP-17		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS												
200.2/200.8 Uranium "As Received"												
Uranium		4.67	0.067	0.200	ug/L	1.00	1	SKJ	10/17/17	0240	1703922	1
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid "As Received"												
Alpha	U	ND	5.57	3.00	pCi/L			BXG2	10/03/17	1730	1705372	2
Beta		18.1	2.18	4.00	pCi/L							
GFPC, Ra228, Liquid "As Received"												
Radium-228	U	ND	0.419	1.00	pCi/L			JXC9	10/04/17	1048	1703996	3
GFPC, Sr90, liquid "As Received"												
Strontium-90	U	ND	1.18	2.00	pCi/L			KSD1	10/09/17	1344	1706150	4
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	ND	0.324	1.00	pCi/L			MXH8	10/01/17	0915	1703999	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 200.2	ICP-MS 200.2 PREP	SXW1	09/27/17	1045	1703921

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 200.8	
2	EPA 900.0/SW846 9310	
3	EPA 904.0/SW846 9320 Modified	
4	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
5	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			78.4	(15%-125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			103	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-07	Project:	MBAC00116
Sample ID:	433581004	Client ID:	MBAC001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-09	Project:	MBAC00116
Sample ID:	433581005	Client ID:	MBAC001
Matrix:	Water		
Collect Date:	22-SEP-17 12:00		
Receive Date:	26-SEP-17		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Metals Analysis-ICP-MS												
200.2/200.8 Uranium "As Received"												
Uranium		0.836	0.067	0.200	ug/L	1.00	1	SKJ	10/17/17	0244	1703922	1
Rad Gas Flow Proportional Counting												
GFPC, Gross A/B, liquid "As Received"												
Alpha	U	ND	2.96	3.00	pCi/L			BXG2	10/03/17	1123	1705372	2
Beta		3.29	1.56	4.00	pCi/L							
GFPC, Ra228, Liquid "As Received"												
Radium-228		0.417	0.416	1.00	pCi/L			JXC9	10/04/17	1048	1703996	3
GFPC, Sr90, liquid "As Received"												
Strontium-90	U	ND	1.16	2.00	pCi/L			KSD1	10/09/17	1344	1706150	4
Rad Radium-226												
Lucas Cell, Ra226, liquid "As Received"												
Radium-226	U	ND	0.294	1.00	pCi/L			MXH8	10/01/17	0915	1703999	5

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 200.2	ICP-MS 200.2 PREP	SXW1	09/27/17	1045	1703921

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 200.8	
2	EPA 900.0/SW846 9310	
3	EPA 904.0/SW846 9320 Modified	
4	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified	
5	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC, Ra228, Liquid "As Received"			87.3	(15%-125%)
Strontium Carrier	GFPC, Sr90, liquid "As Received"			103	(25%-125%)

Notes:

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Certificate of Analysis

Report Date: October 24, 2017

Company :	Company: Microbac Laboratories, Inc Kentucky Division
Address :	3323 Gilmore Industrial Boulevard
	Louisville, Kentucky 40213
Contact:	Ms. Joan Heinsohn
Project:	Radiochemistry Analysis

Client Sample ID:	7091256-09	Project:	MBAC00116
Sample ID:	433581005	Client ID:	MBAC001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method

Column headers are defined as follows:

DF: Dilution Factor
DL: Detection Limit
MDA: Minimum Detectable Activity
MDC: Minimum Detectable Concentration
Lc/LC: Critical Level
PF: Prep Factor
RL: Reporting Limit
SQL: Sample Quantitation Limit

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QC Summary

Report Date: October 24, 2017

Company: Microbac Laboratories, Inc Kentucky Division
3323 Gilmore Industrial Boulevard
Louisville, Kentucky

Contact: **Ms. Joan Heinsohn**

Workorder: **433581**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS										
Batch 1703922										
QC1203883005 433581001 DUP										
Uranium		14.6		14.8	ug/L	0.939		(0%-20%)	SKJ	10/17/17 02:12
QC1203883004 LCS										
Uranium	50.0			53.8	ug/L		108	(85%-115%)		10/17/17 02:04
QC1203883003 MB										
Uranium			U	ND	ug/L					10/17/17 02:01
QC1203883006 433581001 MS										
Uranium	50.0	14.6		65.2	ug/L		101	(75%-125%)		10/17/17 02:16
QC1203883007 433581001 SDILT										
Uranium		14.6		3.01	ug/L	3		(0%-10%)		10/17/17 02:20
Rad Gas Flow										
Batch 1703996										
QC1203883170 433581004 DUP										
Radium-228	U	-0.0149		0.576	pCi/L	211*		(0% - 100%)	JXC9	10/04/17 10:48
QC1203883171 LCS										
Radium-228	6.50			6.81	pCi/L		105	(75%-125%)		10/04/17 10:48
QC1203883169 MB										
Radium-228				0.860	pCi/L					10/04/17 10:48
Batch 1705372										
QC1203886353 433275004 DUP										
Alpha	U	-0.188	U	1.75	pCi/L	N/A		N/A	BXG2	10/03/17 11:33
Beta	U	4.25	U	1.11	pCi/L	N/A		N/A		

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QC Summary

Workorder: **433581**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow											
Batch 1705372											
QC1203886356 LCS											
Alpha	80.6				94.9	pCi/L		118	(75%-125%)	BXG2	10/03/17 11:35
Beta	317				366	pCi/L		115	(75%-125%)		
QC1203886352 MB											
Alpha				U	0.829	pCi/L					10/03/17 11:32
Beta				U	0.139	pCi/L					
QC1203886354 433275004 MS											
Alpha	483	U	-0.188		468	pCi/L		96.8	(75%-125%)		10/03/17 11:35
Beta	1900	U	4.25		1990	pCi/L		105	(75%-125%)		
QC1203886355 433275004 MSD											
Alpha	483	U	-0.188		484	pCi/L	3.47	100	(0%-20%)		10/03/17 11:35
Beta	1900	U	4.25		1940	pCi/L	2.67	102	(0%-20%)		
Batch 1706150											
QC1203888091 433581005 DUP											
Strontium-90		U	0.533	U	0.783	pCi/L	N/A		N/A	KSD1	10/09/17 15:29
QC1203888092 LCS											
Strontium-90	59.4				45.0	pCi/L		75.8	(75%-125%)		10/09/17 13:44
QC1203888090 MB											
Strontium-90				U	0.522	pCi/L					10/09/17 15:28
Rad Ra-226											
Batch 1703999											
QC1203883176 433531001 DUP											
Radium-226		U	0.432		0.763	pCi/L	55.5		(0% - 100%)	MXH8	10/01/17 09:15

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QC Summary

Workorder: **433581**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226										
Batch 1703999										
QC1203883178 LCS										
Radium-226	26.0			21.5	pCi/L		83	(75%-125%)	MXH8	10/01/17 09:15
QC1203883175 MB										
Radium-226			U	0.208	pCi/L					10/01/17 09:15
QC1203883177 433531001 MS										
Radium-226	130	U 0.432		112	pCi/L		86.4	(75%-125%)		10/01/17 09:15

Notes:

The Qualifiers in this report are defined as follows:

**	Analyte is a Tracer compound
<	Result is less than value reported
>	Result is greater than value reported
BD	Results are either below the MDC or tracer recovery is low
E	%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
FA	Failed analysis.
FB	Mercury was found present at quantifiable concentrations in field blanks received with these samples. Data associated with the blank are deemed invalid for reporting to regulatory agencies
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	REMP Result > MDC/CL and < RDL
N	Metals--The Matrix spike sample recovery is not within specified control limits
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification

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QC Summary

Workorder: **433581**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.

X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

Y Other specific qualifiers were required to properly define the results. Consult case narrative.

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Technical Case Narrative
Microbac Laboratories (MBAC)
SDG #: 433581

Metals

Product: **Determination of Metals by ICP-MS**
Analytical Method: EPA 200.8
Analytical Procedure: GL-MA-E-014 REV# 32
Analytical Batch: 1703922

Preparation Method: EPA 200.2
Preparation Procedure: GL-MA-E-016 REV# 17
Preparation Batch: 1703921

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
433581001	7091256-01
433581002	7091256-03
433581003	7091256-05
433581004	7091256-07
433581005	7091256-09
1203883003	Method Blank (MB)**ICP-MS**
1203883004	Laboratory Control Sample (LCS)
1203883007	433581001(7091256-01L) Serial Dilution (SD)
1203883005	433581001(7091256-01D) Sample Duplicate (DUP)
1203883006	433581001(7091256-01S) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Calibration Information

ICSA/ICSAB Statement
For the ICP-MS analysis, the ICSA solution contains analyte concentrations which are verified trace impurities indigenous to the purchased standard.

Radiochemistry

Product: **GFPC, Ra228, Liquid**
Analytical Method: EPA 904.0/SW846 9320 Modified
Analytical Procedure: GL-RAD-A-063 REV# 1
Analytical Batch: 1703996

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
433581001	7091256-01
433581002	7091256-03
433581003	7091256-05
433581004	7091256-07
433581005	7091256-09
1203883169	Method Blank (MB)
1203883170	433581004(7091256-07) Sample Duplicate (DUP)
1203883171	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Method Blank Criteria
The blank result (See Below) is greater than the MDC but less than the required detection limit.

Sample	Analyte	Value
1203883169 (MB)	Radium-228	Result: 0.860 pCi/L > MDA: 0.656 pCi/L < RDL: 1.00 pCi/L

Duplication Criteria between QC Sample and Duplicate Sample
The QC Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1203883170 (7091256-07DUP)	Radium-228	RPD 211* (0%-20%) RER 2.97 (0-3)

Product: **GFPC, Gross A/B, liquid**
Analytical Method: EPA 900.0/SW846 9310
Analytical Procedure: GL-RAD-A-001 REV# 19
Analytical Batch: 1705372

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
433581001	7091256-01
433581002	7091256-03

433581003	7091256-05
433581004	7091256-07
433581005	7091256-09
1203886352	Method Blank (MB)
1203886353	433275004(NonSDG) Sample Duplicate (DUP)
1203886354	433275004(NonSDG) Matrix Spike (MS)
1203886355	433275004(NonSDG) Matrix Spike Duplicate (MSD)
1203886356	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

RDL Met
Sample (See Below) did not meet the required detection limit due to low sample volume. No more volume could be used due to not exceeding the maximum net weight limit of the calibration curve. The sample counted for 500 minutes.

Sample	Analyte	Value
433581004 (7091256-07)	ALPHA	Result 2.92 < MDA 5.57 > RDL 3 pCi/L

Technical Information

Gross Alpha/Beta Preparation Information
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating.

Recounts
Sample 433581001 (7091256-01) was recounted to verify sample result. The second count is reported.

Miscellaneous Information

Additional Comments
The matrix spike and matrix spike duplicate, 1203886354 (Non SDG 433275004MS) and 1203886355 (Non SDG 433275004MSD), aliquots were reduced to conserve sample volume.

Product: **GFPC, Sr90, liquid**
Analytical Method: EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
Analytical Procedure: GL-RAD-A-004 REV# 19

Analytical Batch: 1706150

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
433581001	7091256-01
433581002	7091256-03
433581003	7091256-05
433581004	7091256-07
433581005	7091256-09
1203888090	Method Blank (MB)
1203888091	433581005(7091256-09) Sample Duplicate (DUP)
1203888092	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts
Sample 1203888090 (MB) was recounted due to a suspected blank false positive. The recount is reported. Sample 1203888091 (7091256-09DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported. Sample 433581001 (7091256-01) was recounted due to a suspected false positive. The recount is reported.

Product: **Lucas Cell, Ra226, liquid**
Analytical Method: EPA 903.1 Modified
Analytical Procedure: GL-RAD-A-008 REV# 14
Analytical Batch: 1703999

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
433581001	7091256-01
433581002	7091256-03
433581003	7091256-05
433581004	7091256-07
433581005	7091256-09
1203883175	Method Blank (MB)
1203883176	433531001(NonSDG) Sample Duplicate (DUP)
1203883177	433531001(NonSDG) Matrix Spike (MS)
1203883178	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments
The matrix spike, 1203883177 (Non SDG 433531001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

433581

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Samp #	Sample Description	Test	Matrix	Method	Units	Analyte	Requested RL	Samp Date	Due Date
7091256-01	Outfall 001 - Ash Pond Discharge							09/22/2017	10/03/2017
		Uranium	WATER	EPA 200.8	mg/L	Uranium	0.00100		
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 226	WATER	EPA 903.1/904.0	pCi/L	Radium 226	1.0		
		Designator: H	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 228	WATER	EPA 903.1/904.0	pCi/L	Radium 228	1.0		
		Designator: I	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Alpha	WATER	SM 7110B	pCi/L	Gross Alpha	3.0		
		Designator: F	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Beta	WATER	SM 7110B	pCi/L	Gross Beta	4.0		
		Designator: G	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Strontium - 90	WATER	SM 7500-SR B (Mo	pCi/g	Strontium - 90			
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
7091256-03	Outfall 002 - Unitts 1-2 Misc. Equipment - Once thru Cooling & Paint Stormwater							09/22/2017	10/03/2017
		Uranium	WATER	EPA 200.8	mg/L	Uranium	0.00100		
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 226	WATER	EPA 903.1/904.0	pCi/L	Radium 226	1.0		
		Designator: H	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 228	WATER	EPA 903.1/904.0	pCi/L	Radium 228	1.0		
		Designator: I	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Alpha	WATER	SM 7110B	pCi/L	Gross Alpha	3.0		
		Designator: F	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Beta	WATER	SM 7110B	pCi/L	Gross Beta	4.0		
		Designator: G	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Strontium - 90	WATER	SM 7500-SR B (Mo	pCi/g	Strontium - 90			
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						

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Samp #	Sample Description	Test	Matrix	Method	Units	Analyte	Requested RL	Samp Date	Due Date
7091256-05	Outfall 003 - Units 3-4 Misc. Equipment - Once thru Cooling and Plant Stormwaters							09/22/2017	10/03/2017
		Uranium	WATER	EPA 200.8	mg/L	Uranium	0.00100		
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 226	WATER	EPA 903.1/904.0	pCi/L	Radium 226	1.0		
		Designator: H	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 228	WATER	EPA 903.1/904.0	pCi/L	Radium 228	1.0		
		Designator: I	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Alpha	WATER	SM 7110B	pCi/L	Gross Alpha	3.0		
		Designator: F	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Beta	WATER	SM 7110B	pCi/L	Gross Beta	4.0		
		Designator: G	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Strontium - 90	WATER	SM 7500-SR B (Mo	pCi/g	Strontium - 90			
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
7091256-07	Outfall 006 - 2 - Unit 2 Cooling Tower Blowdown							09/22/2017	10/03/2017
		Uranium	WATER	EPA 200.8	mg/L	Uranium	0.00100		
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 226	WATER	EPA 903.1/904.0	pCi/L	Radium 226	1.0		
		Designator: H	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 228	WATER	EPA 903.1/904.0	pCi/L	Radium 228	1.0		
		Designator: I	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Alpha	WATER	SM 7110B	pCi/L	Gross Alpha	3.0		
		Designator: F	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Beta	WATER	SM 7110B	pCi/L	Gross Beta	4.0		
		Designator: G	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Strontium - 90	WATER	SM 7500-SR B (Mo	pCi/g	Strontium - 90			
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						

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Samp #	Sample Description	Test	Matrix	Method	Units	Analyte	Requested RL	Samp Date	Due Date
7091256-09	Outfall 007 - Plant Intake - Ohio River							09/22/2017	10/03/2017
		Uranium	WATER	EPA 200.8	mg/L	Uranium	0.00100		
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 226	WATER	EPA 903.1/904.0	pCi/L	Radium 226	1.0		
		Designator: H	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Radium 228	WATER	EPA 903.1/904.0	pCi/L	Radium 228	1.0		
		Designator: I	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Alpha	WATER	SM 7110B	pCi/L	Gross Alpha	3.0		
		Designator: F	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Gross Beta	WATER	SM 7110B	pCi/L	Gross Beta	4.0		
		Designator: G	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						
		Strontium - 90	WATER	SM 7500-SR B (Mo	pCi/g	Strontium - 90			
		Designator: J	*Container: B-1 LITER PLASTIC - DW METALS-HNO3*						

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SENDING LAB	RECEIVING LAB
Courier UPS ___ Zip ___ FedEx X Other___	
Number of Bottles Sent: 25	
Auto-log Sent: NA	
Sub COC Scanned into Element: X Custody Assigned: X	
Special Instructions: _____	
Relinquished By: _____ Date: 9/25/17	Received By: _____ Date: 9/26/17 9:05
	Cooler Temperature Upon Receipt: ___°C

GEL Laboratories LLC HT

SAMPLE RECEIPT & REVIEW FORM

Client: MBAC	**SDG/AR/COC/Work Order:** 433581
Received By: AA	**Date Received:** 9/26/17
Carrier and Tracking Number	Circle Applicable: (FedEx Express) FedEx Ground UPS Field Services Courier Other 7703 3694 5575

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		√	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		√	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr **Classified as: Rad 1 Rad 2 Rad 3**
Is package, COC, and/or Samples marked HAZ?		√	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	√			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	√			
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		√		Preservation Method: Wet Ice Ice Packs Dry ice (None) Other: *all temperatures are recorded in Celsius **TEMP:** 1.1°
4	Daily check performed and passed on IR temperature gun?	√			**Temperature Device Serial #:** IR2-17 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	√			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	√			Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			√	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes No___ N/A (If unknown, select No) VOA vials free of headspace? Yes No___ N/A Sample ID's and containers affected:
8	Samples received within holding time?	√			ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	√			Sample ID's and containers affected:
10	Date & time on COC match date & time on bottles?			√	Sample ID's affected: No dates/times on samples
11	Number of containers received match number indicated on COC?	√			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			√	
13	COC form is properly signed in relinquished/received sections?	√			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KHiatt Date 9/27/17 Page 1 of 1

GL-CHL-SR-001 Rev 5

List of current GEL Certifications as of 24 October 2017

State	Certification
Alaska	UST−0110
Arkansas	88−0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH−0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330−15−00283, P330−15−00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C−SC−01
Kansas NELAP	E−10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M−SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE−OS−26−13
Nevada	SC000122018−1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R−158
Oklahoma	9904
Pennsylvania NELAP	68−00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235−17−12
Utah NELAP	SC000122017−24
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

ATTACHMENT 7

DMR QUARTERLY METALS ANALYSES

TWO-YEAR SUMMARY TABLE

Kentucky Utilities Company - Ghent Station

KPDES DMR -Discharge Monitoring Reports - Quarterly Metals Analyses

Data Summary for 2016-2018 to-date, Rev Oct 25, 2018

Quarterly & Average Values [ppb]

			Sb Antimony	As Arsenic	Be Beryllium	Cd Cadmium	Cr Chromium	Cu Copper	Pb Lead	Hg Mercury	Ni Nickel	Se Selenium	Ag Silver	Tl Thallium	Zn Zinc
GH-001	**Ash Pond Discharge**														
			Quarterly Values [ppb]												
2016	Q1	01/06/16	< 25	< 50	< 5	< 2.5	< 5	24	< 5	0.7	9.7	27	< 5	< 25	< 5
	Q2	04/04/16	< 25	< 50	0.12	< 2.5	9.4	34	< 5	< 0.2	33	37	< 5	< 25	15
	Q3	07/05/16	< 25	< 50	0.14	< 5	15.0	28	< 5	< 0.2	32	38	< 5	< 25	32
	Q4	10/03/16	< 25	< 50	< 5	< 5	13.0	14	< 5	< 0.2	26	< 25	< 5	< 25	24
2017	Q1	02/15/17	< 0.78	2.78	< 0.85	1.03	16.3	13.8	< 1.8	0.146	21.6	15.9	1.1	< 6.35	10.1
	Q2	04/12/17	< 0.31	3.20	< 0.34	0.90	11.3	16.3	< 0.7	0.206	21.6	11.0	< 0.35	< 0.26	30.2
	Q3	07/05/17	0.80	4.20	< 0.51	0.70	15.4	18.4	1.20	0.091	1.3	6.0	0.6	0.20	19.5
	Q4	10/03/17	< 2.0	4.60	< 2.0	1.00	16.1	15.8	< 2.0	0.024	16.2	5.9	< 3.0	< 0.4	15.9
2018	Q1	01/03/18	< 3.0	3.20	< 0.6	1.60	21.70	15.2	< 3.0	0.430	26.1	11.00	< 3.0	< 0.6	22.7
	Q2	04/05/18	< 3.0	< 3.0	< 0.5	1.90	3.6	5.2	< 3.0	0.053	27.3	16.9	< 3.0	1.10	23.1
	Q3	07/03/18	< 2.5	4.2	< 0.5	1.90	4.2	17.4	< 2.5	0.124	31.0	11.7	< 2.5	< 0.5	< 5.0
GH-007	**Plant Intake**														
			Quarterly Values [ppb]												
2016	Q1	01/06/16	< 25	< 50	< 5	< 2.5	< 5	< 10	< 5	< 0.2	< 5	< 25	< 5	< 25	< 5
	Q2	04/04/16	< 25	< 50	< 5	< 2.5	< 5	< 10	< 5	< 0.2	< 5	< 25	< 5	< 25	< 5
	Q3	07/05/16	< 25	< 50	< 5	< 5	< 5	< 10	< 5	< 0.2	< 5	< 25	< 5	< 25	0.0
	Q4	10/03/16	< 25	< 50	< 5	< 5	< 5	< 10	< 5	< 0.2	< 5	< 25	< 5	< 25	< 5
2017	Q1	02/15/17	< 0.78	< 2.38	< 0.85	< 0.74	< 3.53	< 3.58	2.65	< 0.025	4.6	< 2.57	< 8.75	< 6.35	13.4
	Q2	04/04/17	< 0.31	2.00	< 0.34	< 0.3	3.4	6.1	5.10	< 0.008	7.8	1.1	< 0.35	< 0.26	25.4
	Q3	07/05/17	< 0.47	1.50	< 0.51	< 0.45	< 2.1	2.5	1.20	< 0.013	2.7	1.1	< 0.53	< 0.38	< 6.9
	Q4	10/03/17	< 2.0	< 2.0	< 2.0	< 0.4	< 2.0	2.2	< 2.0	< 0.001	< 2.0	< 2.0	< 3.0	< 0.4	7.4
2018	Q1	01/03/18	< 3.0	< 2.5	< 0.6	< 0.6	< 0.61	< 3.0	< 3.0	< 0.006	< 3.0	< 2.5	< 3.0	< 0.6	< 6.0
	Q2	04/05/18	< 3.0	3.4	< 0.5	< 0.3	7.0	4.3	6.6	<0.015	9.6	< 3.0	< 3.0	0.42	33.8
	Q3	07/03/18	< 2.5	1.1	< 0.5	< 0.5	2.3	< 2.5	< 2.5	0.0125	2.5	< 5.0	< 2.5	< 0.5	< 5.0

ATTACHMENT 8

STORMWATER RUNOFF CALCULATIONS

Kentucky Utilities Company
GHENT GENERATING STATION

November 29, 2018

Rainfall Runoff Calculations

Data

Area	# Acres	
Coefficient for Rainfall Runoff	Cr	
10 Year 24 Hour Rainfall	**4.1**	inch/24 hours
Annual Average Rainfall	**39.04**	inch/year

Runoff Equations:

1-Day Flow:
(#Acres)(43560 ft2)/Acre)(Cr)(4.1 in/day)(1 ft/12 inch)(7.48 gal/ft3)(1MG/1000000 gal)
MGD = (# Acres) x (Cr) x **0.11132484**

30-Day Flow:
(#Acres)(43560 ft2)/Acre)(Cr)(43.56 in/yr)(1 ft/12 inch)(7.48 gal/ft3)(1MG/1000000 gal)
MGD = (# Acres) x (Cr) x **0.002904191**

Definition of Runoff Coefficients:

	Cr
Vegetated Areas (without slope considerations)	0.25
Gypsum & Loose Gravel (substations, rail beds, dam face, rock-faced slopes, etc.)	0.25
Packed Surfaces (Coal, Bare Soil, Packed Gravel [Roads, Parking Areas, etc.])	0.5
Impervious Surfaces (Pavement, Roofs, Cooling Tower Direct Precip)	0.85
Basin Surfaces	1

KPDES OUTFALLS DESCRIPTION		***Outfall Location***
001	Process Pond Discharges Including Treated FGD Wastewaters, CCR-Contact Wastewaters, Cooling Towers Blowdowns, Plant Sumps, Coal Pile Stormwater Runoff, Landfill Leachate, Closed/Capped Ash Ponds Stormwater Runoff Flows	Process Pond Sample Structure *(Currently @ Manhole North of US-42)*
002	Units 1-2 Misc. Plant Equipment Once-Thru Cooling Waters, Unused Service Water Return Flows, and Plant Roofs-Roads Stormwater Runoff Flows	Top of RiverBank *(Mid-Property East)*
003	Units 3-4 Misc. Plant Equipment Once-Thru Cooling Waters, Unused Service Water Return Flows, and Plant Roofs-Roads Stormwater Runoff Flows	Top of RiverBank *(Mid-Property West)*
004	**Discontinued/Removed** Sanitary Wastewater (internal outfall)	**Discontinued/Removed**
005	Chemical Metal Cleaning Wastes (internal outfall to 001)	(Frac Tanks)
006	Units 1-4 Cooling Tower Blowdown Flows (internal outfall to 001)	
007	Plant Intake	River Water Intake Structure
008	**PROPOSED** - PWS-Process Water System Discharge to 001	PWS Treated Effluent Pump Spigot
009	**PROPOSED** - Stormwater Runoff from Future/Capped ATB-1 Ash Pond/North (to/from Secondary Pond, Discharge Combines with Outfall 001 to Ohio River Diffuser)	ATB-1 Secondary Pond Sample Structure *(South of US-42)*
010	**PROPOSED** - Storm Water Runoff from Future/Capped ATB-2/West Ash Pond and West/Upper Haul Road to Landfill	Construction/Fishing Pond Discharge Sample Structure to Black Rock Creek
011	**PROPOSED** - Storm Water Runoff from Future/Capped ATB-2/East Ash Pond - Stormwater Pond Discharge to Agniels Creek	ATB-2/Cap Stormwater Pond Discharge Sample Structure to Agniels Creek
012	**PROPOSED** - Storm Water Runoff from Undeveloped Landfill - Stormwater Pond Discharge to Stephens Branch Sample Point	Stephens Branch Stream Sample Pont Downstream of Pond Discharge Entry Point
013	**PROPOSED** - Storm Water Runoff from Undeveloped Landfill Area - Temporary Stormwater Pond Discharge to Agniels Creek Sample Point	Agniels Creek Stream Sample Pont Downstream of Pond Discharge Entry Point

GHENT STATION - Stormwater Runoff Areas Listing Imber
(Organized by Outfalls to River, Ponds and Contributing Areas Flows) November 29, 2018

1 **Outfall 001 - Plant Process Ponds, Cooling Tower Blowdowns and Stormwater Flows to Ohio River**
- 1.a Process Pond - North Impoundment, Slopes & Roadways
- 1.b Process Pond - South Impoundment, Slopes & Roadways
- 1.c Process Ponds - South Uphill Slopes (Vegetated)
- 1.d Process Channel (to Process Ponds) - Water Flow, Inward Slopes and Roadways
- 1.e Closed/Capped ATB-1 South Area *(65+% Total of Original ATB-1)*
- 1.f Process Channel - South Uphill Slopes (Vegetated)
- 1.g Coal Pile West Basin (Pumped to Process Channel)
- 1.h Coal Pile Areas Draining to West Basin (Pumped to Process Channel)
- 1.i Coal Pile Handling Areas & Process WW/Tank Farm Area Runoff
- 1.j PWS Area Runoff East Basin (*previous east coalyard*) to Process Channel
- 1.k PWS - Process Water Treatment System Area Runoff (to East Basin to Process Channel)
- 1.l CCRT Area Runoff Pond (Pumped to Process Channel)
- 1.m CCRT - Coal Combustion Residuals Transport Area (Runoff Pond to Process Channel)
- 1.n Oil-Water Separator Units 1-4 Plant Runoff Areas
- 1.o Units 1-4 Cooling Towers Roof Drains (to Basin and to Blowdown/Outfall 001)
- 1.p Active Landfill - Leachate Pond (Pumped to Process Channel)
- 1.q Active Landfill Area with Underdrain System to Landfill Leachate Pond
- 1.r Landfill Main Haul Road Runoff Pond (Pumped to Process Pond)
- 1.s Landfill Main Haul Road (Bermed to Runoff Pond)
- 1.t DTLS (Dual Truck Loading Station) Runoff Pond (to Process Channel)
- 1.u DTLS Diked Area Runoff to Pond

2 **Outfall 002 - Plant Unit 1-2 Areas**
- 2.a Uncontaminated Runoff Areas to 002

3 **Outfall 003 - Plant Unit 3-4 Areas**
- 3.a Uncontaminated Runoff Areas to 003

4-8 **Outfalls 004-to-008 *(Reserved)***

9 **Outfall 009 (PROPOSED) - Secondary Pond (Capped ATB-1) Runoff Area to Ohio River**
- 9.a Secondary Pond - Water, Slopes & Roadways
- 9.b Capped ATB-1 (North 1/3) Runoff and Ditches to Secondary Pond

10 **Outfall 010 (PROPOSED) - West Haul Road & ATB-2/North Runoff Areas Pond to Black Rock Creek**
- 10.a Runoff Pond - Impoundment, Inner Slopes-to-Roadway
- 10.b West Haul Road to ATB-2 Crest - Sloped Drainage to Runoff Pond
- 10.c West Haul Road, Valley from Pond-to-Dam-to East Haul Road Area
- 10.d ATB-2 Dam Face
- 10.e ATB-2/North - Cap, Perimeter Access Road, & Lined Inner Drain Ditches

11 **Outfall 011 (PROPOSED) - ATB-2/South Runoff Areas Pond To Agniels Creek**
- 11.a Runoff Pond - Impoundment and Inner Slopes
- 11.b Landfill - Perimeter Access Road & Inner Drain Ditches to Pond

12 **Outfall 012 (PROPOSED) - Landfill Active (Phases 1-2) Runoff Areas Pond To Stephens Branch**
- 12.a Runoff Pond - Impoundment and Inner Slopes
- 12.b Main Drainage Channel and Access Road to Runoff Pond
- 12.c Perimeter Access Road & Capped Inner Drain Ditches

13 **Outfall 013 (PROPOSED)-- Temporary Storm Pond from Future Landfill (Phase 3) Areas To Agniels Creek**
- 13.a Temporary Stormwater Runoff Pond - Basin Surface and Inner Slopes
- 13.b Inner Slopes to Pond
- 13.c Undeveloped Landfill Areas Uphill of Pond - Above Main Access Road & Extending to DTLS

14 Plant Limestone Pile & Slurry Preparation Areas
- 14.a Limestone Pile Areas pumped to LS Tanks

15 West Plantsite & System Lab Areas to Black Rock Creek
- 15.a West Plantsite Areas
- 15.b System Lab Areas

16 Riverbank Uncontaminated Non-Point Source Runoff Areas to River
- 16.a Vegetation-River Bank Above Normal Water Mark
- 16.b River (water surface) - Low Shoreline Areas Below Normal Water Mark
- 16.c Intake Pier (Units 1-2) Road Stucture and Conveyors

17 US-42 (North) Roadside Areas
- 17.a Plant Fence Areas to US-42 Drainage Ditch to Black Rock Creek
- 17.b Plant Fence Plant Areas to US-42 Drainage Ditch to Agniels Creek

18 US-42 (South) Road-to-Railway Areas
- 18.a West US-42 Roadside Areas to Drainage Ditch to Black Rock Creek
- 18.b Railway-to ATB-1 Berm Areas
- 18.c East US-42 Roadside-to-Railway (South of US-42) Areas

19 CCRT Area Dewatering Buildings Roofs, Non-Contact Adj. Areas, & Ammonia Tanks Areas to Black Rock Creek
- 19.a CCRT Dewatering Facilities/Buildings Roofs (Drainage to Black Rock Creek)
- 19.b Ammonia Tanks Facilities - Building & Pavement
- 19.c CCRT Perimeter Vegetated Areas- North/East (including Unnamed Trib. to Block Rock Creek)

GHENT STATION - Stormwater Runoff Areas Listing ---CONTINUED
(Organized by Outfalls to River, Ponds and Contributing Areas Flows) November 29, 2018

20 Transmission Substation (Valved Drains to Black Rock Creek)
- 20.a Substation (Fenced) Drainage - Northward Towards U.S. 42

21 South US-42 Plant Property Entrance Gates & Access Road Areas - Drainage to Black Rock Creek
- 21.a Security Entrance Gate Area Drainage to US-42 Roadside Ditch
- 21.b Substation Southward Perimeter Area & Access Roads Areas - Drainage to Unnamed Trib to Black Rock Creek
- 21.c South Access Road Areas (to ATB-2) - Drainage to Unnamed Tributary to Black Rock Creek

22 Hilly Woods-Fields Areas Between ATB-1, ATB-2 and Landfill - Drainage to Agniels Creek
- 22.a East Haul Road - East Pond 1 and Bermed Road Area - Drainage to US-42 Agniels Creek
- 22.b East Haul Road - Middle Pond 2 and Bermed Road Area - Drainage to US-42 Agniels Creek
- 22.c East Haul Road - South Pond 3 and Bermed Road Area - Drainage to US-42 Agniels Creek
- 22.d Hills/Woods Areas East of East Haul Road extending to ATB-2 & North/East of Landfill Areas

23 Pipe Conveyor & Woods/Fields Areas West of CCRT & West Haul Road to ATB-2 Areas - Drainage to Black Rock Creek

24 Pipe Conveyor & Woods/Fields Areas West of Landfill & West Haul Road - Drainage to Black Rock Creek

25 Hilly Woods-Fields Areas Northeast of Landfill to ATB-2 (South Perimeter) - Drainage to Agniels Creek
- 25.a Hilly Woods-Fields Areas Northeast of Landfill to ATB-2 (South Perimeter)

26 Hilly Woods-Fields Areas Surrounding Landfill East/South/West Perimeters - Drainage to Stephens Branch

27 Undeveloped/FUTURE Phase III Landfill Areas - Drainage to Agniels Creek
- 27.a Phase III Future Landfill Hills/Fields Downhill of Main Haul Road (not draining into pond) Runoff Area
- 27.b Phase III Future Landfill Area for Future Leachate & Stormwater Ponds Area

Plant Property Areas - Rainfall Runoff Calculations
(Organized by Outfalls to River, Ponds and Contributing Areas Flows)

November 29, 2018

Imber

Outfall 001 - Plant Process Ponds Wastewaters, Cooling Tower Blowdowns, and Stormwater Flows to Ohio River

Area #		Source	Runoff Description	Cr	Acres	1-Day Max (MGD)	Daily (Annual Average) (MGD)
Area 1.a		**Process Pond - North Impoundment, Slopes & Roadways**					
	1	Basin Surface	Basin Surface	1.0	17.19	1.9142	0.0499
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	3.92	0.3705	0.0097
	3	Gravel/Soil Perimeter Roadway, Parking, & Perimeter Areas	Packed Surface	0.5	5.62	0.3127	0.0082
		TOTAL AREA			26.73	2.5975	0.0678
Area 1.b		**Process Pond - South Impoundment, Slopes & Roadways**					
	1	Basin Surface	Basin Surface	1.0	42.31	4.7098	0.1229
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	4.72	0.4465	0.0116
		TOTAL AREA			47.03	5.1563	0.1345
Area 1.c		**Process Pond - South Uphill Vegetated Slopes**					
	1	Uphill Slopes Vegetated Including Roads & Gravel Areas	Vegetated Area	0.3	7.53	0.2094	0.0055
		TOTAL AREA			7.53	0.2094	0.0055
Area 1.d		**Process Channel (to Process Ponds) - Water Flow, Inward Slopes and Roadways**					
	1	Basin Surface	Basin Surface	1.0	5.20	0.5784	0.0151
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	5.52	0.5219	0.0136
		TOTAL AREA			10.71	1.1003	0.0287
Area 1.e		**Closed/Capped ATB-1 South Area (60+% Total of Original ATB-1)**					
	1	Capped Slopes and including Process Channel (Vegetated)	Vegetated Area	0.3	67.08	1.8669	0.0487
		TOTAL AREA			67.08	1.8669	0.0487
Area 1.f		**Process Channel - South Uphill Slopes (Vegetated)**					
	1	Uphill Slopes Vegetated	Vegetated Area	0.3	23.72	0.6601	0.0172
		TOTAL AREA			23.72	0.6601	0.0172
Area 1.g		**Coal Pile West Basin (Pumped to Process Channel)**					
	1	West Basin Surface	Basin Surface	1.0	0.43	0.0476	0.0012
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	0.55	0.0522	0.0014
		TOTAL AREA			0.98	0.0998	0.0026
Area 1.h		**Coal Pile Areas Draining to West Basin (Pumped to Process Channel)**					
	1	Coal Pile, Drainage Channel & Perimeter Road	Packed Surface	0.5	36.28	2.0192	0.0527
	2	Coal Pile *(Area of Previous/Relocated Cemetary Area)*	Packed Surface	0.5	1.51	0.0842	0.0022
		TOTAL AREA			37.79	2.1034	0.0549
Area 1.i		**Coal Pile Handling Areas & Process WW/Tank Farm Area Runoff**					
	1	Coal Handling Crusher, Transfer, Warehouse, Refined Coal, Office Bldgs --- Process Wastewaters Tanks Farm Area ---Roadways, Roofs & Gravel Areas to U1 Cooling Tower (Areas Drainina to West Basin)	Impervious Surface	0.9	6.49	0.6138	0.0160
		TOTAL AREA			6.49	0.6138	0.0160
Area 1.j		**PWS Area Runoff East Basin (*previous east coalyard*) to Process Channel**					
	1	East Basin Surface	Basin Surface	1.0	0.45	0.0498	0.0013
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	0.18	0.0173	0.0005
		TOTAL AREA			0.63	0.0671	0.0017
Area 1.k		**PWS - Process Water Treatment System Area Runoff (to East Basin to Process Channel)**					
	1	PWS Area Building, Perimeter/Pavement & Adjacent Gravel (areas draining to east b	Impervious Surface	0.9	6.29	0.5956	0.0155
		TOTAL AREA			6.29	0.5956	0.0155
Area 1.l		**CCRT Area Runoff Pond (Pumped to Process Channel)**					
	1	Basin Surface	Basin Surface	1.0	0.29	0.0318	0.0008
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	0.25	0.0240	0.0006
		TOTAL AREA			0.54	0.0557	0.0015
Area 1.m		**CCRT - Coal Combustion Residuals Transport Area (Runoff Pond to Process Channel)**					
	1	CCRT Area Handling, Buildings/Roofs, Paved/Gravel Roads/Parking Areas Draining to CCRT Pond	Impervious Surface	0.9	4.32	0.4090	0.0107
		TOTAL AREA			4.32	0.4090	0.0107
Area 1.n		**Oil-Water Separator Units 1-4 Plant Runoff Areas**					
	1	Oil-Water Separator	Impervious Surface	0.9	0.03	0.0033	0.0001
	2	Unit 1-4 GSU/Aux Transformers	Impervious Surface	0.9	0.43	0.0407	0.0011
	3	Tank Berms (525K, 100K gal berms)	Impervious Surface	0.9	0.44	0.0414	0.0011
	4	Vehicle Refueling (Diesel+Gasoline Tanks & Driveway)	Impervious Surface	0.9	0.08	0.0080	0.0002
		TOTAL AREA			0.99	0.0934	0.0024

Plant Property Areas - Rainfall Runoff Calculations
(Organized by Outfalls to River, Ponds and Contributing Areas Flows)

November 29, 2018

Imber

Area #		Source	Runoff Description	Cr	Acres	1-Day Max (MGD)	Daily (Annual Average) (MGD)
Area 1.o		**Units 1-4 Cooling Towers Roof Drains (to Basin and to Blowdown/Outfall 001)**					
	1	Unit 1 Cooling Tower Roof Drains (into Circulating Water Basin)	Impervious Surface	0.9	0.77	0.0724	0.0019
	2	Unit 2 Cooling Tower Roof Drains (into Circulating Water Basin)	Impervious Surface	0.9	0.71	0.0676	0.0018
	3	Unit 3 Cooling Tower Roof Drains (into Circulating Water Basin)	Impervious Surface	0.9	1.06	0.1000	0.0026
	4	Unit 4 Cooling Tower Roof Drains (into Circulating Water Basin)	Impervious Surface	0.9	1.06	0.1002	0.0026
		TOTAL AREA			3.60	0.3402	0.0089
Area 1.p		**Active Landfill - Leachate Pond (Pumped to Process Channel)**					
	1	Active Landfill Leachate Pond Surface	Basin Surface	1.0	0.73	0.0818	0.0021
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	0.27	0.0260	0.0007
		TOTAL AREA			1.01	0.1077	0.0028
Area 1.q		**Active Landfill Area with Underdrain System to Landfill Leachate Pond**					
	1	Active Landfill Area (areas draining to leachate pond)	Packed Surface	0.5	132.35	7.3667	0.1922
		TOTAL AREA			132.35	7.3667	0.1922
Area 1.r		**Landfill Main Haul Road Runoff Pond (Pumped to Process Pond)**					
	1	Landfill Main Haul Road Runoff Pond Surface	Basin Surface	1.0	0.25	0.0281	0.0007
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	0.34	0.0326	0.0009
		TOTAL AREA			0.60	0.0607	0.0016
Area 1.s		**Landfill Main Haul Road (Bermed to Runoff Pond)**					
	1	Landfill Main Haul Road Bermed Area (draining to runoff pond)	Impervious Surface	0.9	4.44	0.4200	0.0110
		TOTAL AREA			4.44	0.4200	0.0110
Area 1.t		**DTLS (Dual Truck Loading Station) Runoff Pond (to Process Channel)**					
	1	DTLS Area Runoff Pond Surface	Basin Surface	1.0	0.21	0.0236	0.0006
	2	Berm & Inner Slope Areas	Impervious Surface	0.85	0.18	0.0172	0.0004
		TOTAL AREA			0.39	0.0408	0.0011
Area 1.u		**DTLS Diked Area Runoff to Pond**					
	1	DTLS Area Bermed Area (draining to runoff pond)	Impervious Surface	0.9	1.70	0.1612	0.0042
		TOTAL AREA			1.70	0.1612	0.0042
Outfall 002 - Plant Unit 1-2 Areas							
Area 2		**Uncontaminated Runoff Areas (to Storm Sewers to Outfall 002)**					
	1	Units 1-2/East Plant Buildings/Equipment/Roofs, Paved Roads, Gravel Areas & Grass Areas to Stormsewers to Outfall 002	Impervious Surface	0.9	20.66	1.9548	0.0510
		TOTAL AREA			20.66	1.9548	0.0510
Outfall 003 - Plant Unit 3-4 Areas							
Area 3		**Uncontaminated Runoff Areas (to Storm Sewers to Outfall 003)**					
	1	Units 3-4/West Plant Buildings/Equipment/Roofs, Paved Roads, Gravel Areas & Grass Areas to Stormsewers to Outfall 003	Impervious Surface	0.9	28.06	2.6548	0.0693
		TOTAL AREA			28.06	2.6548	0.0693

Outfalls 004-to-008 *(Reserved)*

004 Sewage Treatment Plant (**REMOVED**)
005 Boiler Chemical Metal Cleaning Wastewaters *Internal Outfall Discharge to Outfall 001*
006 Units 1-4 Cooling Tower Blowdown Streams *(e.g., Unit 1 = 006-1, etc.) - Internal Outfall Discharge to Outfall 001*
007 Plant River Water Intake
008 Treated FGD Wastewaters - PWTS (Process Waters Treatment System) *Internal Outfall Discharge to Outfall 001*

Outfall 009 (PROPOSED) - Secondary Pond (Capped ATB-1) Runoff Area to Ohio River							
Area 9.a		**Secondary Pond - Water, Slopes & Roadways**					
	1	Runoff Pond Surface	Basin Surface	1.0	4.02	0.4472	0.0117
	2	Berm & Inner Slope Areas	Vegetated Area	0.3	5.64	0.1569	0.0041
		TOTAL AREA			9.65	0.6041	0.0158
Area 9.b		**Capped ATB-1 (North 1/3) Runoff and Ditches to Secondary Pond**					
	1	Capped ATB-1 (North 1/3) Runoff (Lined, Vegetated Slopes)	Vegetated Area	0.3	38.36	1.0676	0.0279
	2	Capped ATB-1 Inner Perimeter Drainage Ditches and Access Roadways	Vegetated Area	0.3	10.78	0.3000	0.0078
		TOTAL AREA			49.14	1.3676	0.0357

Plant Property Areas - Rainfall Runoff Calculations Imber
(Organized by Outfalls to River, Ponds and Contributing Areas Flows) November 29, 2018

Area #		Source	Runoff Description	Cr	Acres	1-Day Max (MGD)	Daily (Annual Average) (MGD)
Outfall 010 (PROPOSED) - West Haul Road & ATB-2/North Runoff Areas Pond to Black Rock Creek							
Area 10.a		**West Haul Road Runoff Pond - Impoundment, Inner Slopes-to-Roadway**					
	1	Landfill Main Haul Road Runoff Pond Surface	Basin Surface	1.0	4.15	0.4618	0.0120
	2	Berm & Inner Slope Areas	Packed Surface	0.5	1.96	0.1090	0.0028
		TOTAL AREA			6.11	0.5708	0.0149
Area 10.b		**West Haul Road to ATB-2 Crest - Sloped Drainage to Runoff Pond**					
	1	West Haul Road to ATB-2 Crest - Sloped Drainage to Runoff Pond	Packed Surface	0.5	2.93	0.1630	0.0043
		TOTAL AREA			2.93	0.1630	0.0043
Area 10.c		**West Haul Road, Valley from Pond-to-Dam-to East Haul Road Area**					
	1	Vegetated Uphill Slopes from ATB-1 Hillcrest Southward to ATB-2 Dam Face/Toe and Eastward to East Haul Road Berms	Vegetated Area	0.3	131.50	3.6598	0.0955
		TOTAL AREA			131.50	3.6598	0.0955
Area 10.d		**ATB-2 Dam Face**					
	1	ATB-2 Dam Face	Packed Surface	0.5	23.99	1.3355	0.0348
		TOTAL AREA			23.99	1.3355	0.0348
Area 10.e		**ATB-2/North - Cap, Perimeter Access Road, & Lined Inner Drain Ditches**					
	1	Capped ATB-2 Inner Perimeter Drainage Ditches and Access Roadways	Vegetated Area	0.3	6.45	0.1796	0.0047
	2	Capped ATB-2 (Northwest 1/2) Runoff (Lined, Vegetated Slopes)	Vegetated Area	0.3	89.78	2.4986	0.0652
		TOTAL AREA			96.23	2.6782	0.0699
Outfall 011 (PROPOSED) - ATB-2/South Runoff Areas Pond To Agniels Creek							
Area 11.a		**Runoff Pond - Impoundment and Inner Slopes**					
	1	Runoff Pond - Pond Surface	Basin Surface	1.0	3.49	0.3880	0.0101
	2	Berm & Inner Slope Areas	Impervious Surface	0.9	7.02	0.6644	0.0173
		TOTAL AREA			10.51	1.0524	0.0275
Area 11.b		**ATB-2/South - Cap, Perimeter Access Road, & Lined Inner Drain Ditches**					
	1	Capped ATB-2 Inner Perimeter Drainage Ditches and Access Roadways	Vegetated Area	0.3	9.88	0.2749	0.0072
	2	Capped ATB-2 (Southeast 1/2) Runoff (Lined, Vegetated Slopes)	Vegetated Area	0.3	76.21	2.1210	0.0553
		TOTAL AREA			86.09	2.3959	0.0625
Outfall 012 (PROPOSED) - Landfill Active (Phases 1-2) Runoff Areas Pond To Stephens Branch							
Area 12.a		**Runoff Pond - Impoundment and Inner Slopes**					
	1	Runoff Pond - Pond Surface	Basin Surface	1.0	0.95	0.1054	0.0027
	2	Berm & Inner Slope Areas	Impervious Surface	0.9	0.59	0.0562	0.0015
		TOTAL AREA			1.54	0.1616	0.0042
Area 12.b		**Main Drainage Channel and Access Road to Runoff Pond**					
	1	Main Drainage Channel/Road from Perimeter, Past Leachate, to Pond	Impervious Surface	0.9	10.10	0.9558	0.0249
		TOTAL AREA			10.10	0.9558	0.0249
Area 12.c		**Perimeter Access Road & Capped Inner Drain Ditches**					
	1	Active Landfill Access Road & Perimeter Drainage Ditches	Impervious Surface	0.9	15.48	1.4646	0.0382
		TOTAL AREA			15.48	1.4646	0.0382
Outfall 013 (PROPOSED) - Temporary Storm Pond from Future Landfill (Phase 3) Areas To Agniels Creek							
Area 13		**Outfall 013 (PROPOSED)-- Temporary Storm Pond from Future Landfill (Phase 3) Areas To Agniels Creek**					
	a	Temporary Stormwater Runoff Pond - Basin Surface and Inner Slopes	Basin Surface	1.0	0.88	0.0985	0.0026
	b	Inner Slopes to Pond	Impervious Surface	0.9	0.41	0.0383	0.0010
	c	Undeveloped Landfill Areas Uphill of Pond - Above Main Access Road & Extending to	Vegetated Area	0.3	65.32	1.8180	0.0474
		TOTAL AREA			66.61	1.9549	0.0510
Area 14		**Plant Limestone Pile & Slurry Preparation Areas**					
	a	Limestone Pile Areas pumped to LS Tanks	Packed Surface	0.5	4.11	0.2287	0.0060
		TOTAL AREA			4.11	0.2287	0.0060
Area 15		**West Plantsite & System Lab Areas to Black Rock Creek**					
Area 15.a		**West Plantsite Areas**					
	1	Gravel Areas	Packed Surface	0.5	7.50	0.4173	0.0109
	2	Building Roofs, Concrete Containment, Pavement	Impervious Surface	0.9	5.32	0.5038	0.0131
		TOTAL AREA			12.82	0.9212	0.0240
Area 15.b		**System Lab Areas**					
	1	Building Roofs & Pavement	Impervious Surface	0.9	0.58	0.0547	0.0014
	2	Vegetation/Grass Areas Around System Lab Building	Vegetated Area	0.3	0.93	0.0259	0.0007
		TOTAL AREA			1.51	0.0805	0.0021

Plant Property Areas - Rainfall Runoff Calculations
(Organized by Outfalls to River, Ponds and Contributing Areas Flows)

November 29, 2018

Imber

Area #		Source	Runoff Description	Cr	Acres	1-Day Max (MGD)	Daily (Annual Average) (MGD)
Area 16		**Riverbank Uncontaminated Non-Point Source Runoff Areas (Drain to Ohio River)**					
	a	Vegetation-River Bank Above Normal Water Mark	Vegetated Area	0.3	45.63	1.2701	0.0331
	b	River (basin) - Low Shoreline Areas Below Normal Water Mark	Basin Surface	1.0	6.53	0.7266	0.0190
	c	Intake Pier (Units 1-2) Road Stucture and Conveyors	Impervious Surface	0.9	0.56	0.0532	0.0014
		TOTAL AREA			52.72	2.0499	0.0535
Area 17		**US-42 (North) Roadside Areas**					
Area 17.a		**Plant Fence Areas to US-42 Drainage Ditch to Black Rock Creek**					
	1	Vegetation, Grass and Gravel Areas Drainage to U.S. 42	Vegetated Area	0.3	6.00	0.1670	0.0044
	2	Pavement - Parking Drainage to U.S. 42	Impervious Surface	0.9	3.83	0.3621	0.0094
		TOTAL AREA			9.83	0.5291	0.0138
Area 17.b		**Plant Fence Plant Areas to US-42 Drainage Ditch to Agniels Creek**					
	1	Gravel Roadway/Parking (compacted)	Impervious Surface	0.9	1.03	0.0973	0.0025
		TOTAL AREA			1.03	0.0973	0.0025
Area 18		**US-42 (South) Road-to-Railway Areas**					
Area 18.a		**Plant/West - Plant Fenced Roadside Areas to US-42 Drainage Ditch to Black Rock Creek**					
	1	Vegetation, Grass and Gravel Areas Drainage to U.S. 42	Vegetated Area	0.3	14.26	0.3968	0.0104
	2	Railway-to ATB-1 External Berm Areas	Vegetated Area	0.3	5.44	0.1513	0.0039
	3	ATB-1 External Berm Areas - Draining to US-42 Roadside Ditch	Vegetated Area	0.3	8.15	0.2270	0.0059
		TOTAL AREA			27.85	0.7751	0.0202
Area 18.b		**River thru Diffuser**					
	1	Vegetation, Grass and Gravel Areas Drainage to U.S. 42	Vegetated Area	0.3	0.45	0.0125	0.0003
	2	Paved Access Road to NE Process Pond (old Synmat) to Storm Drains	Impervious Surface	0.9	2.23	0.2108	0.0055
	3	Gravel Areas	Packed Surface	0.5	1.29	0.0717	0.0019
	4	Railroad Areas	Packed Surface	0.5	0.50	0.0278	0.0007
		TOTAL AREA			4.46	0.3228	0.0084
Area 18.c		**Plant/East Areas Draining to Galatin Steel Property & to Agniels Creek to Ohio River**					
	1	Vegetation, Grass and Gravel Areas Drainage to East to Gallatin Steel Property/Agniels Creek	Vegetated Area	0.3	6.80	0.1893	0.0049
		TOTAL AREA			6.80	0.1893	0.0049
Area 19		**CCRT Area Dewatering Buildings Roofs, Non-Contact Adj. Areas, & Ammonia Tanks Areas to Black Rock Creek**					
	a	CCRT Dewatering Facilities/Buildings Roofs *(Drainage to Black Rock Creek)*	Impervious Surface	0.9	5.53	0.5230	0.0136
	b	Ammonia Tanks Facilities - Building & Pavement	Impervious Surface	0.9	1.05	0.0995	0.0026
	c	CCRT Perimeter Vegetated Areas- North/East *(including Unnamed Tributaries Channels to Block Rock Creek)*	Vegetated Area	0.3	8.85	0.2462	0.0064
		TOTAL AREA			15.42	0.8687	0.0227
Area 20		**Transmission Substation (Valved Drains to Black Rock Creek)**					
	a	Substation (Fenced) Drainage - Northward Towards U.S. 42	Packed Surface	0.5	8.92	0.4963	0.0129
		TOTAL AREA			8.92	0.4963	0.0129
Area 21		**South US-42 Plant Property Entrance Gates & Access Road Areas - Drainage to Black Rock Creek**					
Area 21.a		**Security Entrance Gate Area Drainage to US-42 Roadside Ditch**					
	1	Gravel Roadway to Ammonia Tanks and ATB-1 Access	Packed Surface	0.5	6.86	0.3821	0.0100
		TOTAL AREA			6.86	0.3821	0.0100
Area 21.b		**Substation Southward Perimeter Area & Access Roads Areas - Drainage to Unnamed Trib to Black Rock Creek**					
	1	Gravel Roadway From Ammonia Tanks to Landfill-ATB-2 Access Road	Packed Surface	0.5	20.09	1.1183	0.0292
	2	Vegetation-Grass Area Southside of Substation Area to ATB-2 Access Road	Vegetated Area	0.3	9.48	0.2640	0.0069
		TOTAL AREA			29.58	1.3823	0.0361
Area 21.c		**ATB-1 Western Berm Outer Slope Drainage to Perimeter Substation Areas & to Black Rock Creek**					
	1	Vegetation Area of Capped ATB-1 Western Berm Outer Slope (grass)	Vegetated Area	0.3	2.25	0.0626	0.0016
		TOTAL AREA			2.25	0.0626	0.0016

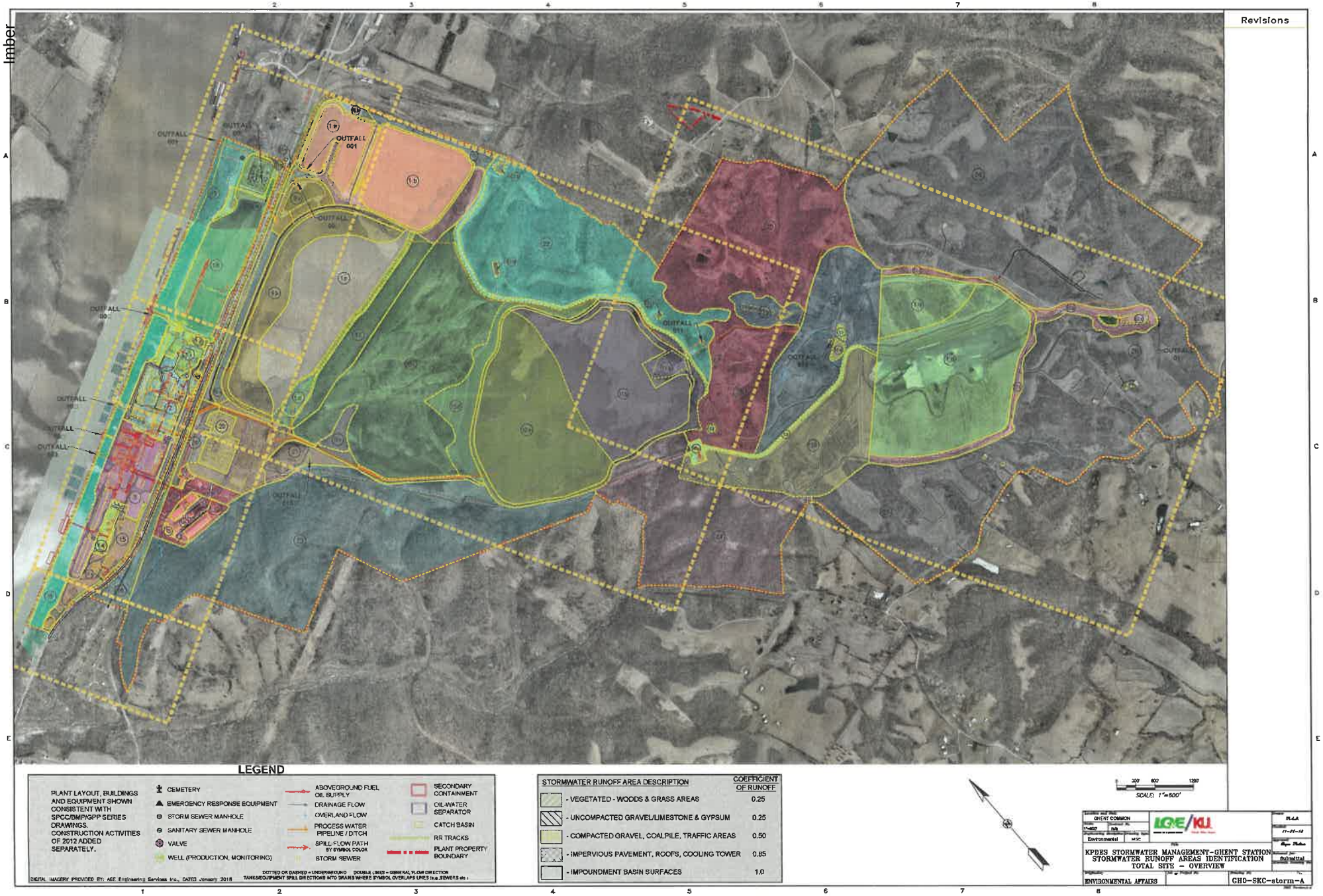
Plant Property Areas - Rainfall Runoff Calculations Imber
(Organized by Outfalls to River, Ponds and Contributing Areas Flows) November 29, 2018

Area #		Source	Runoff Description	Cr	Acres	1-Day Max (MGD)	Daily (Annual Average) (MGD)
Area 22		**Hilly Woods-Fields Areas Between ATB-1, ATB-2 and Landfill - Drainage to Agniels Creek**					
Area 22.a		**Pond A - East Haul Road Runoff Pond *(Closest to Gypsum Stack)***					
	1	Pond A - East Haul Road Runoff Pond Surface	Basin Surface	1.0	0.35	0.0388	0.0010
	2	Pond Inner Slopes	Packed Surface	0.5	0.25	0.0137	0.0004
	3	East Haul Road North-Mid Section Drainage to Pond A	Packed Surface	0.5	3.89	0.2166	0.0057
		TOTAL AREA			4.49	0.2691	0.0070
Area 22.b		**Pond B - East Haul Road Runoff Pond *(Midway to ATB-2)***					
	1	Pond B - East Haul Road Runoff Pond Surface	Basin Surface	1.0	0.33	0.0365	0.0010
	2	Pond Inner Slopes	Packed Surface	0.5	0.15	0.0081	0.0002
	3	East Haul Road Mid-Southward Section Drainage to Pond B	Packed Surface	0.5	2.92	0.1626	0.0042
		TOTAL AREA			3.39	0.2072	0.0054
Area 22.c		**Pond C - East Haul Road Runoff Pond *(Closest to ATB-2)***					
	1	Pond C - East Haul Road Runoff Pond Surface	Basin Surface	1.0	0.14	0.0156	0.0004
	2	Pond Inner Slopes	Packed Surface	0.5	0.07	0.0039	0.0001
	3	East Haul Road Southermost Section Drainage to Pond C	Packed Surface	0.5	1.28	0.0713	0.0019
		TOTAL AREA			1.49	0.0907	0.0024
Area 22.d		**Vegetated Fields/Woods SE/adjacent to East Haul Road**					
		Vegetated Fields/Woods SE/adjacent to East Haul Road	Vegetated Area	0.3	117.33	3.2654	0.0852
		TOTAL AREA			117.33	3.2654	0.0852
Area 23		**Pipe Conveyor and Vegetated Fields/Woods SE adjacent to West Haul Road (North of ATB-2 Highpoint)**					
	a	Vegetated Fields/Woods SE adjacent to West Haul Road	Vegetated Area	0.3	213.80	5.9503	0.1552
		TOTAL AREA			213.80	5.9503	0.1552
Area 24		**Pipe Conveyor and Vegetated Fields/Woods SE adjacent to West Haul Road (South of ATB-2 Highpoint)**					
	a	Vegetated Fields/Woods SE adjacent to West Haul Road	Vegetated Area	0.3	102.33	2.8479	0.0743
		TOTAL AREA			102.33	2.8479	0.0743
Area 25		**Vegetated Fields/Woods East of ATB-2 and Landfill Phase 3 (South of Landfill East Highpoint)**					
		Vegetated Fields/Woods SE adjacent to West Haul Road	Vegetated Area	0.3	167.73	4.6681	0.1218
		TOTAL AREA			167.73	4.6681	0.1218
Area 26		**Vegetated Fields/Woods East/South/West Active Landfill (to Landfill East-West Highpoints) - Drainage to Stephens Branch**					
		Vegetated Fields/Woods E/S/W adjacent to Active Landfill	Vegetated Area	0.3	499.53	13.9025	0.3627
		TOTAL AREA			499.53	13.9025	0.3627
Area 27		**Undeveloped/FUTURE Landfill - Drainage to Agniels Creek**					
	a	Uncontaminated Stormwater Management Pond- Phase III Future Landfill Area (redevelopment later)	Vegetated Area	0.3	10.07	0.2802	0.0073
	b	Phase III Future Landfill Hills/Fields Downhill of Main Haul Road (not draining into pond) Runoff Area	Vegetated Area	0.3	64.22	1.7873	0.0466
		TOTAL AREA			74.29	2.0675	0.0539

TOTAL Plant Property 2312.02 acres

ATTACHMENT 9

STORMWATER RUNOFF DIAGRAMS



Revisions

LEGEND

PLANT LAYOUT, BUILDINGS AND EQUIPMENT SHOWN CONSISTENT WITH SPCC/BMP/GPP SERIES DRAWINGS. CONSTRUCTION ACTIVITIES OF 2012 ADDED SEPARATELY.

- CEMETERY
- EMERGENCY RESPONSE EQUIPMENT
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- VALVE
- WELL (PRODUCTION, MONITORING)
- ABOVEGROUND FUEL OIL SUPPLY
- DRAINAGE FLOW
- OVERLAND FLOW
- PROCESS WATER PIPELINE / DITCH
- SPILL-FLOW PATH BY SYMBOL COLOR
- STORM SEWER
- SECONDARY CONTAINMENT
- OIL-WATER SEPARATOR
- CATCH BASIN
- RR TRACKS
- PLANT PROPERTY BOUNDARY

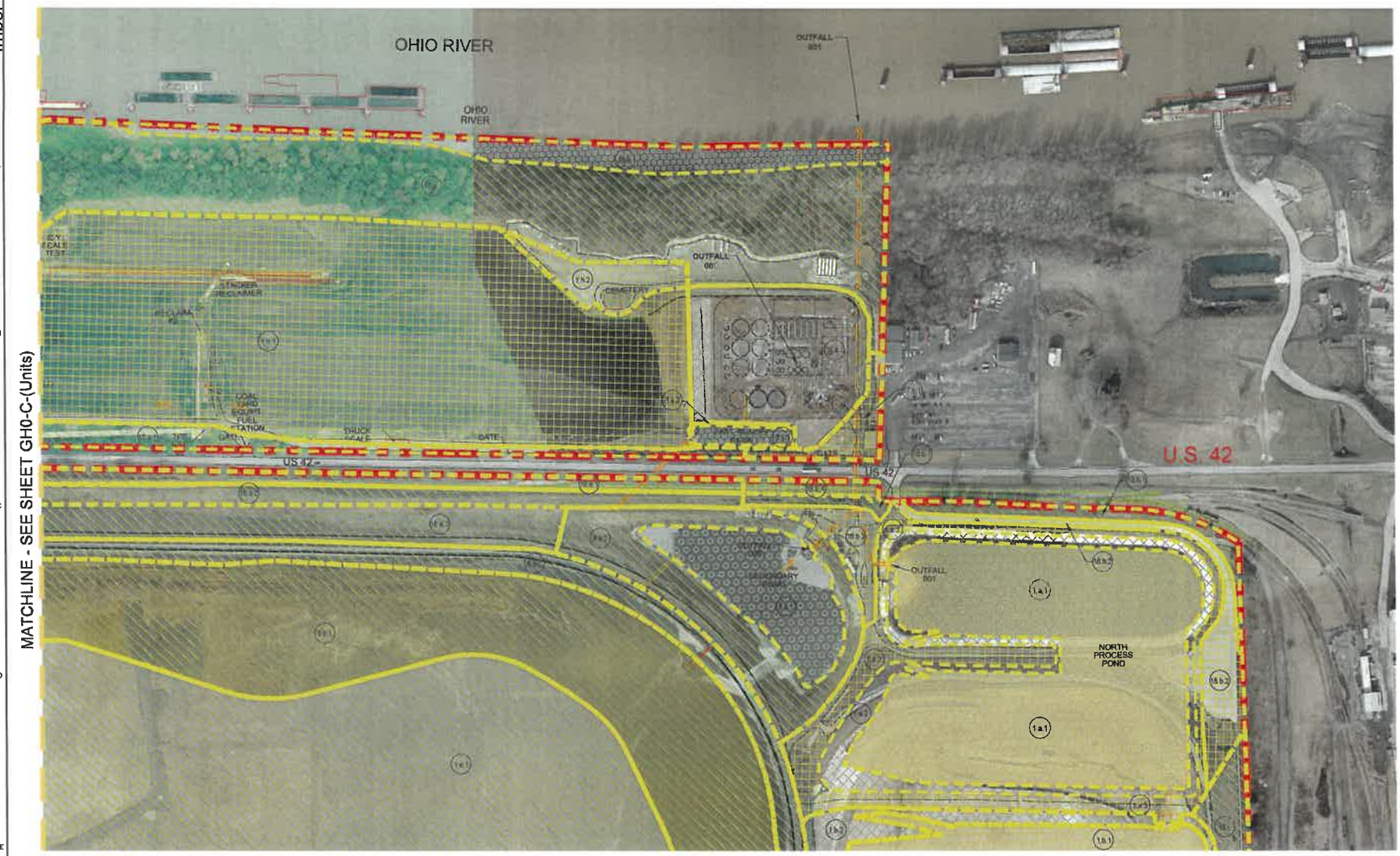
DOTTED OR DASHED = UNDERGROUND DOUBLE LINES = GENERAL FLOW DIRECTION
TANKS/EQUIPMENT SPILL DIRECTIONS INTO SWARS WHERE SYMBOL OVERLAPS LINES (e.g. SEWERS etc.)

DIGITAL IMAGERY PROVIDED BY: AGE Engineering Services Inc., DATED January 2018

STORMWATER RUNOFF AREA DESCRIPTION	COEFFICIENT OF RUNOFF
- VEGETATED - WOODS & GRASS AREAS	0.25
- UNCOMPACTED GRAVEL/LIMESTONE & GYPSUM	0.25
- COMPACTED GRAVEL, COALPILE, TRAFFIC AREAS	0.50
- IMPERVIOUS PAVEMENT, ROOFS, COOLING TOWER	0.85
- IMPOUNDMENT BASIN SURFACES	1.0

300 600 1200
SCALE: 1"=600'

GHENT COMMON
LG&E/KU
Environmental MSC
KPDES STORMWATER MANAGEMENT-GHENT STATION
STORMWATER RUNOFF AREAS IDENTIFICATION
TOTAL SITE - OVERVIEW
ENVIRONMENTAL AFFAIRS
GHG-SKC-storm-A



LEGEND

PLANT LAYOUT, BUILDINGS AND EQUIPMENT SHOWN CONSISTENT WITH SPCC/SWPPP/GPP SERIES DRAWINGS. CONSTRUCTION ACTIVITIES OF 2012 ADDED SEPARATELY.

- CEMETERY
- EMERGENCY RESPONSE EQUIPMENT
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- VALVE
- WELL (PRODUCTION, MONITORING)
- ABOVEGROUND FUEL OIL SUPPLY
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- SECONDARY CONTAINMENT
- OIL-WATER SEPARATOR
- CATCH BASIN
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DOTTED OR DASHED = UNDERGROUND DOUBLE LINES = GENERAL FLOW DIRECTION
TANKS/EQUIPMENT SPILL DIRECTIONS INTO DRAINS WHERE SYMBOL OVERLAPS LINES (e.g. SEWERS etc.)

DIGITAL IMAGERY PROVIDED BY: ACE Engineering Services Inc., DATED January 2018

STORMWATER RUNOFF AREA DESCRIPTION	COEFFICIENT OF RUNOFF
- VEGETATED - WOODS & GRASS AREAS	0.25
- UNCOMPACTED GRAVEL/LIMESTONE & GYPSUM	0.25
- COMPACTED GRAVEL, COALPILE, TRAFFIC AREAS	0.50
- IMPERVIOUS PAVEMENT, ROOFS, COOLING TOWER	0.85
- IMPOUNDMENT BASIN SURFACES	1.0

SCALE: 1"=150'

Revisions

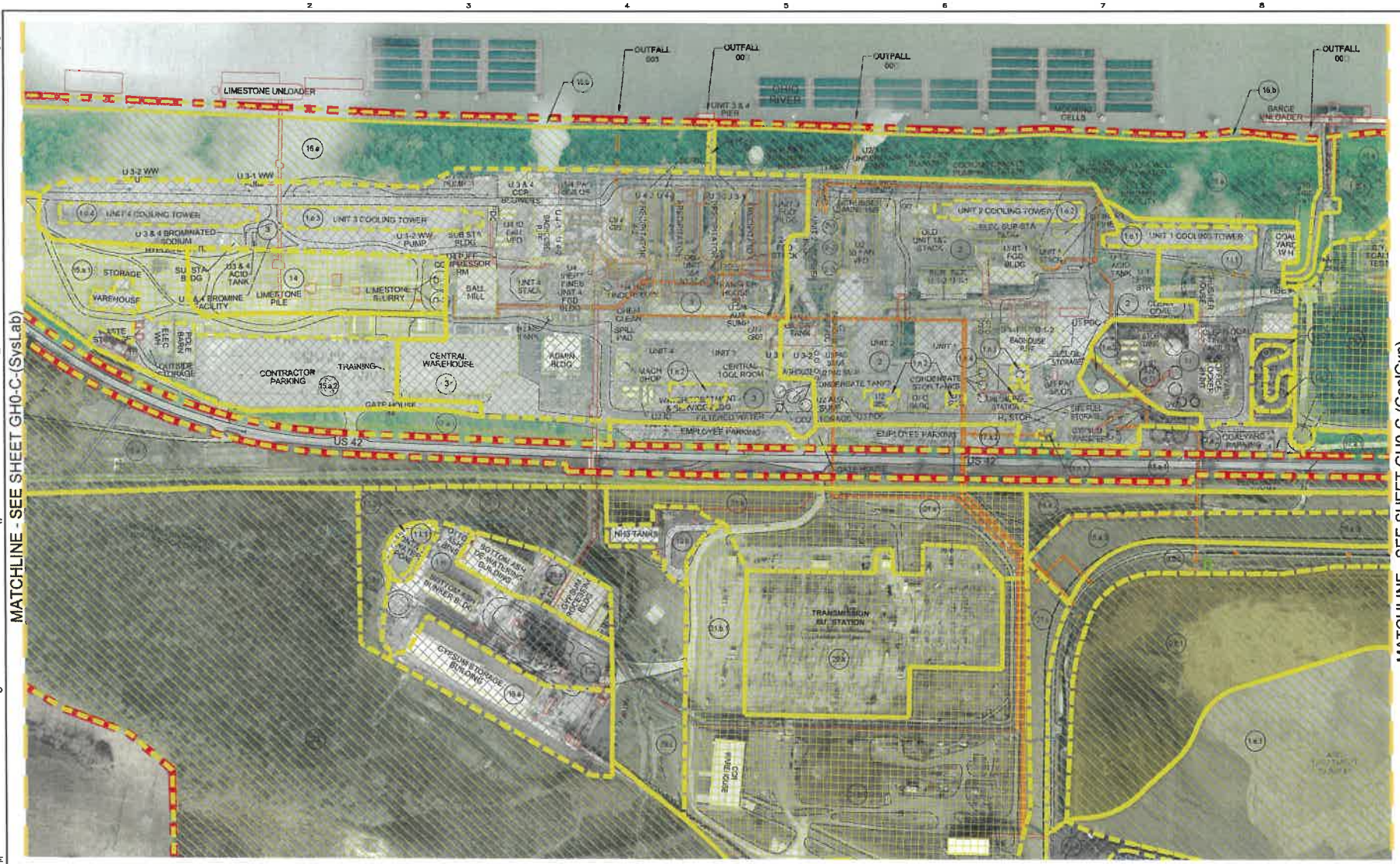
GHENT COMMON

LG&E/KU

KPDES STORMWATER MANAGEMENTGHENT STATION
STORMWATER RUNOFF AREAS IDENTIFICATION
COAL PILE & PWTS AREAS

ENVIRONMENTAL AFFAIRS

GH0-SKC-storm-C



LEGEND

PLANT LAYOUT, BUILDINGS AND EQUIPMENT SHOWN CONSISTENT WITH SPCC/SWPPP/SPP SERIES DRAWINGS. CONSTRUCTION ACTIVITIES OF 2012 ADDED SEPARATELY.

- CEMETERY
- EMERGENCY RESPONSE EQUIPMENT
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- VALVE
- WELL (PRODUCTION, MONITORING)
- ABOVEGROUND FUEL OIL SUPPLY
- DRAINAGE FLOW
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- PROCESS WATER PIPELINE / DITCH
- SPILL-FLOW PATH BY SYMBOL COLOR
- STORM SEWER
- SECONDARY CONTAINMENT
- OIL-WATER SEPARATOR
- CATCH BASIN
- RR TRACKS
- PLANT PROPERTY BOUNDARY

DOTTED OR DASHED = UNDERGROUND DOUBLE LINES = GENERAL FLOW DIRECTION
TANK/EQUIPMENT SPILL DIRECTIONS INTO DRAINS WHERE SYMBOL OVERLAPS LINES (e.g. SEWERS etc.)

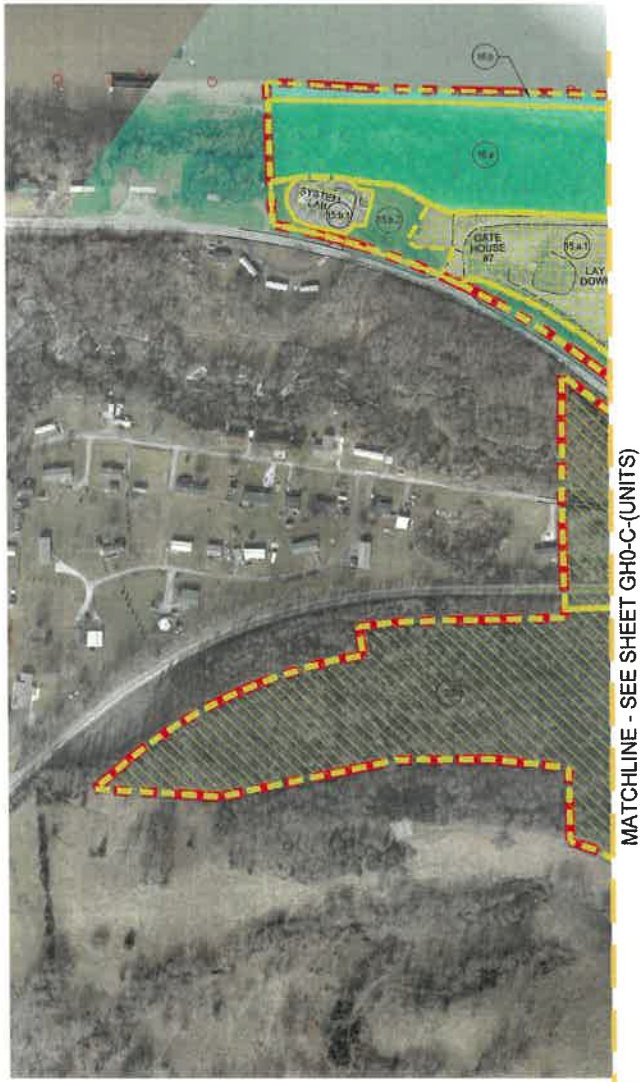
DIGITAL IMAGERY PROVIDED BY: AGE Engineering Services Inc., DATED January 2018

STORMWATER RUNOFF AREA DESCRIPTION	COEFFICIENT OF RUNOFF
- VEGETATED - WOODS & GRASS AREAS	0.25
- UNCOMPACTED GRAVEL/LIMESTONE & GYPSUM	0.25
- COMPACTED GRAVEL, COALPILE, TRAFFIC AREAS	0.50
- IMPERVIOUS PAVEMENT, ROOFS, COOLING TOWER	0.85
- IMPOUNDMENT BASIN SURFACES	1.0

SCALE: 1"=150'

Revisions

GHENT COMMON
1"=150'
Environmental
KPDES STORMWATER MANAGEMENT-GHENT STATION
STORMWATER RUNOFF AREAS IDENTIFICATION
MAIN UNIT AREAS
ENVIRONMENTAL AFFAIRS
GH0-SKC-storm-B



MATCHLINE - SEE SHEET GH0-C-(UNITS)

LEGEND

PLANT LAYOUT, BUILDINGS AND EQUIPMENT SHOWN CONSISTENT WITH SPCC/SMP/GPP SERIES DRAWINGS. CONSTRUCTION ACTIVITIES OF 2012 ADDED SEPARATELY.

- CEMETERY
- EMERGENCY RESPONSE EQUIPMENT
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- VALVE
- WELL (PRODUCTION, MONITORING)
- ABOVEGROUND FUEL OIL SUPPLY
- DRAINAGE FLOW
- OVERLAND FLOW
- PROCESS WATER PIPELINE / DITCH
- SPILL-FLOW PATH BY SYMBOL COLOR
- STORM SEWER
- SECONDARY CONTAINMENT
- OIL-WATER SEPARATOR
- CATCH BASIN
- RR TRACKS
- PLANT PROPERTY BOUNDARY

DOTTED OR DASHED = UNDERGROUND DOUBLE LINES = GENERAL FLOW DIRECTION
TANK/EQUIPMENT SPILL DIRECTIONS INTO DRAINS WHERE SYMBOL OVERLAPS LINES (e.g., SEWERS etc.)

DIGITAL IMAGERY PROVIDED BY: ADE Engineering Services Inc., DATED January 2018

STORMWATER RUNOFF AREA DESCRIPTION	COEFFICIENT OF RUNOFF
- VEGETATED - WOODS & GRASS AREAS	0.25
- UNCOMPACTED GRAVEL/LIMESTONE & GYPSUM	0.25
- COMPACTED GRAVEL, COALPILE, TRAFFIC AREAS	0.50
- IMPERVIOUS PAVEMENT, ROOFS, COOLING TOWER	0.85
- IMPOUNDMENT BASIN SURFACES	1.0

SCALE: 1"=150'

Revisions

GHENT COMMON
Environmental
MSC

KPDES STORMWATER MANAGEMENT-GHENT STATION
STORMWATER RUNOFF AREAS IDENTIFICATION
SYSTEM LAB & WEST PLANT AREAS

ENVIRONMENTAL AFFAIRS

GH0-SKC-storm-D

LEGEND

PLANT LAYOUT, BUILDINGS AND EQUIPMENT SHOWN CONSISTENT WITH SPCC/SMP/GPP SERIES DRAWINGS CONSTRUCTION ACTIVITIES OF 2012 ADDED SEPARATELY.

- CEMETERY
- EMERGENCY RESPONSE EQUIPMENT
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- VALVE
- WELL (PRODUCTION, MONITORING)
- ABOVEGROUND FUEL OIL SUPPLY
- DRAINAGE FLOW
- OVERLAND FLOW
- PROCESS WATER PIPELINE / DITCH
- SPILL-FLOW PATH BY SYMBOL COLOR
- STORM SEWER
- SECONDARY CONTAINMENT
- OIL-WATER SEPARATOR
- CATCH BASIN
- RR TRACKS
- PLANT PROPERTY BOUNDARY

DOTTED OR DASHED = UNDERGROUND DOUBLE LINES = GENERAL FLOW DIRECTION
TANK/EQUIPMENT SPILL DIRECTIONS INTO DRAINS WHERE SYMBOL OVERLAP 8 LINES (e.g. SEWERS etc.)

DIGITAL IMAGERY PROVIDED BY: ACE Engineering Services Inc., DATED January 2018

STORMWATER RUNOFF AREA DESCRIPTION	COEFFICIENT OF RUNOFF
- VEGETATED - WOODS & GRASS AREAS	0.25
- UNCOMPACTED GRAVEL/LIMESTONE & GYPSUM	0.25
- COMPACTED GRAVEL, COALPILE, TRAFFIC AREAS	0.50
- IMPERVIOUS PAVEMENT, ROOFS, COOLING TOWER	0.85
- IMPOUNDMENT BASIN SURFACES	1.0

SCALE: 1"=300'

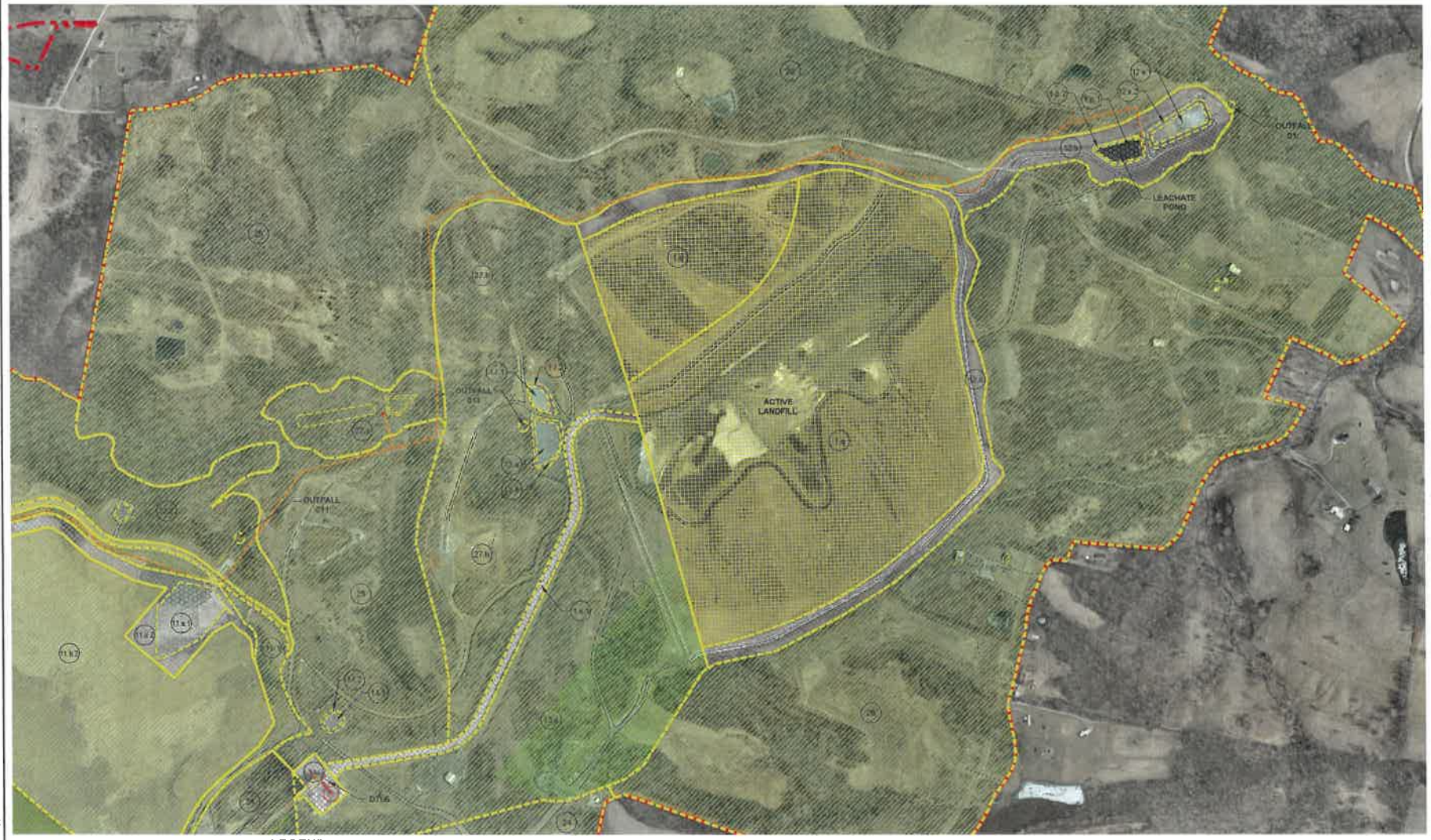
Revisions

GHENT COMMON
IQE/KU
Environmental

EPDES STORMWATER MANAGEMENT-GHENT STATION
STORMWATER RUNOFF AREAS INDENTIFICATIONS
CCR PIPE CONVEYOR, ATB-1 & ATB-2 AREAS

ENVIRONMENTAL AFFAIRS

GHU-SKC-storm-2



LEGEND

PLANT LAYOUT, BUILDINGS AND EQUIPMENT SHOWN CONSISTENT WITH SPCC/SMP/GPP SERIES DRAWINGS. CONSTRUCTION ACTIVITIES OF 2012 ADDED SEPARATELY.

- CEMETERY
- EMERGENCY RESPONSE EQUIPMENT
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- VALVE
- WELL (PRODUCTION, MONITORING)
- ABOVEGROUND FUEL OIL SUPPLY
- DRAINAGE FLOW
- OVERLAND FLOW
- PROCESS WATER PIPELINE / DITCH
- SPILL-FLOW PATH BY SYMBOL COLOR
- STORM SEWER
- SECONDARY CONTAINMENT
- OIL-WATER SEPARATOR
- CATCH BASIN
- RR TRACKS
- PLANT PROPERTY BOUNDARY

DOTTED OR DASHED = UNDERGROUND DOUBLE LINES = GENERAL FLOW DIRECTION
TANKS/EQUIPMENT SPILL DIRECTIONS INTO DRAINS WHERE SYMBOL OVERLAPS LINES (e.g. SEWERS etc.)

DIGITAL IMAGERY PROVIDED BY: ADS Engineering Services Inc., DATED January 2015

STORMWATER RUNOFF AREA DESCRIPTION	COEFFICIENT OF RUNOFF
- VEGETATED - WOODS & GRASS AREAS	0.25
- UNCOMPACTED GRAVEL/LIMESTONE & GYPSUM	0.25
- COMPACTED GRAVEL, COALPILE, TRAFFIC AREAS	0.50
- IMPERVIOUS PAVEMENT, ROOFS, COOLING TOWER	0.85
- IMPOUNDMENT BASIN SURFACES	1.0

SCALE: 1"=300'

Revisions

GHENT COMMON
1"=300'
Environmental

KPDES STORMWATER MANAGEMENT--GHENT STATION
STORMWATER RUNOFF AREAS IDENTIFICATION
CCR LANDFILL AREAS

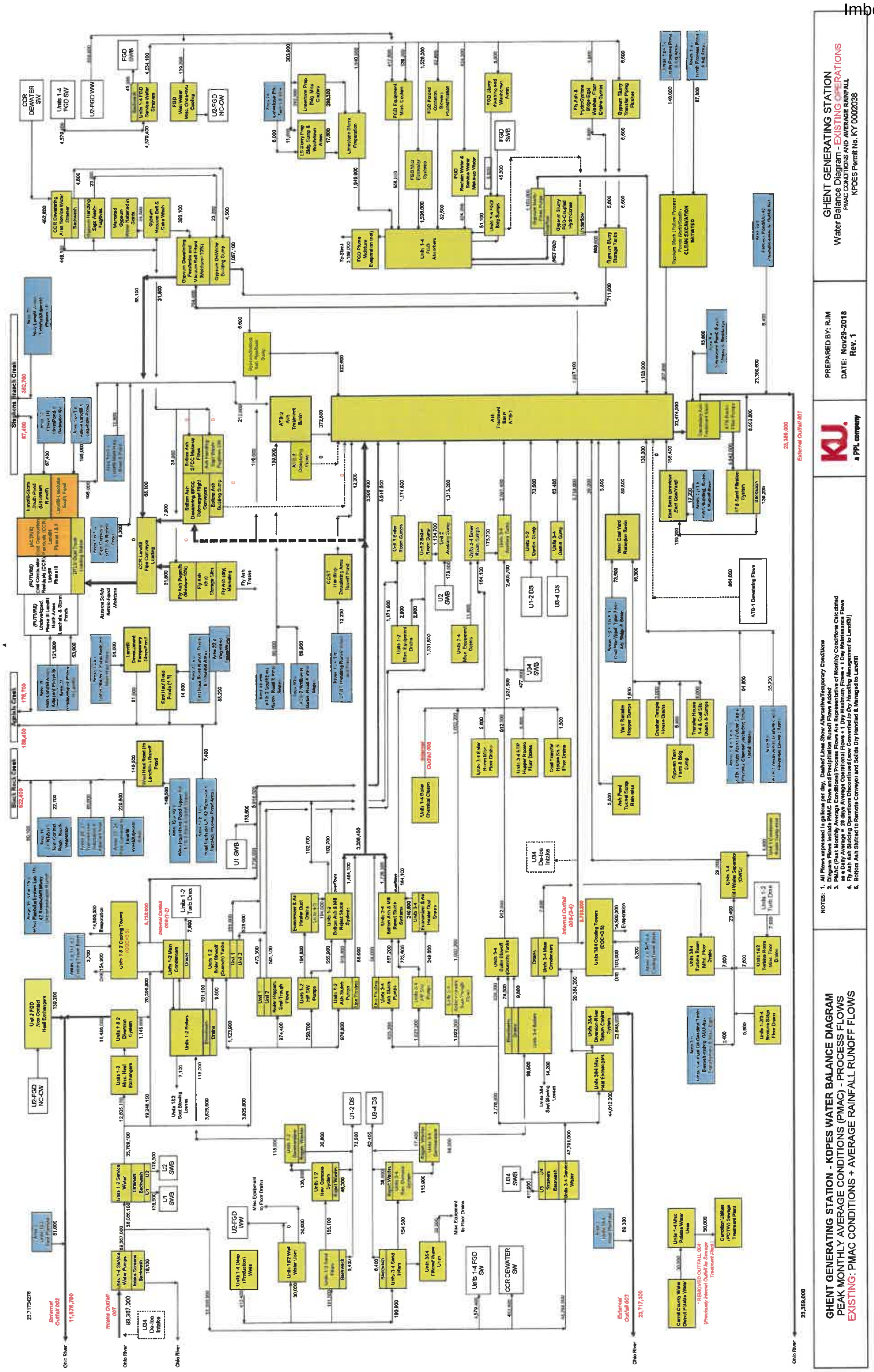
ENVIRONMENTAL AFFAIRS

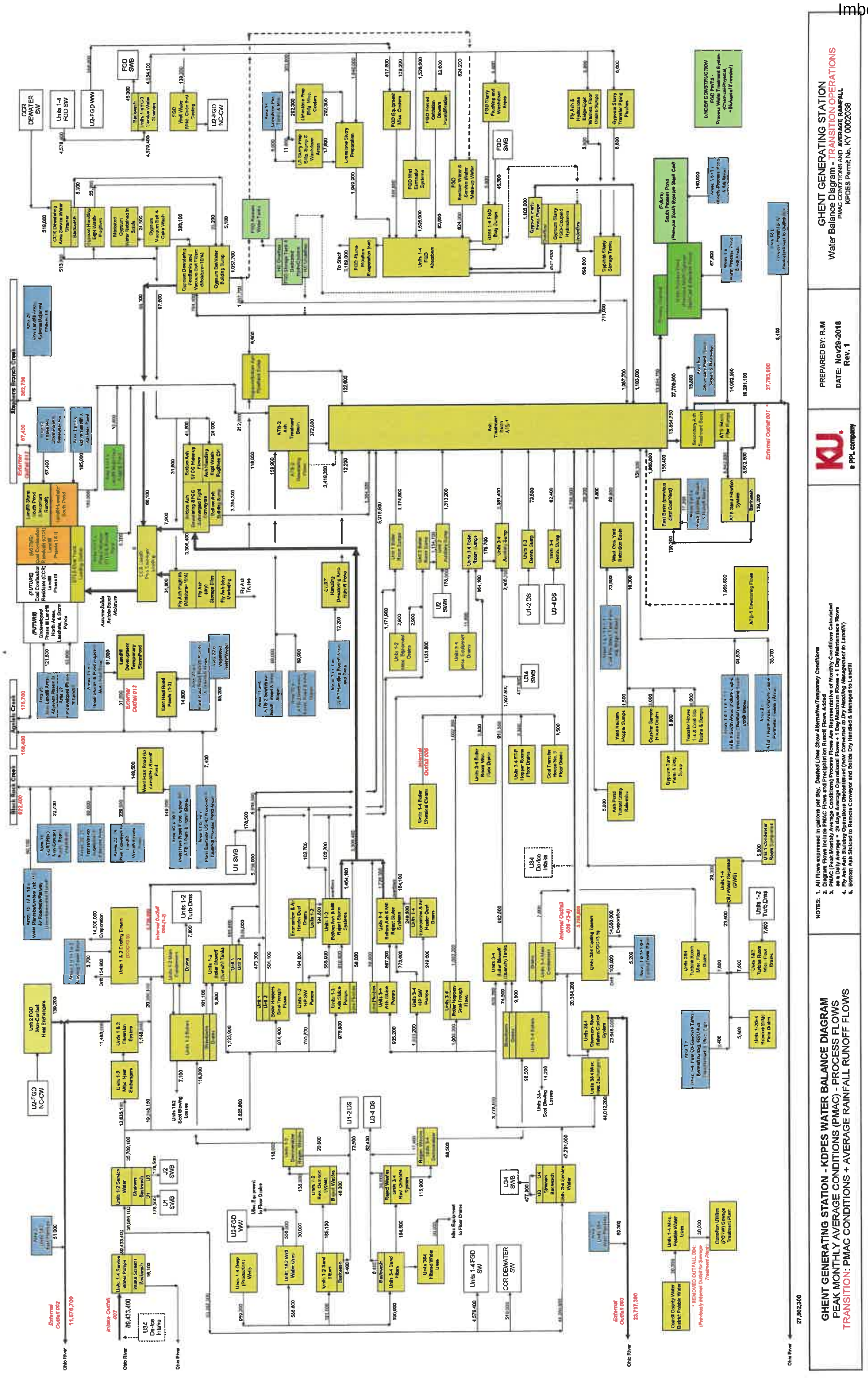
GH0-SKC-storm-F

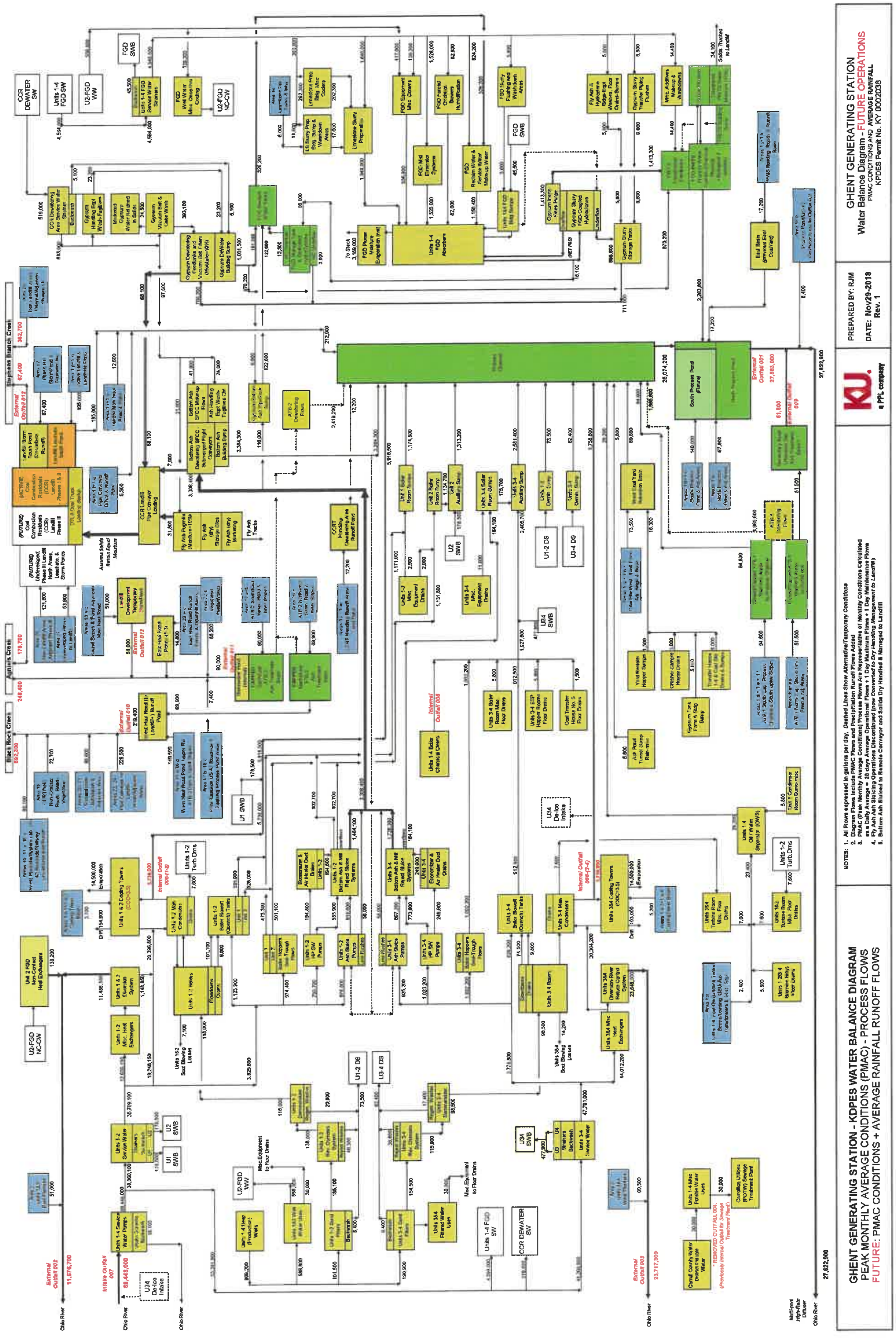
ATTACHMENT 10

WATER BALANCE DIAGRAMS

Diagrams for Process Operations and AVERAGE Stormwater Runoff


GHENT GENERATING STATION
Water Balance Diagram - EXISTING OPERATIONS
PMAC CONDITIONS AND AVERAGE RAINFALL
KPDES Permit No. KY0002038
PREPARED BY: RJM
DATE: Nov29-2018
Rev. 1
a PPL company
GHENT GENERATING STATION - KPDES WATER BALANCE DIAGRAM
PEAK MONTHLY AVERAGE CONDITIONS (PMAC) - PROCESS FLOWS
EXISTING: PMAC CONDITIONS + AVERAGE RAINFALL RUNOFF FLOWS


GHENT GENERATING STATION - KPDES WATER BALANCE DIAGRAM
PEAK MONTHLY AVERAGE CONDITIONS (PMAC) - PROCESS FLOWS
TRANSITION: PMAC CONDITIONS + AVERAGE RAINFALL RUNOFF FLOWS
GHENT GENERATING STATION
Water Balance Diagram - TRANSITION OPERATIONS
PMAC CONDITIONS AND AVERAGE RAINFALL
KPDES Permit No. KY0002038
PREPARED BY: RJM
DATE: Nov29-2018
Rev. 1
KU
a PPL company


GHENT GENERATING STATION - KPDES WATER BALANCE DIAGRAM
PEAK MONTHLY AVERAGE CONDITIONS (PMAC) - PROCESS FLOWS
FUTURE: PMAC CONDITIONS + AVERAGE RAINFALL RUNOFF FLOWS
GHENT GENERATING STATION
Water Balance Diagram - FUTURE OPERATIONS
PMAC CONDITIONS AND AVERAGE RAINFALL
KPDES Permit No. KY 0002038
PREPARED BY: RJM
DATE: Nov29-2018
Rev. 1

ATTACHMENT 11

CONSTRUCTION ACTIVITIES

AT

GHENT GENERATING STATION

IMPACTING

THE SCHEDULE OF COMPLIANCE

WITH FEDERAL AND STATE REGULATIONS

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

Rev November 29, 2018

SUMMARY

To update renewal information for the Kentucky Utilities Company (KU) Ghent Generating Station (Plant) KPDES permit, this document describes construction activities and scheduling information to support setting applicability dates for new KPDES permit conditions to meet Federal Effluent Limitations Guidelines (ELG) regulations and revised Kentucky Water Quality Standards (KyWQS). The USEPA announced it is reconsidering the ELG final rule regarding Flue Gas Desulfurization (FGD) Wastewater treatment requirements and bottom ash sluicing/transport waters. The September 18, 2017 final rule reconsideration revised the earliest possible 'as-soon-as-possible' date from November 1, 2018 to November 1, 2020 for treatment requirements of FGD wastewaters and bottom ash sluice waters; however, the reconsideration retains December 31, 2023 as the latest possible compliance date for treatment of these wastewaters.

The Ghent Station has completely converted to dry fly ash handling; therefore, the ELG regulatory prohibition of the discharge of fly ash transport waters conditionally beginning November 1, 2018 will not affect existing or planned operations at the station. For bottom ash, a remote submerged conveyor to dewater bottom ash sluice streams was installed but the equipment has operated unreliably; therefore, until the system is redesigned/repaired, bottom ash sluicing continues to ATB-1. KU is evaluating whether to redesign, modify and/or replace the equipment; but regardless, KU-Ghent will meet the current ELG compliance date to eliminate discharges of bottom ash transport waters.

For FGD wastewaters, the treatment technologies to meet the ELG regulations are similar to those required to be installed for plant discharges to meet current KyWQS limits (e.g. mercury, selenium, arsenic, etc.). However, because USEPA announced their reconsideration of ELG wastewaters treatment requirements, setting compliance for specific ELG treatment requirements for FGD and bottom ash sluice waters cannot be definitively resolved without finalization of these ELG regulations.

Simultaneously, the Coal Combustion Residual (CCR) Final Rule also profoundly impacts plans for future facility operations and water/solids management by in-effect, requiring the closure of existing impoundments; as a result, the Ghent plant CCR/ash/gypsum materials will be alternatively managed in the on-site landfill (and/or marketed when possible).

Therefore, to comply with KyWQS and to best position the plant to meet future ELG requirements, KU has decided it is prudent to:

- Segregate, recycle and treat FGD (Flue Gas Desulfurization) wastewaters with dedicated physical-chemical systems to meet KyWQS limits by end-of-2020 and ELG technology-based limits by a compliance date of December 31, 2023 (which will be revisited upon finalization of the USEPA reconsideration of these treatment requirements for these wastewaters);
- Installed dry handling for all fly ash systems to prevent the discharge of fly ash sluice waters – (this has already been completed);
- Install a recirculation system to recycle all bottom ash sluice waters, or install dry bottom ash handling systems, to prevent the discharge of bottom ash sluice waters by December 31, 2023.

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

Specifically at the Ghent Plant, construction of new wastewater treatment facilities for FGD (Flue Gas Desulfurization) systems wastewaters and other plant process waters require:

- Final conversion of handling systems from wet-to-dry solids management in the Coal Combustion Residuals Transport (CCRT) facility to manage fly ash, bottom ash, and gypsum for transport to the landfill or marketing/trucking these CCR materials off-site for beneficial reuse – this includes significant tank/piping modifications of FGD wastewaters and bottom ash sluice waters management;
- A Process Waters Treatment System (PWTS) for FGD wastewaters treatment (physical-chemical and potential/future-biological technology) including piping to segregate and manage FGD blowdown, gypsum dewatering, reclaim, PWTS filtration/dewatering solids, and other related process flows;
- Dewatering/closure/capping the ATB-1 and ATB-2 Ash Ponds (by late 2023);
- Excavation/clean-closure of the Gypsum Stack Facility;
- A new Process Pond (North and South halves) to settle/mix/neutralize all plant wastewaters (constructed within footprint of old/closed Gypsum Stack Facility);
- A multiport, high-rate diffuser for enhanced mixing zone/ZID discharge of outfall 001/009 treated process wastewaters to the Ohio River – completion date expected 1st quarter 2020;
- Installing six (6) new outfall monitoring/sample structures for flows associated with PWTS, process ponds, ash pond closures/cap stormwater runoff, and landfill operations;
- Three (3) temporary ponds for management of the gypsum haul road runoff were installed to support excavation/reconstruction and closure of the on-site CCR impoundments – modifications for future service for runoff control through these ponds will occur after 2022.

To reduce the discharge of wastewater contaminants as expeditiously and economically as possible, the description and schedule provided here are accelerated and represent a current best-estimate, but it must be recognized that detailed engineering is not yet complete and delays in contractual bidding, procurement and all-weather construction activities may have a profound effect upon the final completion date. Many of these work tasks are still in the design-phase, many tasks completion are serially dependent, and the simultaneous high-demands by others in the power industry is expected to impair vendors' capabilities to supply equipment and services. Accordingly, KU-Ghent plant will contact KDOW-KPDES staff to provide updated information if the actual schedule significantly deviates from that provided here including whether adjustment in ELG applicability dates are required.

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

CONSTRUCTION ACTIVITIES – WORKFLOW SCHEDULING

In accordance with requirements of the recently finalized USEPA CCR-(Coal Combustion Residuals) and ELG (Effluent Limitation Guidelines) regulatory rules, the Plant has commenced efforts to modify existing process equipment systems and construct new wastewater treatment equipment to comply with these new regulations. Generally the work requires modification, retirement/removal or the new installation of ten (10) ponds, construction of the Process Water Treatment System (PWTS) for FGD wastewater treatment/bulk solids filtration systems, completion of the CCRT/piping-conveyor materials handling system, and very extensive changes or new piping systems associated with management of process waters from operating the plant's four coal-fired units. The current ELG Rule considers that FGD wastewaters have high concentrations of metals and nutrients and must be segregated from other plant process waters for treatment by a physical-chemical and potential/future-biological system (or by equivalent performance technology) prior to co-mingling with other plant wastewater streams. In addition, since issuance of the current KPDES permit, some KyWQS standards have been lowered for metals present in combined/total plant discharges. Compliance with these tightened water quality standards also effectively requires significant reductions in contributing flows with elevated metals concentrations such as FGD wastewaters, and in particular mercury and selenium.

To determine compliance applicability dates with ELG requirements "as soon as possible", permittees are required to provide information for regulators to consider:

- *Time to expeditiously plan (including to raise capital), design, procure, and install equipment to comply with the requirements of the final rule;*
- *Changes being made or planned at the plant in response to greenhouse gas regulations for new or existing fossil fuel-fired power plants under the Clean Air Act, as well as regulations for the disposal of coal combustion residuals under Subtitle D of the Resource Conservation and Recovery Act;*
- *For FGD wastewater requirements only, an initial commissioning period to optimize the installed equipment;*
- *Other factors as appropriate.*

It is quite challenging, costly and difficult-to-schedule the installation of systems to segregate and treat FGD wastewaters, which are currently co-managed as low-volume wastes with other CCR/plant wastestreams as required by the current KPDES permit. Because the Plant's units are very large, the numerous auxiliary systems are complex and highly inter-connected, and current staffing levels cannot undertake such a large-scale/unusual event, the company had to retain professional engineering design and construction firms to assist. These efforts include:

1. Select alternative process technologies for fly ash/bottom ash/gypsum handling and management including:
   i. Dry bottom ash handling for solids landfilling instead of ash pond impoundment management;
   ii. Conversion of air heaters/economizers fly ash management systems from wet-handling (currently sluiced to ash pond) to dry-handling (pneumatic piping, silos, and trucking to onsite landfill);
   iii. FGD wastewaters treatment systems of physical-chemical precipitation design (e.g., mercury, arsenic, other metals) followed by potential/future biological treatment (e.g., selenium, nitrates, etc.) with solids filtration and placement in the site landfill;

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

2. Select and contract consulting engineer firms for process and balance-of-plant equipment including planning, designing, specifying, bidding, procuring, construction management, etc.;
3. Prepare informational packages for submission to the Kentucky Public Service Commission for regulatory approval of these expenditures under base rate/environmental surcharge categories;
4. Conduct pilot testing of biological candidate process technologies to confirm feasibility and finalize/optimize detailed systems process designs;
5. Complete general and detailed engineering designs for equipment selection, modifications, plan/coordinate installation according to unit outage schedules;
6. Prepare detailed equipment specifications;
7. Prepare, award, and negotiate bidding for contracts to procure and install the selected process technologies-equipment;
8. Demolition of existing facilities where required for plant footprint/tight-quarters require for various technical, practical, and economic reasons;
9. Install ponds, tanks, piping, pumps, structural/electrical/controls for segregation of existing plant flows and management by new wastewater treatment systems, including redundant systems for operational reliability;
10. Install facilities in new treatment buildings for plant staff operations control rooms, restrooms/locker-rooms and safe occupancy;
11. Startup/troubleshoot process and wastewater treatment systems operations and commission for up to 6 months to assure regulatory compliance with permitted discharge limits;
12. Site ponds-related work generally includes 3 scenarios:
    i. Pond flows diversion, excavation, pond liner installation, and restoration/refurbishment of piping/pumps/discharge flow controls;
    ii. Pond retirement by excavation, and backfill (for future plant maintenance/laydown areas);
    iii. Pond retirement by limited excavation, regrading, installation of in-place cap/vegetative cover and stormwater runoff management systems.

Currently, the Plant co-manages process waters from multiple CCR-materials and FGD wastewaters in many of the site impoundments to meet KPDES permit limits prior to discharge to the Ohio River. Some of these ponds were configured to flow either in series or parallel which requires temporary diversion and later restoration of these flows in order to perform the closure/cleaning/re-lining activities as required by the CCR Rule. Furthermore, the new FGD wastewater treatment systems alone require 5-10 acres of buildings/tanks/piping/etc. and also required installation of hydrocyclones at the unit FGDs; thus, to provide areas to construct the FGD and other plant process wastewater treatment systems, excavation/clean-closure of some of these ponds is required.

Scheduling for construction activities for both the Plant ponds and the new FGD wastewater treatment systems have been ***optimized and accelerated as much as possible***; but some of the ponds-related work must be scheduled sequentially to allow for the temporary flows redirections, while assuring continued compliance with KPDES permit conditions.

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

PROCESS FLOWS DISCHARGES OVERVIEW

FGD Wastewaters Processes

Currently, Units 1-4 FGD wastewaters primarily include gypsum dewatering/filtration flows and inert-solids blowdown streams; these flows are pumped to the ATB-1 and combined with plant low volume waste streams and the cooling tower blowdown flows for settling/mixing/neutralization of the combined flows prior to discharge to the Ohio River.

By December 2019, FGD wastewaters will be segregated for treatment using the new gypsum slurry hydrocyclones installed on each unit, the process water management tank farm, and the CCRT gypsum dewatering equipment systems. Most surplus FGD process waters will be recycled to supply FGD systems makeup water (to reduce treatment volumes and reduce freshwater use), and the remaining wastewater flows will be treated by the new Process Waters Treatment System (PWTS, two x 100% redundant trains using physical-chemical technology). Treated effluent will discharge to a future ELG-compliance monitoring point (new Outfall 008) and then combine with plant low-volume wastes, cooling tower blowdown flows, and other process flows for settling/mixing/neutralization in the new Process Pond prior to discharge to the Ohio River thru outfall 001.

Planned by Q1-2020, the Process Pond discharge to the Ohio River will be retrofit with a multiport, high-rate diffuser; in combination with operation of the new PWTS for FGD wastewaters, this is expected to assure compliance with current KYWQS. Ultimately the PWTS system compliance can be monitored at the new internal Outfall 008 prior to combining the discharge with any other flows (i.e., to satisfy ELG anti-circumvention measures). However, if the ELG reconsideration requires the installation of biological technology in order to meet the ELG limits, it is expected that design/procurement/installation/startup/testing and reliably operation of these units can require at least 36-42 months following the finalization announcement. Thus, although we plan the PWTS system trains 1-2 will begin startup-testing flows in April/September 2019 with reliable commercial physical-chemical operations by December 2019, designing and installing any required biological systems will achieve full compliance by December 31, 2023.

Ash Sluice Waters

Currently, all fly ash is dry-managed using the plant CCRT system where fly ash is pugmill-moistened and pipe-conveyor managed to the on-site landfill; therefore, Ghent no longer sluices fly ash.

For bottom ash (as described previously), KU installed a remote submerged conveyor to convey/dewater sluiced bottom ash solids to the on-site landfill. However, the equipment has experienced significant operating/reliability problems; consequently, 100% of the bottom ash sluice flows are currently directed to the existing ATB-1 ash pond and, in preparing for closure, further solids are required to properly grade/cap final slopes. The company is currently evaluating requirements for a bottom ash sluice waters recirculation system per current ELG rule requirements to replace the unreliable remote submerged conveyor system. Alternatively, Ghent may choose to completely convert to a dry-handling bottom ash system to avoid management of any sluice waters. KU will provide an updated evaluation of the appropriate compliance date and approach for bottom ash water before the earliest compliance deadline of November 1, 2020. Therefore, in compliance with current ELG regulations, KU-Ghent plans to cease discharging bottom ash sluice waters flows by December 31, 2023.

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

NEW OR MODIFIED PROCESS EQUIPMENT-FLOWS LISTING

Recent construction activities have profoundly changed the plant's CCRT materials handling management systems for fly ash, bottom ash and gypsum. Significant features of new/modified process equipment and/or flow changes related to FGD, CCRs and other materials processing-management include:

- Converting (wet) sluicing conveyance systems to dry fly ash from boiler air heaters/economizers hoppers to combine with existing dry fly ash silos for marketing, off-site/beneficial reuse, or pugmill-moistened for landfilling. Fly ash sluicing flows have already stopped; discharges of bottom ash sluicing flows are planned to stop by December 31, 2023;
- Remote submerged conveyors were installed to receive sluiced bottom ash sluicing flows to a process vessel where moist bottom ash solids can be dredged to bins beside the remote conveyor equipment; however, this system has operated unsuccessfully. Currently, while the equipment is being redesigned/rebuilt, the bottom ash sluice flows are directed to ATB-1 which requires these solids for proper grading and ultimate closure/capping slopes. Upon successful rebuilding of the remote submerged conveyors, or complete replacements by dry handling systems instead, the accumulated bottom ash solids (by either type system) will be subsequently trucked or pipe conveyor managed to the on-site landfill;
- Segregation of FGD wastewaters, flushwaters and FGD-gypsum filtration waters requires installing large storage tanks, constructing new gypsum slurry hydrocyclones, re-piping to the vacuum-filtration solids-dewatering belt systems, extensive piping-pumps, recycling systems, and complex water management-control systems;
- Construction of the Coal Combustion Residuals Transport (CCRT) system has included dry-fly ash storage silos, pneumatic/dry handling or pugmill-moistening capability for loading fly ash into trucks or transport via a pipe conveyor to the new on-site landfill; bottom ash handling capabilities to transport via a pipe conveyor to the new on-site landfill; FGD/gypsum de-watering and solids handling for landfilling or marketing beneficial re-use off-site by trucks---the FGD dewatering recycle flows to the FGD systems and bottom ash sluice water recycling systems require design, installation and troubleshooting work for reliable commercial operations;
- Construction of a PWTS for FGD wastewaters using physical-chemical technology-based systems (2 x 100% for reliability) to reduce mercury, arsenic, selenium and other metals levels in discharge waters. If the ELG regulatory reconsideration requires compliance with reduced selenium/nitrates/nitrites limits, a biological system can be added later (if needed) to incrementally treat the physical-chemical system effluent. Therefore, the PWTS system is being designed and constructed with space for addition of a future biological system if required; however, at this time the need for a biological system has not been demonstrated in order for combined plant discharges to comply with Kentucky water quality standards limits. KU/LG&E has recently tested alternative technologies to biological systems including tests for comparison of four biological (or equivalent) systems pilot units with focus on reliability, costs, and other process impacts to best design-optimize adding such systems in the future. For the physical-chemical system planned, the time schedule provides a 3-month startup/debugging period and another 3-month commissioning period to optimize and tune the treatment systems performance.
- Construction of plate-frame filter systems to dewater and manage the PWTS/physical-chemical solids produced (including future potential biological system solids) to be landfilled on-site.

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

IMPOUNDMENTS AND OUTFALLS WORK OVERVIEW

Ash Ponds ATB-1/ATB-2 Closure/Caps, Gypsum Stack Facility and New Process Pond(s)/Channel
To close and cap the ATB-1/ATB-2 ash ponds, construction of a New Process Pond to treat all plant wastewaters is necessary; due to plant site limitations, the most economic and feasible alternative was to excavate/clean-close the gypsum stack facility and construct the New Process Pond (North and South halves) within the same footprint. The North Process Pond and a process channel with solids 'knockout' chambers will be constructed by April 2019. This will facilitate closure of the ATB-1/ATB-2 ponds and will require several months to divert/transfer flows from the ATB-1 to the North Process Pond for settling/mixing/neutralizing of all plant wastewaters prior to their monitored discharge to the Ohio River. In April 2019 (*or new KPDES permit effective date*), dewatering flows from ATB-1/ATB-2 ponds are planned to begin in preparation for closure in accordance with the CCR final rule requirements.

With closure of these ponds by late 2023, all in-flows to these ATB ponds must stop and the process changes described in this document are required to handle the flows currently sent to these ponds. The ATB-1/ATB-2 ponds will be capped, vegetative cover established, and uncontaminated stormwater runoff flows will be directed through settling ponds to new Outfalls 009-010-011 to the Ohio River:

- North ATB-1 area to Outfall 009 (which requires excavation/clean-closure/refurbishment of the existing secondary pond of ATB-1);
- South ATB-1 area to the new Process Channel to Outfall 001 (no pond work required except drainage controls into new Process Channel);
- North ATB-2 area to Outfall 010 to Black Rock Creek/Ohio River (requires drainage controls to existing stormwater pond and construction of new Outfall monitoring/sample structure);
- South ATB-2 area to Outfall 011 to Agniels Creek/Ohio River (requires constructing stormwater pond within ATB-2 cap structure and new Outfall monitoring/sample structure).

Starting mid/late-2019, FGD wastewaters currently sent to the ATB-1 will be treated by the PWTS system and discharged thru a new internal Outfall 008 to the New Process Pond. The treated FGD wastewaters will combine with the plant low volume wastewaters, cooling tower water blowdowns, misc. other process flows and stormwater flows to the Ohio River through Outfall 001. These Outfall 001 flows will combine with Outfall 009 (ATB-1 stormwater runoff) and subsequently discharge thru the new diffuser (completion planned by Q1-2020) to the Ohio River.

Landfill and Haul Road Runoff Ponds
Operation of the landfill required construction of: the Landfill Leachate and Stormwater Runoff ponds (for active landfill area); a temporary stormwater runoff pond (for undeveloped future landfill area); and two ponds which will collect runoff from the main haul road and Dual Truck Loading Station (DTLS). With development of the New Process Pond including clean closure of the gypsum stack facility, it also became necessary to construct an East Haul road for excavated gypsum transport and three (3) runoff ponds to control/contain the stormwater runoff from this bermed, high traffic road.

The landfill leachate pond is pumped to the ATB-1 currently, but will be diverted to the New Process Pond during mid-2019. The existing landfill active area stormwater runoff and inactive area temporary stormwater

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

ponds discharge to Stephens Branch and Agniels creek(s), respectively. Both of these discharges will have new outfall monitoring/sample structures constructed and designated as KPDES Outfalls 012 and 013.

The Landfill Main Haul road from the pipe conveyor Dual Truck Loading Station (DTLS) and into the active landfill area has been bermed and a new lined pond constructed to receive the runoff from this road. These flows will be collected, combine with the landfill leachate pond flows, and subsequently pumped to the new process pond(s) for settling/mixing/neutralizing treatment prior to discharge to the Ohio River.

The East Haul road and runoff ponds were constructed for development of the new Process Pond and ATB-1/ATB-2 ash pond closure activities. These ponds will be maintained during the construction/closure activities but modified for discharge to Agniels Creek (via unnamed tributaries) of uncontaminated stormwater upon cessation of construction activities.

The West Haul Road is already used as the site primary access to the ATB-2 and landfill areas, but with the future closure of the ATB-2 and regrading/capping of the North/ATB-2 area, cap stormwater runoff flows will be directed to an existing pond (utilized for ATB-2 original construction runoff) which also receives much of the runoff of the west haul road. The pond level is controlled by a riser/decant pipe and a new outfall sample/monitoring structure (designated KPDES Outfall 010) will be constructed at the end of this pond to confirm future integrity of the future cap installed on this North/ATB-2 area.

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Construction Projects Work Required for CCR and ELG Federal Rules Compliance

IMPOUNDMENTS AND OUTFALLS LISTING

These activities involve work on ten (10) existing/future ponds, including closure or new construction of some of these same ponds, including:

- Construct the new North/Process Pond(1) and South/Process Pond (1) (collectively the "New Process Pond"), with liners, following
  excavation/clean-closure of the three (3) gypsum stack impoundments (Reclaim Pond, North/Gypsum Stack Cell, South/Gypsum Stack Cell);
- Two (2) ash ponds (ATB-1/ATB-2) will be dewatered, closed-in-place, regraded, liner/capped, and stormwater runoff management drainage from the caps;
- ATB-1/ATB-2 closure/cap stormwater runoff collected in new construction or refurbishment of the three (3) settling ponds including:
  - ATB-1 North area to existing ATB-1/Secondary Pond (Clean-closure/excavation/lining) and new Outfall monitoring/sampling structure;
  - ATB-1 South area to new Process Channel with drainage controls work required (but no new pond or Outfall structure required);
  - ATB-2 North area to existing pond but requiring drainage controls and new Outfall monitoring/sample structure;
  - ATB-2 South area to new pond within ATB-2 cap and new Outfall monitoring/sample structure;
- Construction of two (2) new stormwater runoff ponds for the Landfill Main Haul Road and the DTLS (Dual Truck Loading Station) Areas;
- Three (3) new stormwater runoff ponds will be constructed with the new gypsum haul road;
- Construct Outfalls 012 and 013 for Landfill Stormwater Runoff Ponds (Active Area & Temporary).

1. Gypsum Stack Reclaim Pond – Closure Started, Completion by January 2019

Excavate/clean-close reclaim pond (& part of north cell) to make room to construct North Process Pond, Redirect Wastewater Treatment from Gypsum Dewatering Wastewater Flows to ATB-1

- Redirect FGD wastewaters (Gypsum Dewatering) to ATB-1 instead of Gypsum Stack Facility;
- Excavate residual/settled gypsum from reclaim pond;
- Demolish third-party contractor gypsum dewatering building;
- Excavate part of north cell of gypsum stack adjacent reclaim pond;
- Remove existing liner of Reclaim pond.

2. North Process Pond – Construction Started, Completion by March 2019

Prepare North Process Pond & Outfall Structure to receive/redirected Plant Wastewater Flows currently discharged to ATB-1

- Excavate final North Process basin, slopes, perimeter, and access roadways;
- Remove/adjust gypsum north cell existing liner to provide adequate space for new pond;
- Construct new Outfall 001 Monitoring/Sample control structure for future pond discharges ;
- Install pond liner (geomembrane);

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- Construct Pipe-racks/infrastructure/Process Channel to divert process flows to New Process Pond, instead of to the ATB-1, including plant sumps, bottom ash sluice flows from Submerged Flight Conveyors (SFC) dewatering equipment (low solids %), FGD wastewaters (low solids %);
- Transition pond wastewater flows from ATB-1 to North Process Pond over several months duration and after April 1, 2019, allow simultaneous discharge from both New Process Pond and ATB-1 thru existing Outfall 001 and to Ohio River.

3. South Process Pond – Potential Start in 2020, Completion Planned before December 2023

Prepare South Process Pond & Outfall Structure to receive/redirected Process Channel Flows instead of direct-to-North Process Pond initial configuration (i.e., then South pond will flow to North Pond)

- Excavate final South Process basin, slopes, perimeter, and access roadways;
- Remove south gypsum cell existing liner (and remainder of north cell area);
- Construct new North/South ponds intermediate Outfall Monitoring/Sample control structure;
- Install pond liner (geo-polymer);
- Perform Process Channel tie-ins to divert direct-to-North Pond flow into South Pond first; Transition pond wastewater flows from ATB-1 to North Process Pond over several months duration and after April 1, 2019, allow simultaneous discharge from both New Process Pond and ATB-1 thru existing Outfall 001 and to Ohio River.

4. ATB-1 Ash Pond – Completion by December 2023

Close-in-place ATB-1 Ash Pond, Install geo-membrane/vegetative cap, future stormwater runoff controls to new/refurbished secondary pond

- Channelize/reconfigure flows to allow Process Channel construction and wastewaters supplemental management (e.g., segregated internal ponds, enhanced settling, diverted high velocity flows, etc.);
- Construct Process Channel with ‘Knockout’ chambers for future pre-treatment of high-TSS flows;
- Construct piping for Process Channel discharge to temporarily bypass South pond and instead direct-discharge into North Process Pond (until South Pond constructed);
- Redirect FGD inert fines blowdown streams to isolated/internal sump for improved TSS settling;
- Install dewatering pumps and infrastructure for dewatering flows discharge upon new KPDES permit effective date (potentially starting April 1, 2019);
- Manage dewatering flows to new Process Pond (or secondary pond) thru existing Outfall 001 monitoring/sample point in accordance with KPDES permit conditions;
- Existing sand filters, or supplemental treatment/filtration equipment will be provided as needed for discharges compliance;
- When appropriate for construction conditions, all decant/dewatering flows from ATB-1 will be directed to new Process Pond, flows to Ohio River from existing secondary pond will stop, and Outfall 001 monitoring point will be relocated from existing location to newly constructed Outfall 001 (upon approval from KDOW/filed inspector);
- Provide pond fill solids, grade slopes for cap, install geo-membrane, soil cover, establish grass on top slopes;
- Construct perimeter internal drainage channel for stormwater runoff from capped pond – North ATB-1 capped area (~49 acres) to secondary pond and South ATB-1 capped area (~67 acres) to Process Channel.

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ATB-2 Ash Pond – Completion by December 2023

Close-in-place ATB-2 Ash Pond, Install geo-membrane/vegetative cap, future stormwater runoff controls to existing West Haul Road Runoff Pond and New Settling pond constructed within ATB-2 South Capped area

- Construct new piping to divert landfill leachate pond flows to new Process Channel (instead of into ATB-2 as existing now). Flows from Landfill Main Haul Road Runoff pond and DTLS Runoff pond will also be pumped to combine with the leachate flows to Process Channel;
- Install dewatering pumps and infrastructure for dewatering flows discharge upon new KPDES permit effective date (potentially starting April 1, 2019);
- Manage accumulated stormwater inflows by decant and dewatering infrastructure to new Process Channel thru existing Outfall 001 monitoring/sample point in accordance with KPDES permit conditions;
- Existing sand filters, or supplemental treatment/filtration equipment will be provided as needed for discharges compliance;
- Provide pond fill solids, grade slopes for cap, install geo-membrane, soil cover, establish grass on top slopes;
- Construct perimeter internal drainage features and piping systems for stormwater runoff from capped pond – North ATB-2 capped area (~96 acres) to existing West Haul Road Runoff Pond with discharges thru Outfall 010, and South ATB-2 capped area internal settling pond (~86 acres including pond) with discharges thru Outfall 011.

5. Closed/Capped ATB-2 North Runoff Pond Outfall 010

– Not Started, Completion by December 2023

Construct Outfall 010 Monitoring/Sample Structure from existing West Haul Road Runoff Pond which receives stormwater runoff from Closed/Capped ATB-2 North area.

- Construct Outfall 010 monitoring/sample structure at discharge of existing East Haul Road settling pond decant pipe outlet (prior to discharges to Black Rock Creek via unnamed tributaries).

6. Closed/Capped ATB-2 South Runoff Pond Outfall 011

– Not Started, Completion by December 2023

Construct internal cap pond and Outfall 011 Monitoring/Sample Structure for stormwater runoff from Closed/Capped ATB-2 South area.

- Construct ATB-2 South Cap area internal settling pond (within cap) and Outfall 011 monitoring/sample structure at discharge from internal runoff pond pipe outlet (prior to discharge to Agniels Creek via unnamed tributaries).

7. Landfill Main Haul Road Runoff Pond– Started, Completion by July 2019

Construct Settling Pond for Landfill Main Haul Road Runoff and pumps/piping to new Process Channel

- Excavate pond and install liner;
- Install berm/drainage controls to direct Main Haul road runoff into pond;
- Install pumps and piping to combine with Landfill Leachate Pond pumped flows to new Process Channel.

KU - Ghent Station – *KPDES Permit Renewal Information*
Construction Projects Work Required for CCR and ELG Federal Rules Compliance

8. Landfill Dual Truck Load Station (DTLS) Runoff Pond– Started, Completion by July 2019
Construct Settling Pond for Landfill Main Haul Road Runoff and pumps/piping to new Process Channel

- Excavate pond and install liner;
- Install berm/drainage controls to direct DTLS bermed area runoff into pond;
- Install pumps and piping to combine with Landfill Leachate Pond pumped flows to new Process Channel.

9. Gypsum-East Haul Road Runoff Pond A– Constructed, Final Completion by December 2023
Construct Settling Pond A (North/close to Gypsum Stack) for East Haul Road Runoff and pumps/piping to ATB-1

- Excavate pond;
- Install berm/drainage controls to direct Northern section of East Haul road runoff into pond;
- Install pumps and piping to discharge flows to ATB-1;
- Upon cessation of excavated gypsum hauling, remove pumps, install riser structure and outlet pipe through berm, rip-rap channel as necessary for discharge to Agniels Creek.

10. Gypsum-East Haul Road Runoff Pond B– Constructed, Final Completion by December 2023
Construct Settling Pond B (Middle section mid-way to ATB-2) for East Haul Road Runoff and pumps/piping to ATB-2

- Excavate pond;
- Install berm/drainage controls to direct Northern section of East Haul road runoff into pond;
- Install pumps and piping to discharge flows to ATB-2;
- Upon cessation of excavated gypsum hauling, remove pumps, install riser structure and outlet pipe through berm, rip-rap channel as necessary for discharge to Agniels Creek.

11. Gypsum-East Haul Road Runoff Pond C– Constructed, Final Completion by December 2023
Construct Settling Pond C (South/close to ATB-2) for East Haul Road Runoff and pumps/piping to ATB-2

- Excavate pond;
- Install berm/drainage controls to direct Northern section of East Haul road runoff into pond;
- Install pumps and piping to discharge flows to ATB-1;
- Upon cessation of excavated gypsum hauling, remove pumps, install riser structure and outlet pipe through berm, rip-rap channel as necessary for discharge to Agniels Creek.

12. Landfill/Active Area Stormwater Runoff Pond – Outfall 012– Completion by July 2019
Construct Outfall 012 Monitoring/Sample Structure from existing Landfill Stormwater Runoff Pond to Stephens Branch (creek)

- Install Outfall 012 Monitoring/Sampling structure at outlet of existing discharge to Stephens Branch.

13. Landfill/Undeveloped Area Stormwater Runoff Pond – Outfall 013 -Completion by July 2019
Construct Outfall 013 Monitoring/Sample Structure from existing Landfill Temporary Stormwater Runoff Pond to Agniels Creek

- Install Outfall 013 Monitoring/Sampling structure at outlet of existing discharge to Agniels Creek.

ATTACHMENT 12

DESIGN REPORT FOR HIGH-RATE, MULTIPORT DIFFUSER

FOR OUTFALL 001 DISCHARGES TO THE OHIO RIVER

OUTFALL 001 CONCEPTUAL MULTI-PORT DIFFUSER DESIGN AND CORMIX MODELING RESULTS

GHENT GENERATING STATION

Prepared for

Kentucky Utilities
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November 30, 2018

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Ghent Generating Station – Outfall 001 Conceptual Multi-Port Diffuser Design and CORMIX Modeling Results

EXECUTIVE SUMMARY

This report provides the results of the mixing zone analysis and conceptual multi-port diffuser design using the Cornell Mixing Zone Model (CORMIX) software for Outfall 001. The objective of the diffuser design is to improve mixing of the discharge with the receiving waterbody, and to provide a minimum ten-fold (10:1) dilution of the discharge constituent concentrations within the regulatory Zone of Initial Dilution (ZID).

Based on the results of the modeling, a 5-port diffuser design with 20-feet spacing on-center between ports has been selected. The CORMIX model results indicate that a dilution of 17.5:1 is achieved at the edge of the ZID at maximum anticipated discharge flows and low river flow conditions.

Consistent with modeling inputs and corresponding empirical results, the conceptual 5-port diffuser design includes the following:

- 48-inch diameter diffuser header pipe oriented perpendicular to the shoreline;
- 18-inch diameter ports (5) with no vertical angle, directed 45° (relative to the direction of the current) toward the north bank of the Ohio River (all facing the same direction), and with the centerline of the ports located 2 feet (minimum) above the existing or proposed river bottom;
- Welded steel as the primary material of construction;
- New land-side piping to connect to a tie-in point to the diffuser;
- Suitable backfill materials (sand) to bed and cover the diffuser header pipe a minimum of 2 feet below the existing or proposed river bottom;
- Riprap placed above the suitable backfill materials to counteract potential lateral and vertical movement of the buried diffuser header pipe; and
- Upstream protection of each diffuser ports using structural steel members driven into the river bottom.

1 INTRODUCTION

1.1 Purpose

This report provides the Kentucky Department for Environmental Protection (DEP) Division of Water (DOW) with the results of a conceptual multi-port diffuser design using Cornell Mixing Zone Model (CORMIX) software for Outfall 001 to the Ohio River at Kentucky Utilities (KU) Ghent Generating Station (Ghent). The intent of the diffuser design is to improve mixing of the discharge with the receiving waterbody, and to provide a minimum ten-fold (10:1) dilution of the discharge constituent concentrations within the regulatory Zone of Initial Dilution (ZID).

1.2 Background

Ghent is a four-unit, coal-fired electric power plant which opened in 1973 and has a generating capacity of 1,932 megawatts (MW) of electricity (LG&E-KU 2018). The facility is located in Ghent, KY along the Ohio River. The station discharges water to the Ohio River through Outfall 001, which is regulated under the Kentucky Pollutant Discharge Elimination System (KPDES) Permit No. KY0002038 (Kentucky DEP 2001a).

Ghent's current KPDES permit became effective on July 1, 2002 and, although initially set to expire on June 30, 2007, has been administratively continued. The permit requires six parameters to be monitored at the discharge of Outfall 001: flow, total suspended solids (TSS), oil and grease (O&G), hardness, total recoverable metals, and acute toxicity. Of these, TSS, O&G, and acute toxicity are the only parameters with discharge limits. The other parameters include monitoring and reporting requirements. The total recoverable metals sample is a quarterly grab sample and is the sum of results of thirteen metals. While only the total recoverable metals value must be included on the facility's Discharge Monitoring Report (DMR), the laboratory analytical report with the results for each metal must be attached to the DMR (Kentucky DEP 2001a).

KU is proposing to design and install a multiport diffuser (considered design scenarios with 3 to 5 ports) at Outfall 001 to improve mixing of the effluent in the river. The diffuser will be located offshore in the river approximately 400 ft downstream of the existing Outfall 001 as shown in **Figure 1-1**. The current objective of the diffuser design is to achieve a minimum ten-fold (10:1) dilution of discharge concentrations at the edge of the regulatory ZID. The results of this report will be provided to the Kentucky DEP.

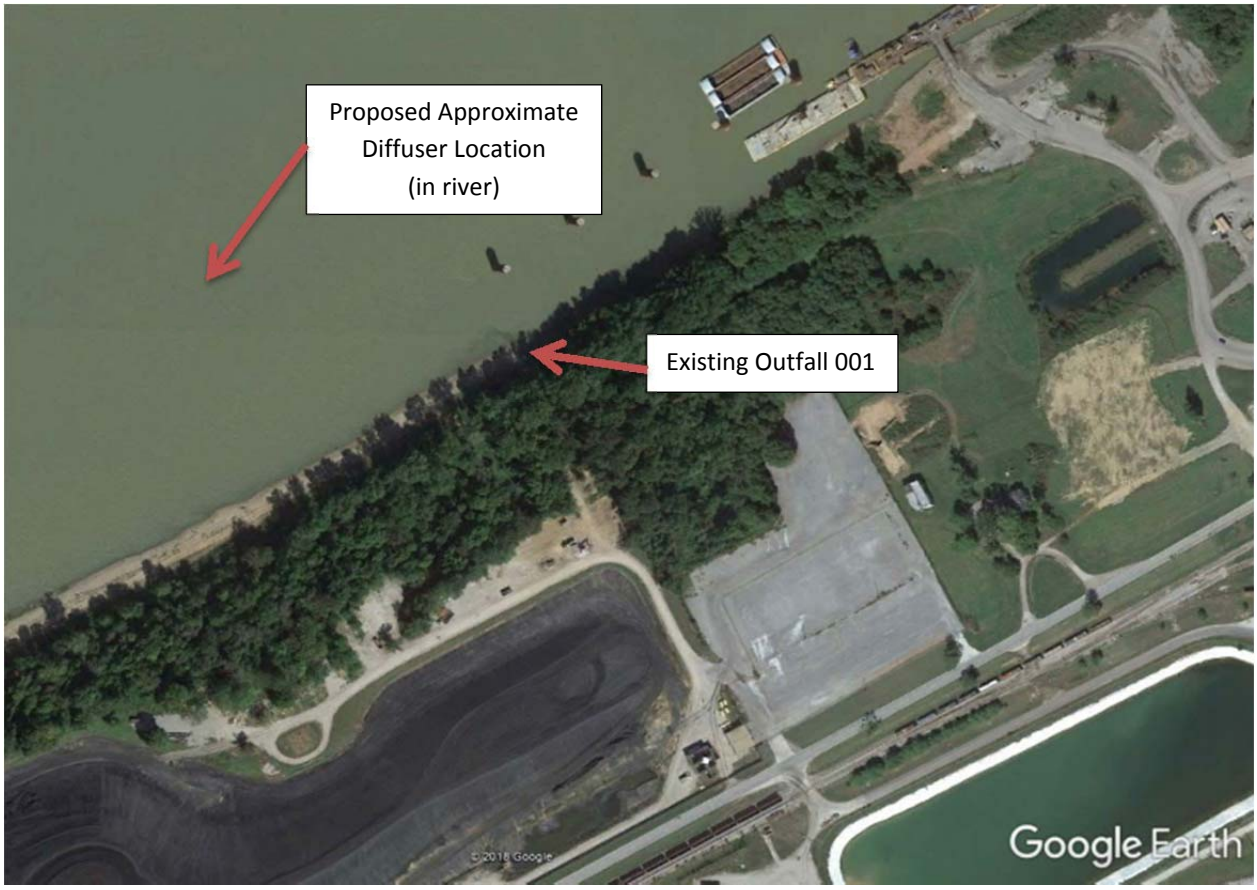

Figure 1-1: Location of proposed diffuser for Outfall 001

1.3 Regulatory Considerations

Ghent is required to monitor and report the sampling results for the parameters listed in the previous section. The regulatory considerations and future potential discharge monitoring requirements and/or limitations for these parameters are therefore key factors for initiating the CORMIX evaluation. To improve mixing of the discharge in the waterbody, the diffuser design will be selected based on an ability to achieve at least a 10:1 dilution of discharge concentrations at the edge of the ZID, and other factors such as overall constructability and operation.

The key regulatory considerations for this evaluation and report pertain to the mixing zone definitions and requirements. The Kentucky DEP DOW regulates water quality criteria (WQC) and mixing zones via the Kentucky Administrative Regulations (KAR) Title 401 Chapters 10:031 and 10:029, respectively (Kentucky DEP 2018a, Kentucky DEP 2018b).

Since temperature WQC are variable according to the time of the year, an additional assessment of the preferred diffuser design was completed to evaluate whether the in-stream temperature limits were met for the bounding winter and summer conditions.

Further discussion of the mixing zone, ZID, and temperature requirements are provided below. CORMIX model inputs are discussed further in **Section 3**.

1.3.1 Temperature

Temperature limitations set by the KAR are more complex than the other WQC. 401 KAR 10:031 states that surface water temperatures should not exceed 89°F. There are also limits for temperature based on the month/period, as provided in **Table 1-1** (Kentucky DEP 2018a).

Table 1-1: KAR monthly temperature surface water limits

Month/Date	Period Average		Instantaneous Maximum	
	(°F)	(°C)	(°F)	(°C)
January 1-31	45	7	50	10
February 1-29	45	7	50	10
March 1-15	51	11	56	13
March 16-31	54	12	59	15
April 1-15	58	14	64	18
April 16-30	64	18	69	21
May 1-15	68	20	73	23
May 16-31	75	24	80	27
June 1-15	80	27	85	29
June 16-30	83	28	87	31
July 1-31	84	29	89	32
August 1-31	84	29	89	32
September 1-15	84	29	87	31
September 16-30	82	28	86	30
October 1-15	77	25	82	28
October 16-31	72	22	77	25
November 1-30	67	19	72	22
December 1-31	52	11	57	14

A previous temperature evaluation performed for Ghent noted that the Kentucky DEP sometimes uses a limit of a maximum temperature rise, or delta T (ΔT), of 5°F above the ambient temperature (Burns & McDonnell 2012). This limit is not specified in 401 KAR 10:031, but as Burns & McDonnell reported, this is similar to the standards of some other states (Burns & McDonnell 2012, U.S. EPA 1988).

It should be noted that in order to comply with the Federal CCR Rule for closure of ash impoundments, there are significant changes being made at Ghent. One of those changes includes closure of both the Reclaim Pond and the Gypsum Stack, and repurposing the area currently occupied by these two CCR Units into a cooling pond of approximately 60 acres. The repurposing will be completed in two phases: Phase 1 resulting in an approximate cooling pond surface of 20 acres at the north pond and Phase 2 resulting in an approximate additional 40 acres of cooling pond surface, for a total of 60 acres. A Technical Memorandum completed during conceptual design (LG&E-KU Ghent Station – Cooling Pond Thermal Analysis [Revision 1], AECOM, June 30, 2016) identified that the required cooling pond size to reduce the expected (at the time) 21 MGD of flow from 120.5°F to 110°F at the outfall was only 4.8 acres. The approximately 60-acre cooling pond was therefore capable of cooling over 12 times the expected load. The current average flow (26.5 MGD) is now slightly higher than expected, and the maximum flow will be less than 2.5 times that expected in the concept design. Therefore the proposed 60-acre pond should adequately provide cooler than 110°F end of pipe conditions for the entire load, and potentially even cooler temperatures at night and during milder weather. However, no consideration of the future cooling pond effect has been considered in the conceptual diffuser design. The end of pipe temperature has been assumed to be the theoretical maximum of 110°F.

In evaluating the mixing zone for the diffuser, a ΔT less than 5°F and maximum in-stream temperatures of 84°F for summer conditions (July) and 45°F for winter conditions (January) will be used as 'bounding' (i.e., most stringent) temperature limitations. Further, the mixing zone analysis reviews the two most extreme or "worst-case" discharge conditions for compliance. In the summer, the ambient river temperature is expected to be the highest, and the final mixed river temperature is therefore expected to be

the highest (i.e., the evaluation will review the mixed river temperature against the maximum in-stream temperature criterion). In the winter, if the discharge temperature is assumed to be the current theoretical maximum discharge temperature of 110°F, and the ambient river temperature is expected to be lowest, the temperature differential will be the highest (i.e., the evaluation will review the ΔT between the discharge and mixed river temperature). For winter conditions, it will be determined whether the most conservative 'Period' temperature criterion of 45°F is exceeded at the edge of the mixing zone.

As discussed above and again in **Section 3.2.4**, it is important to note that the theoretical maximum discharge temperature of 110°F will be modeled for all conditions instead of the actual discharge temperatures. This approach will provide a conservative 'worst case' estimate at bounding conditions and does not include any consideration of the future cooling pond's effects that may provide water cooler than 110°F. Actual discharge temperature conditions have not been modeled since discharge temperature data is not available at this time; however, maximum in-stream temperature and ΔT is expected to be significantly lower than that modeled during most periods of the year (i.e., actual discharge temperature during the winter months is expected to be significantly lower than the theoretical maximum discharge temperature of 110°F).

River flows are typically higher during the winter months and lowest during the summer and fall, so the use of the annual low-flow ($Q_{7,10}$) conditions in lieu of monthly $Q_{7,10}$ conditions provides an additional level of conservatism in this evaluation.

These two summer and winter scenarios were expected to be the most extreme or 'worst-case' conditions, and therefore, an evaluation for every month/period listed in **Table 1-1** was not completed at this time.

1.3.2 Mixing Zone and ZID Regulations

The Kentucky DEP sets mixing zone requirements as part of 401 KAR 10:029. The KAR states that the mixing zone cannot exceed one-third of the width of the receiving stream or river in any spatial direction from the point of discharge, or one-half of the cross-sectional area of the stream or river (Kentucky DEP 2018b). This mixing zone size limitation is applied to the criteria for chronic aquatic life, human drinking water standard, and temperature. The following conditions are also required of the mixing zone:

- "*Shall be limited to an area or volume that shall not adversely affect the designated uses of the receiving water and shall not be so large as to adversely affect an established community of aquatic organisms*";
- "*Shall not interfere with fish spawning or nursery areas, fish migration routes, public water supply intakes, or bathing areas; preclude the free passage of fish or other aquatic life; or jeopardize the continued existence of endangered or threatened aquatic species listed under Section 4 of the Endangered Species Act, 16 U.S.C. 1531 through 1544, or result in the destruction or adverse modification of their critical habitat*" (Kentucky DEP 2018b).

For acute WQC, 401 KAR 10:029 states that the pollutant shall not exist in the mixing zone above the acute WQC unless a ZID is granted. In order for a ZID to be granted, "*The cabinet shall require an applicant to provide a technical evaluation for a zone of initial dilution.*" The following restrictions for sizing the ZID are also specified in 401 KAR 10:029:

- *"A zone of initial dilution for a pollutant shall be available only to a submerged high-rate multiport outfall structure and shall be limited in size to the most restrictive of the acute criteria which shall be met:*
    - *Within ten (10) percent of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in a spatial direction;*

- *Within a distance of fifty (50) times the square root of the cross-sectional area of a discharge port, in a spatial direction; or*
- *In a horizontal direction within a distance of five (5) times the natural water depth that prevails under mixing zone design conditions, and exists before the installation of a discharge outlet."* (Kentucky DEP 2018b).

2 CORMIX MODEL

CORMIX is a hydrodynamic simulation software package that is supported by the U.S. Environmental Protection Agency (U.S. EPA) and used by numerous states and regulatory agencies to develop guidance to manage water quality, evaluate mixing zones, and for other water-related purposes. CORMIX simulates turbulent, buoyant jet mixing. The model developers have verified its predictions for typical and recommended outfall configurations, provided that the dimensions, angles, and parameters appropriately represent the outfall and its surroundings.

CORMIX simulates three types of outfalls, using three different types of modeling. CORMIX1 simulates mixing due to a single port submerged outfall. CORMIX2 simulates a multi-port submerged diffuser. CORMIX3 simulates surface discharges that result when an effluent enters a larger waterbody laterally, through a canal, channel, or near-surface pipe (Doneker & Jirka 2007).

CORMIX inputs fall into one of the following four main classes. The data that are captured as part of these four classes are as follows (Doneker & Jirka 2007):

1. Ambient conditions:
   - Type of receiving waterbody and stratifications, if applicable
   - Receiving waterbody flow rate, temperature, and salinity
   - Channel characteristics such as roughness, bathymetry, and degree of meandering
   - Wind speed
2. Effluent characteristics:
   - Type of discharge
   - Discharge flow rate, density, temperature, and quality
3. Outfall type:
   - Type of outfall (i.e. submerged, surface, diffuser)
   - Depth, size, orientation, shoreline location, and other diffuser characteristics (i.e. length, number of ports, port height/diameter, port orientation, etc., if applicable) of the outfall
   - Distance from outfall to waterbody banks
4. Mixing zone:
   - Applicable water quality standard or Criterion Maximum Concentration (CMC) and Criterion Continuous Concentration (CCC) for pollutant
   - Mixing zone characteristics (i.e. distance downstream of outfall, width, area, and trajectory)
   - Maximum downstream location/distance of interest

CORMIX outputs are in the International System of Units (SI units); however, the inputs may be in either SI or English units.

As with any model, the reliability of results depends on the quality of input data. CORMIX predictions on dilutions and concentrations, with associated plume geometries, are generally accurate to within +/- 50% (standard deviation) or less (Doneker & Jirka 2007).

The next section discusses model inputs and how they were identified.

3 MODELING DATA

3.1 Ambient Characteristics

Ghent is located along the Ohio River in the McAlpine Pool, approximately 4.5 miles downstream of the United States Geological Survey (USGS) Station 03277200, Ohio River at Markland Dam near Warsaw, KY.

3.1.1 Wind

Annual average wind speeds in the vicinity of Ghent are assumed to be approximately less than 4 meters per second (m/s) (8.95 miles per hour [mph]) at a height of 30 meters, based on information from the National Renewable Energy Laboratory (NREL) (U.S. DOE 2012). Average wind speeds recorded from 1974 to 2012 at the nearby Cincinnati/Northern Kentucky International Airport in Hebron, KY range from 6-10 mph; therefore, 8.95 mph (4 m/s) was used in this assessment (WeatherSpark 2017). Wind speed is pertinent to predicting heated discharges, since the discharge will experience heat loss to the atmosphere when the plume contacts the water surface. As part of the CORMIX model, it is necessary to specify a heat loss coefficient (also known as a surface heat exchange coefficient), which is a function of wind speed and ambient water temperature. The effects of wind on the temperature of the river affect the buoyancy of the discharge plume and consequently, the mixing zone.

Heat loss coefficients in Table 4.1 of the CORMIX User Manual were used for the bounding conditions of the thermal modeling at Ghent. These data are based on wind speed (4 m/s) and ambient temperatures at bounding conditions. A heat loss coefficient of 33 watts per square meter-degrees Celsius (W/m2-°C) was selected to represent winter conditions; similarly, a heat loss coefficient of 69.5 W/m2-°C was selected to represent summer conditions (Doneker & Jirka 2007).

3.1.2 Receiving Waterbody Temperature and Streamflow

The Ohio River ambient temperature was required by CORMIX to correctly predict the effluent discharge behavior and density distribution in the waterbody. The current ambient river temperature was available at the downstream gage of the USGS Station 03277200, Ohio River at Markland Dam near Warsaw, KY (about 4.5 miles upstream of Ghent; period of record from 02/12/2011 to 11/02/2015) (USGS 2017). Ghent is located within close proximity to the gage station with little intervening drainage. There are two gauges located at this station: one downstream of the locks system and one downstream of the hydroelectric generating system.

Winter (February) and summer (July) conditions are expected to be the most extreme or ‘worst case’ conditions, and were therefore modeled in CORMIX. The monthly river temperatures over the period of record for both gauges were averaged, resulting in a winter temperature of 39.09°F (3.94°C) and a

summer temperature of 81.64°F (27.58°C) (USGS 2017). Because of the CORMIX limitation for calculations at temperatures less than 4°C[1], the winter water temperature was set at 39.2°F (4°C).

The streamflow used in the CORMIX model is the low flow for the Ohio River. A $Q_{7,10}$ flow is the lowest average flow that occurs for 7 consecutive days during a 10-year period. The annual $Q_{7,10}$ flow, according to KU's KPDES Fact Sheet, is 11,000 cubic feet per second (cfs) (Kentucky DEP 2001b). This was the flow used for modeling purposes.

3.1.3 Channel Characteristics

CORMIX schematizes the receiving waterbody's geometry and defines the cross-section as a rectangular channel, unbounded (large lakes and reservoirs) or bounded laterally (rivers and estuaries), and uniform in downstream direction. For the purposes of the CORMIX model development, the channel was considered a rectangular channel and bounded laterally. AECOM collected bathymetry data during a survey in January 2017. A cross-sectional cut of the river was created at Section AA-AA' (location of existing Outfall 001) as shown in **Figure 3-1** using the collected bathymetric data. This cross-sectional cut yielded the river cross-section at the new location of Outfall 001 (the proposed diffuser location shown in **Figure 1-1**) presented in **Figure 3-2** (AECOM 2017). This cross-section also shows the CORMIX schematized rectangular channel cross-section (shaded light blue area) which has dimensions of 20 ft deep by 1,000 ft wide. The method for selecting this cross-section is described in the paragraphs to follow.

[1]According to the CORMIX User Manual, CORMIX does not provide density calculations for temperatures below 4°C and therefore modeling will be completed assuming densities calculated at 4°C. However, ambient river temperature will be incorporated in the modeling since the effluent excess temperature is taken into consideration as described in **Section 3.2**.

Ghent Generating Station – Outfall 001 Conceptual Multi-Port Diffuser Design and CORMIX Modeling Results

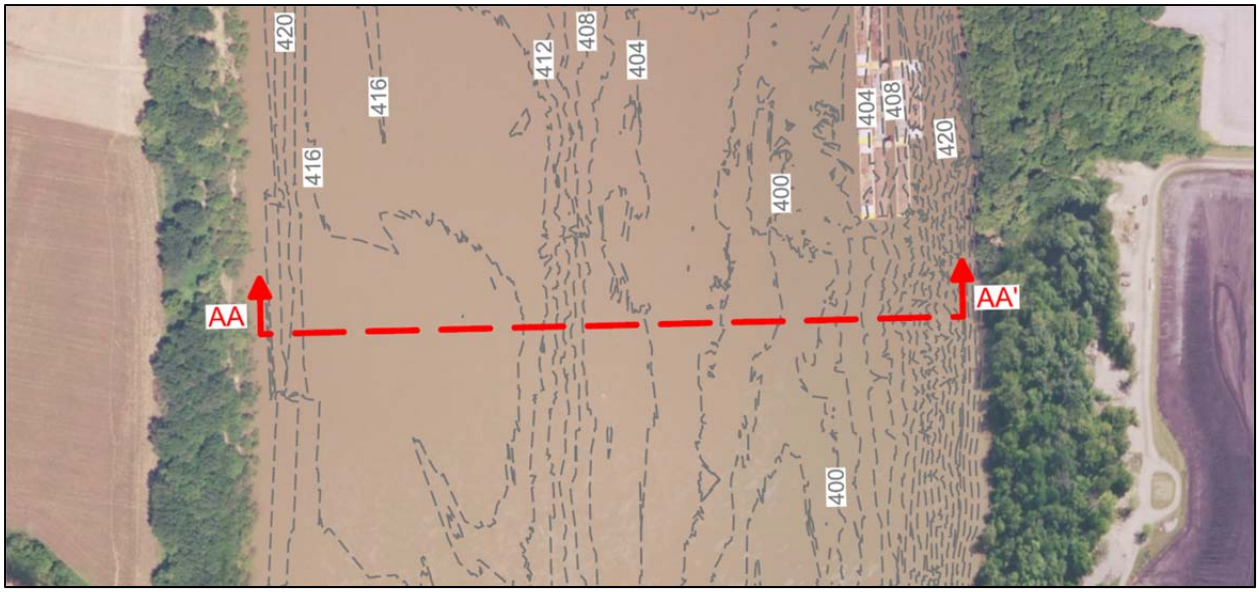

Figure 3-1: Cross-sectional cut (AA-AA') at the proposed location of the diffuser

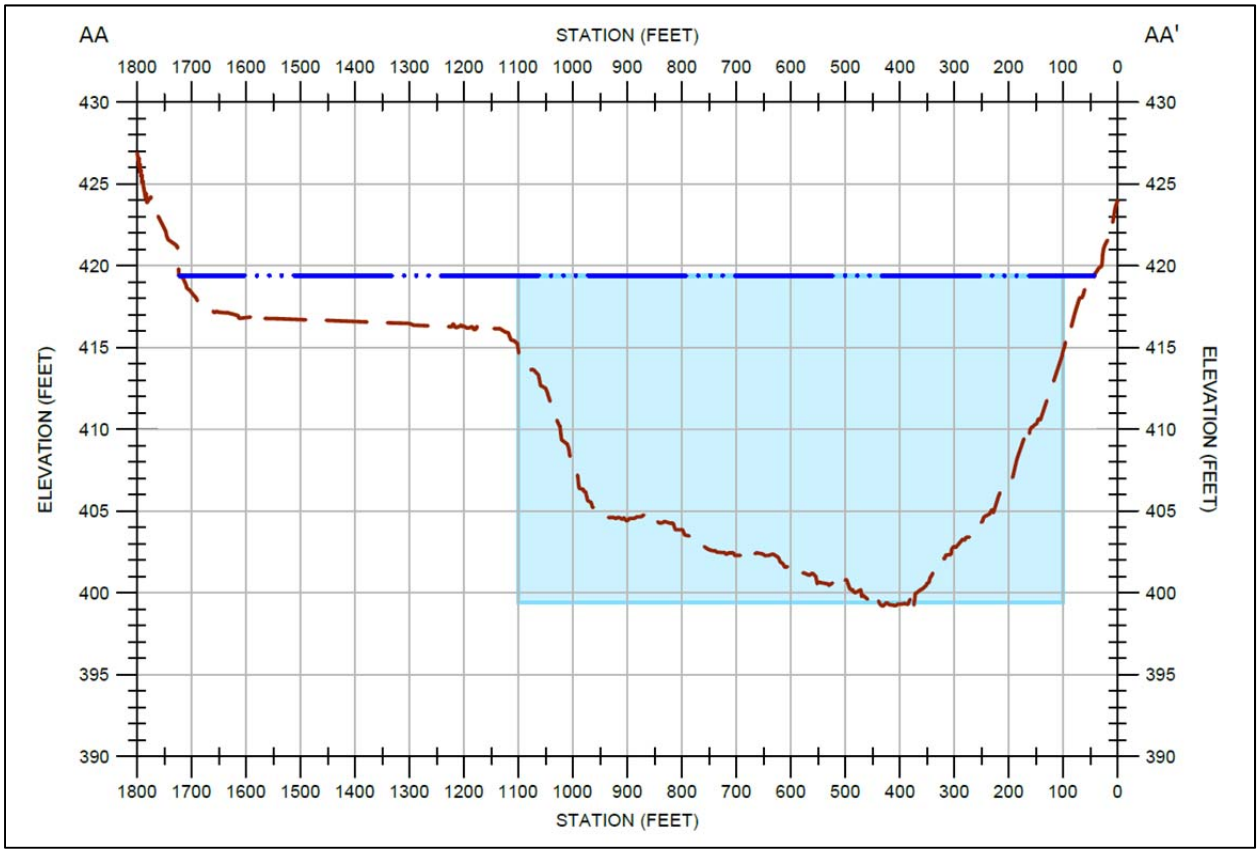

Figure 3-2: River cross-section (AA-AA') at new Outfall 001 (view faces upstream) with CORMIX schematized cross-section shown as blue-shaded area[2]

[2] The near bank (south bank) of the Ohio River at Ghent is located at Station 0.

The width and depth of the Ohio River channel is variable, and the river pool elevation at $Q_{7,10}$ flow conditions is of interest for the model. It is assumed that the normal pool elevation of the McAlpine Pool (section of the Ohio River downstream of the Markland Dam and upstream of the McAlpine Dam) is maintained during the $Q_{7,10}$ flow conditions; therefore, the normal pool elevation was used for modeling. The United States Army Corps of Engineers (USACE) has specified that the normal pool elevation of the McAlpine Pool, and thus at Ghent, is 420 ft (USACE 2014). However, this pool elevation is in reference to the National Geodetic Vertical Datum of 1929 (NGVD 29). To tie into the bathymetric survey data (and other survey data not used by the USACE), this elevation was converted to the North American Vertical Datum of 1988 (NAVD 88), which required a correction factor at Ghent of -0.614 ft (NOAA 2018)[3]. The resulting normal pool elevation that was used in the model is 419.4 ft.

Using the normal river pool elevation, the cross-sectional area of the river flow was calculated based on the actual river bathymetry. Using this cross-sectional area, a river width was selected to approximate as closely as possible the main channel of the Ohio River. The average depth was then calculated, and the resulting rectangular schematized river cross-section for the CORMIX model was selected. The schematized river therefore assumes a 20 ft deep and 1,000 ft wide channel, as shown with the light blue shaded area on **Figure 3-2**.

CORMIX also required the roughness of the channel (Manning's n coefficient) and the degree of meandering as part of the model. The Ohio River was assumed to be a smooth earth channel with no weeds, which yielded a Manning's n value of 0.020 (Doneker & Jirka 2007). Although the Ohio River meanders downstream of Ghent, the river channel appeared to be generally straight in the vicinity of Outfall 001. Therefore, for model purposes the river was assumed to be "Uniform."

3.2 Effluent Characteristics

3.2.1 Outfall Configuration and Flow

The existing discharge at Outfall 001 is accomplished through a 72-inch diameter corrugated metal pipe which empties into a channel which connects to the river. The channel is flat and oriented perpendicular to the Ohio River. The elevation of the bottom of the channel and the normal river pool are 413.5 ft and 420 ft, respectively (KU 2007). From Ghent's DMR data from January 2013 through February 2018, the minimum, maximum, and average flows for the discharge were calculated and are presented in **Table 3-1** (KU 2016, KU 2018).

Table 3-1: Ghent Design Discharge Flows for Outfall 001

	Flow (MGD)
Minimum (1st Percentile)	5.3
Maximum (99th Percentile)	51.8
Average	26.5

3.2.2 Background River Concentrations

The effluent discharge concentration excess is the differential between the discharge concentration and the background concentration of a pollutant in the receiving river. This applies to both conservative pollutants (i.e. metals) and temperature. For this CORMIX evaluation, selenium has been modeled in the discharge to evaluate the dilution; therefore, there is a discharge concentration excess for selenium and temperature. Selenium has been modeled as a conservative pollutant with a background concentration of 0.75 µg/L (ORSANCO 2014). It is important to note that if the dominant form of selenium in the discharge is selenite, which has a greater affinity to bind to the solid phase, it would mix non-

[3] It is important to note that the correction factor is site specific based on the physical location.

conservatively and the selenium concentration in the receiving water would decrease more rapidly when mixing into the Ohio River. This background concentration represents the median value of the range of measurements collected by ORSANCO from 2010-2014. The median background values for total and dissolved selenium were virtually equal in the study. Since it cannot be confirmed that the selenium measurements in the study were collected during $Q_{7,10}$ flows, the median concentrations have been used instead of the maximum concentrations.

3.2.3 Selenium

Based on Ghent's quarterly DMR data and other additional sampling events between January 2013 through October 2017 (27 measurements), the selenium concentration in the discharge has been decreasing over the past few years (KU 2016b, KU 2018). For the model, a total selenium concentration of 72 µg/L has been used to evaluate the dilution, which is the highest observed discharge selenium concentration over the period of April 8, 2015 through October 3, 2017. This yields a discharge concentration excess of 71.25 µg/L.

3.2.4 Temperature

As stated in **Section 3.1.1**, the temperature of the river and the discharge are important factors in determining the buoyancy of the discharge plume and mixing. Since the Ghent does not monitor the temperature at Outfall 001, the effluent temperature has been assumed to be equal to the theoretical maximum discharge temperature of 110°F. Based on the design condition (summer or winter), the discharge excess temperatures were 28.36°F (summer) and 70.8°F (winter).

3.3 Outfall Design

Conceptual diffuser designs have been evaluated for the discharge at Outfall 001 to improve mixing and achieve the 10:1 dilution at the edge of the ZID. The conceptual diffuser has been modeled as completely submerged, even at low flow $Q_{7,10}$ river conditions. Multiple configurations have been evaluated to estimate the dilution at the edge of the ZID. The diffuser pipe header has been modeled as 48 inches in diameter. In all cases, the diffuser ports have been located 2 ft above the bottom of the river.

Barge traffic is common in the vicinity of Outfall 001 and is a design concern in terms of installation and operation of the diffuser. The diffuser should be located so that it does not interfere with barge traffic in the main river channel or the barges situated along the shoreline and operated by the neighboring Nucor Steel Gallatin facility. Additionally, according to the bathymetry data discussed in **Section 3.1.3**, the river is at one of its deeper points at approximately 400 ft from the shoreline. Therefore, the initial section of the 48-inch diffuser header pipe is assumed to extend approximately 400 ft from the shoreline and enters the river perpendicularly (90° angle). The diffuser's first port for each modeled diffuser option was located approximately 400 ft from the shore. The diffuser is also assumed to be located approximately 400 ft downstream of the existing location of Outfall 001, which provides separation between the diffuser and barges.

Based on the proposed outfall configuration (the effluent enters a larger waterbody laterally, through a submerged multiport diffuser discharge structure), CORMIX2 has been used for the diffuser evaluation.

3.4 Mixing Zone

For the mixing zone analysis, the WQC input in the model for selenium and other conservative constituents (metals and other pollutants which are not reactive) in the discharge has been based on a 10:1 dilution and the temperature criteria provided in **Section 1.3**. Assuming a discharge excess concentration of 71.25 µg/L (discharge concentration of 72 µg/L) for selenium (as per **Section 3.2.3**), the target excess concentration at the edge of the ZID is therefore 7.125 µg/L (7.2 µg/L instream concentration). For temperature, the winter (January) and summer (July) temperature limits of 45°F and 84°F, respectively, have been evaluated in the model along with the maximum ΔT of 5°F.

Based on the cross-section in **Figure 3-1** of **Section 3.1.3** and the river pool elevation of the 419.4 ft, the river width is assumed to be approximately 1,734 ft. This is greater than the schematized width of the 1,000 ft because it includes the shallower section (~5.5 ft deep) on the far bank of the river. As stated in **Section 1.3.2**, the mixing zone width and length cannot be larger than one-third of the width of the river (1,734 ft); this limits the mixing zone width and length to 578 ft. For this study, the mixing zone dimensions have been used to assess temperature compliance and establish dimensions for the ZID as described below.

The dimensions of the ZID establish the boundary where the 10:1 dilution must is aimed to be achieved, and are calculated as the most restrictive of the three criteria described in **Section 1.3.2** as follows:

- 10% of the distance from the edge of the outfall structure to the edge of the mixing zone in a spatial direction: 10% of 578 ft = 57.8 ft;
- Distance of fifty times the square root of the cross-sectional area of a discharge port, in a spatial direction: $50 \times \sqrt{(\pi \times [1\text{ ft}]^2)} = 88.6$ ft [3 and 4-port configuration, 24-inch diameter ports]; $50 \times \sqrt{(\pi \times [0.75\text{ ft}]^2)} = 66.5$ ft [5-port configuration, 18-inch diameter ports]; and
- In a horizontal direction within a distance of five times the natural water depth that prevails under mixing zone design conditions, and exists before the installation of discharge outlet: 5 x 20 ft = 100 ft.

Of the three criteria for the ZID, the 57.8 ft dimension has been identified as the most stringent dimension. CORMIX calculates the dimension of the ZID for every model run and diffuser configuration and specifies whether all three criteria are met.

4 CORMIX MODELING SCENARIOS AND RESULTS

4.1 Modeling Scenarios and Results

The CORMIX analysis has been completed in a step-wise manner to evaluate the conceptual diffuser design. First, model runs were completed to evaluate the number of ports (3, 4, and 5) and the spacing between ports (10 ft, 20 ft, and 30 ft on-center). The port diameters for these model runs ranged from 18 to 24 inches to maintain port exit velocities of 7 to 9 feet per second (ft/s). Overall diffuser lengths for these runs ranged from 20 ft to 120 ft. Five of the nine initial model runs achieved the targeted 10:1 dilution. For the five successful model runs, the diffuser configuration was selected by taking into consideration the overall dilution, overall diffuser length and reach in the waterbody, and other factors such as improved flexibility and maintenance with more discharge ports.

Following the selection of the number of ports (5) for the diffuser and the spacing (20 ft on-center) between ports, the diffuser characteristics were optimized with additional CORMIX runs. The vertical angles of the ports were varied from 0° to 90° in 22.5° increments. The horizontal angle of the ports (orientation of the ports in relation to the direction of the current) were also varied between facing directly downstream and on a 45° angle (relative to the direction of the current) toward both the north bank and south bank of the river. Additionally, the "fanning-out" of the ports was evaluated compared to the ports all facing in the same direction. Ultimately, a vertical angle of 0°, horizontal angle of 45° toward the north bank of the river, and ports all facing in the same direction (not fanned out) were selected.

The design parameters of the selected diffuser configuration are presented in **Table 4-1**.

Table 4-1: Design Parameters of the Selected Diffuser Configuration

Parameter	Value
Dilution at Edge of ZID	17.5
Number of Ports	5

Parameter	Value
Port Diameter	18 inches
Port Spacing (on-center)	20 ft
Diffuser Header Pipe Diameter	4 ft
Diffuser Length (centerline of first port to centerline of last port)	80 ft
Diffuser Alignment Angle (γ)[4]	90° (perpendicular to the river)
Port Vertical Angle (θ)[5]	0° (no vertical angle)
Port Horizontal Angle (σ)[6]	315° (toward north bank)
Port Relative Orientation Angle (β)[7]	45°
Port Exit Velocity at Maximum Discharge Flow	9.1 ft/s
Direction of Port Spacing	All in the Same Direction

For the selected diffuser configuration, the detailed CORMIX input values have been provided in **Appendix B** as the CORMIX Checklist for Data Preparation. The CORMIX output files (Session Report and Prediction File), plan view figure of the CORMIX modeled plume, and graphs for dilution as a function of downstream distance are included as **Appendix C**.

To further assess the selected diffuser configuration, mixing performance was evaluated under other operating conditions including a blocked or clogged port; under average (26.5 MGD) and minimum discharge flows (5.3 MGD); and for temperature compliance in the summer and winter. The results of these model runs are described below.

The results of the mixing zone assessments during alternate operating conditions confirm that the selected diffuser configuration will meet the mixing requirements of a 10:1 dilution at the ZID under the clogged port scenario and at lower flows. The dilutions at the ZID for the average (26.5 MGD) and minimum (5.3 MGD) flows were 26.2:1 and 111.5:1, respectively. The discharge velocities through the ports for the average and minimum flows were 4.6 ft/s and 0.9 ft/s, respectively. The river velocity for the schematized river cross-section and the $Q_{7,10}$ flow of 11,000 cfs was 0.55 ft/s. Therefore, the discharge velocity from the diffuser will be greater than the river velocity even at minimum discharge conditions under the conditions modeled. It is important to note that, according to available flow data, low effluent discharge flows at or below 5.3 MGD only occur approximately 1% of the time.

For the CORMIX runs involving temperature, the temperature limits were checked at the **edge of the regulatory mixing zone (578 ft), not the ZID**. As stated in **Section 1.3.1**, the maximum in-stream temperature for January (45ºF) and a target ΔT less than 5°F were used for the winter conditions, while the maximum in-stream temperature for July (84ºF) and a target ΔT less than 5°F were used for the summer conditions[8]. The CORMIX output files (Session Report and Prediction File), plan view figure of

[4] γ = the horizontal angle between river flow direction and the direction of the diffuser header pipe, measured counterclockwise starting from the river flow direction (from 0° to 180°)
[5] θ = the vertical angle between the discharge centerline of the ports and the horizontal plane (from -90° to 90°)
[6] σ = the horizontal angle between river flow direction and the direction of the diffuser ports in the horizontal plane, measured counterclockwise starting from the river flow direction (from 0° to 360°)
[7] β = the smallest angle between the direction of the diffuser header pipe and the direction of the diffuser ports in the horizontal plane (from 0° to 90°)
[8] Note that only two scenarios (winter and summer conditions) were modeled for temperature, since these were expected to be the most extreme or 'worst-case' conditions.

the CORMIX modeled plume, and graphs for temperature and ΔT as a function of downstream distance are included as **Appendix D.**

The temperature requirements were met for both the summer and winter conditions at the edge of the regulatory mixing zone. As mentioned in **Section 1.3.1**, the theoretical maximum discharge temperature of 110°F was used in the model. At this 'bounding' discharge temperature, the CORMIX model indicates that the centerline temperature of the thermal plume would decrease to below the temperature guideline of no more than a 5°F increase in ambient temperature within 2.6 ft for the summer conditions and 20.5 ft for the winter conditions, which is within the allowable mixing zone. Additionally, the model predicts that the centerline temperature of the thermal plume decreases below the maximum in-stream temperature limits for the summer (July) and winter (January) at 14.3 ft and 14.8 ft downstream, respectively. Because the model is predicting the temperature guideline to be met within the regulatory mixing zone under bounding, worst-case conditions, it is anticipated that the water quality standards would be met within the regulatory mixing zone for all discharges from the facility, given similar flows.

The selected diffuser design achieves a 17.5:1 dilution at the edge of the ZID, which exceeds the targeted 10:1 dilution; maintains velocities within the header pipe at 3.3 ft/s to 6.4 ft/s at average and maximum (99^{th} percentile) flow conditions, respectively, to minimize solids deposition during 'typical' operation; and balances construction costs and river impact versus minor improvements in mixing (i.e., the overall length of the diffuser was selected to reduce overall construction costs and environmental impact from disruption of the river bottom for a longer diffuser that would extend into the deepest section of the river.) Diffuser port orientation was selected to optimize mixing while minimizing overall construction costs and long-term operating considerations.

4.2 Model Limitations

While interpreting and using the results of the CORMIX model, the model's limitations must be considered. The following limitations exist within the model.

- As with other models, CORMIX requires that the stream flow characteristics and the channel be simplified and schematized.
- CORMIX assumes that the channel characteristic at the point of discharge remain the same for an indeterminate length of time and distance. Therefore, model predictions are less reliable farther away from the point of discharge. Model outputs are more likely to be reliable for the length of river that has continuous channel/flow characteristics, such as at the point of discharge.
- The model predicts the concentration/temperature along the centerline of the plume, with the centerline defined as the trajectory of the highest concentration/temperature. The concentration/temperature within the plume decreases laterally as well, and the model assumes that the lateral decay is either a Gaussian (normal) or "top-hat" distribution.
- For temperature modeling, the model does not incorporate the impact of solar radiation. Solar-induced heating at the water surface, especially on sunny afternoons, could contribute to certain degree of heating of the river water; therefore, it is challenging to isolate the potential impact of the discharge versus the potential impact of solar radiation after a reasonable travel distance downstream.

5 CONCEPTUAL DIFFUSER DESIGN

The 5-port diffuser was selected for conceptual design purposes due to its ability to meet the 10:1 dilution at the ZID and the other mixing zone considerations. Consistent with modeling inputs and corresponding empirical results, the conceptual 5-port diffuser design includes the following:

- 48-inch diameter diffuser header pipe oriented perpendicular to the shoreline;
- 18-inch diameter ports with no vertical angle and directed 45° (relative to the direction of the current) toward the north bank of the Ohio River, with the centerline of the ports located 2 feet (minimum) above the existing or proposed river bottom;
- Welded steel as the primary material of construction;
- New land-side piping to connect to a tie-in point to the diffuser;
- Suitable backfill materials (sand) to bed and cover the diffuser header pipe a minimum of 2 feet below the existing or proposed river bottom;
- Riprap placed above the suitable backfill materials to counteract potential lateral and vertical movement of the buried diffuser header pipe; and
- Upstream protection of each diffuser ports using steel piles driven into the river bottom.

Plan and profile views of the conceptual 5-port diffuser layout, along with a typical diffuser port section, are presented in **Appendix A.** Other potential design and construction elements associated with the diffuser system may include pipe anchors/collars, thrust blocks, and driven steel piles which act as upstream impact/deflector barriers to help protect the diffuser system from varying pipe and river hydraulics, static and dynamic stresses along river embankments, and instream marine traffic and debris. Further geotechnical, structural, and hydraulic assessments will be completed to identify the appropriate type, number, size, and location of these supporting structures.

Installation of the diffuser system may include one of the following means and methods:

- Implementation of a temporary heavy-duty combination wall (braced steel sheet and H-pilings) or cellular cofferdam system to isolate the proposed excavation areas within the river to the shoreline, allow for a “dry” working environment, and provide river access to conventional earthwork and mechanical equipment; or
- Implementation of sectional barges with cranes and/or excavators and dump scows to mechanically dredge an underwater trench and install piping, anchors/collars, backfill, and other system components with the guidance of a dive crew.

The feasibility, selection, and specification of a construction approach would include an evaluation of costs, river hydraulics, flood protection requirements, dewatering and discharge rates and criteria, facility operations and surrounding navigational needs, varying loading scenarios by construction/marine equipment and head pressures, stability analyses, health and safety considerations, monitoring procedures, and site-specific reviews by specialty (marine) contractors.

6 SUMMARY

This report describes the CORMIX modeling completed for the discharge at Outfall 001 and the diffuser configuration selected for Ghent. The modeling was completed and diffuser configuration selected assuming the maximum discharge of 51.8 MGD. Based on the modeling completed, the selected diffuser configuration (5 ports with 20 ft spacing of ports on-center) provided a dilution of 17.5:1, which is greater than the targeted 10:1 excess concentration dilution at the edge of the ZID under all conditions that were

modeled. The diffuser ports would be installed starting approximately 400 ft from the edge of the bank and would be installed in the deepest portion of the river.

It is also important to note that CORMIX models the dilution of the discharge concentration *excess* (i.e., concentration above the background. Depending on the actual background and discharge concentrations, the actual dilution of the discharge concentration relative to the actual mixed in-stream concentration may vary.

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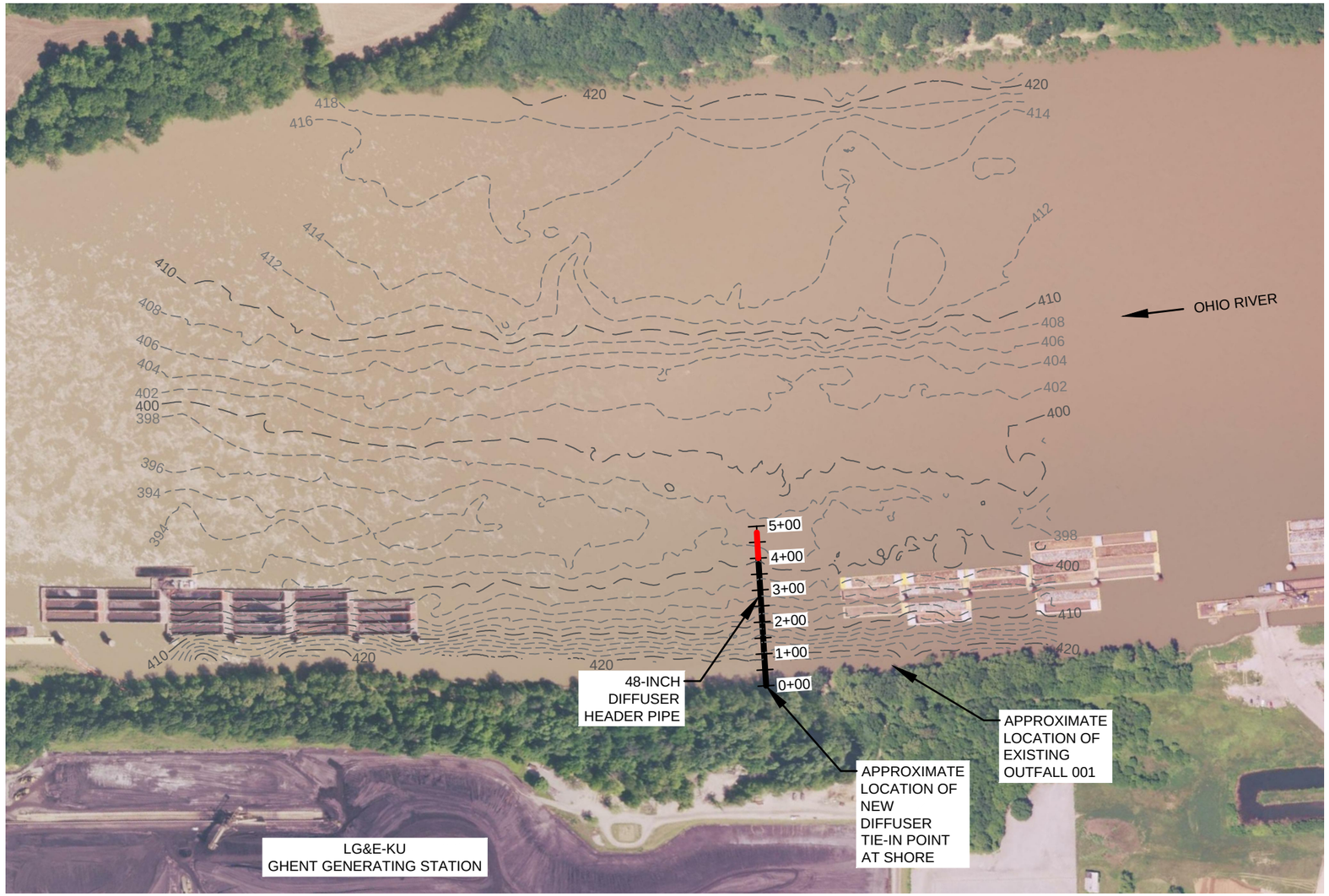
APPENDIX A

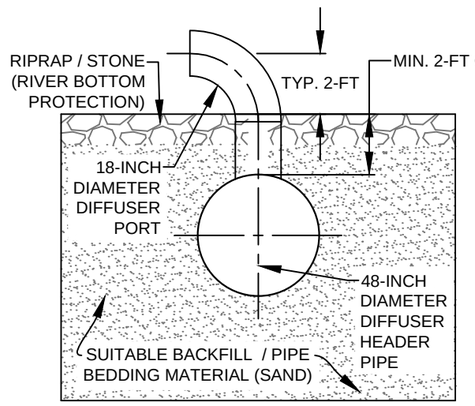
Conceptual Diffuser System Layout



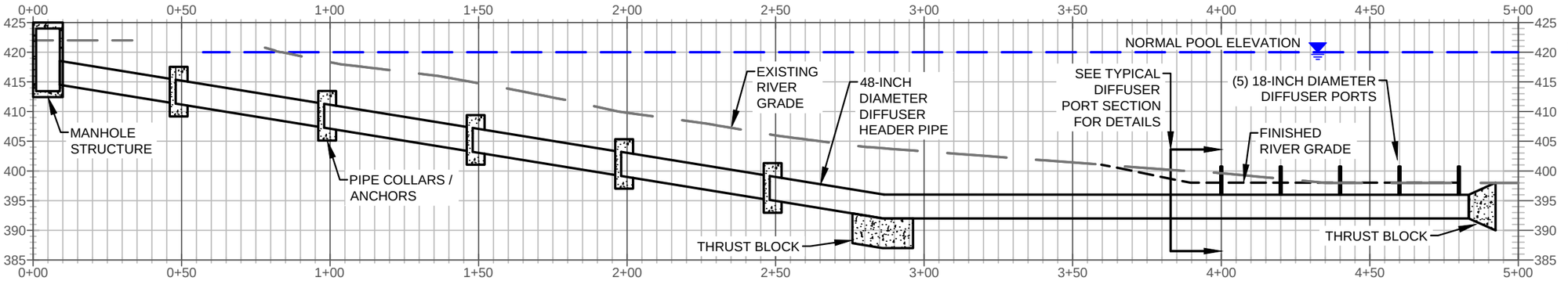
PLAN VIEW
SCALE: 1" = 400'

NOTES:

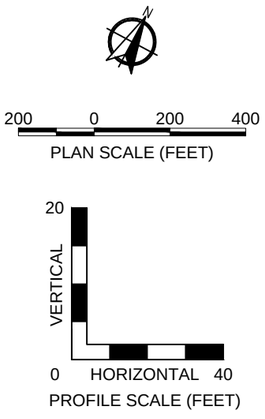
1. THIS FIGURE ILLUSTRATES A CONCEPTUAL DIFFUSER DESIGN LAYOUT. IT IS NOT INTENDED FOR PERMITTING, BIDDING, OR CONSTRUCTION PURPOSES.
2. HORIZONTAL DATUM REFERENCES THE NORTH AMERICAN DATUM OF 1983 (NAD 83), KENTUCKY SINGLE ZONE STATE PLANE COORDINATE SYSTEM (SPCS).
3. VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. AERIAL IMAGERY INCLUDES PORTIONS OF THE KENTUCKY STATEWIDE 2 FOOT AERIAL IMAGERY (2016) FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP).
5. BATHYMETRY DATA COLLECTED BY AECOM IN JANUARY 2017.
6. NORMAL POOL ELEVATION - 420 FEET (REFERENCE: CHART NO. 101 OF THE U.S. ARMY CORPS OF ENGINEERS (USACE), LOUISVILLE DISTRICT, OHIO RIVER NAVIGATION CHARTS, DATED JUNE 2010).
7. THE TYPE, NUMBER, SIZE, AND LOCATION OF PIPE ANCHORS / COLLARS AND THRUST BLOCKS WILL NEED TO BE DETERMINED AND WILL REQUIRE FURTHER STRUCTURAL AND HYDRAULIC ASSESSMENTS.



TYPICAL DIFFUSER PORT SECTION
SCALE: NOT TO SCALE



PROFILE VIEW
SCALE: 1" = 40' (HORIZONTAL) / 1" = 20' (VERTICAL)



AECOM

Appendix A

CONCEPTUAL DIFFUSER DESIGN LAYOUT
5-PORT DIFFUSER
18-INCH DIAMETER DISCHARGE PORTS

LG&E-KU GHENT GENERATING STATION
OUTFALL 001 CONCEPTUAL DIFFUSER DESIGN
GHENT, CARROLL COUNTY, KENTUCKY
Project No.: 60491802 Date: 2018-11-30

APPENDIX B

CORMIX Checklist for Data Preparation

CORMIX Checklist for Data Preparation – Version 8.0

PROJECT LEGEND

Project File Name: Ghent 5-port 20-ft spacing option.cmx
Design Case: 5-ports, 20-ft spacing on center
Site Name: Mill Creek Generating Station
Prepared By: BRK
Date: 11/30/2018

AMBIENT DATA

Ambient Geometry/Flow Field Data

Average Depth: 20 ft
Depth at Discharge: 20 ft

☐ **Unbounded** ☒ **Bounded**: Width: 1000 ft
Appearance: ☒ Uniform ☐ Slight Meander ☐ Highly Irregular

☒ **Steady**
☒ Ambient Flowrate: 11000 cfs **OR**
☐ Ambient Velocity: _____ m/s

☐ **Unsteady**
Period: _____ hr
Tidal Velocity at this Time: _____ m/s
☐ At Slack – Δ Time: _____ hr
Max. Velocity: _____ m/s
☐ At Time: _____ hr Before Slack
☐ At Time: _____ hr After Slack

☒ Manning's n: 0.02 **OR** ☐ Darcy-Weisbach f: _____ m/s
Wind Speed: 8.95 mph

Ambient Density Data

Water Body: ☒ **Fresh Water** ☐ **Non-Fresh Water**

☒ **Uniform**
Fresh: ☒ Temperature: 81.64 °F ☐ Average Density _____ kg/m^3
Non-Fresh: Average Density: _____ kg/m^3

☐ **Stratified**
☐ Type A ☐ Type B: Pycnocline Height: _____ m ☐ Type C: Pycnocline Height: _____m; Jump: _____ kg/m^3/°C
Density: At Surface: _____ kg/m^3/°C At Bottom: _____ kg/m^3/°C

EFFLUENT DATA

☒ Effluent Flow Rate: 51.8 mgd **OR** ☐ Effluent Velocity: _____m/s
Concentration: 71.25 Units: ppb

☒ **Fresh Water Effluent Density**
☒ Temperature 110 °F **OR** ☐ Average Density _____ kg/m^3

☐ **Non-Fresh Water Effluent Density**
Average Density _____ kg/m^3

Pollutant Types

☒ Conservative ☐ Non-Conservative Decay Coefficient: _____ /day ☐ Heated Heat Loss Coefficient: _____ W/m^2/°C

DISCHARGE GEOMETRY DATA

CORMIX 1 – Submerged Single Port

Nearest Bank: ☐ Left ☐ Right
Distance to Nearest Bank: _____ m
Vertical Angle θ: _____ °
Horizontal Angle σ: _____ °

Port Specification
☐ Port Diameter: _____ m
☐ Port Area: _____ m^2
Port Height: _____ m

CORMIX 2 – Submerged Multiport

Nearest Bank: ☒ Left ☐ Right
Diffuser Length: 80 ft
Distance to one end-point: 400 ft
Distance to other end-point: 480 ft
Port Height: 2 ft
Port Diameter: 1.5 ft
Contraction Ratio: 1
Alignment Angle γ: 90 °
Total Number of Openings: 5

Diffuser Arrangement/Type
☒ Unidirectional ☐ Staged
☐ Alternating/Vertical

Angles (degrees)
Vertical Angle θ: 0 °
Horizontal Angle σ: 315 °
Relative Orientation Angle β: 45 °
Nozzle Direction: ☒ Same ☐ Fanned

CORMIX 3 – Buoyant Surface Discharge

Discharge Located ☐ Left ☐ Right
Local Depth at Discharge Outlet: _____ m
☐ **Flush**
Horizontal angle σ: _____ °
Bottom slope: _____ °
☐ **Protruding**
Distance from Bank: _____ m
Horizontal angle σ: _____ °
Bottom slope: _____ °
☐ **Co-flowing**

Discharge Outlet
☐ **Channel**
Width: _____ m | Depth: _____ m
☐ **Pipe**
Diameter: _____ m
Bottom Invert Depth: _____ m

MIXING ZONE DATA

☐ **Non-Toxic Effluent**
☐ WQ Standard: _____ mg/l ☐ No WQ Standard

☒ **Toxic Effluent**
CMC: 7.125 ppb CCC: 5 ppb

☒ **Mixing Zone Specified**
☒ Distance: 578 ft ☐ Width: _____ m

☐ **No Mixing Zone Specified**
☐ Area: _____ %

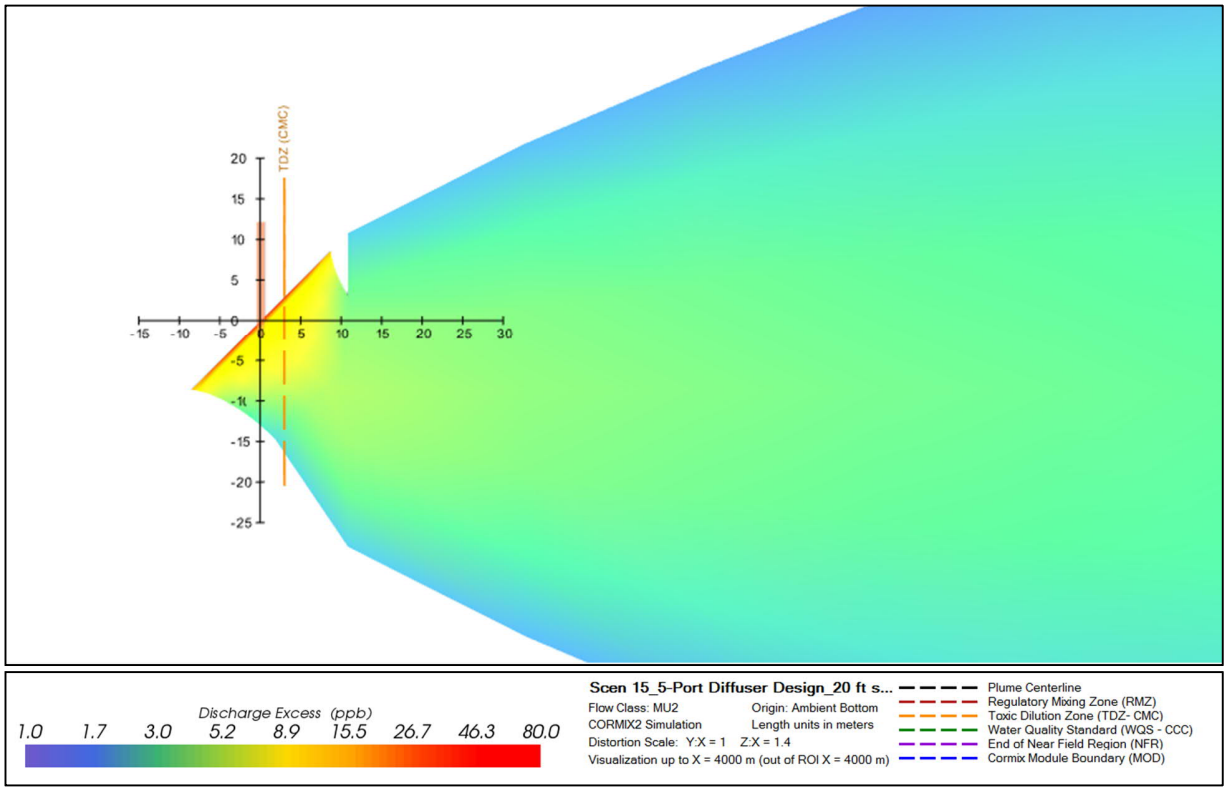
Region of Interest: 4000 m Grid Intervals for Display: 200

APPENDIX C

CORMIX Output Files and Results for Selected Diffuser Configuration

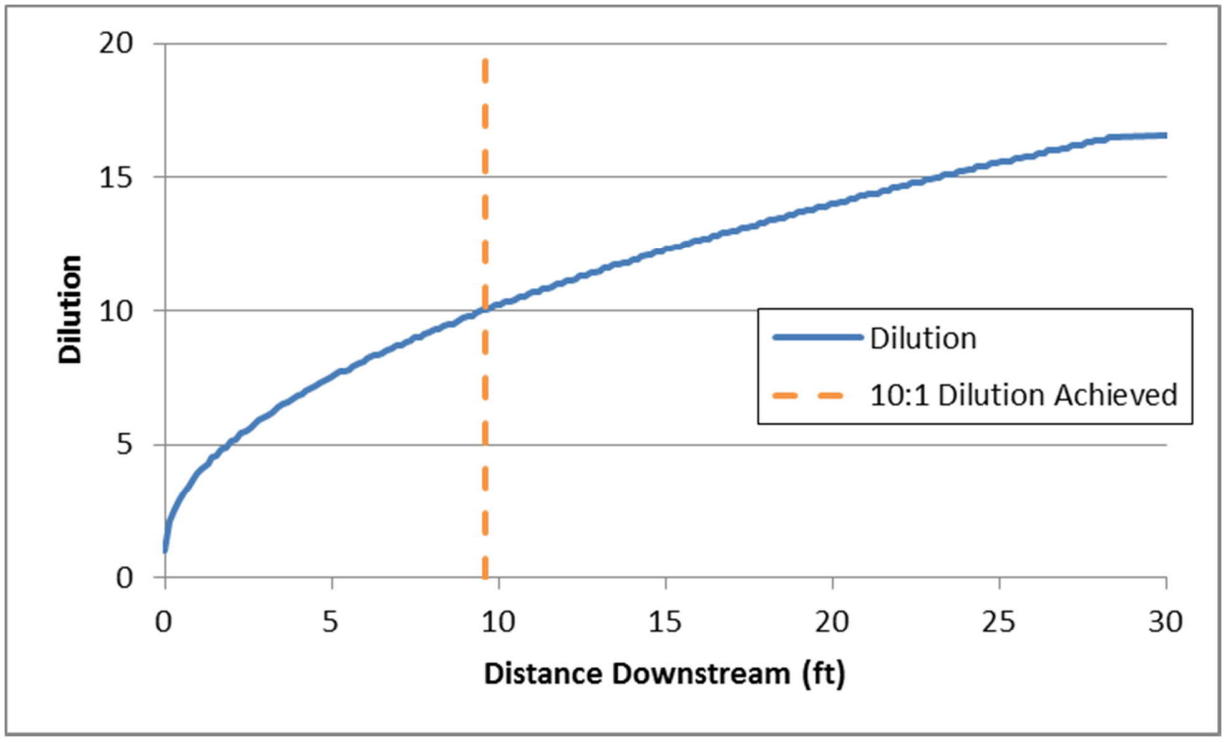
Appendix C – CORMIX Output Files and Results for Selected Diffuser Configuration
Ghent Generating Station

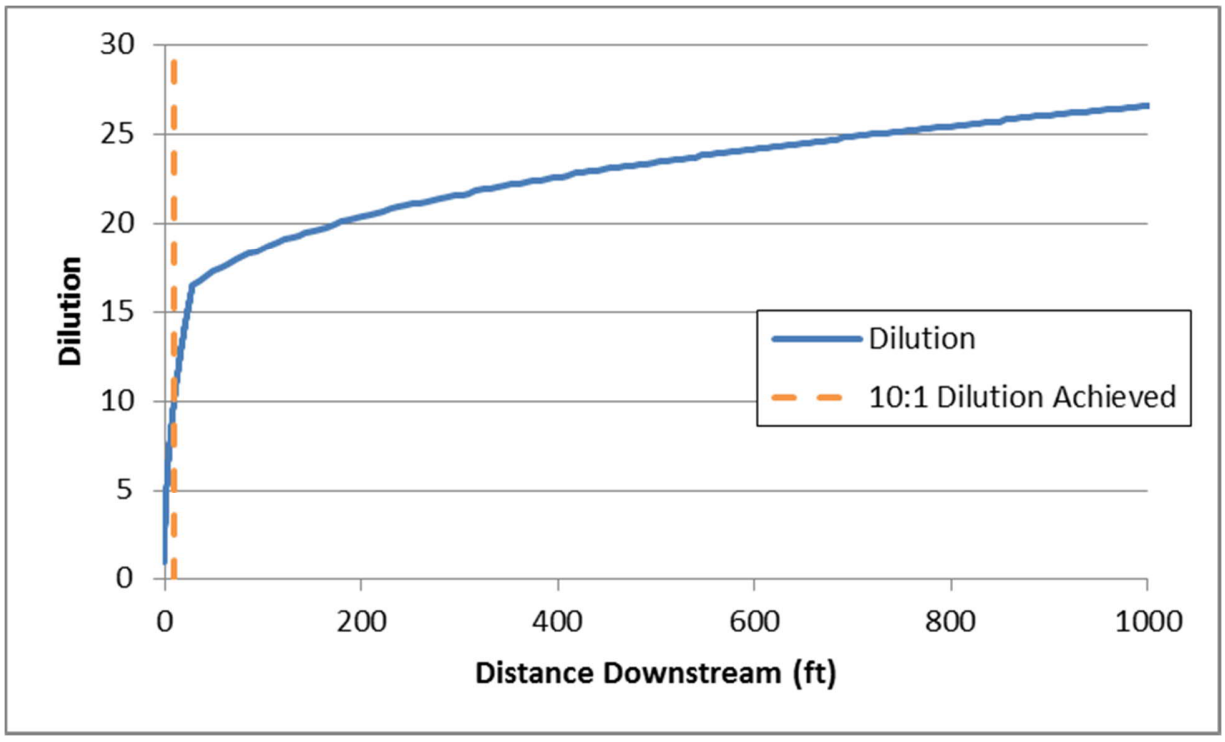
The zone of initial dilution (ZID), shown as the "TDZ," is met 9.6 ft (2.9 m) downstream of the diffuser for Scenario 15. The plan view figure below shows the shape of the plume and the concentrations within the plume. Since the diffuser ports are pointed to the north bank of the river ("downward" direction in the figure), CORMIX begins the plume on this angle with the center of the plume located at the center of the diffuser.



The graphs on the next page show the dilution as a function of distance downstream from the diffuser. The data from CORMIX was exported, converted to English units, and re-graphed. It is important to note that the graphs on the next page showing the dilution as a function of the distance downstream from the diffuser use a dilution based on the "excess" concentration of a constituent above the river background concentration. This dilution was calculated by dividing the initial "excess" (discharge) concentration by the final in-stream "excess" concentration. The background concentration may cause the dilution to be slightly skewed.

Appendix D – CORMIX Outputs for Scenario 15
Ghent Generating Station – Conceptual Diffuser Design





```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
               Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 10.0GT
                     HYDRO2 Version 10.0.1.0 October 2016
-------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:   LG&E KU Ghent
 Design case:       Scenario 15
 FILE NAME:         \\c...m_0 deg vert angle_45 deg horiz to right bank.prd
 Time stamp:        06/14/2018--23:23:57

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    304.80  AS    =   1858.06  QA    =    311.49  ICHREG= 1
 HA    =      6.10  HD    =      6.10
 UA    =     0.168 F     =     0.017 USTAR =0.7771E-02
 UW    =     4.001 UWSTAR=0.4610E-02
 Uniform density environment
 STRCND=  U         RHOAM =  996.3531

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =    134.11  YB1   =    121.92  YB2   =    146.30
 LD    =     24.38  NOPEN =    5       SPAC  =      6.10
 D0    =     0.457 A0    =      0.164 H0    =      0.61  SUB0  =      5.49
 D0INP =     0.457 CR0   =      1.000
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =      0.00  SIGMA =    315.00  BETA  =     45.00
 U0    =     2.765 Q0    =      2.269 Q0A   =0.2269E+01
 RHO0  =  990.8954  DRHO0 =0.5458E+01  GP0   =0.5372E-01
 C0    =0.7125E+02  CUNITS=  ppb
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.9307E-01  m0    =0.2059E+00  j0    =0.4000E-02  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =      0.034 lM    =      8.15  lm    =      9.16
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.2269E+01  M0    =0.5020E+01  J0    =0.9753E-01
 Associated 3-d length scales (meters)
 LQ    =      0.41  LM    =     10.74  Lm    =     14.94  Lb    =     25.88
                                       Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     72.69  FRD0  =     17.64  R     =     16.49  PL    =   11.44
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:
 Properties of riser group with  1 ports/nozzles each:
 U0    =      2.765 D0    =      0.457 A0    =      0.164 THETA =      0.00
 FR0   =     72.69  FRD0  =     17.64  R     =     16.49
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU2    2
 2  Applicable layer depth HS =     6.10  2
 2  Limiting Dilution S =QA/Q0=   138.25  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.7125E+02  CUNITS=  ppb
 NTOX  =  1         CMC   =0.7125E+01  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.5000E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    176.17  WREG  =      0.00  AREG  =      0.00
 XINT  =   4000.00  XMAX  =   4000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       134.11 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 200 display intervals per module
-------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   Uc = Local centerline excess velocity (above ambient)
```

```
   TT = Cumulative travel time

        X        Y        Z        S        C        BV       BH       Uc        TT
      0.00     0.00     0.61     1.0 0.712E+02   0.02    12.19     2.646   .00000E+00

END OF MOD201: DIFFUSER DISCHARGE MODULE
-----------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    6.10m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

        X        Y        Z        S        C        BV       BH        TT
      0.00    -0.00     0.61     1.0 0.712E+02   0.02    12.19 .00000E+00
      0.04    -0.04     0.61     2.1 0.340E+02   0.03    12.15 .40974E-01
      0.09    -0.09     0.62     2.5 0.280E+02   0.06    12.10 .97310E-01
      0.13    -0.13     0.62     2.9 0.246E+02   0.09    12.06 .16292E+00
      0.17    -0.17     0.63     3.2 0.223E+02   0.12    12.01 .23566E+00
      0.22    -0.22     0.63     3.4 0.207E+02   0.15    11.97 .31431E+00
      0.26    -0.26     0.64     3.7 0.194E+02   0.18    11.93 .39806E+00
      0.30    -0.30     0.64     3.9 0.183E+02   0.21    11.89 .48633E+00
      0.34    -0.34     0.65     4.1 0.174E+02   0.24    11.85 .57866E+00
      0.39    -0.39     0.65     4.3 0.166E+02   0.27    11.81 .67468E+00
      0.43    -0.43     0.66     4.5 0.160E+02   0.30    11.77 .77411E+00
      0.47    -0.47     0.66     4.6 0.154E+02   0.34    11.73 .87670E+00
      0.52    -0.52     0.67     4.8 0.149E+02   0.37    11.69 .98224E+00
      0.56    -0.56     0.67     4.9 0.144E+02   0.40    11.65 .10905E+01
      0.60    -0.60     0.68     5.1 0.140E+02   0.43    11.61 .12014E+01
      0.65    -0.65     0.68     5.2 0.136E+02   0.46    11.58 .13148E+01
      0.69    -0.69     0.69     5.4 0.133E+02   0.49    11.54 .14305E+01
      0.73    -0.73     0.69     5.5 0.129E+02   0.52    11.51 .15485E+01
      0.78    -0.78     0.70     5.6 0.126E+02   0.55    11.47 .16686E+01
      0.82    -0.82     0.70     5.8 0.123E+02   0.58    11.44 .17907E+01
      0.86    -0.86     0.71     5.9 0.121E+02   0.61    11.40 .19148E+01
      0.91    -0.91     0.71     6.0 0.118E+02   0.64    11.37 .20407E+01
      0.95    -0.95     0.72     6.1 0.116E+02   0.67    11.33 .21685E+01
      0.99    -0.99     0.72     6.2 0.114E+02   0.70    11.30 .22979E+01
      1.03    -1.03     0.73     6.4 0.112E+02   0.73    11.27 .24291E+01
      1.08    -1.08     0.73     6.5 0.110E+02   0.76    11.24 .25619E+01
      1.12    -1.12     0.74     6.6 0.108E+02   0.79    11.21 .26963E+01
      1.16    -1.16     0.74     6.7 0.107E+02   0.82    11.17 .28322E+01
      1.21    -1.21     0.75     6.8 0.105E+02   0.85    11.14 .29695E+01
      1.25    -1.25     0.75     6.9 0.103E+02   0.88    11.11 .31083E+01
      1.29    -1.29     0.76     7.0 0.102E+02   0.91    11.08 .32485E+01
      1.34    -1.34     0.76     7.1 0.100E+02   0.94    11.05 .33900E+01
      1.38    -1.38     0.77     7.2 0.991E+01   0.98    11.03 .35329E+01
      1.42    -1.42     0.77     7.3 0.978E+01   1.01    11.00 .36770E+01
      1.47    -1.47     0.78     7.4 0.965E+01   1.04    10.97 .38224E+01
      1.51    -1.51     0.78     7.5 0.953E+01   1.07    10.94 .39690E+01
      1.55    -1.55     0.79     7.6 0.942E+01   1.10    10.91 .41168E+01
      1.59    -1.59     0.79     7.7 0.931E+01   1.13    10.89 .42657E+01
      1.64    -1.64     0.79     7.7 0.920E+01   1.16    10.86 .44158E+01
      1.68    -1.68     0.80     7.8 0.910E+01   1.19    10.83 .45670E+01
      1.72    -1.72     0.80     7.9 0.900E+01   1.22    10.81 .47193E+01
      1.77    -1.77     0.81     8.0 0.890E+01   1.25    10.78 .48726E+01
      1.81    -1.81     0.81     8.1 0.881E+01   1.28    10.76 .50270E+01
      1.85    -1.85     0.82     8.2 0.871E+01   1.31    10.73 .51824E+01
      1.90    -1.90     0.82     8.3 0.863E+01   1.34    10.71 .53387E+01
      1.94    -1.94     0.83     8.3 0.854E+01   1.37    10.68 .54961E+01
      1.98    -1.98     0.83     8.4 0.846E+01   1.40    10.66 .56544E+01
      2.03    -2.03     0.84     8.5 0.838E+01   1.43    10.64 .58136E+01
      2.07    -2.07     0.84     8.6 0.830E+01   1.46    10.61 .59738E+01
      2.11    -2.11     0.85     8.7 0.823E+01   1.49    10.59 .61348E+01
      2.16    -2.16     0.85     8.7 0.815E+01   1.52    10.57 .62968E+01
      2.20    -2.20     0.86     8.8 0.808E+01   1.55    10.54 .64596E+01
      2.24    -2.24     0.86     8.9 0.801E+01   1.58    10.52 .66233E+01
      2.28    -2.28     0.87     9.0 0.795E+01   1.62    10.50 .67878E+01
      2.33    -2.33     0.87     9.0 0.788E+01   1.65    10.48 .69531E+01
      2.37    -2.37     0.88     9.1 0.782E+01   1.68    10.46 .71193E+01
      2.41    -2.41     0.88     9.2 0.775E+01   1.71    10.43 .72862E+01
      2.46    -2.46     0.89     9.3 0.769E+01   1.74    10.41 .74540E+01
      2.50    -2.50     0.89     9.3 0.763E+01   1.77    10.39 .76225E+01
      2.54    -2.54     0.90     9.4 0.758E+01   1.80    10.37 .77917E+01
      2.59    -2.59     0.90     9.5 0.752E+01   1.83    10.35 .79618E+01
      2.63    -2.63     0.91     9.5 0.746E+01   1.86    10.33 .81325E+01
      2.67    -2.67     0.91     9.6 0.741E+01   1.89    10.31 .83040E+01
      2.72    -2.72     0.92     9.7 0.736E+01   1.92    10.29 .84762E+01
      2.76    -2.76     0.92     9.8 0.730E+01   1.95    10.27 .86491E+01
      2.80    -2.80     0.93     9.8 0.725E+01   1.98    10.25 .88227E+01
      2.84    -2.84     0.93     9.9 0.720E+01   2.01    10.24 .89970E+01
```

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     2.89    -2.89    0.94    10.0 0.716E+01   2.04    10.22 .91719E+01
** CMC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below CMC value of 0.712E+01
   in the current prediction interval.
 This is the extent of the TOXIC DILUTION ZONE.
     2.93    -2.93    0.94    10.0 0.711E+01   2.07    10.20 .93475E+01
     2.97    -2.97    0.95    10.1 0.706E+01   2.10    10.18 .95238E+01
     3.02    -3.02    0.95    10.2 0.702E+01   2.13    10.16 .97007E+01
     3.06    -3.06    0.96    10.2 0.697E+01   2.16    10.14 .98783E+01
     3.10    -3.10    0.96    10.3 0.693E+01   2.19    10.13 .10056E+02
     3.15    -3.15    0.97    10.3 0.688E+01   2.23    10.11 .10235E+02
     3.19    -3.19    0.97    10.4 0.684E+01   2.26    10.09 .10415E+02
     3.23    -3.23    0.98    10.5 0.680E+01   2.29    10.08 .10595E+02
     3.28    -3.28    0.98    10.5 0.676E+01   2.32    10.06 .10775E+02
     3.32    -3.32    0.99    10.6 0.672E+01   2.35    10.04 .10957E+02
     3.36    -3.36    0.99    10.7 0.668E+01   2.38    10.03 .11138E+02
     3.41    -3.41    0.99    10.7 0.664E+01   2.41    10.01 .11321E+02
     3.45    -3.45    1.00    10.8 0.660E+01   2.44     9.99 .11504E+02
     3.49    -3.49    1.00    10.8 0.657E+01   2.47     9.98 .11687E+02
     3.53    -3.53    1.01    10.9 0.653E+01   2.50     9.96 .11871E+02
     3.58    -3.58    1.01    11.0 0.650E+01   2.53     9.95 .12056E+02
     3.62    -3.62    1.02    11.0 0.646E+01   2.56     9.93 .12241E+02
     3.66    -3.66    1.02    11.1 0.643E+01   2.59     9.92 .12427E+02
     3.71    -3.71    1.03    11.1 0.639E+01   2.62     9.90 .12613E+02
     3.75    -3.75    1.03    11.2 0.636E+01   2.65     9.89 .12800E+02
     3.79    -3.79    1.04    11.3 0.632E+01   2.68     9.87 .12987E+02
     3.84    -3.84    1.04    11.3 0.629E+01   2.71     9.86 .13175E+02
     3.88    -3.88    1.05    11.4 0.626E+01   2.74     9.84 .13363E+02
     3.92    -3.92    1.05    11.4 0.623E+01   2.77     9.83 .13552E+02
     3.97    -3.97    1.06    11.5 0.620E+01   2.80     9.81 .13741E+02
     4.01    -4.01    1.06    11.6 0.617E+01   2.83     9.80 .13931E+02
     4.05    -4.05    1.07    11.6 0.614E+01   2.87     9.79 .14121E+02
     4.09    -4.09    1.07    11.7 0.611E+01   2.90     9.77 .14312E+02
     4.14    -4.14    1.08    11.7 0.608E+01   2.93     9.76 .14503E+02
     4.18    -4.18    1.08    11.8 0.605E+01   2.96     9.75 .14695E+02
     4.22    -4.22    1.09    11.8 0.602E+01   2.99     9.73 .14887E+02
     4.27    -4.27    1.09    11.9 0.599E+01   3.02     9.72 .15080E+02
     4.31    -4.31    1.10    11.9 0.597E+01   3.05     9.71 .15273E+02
     4.35    -4.35    1.10    12.0 0.594E+01   3.08     9.69 .15466E+02
     4.40    -4.40    1.11    12.1 0.591E+01   3.11     9.68 .15660E+02
     4.44    -4.44    1.11    12.1 0.589E+01   3.14     9.67 .15855E+02
     4.48    -4.48    1.12    12.2 0.586E+01   3.17     9.66 .16050E+02
     4.53    -4.53    1.12    12.2 0.583E+01   3.20     9.65 .16245E+02
     4.57    -4.57    1.13    12.3 0.581E+01   3.23     9.63 .16441E+02
     4.61    -4.61    1.13    12.3 0.578E+01   3.26     9.62 .16637E+02
     4.66    -4.66    1.14    12.4 0.576E+01   3.29     9.61 .16833E+02
     4.70    -4.70    1.14    12.4 0.573E+01   3.32     9.60 .17030E+02
     4.74    -4.74    1.15    12.5 0.571E+01   3.35     9.59 .17228E+02
     4.78    -4.78    1.15    12.5 0.569E+01   3.38     9.58 .17426E+02
     4.83    -4.83    1.16    12.6 0.566E+01   3.41     9.57 .17624E+02
     4.87    -4.87    1.16    12.6 0.564E+01   3.44     9.55 .17823E+02
     4.91    -4.91    1.17    12.7 0.562E+01   3.47     9.54 .18022E+02
     4.96    -4.96    1.17    12.7 0.559E+01   3.51     9.53 .18221E+02
     5.00    -5.00    1.18    12.8 0.557E+01   3.54     9.52 .18421E+02
     5.04    -5.04    1.18    12.8 0.555E+01   3.57     9.51 .18621E+02
     5.09    -5.09    1.19    12.9 0.553E+01   3.60     9.50 .18822E+02
     5.13    -5.13    1.19    12.9 0.551E+01   3.63     9.49 .19023E+02
     5.17    -5.17    1.19    13.0 0.549E+01   3.66     9.48 .19224E+02
     5.22    -5.22    1.20    13.0 0.547E+01   3.69     9.47 .19426E+02
     5.26    -5.26    1.20    13.1 0.544E+01   3.72     9.47 .19628E+02
     5.30    -5.30    1.21    13.1 0.542E+01   3.75     9.46 .19830E+02
     5.35    -5.35    1.21    13.2 0.540E+01   3.78     9.45 .20033E+02
     5.39    -5.39    1.22    13.2 0.538E+01   3.81     9.44 .20237E+02
     5.43    -5.43    1.22    13.3 0.536E+01   3.84     9.43 .20440E+02
     5.47    -5.47    1.23    13.3 0.534E+01   3.87     9.42 .20644E+02
     5.52    -5.52    1.23    13.4 0.532E+01   3.90     9.41 .20848E+02
     5.56    -5.56    1.24    13.4 0.531E+01   3.93     9.40 .21053E+02
     5.60    -5.60    1.24    13.5 0.529E+01   3.96     9.40 .21258E+02
     5.65    -5.65    1.25    13.5 0.527E+01   3.99     9.39 .21463E+02
     5.69    -5.69    1.25    13.6 0.525E+01   4.02     9.38 .21669E+02
     5.73    -5.73    1.26    13.6 0.523E+01   4.05     9.37 .21875E+02
     5.78    -5.78    1.26    13.7 0.521E+01   4.08     9.37 .22081E+02
     5.82    -5.82    1.27    13.7 0.520E+01   4.11     9.36 .22288E+02
     5.86    -5.86    1.27    13.8 0.518E+01   4.15     9.35 .22495E+02
     5.91    -5.91    1.28    13.8 0.516E+01   4.18     9.34 .22703E+02
     5.95    -5.95    1.28    13.9 0.514E+01   4.21     9.34 .22910E+02
     5.99    -5.99    1.29    13.9 0.513E+01   4.24     9.33 .23118E+02
     6.03    -6.03    1.29    13.9 0.511E+01   4.27     9.32 .23327E+02
     6.08    -6.08    1.30    14.0 0.509E+01   4.30     9.32 .23535E+02
     6.12    -6.12    1.30    14.0 0.507E+01   4.33     9.31 .23744E+02
     6.16    -6.16    1.31    14.1 0.506E+01   4.36     9.31 .23954E+02
     6.21    -6.21    1.31    14.1 0.504E+01   4.39     9.30 .24163E+02
     6.25    -6.25    1.32    14.2 0.503E+01   4.42     9.29 .24373E+02
     6.29    -6.29    1.32    14.2 0.501E+01   4.45     9.29 .24584E+02
** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below water quality standard
   or CCC value of 0.500E+01 in the current prediction interval.
 This is the spatial extent of concentrations exceeding the water quality
   standard or CCC value.
     6.34    -6.34    1.33    14.3 0.499E+01   4.48     9.28 .24794E+02
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      6.38    -6.38    1.33    14.3 0.498E+01   4.51     9.28 .25005E+02
      6.42    -6.42    1.34    14.4 0.496E+01   4.54     9.27 .25216E+02
      6.47    -6.47    1.34    14.4 0.495E+01   4.57     9.27 .25428E+02
      6.51    -6.51    1.35    14.4 0.493E+01   4.60     9.26 .25639E+02
      6.55    -6.55    1.35    14.5 0.492E+01   4.63     9.26 .25851E+02
      6.60    -6.60    1.36    14.5 0.490E+01   4.66     9.25 .26064E+02
      6.64    -6.64    1.36    14.6 0.489E+01   4.69     9.25 .26276E+02
      6.68    -6.68    1.37    14.6 0.487E+01   4.72     9.24 .26489E+02
      6.72    -6.72    1.37    14.7 0.486E+01   4.75     9.24 .26703E+02
      6.77    -6.77    1.38    14.7 0.484E+01   4.79     9.24 .26916E+02
      6.81    -6.81    1.38    14.8 0.483E+01   4.82     9.23 .27130E+02
      6.85    -6.85    1.39    14.8 0.481E+01   4.85     9.23 .27344E+02
      6.90    -6.90    1.39    14.8 0.480E+01   4.88     9.22 .27558E+02
      6.94    -6.94    1.39    14.9 0.479E+01   4.91     9.22 .27773E+02
      6.98    -6.98    1.40    14.9 0.477E+01   4.94     9.22 .27988E+02
      7.03    -7.03    1.40    15.0 0.476E+01   4.97     9.21 .28203E+02
      7.07    -7.07    1.41    15.0 0.475E+01   5.00     9.21 .28419E+02
      7.11    -7.11    1.41    15.1 0.473E+01   5.03     9.21 .28634E+02
      7.16    -7.16    1.42    15.1 0.472E+01   5.06     9.20 .28851E+02
      7.20    -7.20    1.42    15.1 0.471E+01   5.09     9.20 .29067E+02
      7.24    -7.24    1.43    15.2 0.469E+01   5.12     9.20 .29283E+02
      7.28    -7.28    1.43    15.2 0.468E+01   5.15     9.19 .29500E+02
      7.33    -7.33    1.44    15.3 0.467E+01   5.18     9.19 .29717E+02
      7.37    -7.37    1.44    15.3 0.465E+01   5.21     9.19 .29935E+02
      7.41    -7.41    1.45    15.4 0.464E+01   5.24     9.19 .30152E+02
      7.46    -7.46    1.45    15.4 0.463E+01   5.27     9.18 .30370E+02
      7.50    -7.50    1.46    15.4 0.462E+01   5.30     9.18 .30588E+02
      7.54    -7.54    1.46    15.5 0.460E+01   5.33     9.18 .30807E+02
      7.59    -7.59    1.47    15.5 0.459E+01   5.36     9.18 .31025E+02
      7.63    -7.63    1.47    15.6 0.458E+01   5.39     9.18 .31244E+02
      7.67    -7.67    1.48    15.6 0.457E+01   5.43     9.17 .31463E+02
      7.72    -7.72    1.48    15.6 0.456E+01   5.46     9.17 .31683E+02
      7.76    -7.76    1.49    15.7 0.454E+01   5.49     9.17 .31902E+02
      7.80    -7.80    1.49    15.7 0.453E+01   5.52     9.17 .32122E+02
      7.85    -7.85    1.50    15.8 0.452E+01   5.55     9.17 .32342E+02
      7.89    -7.89    1.50    15.8 0.451E+01   5.58     9.17 .32563E+02
      7.93    -7.93    1.51    15.8 0.450E+01   5.61     9.16 .32783E+02
      7.97    -7.97    1.51    15.9 0.449E+01   5.64     9.16 .33004E+02
      8.02    -8.02    1.52    15.9 0.447E+01   5.67     9.16 .33225E+02
      8.06    -8.06    1.52    16.0 0.446E+01   5.70     9.16 .33447E+02
      8.10    -8.10    1.53    16.0 0.445E+01   5.73     9.16 .33668E+02
      8.15    -8.15    1.53    16.0 0.444E+01   5.76     9.16 .33890E+02
      8.19    -8.19    1.54    16.1 0.443E+01   5.79     9.16 .34112E+02
      8.23    -8.23    1.54    16.1 0.442E+01   5.82     9.16 .34334E+02
      8.28    -8.28    1.55    16.2 0.441E+01   5.85     9.16 .34557E+02
      8.32    -8.32    1.55    16.2 0.440E+01   5.88     9.15 .34780E+02
      8.36    -8.36    1.56    16.2 0.439E+01   5.91     9.15 .35003E+02
      8.41    -8.41    1.56    16.3 0.438E+01   5.94     9.15 .35226E+02
      8.45    -8.45    1.57    16.3 0.437E+01   5.97     9.15 .35449E+02
      8.49    -8.49    1.57    16.4 0.436E+01   6.00     9.15 .35673E+02
      8.53    -8.53    1.58    16.4 0.435E+01   6.04     9.15 .35897E+02
      8.58    -8.58    1.58    16.4 0.433E+01   6.07     9.15 .36121E+02
      8.62    -8.62    1.58    16.5 0.432E+01   6.10     9.15 .36345E+02
 Cumulative travel time =          36.3451 sec  (    0.01 hrs)
   Plume centerline may exhibit slight discontinuities in transition
     to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER
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BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

 Phase 1: Vertically mixed, Phase 2: Re-stratified

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 Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW
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** End of NEAR-FIELD REGION (NFR) **

 The initial plume WIDTH values in the next far-field module will be
  CORRECTED by a factor  1.98 to conserve the mass flux in the far-field!
 The correction factor is quite large because of the small ambient velocity
   relative to the strong mixing characteristics of the discharge!
   This indicates localized RECIRCULATION REGIONS and INTERNAL HYDRAULIC JUMPS.
   Width predictions show discontinuities. Dilution values should be acceptable.
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BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time
```

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
8.62	-8.62	6.10	16.5	0.432E+01	6.10	18.16	6.10	0.00	.36345E+02
10.81	-8.62	6.10	16.8	0.425E+01	5.79	19.43	6.10	0.30	.49336E+02
13.01	-8.62	6.10	17.0	0.419E+01	5.53	20.66	6.10	0.56	.62327E+02
15.20	-8.62	6.10	17.3	0.413E+01	5.31	21.86	6.10	0.79	.75318E+02
17.40	-8.62	6.10	17.5	0.408E+01	5.10	23.02	6.10	0.99	.88309E+02
19.59	-8.62	6.10	17.7	0.403E+01	4.92	24.16	6.10	1.17	.10130E+03
21.78	-8.62	6.10	17.9	0.398E+01	4.76	25.27	6.10	1.34	.11429E+03
23.98	-8.62	6.10	18.1	0.394E+01	4.61	26.35	6.10	1.48	.12728E+03
26.17	-8.62	6.10	18.3	0.390E+01	4.48	27.41	6.10	1.62	.14027E+03
28.36	-8.62	6.10	18.4	0.386E+01	4.35	28.46	6.10	1.74	.15326E+03
30.56	-8.62	6.10	18.6	0.383E+01	4.24	29.48	6.10	1.86	.16625E+03
32.75	-8.62	6.10	18.8	0.380E+01	4.14	30.48	6.10	1.96	.17924E+03
34.94	-8.62	6.10	18.9	0.377E+01	4.04	31.47	6.10	2.06	.19224E+03
37.14	-8.62	6.10	19.1	0.374E+01	3.95	32.45	6.10	2.15	.20523E+03
39.33	-8.62	6.10	19.2	0.371E+01	3.86	33.41	6.10	2.23	.21822E+03
41.53	-8.62	6.10	19.3	0.369E+01	3.78	34.35	6.10	2.31	.23121E+03
43.72	-8.62	6.10	19.5	0.366E+01	3.71	35.28	6.10	2.39	.24420E+03
45.91	-8.62	6.10	19.6	0.364E+01	3.64	36.20	6.10	2.46	.25719E+03
48.11	-8.62	6.10	19.7	0.361E+01	3.57	37.11	6.10	2.53	.27018E+03
50.30	-8.62	6.10	19.8	0.359E+01	3.51	38.01	6.10	2.59	.28317E+03
52.49	-8.62	6.10	19.9	0.357E+01	3.45	38.90	6.10	2.65	.29616E+03
54.69	-8.62	6.10	20.1	0.355E+01	3.39	39.77	6.10	2.71	.30915E+03
56.88	-8.62	6.10	20.2	0.353E+01	3.34	40.64	6.10	2.76	.32214E+03
59.08	-8.62	6.10	20.3	0.351E+01	3.28	41.50	6.10	2.81	.33514E+03
61.27	-8.62	6.10	20.4	0.350E+01	3.23	42.35	6.10	2.86	.34813E+03
63.46	-8.62	6.10	20.5	0.348E+01	3.19	43.19	6.10	2.91	.36112E+03
65.66	-8.62	6.10	20.6	0.346E+01	3.14	44.02	6.10	2.95	.37411E+03
67.85	-8.62	6.10	20.7	0.344E+01	3.10	44.84	6.10	3.00	.38710E+03
70.04	-8.62	6.10	20.8	0.343E+01	3.06	45.66	6.10	3.04	.40009E+03
72.24	-8.62	6.10	20.9	0.341E+01	3.02	46.47	6.10	3.08	.41308E+03
74.43	-8.62	6.10	21.0	0.340E+01	2.98	47.27	6.10	3.12	.42607E+03
76.62	-8.62	6.10	21.1	0.338E+01	2.94	48.07	6.10	3.15	.43906E+03
78.82	-8.62	6.10	21.1	0.337E+01	2.91	48.85	6.10	3.19	.45205E+03
81.01	-8.62	6.10	21.2	0.336E+01	2.87	49.64	6.10	3.22	.46504E+03
83.21	-8.62	6.10	21.3	0.334E+01	2.84	50.41	6.10	3.26	.47803E+03
85.40	-8.62	6.10	21.4	0.333E+01	2.81	51.18	6.10	3.29	.49103E+03
87.59	-8.62	6.10	21.5	0.332E+01	2.78	51.95	6.10	3.32	.50402E+03
89.79	-8.62	6.10	21.6	0.331E+01	2.75	52.70	6.10	3.35	.51701E+03
91.98	-8.62	6.10	21.6	0.329E+01	2.72	53.46	6.10	3.38	.53000E+03
94.17	-8.62	6.10	21.7	0.328E+01	2.69	54.20	6.10	3.40	.54299E+03
96.37	-8.62	6.10	21.8	0.327E+01	2.66	54.95	6.10	3.43	.55598E+03
98.56	-8.62	6.10	21.9	0.326E+01	2.64	55.68	6.10	3.46	.56897E+03
100.75	-8.62	6.10	21.9	0.325E+01	2.61	56.41	6.10	3.48	.58196E+03
102.95	-8.62	6.10	22.0	0.324E+01	2.59	57.14	6.10	3.51	.59495E+03
105.14	-8.62	6.10	22.1	0.323E+01	2.56	57.86	6.10	3.53	.60794E+03
107.34	-8.62	6.10	22.2	0.322E+01	2.54	58.58	6.10	3.55	.62093E+03
109.53	-8.62	6.10	22.2	0.321E+01	2.52	59.30	6.10	3.58	.63393E+03
111.72	-8.62	6.10	22.3	0.320E+01	2.50	60.00	6.10	3.60	.64692E+03
113.92	-8.62	6.10	22.4	0.319E+01	2.48	60.71	6.10	3.62	.65991E+03
116.11	-8.62	6.10	22.4	0.318E+01	2.45	61.41	6.10	3.64	.67290E+03
118.30	-8.62	6.10	22.5	0.317E+01	2.43	62.11	6.10	3.66	.68589E+03
120.50	-8.62	6.10	22.6	0.316E+01	2.41	62.80	6.10	3.68	.69888E+03
122.69	-8.62	6.10	22.6	0.315E+01	2.39	63.49	6.10	3.70	.71187E+03
124.88	-8.62	6.10	22.7	0.314E+01	2.38	64.17	6.10	3.72	.72486E+03
127.08	-8.62	6.10	22.8	0.313E+01	2.36	64.85	6.10	3.74	.73785E+03
129.27	-8.62	6.10	22.8	0.312E+01	2.34	65.53	6.10	3.76	.75084E+03
131.47	-8.62	6.10	22.9	0.311E+01	2.32	66.20	6.10	3.77	.76383E+03
133.66	-8.62	6.10	22.9	0.311E+01	2.30	66.87	6.10	3.79	.77682E+03
135.85	-8.62	6.10	23.0	0.310E+01	2.29	67.54	6.10	3.81	.78982E+03
138.05	-8.62	6.10	23.1	0.309E+01	2.27	68.20	6.10	3.82	.80281E+03
140.24	-8.62	6.10	23.1	0.308E+01	2.26	68.86	6.10	3.84	.81580E+03
142.43	-8.62	6.10	23.2	0.307E+01	2.24	69.52	6.10	3.86	.82879E+03
144.63	-8.62	6.10	23.2	0.307E+01	2.22	70.17	6.10	3.87	.84178E+03
146.82	-8.62	6.10	23.3	0.306E+01	2.21	70.83	6.10	3.89	.85477E+03
149.02	-8.62	6.10	23.3	0.305E+01	2.20	71.47	6.10	3.90	.86776E+03
151.21	-8.62	6.10	23.4	0.304E+01	2.18	72.12	6.10	3.92	.88075E+03
153.40	-8.62	6.10	23.5	0.304E+01	2.17	72.76	6.10	3.93	.89374E+03
155.60	-8.62	6.10	23.5	0.303E+01	2.15	73.40	6.10	3.94	.90673E+03
157.79	-8.62	6.10	23.6	0.302E+01	2.14	74.03	6.10	3.96	.91972E+03
159.98	-8.62	6.10	23.6	0.302E+01	2.13	74.67	6.10	3.97	.93272E+03
162.18	-8.62	6.10	23.7	0.301E+01	2.11	75.30	6.10	3.98	.94571E+03
164.37	-8.62	6.10	23.7	0.300E+01	2.10	75.92	6.10	4.00	.95870E+03
166.56	-8.62	6.10	23.8	0.300E+01	2.09	76.55	6.10	4.01	.97169E+03
168.76	-8.62	6.10	23.8	0.299E+01	2.08	77.17	6.10	4.02	.98468E+03
170.95	-8.62	6.10	23.9	0.298E+01	2.06	77.79	6.10	4.03	.99767E+03
173.15	-8.62	6.10	23.9	0.298E+01	2.05	78.41	6.10	4.04	.10107E+04
175.34	-8.62	6.10	24.0	0.297E+01	2.04	79.02	6.10	4.06	.10237E+04

** REGULATORY MIXING ZONE BOUNDARY **
In this prediction interval the plume DOWNSTREAM distance meets or exceeds
the regulatory value = 176.17 m.
This is the extent of the REGULATORY MIXING ZONE.

177.53	-8.62	6.10	24.0	0.296E+01	2.03	79.63	6.10	4.07	.10366E+04
179.73	-8.62	6.10	24.1	0.296E+01	2.02	80.24	6.10	4.08	.10496E+04
181.92	-8.62	6.10	24.1	0.295E+01	2.01	80.85	6.10	4.09	.10626E+04
184.11	-8.62	6.10	24.2	0.294E+01	2.00	81.45	6.10	4.10	.10756E+04
186.31	-8.62	6.10	24.2	0.294E+01	1.99	82.05	6.10	4.11	.10886E+04
188.50	-8.62	6.10	24.3	0.293E+01	1.98	82.65	6.10	4.12	.11016E+04

190.69	-8.62	6.10	24.3	0.293E+01	1.97	83.25	6.10	4.13	.11146E+04
192.89	-8.62	6.10	24.4	0.292E+01	1.96	83.85	6.10	4.14	.11276E+04
195.08	-8.62	6.10	24.4	0.291E+01	1.95	84.44	6.10	4.15	.11406E+04
197.28	-8.62	6.10	24.5	0.291E+01	1.94	85.03	6.10	4.16	.11536E+04
199.47	-8.62	6.10	24.5	0.290E+01	1.93	85.62	6.10	4.17	.11666E+04
201.66	-8.62	6.10	24.6	0.290E+01	1.92	86.21	6.10	4.18	.11795E+04
203.86	-8.62	6.10	24.6	0.289E+01	1.91	86.79	6.10	4.19	.11925E+04
206.05	-8.62	6.10	24.7	0.289E+01	1.90	87.37	6.10	4.20	.12055E+04
208.24	-8.62	6.10	24.7	0.288E+01	1.89	87.95	6.10	4.21	.12185E+04
210.44	-8.62	6.10	24.8	0.288E+01	1.88	88.53	6.10	4.22	.12315E+04
212.63	-8.62	6.10	24.8	0.287E+01	1.87	89.11	6.10	4.22	.12445E+04
214.83	-8.62	6.10	24.9	0.287E+01	1.86	89.68	6.10	4.23	.12575E+04
217.02	-8.62	6.10	24.9	0.286E+01	1.85	90.26	6.10	4.24	.12705E+04
219.21	-8.62	6.10	25.0	0.285E+01	1.85	90.83	6.10	4.25	.12835E+04
221.41	-8.62	6.10	25.0	0.285E+01	1.84	91.40	6.10	4.26	.12965E+04
223.60	-8.62	6.10	25.0	0.284E+01	1.83	91.96	6.10	4.27	.13095E+04
225.79	-8.62	6.10	25.1	0.284E+01	1.82	92.53	6.10	4.27	.13224E+04
227.99	-8.62	6.10	25.1	0.283E+01	1.81	93.09	6.10	4.28	.13354E+04
230.18	-8.62	6.10	25.2	0.283E+01	1.81	93.65	6.10	4.29	.13484E+04
232.37	-8.62	6.10	25.2	0.282E+01	1.80	94.21	6.10	4.30	.13614E+04
234.57	-8.62	6.10	25.3	0.282E+01	1.79	94.77	6.10	4.30	.13744E+04
236.76	-8.62	6.10	25.3	0.281E+01	1.78	95.33	6.10	4.31	.13874E+04
238.96	-8.62	6.10	25.4	0.281E+01	1.78	95.88	6.10	4.32	.14004E+04
241.15	-8.62	6.10	25.4	0.281E+01	1.77	96.44	6.10	4.33	.14134E+04
243.34	-8.62	6.10	25.4	0.280E+01	1.76	96.99	6.10	4.33	.14264E+04
245.54	-8.62	6.10	25.5	0.280E+01	1.76	97.54	6.10	4.34	.14394E+04
247.73	-8.62	6.10	25.5	0.279E+01	1.75	98.08	6.10	4.35	.14524E+04
249.92	-8.62	6.10	25.6	0.279E+01	1.74	98.63	6.10	4.35	.14653E+04
252.12	-8.62	6.10	25.6	0.278E+01	1.74	99.18	6.10	4.36	.14783E+04
254.31	-8.62	6.10	25.7	0.278E+01	1.73	99.72	6.10	4.37	.14913E+04
256.50	-8.62	6.10	25.7	0.277E+01	1.72	100.26	6.10	4.37	.15043E+04
258.70	-8.62	6.10	25.7	0.277E+01	1.72	100.80	6.10	4.38	.15173E+04
260.89	-8.62	6.10	25.8	0.276E+01	1.71	101.34	6.10	4.39	.15303E+04
263.09	-8.62	6.10	25.8	0.276E+01	1.70	101.88	6.10	4.39	.15433E+04
265.28	-8.62	6.10	25.9	0.275E+01	1.70	102.41	6.10	4.40	.15563E+04
267.47	-8.62	6.10	25.9	0.275E+01	1.69	102.95	6.10	4.40	.15693E+04
269.67	-8.62	6.10	26.0	0.275E+01	1.69	103.48	6.10	4.41	.15823E+04
271.86	-8.62	6.10	26.0	0.274E+01	1.68	104.01	6.10	4.42	.15953E+04
274.05	-8.62	6.10	26.0	0.274E+01	1.67	104.54	6.10	4.42	.16082E+04
276.25	-8.62	6.10	26.1	0.273E+01	1.67	105.07	6.10	4.43	.16212E+04
278.44	-8.62	6.10	26.1	0.273E+01	1.66	105.59	6.10	4.43	.16342E+04
280.64	-8.62	6.10	26.2	0.272E+01	1.66	106.12	6.10	4.44	.16472E+04
282.83	-8.62	6.10	26.2	0.272E+01	1.65	106.64	6.10	4.45	.16602E+04
285.02	-8.62	6.10	26.2	0.272E+01	1.65	107.17	6.10	4.45	.16732E+04
287.22	-8.62	6.10	26.3	0.271E+01	1.64	107.69	6.10	4.46	.16862E+04
289.41	-8.62	6.10	26.3	0.271E+01	1.63	108.21	6.10	4.46	.16992E+04
291.60	-8.62	6.10	26.4	0.270E+01	1.63	108.73	6.10	4.47	.17122E+04
293.80	-8.62	6.10	26.4	0.270E+01	1.62	109.24	6.10	4.47	.17252E+04
295.99	-8.62	6.10	26.4	0.270E+01	1.62	109.76	6.10	4.48	.17382E+04
298.18	-8.62	6.10	26.5	0.269E+01	1.61	110.27	6.10	4.48	.17511E+04
300.38	-8.62	6.10	26.5	0.269E+01	1.61	110.79	6.10	4.49	.17641E+04
302.57	-8.62	6.10	26.6	0.268E+01	1.60	111.30	6.10	4.49	.17771E+04
304.77	-8.62	6.10	26.6	0.268E+01	1.60	111.81	6.10	4.50	.17901E+04
306.96	-8.62	6.10	26.6	0.267E+01	1.59	112.32	6.10	4.50	.18031E+04
309.15	-8.62	6.10	26.7	0.267E+01	1.59	112.83	6.10	4.51	.18161E+04
311.35	-8.62	6.10	26.7	0.267E+01	1.58	113.33	6.10	4.51	.18291E+04
313.54	-8.62	6.10	26.8	0.266E+01	1.58	113.84	6.10	4.52	.18421E+04
315.73	-8.62	6.10	26.8	0.266E+01	1.57	114.34	6.10	4.52	.18551E+04
317.93	-8.62	6.10	26.8	0.266E+01	1.57	114.85	6.10	4.53	.18681E+04
320.12	-8.62	6.10	26.9	0.265E+01	1.57	115.35	6.10	4.53	.18811E+04
322.31	-8.62	6.10	26.9	0.265E+01	1.56	115.85	6.10	4.54	.18940E+04
324.51	-8.62	6.10	26.9	0.264E+01	1.56	116.35	6.10	4.54	.19070E+04
326.70	-8.62	6.10	27.0	0.264E+01	1.55	116.85	6.10	4.54	.19200E+04
328.90	-8.62	6.10	27.0	0.264E+01	1.55	117.35	6.10	4.55	.19330E+04
331.09	-8.62	6.10	27.1	0.263E+01	1.54	117.84	6.10	4.55	.19460E+04
333.28	-8.62	6.10	27.1	0.263E+01	1.54	118.34	6.10	4.56	.19590E+04
335.48	-8.62	6.10	27.1	0.263E+01	1.53	118.83	6.10	4.56	.19720E+04
337.67	-8.62	6.10	27.2	0.262E+01	1.53	119.33	6.10	4.57	.19850E+04
339.86	-8.62	6.10	27.2	0.262E+01	1.53	119.82	6.10	4.57	.19980E+04
342.06	-8.62	6.10	27.3	0.261E+01	1.52	120.31	6.10	4.57	.20110E+04
344.25	-8.62	6.10	27.3	0.261E+01	1.52	120.80	6.10	4.58	.20240E+04
346.44	-8.62	6.10	27.3	0.261E+01	1.51	121.29	6.10	4.58	.20369E+04
348.64	-8.62	6.10	27.4	0.260E+01	1.51	121.78	6.10	4.59	.20499E+04
350.83	-8.62	6.10	27.4	0.260E+01	1.51	122.26	6.10	4.59	.20629E+04
353.03	-8.62	6.10	27.4	0.260E+01	1.50	122.75	6.10	4.59	.20759E+04
355.22	-8.62	6.10	27.5	0.259E+01	1.50	123.23	6.10	4.60	.20889E+04
357.41	-8.62	6.10	27.5	0.259E+01	1.50	123.72	6.10	4.60	.21019E+04
359.61	-8.62	6.10	27.6	0.258E+01	1.49	124.20	6.10	4.60	.21149E+04
361.80	-8.62	6.10	27.6	0.258E+01	1.49	124.68	6.10	4.61	.21279E+04
363.99	-8.62	6.10	27.6	0.258E+01	1.48	125.16	6.10	4.61	.21409E+04
366.19	-8.62	6.10	27.7	0.257E+01	1.48	125.64	6.10	4.62	.21539E+04
368.38	-8.62	6.10	27.7	0.257E+01	1.48	126.12	6.10	4.62	.21669E+04
370.58	-8.62	6.10	27.8	0.257E+01	1.47	126.60	6.10	4.62	.21798E+04
372.77	-8.62	6.10	27.8	0.256E+01	1.47	127.07	6.10	4.63	.21928E+04
374.96	-8.62	6.10	27.8	0.256E+01	1.47	127.55	6.10	4.63	.22058E+04
377.16	-8.62	6.10	27.9	0.256E+01	1.46	128.02	6.10	4.63	.22188E+04
379.35	-8.62	6.10	27.9	0.255E+01	1.46	128.50	6.10	4.64	.22318E+04
381.54	-8.62	6.10	27.9	0.255E+01	1.46	128.97	6.10	4.64	.22448E+04
383.74	-8.62	6.10	28.0	0.255E+01	1.45	129.44	6.10	4.64	.22578E+04
385.93	-8.62	6.10	28.0	0.254E+01	1.45	129.91	6.10	4.65	.22708E+04

388.12	-8.62	6.10	28.1	0.254E+01	1.45	130.38	6.10	4.65	.22838E+04
390.32	-8.62	6.10	28.1	0.254E+01	1.44	130.85	6.10	4.65	.22968E+04
392.51	-8.62	6.10	28.1	0.253E+01	1.44	131.32	6.10	4.66	.23098E+04
394.71	-8.62	6.10	28.2	0.253E+01	1.44	131.79	6.10	4.66	.23227E+04
396.90	-8.62	6.10	28.2	0.253E+01	1.43	132.25	6.10	4.66	.23357E+04
399.09	-8.62	6.10	28.2	0.252E+01	1.43	132.72	6.10	4.67	.23487E+04
401.29	-8.62	6.10	28.3	0.252E+01	1.43	133.18	6.10	4.67	.23617E+04
403.48	-8.62	6.10	28.3	0.252E+01	1.42	133.65	6.10	4.67	.23747E+04
405.67	-8.62	6.10	28.4	0.251E+01	1.42	134.11	6.10	4.68	.23877E+04
407.87	-8.62	6.10	28.4	0.251E+01	1.42	134.57	6.10	4.68	.24007E+04
410.06	-8.62	6.10	28.4	0.251E+01	1.41	135.03	6.10	4.68	.24137E+04
412.25	-8.62	6.10	28.5	0.250E+01	1.41	135.49	6.10	4.68	.24267E+04
414.45	-8.62	6.10	28.5	0.250E+01	1.41	135.95	6.10	4.69	.24397E+04
416.64	-8.62	6.10	28.5	0.250E+01	1.41	136.41	6.10	4.69	.24527E+04
418.84	-8.62	6.10	28.6	0.249E+01	1.40	136.87	6.10	4.69	.24656E+04
421.03	-8.62	6.10	28.6	0.249E+01	1.40	137.32	6.10	4.70	.24786E+04
423.22	-8.62	6.10	28.7	0.249E+01	1.40	137.78	6.10	4.70	.24916E+04
425.42	-8.62	6.10	28.7	0.248E+01	1.39	138.24	6.10	4.70	.25046E+04
427.61	-8.62	6.10	28.7	0.248E+01	1.39	138.69	6.10	4.70	.25176E+04
429.80	-8.62	6.10	28.8	0.248E+01	1.39	139.14	6.10	4.71	.25306E+04
432.00	-8.62	6.10	28.8	0.247E+01	1.39	139.60	6.10	4.71	.25436E+04
434.19	-8.62	6.10	28.8	0.247E+01	1.38	140.05	6.10	4.71	.25566E+04
436.39	-8.62	6.10	28.9	0.247E+01	1.38	140.50	6.10	4.71	.25696E+04
438.58	-8.62	6.10	28.9	0.246E+01	1.38	140.95	6.10	4.72	.25826E+04
440.77	-8.62	6.10	29.0	0.246E+01	1.38	141.40	6.10	4.72	.25956E+04
442.97	-8.62	6.10	29.0	0.246E+01	1.37	141.85	6.10	4.72	.26085E+04
445.16	-8.62	6.10	29.0	0.245E+01	1.37	142.29	6.10	4.72	.26215E+04
447.35	-8.62	6.10	29.1	0.245E+01	1.37	142.74	6.10	4.73	.26345E+04

Cumulative travel time = 2634.5198 sec (0.73 hrs)

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
447.35	134.11	6.10	29.1	0.245E+01	1.37	285.48	6.10	4.73	.26345E+04
447.85	134.11	6.10	29.1	0.245E+01	1.37	285.58	6.10	4.73	.26375E+04
448.35	134.11	6.10	29.1	0.245E+01	1.37	285.68	6.10	4.73	.26404E+04
448.85	134.11	6.10	29.1	0.245E+01	1.37	285.78	6.10	4.73	.26434E+04
449.35	134.11	6.10	29.1	0.245E+01	1.37	285.88	6.10	4.73	.26464E+04
449.85	134.11	6.10	29.1	0.245E+01	1.37	285.98	6.10	4.73	.26493E+04
450.35	134.11	6.10	29.1	0.245E+01	1.37	286.07	6.10	4.73	.26523E+04
450.85	134.11	6.10	29.1	0.245E+01	1.37	286.17	6.10	4.73	.26552E+04
451.35	134.11	6.10	29.1	0.245E+01	1.37	286.27	6.10	4.73	.26582E+04
451.85	134.11	6.10	29.1	0.245E+01	1.37	286.37	6.10	4.73	.26612E+04
452.35	134.11	6.10	29.1	0.245E+01	1.37	286.47	6.10	4.73	.26641E+04
452.85	134.11	6.10	29.1	0.245E+01	1.37	286.57	6.10	4.73	.26671E+04
453.35	134.11	6.10	29.1	0.245E+01	1.37	286.66	6.10	4.73	.26700E+04
453.85	134.11	6.10	29.1	0.244E+01	1.37	286.76	6.10	4.73	.26730E+04
454.35	134.11	6.10	29.2	0.244E+01	1.37	286.86	6.10	4.73	.26760E+04
454.85	134.11	6.10	29.2	0.244E+01	1.37	286.96	6.10	4.73	.26789E+04
455.35	134.11	6.10	29.2	0.244E+01	1.37	287.06	6.10	4.73	.26819E+04
455.85	134.11	6.10	29.2	0.244E+01	1.37	287.16	6.10	4.73	.26848E+04
456.35	134.11	6.10	29.2	0.244E+01	1.36	287.25	6.10	4.73	.26878E+04
456.85	134.11	6.10	29.2	0.244E+01	1.36	287.35	6.10	4.73	.26908E+04
457.35	134.11	6.10	29.2	0.244E+01	1.36	287.45	6.10	4.73	.26937E+04
457.85	134.11	6.10	29.2	0.244E+01	1.36	287.55	6.10	4.73	.26967E+04
458.35	134.11	6.10	29.2	0.244E+01	1.36	287.65	6.10	4.73	.26996E+04
458.85	134.11	6.10	29.2	0.244E+01	1.36	287.75	6.10	4.73	.27026E+04
459.35	134.11	6.10	29.2	0.244E+01	1.36	287.84	6.10	4.73	.27055E+04
459.85	134.11	6.10	29.2	0.244E+01	1.36	287.94	6.10	4.73	.27085E+04
460.35	134.11	6.10	29.2	0.244E+01	1.36	288.04	6.10	4.73	.27115E+04
460.85	134.11	6.10	29.2	0.244E+01	1.36	288.14	6.10	4.73	.27144E+04
461.35	134.11	6.10	29.2	0.244E+01	1.36	288.24	6.10	4.73	.27174E+04
461.85	134.11	6.10	29.2	0.244E+01	1.36	288.33	6.10	4.73	.27203E+04
462.35	134.11	6.10	29.2	0.244E+01	1.36	288.43	6.10	4.73	.27233E+04
462.84	134.11	6.10	29.3	0.244E+01	1.36	288.53	6.10	4.73	.27263E+04
463.34	134.11	6.10	29.3	0.244E+01	1.36	288.63	6.10	4.73	.27292E+04
463.84	134.11	6.10	29.3	0.243E+01	1.36	288.73	6.10	4.73	.27322E+04
464.34	134.11	6.10	29.3	0.243E+01	1.36	288.82	6.10	4.73	.27351E+04
464.84	134.11	6.10	29.3	0.243E+01	1.36	288.92	6.10	4.73	.27381E+04
465.34	134.11	6.10	29.3	0.243E+01	1.36	289.02	6.10	4.73	.27411E+04
465.84	134.11	6.10	29.3	0.243E+01	1.36	289.12	6.10	4.73	.27440E+04
466.34	134.11	6.10	29.3	0.243E+01	1.36	289.22	6.10	4.73	.27470E+04
466.84	134.11	6.10	29.3	0.243E+01	1.36	289.31	6.10	4.73	.27499E+04
467.34	134.11	6.10	29.3	0.243E+01	1.36	289.41	6.10	4.74	.27529E+04
467.84	134.11	6.10	29.3	0.243E+01	1.36	289.51	6.10	4.74	.27559E+04
468.34	134.11	6.10	29.3	0.243E+01	1.36	289.61	6.10	4.74	.27588E+04
468.84	134.11	6.10	29.3	0.243E+01	1.36	289.70	6.10	4.74	.27618E+04
469.34	134.11	6.10	29.3	0.243E+01	1.36	289.80	6.10	4.74	.27647E+04
469.84	134.11	6.10	29.3	0.243E+01	1.36	289.90	6.10	4.74	.27677E+04
470.34	134.11	6.10	29.3	0.243E+01	1.36	290.00	6.10	4.74	.27707E+04
470.84	134.11	6.10	29.3	0.243E+01	1.36	290.10	6.10	4.74	.27736E+04
471.34	134.11	6.10	29.4	0.243E+01	1.36	290.19	6.10	4.74	.27766E+04
471.84	134.11	6.10	29.4	0.243E+01	1.36	290.29	6.10	4.74	.27795E+04
472.34	134.11	6.10	29.4	0.243E+01	1.36	290.39	6.10	4.74	.27825E+04
472.84	134.11	6.10	29.4	0.243E+01	1.36	290.49	6.10	4.74	.27855E+04
473.34	134.11	6.10	29.4	0.243E+01	1.36	290.58	6.10	4.74	.27884E+04
473.84	134.11	6.10	29.4	0.243E+01	1.36	290.68	6.10	4.74	.27914E+04

474.34	134.11	6.10	29.4	0.242E+01	1.36	290.78	6.10	4.74	.27943E+04
474.84	134.11	6.10	29.4	0.242E+01	1.36	290.88	6.10	4.74	.27973E+04
475.34	134.11	6.10	29.4	0.242E+01	1.36	290.97	6.10	4.74	.28003E+04
475.84	134.11	6.10	29.4	0.242E+01	1.36	291.07	6.10	4.74	.28032E+04
476.34	134.11	6.10	29.4	0.242E+01	1.36	291.17	6.10	4.74	.28062E+04
476.84	134.11	6.10	29.4	0.242E+01	1.36	291.27	6.10	4.74	.28091E+04
477.34	134.11	6.10	29.4	0.242E+01	1.36	291.36	6.10	4.74	.28121E+04
477.84	134.11	6.10	29.4	0.242E+01	1.36	291.46	6.10	4.74	.28151E+04
478.34	134.11	6.10	29.4	0.242E+01	1.36	291.56	6.10	4.74	.28180E+04
478.84	134.11	6.10	29.4	0.242E+01	1.36	291.66	6.10	4.74	.28210E+04
479.34	134.11	6.10	29.4	0.242E+01	1.36	291.75	6.10	4.74	.28239E+04
479.84	134.11	6.10	29.5	0.242E+01	1.36	291.85	6.10	4.74	.28269E+04
480.34	134.11	6.10	29.5	0.242E+01	1.36	291.95	6.10	4.74	.28299E+04
480.84	134.11	6.10	29.5	0.242E+01	1.36	292.05	6.10	4.74	.28328E+04
481.34	134.11	6.10	29.5	0.242E+01	1.36	292.14	6.10	4.74	.28358E+04
481.84	134.11	6.10	29.5	0.242E+01	1.36	292.24	6.10	4.74	.28387E+04
482.34	134.11	6.10	29.5	0.242E+01	1.36	292.34	6.10	4.74	.28417E+04
482.84	134.11	6.10	29.5	0.242E+01	1.36	292.43	6.10	4.74	.28446E+04
483.33	134.11	6.10	29.5	0.242E+01	1.36	292.53	6.10	4.74	.28476E+04
483.83	134.11	6.10	29.5	0.242E+01	1.35	292.63	6.10	4.74	.28506E+04
484.33	134.11	6.10	29.5	0.241E+01	1.35	292.73	6.10	4.74	.28535E+04
484.83	134.11	6.10	29.5	0.241E+01	1.35	292.82	6.10	4.74	.28565E+04
485.33	134.11	6.10	29.5	0.241E+01	1.35	292.92	6.10	4.74	.28594E+04
485.83	134.11	6.10	29.5	0.241E+01	1.35	293.02	6.10	4.74	.28624E+04
486.33	134.11	6.10	29.5	0.241E+01	1.35	293.11	6.10	4.74	.28654E+04
486.83	134.11	6.10	29.5	0.241E+01	1.35	293.21	6.10	4.74	.28683E+04
487.33	134.11	6.10	29.5	0.241E+01	1.35	293.31	6.10	4.74	.28713E+04
487.83	134.11	6.10	29.5	0.241E+01	1.35	293.41	6.10	4.74	.28742E+04
488.33	134.11	6.10	29.6	0.241E+01	1.35	293.50	6.10	4.74	.28772E+04
488.83	134.11	6.10	29.6	0.241E+01	1.35	293.60	6.10	4.74	.28802E+04
489.33	134.11	6.10	29.6	0.241E+01	1.35	293.70	6.10	4.74	.28831E+04
489.83	134.11	6.10	29.6	0.241E+01	1.35	293.79	6.10	4.74	.28861E+04
490.33	134.11	6.10	29.6	0.241E+01	1.35	293.89	6.10	4.74	.28890E+04
490.83	134.11	6.10	29.6	0.241E+01	1.35	293.99	6.10	4.74	.28920E+04
491.33	134.11	6.10	29.6	0.241E+01	1.35	294.08	6.10	4.74	.28950E+04
491.83	134.11	6.10	29.6	0.241E+01	1.35	294.18	6.10	4.74	.28979E+04
492.33	134.11	6.10	29.6	0.241E+01	1.35	294.28	6.10	4.74	.29009E+04
492.83	134.11	6.10	29.6	0.241E+01	1.35	294.38	6.10	4.74	.29038E+04
493.33	134.11	6.10	29.6	0.241E+01	1.35	294.47	6.10	4.74	.29068E+04
493.83	134.11	6.10	29.6	0.241E+01	1.35	294.57	6.10	4.74	.29098E+04
494.33	134.11	6.10	29.6	0.241E+01	1.35	294.67	6.10	4.74	.29127E+04
494.83	134.11	6.10	29.6	0.240E+01	1.35	294.76	6.10	4.74	.29157E+04
495.33	134.11	6.10	29.6	0.240E+01	1.35	294.86	6.10	4.75	.29186E+04
495.83	134.11	6.10	29.6	0.240E+01	1.35	294.96	6.10	4.75	.29216E+04
496.33	134.11	6.10	29.6	0.240E+01	1.35	295.05	6.10	4.75	.29246E+04
496.83	134.11	6.10	29.7	0.240E+01	1.35	295.15	6.10	4.75	.29275E+04
497.33	134.11	6.10	29.7	0.240E+01	1.35	295.25	6.10	4.75	.29305E+04
497.83	134.11	6.10	29.7	0.240E+01	1.35	295.34	6.10	4.75	.29334E+04
498.33	134.11	6.10	29.7	0.240E+01	1.35	295.44	6.10	4.75	.29364E+04
498.83	134.11	6.10	29.7	0.240E+01	1.35	295.54	6.10	4.75	.29394E+04
499.33	134.11	6.10	29.7	0.240E+01	1.35	295.63	6.10	4.75	.29423E+04
499.83	134.11	6.10	29.7	0.240E+01	1.35	295.73	6.10	4.75	.29453E+04
500.33	134.11	6.10	29.7	0.240E+01	1.35	295.83	6.10	4.75	.29482E+04
500.83	134.11	6.10	29.7	0.240E+01	1.35	295.92	6.10	4.75	.29512E+04
501.33	134.11	6.10	29.7	0.240E+01	1.35	296.02	6.10	4.75	.29542E+04
501.83	134.11	6.10	29.7	0.240E+01	1.35	296.12	6.10	4.75	.29571E+04
502.33	134.11	6.10	29.7	0.240E+01	1.35	296.21	6.10	4.75	.29601E+04
502.83	134.11	6.10	29.7	0.240E+01	1.35	296.31	6.10	4.75	.29630E+04
503.33	134.11	6.10	29.7	0.240E+01	1.35	296.40	6.10	4.75	.29660E+04
503.82	134.11	6.10	29.7	0.240E+01	1.35	296.50	6.10	4.75	.29690E+04
504.32	134.11	6.10	29.7	0.240E+01	1.35	296.60	6.10	4.75	.29719E+04
504.82	134.11	6.10	29.8	0.239E+01	1.35	296.69	6.10	4.75	.29749E+04
505.32	134.11	6.10	29.8	0.239E+01	1.35	296.79	6.10	4.75	.29778E+04
505.82	134.11	6.10	29.8	0.239E+01	1.35	296.89	6.10	4.75	.29808E+04
506.32	134.11	6.10	29.8	0.239E+01	1.35	296.98	6.10	4.75	.29837E+04
506.82	134.11	6.10	29.8	0.239E+01	1.35	297.08	6.10	4.75	.29867E+04
507.32	134.11	6.10	29.8	0.239E+01	1.35	297.18	6.10	4.75	.29897E+04
507.82	134.11	6.10	29.8	0.239E+01	1.35	297.27	6.10	4.75	.29926E+04
508.32	134.11	6.10	29.8	0.239E+01	1.35	297.37	6.10	4.75	.29956E+04
508.82	134.11	6.10	29.8	0.239E+01	1.35	297.46	6.10	4.75	.29985E+04
509.32	134.11	6.10	29.8	0.239E+01	1.35	297.56	6.10	4.75	.30015E+04
509.82	134.11	6.10	29.8	0.239E+01	1.35	297.66	6.10	4.75	.30045E+04
510.32	134.11	6.10	29.8	0.239E+01	1.35	297.75	6.10	4.75	.30074E+04
510.82	134.11	6.10	29.8	0.239E+01	1.35	297.85	6.10	4.75	.30104E+04
511.32	134.11	6.10	29.8	0.239E+01	1.35	297.95	6.10	4.75	.30133E+04
511.82	134.11	6.10	29.8	0.239E+01	1.35	298.04	6.10	4.75	.30163E+04
512.32	134.11	6.10	29.8	0.239E+01	1.35	298.14	6.10	4.75	.30193E+04
512.82	134.11	6.10	29.8	0.239E+01	1.35	298.23	6.10	4.75	.30222E+04
513.32	134.11	6.10	29.9	0.239E+01	1.34	298.33	6.10	4.75	.30252E+04
513.82	134.11	6.10	29.9	0.239E+01	1.34	298.43	6.10	4.75	.30281E+04
514.32	134.11	6.10	29.9	0.239E+01	1.34	298.52	6.10	4.75	.30311E+04
514.82	134.11	6.10	29.9	0.239E+01	1.34	298.62	6.10	4.75	.30341E+04
515.32	134.11	6.10	29.9	0.238E+01	1.34	298.71	6.10	4.75	.30370E+04
515.82	134.11	6.10	29.9	0.238E+01	1.34	298.81	6.10	4.75	.30400E+04
516.32	134.11	6.10	29.9	0.238E+01	1.34	298.91	6.10	4.75	.30429E+04
516.82	134.11	6.10	29.9	0.238E+01	1.34	299.00	6.10	4.75	.30459E+04
517.32	134.11	6.10	29.9	0.238E+01	1.34	299.10	6.10	4.75	.30489E+04
517.82	134.11	6.10	29.9	0.238E+01	1.34	299.19	6.10	4.75	.30518E+04
518.32	134.11	6.10	29.9	0.238E+01	1.34	299.29	6.10	4.75	.30548E+04
518.82	134.11	6.10	29.9	0.238E+01	1.34	299.39	6.10	4.75	.30577E+04

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    519.32   134.11    6.10    29.9 0.238E+01   1.34   299.48    6.10    4.75   .30607E+04
    519.82   134.11    6.10    29.9 0.238E+01   1.34   299.58    6.10    4.75   .30637E+04
    520.32   134.11    6.10    29.9 0.238E+01   1.34   299.67    6.10    4.75   .30666E+04
    520.82   134.11    6.10    29.9 0.238E+01   1.34   299.77    6.10    4.75   .30696E+04
    521.32   134.11    6.10    30.0 0.238E+01   1.34   299.87    6.10    4.75   .30725E+04
    521.82   134.11    6.10    30.0 0.238E+01   1.34   299.96    6.10    4.75   .30755E+04
    522.32   134.11    6.10    30.0 0.238E+01   1.34   300.06    6.10    4.75   .30785E+04
    522.82   134.11    6.10    30.0 0.238E+01   1.34   300.15    6.10    4.75   .30814E+04
    523.32   134.11    6.10    30.0 0.238E+01   1.34   300.25    6.10    4.75   .30844E+04
    523.82   134.11    6.10    30.0 0.238E+01   1.34   300.34    6.10    4.75   .30873E+04
    524.31   134.11    6.10    30.0 0.238E+01   1.34   300.44    6.10    4.75   .30903E+04
    524.81   134.11    6.10    30.0 0.238E+01   1.34   300.54    6.10    4.75   .30933E+04
    525.31   134.11    6.10    30.0 0.238E+01   1.34   300.63    6.10    4.75   .30962E+04
    525.81   134.11    6.10    30.0 0.237E+01   1.34   300.73    6.10    4.75   .30992E+04
    526.31   134.11    6.10    30.0 0.237E+01   1.34   300.82    6.10    4.76   .31021E+04
    526.81   134.11    6.10    30.0 0.237E+01   1.34   300.92    6.10    4.76   .31051E+04
    527.31   134.11    6.10    30.0 0.237E+01   1.34   301.01    6.10    4.76   .31080E+04
    527.81   134.11    6.10    30.0 0.237E+01   1.34   301.11    6.10    4.76   .31110E+04
    528.31   134.11    6.10    30.0 0.237E+01   1.34   301.21    6.10    4.76   .31140E+04
    528.81   134.11    6.10    30.0 0.237E+01   1.34   301.30    6.10    4.76   .31169E+04
    529.31   134.11    6.10    30.0 0.237E+01   1.34   301.40    6.10    4.76   .31199E+04
    529.81   134.11    6.10    30.1 0.237E+01   1.34   301.49    6.10    4.76   .31228E+04
    530.31   134.11    6.10    30.1 0.237E+01   1.34   301.59    6.10    4.76   .31258E+04
    530.81   134.11    6.10    30.1 0.237E+01   1.34   301.68    6.10    4.76   .31288E+04
    531.31   134.11    6.10    30.1 0.237E+01   1.34   301.78    6.10    4.76   .31317E+04
    531.81   134.11    6.10    30.1 0.237E+01   1.34   301.87    6.10    4.76   .31347E+04
    532.31   134.11    6.10    30.1 0.237E+01   1.34   301.97    6.10    4.76   .31376E+04
    532.81   134.11    6.10    30.1 0.237E+01   1.34   302.06    6.10    4.76   .31406E+04
    533.31   134.11    6.10    30.1 0.237E+01   1.34   302.16    6.10    4.76   .31436E+04
    533.81   134.11    6.10    30.1 0.237E+01   1.34   302.26    6.10    4.76   .31465E+04
    534.31   134.11    6.10    30.1 0.237E+01   1.34   302.35    6.10    4.76   .31495E+04
    534.81   134.11    6.10    30.1 0.237E+01   1.34   302.45    6.10    4.76   .31524E+04
    535.31   134.11    6.10    30.1 0.237E+01   1.34   302.54    6.10    4.76   .31554E+04
    535.81   134.11    6.10    30.1 0.236E+01   1.34   302.64    6.10    4.76   .31584E+04
    536.31   134.11    6.10    30.1 0.236E+01   1.34   302.73    6.10    4.76   .31613E+04
    536.81   134.11    6.10    30.1 0.236E+01   1.34   302.83    6.10    4.76   .31643E+04
    537.31   134.11    6.10    30.1 0.236E+01   1.34   302.92    6.10    4.76   .31672E+04
    537.81   134.11    6.10    30.2 0.236E+01   1.34   303.02    6.10    4.76   .31702E+04
    538.31   134.11    6.10    30.2 0.236E+01   1.34   303.11    6.10    4.76   .31732E+04
    538.81   134.11    6.10    30.2 0.236E+01   1.34   303.21    6.10    4.76   .31761E+04
    539.31   134.11    6.10    30.2 0.236E+01   1.34   303.30    6.10    4.76   .31791E+04
    539.81   134.11    6.10    30.2 0.236E+01   1.34   303.40    6.10    4.76   .31820E+04
    540.31   134.11    6.10    30.2 0.236E+01   1.34   303.49    6.10    4.76   .31850E+04
    540.81   134.11    6.10    30.2 0.236E+01   1.34   303.59    6.10    4.76   .31880E+04
    541.31   134.11    6.10    30.2 0.236E+01   1.34   303.68    6.10    4.76   .31909E+04
    541.81   134.11    6.10    30.2 0.236E+01   1.34   303.78    6.10    4.76   .31939E+04
    542.31   134.11    6.10    30.2 0.236E+01   1.34   303.87    6.10    4.76   .31968E+04
    542.81   134.11    6.10    30.2 0.236E+01   1.34   303.97    6.10    4.76   .31998E+04
    543.31   134.11    6.10    30.2 0.236E+01   1.34   304.06    6.10    4.76   .32028E+04
    543.81   134.11    6.10    30.2 0.236E+01   1.34   304.16    6.10    4.76   .32057E+04
    544.31   134.11    6.10    30.2 0.236E+01   1.34   304.25    6.10    4.76   .32087E+04
    544.80   134.11    6.10    30.2 0.236E+01   1.34   304.35    6.10    4.76   .32116E+04
    545.30   134.11    6.10    30.2 0.236E+01   1.34   304.44    6.10    4.76   .32146E+04
    545.80   134.11    6.10    30.3 0.236E+01   1.34   304.54    6.10    4.76   .32176E+04
    546.30   134.11    6.10    30.3 0.235E+01   1.33   304.63    6.10    4.76   .32205E+04
    546.80   134.11    6.10    30.3 0.235E+01   1.33   304.73    6.10    4.76   .32235E+04
    547.30   134.11    6.10    30.3 0.235E+01   1.33   304.80    6.10    4.76   .32264E+04
 Cumulative travel time =        3226.4473 sec  (    0.90 hrs)
 Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING
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BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.101E-01 m^2/s
  Horizontal diffusivity (initial value) = 0.126E-01 m^2/s

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):
        X        Y        Z        S        C        BV       BH       ZU       ZL       TT
    547.30   134.11    6.10    30.3 0.235E+01   1.33   304.80    6.10    4.76   .32264E+04
    564.57   134.11    6.10    30.3 0.235E+01   1.33   304.80    6.10    4.76   .33287E+04
    581.83   134.11    6.10    30.3 0.235E+01   1.33   304.80    6.10    4.76   .34309E+04
    599.09   134.11    6.10    30.3 0.235E+01   1.34   304.80    6.10    4.76   .35331E+04
    616.36   134.11    6.10    30.3 0.235E+01   1.34   304.80    6.10    4.76   .36354E+04
    633.62   134.11    6.10    30.3 0.235E+01   1.34   304.80    6.10    4.76   .37376E+04
    650.88   134.11    6.10    30.3 0.235E+01   1.34   304.80    6.10    4.76   .38398E+04
    668.15   134.11    6.10    30.3 0.235E+01   1.34   304.80    6.10    4.76   .39421E+04
    685.41   134.11    6.10    30.3 0.235E+01   1.34   304.80    6.10    4.76   .40443E+04
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702.68	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.41465E+04
719.94	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.42488E+04
737.20	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.43510E+04
754.47	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.44532E+04
771.73	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.45555E+04
788.99	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.46577E+04
806.26	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.47600E+04
823.52	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.48622E+04
840.78	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.49644E+04
858.05	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.50667E+04
875.31	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.51689E+04
892.57	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.52711E+04
909.84	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.53734E+04
927.10	134.11	6.10	30.3	0.235E+01	1.34	304.80	6.10	4.76	.54756E+04
944.36	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.55778E+04
961.63	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.56801E+04
978.89	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.57823E+04
996.15	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.58845E+04
1013.42	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.59868E+04
1030.68	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.60890E+04
1047.94	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.61912E+04
1065.21	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.62935E+04
1082.47	134.11	6.10	30.4	0.235E+01	1.34	304.80	6.10	4.76	.63957E+04
1099.74	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.64979E+04
1117.00	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.66002E+04
1134.26	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.67024E+04
1151.53	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.68046E+04
1168.79	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.69069E+04
1186.05	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.70091E+04
1203.32	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.71113E+04
1220.58	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.76	.72136E+04
1237.84	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.73158E+04
1255.11	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.74180E+04
1272.37	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.75203E+04
1289.63	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.76225E+04
1306.90	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.77248E+04
1324.16	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.78270E+04
1341.42	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.79292E+04
1358.69	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.80315E+04
1375.95	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.81337E+04
1393.21	134.11	6.10	30.4	0.234E+01	1.34	304.80	6.10	4.75	.82359E+04
1410.48	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.83382E+04
1427.74	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.84404E+04
1445.00	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.85426E+04
1462.27	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.86449E+04
1479.53	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.87471E+04
1496.79	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.88493E+04
1514.06	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.89516E+04
1531.32	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.90538E+04
1548.58	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.91560E+04
1565.85	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.92583E+04
1583.11	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.93605E+04
1600.37	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.94627E+04
1617.64	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.95650E+04
1634.90	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.96672E+04
1652.16	134.11	6.10	30.5	0.234E+01	1.34	304.80	6.10	4.75	.97694E+04
1669.43	134.11	6.10	30.5	0.234E+01	1.35	304.80	6.10	4.75	.98717E+04
1686.69	134.11	6.10	30.5	0.234E+01	1.35	304.80	6.10	4.75	.99739E+04
1703.96	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10076E+05
1721.22	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10178E+05
1738.48	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10281E+05
1755.75	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10383E+05
1773.01	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10485E+05
1790.27	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10587E+05
1807.54	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10690E+05
1824.80	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10792E+05
1842.06	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10894E+05
1859.33	134.11	6.10	30.5	0.233E+01	1.35	304.80	6.10	4.75	.10996E+05
1876.59	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11098E+05
1893.85	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11201E+05
1911.12	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11303E+05
1928.38	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11405E+05
1945.64	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11507E+05
1962.91	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11610E+05
1980.17	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11712E+05
1997.43	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11814E+05
2014.70	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.11916E+05
2031.96	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12019E+05
2049.22	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12121E+05
2066.49	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12223E+05
2083.75	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12325E+05
2101.01	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12428E+05
2118.28	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12530E+05
2135.54	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12632E+05
2152.80	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12734E+05
2170.07	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12836E+05
2187.33	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.12939E+05
2204.59	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.13041E+05
2221.86	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.13143E+05
2239.12	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.13245E+05

2256.38	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.13348E+05
2273.65	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.75	.13450E+05
2290.91	134.11	6.10	30.6	0.233E+01	1.35	304.80	6.10	4.74	.13552E+05
2308.18	134.11	6.10	30.6	0.232E+01	1.35	304.80	6.10	4.74	.13654E+05
2325.44	134.11	6.10	30.6	0.232E+01	1.35	304.80	6.10	4.74	.13757E+05
2342.70	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.13859E+05
2359.97	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.13961E+05
2377.23	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14063E+05
2394.49	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14166E+05
2411.76	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14268E+05
2429.02	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14370E+05
2446.28	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14472E+05
2463.55	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14574E+05
2480.81	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14677E+05
2498.07	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14779E+05
2515.34	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14881E+05
2532.60	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.14983E+05
2549.86	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15086E+05
2567.13	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15188E+05
2584.39	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15290E+05
2601.65	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15392E+05
2618.92	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15495E+05
2636.18	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15597E+05
2653.44	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15699E+05
2670.71	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15801E+05
2687.97	134.11	6.10	30.7	0.232E+01	1.35	304.80	6.10	4.74	.15903E+05
2705.23	134.11	6.10	30.7	0.232E+01	1.36	304.80	6.10	4.74	.16006E+05
2722.50	134.11	6.10	30.7	0.232E+01	1.36	304.80	6.10	4.74	.16108E+05
2739.76	134.11	6.10	30.7	0.232E+01	1.36	304.80	6.10	4.74	.16210E+05
2757.02	134.11	6.10	30.7	0.232E+01	1.36	304.80	6.10	4.74	.16312E+05
2774.29	134.11	6.10	30.7	0.232E+01	1.36	304.80	6.10	4.74	.16415E+05
2791.55	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.16517E+05
2808.81	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.16619E+05
2826.08	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.16721E+05
2843.34	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.16824E+05
2860.60	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.16926E+05
2877.87	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.17028E+05
2895.13	134.11	6.10	30.8	0.232E+01	1.36	304.80	6.10	4.74	.17130E+05
2912.40	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17233E+05
2929.66	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17335E+05
2946.92	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17437E+05
2964.19	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17539E+05
2981.45	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17641E+05
2998.71	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17744E+05
3015.98	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17846E+05
3033.24	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.17948E+05
3050.50	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18050E+05
3067.77	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18153E+05
3085.03	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18255E+05
3102.29	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18357E+05
3119.56	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18459E+05
3136.82	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18562E+05
3154.08	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18664E+05
3171.35	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18766E+05
3188.61	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18868E+05
3205.87	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.18971E+05
3223.14	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.19073E+05
3240.40	134.11	6.10	30.8	0.231E+01	1.36	304.80	6.10	4.74	.19175E+05
3257.66	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.74	.19277E+05
3274.93	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.74	.19379E+05
3292.19	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.74	.19482E+05
3309.45	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.74	.19584E+05
3326.72	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.19686E+05
3343.98	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.19788E+05
3361.24	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.19891E+05
3378.51	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.19993E+05
3395.77	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20095E+05
3413.03	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20197E+05
3430.30	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20300E+05
3447.56	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20402E+05
3464.82	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20504E+05
3482.09	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20606E+05
3499.35	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20709E+05
3516.61	134.11	6.10	30.9	0.231E+01	1.36	304.80	6.10	4.73	.20811E+05
3533.88	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.20913E+05
3551.14	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21015E+05
3568.41	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21117E+05
3585.67	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21220E+05
3602.93	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21322E+05
3620.20	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21424E+05
3637.46	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21526E+05
3654.72	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21629E+05
3671.99	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21731E+05
3689.25	134.11	6.10	30.9	0.230E+01	1.36	304.80	6.10	4.73	.21833E+05
3706.51	134.11	6.10	31.0	0.230E+01	1.36	304.80	6.10	4.73	.21935E+05
3723.78	134.11	6.10	31.0	0.230E+01	1.36	304.80	6.10	4.73	.22038E+05
3741.04	134.11	6.10	31.0	0.230E+01	1.37	304.80	6.10	4.73	.22140E+05
3758.30	134.11	6.10	31.0	0.230E+01	1.37	304.80	6.10	4.73	.22242E+05
3775.57	134.11	6.10	31.0	0.230E+01	1.37	304.80	6.10	4.73	.22344E+05
3792.83	134.11	6.10	31.0	0.230E+01	1.37	304.80	6.10	4.73	.22446E+05

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   3810.09   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .22549E+05
   3827.36   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .22651E+05
   3844.62   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .22753E+05
   3861.88   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .22855E+05
   3879.15   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .22958E+05
   3896.41   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23060E+05
   3913.67   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23162E+05
   3930.94   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23264E+05
   3948.20   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23367E+05
   3965.46   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23469E+05
   3982.73   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23571E+05
   3999.99   134.11    6.10    31.0 0.230E+01   1.37   304.80    6.10    4.73   .23673E+05
 Cumulative travel time =       23673.3516 sec  (    6.58 hrs)

 Simulation limit based on maximum specified distance =   4000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT
-------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------
CORMIX2: Multiport Diffuser Discharges       End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
```

```
CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                      CORMIX MIXING ZONE EXPERT SYSTEM
                          CORMIX Version 10.0GT
                       HYDRO2:Version-10.0.1.0  October,2016
SITE NAME/LABEL:                LG&E KU Ghent
  DESIGN CASE:                  Scenario 15
  FILE NAME:                    \\conshohocken.na.aecomnet.com\Conshohocken\Projects\Private-Sector\LG&E KU\Ghent\Conceptual
Design\2018\Model Run Files\Scen 15 5-Port Diffuser Design 20 ft spacing selenium 0 deg vert angle 45 deg horiz to right bank.prd
  Using subsystem CORMIX2:     Multiport Diffuser Discharges
  Start of session:             06/14/2018--23:23:57
*******************************************************************************
SUMMARY OF INPUT DATA:
-------------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                         = bounded
  Width                         BS      = 304.80 m
  Channel regularity            ICHREG = 1
  Ambient flowrate              QA      = 311.49 m^3/s
  Average depth                 HA      = 6.10 m
  Depth at discharge            HD      = 6.10 m
  Ambient velocity              UA      = 0.1676 m/s
  Darcy-Weisbach friction factor F      = 0.0172
    Calculated from Manning's n         = 0.02
  Wind velocity                 UW      = 4.00 m/s
  Stratification Type           STRCND = U
  Surface temperature                   = 27.58 degC
  Bottom temperature                    = 27.58 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density               RHOAS   = 996.3531 kg/m^3
  Bottom density                RHOAB   = 996.3531 kg/m^3
-------------------------------------------------------------------------------
DISCHARGE PARAMETERS:           Submerged Multiport Diffuser Discharge
  Diffuser type                 DITYPE = unidirectional perpendicular
  Diffuser length               LD      = 24.38 m
  Nearest bank                          = left
  Diffuser endpoints            YB1     = 121.92 m;    YB2 = 146.30 m
  Number of openings            NOPEN   = 5
  Number of Risers              NRISER = 5
  Ports/Nozzles per Riser       NPPERR  = 1
  Spacing between risers/openings SPAC  = 6.10 m
  Port/Nozzle diameter          D0      = 0.4572 m
    with contraction ratio              = 1
  Equivalent slot width         B0      = 0.0269 m
  Total area of openings        TA0     = 0.8209 m^2
  Discharge velocity            U0      = 2.76 m/s
  Total discharge flowrate      Q0      = 2.269495 m^3/s
  Discharge port height         H0      = 0.61 m
  Nozzle arrangement            BETYPE = unidirectional without fanning
  Diffuser alignment angle      GAMMA   = 90 deg
  Vertical discharge angle      THETA   = 0 deg
  Actual Vertical discharge angle THEAC  = 0 deg
  Horizontal discharge angle    SIGMA   = 315 deg
  Relative orientation angle    BETA    = 45 deg
  Discharge temperature (freshwater)    = 43.33 degC
  Corresponding density         RHO0    = 990.8954 kg/m^3
  Density difference            DRHO    = 5.4577 kg/m^3
  Buoyant acceleration          GP0     = 0.0537 m/s^2
  Discharge concentration       C0      = 71.25 ppb
  Surface heat exchange coeff.  KS      = 0 m/s
  Coefficient of decay          KD      = 0 /s
-------------------------------------------------------------------------------
FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
  Discharge (volume flux)       q0      = 0.093073 m^2/s
  Momentum flux                 m0      = 0.257324 m^3/s^2
  Buoyancy flux                 j0      = 0.005000 m^3/s^3
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.03 m          Lm  = 9.16 m          LM  = 8.15 m
  lm' = 99999 m         Lb' = 99999 m         La  = 99999 m
  (These refer to the actual discharge/environment length scales.)
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
Slot Froude number              FR0    = 72.69
  Port/nozzle Froude number     FRD0    = 17.64
  Velocity ratio                R       = 16.49
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                       = yes
  CMC concentration             CMC     = 7.125 ppb
  CCC concentration             CCC     = 5 ppb
  Water quality standard specified      = given by CCC value
  Regulatory mixing zone                = yes
  Regulatory mixing zone specification  = distance
  Regulatory mixing zone value          = 176.17 m (m^2 if area)
  Region of interest                    = 4000 m
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *------------------------*
  | FLOW CLASS   = MU2 |
```

```
  *------------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 6.10 m

  Limiting Dilution S = (QA/Q0)+ 1.0 = 138.2

*******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-------------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the BOTTOM below the port/diffuser center:
    134.11 m from the left bank/shore.
  Number of display steps NSTEP = 200 per module.
-------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
  implication.  However, this information may be useful for the discharge
  designer because the mixing in the NFR is usually sensitive to the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 4.3246 ppb
  Dilution at edge of NFR              s = 16.5
  NFR Location:                        x = 8.62 m
    (centerline coordinates)           y = -8.62 m
                                       z = 6.10 m
  NFR plume dimensions:  half-width (bh) = 9.15 m
                          thickness (bv) = 6.10 m
Cumulative travel time:       36.3451 sec.
-------------------------------------------------------------------------------
Buoyancy assessment:
  The effluent density is less than the surrounding ambient water
  density at the discharge level.
  Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
  the surface.
-------------------------------------------------------------------------------
Near-field instability behavior:
  The diffuser flow will experience instabilities with full vertical mixing
  in the near-field.
  There may be benthic impact of high pollutant concentrations.
-------------------------------------------------------------------------------
FAR-FIELD MIXING SUMMARY:
  Plume becomes vertically fully mixed WITHIN NEAR-FIELD at 0 m
  downstream, but RE-STRATIFIES LATER and is not mixed in the far-field.
  Plume becomes laterally fully mixed at 547.31 m
  downstream.
-------------------------------------------------------------------------------
PLUME BANK CONTACT SUMMARY:
  Plume in bounded section contacts nearest bank at 447.35 m downstream.
  Plume contacts second bank at 547.31 m downstream.
********************** TOXIC DILUTION ZONE SUMMARY ************************
Recall: The TDZ corresponds to the three (3) criteria issued in the USEPA
  Technical Support Document (TSD) for Water Quality-based Toxics Control,
  1991 (EPA/505/2-90-001).
  Criterion maximum concentration (CMC)  = 7.125  ppb
Corresponding dilution                   = 10
The CMC was encountered at the following plume position:
  Plume location:                      x = 2.92 m
    (centerline coordinates)           y = -2.92 m
                                       z = 0.94 m
  Plume dimension:       half-width (bh) = 10.21 m
                          thickness (bv) = 2.06 m

 Computed distance from port opening to CMC location = 4.14 m.
 CRITERION 1: This location is within 50 times the discharge length scale of
              Lq = 0.41 m.
 +++++ The discharge length scale TEST for the TDZ has been SATISFIED. ++++++

 Computed horizontal distance from port opening to CMC location = 4.12 m.
 CRITERION 2: This location is within 5 times the ambient water depth of
              HD = 6.10 m.
 ++++++++++ The ambient depth TEST for the TDZ has been SATISFIED. ++++++++++

 Computed distance from port opening to CMC location = 4.14 m.
 CRITERION 3: This location is within one tenth the distance of the extent
              of the Regulatory Mixing Zone of 176.47 m in any
              spatial direction from the port opening.
 +++++ The Regulatory Mixing Zone TEST for the TDZ has been SATISFIED. ++++++

 The diffuser discharge velocity is equal to 2.76 m/s.
 This is below the value of 3.0 m/s recommended in the TSD.

 *** All three CMC criteria for the TDZ are SATISFIED for this discharge. ***
******************** REGULATORY MIXING ZONE SUMMARY ***********************
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration              c = 2.966885  ppb
  Corresponding dilution               s = 24.0
  Plume location:                      x = 176.17 m
    (centerline coordinates)           y = -8.62 m
                                       z = 6.10 m
```

```
  Plume dimensions:      half-width (bh) = 79.25 m
                          thickness (bv) = 2.04 m
Cumulative travel time:       1028.5986 sec.

Note:
Plume concentration c and dilution s values are reported based on prediction
file values - assuming linear interpolation between predicted points just
before and just after the RMZ boundary has been detected.

Please ensure a small step size is used in the prediction file to account
for this linear interpolation. Step size can be controlled by increasing
(reduces the prediction step size) or decreasing (increases the prediction
step size) the - Output Steps per Module - in CORMIX input.

At this position, the plume is CONTACTING the LEFT bank.
Furthermore, the CCC for the toxic pollutant has indeed been met
  within the RMZ. In particular:
The CCC was encountered at the following plume position:
The CCC for the toxic pollutant was encountered at the following
  plume position:
  CCC                                  = 5  ppb
Corresponding dilution                 = 14.3
  Plume location:                    x = 6.32 m
    (centerline coordinates)         y = -6.32 m
                                     z = 1.32 m
 Computed horizontal distance from port opening to CCC location = 8.97
  Plume dimensions:      half-width (bh) = 9.28 m
                          thickness (bv) = 4.47 m
******************** FINAL DESIGN ADVICE AND COMMENTS **********************
CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent
  the actual three-dimensional diffuser geometry.  Thus, it approximates
  the details of the merging process of the individual jets from each
  port/nozzle.
In the present design, the spacing between adjacent ports/nozzles
  (or riser assemblies) is of the order of, or less than, the local
  water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a
  final CORMIX1 (single port discharge) analysis, with discharge data
  for an individual diffuser jet/plume, in order to compare to
  the present near-field prediction.
------------------------------------------------------------------------------
REMINDER:  The user must take note that HYDRODYNAMIC MODELING by any known
  technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the
  CORMIX predictions on dilutions and concentrations (with associated
  plume geometries) are reliable for the majority of cases and are accurate
  to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges
  the design configuration as highly complex and uncertain for prediction.
```

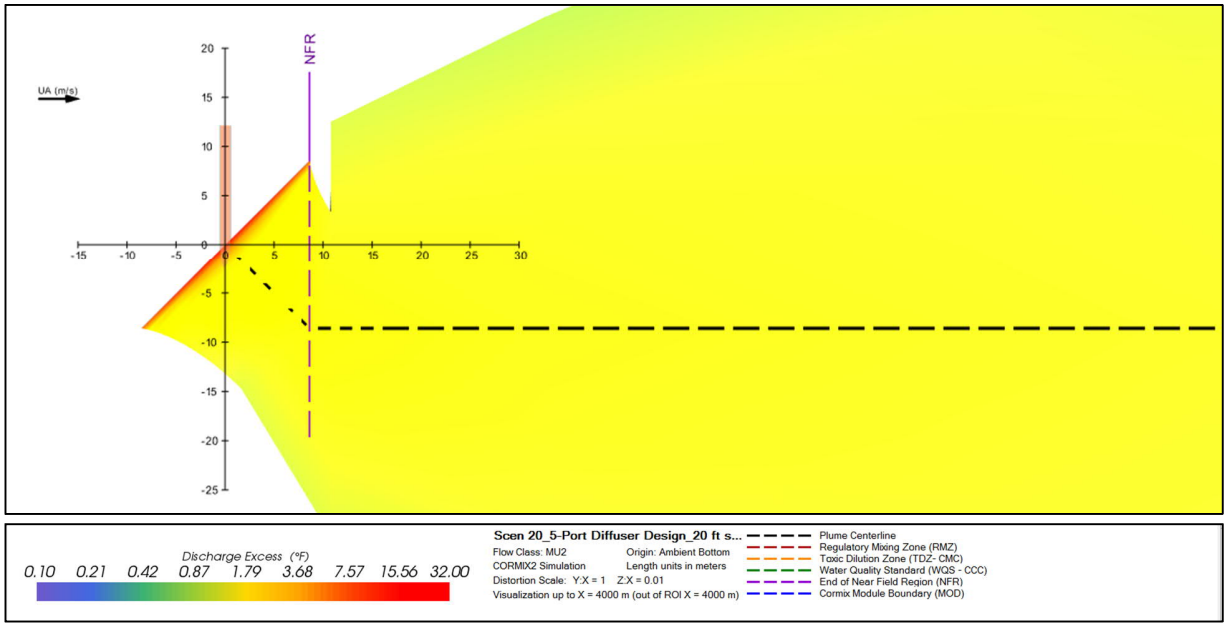
APPENDIX D

CORMIX Output Files and Results for Temperature Model Runs

Appendix D – CORMIX Output Files and Results for Temperature Model Runs
Ghent Generating Station

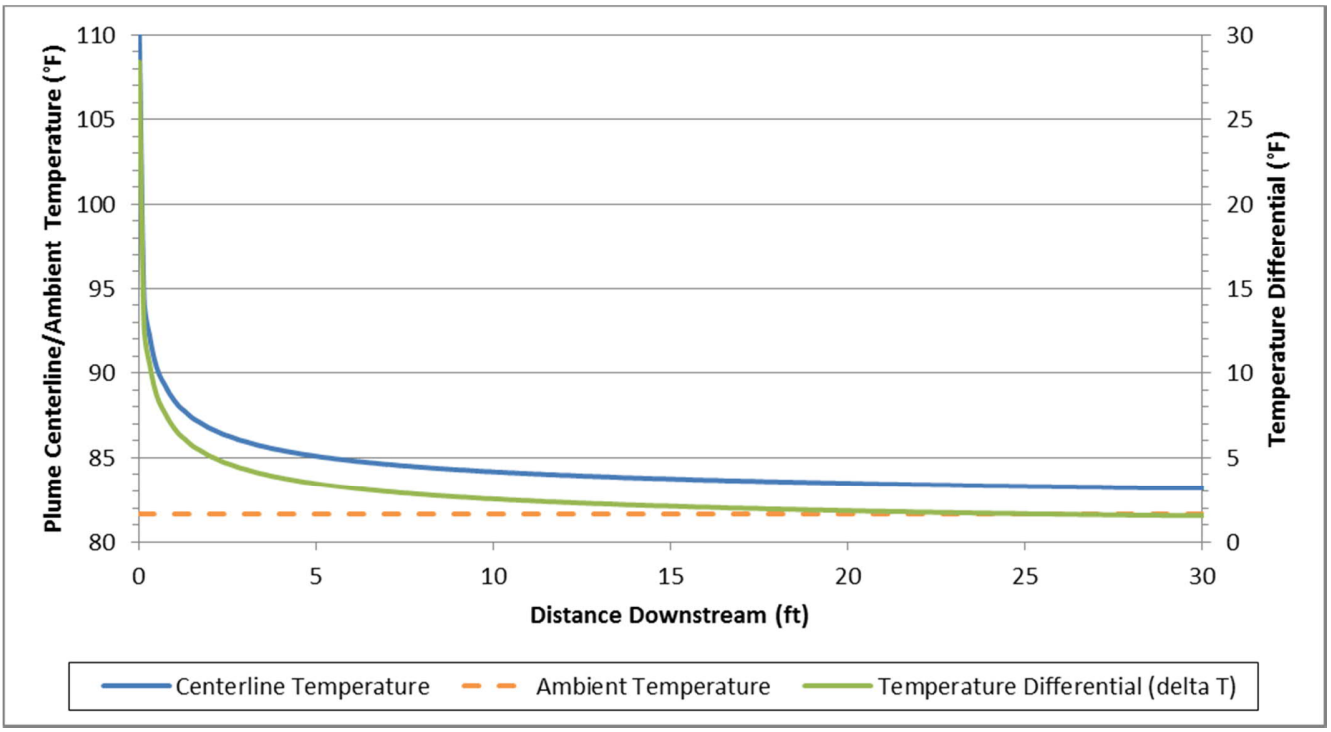
Summer Conditions:
Ambient River Temperature = 81.64°F
Discharge Temperature = 110°F
Initial Discharge Temperature Excess = 28.36°F

The plan view figure below shows the shape of the plume and the concentrations within the plume. Since the diffuser ports are pointed to the north bank of the river ("downward" direction in the figure), CORMIX begins the plume on this angle with the center of the plume located at the center of the diffuser.



Appendix D – CORMIX Output Files and Results for Temperature Model Runs
Ghent Generating Station

The ΔT drops to less than 5°F within 2.6 ft downstream of the diffuser. The centerline plume temperature drops below the July maximum temperature of 84°F within 14.3 ft downstream of the diffuser. The graph below shows the plume centerline temperature and ΔT as a function of distance downstream of the diffuser. The data from CORMIX was exported, converted to English units, and re-graphed.



```
CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                      CORMIX MIXING ZONE EXPERT SYSTEM
                          CORMIX Version 10.0GT
                       HYDRO2:Version-10.0.1.0  October,2016
SITE NAME/LABEL:                LG&E KU Ghent
  DESIGN CASE:                  Scenario 20
  FILE NAME:                    \\conshohocken.na.aecomnet.com\Conshohocken\Projects\Private-Sector\LG&E KU\Ghent\Conceptual
Design\2018\Model Run Files\Scen 20 5-Port Diffuser Design 20 ft spacing summer temp 0 deg vert angle 45 deg horiz to right bank
non fanned.prd
  Using subsystem CORMIX2:     Multiport Diffuser Discharges
  Start of session:             06/15/2018--16:58:01
*******************************************************************************
SUMMARY OF INPUT DATA:
-------------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                         = bounded
  Width                          BS     = 304.80 m
  Channel regularity             ICHREG = 1
  Ambient flowrate               QA     = 311.49 m^3/s
  Average depth                  HA     = 6.10 m
  Depth at discharge             HD     = 6.10 m
  Ambient velocity               UA     = 0.1676 m/s
  Darcy-Weisbach friction factor F      = 0.0172
    Calculated from Manning's n         = 0.02
  Wind velocity                  UW     = 4.00 m/s
  Stratification Type            STRCND = U
  Surface temperature                   = 27.58 degC
  Bottom temperature                    = 27.58 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density                RHOAS  = 996.3531 kg/m^3
  Bottom density                 RHOAB  = 996.3531 kg/m^3
-------------------------------------------------------------------------------
DISCHARGE PARAMETERS:           Submerged Multiport Diffuser Discharge
  Diffuser type                 DITYPE = unidirectional perpendicular
  Diffuser length               LD     = 24.38 m
  Nearest bank                          = left
  Diffuser endpoints            YB1    = 121.92 m;    YB2 = 146.30 m
  Number of openings            NOPEN  = 5
  Number of Risers              NRISER = 5
  Ports/Nozzles per Riser       NPPERR  = 1
  Spacing between risers/openings SPAC   = 6.10 m
  Port/Nozzle diameter          D0     = 0.4572 m
    with contraction ratio              = 1
  Equivalent slot width         B0     = 0.0269 m
  Total area of openings        TA0    = 0.8209 m^2
  Discharge velocity            U0     = 2.76 m/s
  Total discharge flowrate      Q0     = 2.269495 m^3/s
  Discharge port height         H0     = 0.61 m
  Nozzle arrangement            BETYPE = unidirectional without fanning
  Diffuser alignment angle      GAMMA  = 90 deg
  Vertical discharge angle      THETA  = 0 deg
  Actual Vertical discharge angle THEAC  = 0 deg
  Horizontal discharge angle    SIGMA  = 315 deg
  Relative orientation angle    BETA   = 45 deg
  Discharge temperature (freshwater)    = 43.33 degC
  Corresponding density         RHO0   = 990.8954 kg/m^3
  Density difference            DRHO   = 5.4577 kg/m^3
  Buoyant acceleration          GP0    = 0.0537 m/s^2
  Discharge concentration       C0     = 28.360000 deg.F
  Surface heat exchange coeff.  KS     = 0.000017 m/s
  Coefficient of decay          KD     = 0 /s
-------------------------------------------------------------------------------
FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
  Discharge (volume flux)       q0     = 0.093073 m^2/s
  Momentum flux                 m0     = 0.257324 m^3/s^2
  Buoyancy flux                 j0     = 0.005000 m^3/s^3
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.03 m         Lm  = 9.16 m         LM  = 8.15 m
  lm' = 99999 m         Lb' = 99999 m         La  = 99999 m
  (These refer to the actual discharge/environment length scales.)
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
Slot Froude number              FR0    = 72.69
  Port/nozzle Froude number     FRD0   = 17.64
  Velocity ratio                R      = 16.49
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                       = yes
  CMC concentration             CMC    = 5 deg.F
  CCC concentration             CCC    = 2.36 deg.F
  Water quality standard specified      = given by CCC value
  Regulatory mixing zone                = yes
  Regulatory mixing zone specification  = distance
  Regulatory mixing zone value          = 176.17 m (m^2 if area)
  Region of interest                    = 4000 m
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *------------------------*
```

```
  | FLOW CLASS   = MU2 |
  *------------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 6.10 m

  Limiting Dilution S = (QA/Q0)+ 1.0 = 138.2

*******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-------------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the BOTTOM below the port/diffuser center:
    134.11 m from the left bank/shore.
  Number of display steps NSTEP = 200 per module.
-------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
  implication.  However, this information may be useful for the discharge
  designer because the mixing in the NFR is usually sensitive to the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 1.7214 deg.F
  Dilution at edge of NFR              s = 16.5
  NFR Location:                        x = 8.62 m
    (centerline coordinates)           y = -8.62 m
                                       z = 6.10 m
  NFR plume dimensions:  half-width (bh) = 9.15 m
                          thickness (bv) = 6.10 m
Cumulative travel time:       36.3451 sec.
-------------------------------------------------------------------------------
Buoyancy assessment:
  The effluent density is less than the surrounding ambient water
  density at the discharge level.
  Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
  the surface.
-------------------------------------------------------------------------------
Near-field instability behavior:
  The diffuser flow will experience instabilities with full vertical mixing
  in the near-field.
  There may be benthic impact of high pollutant concentrations.
-------------------------------------------------------------------------------
FAR-FIELD MIXING SUMMARY:
  Plume becomes vertically fully mixed WITHIN NEAR-FIELD at 0 m
  downstream, but RE-STRATIFIES LATER and is not mixed in the far-field.
  Plume becomes laterally fully mixed at 549.68 m
  downstream.
-------------------------------------------------------------------------------
PLUME BANK CONTACT SUMMARY:
  Plume in bounded section contacts nearest bank at 449.51 m downstream.
  Plume contacts second bank at 549.68 m downstream.
********************** TOXIC DILUTION ZONE SUMMARY ************************
Recall: The TDZ corresponds to the three (3) criteria issued in the USEPA
  Technical Support Document (TSD) for Water Quality-based Toxics Control,
  1991 (EPA/505/2-90-001).
  Criterion maximum concentration (CMC)  = 5  deg.F
Corresponding dilution                   = 5.672
The CMC was encountered at the following plume position:
  Plume location:                      x = 0.79 m
    (centerline coordinates)           y = -0.79 m
                                       z = 0.70 m
  Plume dimension:       half-width (bh) = 11.46 m
                          thickness (bv) = 0.56 m

 Computed distance from port opening to CMC location = 1.12 m.
 CRITERION 1: This location is within 50 times the discharge length scale of
              Lq = 0.41 m.
 +++++ The discharge length scale TEST for the TDZ has been SATISFIED. ++++++

 Computed horizontal distance from port opening to CMC location = 1.11 m.
 CRITERION 2: This location is within 5 times the ambient water depth of
              HD = 6.10 m.
 ++++++++++ The ambient depth TEST for the TDZ has been SATISFIED. ++++++++++

 Computed distance from port opening to CMC location = 1.12 m.
 CRITERION 3: This location is within one tenth the distance of the extent
              of the Regulatory Mixing Zone of 176.47 m in any
              spatial direction from the port opening.
 +++++ The Regulatory Mixing Zone TEST for the TDZ has been SATISFIED. ++++++

 The diffuser discharge velocity is equal to 2.76 m/s.
 This is below the value of 3.0 m/s recommended in the TSD.

 *** All three CMC criteria for the TDZ are SATISFIED for this discharge. ***
********************* REGULATORY MIXING ZONE SUMMARY **********************
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration              c = 1.177933  deg.F
  Corresponding dilution               s = 24.0
  Plume location:                      x = 176.17 m
    (centerline coordinates)           y = -8.62 m
```

```
                                    z = 6.10 m
  Plume dimensions:      half-width (bh) = 79.19 m
                          thickness (bv) = 2.04 m
Cumulative travel time:       1028.5986 sec.

Note:
Plume concentration c and dilution s values are reported based on prediction
file values - assuming linear interpolation between predicted points just
before and just after the RMZ boundary has been detected.

Please ensure a small step size is used in the prediction file to account
for this linear interpolation. Step size can be controlled by increasing
(reduces the prediction step size) or decreasing (increases the prediction
step size) the - Output Steps per Module - in CORMIX input.

At this position, the plume is CONTACTING the LEFT bank.
Furthermore, the CCC for the toxic pollutant has indeed been met
  within the RMZ. In particular:
The CCC was encountered at the following plume position:
The CCC for the toxic pollutant was encountered at the following
  plume position:
  CCC                                 = 2.36  deg.F
Corresponding dilution                = 12.0
  Plume location:                    x = 4.37 m
    (centerline coordinates)         y = -4.37 m
                                     z = 1.10 m
 Computed horizontal distance from port opening to CCC location = 6.20
  Plume dimensions:      half-width (bh) = 9.69 m
                          thickness (bv) = 3.09 m
******************** FINAL DESIGN ADVICE AND COMMENTS **********************
CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent
  the actual three-dimensional diffuser geometry.  Thus, it approximates
  the details of the merging process of the individual jets from each
  port/nozzle.
In the present design, the spacing between adjacent ports/nozzles
  (or riser assemblies) is of the order of, or less than, the local
  water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a
  final CORMIX1 (single port discharge) analysis, with discharge data
  for an individual diffuser jet/plume, in order to compare to
  the present near-field prediction.
------------------------------------------------------------------------------
REMINDER:  The user must take note that HYDRODYNAMIC MODELING by any known
  technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the
  CORMIX predictions on dilutions and concentrations (with associated
  plume geometries) are reliable for the majority of cases and are accurate
  to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges
  the design configuration as highly complex and uncertain for prediction.
```

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
               Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 10.0GT
                     HYDRO2 Version 10.0.1.0 October 2016
-------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:   LG&E KU Ghent
 Design case:       Scenario 20
 FILE NAME:         \\c...t angle_45 deg horiz to right bank_non fanned.prd
 Time stamp:        06/15/2018--16:58:01

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    304.80  AS    =   1858.06  QA    =    311.49  ICHREG= 1
 HA    =      6.10  HD    =      6.10
 UA    =     0.168 F     =     0.017 USTAR =0.7771E-02
 UW    =     4.001 UWSTAR=0.4610E-02
 Uniform density environment
 STRCND=  U         RHOAM =  996.3531

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =    134.11  YB1   =    121.92  YB2   =    146.30
 LD    =     24.38  NOPEN =    5       SPAC  =      6.10
 D0    =     0.457 A0    =      0.164 H0    =      0.61  SUB0  =      5.49
 D0INP =     0.457 CR0   =      1.000
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =      0.00  SIGMA =    315.00  BETA  =     45.00
 U0    =     2.765 Q0    =      2.269 Q0A   =0.2269E+01
 RHO0  =  990.8954  DRHO0 =0.5458E+01  GP0   =0.5372E-01
 C0    =0.2836E+02  CUNITS=  deg.F
 IPOLL =  3         KS    =0.1660E-04  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.9307E-01  m0    =0.2059E+00  j0    =0.4000E-02  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =      0.034 lM    =      8.15  lm    =      9.16
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.2269E+01  M0    =0.5020E+01  J0    =0.9753E-01
 Associated 3-d length scales (meters)
 LQ    =      0.41  LM    =     10.74  Lm    =     14.94  Lb    =     25.88
                                       Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     72.69  FRD0  =     17.64  R     =     16.49  PL    =   11.44
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:
 Properties of riser group with  1 ports/nozzles each:
 U0    =      2.765 D0    =      0.457 A0    =      0.164 THETA =      0.00
 FR0   =     72.69  FRD0  =     17.64  R     =     16.49
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU2    2
 2  Applicable layer depth HS =     6.10  2
 2  Limiting Dilution S =QA/Q0=   138.25  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.2836E+02  CUNITS=  deg.F
 NTOX  =  1         CMC   =0.5000E+01  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.2360E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    176.17  WREG  =      0.00  AREG  =      0.00
 XINT  =   4000.00  XMAX  =   4000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       134.11 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 200 display intervals per module
-------------------------------------------------------------------------------------------------

NOTE on dilution/concentration values for this HEATED DISCHARGE (IPOLL=3):
   S  = hydrodynamic dilutions, include buoyancy (heat) loss effects, but
        provided plume has surface contact
   C  = corresponding temperature values (in "deg.F"!) include heat loss,
        if any
-------------------------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY
```

```
 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   Uc = Local centerline excess velocity (above ambient)
   TT = Cumulative travel time

       X        Y       Z        S       C       BV       BH       Uc        TT
     0.00     0.00    0.61     1.0 0.284E+02   0.02    12.19     2.646   .00000E+00

END OF MOD201: DIFFUSER DISCHARGE MODULE
-----------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    6.10m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

       X        Y       Z        S       C       BV       BH        TT
     0.00    -0.00    0.61     1.0 0.284E+02   0.02    12.19 .00000E+00
     0.04    -0.04    0.61     2.1 0.135E+02   0.03    12.15 .40974E-01
     0.09    -0.09    0.62     2.5 0.111E+02   0.06    12.10 .97310E-01
     0.13    -0.13    0.62     2.9 0.980E+01   0.09    12.06 .16292E+00
     0.17    -0.17    0.63     3.2 0.889E+01   0.12    12.01 .23566E+00
     0.22    -0.22    0.63     3.4 0.823E+01   0.15    11.97 .31431E+00
     0.26    -0.26    0.64     3.7 0.771E+01   0.18    11.93 .39806E+00
     0.30    -0.30    0.64     3.9 0.728E+01   0.21    11.89 .48633E+00
     0.34    -0.34    0.65     4.1 0.693E+01   0.24    11.85 .57866E+00
     0.39    -0.39    0.65     4.3 0.662E+01   0.27    11.81 .67468E+00
     0.43    -0.43    0.66     4.5 0.636E+01   0.30    11.77 .77411E+00
     0.47    -0.47    0.66     4.6 0.613E+01   0.34    11.73 .87670E+00
     0.52    -0.52    0.67     4.8 0.592E+01   0.37    11.69 .98224E+00
     0.56    -0.56    0.67     4.9 0.573E+01   0.40    11.65 .10905E+01
     0.60    -0.60    0.68     5.1 0.557E+01   0.43    11.61 .12014E+01
     0.65    -0.65    0.68     5.2 0.541E+01   0.46    11.58 .13148E+01
     0.69    -0.69    0.69     5.4 0.527E+01   0.49    11.54 .14305E+01
     0.73    -0.73    0.69     5.5 0.515E+01   0.52    11.51 .15485E+01
     0.78    -0.78    0.70     5.6 0.503E+01   0.55    11.47 .16686E+01
** CMC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below CMC value of 0.500E+01
   in the current prediction interval.
 This is the extent of the TOXIC DILUTION ZONE.
     0.82    -0.82    0.70     5.8 0.492E+01   0.58    11.44 .17907E+01
     0.86    -0.86    0.71     5.9 0.481E+01   0.61    11.40 .19148E+01
     0.91    -0.91    0.71     6.0 0.472E+01   0.64    11.37 .20407E+01
     0.95    -0.95    0.72     6.1 0.462E+01   0.67    11.33 .21685E+01
     0.99    -0.99    0.72     6.2 0.454E+01   0.70    11.30 .22979E+01
     1.03    -1.03    0.73     6.4 0.446E+01   0.73    11.27 .24291E+01
     1.08    -1.08    0.73     6.5 0.438E+01   0.76    11.24 .25619E+01
     1.12    -1.12    0.74     6.6 0.431E+01   0.79    11.21 .26963E+01
     1.16    -1.16    0.74     6.7 0.424E+01   0.82    11.17 .28322E+01
     1.21    -1.21    0.75     6.8 0.418E+01   0.85    11.14 .29695E+01
     1.25    -1.25    0.75     6.9 0.411E+01   0.88    11.11 .31083E+01
     1.29    -1.29    0.76     7.0 0.406E+01   0.91    11.08 .32485E+01
     1.34    -1.34    0.76     7.1 0.400E+01   0.94    11.05 .33900E+01
     1.38    -1.38    0.77     7.2 0.394E+01   0.98    11.03 .35329E+01
     1.42    -1.42    0.77     7.3 0.389E+01   1.01    11.00 .36770E+01
     1.47    -1.47    0.78     7.4 0.384E+01   1.04    10.97 .38224E+01
     1.51    -1.51    0.78     7.5 0.379E+01   1.07    10.94 .39690E+01
     1.55    -1.55    0.79     7.6 0.375E+01   1.10    10.91 .41168E+01
     1.59    -1.59    0.79     7.7 0.370E+01   1.13    10.89 .42657E+01
     1.64    -1.64    0.79     7.7 0.366E+01   1.16    10.86 .44158E+01
     1.68    -1.68    0.80     7.8 0.362E+01   1.19    10.83 .45670E+01
     1.72    -1.72    0.80     7.9 0.358E+01   1.22    10.81 .47193E+01
     1.77    -1.77    0.81     8.0 0.354E+01   1.25    10.78 .48726E+01
     1.81    -1.81    0.81     8.1 0.350E+01   1.28    10.76 .50270E+01
     1.85    -1.85    0.82     8.2 0.347E+01   1.31    10.73 .51824E+01
     1.90    -1.90    0.82     8.3 0.343E+01   1.34    10.71 .53387E+01
     1.94    -1.94    0.83     8.3 0.340E+01   1.37    10.68 .54961E+01
     1.98    -1.98    0.83     8.4 0.337E+01   1.40    10.66 .56544E+01
     2.03    -2.03    0.84     8.5 0.334E+01   1.43    10.64 .58136E+01
     2.07    -2.07    0.84     8.6 0.330E+01   1.46    10.61 .59738E+01
     2.11    -2.11    0.85     8.7 0.327E+01   1.49    10.59 .61348E+01
     2.16    -2.16    0.85     8.7 0.325E+01   1.52    10.57 .62968E+01
     2.20    -2.20    0.86     8.8 0.322E+01   1.55    10.54 .64596E+01
     2.24    -2.24    0.86     8.9 0.319E+01   1.58    10.52 .66233E+01
     2.28    -2.28    0.87     9.0 0.316E+01   1.62    10.50 .67878E+01
     2.33    -2.33    0.87     9.0 0.314E+01   1.65    10.48 .69531E+01
     2.37    -2.37    0.88     9.1 0.311E+01   1.68    10.46 .71193E+01
     2.41    -2.41    0.88     9.2 0.309E+01   1.71    10.43 .72862E+01
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2.46	-2.46	0.89	9.3	0.306E+01	1.74	10.41	.74540E+01
2.50	-2.50	0.89	9.3	0.304E+01	1.77	10.39	.76225E+01
2.54	-2.54	0.90	9.4	0.302E+01	1.80	10.37	.77917E+01
2.59	-2.59	0.90	9.5	0.299E+01	1.83	10.35	.79618E+01
2.63	-2.63	0.91	9.5	0.297E+01	1.86	10.33	.81325E+01
2.67	-2.67	0.91	9.6	0.295E+01	1.89	10.31	.83040E+01
2.72	-2.72	0.92	9.7	0.293E+01	1.92	10.29	.84762E+01
2.76	-2.76	0.92	9.8	0.291E+01	1.95	10.27	.86491E+01
2.80	-2.80	0.93	9.8	0.289E+01	1.98	10.25	.88227E+01
2.84	-2.84	0.93	9.9	0.287E+01	2.01	10.24	.89970E+01
2.89	-2.89	0.94	10.0	0.285E+01	2.04	10.22	.91719E+01
2.93	-2.93	0.94	10.0	0.283E+01	2.07	10.20	.93475E+01
2.97	-2.97	0.95	10.1	0.281E+01	2.10	10.18	.95238E+01
3.02	-3.02	0.95	10.2	0.279E+01	2.13	10.16	.97007E+01
3.06	-3.06	0.96	10.2	0.277E+01	2.16	10.14	.98783E+01
3.10	-3.10	0.96	10.3	0.276E+01	2.19	10.13	.10056E+02
3.15	-3.15	0.97	10.3	0.274E+01	2.23	10.11	.10235E+02
3.19	-3.19	0.97	10.4	0.272E+01	2.26	10.09	.10415E+02
3.23	-3.23	0.98	10.5	0.271E+01	2.29	10.08	.10595E+02
3.28	-3.28	0.98	10.5	0.269E+01	2.32	10.06	.10775E+02
3.32	-3.32	0.99	10.6	0.267E+01	2.35	10.04	.10957E+02
3.36	-3.36	0.99	10.7	0.266E+01	2.38	10.03	.11138E+02
3.41	-3.41	0.99	10.7	0.264E+01	2.41	10.01	.11321E+02
3.45	-3.45	1.00	10.8	0.263E+01	2.44	9.99	.11504E+02
3.49	-3.49	1.00	10.8	0.261E+01	2.47	9.98	.11687E+02
3.53	-3.53	1.01	10.9	0.260E+01	2.50	9.96	.11871E+02
3.58	-3.58	1.01	11.0	0.259E+01	2.53	9.95	.12056E+02
3.62	-3.62	1.02	11.0	0.257E+01	2.56	9.93	.12241E+02
3.66	-3.66	1.02	11.1	0.256E+01	2.59	9.92	.12427E+02
3.71	-3.71	1.03	11.1	0.254E+01	2.62	9.90	.12613E+02
3.75	-3.75	1.03	11.2	0.253E+01	2.65	9.89	.12800E+02
3.79	-3.79	1.04	11.3	0.252E+01	2.68	9.87	.12987E+02
3.84	-3.84	1.04	11.3	0.250E+01	2.71	9.86	.13175E+02
3.88	-3.88	1.05	11.4	0.249E+01	2.74	9.84	.13363E+02
3.92	-3.92	1.05	11.4	0.248E+01	2.77	9.83	.13552E+02
3.97	-3.97	1.06	11.5	0.247E+01	2.80	9.81	.13741E+02
4.01	-4.01	1.06	11.6	0.245E+01	2.83	9.80	.13931E+02
4.05	-4.05	1.07	11.6	0.244E+01	2.87	9.79	.14121E+02
4.09	-4.09	1.07	11.7	0.243E+01	2.90	9.77	.14312E+02
4.14	-4.14	1.08	11.7	0.242E+01	2.93	9.76	.14503E+02
4.18	-4.18	1.08	11.8	0.241E+01	2.96	9.75	.14695E+02
4.22	-4.22	1.09	11.8	0.240E+01	2.99	9.73	.14887E+02
4.27	-4.27	1.09	11.9	0.239E+01	3.02	9.72	.15080E+02
4.31	-4.31	1.10	11.9	0.237E+01	3.05	9.71	.15273E+02
4.35	-4.35	1.10	12.0	0.236E+01	3.08	9.69	.15466E+02

** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
The pollutant concentration in the plume falls below water quality standard or CCC value of 0.236E+01 in the current prediction interval.
This is the spatial extent of concentrations exceeding the water quality standard or CCC value.

4.40	-4.40	1.11	12.1	0.235E+01	3.11	9.68	.15660E+02
4.44	-4.44	1.11	12.1	0.234E+01	3.14	9.67	.15855E+02
4.48	-4.48	1.12	12.2	0.233E+01	3.17	9.66	.16050E+02
4.53	-4.53	1.12	12.2	0.232E+01	3.20	9.65	.16245E+02
4.57	-4.57	1.13	12.3	0.231E+01	3.23	9.63	.16441E+02
4.61	-4.61	1.13	12.3	0.230E+01	3.26	9.62	.16637E+02
4.66	-4.66	1.14	12.4	0.229E+01	3.29	9.61	.16833E+02
4.70	-4.70	1.14	12.4	0.228E+01	3.32	9.60	.17030E+02
4.74	-4.74	1.15	12.5	0.227E+01	3.35	9.59	.17228E+02
4.78	-4.78	1.15	12.5	0.226E+01	3.38	9.58	.17426E+02
4.83	-4.83	1.16	12.6	0.225E+01	3.41	9.57	.17624E+02
4.87	-4.87	1.16	12.6	0.225E+01	3.44	9.55	.17823E+02
4.91	-4.91	1.17	12.7	0.224E+01	3.47	9.54	.18022E+02
4.96	-4.96	1.17	12.7	0.223E+01	3.51	9.53	.18221E+02
5.00	-5.00	1.18	12.8	0.222E+01	3.54	9.52	.18421E+02
5.04	-5.04	1.18	12.8	0.221E+01	3.57	9.51	.18621E+02
5.09	-5.09	1.19	12.9	0.220E+01	3.60	9.50	.18822E+02
5.13	-5.13	1.19	12.9	0.219E+01	3.63	9.49	.19023E+02
5.17	-5.17	1.19	13.0	0.218E+01	3.66	9.48	.19224E+02
5.22	-5.22	1.20	13.0	0.218E+01	3.69	9.47	.19426E+02
5.26	-5.26	1.20	13.1	0.217E+01	3.72	9.47	.19628E+02
5.30	-5.30	1.21	13.1	0.216E+01	3.75	9.46	.19830E+02
5.35	-5.35	1.21	13.2	0.215E+01	3.78	9.45	.20033E+02
5.39	-5.39	1.22	13.2	0.214E+01	3.81	9.44	.20237E+02
5.43	-5.43	1.22	13.3	0.214E+01	3.84	9.43	.20440E+02
5.47	-5.47	1.23	13.3	0.213E+01	3.87	9.42	.20644E+02
5.52	-5.52	1.23	13.4	0.212E+01	3.90	9.41	.20848E+02
5.56	-5.56	1.24	13.4	0.211E+01	3.93	9.40	.21053E+02
5.60	-5.60	1.24	13.5	0.210E+01	3.96	9.40	.21258E+02
5.65	-5.65	1.25	13.5	0.210E+01	3.99	9.39	.21463E+02
5.69	-5.69	1.25	13.6	0.209E+01	4.02	9.38	.21669E+02
5.73	-5.73	1.26	13.6	0.208E+01	4.05	9.37	.21875E+02
5.78	-5.78	1.26	13.7	0.208E+01	4.08	9.37	.22081E+02
5.82	-5.82	1.27	13.7	0.207E+01	4.11	9.36	.22288E+02
5.86	-5.86	1.27	13.8	0.206E+01	4.15	9.35	.22495E+02
5.91	-5.91	1.28	13.8	0.205E+01	4.18	9.34	.22703E+02
5.95	-5.95	1.28	13.9	0.205E+01	4.21	9.34	.22910E+02
5.99	-5.99	1.29	13.9	0.204E+01	4.24	9.33	.23118E+02
6.03	-6.03	1.29	13.9	0.203E+01	4.27	9.32	.23327E+02
6.08	-6.08	1.30	14.0	0.203E+01	4.30	9.32	.23535E+02

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      6.12    -6.12    1.30    14.0 0.202E+01   4.33     9.31 .23744E+02
      6.16    -6.16    1.31    14.1 0.201E+01   4.36     9.31 .23954E+02
      6.21    -6.21    1.31    14.1 0.201E+01   4.39     9.30 .24163E+02
      6.25    -6.25    1.32    14.2 0.200E+01   4.42     9.29 .24373E+02
      6.29    -6.29    1.32    14.2 0.199E+01   4.45     9.29 .24584E+02
      6.34    -6.34    1.33    14.3 0.199E+01   4.48     9.28 .24794E+02
      6.38    -6.38    1.33    14.3 0.198E+01   4.51     9.28 .25005E+02
      6.42    -6.42    1.34    14.4 0.198E+01   4.54     9.27 .25216E+02
      6.47    -6.47    1.34    14.4 0.197E+01   4.57     9.27 .25428E+02
      6.51    -6.51    1.35    14.4 0.196E+01   4.60     9.26 .25639E+02
      6.55    -6.55    1.35    14.5 0.196E+01   4.63     9.26 .25851E+02
      6.60    -6.60    1.36    14.5 0.195E+01   4.66     9.25 .26064E+02
      6.64    -6.64    1.36    14.6 0.195E+01   4.69     9.25 .26276E+02
      6.68    -6.68    1.37    14.6 0.194E+01   4.72     9.24 .26489E+02
      6.72    -6.72    1.37    14.7 0.193E+01   4.75     9.24 .26703E+02
      6.77    -6.77    1.38    14.7 0.193E+01   4.79     9.24 .26916E+02
      6.81    -6.81    1.38    14.8 0.192E+01   4.82     9.23 .27130E+02
      6.85    -6.85    1.39    14.8 0.192E+01   4.85     9.23 .27344E+02
      6.90    -6.90    1.39    14.8 0.191E+01   4.88     9.22 .27558E+02
      6.94    -6.94    1.39    14.9 0.191E+01   4.91     9.22 .27773E+02
      6.98    -6.98    1.40    14.9 0.190E+01   4.94     9.22 .27988E+02
      7.03    -7.03    1.40    15.0 0.189E+01   4.97     9.21 .28203E+02
      7.07    -7.07    1.41    15.0 0.189E+01   5.00     9.21 .28419E+02
      7.11    -7.11    1.41    15.1 0.188E+01   5.03     9.21 .28634E+02
      7.16    -7.16    1.42    15.1 0.188E+01   5.06     9.20 .28851E+02
      7.20    -7.20    1.42    15.1 0.187E+01   5.09     9.20 .29067E+02
      7.24    -7.24    1.43    15.2 0.187E+01   5.12     9.20 .29283E+02
      7.28    -7.28    1.43    15.2 0.186E+01   5.15     9.19 .29500E+02
      7.33    -7.33    1.44    15.3 0.186E+01   5.18     9.19 .29717E+02
      7.37    -7.37    1.44    15.3 0.185E+01   5.21     9.19 .29935E+02
      7.41    -7.41    1.45    15.4 0.185E+01   5.24     9.19 .30152E+02
      7.46    -7.46    1.45    15.4 0.184E+01   5.27     9.18 .30370E+02
      7.50    -7.50    1.46    15.4 0.184E+01   5.30     9.18 .30588E+02
      7.54    -7.54    1.46    15.5 0.183E+01   5.33     9.18 .30807E+02
      7.59    -7.59    1.47    15.5 0.183E+01   5.36     9.18 .31025E+02
      7.63    -7.63    1.47    15.6 0.182E+01   5.39     9.18 .31244E+02
      7.67    -7.67    1.48    15.6 0.182E+01   5.43     9.17 .31463E+02
      7.72    -7.72    1.48    15.6 0.181E+01   5.46     9.17 .31683E+02
      7.76    -7.76    1.49    15.7 0.181E+01   5.49     9.17 .31902E+02
      7.80    -7.80    1.49    15.7 0.180E+01   5.52     9.17 .32122E+02
      7.85    -7.85    1.50    15.8 0.180E+01   5.55     9.17 .32342E+02
      7.89    -7.89    1.50    15.8 0.179E+01   5.58     9.17 .32563E+02
      7.93    -7.93    1.51    15.8 0.179E+01   5.61     9.16 .32783E+02
      7.97    -7.97    1.51    15.9 0.179E+01   5.64     9.16 .33004E+02
      8.02    -8.02    1.52    15.9 0.178E+01   5.67     9.16 .33225E+02
      8.06    -8.06    1.52    16.0 0.178E+01   5.70     9.16 .33447E+02
      8.10    -8.10    1.53    16.0 0.177E+01   5.73     9.16 .33668E+02
      8.15    -8.15    1.53    16.0 0.177E+01   5.76     9.16 .33890E+02
      8.19    -8.19    1.54    16.1 0.176E+01   5.79     9.16 .34112E+02
      8.23    -8.23    1.54    16.1 0.176E+01   5.82     9.16 .34334E+02
      8.28    -8.28    1.55    16.2 0.175E+01   5.85     9.16 .34557E+02
      8.32    -8.32    1.55    16.2 0.175E+01   5.88     9.15 .34780E+02
      8.36    -8.36    1.56    16.2 0.175E+01   5.91     9.15 .35003E+02
      8.41    -8.41    1.56    16.3 0.174E+01   5.94     9.15 .35226E+02
      8.45    -8.45    1.57    16.3 0.174E+01   5.97     9.15 .35449E+02
      8.49    -8.49    1.57    16.4 0.173E+01   6.00     9.15 .35673E+02
      8.53    -8.53    1.58    16.4 0.173E+01   6.04     9.15 .35897E+02
      8.58    -8.58    1.58    16.4 0.173E+01   6.07     9.15 .36121E+02
      8.62    -8.62    1.58    16.5 0.172E+01   6.10     9.15 .36345E+02
 Cumulative travel time =          36.3451 sec  (    0.01 hrs)
   Plume centerline may exhibit slight discontinuities in transition
     to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER
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BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

 Phase 1: Vertically mixed, Phase 2: Re-stratified

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 Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW
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** End of NEAR-FIELD REGION (NFR) **

 The initial plume WIDTH values in the next far-field module will be
  CORRECTED by a factor  1.98 to conserve the mass flux in the far-field!
 The correction factor is quite large because of the small ambient velocity
   relative to the strong mixing characteristics of the discharge!
   This indicates localized RECIRCULATION REGIONS and INTERNAL HYDRAULIC JUMPS.
   Width predictions show discontinuities. Dilution values should be acceptable.
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BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Profile definitions:
   BV = top-hat thickness, measured vertically
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BH = top-hat half-width, measured horizontally in y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic average (bulk) dilution
C = average (bulk) concentration (includes reaction effects, if any)
TT = Cumulative travel time

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
8.62	-8.62	6.10	16.5	0.172E+01	6.10	18.16	6.10	0.00	.36345E+02
10.83	-8.62	6.10	16.8	0.169E+01	5.79	19.44	6.10	0.30	.49400E+02
13.03	-8.62	6.10	17.0	0.167E+01	5.53	20.68	6.10	0.56	.62455E+02
15.23	-8.62	6.10	17.3	0.164E+01	5.30	21.88	6.10	0.79	.75509E+02
17.44	-8.62	6.10	17.5	0.162E+01	5.10	23.05	6.10	1.00	.88564E+02
19.64	-8.62	6.10	17.7	0.160E+01	4.92	24.19	6.10	1.18	.10162E+03
21.85	-8.62	6.10	17.9	0.158E+01	4.76	25.30	6.10	1.34	.11467E+03
24.05	-8.62	6.10	18.1	0.157E+01	4.61	26.39	6.10	1.49	.12773E+03
26.26	-8.62	6.10	18.3	0.155E+01	4.47	27.45	6.10	1.62	.14078E+03
28.46	-8.62	6.10	18.4	0.154E+01	4.35	28.50	6.10	1.75	.15384E+03
30.67	-8.62	6.10	18.6	0.152E+01	4.24	29.53	6.10	1.86	.16689E+03
32.87	-8.62	6.10	18.8	0.151E+01	4.13	30.54	6.10	1.97	.17995E+03
35.07	-8.62	6.10	18.9	0.150E+01	4.03	31.53	6.10	2.06	.19300E+03
37.28	-8.62	6.10	19.1	0.149E+01	3.94	32.51	6.10	2.15	.20606E+03
39.48	-8.62	6.10	19.2	0.148E+01	3.86	33.47	6.10	2.24	.21911E+03
41.69	-8.62	6.10	19.3	0.147E+01	3.78	34.42	6.10	2.32	.23217E+03
43.89	-8.62	6.10	19.5	0.146E+01	3.70	35.35	6.10	2.39	.24522E+03
46.10	-8.62	6.10	19.6	0.145E+01	3.63	36.28	6.10	2.47	.25828E+03
48.30	-8.62	6.10	19.7	0.144E+01	3.56	37.19	6.10	2.53	.27133E+03
50.51	-8.62	6.10	19.8	0.143E+01	3.50	38.09	6.10	2.59	.28439E+03
52.71	-8.62	6.10	20.0	0.142E+01	3.44	38.98	6.10	2.65	.29744E+03
54.91	-8.62	6.10	20.1	0.141E+01	3.38	39.86	6.10	2.71	.31050E+03
57.12	-8.62	6.10	20.2	0.140E+01	3.33	40.73	6.10	2.77	.32355E+03
59.32	-8.62	6.10	20.3	0.140E+01	3.28	41.59	6.10	2.82	.33661E+03
61.53	-8.62	6.10	20.4	0.139E+01	3.23	42.44	6.10	2.87	.34966E+03
63.73	-8.62	6.10	20.5	0.138E+01	3.18	43.28	6.10	2.91	.36272E+03
65.94	-8.62	6.10	20.6	0.138E+01	3.14	44.12	6.10	2.96	.37577E+03
68.14	-8.62	6.10	20.7	0.137E+01	3.09	44.94	6.10	3.00	.38882E+03
70.35	-8.62	6.10	20.8	0.136E+01	3.05	45.76	6.10	3.04	.40188E+03
72.55	-8.62	6.10	20.9	0.136E+01	3.01	46.57	6.10	3.08	.41493E+03
74.75	-8.62	6.10	21.0	0.135E+01	2.98	47.38	6.10	3.12	.42799E+03
76.96	-8.62	6.10	21.1	0.134E+01	2.94	48.18	6.10	3.16	.44104E+03
79.16	-8.62	6.10	21.2	0.134E+01	2.90	48.97	6.10	3.19	.45410E+03
81.37	-8.62	6.10	21.2	0.133E+01	2.87	49.75	6.10	3.23	.46715E+03
83.57	-8.62	6.10	21.3	0.133E+01	2.84	50.53	6.10	3.26	.48021E+03
85.78	-8.62	6.10	21.4	0.132E+01	2.80	51.30	6.10	3.29	.49326E+03
87.98	-8.62	6.10	21.5	0.132E+01	2.77	52.07	6.10	3.32	.50632E+03
90.19	-8.62	6.10	21.6	0.131E+01	2.74	52.83	6.10	3.35	.51937E+03
92.39	-8.62	6.10	21.6	0.131E+01	2.71	53.58	6.10	3.38	.53243E+03
94.59	-8.62	6.10	21.7	0.130E+01	2.69	54.33	6.10	3.41	.54548E+03
96.80	-8.62	6.10	21.8	0.130E+01	2.66	55.08	6.10	3.44	.55854E+03
99.00	-8.62	6.10	21.9	0.129E+01	2.63	55.81	6.10	3.46	.57159E+03
101.21	-8.62	6.10	22.0	0.129E+01	2.61	56.55	6.10	3.49	.58465E+03
103.41	-8.62	6.10	22.0	0.129E+01	2.58	57.28	6.10	3.51	.59770E+03
105.62	-8.62	6.10	22.1	0.128E+01	2.56	58.00	6.10	3.54	.61076E+03
107.82	-8.62	6.10	22.2	0.128E+01	2.54	58.72	6.10	3.56	.62381E+03
110.03	-8.62	6.10	22.2	0.127E+01	2.51	59.44	6.10	3.58	.63687E+03
112.23	-8.62	6.10	22.3	0.127E+01	2.49	60.15	6.10	3.60	.64992E+03
114.43	-8.62	6.10	22.4	0.127E+01	2.47	60.85	6.10	3.63	.66298E+03
116.64	-8.62	6.10	22.4	0.126E+01	2.45	61.55	6.10	3.65	.67603E+03
118.84	-8.62	6.10	22.5	0.126E+01	2.43	62.25	6.10	3.67	.68909E+03
121.05	-8.62	6.10	22.6	0.125E+01	2.41	62.95	6.10	3.69	.70214E+03
123.25	-8.62	6.10	22.6	0.125E+01	2.39	63.64	6.10	3.71	.71519E+03
125.46	-8.62	6.10	22.7	0.125E+01	2.37	64.32	6.10	3.72	.72825E+03
127.66	-8.62	6.10	22.8	0.124E+01	2.35	65.00	6.10	3.74	.74130E+03
129.87	-8.62	6.10	22.8	0.124E+01	2.34	65.68	6.10	3.76	.75436E+03
132.07	-8.62	6.10	22.9	0.124E+01	2.32	66.36	6.10	3.78	.76741E+03
134.27	-8.62	6.10	23.0	0.123E+01	2.30	67.03	6.10	3.79	.78047E+03
136.48	-8.62	6.10	23.0	0.123E+01	2.28	67.70	6.10	3.81	.79352E+03
138.68	-8.62	6.10	23.1	0.123E+01	2.27	68.36	6.10	3.83	.80658E+03
140.89	-8.62	6.10	23.1	0.122E+01	2.25	69.02	6.10	3.84	.81963E+03
143.09	-8.62	6.10	23.2	0.122E+01	2.24	69.68	6.10	3.86	.83269E+03
145.30	-8.62	6.10	23.2	0.122E+01	2.22	70.33	6.10	3.87	.84574E+03
147.50	-8.62	6.10	23.3	0.121E+01	2.21	70.99	6.10	3.89	.85880E+03
149.71	-8.62	6.10	23.4	0.121E+01	2.19	71.63	6.10	3.90	.87185E+03
151.91	-8.62	6.10	23.4	0.121E+01	2.18	72.28	6.10	3.92	.88491E+03
154.11	-8.62	6.10	23.5	0.121E+01	2.16	72.92	6.10	3.93	.89796E+03
156.32	-8.62	6.10	23.5	0.120E+01	2.15	73.56	6.10	3.95	.91102E+03
158.52	-8.62	6.10	23.6	0.120E+01	2.14	74.20	6.10	3.96	.92407E+03
160.73	-8.62	6.10	23.6	0.120E+01	2.12	74.83	6.10	3.97	.93713E+03
162.93	-8.62	6.10	23.7	0.119E+01	2.11	75.46	6.10	3.99	.95018E+03
165.14	-8.62	6.10	23.7	0.119E+01	2.10	76.09	6.10	4.00	.96324E+03
167.34	-8.62	6.10	23.8	0.119E+01	2.08	76.72	6.10	4.01	.97629E+03
169.55	-8.62	6.10	23.9	0.119E+01	2.07	77.34	6.10	4.02	.98935E+03
171.75	-8.62	6.10	23.9	0.118E+01	2.06	77.96	6.10	4.04	.10024E+04
173.95	-8.62	6.10	24.0	0.118E+01	2.05	78.58	6.10	4.05	.10155E+04
176.16	-8.62	6.10	24.0	0.118E+01	2.04	79.19	6.10	4.06	.10285E+04

** REGULATORY MIXING ZONE BOUNDARY **
In this prediction interval the plume DOWNSTREAM distance meets or exceeds
the regulatory value = 176.17 m.
This is the extent of the REGULATORY MIXING ZONE.

178.36	-8.62	6.10	24.1	0.118E+01	2.03	79.80	6.10	4.07	.10416E+04
180.57	-8.62	6.10	24.1	0.117E+01	2.02	80.41	6.10	4.08	.10546E+04
182.77	-8.62	6.10	24.2	0.117E+01	2.00	81.02	6.10	4.09	.10677E+04
184.98	-8.62	6.10	24.2	0.117E+01	1.99	81.62	6.10	4.10	.10807E+04
187.18	-8.62	6.10	24.3	0.117E+01	1.98	82.23	6.10	4.11	.10938E+04
189.39	-8.62	6.10	24.3	0.116E+01	1.97	82.83	6.10	4.12	.11068E+04
191.59	-8.62	6.10	24.4	0.116E+01	1.96	83.43	6.10	4.13	.11199E+04
193.80	-8.62	6.10	24.4	0.116E+01	1.95	84.02	6.10	4.14	.11329E+04
196.00	-8.62	6.10	24.5	0.116E+01	1.94	84.61	6.10	4.15	.11460E+04
198.20	-8.62	6.10	24.5	0.115E+01	1.93	85.21	6.10	4.16	.11591E+04
200.41	-8.62	6.10	24.6	0.115E+01	1.92	85.79	6.10	4.17	.11721E+04
202.61	-8.62	6.10	24.6	0.115E+01	1.91	86.38	6.10	4.18	.11852E+04
204.82	-8.62	6.10	24.6	0.115E+01	1.90	86.97	6.10	4.19	.11982E+04
207.02	-8.62	6.10	24.7	0.114E+01	1.90	87.55	6.10	4.20	.12113E+04
209.23	-8.62	6.10	24.7	0.114E+01	1.89	88.13	6.10	4.21	.12243E+04
211.43	-8.62	6.10	24.8	0.114E+01	1.88	88.71	6.10	4.22	.12374E+04
213.64	-8.62	6.10	24.8	0.114E+01	1.87	89.28	6.10	4.23	.12504E+04
215.84	-8.62	6.10	24.9	0.114E+01	1.86	89.86	6.10	4.24	.12635E+04
218.04	-8.62	6.10	24.9	0.113E+01	1.85	90.43	6.10	4.24	.12766E+04
220.25	-8.62	6.10	25.0	0.113E+01	1.84	91.00	6.10	4.25	.12896E+04
222.45	-8.62	6.10	25.0	0.113E+01	1.84	91.57	6.10	4.26	.13027E+04
224.66	-8.62	6.10	25.1	0.113E+01	1.83	92.14	6.10	4.27	.13157E+04
226.86	-8.62	6.10	25.1	0.113E+01	1.82	92.70	6.10	4.28	.13288E+04
229.07	-8.62	6.10	25.2	0.112E+01	1.81	93.27	6.10	4.28	.13418E+04
231.27	-8.62	6.10	25.2	0.112E+01	1.80	93.83	6.10	4.29	.13549E+04
233.48	-8.62	6.10	25.2	0.112E+01	1.80	94.39	6.10	4.30	.13679E+04
235.68	-8.62	6.10	25.3	0.112E+01	1.79	94.95	6.10	4.31	.13810E+04
237.88	-8.62	6.10	25.3	0.112E+01	1.78	95.50	6.10	4.31	.13940E+04
240.09	-8.62	6.10	25.4	0.111E+01	1.78	96.06	6.10	4.32	.14071E+04
242.29	-8.62	6.10	25.4	0.111E+01	1.77	96.61	6.10	4.33	.14202E+04
244.50	-8.62	6.10	25.5	0.111E+01	1.76	97.16	6.10	4.34	.14332E+04
246.70	-8.62	6.10	25.5	0.111E+01	1.75	97.71	6.10	4.34	.14463E+04
248.91	-8.62	6.10	25.5	0.111E+01	1.75	98.26	6.10	4.35	.14593E+04
251.11	-8.62	6.10	25.6	0.110E+01	1.74	98.80	6.10	4.36	.14724E+04
253.32	-8.62	6.10	25.6	0.110E+01	1.73	99.35	6.10	4.36	.14854E+04
255.52	-8.62	6.10	25.7	0.110E+01	1.73	99.89	6.10	4.37	.14985E+04
257.72	-8.62	6.10	25.7	0.110E+01	1.72	100.43	6.10	4.38	.15115E+04
259.93	-8.62	6.10	25.8	0.110E+01	1.71	100.97	6.10	4.38	.15246E+04
262.13	-8.62	6.10	25.8	0.109E+01	1.71	101.51	6.10	4.39	.15376E+04
264.34	-8.62	6.10	25.8	0.109E+01	1.70	102.04	6.10	4.39	.15507E+04
266.54	-8.62	6.10	25.9	0.109E+01	1.70	102.58	6.10	4.40	.15638E+04
268.75	-8.62	6.10	25.9	0.109E+01	1.69	103.11	6.10	4.41	.15768E+04
270.95	-8.62	6.10	26.0	0.109E+01	1.68	103.64	6.10	4.41	.15899E+04
273.16	-8.62	6.10	26.0	0.109E+01	1.68	104.17	6.10	4.42	.16029E+04
275.36	-8.62	6.10	26.0	0.108E+01	1.67	104.70	6.10	4.42	.16160E+04
277.56	-8.62	6.10	26.1	0.108E+01	1.67	105.23	6.10	4.43	.16290E+04
279.77	-8.62	6.10	26.1	0.108E+01	1.66	105.76	6.10	4.44	.16421E+04
281.97	-8.62	6.10	26.2	0.108E+01	1.65	106.28	6.10	4.44	.16551E+04
284.18	-8.62	6.10	26.2	0.108E+01	1.65	106.80	6.10	4.45	.16682E+04
286.38	-8.62	6.10	26.3	0.108E+01	1.64	107.32	6.10	4.45	.16813E+04
288.59	-8.62	6.10	26.3	0.107E+01	1.64	107.84	6.10	4.46	.16943E+04
290.79	-8.62	6.10	26.3	0.107E+01	1.63	108.36	6.10	4.46	.17074E+04
293.00	-8.62	6.10	26.4	0.107E+01	1.63	108.88	6.10	4.47	.17204E+04
295.20	-8.62	6.10	26.4	0.107E+01	1.62	109.40	6.10	4.47	.17335E+04
297.40	-8.62	6.10	26.5	0.107E+01	1.62	109.91	6.10	4.48	.17465E+04
299.61	-8.62	6.10	26.5	0.107E+01	1.61	110.43	6.10	4.48	.17596E+04
301.81	-8.62	6.10	26.5	0.106E+01	1.61	110.94	6.10	4.49	.17726E+04
304.02	-8.62	6.10	26.6	0.106E+01	1.60	111.45	6.10	4.49	.17857E+04
306.22	-8.62	6.10	26.6	0.106E+01	1.60	111.96	6.10	4.50	.17987E+04
308.43	-8.62	6.10	26.7	0.106E+01	1.59	112.47	6.10	4.50	.18118E+04
310.63	-8.62	6.10	26.7	0.106E+01	1.59	112.97	6.10	4.51	.18249E+04
312.84	-8.62	6.10	26.7	0.106E+01	1.58	113.48	6.10	4.51	.18379E+04
315.04	-8.62	6.10	26.8	0.105E+01	1.58	113.98	6.10	4.52	.18510E+04
317.24	-8.62	6.10	26.8	0.105E+01	1.57	114.49	6.10	4.52	.18640E+04
319.45	-8.62	6.10	26.9	0.105E+01	1.57	114.99	6.10	4.53	.18771E+04
321.65	-8.62	6.10	26.9	0.105E+01	1.56	115.49	6.10	4.53	.18901E+04
323.86	-8.62	6.10	26.9	0.105E+01	1.56	115.99	6.10	4.54	.19032E+04
326.06	-8.62	6.10	27.0	0.105E+01	1.56	116.49	6.10	4.54	.19162E+04
328.27	-8.62	6.10	27.0	0.104E+01	1.55	116.99	6.10	4.54	.19293E+04
330.47	-8.62	6.10	27.0	0.104E+01	1.55	117.48	6.10	4.55	.19423E+04
332.68	-8.62	6.10	27.1	0.104E+01	1.54	117.98	6.10	4.55	.19554E+04
334.88	-8.62	6.10	27.1	0.104E+01	1.54	118.47	6.10	4.56	.19685E+04
337.09	-8.62	6.10	27.2	0.104E+01	1.53	118.96	6.10	4.56	.19815E+04
339.29	-8.62	6.10	27.2	0.104E+01	1.53	119.46	6.10	4.57	.19946E+04
341.49	-8.62	6.10	27.2	0.104E+01	1.53	119.95	6.10	4.57	.20076E+04
343.70	-8.62	6.10	27.3	0.103E+01	1.52	120.44	6.10	4.57	.20207E+04
345.90	-8.62	6.10	27.3	0.103E+01	1.52	120.92	6.10	4.58	.20337E+04
348.11	-8.62	6.10	27.4	0.103E+01	1.51	121.41	6.10	4.58	.20468E+04
350.31	-8.62	6.10	27.4	0.103E+01	1.51	121.90	6.10	4.59	.20598E+04
352.52	-8.62	6.10	27.4	0.103E+01	1.51	122.38	6.10	4.59	.20729E+04
354.72	-8.62	6.10	27.5	0.103E+01	1.50	122.87	6.10	4.59	.20860E+04
356.93	-8.62	6.10	27.5	0.103E+01	1.50	123.35	6.10	4.60	.20990E+04
359.13	-8.62	6.10	27.5	0.102E+01	1.49	123.83	6.10	4.60	.21121E+04
361.33	-8.62	6.10	27.6	0.102E+01	1.49	124.31	6.10	4.60	.21251E+04
363.54	-8.62	6.10	27.6	0.102E+01	1.49	124.79	6.10	4.61	.21382E+04
365.74	-8.62	6.10	27.7	0.102E+01	1.48	125.27	6.10	4.61	.21512E+04
367.95	-8.62	6.10	27.7	0.102E+01	1.48	125.75	6.10	4.62	.21643E+04
370.15	-8.62	6.10	27.7	0.102E+01	1.48	126.22	6.10	4.62	.21773E+04
372.36	-8.62	6.10	27.8	0.102E+01	1.47	126.70	6.10	4.62	.21904E+04
374.56	-8.62	6.10	27.8	0.101E+01	1.47	127.17	6.10	4.63	.22034E+04

376.77	-8.62	6.10	27.9	0.101E+01	1.47	127.65	6.10	4.63	.22165E+04
378.97	-8.62	6.10	27.9	0.101E+01	1.46	128.12	6.10	4.63	.22296E+04
381.17	-8.62	6.10	27.9	0.101E+01	1.46	128.59	6.10	4.64	.22426E+04
383.38	-8.62	6.10	28.0	0.101E+01	1.46	129.06	6.10	4.64	.22557E+04
385.58	-8.62	6.10	28.0	0.101E+01	1.45	129.53	6.10	4.64	.22687E+04
387.79	-8.62	6.10	28.0	0.101E+01	1.45	130.00	6.10	4.65	.22818E+04
389.99	-8.62	6.10	28.1	0.100E+01	1.45	130.47	6.10	4.65	.22948E+04
392.20	-8.62	6.10	28.1	0.100E+01	1.44	130.93	6.10	4.65	.23079E+04
394.40	-8.62	6.10	28.2	0.100E+01	1.44	131.40	6.10	4.66	.23209E+04
396.61	-8.62	6.10	28.2	0.100E+01	1.44	131.87	6.10	4.66	.23340E+04
398.81	-8.62	6.10	28.2	0.998E+00	1.43	132.33	6.10	4.66	.23471E+04
401.01	-8.62	6.10	28.3	0.997E+00	1.43	132.79	6.10	4.67	.23601E+04
403.22	-8.62	6.10	28.3	0.996E+00	1.43	133.25	6.10	4.67	.23732E+04
405.42	-8.62	6.10	28.3	0.994E+00	1.42	133.72	6.10	4.67	.23862E+04
407.63	-8.62	6.10	28.4	0.993E+00	1.42	134.18	6.10	4.67	.23993E+04
409.83	-8.62	6.10	28.4	0.991E+00	1.42	134.64	6.10	4.68	.24123E+04
412.04	-8.62	6.10	28.5	0.990E+00	1.42	135.09	6.10	4.68	.24254E+04
414.24	-8.62	6.10	28.5	0.989E+00	1.41	135.55	6.10	4.68	.24384E+04
416.45	-8.62	6.10	28.5	0.987E+00	1.41	136.01	6.10	4.69	.24515E+04
418.65	-8.62	6.10	28.6	0.986E+00	1.41	136.46	6.10	4.69	.24645E+04
420.85	-8.62	6.10	28.6	0.985E+00	1.40	136.92	6.10	4.69	.24776E+04
423.06	-8.62	6.10	28.6	0.983E+00	1.40	137.37	6.10	4.69	.24907E+04
425.26	-8.62	6.10	28.7	0.982E+00	1.40	137.83	6.10	4.70	.25037E+04
427.47	-8.62	6.10	28.7	0.981E+00	1.40	138.28	6.10	4.70	.25168E+04
429.67	-8.62	6.10	28.8	0.979E+00	1.39	138.73	6.10	4.70	.25298E+04
431.88	-8.62	6.10	28.8	0.978E+00	1.39	139.18	6.10	4.71	.25429E+04
434.08	-8.62	6.10	28.8	0.977E+00	1.39	139.63	6.10	4.71	.25559E+04
436.29	-8.62	6.10	28.9	0.976E+00	1.39	140.08	6.10	4.71	.25690E+04
438.49	-8.62	6.10	28.9	0.974E+00	1.38	140.53	6.10	4.71	.25820E+04
440.70	-8.62	6.10	28.9	0.973E+00	1.38	140.98	6.10	4.72	.25951E+04
442.90	-8.62	6.10	29.0	0.972E+00	1.38	141.42	6.10	4.72	.26081E+04
445.10	-8.62	6.10	29.0	0.970E+00	1.37	141.87	6.10	4.72	.26212E+04
447.31	-8.62	6.10	29.1	0.969E+00	1.37	142.31	6.10	4.72	.26343E+04
449.51	-8.62	6.10	29.1	0.968E+00	1.37	142.76	6.10	4.73	.26473E+04

Cumulative travel time = 2647.3064 sec (0.74 hrs)

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
449.51	134.11	6.10	29.1	0.968E+00	1.37	285.47	6.10	4.73	.26473E+04
450.01	134.11	6.10	29.1	0.968E+00	1.37	285.56	6.10	4.73	.26503E+04
450.51	134.11	6.10	29.1	0.967E+00	1.37	285.66	6.10	4.73	.26532E+04
451.01	134.11	6.10	29.1	0.967E+00	1.37	285.76	6.10	4.73	.26562E+04
451.52	134.11	6.10	29.1	0.967E+00	1.37	285.86	6.10	4.73	.26592E+04
452.02	134.11	6.10	29.1	0.967E+00	1.37	285.96	6.10	4.73	.26621E+04
452.52	134.11	6.10	29.1	0.967E+00	1.37	286.06	6.10	4.73	.26651E+04
453.02	134.11	6.10	29.1	0.966E+00	1.37	286.16	6.10	4.73	.26681E+04
453.52	134.11	6.10	29.1	0.966E+00	1.37	286.26	6.10	4.73	.26710E+04
454.02	134.11	6.10	29.2	0.966E+00	1.37	286.35	6.10	4.73	.26740E+04
454.52	134.11	6.10	29.2	0.966E+00	1.37	286.45	6.10	4.73	.26770E+04
455.02	134.11	6.10	29.2	0.966E+00	1.37	286.55	6.10	4.73	.26799E+04
455.52	134.11	6.10	29.2	0.965E+00	1.37	286.65	6.10	4.73	.26829E+04
456.02	134.11	6.10	29.2	0.965E+00	1.37	286.75	6.10	4.73	.26859E+04
456.52	134.11	6.10	29.2	0.965E+00	1.37	286.85	6.10	4.73	.26888E+04
457.02	134.11	6.10	29.2	0.965E+00	1.37	286.95	6.10	4.73	.26918E+04
457.52	134.11	6.10	29.2	0.964E+00	1.37	287.04	6.10	4.73	.26948E+04
458.03	134.11	6.10	29.2	0.964E+00	1.37	287.14	6.10	4.73	.26977E+04
458.53	134.11	6.10	29.2	0.964E+00	1.37	287.24	6.10	4.73	.27007E+04
459.03	134.11	6.10	29.2	0.964E+00	1.37	287.34	6.10	4.73	.27037E+04
459.53	134.11	6.10	29.2	0.964E+00	1.37	287.44	6.10	4.73	.27066E+04
460.03	134.11	6.10	29.2	0.963E+00	1.37	287.54	6.10	4.73	.27096E+04
460.53	134.11	6.10	29.2	0.963E+00	1.37	287.63	6.10	4.73	.27126E+04
461.03	134.11	6.10	29.2	0.963E+00	1.37	287.73	6.10	4.73	.27155E+04
461.53	134.11	6.10	29.2	0.963E+00	1.37	287.83	6.10	4.73	.27185E+04
462.03	134.11	6.10	29.2	0.963E+00	1.36	287.93	6.10	4.73	.27215E+04
462.53	134.11	6.10	29.3	0.962E+00	1.36	288.03	6.10	4.73	.27244E+04
463.03	134.11	6.10	29.3	0.962E+00	1.36	288.13	6.10	4.73	.27274E+04
463.53	134.11	6.10	29.3	0.962E+00	1.36	288.22	6.10	4.73	.27304E+04
464.04	134.11	6.10	29.3	0.962E+00	1.36	288.32	6.10	4.73	.27333E+04
464.54	134.11	6.10	29.3	0.962E+00	1.36	288.42	6.10	4.73	.27363E+04
465.04	134.11	6.10	29.3	0.961E+00	1.36	288.52	6.10	4.73	.27392E+04
465.54	134.11	6.10	29.3	0.961E+00	1.36	288.62	6.10	4.73	.27422E+04
466.04	134.11	6.10	29.3	0.961E+00	1.36	288.72	6.10	4.73	.27452E+04
466.54	134.11	6.10	29.3	0.961E+00	1.36	288.81	6.10	4.73	.27481E+04
467.04	134.11	6.10	29.3	0.961E+00	1.36	288.91	6.10	4.73	.27511E+04
467.54	134.11	6.10	29.3	0.960E+00	1.36	289.01	6.10	4.73	.27541E+04
468.04	134.11	6.10	29.3	0.960E+00	1.36	289.11	6.10	4.73	.27570E+04
468.54	134.11	6.10	29.3	0.960E+00	1.36	289.21	6.10	4.73	.27600E+04
469.04	134.11	6.10	29.3	0.960E+00	1.36	289.30	6.10	4.73	.27630E+04
469.54	134.11	6.10	29.3	0.960E+00	1.36	289.40	6.10	4.73	.27659E+04
470.05	134.11	6.10	29.3	0.959E+00	1.36	289.50	6.10	4.73	.27689E+04
470.55	134.11	6.10	29.3	0.959E+00	1.36	289.60	6.10	4.73	.27719E+04
471.05	134.11	6.10	29.4	0.959E+00	1.36	289.70	6.10	4.73	.27748E+04
471.55	134.11	6.10	29.4	0.959E+00	1.36	289.79	6.10	4.73	.27778E+04
472.05	134.11	6.10	29.4	0.959E+00	1.36	289.89	6.10	4.73	.27808E+04
472.55	134.11	6.10	29.4	0.958E+00	1.36	289.99	6.10	4.74	.27837E+04
473.05	134.11	6.10	29.4	0.958E+00	1.36	290.09	6.10	4.74	.27867E+04

473.55	134.11	6.10	29.4	0.958E+00	1.36	290.18	6.10	4.74	.27897E+04
474.05	134.11	6.10	29.4	0.958E+00	1.36	290.28	6.10	4.74	.27926E+04
474.55	134.11	6.10	29.4	0.958E+00	1.36	290.38	6.10	4.74	.27956E+04
475.05	134.11	6.10	29.4	0.957E+00	1.36	290.48	6.10	4.74	.27986E+04
475.55	134.11	6.10	29.4	0.957E+00	1.36	290.58	6.10	4.74	.28015E+04
476.06	134.11	6.10	29.4	0.957E+00	1.36	290.67	6.10	4.74	.28045E+04
476.56	134.11	6.10	29.4	0.957E+00	1.36	290.77	6.10	4.74	.28075E+04
477.06	134.11	6.10	29.4	0.957E+00	1.36	290.87	6.10	4.74	.28104E+04
477.56	134.11	6.10	29.4	0.956E+00	1.36	290.97	6.10	4.74	.28134E+04
478.06	134.11	6.10	29.4	0.956E+00	1.36	291.06	6.10	4.74	.28164E+04
478.56	134.11	6.10	29.4	0.956E+00	1.36	291.16	6.10	4.74	.28193E+04
479.06	134.11	6.10	29.4	0.956E+00	1.36	291.26	6.10	4.74	.28223E+04
479.56	134.11	6.10	29.5	0.956E+00	1.36	291.36	6.10	4.74	.28253E+04
480.06	134.11	6.10	29.5	0.955E+00	1.36	291.45	6.10	4.74	.28282E+04
480.56	134.11	6.10	29.5	0.955E+00	1.36	291.55	6.10	4.74	.28312E+04
481.06	134.11	6.10	29.5	0.955E+00	1.36	291.65	6.10	4.74	.28342E+04
481.56	134.11	6.10	29.5	0.955E+00	1.36	291.75	6.10	4.74	.28371E+04
482.07	134.11	6.10	29.5	0.955E+00	1.36	291.84	6.10	4.74	.28401E+04
482.57	134.11	6.10	29.5	0.954E+00	1.36	291.94	6.10	4.74	.28431E+04
483.07	134.11	6.10	29.5	0.954E+00	1.36	292.04	6.10	4.74	.28460E+04
483.57	134.11	6.10	29.5	0.954E+00	1.36	292.14	6.10	4.74	.28490E+04
484.07	134.11	6.10	29.5	0.954E+00	1.36	292.23	6.10	4.74	.28520E+04
484.57	134.11	6.10	29.5	0.954E+00	1.36	292.33	6.10	4.74	.28549E+04
485.07	134.11	6.10	29.5	0.953E+00	1.36	292.43	6.10	4.74	.28579E+04
485.57	134.11	6.10	29.5	0.953E+00	1.36	292.52	6.10	4.74	.28609E+04
486.07	134.11	6.10	29.5	0.953E+00	1.36	292.62	6.10	4.74	.28638E+04
486.57	134.11	6.10	29.5	0.953E+00	1.36	292.72	6.10	4.74	.28668E+04
487.07	134.11	6.10	29.5	0.953E+00	1.36	292.82	6.10	4.74	.28697E+04
487.57	134.11	6.10	29.5	0.952E+00	1.36	292.91	6.10	4.74	.28727E+04
488.08	134.11	6.10	29.6	0.952E+00	1.36	293.01	6.10	4.74	.28757E+04
488.58	134.11	6.10	29.6	0.952E+00	1.36	293.11	6.10	4.74	.28786E+04
489.08	134.11	6.10	29.6	0.952E+00	1.36	293.21	6.10	4.74	.28816E+04
489.58	134.11	6.10	29.6	0.952E+00	1.35	293.30	6.10	4.74	.28846E+04
490.08	134.11	6.10	29.6	0.951E+00	1.35	293.40	6.10	4.74	.28875E+04
490.58	134.11	6.10	29.6	0.951E+00	1.35	293.50	6.10	4.74	.28905E+04
491.08	134.11	6.10	29.6	0.951E+00	1.35	293.59	6.10	4.74	.28935E+04
491.58	134.11	6.10	29.6	0.951E+00	1.35	293.69	6.10	4.74	.28964E+04
492.08	134.11	6.10	29.6	0.951E+00	1.35	293.79	6.10	4.74	.28994E+04
492.58	134.11	6.10	29.6	0.950E+00	1.35	293.88	6.10	4.74	.29024E+04
493.08	134.11	6.10	29.6	0.950E+00	1.35	293.98	6.10	4.74	.29053E+04
493.58	134.11	6.10	29.6	0.950E+00	1.35	294.08	6.10	4.74	.29083E+04
494.09	134.11	6.10	29.6	0.950E+00	1.35	294.18	6.10	4.74	.29113E+04
494.59	134.11	6.10	29.6	0.950E+00	1.35	294.27	6.10	4.74	.29142E+04
495.09	134.11	6.10	29.6	0.949E+00	1.35	294.37	6.10	4.74	.29172E+04
495.59	134.11	6.10	29.6	0.949E+00	1.35	294.47	6.10	4.74	.29202E+04
496.09	134.11	6.10	29.7	0.949E+00	1.35	294.56	6.10	4.74	.29231E+04
496.59	134.11	6.10	29.7	0.949E+00	1.35	294.66	6.10	4.74	.29261E+04
497.09	134.11	6.10	29.7	0.949E+00	1.35	294.76	6.10	4.74	.29291E+04
497.59	134.11	6.10	29.7	0.948E+00	1.35	294.85	6.10	4.74	.29320E+04
498.09	134.11	6.10	29.7	0.948E+00	1.35	294.95	6.10	4.74	.29350E+04
498.59	134.11	6.10	29.7	0.948E+00	1.35	295.05	6.10	4.74	.29380E+04
499.09	134.11	6.10	29.7	0.948E+00	1.35	295.14	6.10	4.74	.29409E+04
499.59	134.11	6.10	29.7	0.948E+00	1.35	295.24	6.10	4.74	.29439E+04
500.09	134.11	6.10	29.7	0.947E+00	1.35	295.34	6.10	4.74	.29469E+04
500.60	134.11	6.10	29.7	0.947E+00	1.35	295.43	6.10	4.74	.29498E+04
501.10	134.11	6.10	29.7	0.947E+00	1.35	295.53	6.10	4.75	.29528E+04
501.60	134.11	6.10	29.7	0.947E+00	1.35	295.63	6.10	4.75	.29558E+04
502.10	134.11	6.10	29.7	0.947E+00	1.35	295.72	6.10	4.75	.29587E+04
502.60	134.11	6.10	29.7	0.946E+00	1.35	295.82	6.10	4.75	.29617E+04
503.10	134.11	6.10	29.7	0.946E+00	1.35	295.92	6.10	4.75	.29647E+04
503.60	134.11	6.10	29.7	0.946E+00	1.35	296.01	6.10	4.75	.29676E+04
504.10	134.11	6.10	29.7	0.946E+00	1.35	296.11	6.10	4.75	.29706E+04
504.60	134.11	6.10	29.8	0.946E+00	1.35	296.21	6.10	4.75	.29736E+04
505.10	134.11	6.10	29.8	0.945E+00	1.35	296.30	6.10	4.75	.29765E+04
505.60	134.11	6.10	29.8	0.945E+00	1.35	296.40	6.10	4.75	.29795E+04
506.10	134.11	6.10	29.8	0.945E+00	1.35	296.50	6.10	4.75	.29825E+04
506.61	134.11	6.10	29.8	0.945E+00	1.35	296.59	6.10	4.75	.29854E+04
507.11	134.11	6.10	29.8	0.945E+00	1.35	296.69	6.10	4.75	.29884E+04
507.61	134.11	6.10	29.8	0.944E+00	1.35	296.79	6.10	4.75	.29913E+04
508.11	134.11	6.10	29.8	0.944E+00	1.35	296.88	6.10	4.75	.29943E+04
508.61	134.11	6.10	29.8	0.944E+00	1.35	296.98	6.10	4.75	.29973E+04
509.11	134.11	6.10	29.8	0.944E+00	1.35	297.07	6.10	4.75	.30002E+04
509.61	134.11	6.10	29.8	0.944E+00	1.35	297.17	6.10	4.75	.30032E+04
510.11	134.11	6.10	29.8	0.943E+00	1.35	297.27	6.10	4.75	.30062E+04
510.61	134.11	6.10	29.8	0.943E+00	1.35	297.36	6.10	4.75	.30091E+04
511.11	134.11	6.10	29.8	0.943E+00	1.35	297.46	6.10	4.75	.30121E+04
511.61	134.11	6.10	29.8	0.943E+00	1.35	297.56	6.10	4.75	.30151E+04
512.11	134.11	6.10	29.8	0.943E+00	1.35	297.65	6.10	4.75	.30180E+04
512.62	134.11	6.10	29.9	0.942E+00	1.35	297.75	6.10	4.75	.30210E+04
513.12	134.11	6.10	29.9	0.942E+00	1.35	297.84	6.10	4.75	.30240E+04
513.62	134.11	6.10	29.9	0.942E+00	1.35	297.94	6.10	4.75	.30269E+04
514.12	134.11	6.10	29.9	0.942E+00	1.35	298.04	6.10	4.75	.30299E+04
514.62	134.11	6.10	29.9	0.942E+00	1.35	298.13	6.10	4.75	.30329E+04
515.12	134.11	6.10	29.9	0.941E+00	1.35	298.23	6.10	4.75	.30358E+04
515.62	134.11	6.10	29.9	0.941E+00	1.35	298.33	6.10	4.75	.30388E+04
516.12	134.11	6.10	29.9	0.941E+00	1.35	298.42	6.10	4.75	.30418E+04
516.62	134.11	6.10	29.9	0.941E+00	1.35	298.52	6.10	4.75	.30447E+04
517.12	134.11	6.10	29.9	0.941E+00	1.35	298.61	6.10	4.75	.30477E+04
517.62	134.11	6.10	29.9	0.940E+00	1.35	298.71	6.10	4.75	.30507E+04
518.12	134.11	6.10	29.9	0.940E+00	1.35	298.81	6.10	4.75	.30536E+04

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    518.63   134.11    6.10    29.9 0.940E+00   1.35   298.90    6.10    4.75   .30566E+04
    519.13   134.11    6.10    29.9 0.940E+00   1.35   299.00    6.10    4.75   .30596E+04
    519.63   134.11    6.10    29.9 0.940E+00   1.34   299.09    6.10    4.75   .30625E+04
    520.13   134.11    6.10    29.9 0.939E+00   1.34   299.19    6.10    4.75   .30655E+04
    520.63   134.11    6.10    29.9 0.939E+00   1.34   299.28    6.10    4.75   .30685E+04
    521.13   134.11    6.10    30.0 0.939E+00   1.34   299.38    6.10    4.75   .30714E+04
    521.63   134.11    6.10    30.0 0.939E+00   1.34   299.48    6.10    4.75   .30744E+04
    522.13   134.11    6.10    30.0 0.939E+00   1.34   299.57    6.10    4.75   .30774E+04
    522.63   134.11    6.10    30.0 0.938E+00   1.34   299.67    6.10    4.75   .30803E+04
    523.13   134.11    6.10    30.0 0.938E+00   1.34   299.76    6.10    4.75   .30833E+04
    523.63   134.11    6.10    30.0 0.938E+00   1.34   299.86    6.10    4.75   .30863E+04
    524.14   134.11    6.10    30.0 0.938E+00   1.34   299.96    6.10    4.75   .30892E+04
    524.64   134.11    6.10    30.0 0.938E+00   1.34   300.05    6.10    4.75   .30922E+04
    525.14   134.11    6.10    30.0 0.937E+00   1.34   300.15    6.10    4.75   .30952E+04
    525.64   134.11    6.10    30.0 0.937E+00   1.34   300.24    6.10    4.75   .30981E+04
    526.14   134.11    6.10    30.0 0.937E+00   1.34   300.34    6.10    4.75   .31011E+04
    526.64   134.11    6.10    30.0 0.937E+00   1.34   300.43    6.10    4.75   .31041E+04
    527.14   134.11    6.10    30.0 0.937E+00   1.34   300.53    6.10    4.75   .31070E+04
    527.64   134.11    6.10    30.0 0.936E+00   1.34   300.62    6.10    4.75   .31100E+04
    528.14   134.11    6.10    30.0 0.936E+00   1.34   300.72    6.10    4.75   .31130E+04
    528.64   134.11    6.10    30.0 0.936E+00   1.34   300.82    6.10    4.75   .31159E+04
    529.14   134.11    6.10    30.1 0.936E+00   1.34   300.91    6.10    4.75   .31189E+04
    529.64   134.11    6.10    30.1 0.936E+00   1.34   301.01    6.10    4.75   .31219E+04
    530.15   134.11    6.10    30.1 0.935E+00   1.34   301.10    6.10    4.75   .31248E+04
    530.65   134.11    6.10    30.1 0.935E+00   1.34   301.20    6.10    4.75   .31278E+04
    531.15   134.11    6.10    30.1 0.935E+00   1.34   301.29    6.10    4.75   .31308E+04
    531.65   134.11    6.10    30.1 0.935E+00   1.34   301.39    6.10    4.75   .31337E+04
    532.15   134.11    6.10    30.1 0.935E+00   1.34   301.48    6.10    4.75   .31367E+04
    532.65   134.11    6.10    30.1 0.934E+00   1.34   301.58    6.10    4.76   .31397E+04
    533.15   134.11    6.10    30.1 0.934E+00   1.34   301.68    6.10    4.76   .31426E+04
    533.65   134.11    6.10    30.1 0.934E+00   1.34   301.77    6.10    4.76   .31456E+04
    534.15   134.11    6.10    30.1 0.934E+00   1.34   301.87    6.10    4.76   .31485E+04
    534.65   134.11    6.10    30.1 0.934E+00   1.34   301.96    6.10    4.76   .31515E+04
    535.15   134.11    6.10    30.1 0.933E+00   1.34   302.06    6.10    4.76   .31545E+04
    535.65   134.11    6.10    30.1 0.933E+00   1.34   302.15    6.10    4.76   .31574E+04
    536.16   134.11    6.10    30.1 0.933E+00   1.34   302.25    6.10    4.76   .31604E+04
    536.66   134.11    6.10    30.1 0.933E+00   1.34   302.34    6.10    4.76   .31634E+04
    537.16   134.11    6.10    30.1 0.933E+00   1.34   302.44    6.10    4.76   .31663E+04
    537.66   134.11    6.10    30.2 0.932E+00   1.34   302.53    6.10    4.76   .31693E+04
    538.16   134.11    6.10    30.2 0.932E+00   1.34   302.63    6.10    4.76   .31723E+04
    538.66   134.11    6.10    30.2 0.932E+00   1.34   302.72    6.10    4.76   .31752E+04
    539.16   134.11    6.10    30.2 0.932E+00   1.34   302.82    6.10    4.76   .31782E+04
    539.66   134.11    6.10    30.2 0.932E+00   1.34   302.91    6.10    4.76   .31812E+04
    540.16   134.11    6.10    30.2 0.931E+00   1.34   303.01    6.10    4.76   .31841E+04
    540.66   134.11    6.10    30.2 0.931E+00   1.34   303.10    6.10    4.76   .31871E+04
    541.16   134.11    6.10    30.2 0.931E+00   1.34   303.20    6.10    4.76   .31901E+04
    541.67   134.11    6.10    30.2 0.931E+00   1.34   303.29    6.10    4.76   .31930E+04
    542.17   134.11    6.10    30.2 0.931E+00   1.34   303.39    6.10    4.76   .31960E+04
    542.67   134.11    6.10    30.2 0.930E+00   1.34   303.48    6.10    4.76   .31990E+04
    543.17   134.11    6.10    30.2 0.930E+00   1.34   303.58    6.10    4.76   .32019E+04
    543.67   134.11    6.10    30.2 0.930E+00   1.34   303.67    6.10    4.76   .32049E+04
    544.17   134.11    6.10    30.2 0.930E+00   1.34   303.77    6.10    4.76   .32079E+04
    544.67   134.11    6.10    30.2 0.930E+00   1.34   303.86    6.10    4.76   .32108E+04
    545.17   134.11    6.10    30.2 0.930E+00   1.34   303.96    6.10    4.76   .32138E+04
    545.67   134.11    6.10    30.3 0.929E+00   1.34   304.05    6.10    4.76   .32168E+04
    546.17   134.11    6.10    30.3 0.929E+00   1.34   304.15    6.10    4.76   .32197E+04
    546.67   134.11    6.10    30.3 0.929E+00   1.34   304.24    6.10    4.76   .32227E+04
    547.17   134.11    6.10    30.3 0.929E+00   1.34   304.34    6.10    4.76   .32257E+04
    547.68   134.11    6.10    30.3 0.929E+00   1.34   304.43    6.10    4.76   .32286E+04
    548.18   134.11    6.10    30.3 0.928E+00   1.34   304.53    6.10    4.76   .32316E+04
    548.68   134.11    6.10    30.3 0.928E+00   1.34   304.62    6.10    4.76   .32346E+04
    549.18   134.11    6.10    30.3 0.928E+00   1.34   304.72    6.10    4.76   .32375E+04
    549.68   134.11    6.10    30.3 0.928E+00   1.34   304.80    6.10    4.76   .32405E+04
 Cumulative travel time =       3240.4878 sec  (    0.90 hrs)
 Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING
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BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.101E-01 m^2/s
  Horizontal diffusivity (initial value) = 0.126E-01 m^2/s

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   TT = Cumulative travel time

 Plume Stage 2 (bank attached):
       X        Y       Z        S       C       BV       BH      ZU      ZL       TT
    549.68   134.11    6.10    30.3 0.928E+00   1.34   304.80    6.10    4.76   .32405E+04
    566.93   134.11    6.10    30.3 0.927E+00   1.34   304.80    6.10    4.76   .33427E+04
    584.18   134.11    6.10    30.3 0.927E+00   1.34   304.80    6.10    4.76   .34448E+04
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601.43	134.11	6.10	30.3	0.927E+00	1.34	304.80	6.10	4.76	.35470E+04
618.68	134.11	6.10	30.3	0.926E+00	1.34	304.80	6.10	4.76	.36491E+04
635.94	134.11	6.10	30.3	0.926E+00	1.34	304.80	6.10	4.76	.37513E+04
653.19	134.11	6.10	30.3	0.926E+00	1.34	304.80	6.10	4.76	.38535E+04
670.44	134.11	6.10	30.3	0.925E+00	1.34	304.80	6.10	4.76	.39556E+04
687.69	134.11	6.10	30.3	0.925E+00	1.34	304.80	6.10	4.76	.40578E+04
704.94	134.11	6.10	30.3	0.924E+00	1.34	304.80	6.10	4.76	.41600E+04
722.19	134.11	6.10	30.3	0.924E+00	1.34	304.80	6.10	4.76	.42621E+04
739.44	134.11	6.10	30.3	0.924E+00	1.34	304.80	6.10	4.76	.43643E+04
756.70	134.11	6.10	30.3	0.923E+00	1.34	304.80	6.10	4.76	.44665E+04
773.95	134.11	6.10	30.4	0.923E+00	1.34	304.80	6.10	4.76	.45686E+04
791.20	134.11	6.10	30.4	0.923E+00	1.34	304.80	6.10	4.76	.46708E+04
808.45	134.11	6.10	30.4	0.922E+00	1.34	304.80	6.10	4.76	.47730E+04
825.70	134.11	6.10	30.4	0.922E+00	1.34	304.80	6.10	4.76	.48751E+04
842.95	134.11	6.10	30.4	0.921E+00	1.34	304.80	6.10	4.76	.49773E+04
860.21	134.11	6.10	30.4	0.921E+00	1.34	304.80	6.10	4.76	.50794E+04
877.46	134.11	6.10	30.4	0.921E+00	1.34	304.80	6.10	4.76	.51816E+04
894.71	134.11	6.10	30.4	0.920E+00	1.34	304.80	6.10	4.76	.52838E+04
911.96	134.11	6.10	30.4	0.920E+00	1.34	304.80	6.10	4.76	.53859E+04
929.21	134.11	6.10	30.4	0.920E+00	1.34	304.80	6.10	4.76	.54881E+04
946.46	134.11	6.10	30.4	0.919E+00	1.34	304.80	6.10	4.76	.55903E+04
963.72	134.11	6.10	30.4	0.919E+00	1.34	304.80	6.10	4.76	.56924E+04
980.97	134.11	6.10	30.4	0.918E+00	1.34	304.80	6.10	4.76	.57946E+04
998.22	134.11	6.10	30.4	0.918E+00	1.34	304.80	6.10	4.76	.58968E+04
1015.47	134.11	6.10	30.4	0.918E+00	1.34	304.80	6.10	4.76	.59989E+04
1032.72	134.11	6.10	30.4	0.917E+00	1.34	304.80	6.10	4.76	.61011E+04
1049.97	134.11	6.10	30.4	0.917E+00	1.34	304.80	6.10	4.76	.62032E+04
1067.22	134.11	6.10	30.4	0.917E+00	1.34	304.80	6.10	4.76	.63054E+04
1084.48	134.11	6.10	30.4	0.916E+00	1.34	304.80	6.10	4.75	.64076E+04
1101.73	134.11	6.10	30.4	0.916E+00	1.34	304.80	6.10	4.75	.65097E+04
1118.98	134.11	6.10	30.4	0.915E+00	1.34	304.80	6.10	4.75	.66119E+04
1136.23	134.11	6.10	30.4	0.915E+00	1.34	304.80	6.10	4.75	.67141E+04
1153.48	134.11	6.10	30.4	0.915E+00	1.34	304.80	6.10	4.75	.68162E+04
1170.73	134.11	6.10	30.4	0.914E+00	1.34	304.80	6.10	4.75	.69184E+04
1187.99	134.11	6.10	30.4	0.914E+00	1.34	304.80	6.10	4.75	.70206E+04
1205.24	134.11	6.10	30.4	0.914E+00	1.34	304.80	6.10	4.75	.71227E+04
1222.49	134.11	6.10	30.5	0.913E+00	1.34	304.80	6.10	4.75	.72249E+04
1239.74	134.11	6.10	30.5	0.913E+00	1.34	304.80	6.10	4.75	.73271E+04
1256.99	134.11	6.10	30.5	0.912E+00	1.34	304.80	6.10	4.75	.74292E+04
1274.24	134.11	6.10	30.5	0.912E+00	1.34	304.80	6.10	4.75	.75314E+04
1291.50	134.11	6.10	30.5	0.912E+00	1.34	304.80	6.10	4.75	.76335E+04
1308.75	134.11	6.10	30.5	0.911E+00	1.34	304.80	6.10	4.75	.77357E+04
1326.00	134.11	6.10	30.5	0.911E+00	1.34	304.80	6.10	4.75	.78379E+04
1343.25	134.11	6.10	30.5	0.911E+00	1.34	304.80	6.10	4.75	.79400E+04
1360.50	134.11	6.10	30.5	0.910E+00	1.34	304.80	6.10	4.75	.80422E+04
1377.75	134.11	6.10	30.5	0.910E+00	1.34	304.80	6.10	4.75	.81444E+04
1395.01	134.11	6.10	30.5	0.909E+00	1.34	304.80	6.10	4.75	.82465E+04
1412.26	134.11	6.10	30.5	0.909E+00	1.34	304.80	6.10	4.75	.83487E+04
1429.51	134.11	6.10	30.5	0.909E+00	1.34	304.80	6.10	4.75	.84509E+04
1446.76	134.11	6.10	30.5	0.908E+00	1.34	304.80	6.10	4.75	.85530E+04
1464.01	134.11	6.10	30.5	0.908E+00	1.34	304.80	6.10	4.75	.86552E+04
1481.26	134.11	6.10	30.5	0.908E+00	1.35	304.80	6.10	4.75	.87574E+04
1498.51	134.11	6.10	30.5	0.907E+00	1.35	304.80	6.10	4.75	.88595E+04
1515.77	134.11	6.10	30.5	0.907E+00	1.35	304.80	6.10	4.75	.89617E+04
1533.02	134.11	6.10	30.5	0.907E+00	1.35	304.80	6.10	4.75	.90638E+04
1550.27	134.11	6.10	30.5	0.906E+00	1.35	304.80	6.10	4.75	.91660E+04
1567.52	134.11	6.10	30.5	0.906E+00	1.35	304.80	6.10	4.75	.92682E+04
1584.77	134.11	6.10	30.5	0.905E+00	1.35	304.80	6.10	4.75	.93703E+04
1602.02	134.11	6.10	30.5	0.905E+00	1.35	304.80	6.10	4.75	.94725E+04
1619.28	134.11	6.10	30.5	0.905E+00	1.35	304.80	6.10	4.75	.95747E+04
1636.53	134.11	6.10	30.6	0.904E+00	1.35	304.80	6.10	4.75	.96768E+04
1653.78	134.11	6.10	30.6	0.904E+00	1.35	304.80	6.10	4.75	.97790E+04
1671.03	134.11	6.10	30.6	0.904E+00	1.35	304.80	6.10	4.75	.98812E+04
1688.28	134.11	6.10	30.6	0.903E+00	1.35	304.80	6.10	4.75	.99833E+04
1705.53	134.11	6.10	30.6	0.903E+00	1.35	304.80	6.10	4.75	.10085E+05
1722.79	134.11	6.10	30.6	0.902E+00	1.35	304.80	6.10	4.75	.10188E+05
1740.04	134.11	6.10	30.6	0.902E+00	1.35	304.80	6.10	4.75	.10290E+05
1757.29	134.11	6.10	30.6	0.902E+00	1.35	304.80	6.10	4.75	.10392E+05
1774.54	134.11	6.10	30.6	0.901E+00	1.35	304.80	6.10	4.75	.10494E+05
1791.79	134.11	6.10	30.6	0.901E+00	1.35	304.80	6.10	4.75	.10596E+05
1809.04	134.11	6.10	30.6	0.900E+00	1.35	304.80	6.10	4.75	.10698E+05
1826.29	134.11	6.10	30.6	0.900E+00	1.35	304.80	6.10	4.75	.10801E+05
1843.55	134.11	6.10	30.6	0.900E+00	1.35	304.80	6.10	4.75	.10903E+05
1860.80	134.11	6.10	30.6	0.899E+00	1.35	304.80	6.10	4.75	.11005E+05
1878.05	134.11	6.10	30.6	0.899E+00	1.35	304.80	6.10	4.75	.11107E+05
1895.30	134.11	6.10	30.6	0.899E+00	1.35	304.80	6.10	4.75	.11209E+05
1912.55	134.11	6.10	30.6	0.898E+00	1.35	304.80	6.10	4.75	.11311E+05
1929.80	134.11	6.10	30.6	0.898E+00	1.35	304.80	6.10	4.75	.11414E+05
1947.06	134.11	6.10	30.6	0.897E+00	1.35	304.80	6.10	4.75	.11516E+05
1964.31	134.11	6.10	30.6	0.897E+00	1.35	304.80	6.10	4.75	.11618E+05
1981.56	134.11	6.10	30.6	0.897E+00	1.35	304.80	6.10	4.75	.11720E+05
1998.81	134.11	6.10	30.6	0.896E+00	1.35	304.80	6.10	4.75	.11822E+05
2016.06	134.11	6.10	30.6	0.896E+00	1.35	304.80	6.10	4.75	.11924E+05
2033.31	134.11	6.10	30.6	0.896E+00	1.35	304.80	6.10	4.74	.12027E+05
2050.57	134.11	6.10	30.7	0.895E+00	1.35	304.80	6.10	4.74	.12129E+05
2067.82	134.11	6.10	30.7	0.895E+00	1.35	304.80	6.10	4.74	.12231E+05
2085.07	134.11	6.10	30.7	0.894E+00	1.35	304.80	6.10	4.74	.12333E+05
2102.32	134.11	6.10	30.7	0.894E+00	1.35	304.80	6.10	4.74	.12435E+05
2119.57	134.11	6.10	30.7	0.894E+00	1.35	304.80	6.10	4.74	.12537E+05
2136.82	134.11	6.10	30.7	0.893E+00	1.35	304.80	6.10	4.74	.12640E+05

2154.08	134.11	6.10	30.7	0.893E+00	1.35	304.80	6.10	4.74	.12742E+05
2171.33	134.11	6.10	30.7	0.893E+00	1.35	304.80	6.10	4.74	.12844E+05
2188.58	134.11	6.10	30.7	0.892E+00	1.35	304.80	6.10	4.74	.12946E+05
2205.83	134.11	6.10	30.7	0.892E+00	1.35	304.80	6.10	4.74	.13048E+05
2223.08	134.11	6.10	30.7	0.891E+00	1.35	304.80	6.10	4.74	.13150E+05
2240.33	134.11	6.10	30.7	0.891E+00	1.35	304.80	6.10	4.74	.13253E+05
2257.59	134.11	6.10	30.7	0.891E+00	1.35	304.80	6.10	4.74	.13355E+05
2274.84	134.11	6.10	30.7	0.890E+00	1.35	304.80	6.10	4.74	.13457E+05
2292.09	134.11	6.10	30.7	0.890E+00	1.35	304.80	6.10	4.74	.13559E+05
2309.34	134.11	6.10	30.7	0.890E+00	1.35	304.80	6.10	4.74	.13661E+05
2326.59	134.11	6.10	30.7	0.889E+00	1.35	304.80	6.10	4.74	.13763E+05
2343.84	134.11	6.10	30.7	0.889E+00	1.35	304.80	6.10	4.74	.13866E+05
2361.10	134.11	6.10	30.7	0.888E+00	1.35	304.80	6.10	4.74	.13968E+05
2378.35	134.11	6.10	30.7	0.888E+00	1.36	304.80	6.10	4.74	.14070E+05
2395.60	134.11	6.10	30.7	0.888E+00	1.36	304.80	6.10	4.74	.14172E+05
2412.85	134.11	6.10	30.7	0.887E+00	1.36	304.80	6.10	4.74	.14274E+05
2430.10	134.11	6.10	30.8	0.887E+00	1.36	304.80	6.10	4.74	.14376E+05
2447.35	134.11	6.10	30.8	0.886E+00	1.36	304.80	6.10	4.74	.14479E+05
2464.61	134.11	6.10	30.8	0.886E+00	1.36	304.80	6.10	4.74	.14581E+05
2481.86	134.11	6.10	30.8	0.886E+00	1.36	304.80	6.10	4.74	.14683E+05
2499.11	134.11	6.10	30.8	0.885E+00	1.36	304.80	6.10	4.74	.14785E+05
2516.36	134.11	6.10	30.8	0.885E+00	1.36	304.80	6.10	4.74	.14887E+05
2533.61	134.11	6.10	30.8	0.885E+00	1.36	304.80	6.10	4.74	.14989E+05
2550.86	134.11	6.10	30.8	0.884E+00	1.36	304.80	6.10	4.74	.15092E+05
2568.12	134.11	6.10	30.8	0.884E+00	1.36	304.80	6.10	4.74	.15194E+05
2585.37	134.11	6.10	30.8	0.883E+00	1.36	304.80	6.10	4.74	.15296E+05
2602.62	134.11	6.10	30.8	0.883E+00	1.36	304.80	6.10	4.74	.15398E+05
2619.87	134.11	6.10	30.8	0.883E+00	1.36	304.80	6.10	4.74	.15500E+05
2637.12	134.11	6.10	30.8	0.882E+00	1.36	304.80	6.10	4.74	.15602E+05
2654.38	134.11	6.10	30.8	0.882E+00	1.36	304.80	6.10	4.74	.15705E+05
2671.63	134.11	6.10	30.8	0.882E+00	1.36	304.80	6.10	4.74	.15807E+05
2688.88	134.11	6.10	30.8	0.881E+00	1.36	304.80	6.10	4.74	.15909E+05
2706.13	134.11	6.10	30.8	0.881E+00	1.36	304.80	6.10	4.74	.16011E+05
2723.38	134.11	6.10	30.8	0.880E+00	1.36	304.80	6.10	4.74	.16113E+05
2740.63	134.11	6.10	30.8	0.880E+00	1.36	304.80	6.10	4.74	.16215E+05
2757.89	134.11	6.10	30.8	0.880E+00	1.36	304.80	6.10	4.74	.16318E+05
2775.14	134.11	6.10	30.8	0.879E+00	1.36	304.80	6.10	4.74	.16420E+05
2792.39	134.11	6.10	30.9	0.879E+00	1.36	304.80	6.10	4.74	.16522E+05
2809.64	134.11	6.10	30.9	0.878E+00	1.36	304.80	6.10	4.74	.16624E+05
2826.89	134.11	6.10	30.9	0.878E+00	1.36	304.80	6.10	4.74	.16726E+05
2844.14	134.11	6.10	30.9	0.878E+00	1.36	304.80	6.10	4.74	.16828E+05
2861.40	134.11	6.10	30.9	0.877E+00	1.36	304.80	6.10	4.74	.16931E+05
2878.65	134.11	6.10	30.9	0.877E+00	1.36	304.80	6.10	4.73	.17033E+05
2895.90	134.11	6.10	30.9	0.877E+00	1.36	304.80	6.10	4.73	.17135E+05
2913.15	134.11	6.10	30.9	0.876E+00	1.36	304.80	6.10	4.73	.17237E+05
2930.40	134.11	6.10	30.9	0.876E+00	1.36	304.80	6.10	4.73	.17339E+05
2947.65	134.11	6.10	30.9	0.875E+00	1.36	304.80	6.10	4.73	.17441E+05
2964.91	134.11	6.10	30.9	0.875E+00	1.36	304.80	6.10	4.73	.17544E+05
2982.16	134.11	6.10	30.9	0.875E+00	1.36	304.80	6.10	4.73	.17646E+05
2999.41	134.11	6.10	30.9	0.874E+00	1.36	304.80	6.10	4.73	.17748E+05
3016.66	134.11	6.10	30.9	0.874E+00	1.36	304.80	6.10	4.73	.17850E+05
3033.91	134.11	6.10	30.9	0.874E+00	1.36	304.80	6.10	4.73	.17952E+05
3051.16	134.11	6.10	30.9	0.873E+00	1.36	304.80	6.10	4.73	.18054E+05
3068.42	134.11	6.10	30.9	0.873E+00	1.36	304.80	6.10	4.73	.18156E+05
3085.67	134.11	6.10	30.9	0.872E+00	1.36	304.80	6.10	4.73	.18259E+05
3102.92	134.11	6.10	30.9	0.872E+00	1.36	304.80	6.10	4.73	.18361E+05
3120.17	134.11	6.10	30.9	0.872E+00	1.36	304.80	6.10	4.73	.18463E+05
3137.42	134.11	6.10	31.0	0.871E+00	1.36	304.80	6.10	4.73	.18565E+05
3154.67	134.11	6.10	31.0	0.871E+00	1.36	304.80	6.10	4.73	.18667E+05
3171.93	134.11	6.10	31.0	0.870E+00	1.36	304.80	6.10	4.73	.18769E+05
3189.18	134.11	6.10	31.0	0.870E+00	1.37	304.80	6.10	4.73	.18872E+05
3206.43	134.11	6.10	31.0	0.870E+00	1.37	304.80	6.10	4.73	.18974E+05
3223.68	134.11	6.10	31.0	0.869E+00	1.37	304.80	6.10	4.73	.19076E+05
3240.93	134.11	6.10	31.0	0.869E+00	1.37	304.80	6.10	4.73	.19178E+05
3258.19	134.11	6.10	31.0	0.869E+00	1.37	304.80	6.10	4.73	.19280E+05
3275.44	134.11	6.10	31.0	0.868E+00	1.37	304.80	6.10	4.73	.19382E+05
3292.69	134.11	6.10	31.0	0.868E+00	1.37	304.80	6.10	4.73	.19485E+05
3309.94	134.11	6.10	31.0	0.867E+00	1.37	304.80	6.10	4.73	.19587E+05
3327.19	134.11	6.10	31.0	0.867E+00	1.37	304.80	6.10	4.73	.19689E+05
3344.44	134.11	6.10	31.0	0.867E+00	1.37	304.80	6.10	4.73	.19791E+05
3361.70	134.11	6.10	31.0	0.866E+00	1.37	304.80	6.10	4.73	.19893E+05
3378.95	134.11	6.10	31.0	0.866E+00	1.37	304.80	6.10	4.73	.19995E+05
3396.20	134.11	6.10	31.0	0.865E+00	1.37	304.80	6.10	4.73	.20098E+05
3413.45	134.11	6.10	31.0	0.865E+00	1.37	304.80	6.10	4.73	.20200E+05
3430.70	134.11	6.10	31.0	0.865E+00	1.37	304.80	6.10	4.73	.20302E+05
3447.95	134.11	6.10	31.0	0.864E+00	1.37	304.80	6.10	4.73	.20404E+05
3465.21	134.11	6.10	31.0	0.864E+00	1.37	304.80	6.10	4.73	.20506E+05
3482.46	134.11	6.10	31.1	0.863E+00	1.37	304.80	6.10	4.73	.20608E+05
3499.71	134.11	6.10	31.1	0.863E+00	1.37	304.80	6.10	4.73	.20711E+05
3516.96	134.11	6.10	31.1	0.863E+00	1.37	304.80	6.10	4.73	.20813E+05
3534.21	134.11	6.10	31.1	0.862E+00	1.37	304.80	6.10	4.73	.20915E+05
3551.46	134.11	6.10	31.1	0.862E+00	1.37	304.80	6.10	4.73	.21017E+05
3568.72	134.11	6.10	31.1	0.862E+00	1.37	304.80	6.10	4.73	.21119E+05
3585.97	134.11	6.10	31.1	0.861E+00	1.37	304.80	6.10	4.73	.21221E+05
3603.22	134.11	6.10	31.1	0.861E+00	1.37	304.80	6.10	4.73	.21324E+05
3620.47	134.11	6.10	31.1	0.860E+00	1.37	304.80	6.10	4.73	.21426E+05
3637.72	134.11	6.10	31.1	0.860E+00	1.37	304.80	6.10	4.72	.21528E+05
3654.97	134.11	6.10	31.1	0.860E+00	1.37	304.80	6.10	4.72	.21630E+05
3672.23	134.11	6.10	31.1	0.859E+00	1.37	304.80	6.10	4.72	.21732E+05
3689.48	134.11	6.10	31.1	0.859E+00	1.37	304.80	6.10	4.72	.21834E+05

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   3706.73   134.11    6.10    31.1 0.858E+00   1.37   304.80    6.10    4.72   .21937E+05
   3723.98   134.11    6.10    31.1 0.858E+00   1.37   304.80    6.10    4.72   .22039E+05
   3741.23   134.11    6.10    31.1 0.858E+00   1.37   304.80    6.10    4.72   .22141E+05
   3758.48   134.11    6.10    31.1 0.857E+00   1.37   304.80    6.10    4.72   .22243E+05
   3775.74   134.11    6.10    31.1 0.857E+00   1.37   304.80    6.10    4.72   .22345E+05
   3792.99   134.11    6.10    31.2 0.857E+00   1.37   304.80    6.10    4.72   .22447E+05
   3810.24   134.11    6.10    31.2 0.856E+00   1.37   304.80    6.10    4.72   .22550E+05
   3827.49   134.11    6.10    31.2 0.856E+00   1.37   304.80    6.10    4.72   .22652E+05
   3844.74   134.11    6.10    31.2 0.855E+00   1.37   304.80    6.10    4.72   .22754E+05
   3861.99   134.11    6.10    31.2 0.855E+00   1.37   304.80    6.10    4.72   .22856E+05
   3879.25   134.11    6.10    31.2 0.855E+00   1.37   304.80    6.10    4.72   .22958E+05
   3896.50   134.11    6.10    31.2 0.854E+00   1.37   304.80    6.10    4.72   .23060E+05
   3913.75   134.11    6.10    31.2 0.854E+00   1.38   304.80    6.10    4.72   .23163E+05
   3931.00   134.11    6.10    31.2 0.853E+00   1.38   304.80    6.10    4.72   .23265E+05
   3948.25   134.11    6.10    31.2 0.853E+00   1.38   304.80    6.10    4.72   .23367E+05
   3965.51   134.11    6.10    31.2 0.853E+00   1.38   304.80    6.10    4.72   .23469E+05
   3982.76   134.11    6.10    31.2 0.852E+00   1.38   304.80    6.10    4.72   .23571E+05
   4000.01   134.11    6.10    31.2 0.852E+00   1.38   304.80    6.10    4.72   .23673E+05
 Cumulative travel time =       23673.3516 sec  (    6.58 hrs)

 Simulation limit based on maximum specified distance =   4000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT
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CORMIX2: Multiport Diffuser Discharges       End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
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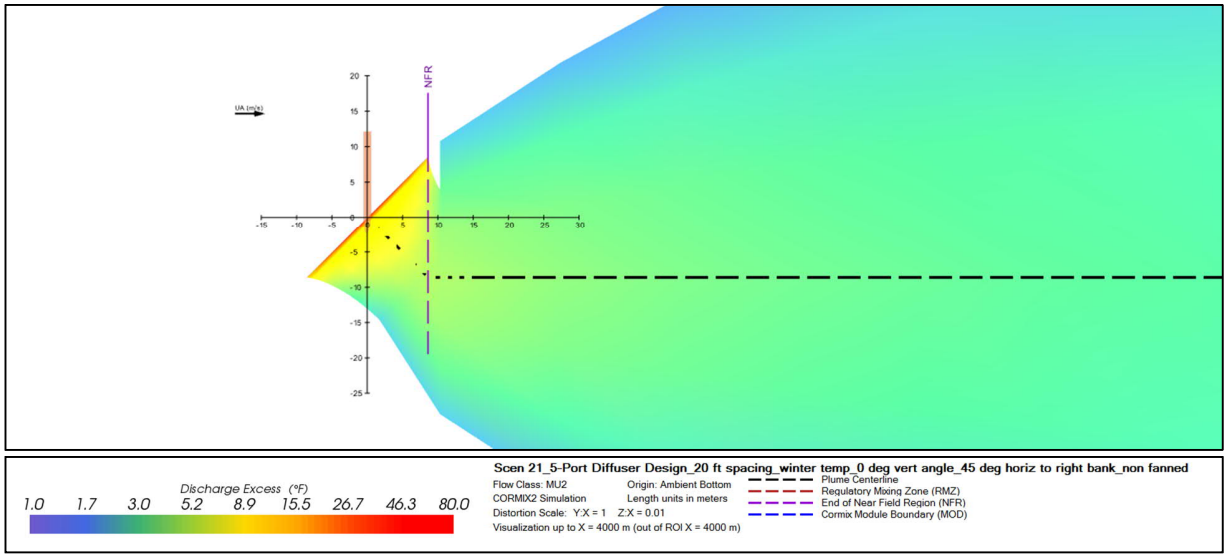
Appendix D – CORMIX Output Files and Results for Temperature Model Runs
Ghent Generating Station

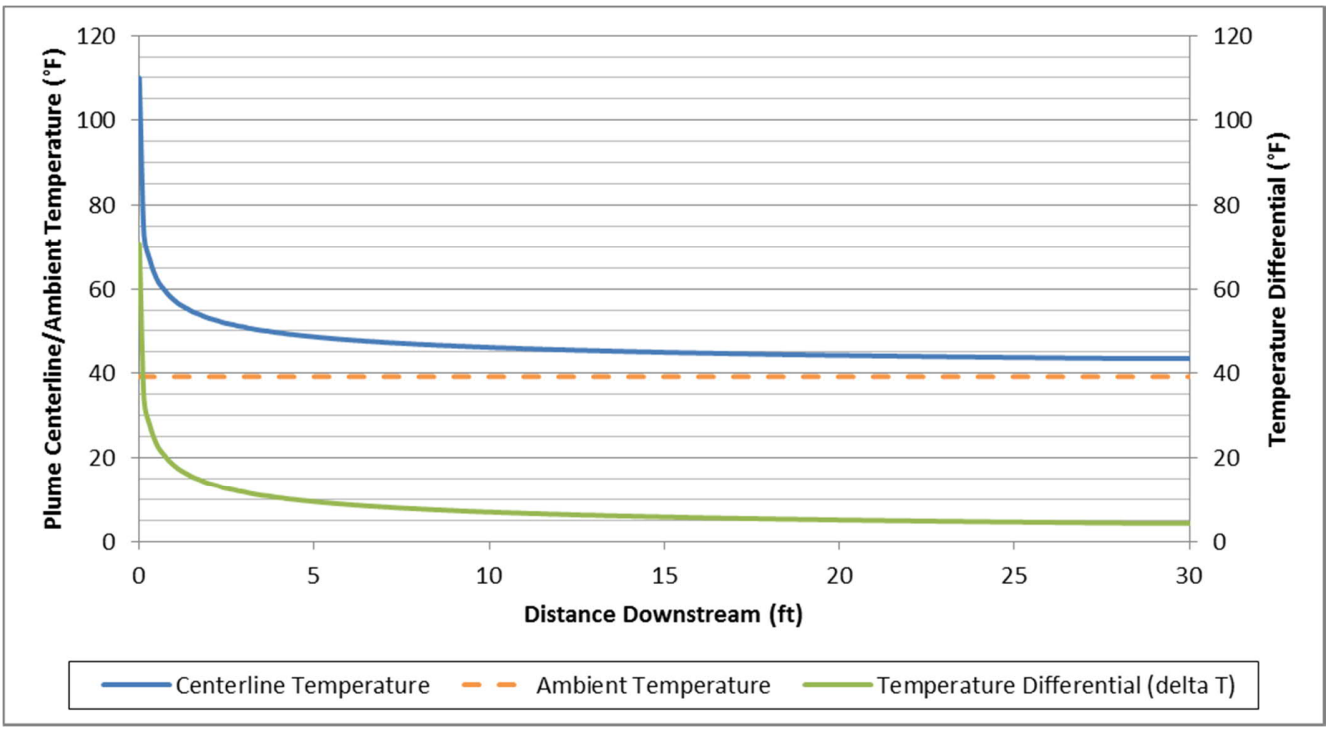
Winter Conditions:
Ambient River Temperature = 39.2°F
Discharge Temperature = 110°F
Initial Discharge Temperature Excess = 70.8°F

The plan view figure below shows the shape of the plume and the concentrations within the plume. Since the diffuser ports are pointed to the west bank of the river ("downward" direction in the figure), CORMIX begins the plume on this angle with the center of the plume located at the center of the diffuser.



Appendix D – CORMIX Output Files and Results for Temperature Model Runs
Ghent Generating Station

The ΔT drops to less than 5°F within 20.5 ft downstream of the diffuser. The centerline plume temperature drops below the January maximum temperature of 45°F within 14.8 ft downstream of the diffuser. The graph below shows the plume centerline temperature and ΔT as a function of distance downstream of the diffuser. The data from CORMIX was exported, converted to English units, and re-graphed.



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CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                      CORMIX MIXING ZONE EXPERT SYSTEM
                          CORMIX Version 10.0GT
                       HYDRO2:Version-10.0.1.0  October,2016
SITE NAME/LABEL:                LG&E KU Ghent
  DESIGN CASE:                  Scenario 21
  FILE NAME:                    \\conshohocken.na.aecomnet.com\Conshohocken\Projects\Private-Sector\LG&E KU\Ghent\Conceptual
Design\2018\Model Run Files\Scen 21 5-Port Diffuser Design 20 ft spacing winter temp 0 deg vert angle 45 deg horiz to right bank
non fanned.prd
  Using subsystem CORMIX2:     Multiport Diffuser Discharges
  Start of session:             06/15/2018--17:13:46
*******************************************************************************
SUMMARY OF INPUT DATA:
-------------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                         = bounded
  Width                          BS     = 304.80 m
  Channel regularity             ICHREG = 1
  Ambient flowrate               QA     = 311.49 m^3/s
  Average depth                  HA     = 6.10 m
  Depth at discharge             HD     = 6.10 m
  Ambient velocity               UA     = 0.1676 m/s
  Darcy-Weisbach friction factor F      = 0.0172
    Calculated from Manning's n         = 0.02
  Wind velocity                  UW     = 4.00 m/s
  Stratification Type            STRCND = U
  Surface temperature                   = 4.00 degC
  Bottom temperature                    = 4.00 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density                RHOAS  = 999.9749 kg/m^3
  Bottom density                 RHOAB  = 999.9749 kg/m^3
-------------------------------------------------------------------------------
DISCHARGE PARAMETERS:           Submerged Multiport Diffuser Discharge
  Diffuser type                 DITYPE = unidirectional perpendicular
  Diffuser length               LD     = 24.38 m
  Nearest bank                          = left
  Diffuser endpoints            YB1    = 121.92 m;    YB2 = 146.30 m
  Number of openings            NOPEN  = 5
  Number of Risers              NRISER = 5
  Ports/Nozzles per Riser       NPPERR  = 1
  Spacing between risers/openings SPAC   = 6.10 m
  Port/Nozzle diameter          D0     = 0.4572 m
    with contraction ratio              = 1
  Equivalent slot width         B0     = 0.0269 m
  Total area of openings        TA0    = 0.8209 m^2
  Discharge velocity            U0     = 2.76 m/s
  Total discharge flowrate      Q0     = 2.269495 m^3/s
  Discharge port height         H0     = 0.61 m
  Nozzle arrangement            BETYPE = unidirectional without fanning
  Diffuser alignment angle      GAMMA  = 90 deg
  Vertical discharge angle      THETA  = 0 deg
  Actual Vertical discharge angle THEAC  = 0 deg
  Horizontal discharge angle    SIGMA  = 315 deg
  Relative orientation angle    BETA   = 45 deg
  Discharge temperature (freshwater)    = 43.33 degC
  Corresponding density         RHO0   = 990.8954 kg/m^3
  Density difference            DRHO   = 9.0796 kg/m^3
  Buoyant acceleration          GP0    = 0.089 m/s^2
  Discharge concentration       C0     = 70.800000 deg.F
  Surface heat exchange coeff.  KS     = 0.000008 m/s
  Coefficient of decay          KD     = 0 /s
-------------------------------------------------------------------------------
FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
  Discharge (volume flux)       q0     = 0.093073 m^2/s
  Momentum flux                 m0     = 0.257324 m^3/s^2
  Buoyancy flux                 j0     = 0.008287 m^3/s^3
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.03 m         Lm  = 9.16 m         LM  = 5.82 m
  lm' = 99999 m         Lb' = 99999 m         La  = 99999 m
  (These refer to the actual discharge/environment length scales.)
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
Slot Froude number              FR0    = 56.46
  Port/nozzle Froude number     FRD0   = 13.70
  Velocity ratio                R      = 16.49
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                       = no
  Water quality standard specified      = yes
  Water quality standard        CSTD    = 5.8 deg.F
  Regulatory mixing zone                = yes
  Regulatory mixing zone specification  = distance
  Regulatory mixing zone value          = 176.17 m (m^2 if area)
  Region of interest                    = 4000 m
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *-----------------------*
  | FLOW CLASS   = MU2 |
```

```
  *------------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 6.10 m

  Limiting Dilution S = (QA/Q0)+ 1.0 = 138.2

*******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-------------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the BOTTOM below the port/diffuser center:
    134.11 m from the left bank/shore.
  Number of display steps NSTEP = 200 per module.
-------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
  implication.  However, this information may be useful for the discharge
  designer because the mixing in the NFR is usually sensitive to the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 4.2973 deg.F
  Dilution at edge of NFR              s = 16.5
  NFR Location:                        x = 8.62 m
    (centerline coordinates)           y = -8.62 m
                                       z = 6.10 m
  NFR plume dimensions:  half-width (bh) = 9.15 m
                          thickness (bv) = 6.10 m
Cumulative travel time:       36.3451 sec.
-------------------------------------------------------------------------------
Buoyancy assessment:
  The effluent density is less than the surrounding ambient water
  density at the discharge level.
  Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
  the surface.
-------------------------------------------------------------------------------
Near-field instability behavior:
  The diffuser flow will experience instabilities with full vertical mixing
  in the near-field.
  There may be benthic impact of high pollutant concentrations.
-------------------------------------------------------------------------------
FAR-FIELD MIXING SUMMARY:
  Plume becomes vertically fully mixed WITHIN NEAR-FIELD at 0 m
  downstream, but RE-STRATIFIES LATER and is not mixed in the far-field.
  Plume becomes laterally fully mixed at 428.13 m
  downstream.
-------------------------------------------------------------------------------
PLUME BANK CONTACT SUMMARY:
  Plume in bounded section contacts nearest bank at 350.12 m downstream.
  Plume contacts second bank at 428.13 m downstream.
************************ TOXIC DILUTION ZONE SUMMARY ************************
No TDZ was specified for this simulation.
********************** REGULATORY MIXING ZONE SUMMARY ***********************
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration              c = 2.839268  deg.F
  Corresponding dilution               s = 24.9
  Plume location:                      x = 176.17 m
    (centerline coordinates)           y = -8.62 m
                                       z = 6.10 m
  Plume dimensions:      half-width (bh) = 92.12 m
                          thickness (bv) = 1.82 m
Cumulative travel time:       1028.5986 sec.

Note:
Plume concentration c and dilution s values are reported based on prediction
file values - assuming linear interpolation between predicted points just
before and just after the RMZ boundary has been detected.

Please ensure a small step size is used in the prediction file to account
for this linear interpolation. Step size can be controlled by increasing
(reduces the prediction step size) or decreasing (increases the prediction
step size) the - Output Steps per Module - in CORMIX input.

At this position, the plume is CONTACTING the LEFT bank.
Furthermore, the specified water quality standard has indeed been met
  within the RMZ. In particular:
The ambient water quality standard was encountered at the following
  plume position:
  Water quality standard                 = 5.8  deg.F
  Corresponding dilution               s = 12.2
  Plume location:                      x = 4.52 m
    (centerline coordinates)           y = -4.52 m
                                       z = 1.12 m
  Plume dimensions:      half-width (bh) = 9.65 m
                          thickness (bv) = 3.20 m
******************** FINAL DESIGN ADVICE AND COMMENTS ***********************
CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent
  the actual three-dimensional diffuser geometry.  Thus, it approximates
  the details of the merging process of the individual jets from each
  port/nozzle.
```

```
In the present design, the spacing between adjacent ports/nozzles
  (or riser assemblies) is of the order of, or less than, the local
  water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a
  final CORMIX1 (single port discharge) analysis, with discharge data
  for an individual diffuser jet/plume, in order to compare to
  the present near-field prediction.
--------------------------------------------------------------------------------
REMINDER:  The user must take note that HYDRODYNAMIC MODELING by any known
  technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the
  CORMIX predictions on dilutions and concentrations (with associated
  plume geometries) are reliable for the majority of cases and are accurate
  to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges
  the design configuration as highly complex and uncertain for prediction.
```

```
CORMIX2 PREDICTION FILE:
2222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
                    CORMIX MIXING ZONE EXPERT SYSTEM
               Subsystem CORMIX2: Multiport Diffuser Discharges
                          CORMIX Version 10.0GT
                     HYDRO2 Version 10.0.1.0 October 2016
-------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:   LG&E KU Ghent
 Design case:       Scenario 21
 FILE NAME:         \\c...t angle_45 deg horiz to right bank_non fanned.prd
 Time stamp:        06/15/2018--17:13:46

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    304.80  AS    =   1858.06  QA    =    311.49  ICHREG= 1
 HA    =      6.10  HD    =      6.10
 UA    =     0.168 F     =     0.017 USTAR =0.7771E-02
 UW    =     4.001 UWSTAR=0.4610E-02
 Uniform density environment
 STRCND=  U         RHOAM =  999.9750

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =    134.11  YB1   =    121.92  YB2   =    146.30
 LD    =     24.38  NOPEN =    5       SPAC  =      6.10
 D0    =     0.457 A0    =      0.164 H0    =      0.61  SUB0  =      5.49
 D0INP =     0.457 CR0   =      1.000
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =      0.00  SIGMA =    315.00  BETA  =     45.00
 U0    =     2.765 Q0    =      2.269 Q0A   =0.2269E+01
 RHO0  =  990.8954  DRHO0 =0.9080E+01  GP0   =0.8904E-01
 C0    =0.7080E+02  CUNITS=  deg.F
 IPOLL =  3         KS    =0.7882E-05  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.9307E-01  m0    =0.2059E+00  j0    =0.6630E-02  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =      0.034 lM    =      5.82  lm    =      9.16
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.2269E+01  M0    =0.5020E+01  J0    =0.1617E+00
 Associated 3-d length scales (meters)
 LQ    =      0.41  LM    =      8.34  Lm    =     14.94  Lb    =     42.89
                                       Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =     56.46  FRD0  =     13.70  R     =     16.49  PL    =   13.54
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:
 Properties of riser group with  1 ports/nozzles each:
 U0    =      2.765 D0    =      0.457 A0    =      0.164 THETA =      0.00
 FR0   =     56.46  FRD0  =     13.70  R     =     16.49
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    MU2    2
 2  Applicable layer depth HS =     6.10  2
 2  Limiting Dilution S =QA/Q0=   138.25  2
 22222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.7080E+02  CUNITS=  deg.F
 NTOX  =  0
 NSTD  =  1         CSTD  =0.5800E+01
 REGMZ =  1
 REGSPC=  1         XREG  =    176.17  WREG  =      0.00  AREG  =      0.00
 XINT  =   4000.00  XMAX  =   4000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
       134.11 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 200 display intervals per module
-------------------------------------------------------------------------------------------------

NOTE on dilution/concentration values for this HEATED DISCHARGE (IPOLL=3):
   S  = hydrodynamic dilutions, include buoyancy (heat) loss effects, but
        provided plume has surface contact
   C  = corresponding temperature values (in "deg.F"!) include heat loss,
        if any
-------------------------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY
```

```
 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)
   Uc = Local centerline excess velocity (above ambient)
   TT = Cumulative travel time

       X        Y       Z        S       C       BV       BH       Uc        TT
     0.00     0.00    0.61     1.0 0.708E+02   0.02    12.19     2.646   .00000E+00

END OF MOD201: DIFFUSER DISCHARGE MODULE
-----------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    6.10m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
   TT = Cumulative travel time

       X        Y       Z        S       C       BV       BH        TT
     0.00    -0.00    0.61     1.0 0.708E+02   0.02    12.19 .00000E+00
     0.04    -0.04    0.61     2.1 0.338E+02   0.03    12.15 .40974E-01
     0.09    -0.09    0.62     2.5 0.278E+02   0.06    12.10 .97310E-01
     0.13    -0.13    0.62     2.9 0.245E+02   0.09    12.06 .16292E+00
     0.17    -0.17    0.63     3.2 0.222E+02   0.12    12.01 .23566E+00
     0.22    -0.22    0.63     3.4 0.205E+02   0.15    11.97 .31431E+00
     0.26    -0.26    0.64     3.7 0.192E+02   0.18    11.93 .39806E+00
     0.30    -0.30    0.64     3.9 0.182E+02   0.21    11.89 .48633E+00
     0.34    -0.34    0.65     4.1 0.173E+02   0.24    11.85 .57866E+00
     0.39    -0.39    0.65     4.3 0.165E+02   0.27    11.81 .67468E+00
     0.43    -0.43    0.66     4.5 0.159E+02   0.30    11.77 .77411E+00
     0.47    -0.47    0.66     4.6 0.153E+02   0.34    11.73 .87670E+00
     0.52    -0.52    0.67     4.8 0.148E+02   0.37    11.69 .98224E+00
     0.56    -0.56    0.67     4.9 0.143E+02   0.40    11.65 .10905E+01
     0.60    -0.60    0.68     5.1 0.139E+02   0.43    11.61 .12014E+01
     0.65    -0.65    0.68     5.2 0.135E+02   0.46    11.58 .13148E+01
     0.69    -0.69    0.69     5.4 0.132E+02   0.49    11.54 .14305E+01
     0.73    -0.73    0.69     5.5 0.128E+02   0.52    11.51 .15485E+01
     0.78    -0.78    0.70     5.6 0.125E+02   0.55    11.47 .16686E+01
     0.82    -0.82    0.70     5.8 0.123E+02   0.58    11.44 .17907E+01
     0.86    -0.86    0.71     5.9 0.120E+02   0.61    11.40 .19148E+01
     0.91    -0.91    0.71     6.0 0.118E+02   0.64    11.37 .20407E+01
     0.95    -0.95    0.72     6.1 0.115E+02   0.67    11.33 .21685E+01
     0.99    -0.99    0.72     6.2 0.113E+02   0.70    11.30 .22979E+01
     1.03    -1.03    0.73     6.4 0.111E+02   0.73    11.27 .24291E+01
     1.08    -1.08    0.73     6.5 0.109E+02   0.76    11.24 .25619E+01
     1.12    -1.12    0.74     6.6 0.108E+02   0.79    11.21 .26963E+01
     1.16    -1.16    0.74     6.7 0.106E+02   0.82    11.17 .28322E+01
     1.21    -1.21    0.75     6.8 0.104E+02   0.85    11.14 .29695E+01
     1.25    -1.25    0.75     6.9 0.103E+02   0.88    11.11 .31083E+01
     1.29    -1.29    0.76     7.0 0.101E+02   0.91    11.08 .32485E+01
     1.34    -1.34    0.76     7.1 0.998E+01   0.94    11.05 .33900E+01
     1.38    -1.38    0.77     7.2 0.985E+01   0.98    11.03 .35329E+01
     1.42    -1.42    0.77     7.3 0.972E+01   1.01    11.00 .36770E+01
     1.47    -1.47    0.78     7.4 0.959E+01   1.04    10.97 .38224E+01
     1.51    -1.51    0.78     7.5 0.947E+01   1.07    10.94 .39690E+01
     1.55    -1.55    0.79     7.6 0.936E+01   1.10    10.91 .41168E+01
     1.59    -1.59    0.79     7.7 0.925E+01   1.13    10.89 .42657E+01
     1.64    -1.64    0.79     7.7 0.914E+01   1.16    10.86 .44158E+01
     1.68    -1.68    0.80     7.8 0.904E+01   1.19    10.83 .45670E+01
     1.72    -1.72    0.80     7.9 0.894E+01   1.22    10.81 .47193E+01
     1.77    -1.77    0.81     8.0 0.884E+01   1.25    10.78 .48726E+01
     1.81    -1.81    0.81     8.1 0.875E+01   1.28    10.76 .50270E+01
     1.85    -1.85    0.82     8.2 0.866E+01   1.31    10.73 .51824E+01
     1.90    -1.90    0.82     8.3 0.857E+01   1.34    10.71 .53387E+01
     1.94    -1.94    0.83     8.3 0.849E+01   1.37    10.68 .54961E+01
     1.98    -1.98    0.83     8.4 0.841E+01   1.40    10.66 .56544E+01
     2.03    -2.03    0.84     8.5 0.833E+01   1.43    10.64 .58136E+01
     2.07    -2.07    0.84     8.6 0.825E+01   1.46    10.61 .59738E+01
     2.11    -2.11    0.85     8.7 0.818E+01   1.49    10.59 .61348E+01
     2.16    -2.16    0.85     8.7 0.810E+01   1.52    10.57 .62968E+01
     2.20    -2.20    0.86     8.8 0.803E+01   1.55    10.54 .64596E+01
     2.24    -2.24    0.86     8.9 0.796E+01   1.58    10.52 .66233E+01
     2.28    -2.28    0.87     9.0 0.790E+01   1.62    10.50 .67878E+01
     2.33    -2.33    0.87     9.0 0.783E+01   1.65    10.48 .69531E+01
     2.37    -2.37    0.88     9.1 0.777E+01   1.68    10.46 .71193E+01
     2.41    -2.41    0.88     9.2 0.771E+01   1.71    10.43 .72862E+01
     2.46    -2.46    0.89     9.3 0.764E+01   1.74    10.41 .74540E+01
     2.50    -2.50    0.89     9.3 0.759E+01   1.77    10.39 .76225E+01
     2.54    -2.54    0.90     9.4 0.753E+01   1.80    10.37 .77917E+01
     2.59    -2.59    0.90     9.5 0.747E+01   1.83    10.35 .79618E+01
```

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      2.63    -2.63    0.91     9.5 0.742E+01   1.86    10.33 .81325E+01
      2.67    -2.67    0.91     9.6 0.736E+01   1.89    10.31 .83040E+01
      2.72    -2.72    0.92     9.7 0.731E+01   1.92    10.29 .84762E+01
      2.76    -2.76    0.92     9.8 0.726E+01   1.95    10.27 .86491E+01
      2.80    -2.80    0.93     9.8 0.721E+01   1.98    10.25 .88227E+01
      2.84    -2.84    0.93     9.9 0.716E+01   2.01    10.24 .89970E+01
      2.89    -2.89    0.94    10.0 0.711E+01   2.04    10.22 .91719E+01
      2.93    -2.93    0.94    10.0 0.706E+01   2.07    10.20 .93475E+01
      2.97    -2.97    0.95    10.1 0.702E+01   2.10    10.18 .95238E+01
      3.02    -3.02    0.95    10.2 0.697E+01   2.13    10.16 .97007E+01
      3.06    -3.06    0.96    10.2 0.693E+01   2.16    10.14 .98783E+01
      3.10    -3.10    0.96    10.3 0.688E+01   2.19    10.13 .10056E+02
      3.15    -3.15    0.97    10.3 0.684E+01   2.23    10.11 .10235E+02
      3.19    -3.19    0.97    10.4 0.680E+01   2.26    10.09 .10415E+02
      3.23    -3.23    0.98    10.5 0.676E+01   2.29    10.08 .10595E+02
      3.28    -3.28    0.98    10.5 0.672E+01   2.32    10.06 .10775E+02
      3.32    -3.32    0.99    10.6 0.668E+01   2.35    10.04 .10957E+02
      3.36    -3.36    0.99    10.7 0.664E+01   2.38    10.03 .11138E+02
      3.41    -3.41    0.99    10.7 0.660E+01   2.41    10.01 .11321E+02
      3.45    -3.45    1.00    10.8 0.656E+01   2.44     9.99 .11504E+02
      3.49    -3.49    1.00    10.8 0.653E+01   2.47     9.98 .11687E+02
      3.53    -3.53    1.01    10.9 0.649E+01   2.50     9.96 .11871E+02
      3.58    -3.58    1.01    11.0 0.645E+01   2.53     9.95 .12056E+02
      3.62    -3.62    1.02    11.0 0.642E+01   2.56     9.93 .12241E+02
      3.66    -3.66    1.02    11.1 0.638E+01   2.59     9.92 .12427E+02
      3.71    -3.71    1.03    11.1 0.635E+01   2.62     9.90 .12613E+02
      3.75    -3.75    1.03    11.2 0.632E+01   2.65     9.89 .12800E+02
      3.79    -3.79    1.04    11.3 0.628E+01   2.68     9.87 .12987E+02
      3.84    -3.84    1.04    11.3 0.625E+01   2.71     9.86 .13175E+02
      3.88    -3.88    1.05    11.4 0.622E+01   2.74     9.84 .13363E+02
      3.92    -3.92    1.05    11.4 0.619E+01   2.77     9.83 .13552E+02
      3.97    -3.97    1.06    11.5 0.616E+01   2.80     9.81 .13741E+02
      4.01    -4.01    1.06    11.6 0.613E+01   2.83     9.80 .13931E+02
      4.05    -4.05    1.07    11.6 0.610E+01   2.87     9.79 .14121E+02
      4.09    -4.09    1.07    11.7 0.607E+01   2.90     9.77 .14312E+02
      4.14    -4.14    1.08    11.7 0.604E+01   2.93     9.76 .14503E+02
      4.18    -4.18    1.08    11.8 0.601E+01   2.96     9.75 .14695E+02
      4.22    -4.22    1.09    11.8 0.598E+01   2.99     9.73 .14887E+02
      4.27    -4.27    1.09    11.9 0.596E+01   3.02     9.72 .15080E+02
      4.31    -4.31    1.10    11.9 0.593E+01   3.05     9.71 .15273E+02
      4.35    -4.35    1.10    12.0 0.590E+01   3.08     9.69 .15466E+02
      4.40    -4.40    1.11    12.1 0.587E+01   3.11     9.68 .15660E+02
      4.44    -4.44    1.11    12.1 0.585E+01   3.14     9.67 .15855E+02
      4.48    -4.48    1.12    12.2 0.582E+01   3.17     9.66 .16050E+02
** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below water quality standard
   or CCC value of 0.580E+01 in the current prediction interval.
 This is the spatial extent of concentrations exceeding the water quality
   standard or CCC value.
      4.53    -4.53    1.12    12.2 0.580E+01   3.20     9.65 .16245E+02
      4.57    -4.57    1.13    12.3 0.577E+01   3.23     9.63 .16441E+02
      4.61    -4.61    1.13    12.3 0.575E+01   3.26     9.62 .16637E+02
      4.66    -4.66    1.14    12.4 0.572E+01   3.29     9.61 .16833E+02
      4.70    -4.70    1.14    12.4 0.570E+01   3.32     9.60 .17030E+02
      4.74    -4.74    1.15    12.5 0.567E+01   3.35     9.59 .17228E+02
      4.78    -4.78    1.15    12.5 0.565E+01   3.38     9.58 .17426E+02
      4.83    -4.83    1.16    12.6 0.563E+01   3.41     9.57 .17624E+02
      4.87    -4.87    1.16    12.6 0.560E+01   3.44     9.55 .17823E+02
      4.91    -4.91    1.17    12.7 0.558E+01   3.47     9.54 .18022E+02
      4.96    -4.96    1.17    12.7 0.556E+01   3.51     9.53 .18221E+02
      5.00    -5.00    1.18    12.8 0.554E+01   3.54     9.52 .18421E+02
      5.04    -5.04    1.18    12.8 0.552E+01   3.57     9.51 .18621E+02
      5.09    -5.09    1.19    12.9 0.549E+01   3.60     9.50 .18822E+02
      5.13    -5.13    1.19    12.9 0.547E+01   3.63     9.49 .19023E+02
      5.17    -5.17    1.19    13.0 0.545E+01   3.66     9.48 .19224E+02
      5.22    -5.22    1.20    13.0 0.543E+01   3.69     9.47 .19426E+02
      5.26    -5.26    1.20    13.1 0.541E+01   3.72     9.47 .19628E+02
      5.30    -5.30    1.21    13.1 0.539E+01   3.75     9.46 .19830E+02
      5.35    -5.35    1.21    13.2 0.537E+01   3.78     9.45 .20033E+02
      5.39    -5.39    1.22    13.2 0.535E+01   3.81     9.44 .20237E+02
      5.43    -5.43    1.22    13.3 0.533E+01   3.84     9.43 .20440E+02
      5.47    -5.47    1.23    13.3 0.531E+01   3.87     9.42 .20644E+02
      5.52    -5.52    1.23    13.4 0.529E+01   3.90     9.41 .20848E+02
      5.56    -5.56    1.24    13.4 0.527E+01   3.93     9.40 .21053E+02
      5.60    -5.60    1.24    13.5 0.525E+01   3.96     9.40 .21258E+02
      5.65    -5.65    1.25    13.5 0.523E+01   3.99     9.39 .21463E+02
      5.69    -5.69    1.25    13.6 0.522E+01   4.02     9.38 .21669E+02
      5.73    -5.73    1.26    13.6 0.520E+01   4.05     9.37 .21875E+02
      5.78    -5.78    1.26    13.7 0.518E+01   4.08     9.37 .22081E+02
      5.82    -5.82    1.27    13.7 0.516E+01   4.11     9.36 .22288E+02
      5.86    -5.86    1.27    13.8 0.514E+01   4.15     9.35 .22495E+02
      5.91    -5.91    1.28    13.8 0.513E+01   4.18     9.34 .22703E+02
      5.95    -5.95    1.28    13.9 0.511E+01   4.21     9.34 .22910E+02
      5.99    -5.99    1.29    13.9 0.509E+01   4.24     9.33 .23118E+02
      6.03    -6.03    1.29    13.9 0.508E+01   4.27     9.32 .23327E+02
      6.08    -6.08    1.30    14.0 0.506E+01   4.30     9.32 .23535E+02
      6.12    -6.12    1.30    14.0 0.504E+01   4.33     9.31 .23744E+02
      6.16    -6.16    1.31    14.1 0.503E+01   4.36     9.31 .23954E+02
      6.21    -6.21    1.31    14.1 0.501E+01   4.39     9.30 .24163E+02
      6.25    -6.25    1.32    14.2 0.499E+01   4.42     9.29 .24373E+02
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      6.29    -6.29    1.32    14.2 0.498E+01   4.45     9.29 .24584E+02
      6.34    -6.34    1.33    14.3 0.496E+01   4.48     9.28 .24794E+02
      6.38    -6.38    1.33    14.3 0.495E+01   4.51     9.28 .25005E+02
      6.42    -6.42    1.34    14.4 0.493E+01   4.54     9.27 .25216E+02
      6.47    -6.47    1.34    14.4 0.492E+01   4.57     9.27 .25428E+02
      6.51    -6.51    1.35    14.4 0.490E+01   4.60     9.26 .25639E+02
      6.55    -6.55    1.35    14.5 0.489E+01   4.63     9.26 .25851E+02
      6.60    -6.60    1.36    14.5 0.487E+01   4.66     9.25 .26064E+02
      6.64    -6.64    1.36    14.6 0.486E+01   4.69     9.25 .26276E+02
      6.68    -6.68    1.37    14.6 0.484E+01   4.72     9.24 .26489E+02
      6.72    -6.72    1.37    14.7 0.483E+01   4.75     9.24 .26703E+02
      6.77    -6.77    1.38    14.7 0.481E+01   4.79     9.24 .26916E+02
      6.81    -6.81    1.38    14.8 0.480E+01   4.82     9.23 .27130E+02
      6.85    -6.85    1.39    14.8 0.478E+01   4.85     9.23 .27344E+02
      6.90    -6.90    1.39    14.8 0.477E+01   4.88     9.22 .27558E+02
      6.94    -6.94    1.39    14.9 0.476E+01   4.91     9.22 .27773E+02
      6.98    -6.98    1.40    14.9 0.474E+01   4.94     9.22 .27988E+02
      7.03    -7.03    1.40    15.0 0.473E+01   4.97     9.21 .28203E+02
      7.07    -7.07    1.41    15.0 0.472E+01   5.00     9.21 .28419E+02
      7.11    -7.11    1.41    15.1 0.470E+01   5.03     9.21 .28634E+02
      7.16    -7.16    1.42    15.1 0.469E+01   5.06     9.20 .28851E+02
      7.20    -7.20    1.42    15.1 0.468E+01   5.09     9.20 .29067E+02
      7.24    -7.24    1.43    15.2 0.466E+01   5.12     9.20 .29283E+02
      7.28    -7.28    1.43    15.2 0.465E+01   5.15     9.19 .29500E+02
      7.33    -7.33    1.44    15.3 0.464E+01   5.18     9.19 .29717E+02
      7.37    -7.37    1.44    15.3 0.462E+01   5.21     9.19 .29935E+02
      7.41    -7.41    1.45    15.4 0.461E+01   5.24     9.19 .30152E+02
      7.46    -7.46    1.45    15.4 0.460E+01   5.27     9.18 .30370E+02
      7.50    -7.50    1.46    15.4 0.459E+01   5.30     9.18 .30588E+02
      7.54    -7.54    1.46    15.5 0.457E+01   5.33     9.18 .30807E+02
      7.59    -7.59    1.47    15.5 0.456E+01   5.36     9.18 .31025E+02
      7.63    -7.63    1.47    15.6 0.455E+01   5.39     9.18 .31244E+02
      7.67    -7.67    1.48    15.6 0.454E+01   5.43     9.17 .31463E+02
      7.72    -7.72    1.48    15.6 0.453E+01   5.46     9.17 .31683E+02
      7.76    -7.76    1.49    15.7 0.451E+01   5.49     9.17 .31902E+02
      7.80    -7.80    1.49    15.7 0.450E+01   5.52     9.17 .32122E+02
      7.85    -7.85    1.50    15.8 0.449E+01   5.55     9.17 .32342E+02
      7.89    -7.89    1.50    15.8 0.448E+01   5.58     9.17 .32563E+02
      7.93    -7.93    1.51    15.8 0.447E+01   5.61     9.16 .32783E+02
      7.97    -7.97    1.51    15.9 0.446E+01   5.64     9.16 .33004E+02
      8.02    -8.02    1.52    15.9 0.445E+01   5.67     9.16 .33225E+02
      8.06    -8.06    1.52    16.0 0.443E+01   5.70     9.16 .33447E+02
      8.10    -8.10    1.53    16.0 0.442E+01   5.73     9.16 .33668E+02
      8.15    -8.15    1.53    16.0 0.441E+01   5.76     9.16 .33890E+02
      8.19    -8.19    1.54    16.1 0.440E+01   5.79     9.16 .34112E+02
      8.23    -8.23    1.54    16.1 0.439E+01   5.82     9.16 .34334E+02
      8.28    -8.28    1.55    16.2 0.438E+01   5.85     9.16 .34557E+02
      8.32    -8.32    1.55    16.2 0.437E+01   5.88     9.15 .34780E+02
      8.36    -8.36    1.56    16.2 0.436E+01   5.91     9.15 .35003E+02
      8.41    -8.41    1.56    16.3 0.435E+01   5.94     9.15 .35226E+02
      8.45    -8.45    1.57    16.3 0.434E+01   5.97     9.15 .35449E+02
      8.49    -8.49    1.57    16.4 0.433E+01   6.00     9.15 .35673E+02
      8.53    -8.53    1.58    16.4 0.432E+01   6.04     9.15 .35897E+02
      8.58    -8.58    1.58    16.4 0.431E+01   6.07     9.15 .36121E+02
      8.62    -8.62    1.58    16.5 0.430E+01   6.10     9.15 .36345E+02
 Cumulative travel time =          36.3451 sec  (    0.01 hrs)
   Plume centerline may exhibit slight discontinuities in transition
     to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER
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BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

 Phase 1: Vertically mixed, Phase 2: Re-stratified

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 Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW
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** End of NEAR-FIELD REGION (NFR) **

 The initial plume WIDTH values in the next far-field module will be
  CORRECTED by a factor  1.98 to conserve the mass flux in the far-field!
 The correction factor is quite large because of the small ambient velocity
   relative to the strong mixing characteristics of the discharge!
   This indicates localized RECIRCULATION REGIONS and INTERNAL HYDRAULIC JUMPS.
   Width predictions show discontinuities. Dilution values should be acceptable.
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BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
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C = average (bulk) concentration (includes reaction effects, if any)
TT = Cumulative travel time

Plume Stage 1 (not bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
8.62	-8.62	6.10	16.5	0.430E+01	6.10	18.16	6.10	0.00	.36345E+02
10.33	-8.62	6.10	16.8	0.422E+01	5.79	19.44	6.10	0.30	.46457E+02
12.04	-8.62	6.10	17.0	0.416E+01	5.53	20.67	6.10	0.56	.56568E+02
13.74	-8.62	6.10	17.3	0.410E+01	5.30	21.87	6.10	0.79	.66680E+02
15.45	-8.62	6.10	17.5	0.405E+01	5.10	23.03	6.10	0.99	.76792E+02
17.16	-8.62	6.10	17.7	0.400E+01	4.92	24.17	6.10	1.18	.86903E+02
18.87	-8.62	6.10	17.9	0.396E+01	4.76	25.28	6.10	1.34	.97015E+02
20.57	-8.62	6.10	18.1	0.391E+01	4.61	26.37	6.10	1.49	.10713E+03
22.28	-8.62	6.10	18.3	0.388E+01	4.48	27.43	6.10	1.62	.11724E+03
23.99	-8.62	6.10	18.4	0.384E+01	4.35	28.47	6.10	1.74	.12735E+03
25.70	-8.62	6.10	18.6	0.381E+01	4.24	29.50	6.10	1.86	.13746E+03
27.40	-8.62	6.10	18.8	0.377E+01	4.13	30.51	6.10	1.96	.14757E+03
29.11	-8.62	6.10	18.9	0.374E+01	4.03	31.50	6.10	2.06	.15769E+03
30.82	-8.62	6.10	19.1	0.371E+01	3.94	32.47	6.10	2.15	.16780E+03
32.53	-8.62	6.10	19.2	0.369E+01	3.86	33.43	6.10	2.24	.17791E+03
34.23	-8.62	6.10	19.3	0.366E+01	3.78	34.38	6.10	2.32	.18802E+03
35.94	-8.62	6.10	19.5	0.364E+01	3.70	35.31	6.10	2.39	.19813E+03
37.65	-8.62	6.10	19.6	0.361E+01	3.63	36.24	6.10	2.46	.20824E+03
39.36	-8.62	6.10	19.7	0.359E+01	3.57	37.15	6.10	2.53	.21836E+03
41.06	-8.62	6.10	19.8	0.357E+01	3.50	38.04	6.10	2.59	.22847E+03
42.77	-8.62	6.10	19.9	0.355E+01	3.44	38.93	6.10	2.65	.23858E+03
44.48	-8.62	6.10	20.1	0.353E+01	3.39	39.81	6.10	2.71	.24869E+03
46.19	-8.62	6.10	20.2	0.351E+01	3.33	40.68	6.10	2.76	.25880E+03
47.89	-8.62	6.10	20.3	0.349E+01	3.28	41.54	6.10	2.82	.26891E+03
49.60	-8.62	6.10	20.4	0.347E+01	3.23	42.39	6.10	2.87	.27902E+03
51.31	-8.62	6.10	20.5	0.346E+01	3.18	43.23	6.10	2.91	.28914E+03
53.02	-8.62	6.10	20.6	0.344E+01	3.14	44.06	6.10	2.96	.29925E+03
54.72	-8.62	6.10	20.7	0.342E+01	3.10	44.89	6.10	3.00	.30936E+03
56.43	-8.62	6.10	20.8	0.341E+01	3.05	45.70	6.10	3.04	.31947E+03
58.14	-8.62	6.10	20.9	0.339E+01	3.01	46.52	6.10	3.08	.32958E+03
59.85	-8.62	6.10	21.0	0.338E+01	2.98	47.32	6.10	3.12	.33969E+03
61.55	-8.62	6.10	21.0	0.336E+01	2.94	48.11	6.10	3.16	.34981E+03
63.26	-8.62	6.10	21.1	0.335E+01	2.90	48.90	6.10	3.19	.35992E+03
64.97	-8.62	6.10	21.2	0.334E+01	2.87	49.69	6.10	3.23	.37003E+03
66.68	-8.62	6.10	21.3	0.332E+01	2.84	50.46	6.10	3.26	.38014E+03
68.38	-8.62	6.10	21.4	0.331E+01	2.80	51.23	6.10	3.29	.39025E+03
70.09	-8.62	6.10	21.5	0.330E+01	2.77	52.00	6.10	3.32	.40037E+03
71.80	-8.62	6.10	21.5	0.329E+01	2.74	52.76	6.10	3.35	.41048E+03
73.50	-8.62	6.10	21.6	0.327E+01	2.71	53.51	6.10	3.38	.42059E+03
75.21	-8.62	6.10	21.7	0.326E+01	2.69	54.26	6.10	3.41	.43070E+03
76.92	-8.62	6.10	21.8	0.325E+01	2.66	55.00	6.10	3.44	.44081E+03
78.63	-8.62	6.10	21.8	0.324E+01	2.63	55.74	6.10	3.46	.45092E+03
80.33	-8.62	6.10	21.9	0.323E+01	2.61	56.47	6.10	3.49	.46104E+03
82.04	-8.62	6.10	22.0	0.322E+01	2.58	57.20	6.10	3.51	.47115E+03
83.75	-8.62	6.10	22.1	0.321E+01	2.56	57.92	6.10	3.54	.48126E+03
85.46	-8.62	6.10	22.1	0.320E+01	2.54	58.64	6.10	3.56	.49137E+03
87.16	-8.62	6.10	22.2	0.319E+01	2.51	59.36	6.10	3.58	.50148E+03
88.87	-8.62	6.10	22.3	0.318E+01	2.49	60.07	6.10	3.61	.51159E+03
90.58	-8.62	6.10	22.3	0.317E+01	2.47	60.77	6.10	3.63	.52171E+03
92.29	-8.62	6.10	22.4	0.316E+01	2.45	61.47	6.10	3.65	.53182E+03
93.99	-8.62	6.10	22.5	0.315E+01	2.43	62.17	6.10	3.67	.54193E+03
95.70	-8.62	6.10	22.5	0.314E+01	2.41	62.86	6.10	3.69	.55204E+03
97.41	-8.62	6.10	22.6	0.313E+01	2.39	63.55	6.10	3.71	.56215E+03
99.12	-8.62	6.10	22.7	0.312E+01	2.37	64.24	6.10	3.73	.57226E+03
100.82	-8.62	6.10	22.7	0.311E+01	2.35	64.92	6.10	3.74	.58238E+03
102.53	-8.62	6.10	22.8	0.311E+01	2.33	65.60	6.10	3.76	.59249E+03
104.24	-8.62	6.10	22.8	0.310E+01	2.32	66.27	6.10	3.78	.60260E+03
105.95	-8.62	6.10	22.9	0.309E+01	2.30	66.94	6.10	3.80	.61271E+03
107.65	-8.62	6.10	23.0	0.308E+01	2.28	67.61	6.10	3.81	.62282E+03
109.36	-8.62	6.10	23.0	0.307E+01	2.26	68.27	6.10	3.83	.63293E+03
111.07	-8.62	6.10	23.1	0.307E+01	2.25	68.94	6.10	3.85	.64305E+03
112.78	-8.62	6.10	23.1	0.306E+01	2.23	69.59	6.10	3.86	.65316E+03
114.48	-8.62	6.10	23.2	0.305E+01	2.22	70.25	6.10	3.88	.66327E+03
116.19	-8.62	6.10	23.2	0.304E+01	2.20	70.90	6.10	3.89	.67338E+03
117.90	-8.62	6.10	23.3	0.304E+01	2.19	71.55	6.10	3.91	.68349E+03
119.61	-8.62	6.10	23.3	0.303E+01	2.17	72.19	6.10	3.92	.69360E+03
121.31	-8.62	6.10	23.4	0.302E+01	2.16	72.83	6.10	3.94	.70372E+03
123.02	-8.62	6.10	23.5	0.302E+01	2.15	73.47	6.10	3.95	.71383E+03
124.73	-8.62	6.10	23.5	0.301E+01	2.13	74.11	6.10	3.96	.72394E+03
126.44	-8.62	6.10	23.6	0.300E+01	2.12	74.74	6.10	3.98	.73405E+03
128.14	-8.62	6.10	23.6	0.300E+01	2.11	75.37	6.10	3.99	.74416E+03
129.85	-8.62	6.10	23.7	0.299E+01	2.09	76.00	6.10	4.00	.75427E+03
131.56	-8.62	6.10	23.7	0.298E+01	2.08	76.62	6.10	4.02	.76439E+03
133.27	-8.62	6.10	23.8	0.298E+01	2.07	77.25	6.10	4.03	.77450E+03
134.97	-8.62	6.10	23.8	0.297E+01	2.06	77.86	6.10	4.04	.78461E+03
136.68	-8.62	6.10	23.9	0.296E+01	2.04	78.48	6.10	4.05	.79472E+03
138.39	-8.62	6.10	23.9	0.296E+01	2.03	79.10	6.10	4.06	.80483E+03
140.10	-8.62	6.10	24.0	0.295E+01	2.02	79.71	6.10	4.08	.81494E+03
141.80	-8.62	6.10	24.0	0.295E+01	2.01	80.32	6.10	4.09	.82506E+03
143.51	-8.62	6.10	24.1	0.294E+01	2.00	80.93	6.10	4.10	.83517E+03
145.22	-8.62	6.10	24.1	0.293E+01	1.99	81.53	6.10	4.11	.84528E+03
146.93	-8.62	6.10	24.2	0.293E+01	1.98	82.13	6.10	4.12	.85539E+03
148.63	-8.62	6.10	24.2	0.292E+01	1.97	82.73	6.10	4.13	.86550E+03
150.34	-8.62	6.10	24.2	0.292E+01	1.96	83.33	6.10	4.14	.87561E+03
152.05	-8.62	6.10	24.3	0.291E+01	1.94	83.93	6.10	4.15	.88573E+03

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   153.76    -8.62    6.10    24.3 0.291E+01   1.93    84.52    6.10    4.16   .89584E+03
   155.46    -8.62    6.10    24.4 0.290E+01   1.92    85.11    6.10    4.17   .90595E+03
   157.17    -8.62    6.10    24.4 0.290E+01   1.92    85.70    6.10    4.18   .91606E+03
   158.88    -8.62    6.10    24.5 0.289E+01   1.91    86.29    6.10    4.19   .92617E+03
   160.59    -8.62    6.10    24.5 0.288E+01   1.90    86.87    6.10    4.20   .93628E+03
   162.29    -8.62    6.10    24.6 0.288E+01   1.89    87.45    6.10    4.21   .94640E+03
   164.00    -8.62    6.10    24.6 0.287E+01   1.88    88.03    6.10    4.22   .95651E+03
   165.71    -8.62    6.10    24.6 0.287E+01   1.87    88.61    6.10    4.23   .96662E+03
   167.42    -8.62    6.10    24.7 0.286E+01   1.86    89.19    6.10    4.24   .97673E+03
   169.12    -8.62    6.10    24.7 0.286E+01   1.85    89.77    6.10    4.24   .98684E+03
   170.83    -8.62    6.10    24.8 0.285E+01   1.84    90.34    6.10    4.25   .99695E+03
   172.54    -8.62    6.10    24.8 0.285E+01   1.83    90.91    6.10    4.26   .10071E+04
   174.25    -8.62    6.10    24.9 0.284E+01   1.83    91.48    6.10    4.27   .10172E+04
   175.95    -8.62    6.10    24.9 0.284E+01   1.82    92.04    6.10    4.28   .10273E+04
** REGULATORY MIXING ZONE BOUNDARY **
In this prediction interval the plume DOWNSTREAM distance meets or exceeds
the regulatory value =   176.17 m.
This is the extent of the REGULATORY MIXING ZONE.
   177.66    -8.62    6.10    24.9 0.284E+01   1.81    92.61    6.10    4.29   .10374E+04
   179.37    -8.62    6.10    25.0 0.283E+01   1.80    93.17    6.10    4.29   .10475E+04
   181.08    -8.62    6.10    25.0 0.283E+01   1.79    93.73    6.10    4.30   .10576E+04
   182.78    -8.62    6.10    25.1 0.282E+01   1.79    94.29    6.10    4.31   .10677E+04
   184.49    -8.62    6.10    25.1 0.282E+01   1.78    94.85    6.10    4.32   .10778E+04
   186.20    -8.62    6.10    25.1 0.281E+01   1.77    95.41    6.10    4.33   .10880E+04
   187.91    -8.62    6.10    25.2 0.281E+01   1.76    95.96    6.10    4.33   .10981E+04
   189.61    -8.62    6.10    25.2 0.280E+01   1.76    96.52    6.10    4.34   .11082E+04
   191.32    -8.62    6.10    25.3 0.280E+01   1.75    97.07    6.10    4.35   .11183E+04
   193.03    -8.62    6.10    25.3 0.279E+01   1.74    97.62    6.10    4.35   .11284E+04
   194.74    -8.62    6.10    25.3 0.279E+01   1.73    98.16    6.10    4.36   .11385E+04
   196.44    -8.62    6.10    25.4 0.279E+01   1.73    98.71    6.10    4.37   .11486E+04
   198.15    -8.62    6.10    25.4 0.278E+01   1.72    99.26    6.10    4.38   .11587E+04
   199.86    -8.62    6.10    25.5 0.278E+01   1.71    99.80    6.10    4.38   .11689E+04
   201.57    -8.62    6.10    25.5 0.277E+01   1.71   100.34    6.10    4.39   .11790E+04
   203.27    -8.62    6.10    25.5 0.277E+01   1.70   100.88    6.10    4.40   .11891E+04
   204.98    -8.62    6.10    25.6 0.276E+01   1.69   101.42    6.10    4.40   .11992E+04
   206.69    -8.62    6.10    25.6 0.276E+01   1.69   101.95    6.10    4.41   .12093E+04
   208.40    -8.62    6.10    25.6 0.276E+01   1.68   102.49    6.10    4.41   .12194E+04
   210.10    -8.62    6.10    25.7 0.275E+01   1.68   103.02    6.10    4.42   .12295E+04
   211.81    -8.62    6.10    25.7 0.275E+01   1.67   103.56    6.10    4.43   .12396E+04
   213.52    -8.62    6.10    25.8 0.274E+01   1.66   104.09    6.10    4.43   .12497E+04
   215.23    -8.62    6.10    25.8 0.274E+01   1.66   104.62    6.10    4.44   .12599E+04
   216.93    -8.62    6.10    25.8 0.274E+01   1.65   105.14    6.10    4.45   .12700E+04
   218.64    -8.62    6.10    25.9 0.273E+01   1.64   105.67    6.10    4.45   .12801E+04
   220.35    -8.62    6.10    25.9 0.273E+01   1.64   106.20    6.10    4.46   .12902E+04
   222.06    -8.62    6.10    25.9 0.272E+01   1.63   106.72    6.10    4.46   .13003E+04
   223.76    -8.62    6.10    26.0 0.272E+01   1.63   107.24    6.10    4.47   .13104E+04
   225.47    -8.62    6.10    26.0 0.272E+01   1.62   107.76    6.10    4.47   .13205E+04
   227.18    -8.62    6.10    26.0 0.271E+01   1.62   108.28    6.10    4.48   .13306E+04
   228.89    -8.62    6.10    26.1 0.271E+01   1.61   108.80    6.10    4.49   .13408E+04
   230.59    -8.62    6.10    26.1 0.271E+01   1.61   109.32    6.10    4.49   .13509E+04
   232.30    -8.62    6.10    26.2 0.270E+01   1.60   109.83    6.10    4.50   .13610E+04
   234.01    -8.62    6.10    26.2 0.270E+01   1.59   110.35    6.10    4.50   .13711E+04
   235.71    -8.62    6.10    26.2 0.270E+01   1.59   110.86    6.10    4.51   .13812E+04
   237.42    -8.62    6.10    26.3 0.269E+01   1.58   111.37    6.10    4.51   .13913E+04
   239.13    -8.62    6.10    26.3 0.269E+01   1.58   111.88    6.10    4.52   .14014E+04
   240.84    -8.62    6.10    26.3 0.268E+01   1.57   112.39    6.10    4.52   .14115E+04
   242.54    -8.62    6.10    26.4 0.268E+01   1.57   112.90    6.10    4.53   .14216E+04
   244.25    -8.62    6.10    26.4 0.268E+01   1.56   113.41    6.10    4.53   .14318E+04
   245.96    -8.62    6.10    26.4 0.267E+01   1.56   113.91    6.10    4.54   .14419E+04
   247.67    -8.62    6.10    26.5 0.267E+01   1.55   114.41    6.10    4.54   .14520E+04
   249.37    -8.62    6.10    26.5 0.267E+01   1.55   114.92    6.10    4.55   .14621E+04
   251.08    -8.62    6.10    26.5 0.266E+01   1.54   115.42    6.10    4.55   .14722E+04
   252.79    -8.62    6.10    26.6 0.266E+01   1.54   115.92    6.10    4.56   .14823E+04
   254.50    -8.62    6.10    26.6 0.266E+01   1.54   116.42    6.10    4.56   .14924E+04
   256.20    -8.62    6.10    26.6 0.265E+01   1.53   116.92    6.10    4.57   .15025E+04
   257.91    -8.62    6.10    26.7 0.265E+01   1.53   117.41    6.10    4.57   .15127E+04
   259.62    -8.62    6.10    26.7 0.265E+01   1.52   117.91    6.10    4.57   .15228E+04
   261.33    -8.62    6.10    26.7 0.264E+01   1.52   118.41    6.10    4.58   .15329E+04
   263.03    -8.62    6.10    26.8 0.264E+01   1.51   118.90    6.10    4.58   .15430E+04
   264.74    -8.62    6.10    26.8 0.264E+01   1.51   119.39    6.10    4.59   .15531E+04
   266.45    -8.62    6.10    26.8 0.263E+01   1.50   119.88    6.10    4.59   .15632E+04
   268.16    -8.62    6.10    26.9 0.263E+01   1.50   120.37    6.10    4.60   .15733E+04
   269.86    -8.62    6.10    26.9 0.263E+01   1.50   120.86    6.10    4.60   .15834E+04
   271.57    -8.62    6.10    26.9 0.262E+01   1.49   121.35    6.10    4.60   .15935E+04
   273.28    -8.62    6.10    27.0 0.262E+01   1.49   121.84    6.10    4.61   .16037E+04
   274.99    -8.62    6.10    27.0 0.262E+01   1.48   122.32    6.10    4.61   .16138E+04
   276.69    -8.62    6.10    27.0 0.261E+01   1.48   122.81    6.10    4.62   .16239E+04
   278.40    -8.62    6.10    27.1 0.261E+01   1.47   123.29    6.10    4.62   .16340E+04
   280.11    -8.62    6.10    27.1 0.261E+01   1.47   123.78    6.10    4.63   .16441E+04
   281.82    -8.62    6.10    27.1 0.261E+01   1.47   124.26    6.10    4.63   .16542E+04
   283.52    -8.62    6.10    27.2 0.260E+01   1.46   124.74    6.10    4.63   .16643E+04
   285.23    -8.62    6.10    27.2 0.260E+01   1.46   125.22    6.10    4.64   .16744E+04
   286.94    -8.62    6.10    27.2 0.260E+01   1.45   125.70    6.10    4.64   .16845E+04
   288.65    -8.62    6.10    27.2 0.259E+01   1.45   126.17    6.10    4.64   .16947E+04
   290.35    -8.62    6.10    27.3 0.259E+01   1.45   126.65    6.10    4.65   .17048E+04
   292.06    -8.62    6.10    27.3 0.259E+01   1.44   127.13    6.10    4.65   .17149E+04
   293.77    -8.62    6.10    27.3 0.258E+01   1.44   127.60    6.10    4.66   .17250E+04
   295.48    -8.62    6.10    27.4 0.258E+01   1.44   128.07    6.10    4.66   .17351E+04
   297.18    -8.62    6.10    27.4 0.258E+01   1.43   128.55    6.10    4.66   .17452E+04
   298.89    -8.62    6.10    27.4 0.257E+01   1.43   129.02    6.10    4.67   .17553E+04
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300.60	-8.62	6.10	27.5	0.257E+01	1.43	129.49	6.10	4.67	.17654E+04
302.31	-8.62	6.10	27.5	0.257E+01	1.42	129.96	6.10	4.67	.17756E+04
304.01	-8.62	6.10	27.5	0.257E+01	1.42	130.43	6.10	4.68	.17857E+04
305.72	-8.62	6.10	27.6	0.256E+01	1.41	130.90	6.10	4.68	.17958E+04
307.43	-8.62	6.10	27.6	0.256E+01	1.41	131.36	6.10	4.68	.18059E+04
309.14	-8.62	6.10	27.6	0.256E+01	1.41	131.83	6.10	4.69	.18160E+04
310.84	-8.62	6.10	27.7	0.255E+01	1.40	132.30	6.10	4.69	.18261E+04
312.55	-8.62	6.10	27.7	0.255E+01	1.40	132.76	6.10	4.69	.18362E+04
314.26	-8.62	6.10	27.7	0.255E+01	1.40	133.22	6.10	4.70	.18463E+04
315.97	-8.62	6.10	27.7	0.255E+01	1.39	133.69	6.10	4.70	.18564E+04
317.67	-8.62	6.10	27.8	0.254E+01	1.39	134.15	6.10	4.70	.18666E+04
319.38	-8.62	6.10	27.8	0.254E+01	1.39	134.61	6.10	4.71	.18767E+04
321.09	-8.62	6.10	27.8	0.254E+01	1.38	135.07	6.10	4.71	.18868E+04
322.80	-8.62	6.10	27.9	0.253E+01	1.38	135.53	6.10	4.71	.18969E+04
324.50	-8.62	6.10	27.9	0.253E+01	1.38	135.99	6.10	4.72	.19070E+04
326.21	-8.62	6.10	27.9	0.253E+01	1.38	136.44	6.10	4.72	.19171E+04
327.92	-8.62	6.10	28.0	0.253E+01	1.37	136.90	6.10	4.72	.19272E+04
329.63	-8.62	6.10	28.0	0.252E+01	1.37	137.35	6.10	4.73	.19373E+04
331.33	-8.62	6.10	28.0	0.252E+01	1.37	137.81	6.10	4.73	.19474E+04
333.04	-8.62	6.10	28.0	0.252E+01	1.36	138.26	6.10	4.73	.19576E+04
334.75	-8.62	6.10	28.1	0.252E+01	1.36	138.72	6.10	4.74	.19677E+04
336.46	-8.62	6.10	28.1	0.251E+01	1.36	139.17	6.10	4.74	.19778E+04
338.16	-8.62	6.10	28.1	0.251E+01	1.35	139.62	6.10	4.74	.19879E+04
339.87	-8.62	6.10	28.2	0.251E+01	1.35	140.07	6.10	4.74	.19980E+04
341.58	-8.62	6.10	28.2	0.251E+01	1.35	140.52	6.10	4.75	.20081E+04
343.28	-8.62	6.10	28.2	0.250E+01	1.35	140.97	6.10	4.75	.20182E+04
344.99	-8.62	6.10	28.3	0.250E+01	1.34	141.42	6.10	4.75	.20283E+04
346.70	-8.62	6.10	28.3	0.250E+01	1.34	141.86	6.10	4.76	.20385E+04
348.41	-8.62	6.10	28.3	0.249E+01	1.34	142.31	6.10	4.76	.20486E+04
350.11	-8.62	6.10	28.3	0.249E+01	1.33	142.76	6.10	4.76	.20587E+04

Cumulative travel time = 2058.6787 sec (0.57 hrs)

Plume is ATTACHED to LEFT bank/shore.
Plume width is now determined from LEFT bank/shore.

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
350.11	134.11	6.10	28.3	0.249E+01	1.33	285.47	6.10	4.76	.20587E+04
350.50	134.11	6.10	28.3	0.249E+01	1.33	285.57	6.10	4.76	.20610E+04
350.89	134.11	6.10	28.3	0.249E+01	1.33	285.66	6.10	4.76	.20633E+04
351.29	134.11	6.10	28.4	0.249E+01	1.33	285.76	6.10	4.76	.20656E+04
351.68	134.11	6.10	28.4	0.249E+01	1.33	285.86	6.10	4.76	.20679E+04
352.07	134.11	6.10	28.4	0.249E+01	1.33	285.96	6.10	4.76	.20702E+04
352.46	134.11	6.10	28.4	0.249E+01	1.33	286.06	6.10	4.76	.20725E+04
352.85	134.11	6.10	28.4	0.249E+01	1.33	286.16	6.10	4.76	.20748E+04
353.24	134.11	6.10	28.4	0.249E+01	1.33	286.26	6.10	4.76	.20772E+04
353.63	134.11	6.10	28.4	0.249E+01	1.33	286.36	6.10	4.76	.20795E+04
354.02	134.11	6.10	28.4	0.249E+01	1.33	286.45	6.10	4.76	.20818E+04
354.41	134.11	6.10	28.4	0.249E+01	1.33	286.55	6.10	4.76	.20841E+04
354.80	134.11	6.10	28.4	0.249E+01	1.33	286.65	6.10	4.77	.20864E+04
355.19	134.11	6.10	28.4	0.249E+01	1.33	286.75	6.10	4.77	.20887E+04
355.58	134.11	6.10	28.4	0.249E+01	1.33	286.85	6.10	4.77	.20910E+04
355.97	134.11	6.10	28.4	0.249E+01	1.33	286.95	6.10	4.77	.20933E+04
356.36	134.11	6.10	28.4	0.249E+01	1.33	287.05	6.10	4.77	.20956E+04
356.75	134.11	6.10	28.4	0.249E+01	1.33	287.14	6.10	4.77	.20979E+04
357.14	134.11	6.10	28.4	0.249E+01	1.33	287.24	6.10	4.77	.21003E+04
357.53	134.11	6.10	28.4	0.248E+01	1.33	287.34	6.10	4.77	.21026E+04
357.92	134.11	6.10	28.4	0.248E+01	1.33	287.44	6.10	4.77	.21049E+04
358.31	134.11	6.10	28.4	0.248E+01	1.33	287.54	6.10	4.77	.21072E+04
358.70	134.11	6.10	28.4	0.248E+01	1.33	287.64	6.10	4.77	.21095E+04
359.09	134.11	6.10	28.4	0.248E+01	1.33	287.74	6.10	4.77	.21118E+04
359.48	134.11	6.10	28.4	0.248E+01	1.33	287.83	6.10	4.77	.21141E+04
359.87	134.11	6.10	28.4	0.248E+01	1.33	287.93	6.10	4.77	.21164E+04
360.26	134.11	6.10	28.4	0.248E+01	1.33	288.03	6.10	4.77	.21187E+04
360.65	134.11	6.10	28.4	0.248E+01	1.33	288.13	6.10	4.77	.21210E+04
361.04	134.11	6.10	28.5	0.248E+01	1.33	288.23	6.10	4.77	.21234E+04
361.43	134.11	6.10	28.5	0.248E+01	1.33	288.33	6.10	4.77	.21257E+04
361.82	134.11	6.10	28.5	0.248E+01	1.33	288.42	6.10	4.77	.21280E+04
362.21	134.11	6.10	28.5	0.248E+01	1.33	288.52	6.10	4.77	.21303E+04
362.60	134.11	6.10	28.5	0.248E+01	1.33	288.62	6.10	4.77	.21326E+04
362.99	134.11	6.10	28.5	0.248E+01	1.33	288.72	6.10	4.77	.21349E+04
363.38	134.11	6.10	28.5	0.248E+01	1.32	288.82	6.10	4.77	.21372E+04
363.77	134.11	6.10	28.5	0.248E+01	1.32	288.92	6.10	4.77	.21395E+04
364.16	134.11	6.10	28.5	0.248E+01	1.32	289.01	6.10	4.77	.21418E+04
364.55	134.11	6.10	28.5	0.248E+01	1.32	289.11	6.10	4.77	.21441E+04
364.94	134.11	6.10	28.5	0.248E+01	1.32	289.21	6.10	4.77	.21465E+04
365.33	134.11	6.10	28.5	0.248E+01	1.32	289.31	6.10	4.77	.21488E+04
365.72	134.11	6.10	28.5	0.248E+01	1.32	289.41	6.10	4.77	.21511E+04
366.11	134.11	6.10	28.5	0.248E+01	1.32	289.50	6.10	4.77	.21534E+04
366.50	134.11	6.10	28.5	0.248E+01	1.32	289.60	6.10	4.77	.21557E+04
366.89	134.11	6.10	28.5	0.248E+01	1.32	289.70	6.10	4.77	.21580E+04
367.28	134.11	6.10	28.5	0.248E+01	1.32	289.80	6.10	4.77	.21603E+04
367.67	134.11	6.10	28.5	0.248E+01	1.32	289.90	6.10	4.77	.21626E+04
368.06	134.11	6.10	28.5	0.248E+01	1.32	289.99	6.10	4.77	.21649E+04
368.45	134.11	6.10	28.5	0.247E+01	1.32	290.09	6.10	4.77	.21672E+04
368.84	134.11	6.10	28.5	0.247E+01	1.32	290.19	6.10	4.77	.21696E+04
369.23	134.11	6.10	28.5	0.247E+01	1.32	290.29	6.10	4.77	.21719E+04
369.62	134.11	6.10	28.5	0.247E+01	1.32	290.39	6.10	4.78	.21742E+04
370.01	134.11	6.10	28.5	0.247E+01	1.32	290.48	6.10	4.78	.21765E+04

370.40	134.11	6.10	28.6	0.247E+01	1.32	290.58	6.10	4.78	.21788E+04
370.79	134.11	6.10	28.6	0.247E+01	1.32	290.68	6.10	4.78	.21811E+04
371.18	134.11	6.10	28.6	0.247E+01	1.32	290.78	6.10	4.78	.21834E+04
371.57	134.11	6.10	28.6	0.247E+01	1.32	290.88	6.10	4.78	.21857E+04
371.96	134.11	6.10	28.6	0.247E+01	1.32	290.97	6.10	4.78	.21880E+04
372.35	134.11	6.10	28.6	0.247E+01	1.32	291.07	6.10	4.78	.21903E+04
372.74	134.11	6.10	28.6	0.247E+01	1.32	291.17	6.10	4.78	.21927E+04
373.13	134.11	6.10	28.6	0.247E+01	1.32	291.27	6.10	4.78	.21950E+04
373.52	134.11	6.10	28.6	0.247E+01	1.32	291.36	6.10	4.78	.21973E+04
373.91	134.11	6.10	28.6	0.247E+01	1.32	291.46	6.10	4.78	.21996E+04
374.30	134.11	6.10	28.6	0.247E+01	1.32	291.56	6.10	4.78	.22019E+04
374.69	134.11	6.10	28.6	0.247E+01	1.32	291.66	6.10	4.78	.22042E+04
375.08	134.11	6.10	28.6	0.247E+01	1.32	291.75	6.10	4.78	.22065E+04
375.47	134.11	6.10	28.6	0.247E+01	1.32	291.85	6.10	4.78	.22088E+04
375.86	134.11	6.10	28.6	0.247E+01	1.32	291.95	6.10	4.78	.22111E+04
376.25	134.11	6.10	28.6	0.247E+01	1.32	292.05	6.10	4.78	.22134E+04
376.64	134.11	6.10	28.6	0.247E+01	1.32	292.14	6.10	4.78	.22158E+04
377.03	134.11	6.10	28.6	0.247E+01	1.32	292.24	6.10	4.78	.22181E+04
377.42	134.11	6.10	28.6	0.247E+01	1.32	292.34	6.10	4.78	.22204E+04
377.81	134.11	6.10	28.6	0.247E+01	1.32	292.44	6.10	4.78	.22227E+04
378.20	134.11	6.10	28.6	0.247E+01	1.32	292.53	6.10	4.78	.22250E+04
378.59	134.11	6.10	28.6	0.247E+01	1.32	292.63	6.10	4.78	.22273E+04
378.98	134.11	6.10	28.6	0.246E+01	1.31	292.73	6.10	4.78	.22296E+04
379.37	134.11	6.10	28.6	0.246E+01	1.31	292.83	6.10	4.78	.22319E+04
379.76	134.11	6.10	28.6	0.246E+01	1.31	292.92	6.10	4.78	.22342E+04
380.15	134.11	6.10	28.7	0.246E+01	1.31	293.02	6.10	4.78	.22365E+04
380.54	134.11	6.10	28.7	0.246E+01	1.31	293.12	6.10	4.78	.22389E+04
380.93	134.11	6.10	28.7	0.246E+01	1.31	293.22	6.10	4.78	.22412E+04
381.32	134.11	6.10	28.7	0.246E+01	1.31	293.31	6.10	4.78	.22435E+04
381.71	134.11	6.10	28.7	0.246E+01	1.31	293.41	6.10	4.78	.22458E+04
382.10	134.11	6.10	28.7	0.246E+01	1.31	293.51	6.10	4.78	.22481E+04
382.49	134.11	6.10	28.7	0.246E+01	1.31	293.61	6.10	4.78	.22504E+04
382.88	134.11	6.10	28.7	0.246E+01	1.31	293.70	6.10	4.78	.22527E+04
383.27	134.11	6.10	28.7	0.246E+01	1.31	293.80	6.10	4.78	.22550E+04
383.66	134.11	6.10	28.7	0.246E+01	1.31	293.90	6.10	4.78	.22573E+04
384.05	134.11	6.10	28.7	0.246E+01	1.31	293.99	6.10	4.78	.22596E+04
384.44	134.11	6.10	28.7	0.246E+01	1.31	294.09	6.10	4.78	.22620E+04
384.83	134.11	6.10	28.7	0.246E+01	1.31	294.19	6.10	4.78	.22643E+04
385.22	134.11	6.10	28.7	0.246E+01	1.31	294.29	6.10	4.79	.22666E+04
385.61	134.11	6.10	28.7	0.246E+01	1.31	294.38	6.10	4.79	.22689E+04
386.00	134.11	6.10	28.7	0.246E+01	1.31	294.48	6.10	4.79	.22712E+04
386.39	134.11	6.10	28.7	0.246E+01	1.31	294.58	6.10	4.79	.22735E+04
386.78	134.11	6.10	28.7	0.246E+01	1.31	294.67	6.10	4.79	.22758E+04
387.17	134.11	6.10	28.7	0.246E+01	1.31	294.77	6.10	4.79	.22781E+04
387.56	134.11	6.10	28.7	0.246E+01	1.31	294.87	6.10	4.79	.22804E+04
387.95	134.11	6.10	28.7	0.246E+01	1.31	294.96	6.10	4.79	.22827E+04
388.34	134.11	6.10	28.7	0.246E+01	1.31	295.06	6.10	4.79	.22851E+04
388.73	134.11	6.10	28.7	0.246E+01	1.31	295.16	6.10	4.79	.22874E+04
389.12	134.11	6.10	28.7	0.246E+01	1.31	295.26	6.10	4.79	.22897E+04
389.51	134.11	6.10	28.8	0.246E+01	1.31	295.35	6.10	4.79	.22920E+04
389.90	134.11	6.10	28.8	0.245E+01	1.31	295.45	6.10	4.79	.22943E+04
390.29	134.11	6.10	28.8	0.245E+01	1.31	295.55	6.10	4.79	.22966E+04
390.68	134.11	6.10	28.8	0.245E+01	1.31	295.64	6.10	4.79	.22989E+04
391.07	134.11	6.10	28.8	0.245E+01	1.31	295.74	6.10	4.79	.23012E+04
391.46	134.11	6.10	28.8	0.245E+01	1.31	295.84	6.10	4.79	.23035E+04
391.85	134.11	6.10	28.8	0.245E+01	1.31	295.93	6.10	4.79	.23059E+04
392.24	134.11	6.10	28.8	0.245E+01	1.31	296.03	6.10	4.79	.23082E+04
392.63	134.11	6.10	28.8	0.245E+01	1.31	296.13	6.10	4.79	.23105E+04
393.02	134.11	6.10	28.8	0.245E+01	1.31	296.22	6.10	4.79	.23128E+04
393.41	134.11	6.10	28.8	0.245E+01	1.31	296.32	6.10	4.79	.23151E+04
393.80	134.11	6.10	28.8	0.245E+01	1.31	296.42	6.10	4.79	.23174E+04
394.19	134.11	6.10	28.8	0.245E+01	1.31	296.51	6.10	4.79	.23197E+04
394.58	134.11	6.10	28.8	0.245E+01	1.30	296.61	6.10	4.79	.23220E+04
394.97	134.11	6.10	28.8	0.245E+01	1.30	296.71	6.10	4.79	.23243E+04
395.36	134.11	6.10	28.8	0.245E+01	1.30	296.80	6.10	4.79	.23266E+04
395.75	134.11	6.10	28.8	0.245E+01	1.30	296.90	6.10	4.79	.23290E+04
396.14	134.11	6.10	28.8	0.245E+01	1.30	297.00	6.10	4.79	.23313E+04
396.53	134.11	6.10	28.8	0.245E+01	1.30	297.09	6.10	4.79	.23336E+04
396.92	134.11	6.10	28.8	0.245E+01	1.30	297.19	6.10	4.79	.23359E+04
397.31	134.11	6.10	28.8	0.245E+01	1.30	297.29	6.10	4.79	.23382E+04
397.70	134.11	6.10	28.8	0.245E+01	1.30	297.38	6.10	4.79	.23405E+04
398.09	134.11	6.10	28.8	0.245E+01	1.30	297.48	6.10	4.79	.23428E+04
398.48	134.11	6.10	28.8	0.245E+01	1.30	297.57	6.10	4.79	.23451E+04
398.87	134.11	6.10	28.9	0.245E+01	1.30	297.67	6.10	4.79	.23474E+04
399.26	134.11	6.10	28.9	0.245E+01	1.30	297.77	6.10	4.79	.23497E+04
399.65	134.11	6.10	28.9	0.245E+01	1.30	297.86	6.10	4.79	.23521E+04
400.04	134.11	6.10	28.9	0.245E+01	1.30	297.96	6.10	4.79	.23544E+04
400.43	134.11	6.10	28.9	0.245E+01	1.30	298.06	6.10	4.79	.23567E+04
400.82	134.11	6.10	28.9	0.244E+01	1.30	298.15	6.10	4.79	.23590E+04
401.21	134.11	6.10	28.9	0.244E+01	1.30	298.25	6.10	4.80	.23613E+04
401.60	134.11	6.10	28.9	0.244E+01	1.30	298.35	6.10	4.80	.23636E+04
401.99	134.11	6.10	28.9	0.244E+01	1.30	298.44	6.10	4.80	.23659E+04
402.38	134.11	6.10	28.9	0.244E+01	1.30	298.54	6.10	4.80	.23682E+04
402.78	134.11	6.10	28.9	0.244E+01	1.30	298.63	6.10	4.80	.23705E+04
403.17	134.11	6.10	28.9	0.244E+01	1.30	298.73	6.10	4.80	.23728E+04
403.56	134.11	6.10	28.9	0.244E+01	1.30	298.83	6.10	4.80	.23752E+04
403.95	134.11	6.10	28.9	0.244E+01	1.30	298.92	6.10	4.80	.23775E+04
404.34	134.11	6.10	28.9	0.244E+01	1.30	299.02	6.10	4.80	.23798E+04
404.73	134.11	6.10	28.9	0.244E+01	1.30	299.11	6.10	4.80	.23821E+04
405.12	134.11	6.10	28.9	0.244E+01	1.30	299.21	6.10	4.80	.23844E+04

405.51	134.11	6.10	28.9	0.244E+01	1.30	299.31	6.10	4.80	.23867E+04
405.90	134.11	6.10	28.9	0.244E+01	1.30	299.40	6.10	4.80	.23890E+04
406.29	134.11	6.10	28.9	0.244E+01	1.30	299.50	6.10	4.80	.23913E+04
406.68	134.11	6.10	28.9	0.244E+01	1.30	299.59	6.10	4.80	.23936E+04
407.07	134.11	6.10	28.9	0.244E+01	1.30	299.69	6.10	4.80	.23959E+04
407.46	134.11	6.10	28.9	0.244E+01	1.30	299.79	6.10	4.80	.23983E+04
407.85	134.11	6.10	28.9	0.244E+01	1.30	299.88	6.10	4.80	.24006E+04
408.24	134.11	6.10	28.9	0.244E+01	1.30	299.98	6.10	4.80	.24029E+04
408.63	134.11	6.10	29.0	0.244E+01	1.30	300.07	6.10	4.80	.24052E+04
409.02	134.11	6.10	29.0	0.244E+01	1.30	300.17	6.10	4.80	.24075E+04
409.41	134.11	6.10	29.0	0.244E+01	1.30	300.27	6.10	4.80	.24098E+04
409.80	134.11	6.10	29.0	0.244E+01	1.30	300.36	6.10	4.80	.24121E+04
410.19	134.11	6.10	29.0	0.244E+01	1.30	300.46	6.10	4.80	.24144E+04
410.58	134.11	6.10	29.0	0.244E+01	1.30	300.55	6.10	4.80	.24167E+04
410.97	134.11	6.10	29.0	0.244E+01	1.30	300.65	6.10	4.80	.24190E+04
411.36	134.11	6.10	29.0	0.244E+01	1.29	300.75	6.10	4.80	.24214E+04
411.75	134.11	6.10	29.0	0.244E+01	1.29	300.84	6.10	4.80	.24237E+04
412.14	134.11	6.10	29.0	0.243E+01	1.29	300.94	6.10	4.80	.24260E+04
412.53	134.11	6.10	29.0	0.243E+01	1.29	301.03	6.10	4.80	.24283E+04
412.92	134.11	6.10	29.0	0.243E+01	1.29	301.13	6.10	4.80	.24306E+04
413.31	134.11	6.10	29.0	0.243E+01	1.29	301.22	6.10	4.80	.24329E+04
413.70	134.11	6.10	29.0	0.243E+01	1.29	301.32	6.10	4.80	.24352E+04
414.09	134.11	6.10	29.0	0.243E+01	1.29	301.42	6.10	4.80	.24375E+04
414.48	134.11	6.10	29.0	0.243E+01	1.29	301.51	6.10	4.80	.24398E+04
414.87	134.11	6.10	29.0	0.243E+01	1.29	301.61	6.10	4.80	.24421E+04
415.26	134.11	6.10	29.0	0.243E+01	1.29	301.70	6.10	4.80	.24445E+04
415.65	134.11	6.10	29.0	0.243E+01	1.29	301.80	6.10	4.80	.24468E+04
416.04	134.11	6.10	29.0	0.243E+01	1.29	301.89	6.10	4.80	.24491E+04
416.43	134.11	6.10	29.0	0.243E+01	1.29	301.99	6.10	4.80	.24514E+04
416.82	134.11	6.10	29.0	0.243E+01	1.29	302.08	6.10	4.80	.24537E+04
417.21	134.11	6.10	29.0	0.243E+01	1.29	302.18	6.10	4.80	.24560E+04
417.60	134.11	6.10	29.0	0.243E+01	1.29	302.28	6.10	4.80	.24583E+04
417.99	134.11	6.10	29.1	0.243E+01	1.29	302.37	6.10	4.80	.24606E+04
418.38	134.11	6.10	29.1	0.243E+01	1.29	302.47	6.10	4.81	.24629E+04
418.77	134.11	6.10	29.1	0.243E+01	1.29	302.56	6.10	4.81	.24652E+04
419.16	134.11	6.10	29.1	0.243E+01	1.29	302.66	6.10	4.81	.24676E+04
419.55	134.11	6.10	29.1	0.243E+01	1.29	302.75	6.10	4.81	.24699E+04
419.94	134.11	6.10	29.1	0.243E+01	1.29	302.85	6.10	4.81	.24722E+04
420.33	134.11	6.10	29.1	0.243E+01	1.29	302.94	6.10	4.81	.24745E+04
420.72	134.11	6.10	29.1	0.243E+01	1.29	303.04	6.10	4.81	.24768E+04
421.11	134.11	6.10	29.1	0.243E+01	1.29	303.13	6.10	4.81	.24791E+04
421.50	134.11	6.10	29.1	0.243E+01	1.29	303.23	6.10	4.81	.24814E+04
421.89	134.11	6.10	29.1	0.243E+01	1.29	303.32	6.10	4.81	.24837E+04
422.28	134.11	6.10	29.1	0.243E+01	1.29	303.42	6.10	4.81	.24860E+04
422.67	134.11	6.10	29.1	0.243E+01	1.29	303.51	6.10	4.81	.24883E+04
423.06	134.11	6.10	29.1	0.242E+01	1.29	303.61	6.10	4.81	.24907E+04
423.45	134.11	6.10	29.1	0.242E+01	1.29	303.70	6.10	4.81	.24930E+04
423.84	134.11	6.10	29.1	0.242E+01	1.29	303.80	6.10	4.81	.24953E+04
424.23	134.11	6.10	29.1	0.242E+01	1.29	303.90	6.10	4.81	.24976E+04
424.62	134.11	6.10	29.1	0.242E+01	1.29	303.99	6.10	4.81	.24999E+04
425.01	134.11	6.10	29.1	0.242E+01	1.29	304.09	6.10	4.81	.25022E+04
425.40	134.11	6.10	29.1	0.242E+01	1.29	304.18	6.10	4.81	.25045E+04
425.79	134.11	6.10	29.1	0.242E+01	1.29	304.28	6.10	4.81	.25068E+04
426.18	134.11	6.10	29.1	0.242E+01	1.29	304.37	6.10	4.81	.25091E+04
426.57	134.11	6.10	29.1	0.242E+01	1.29	304.47	6.10	4.81	.25114E+04
426.96	134.11	6.10	29.1	0.242E+01	1.29	304.56	6.10	4.81	.25138E+04
427.35	134.11	6.10	29.2	0.242E+01	1.29	304.66	6.10	4.81	.25161E+04
427.74	134.11	6.10	29.2	0.242E+01	1.29	304.75	6.10	4.81	.25184E+04
428.13	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.25207E+04

Cumulative travel time = 2520.6689 sec (0.70 hrs)
Plume is LATERALLY FULLY MIXED at the end of the buoyant spreading regime.

END OF MOD241: BUOYANT AMBIENT SPREADING

BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

Vertical diffusivity (initial value) = 0.101E-01 m^2/s
Horizontal diffusivity (initial value) = 0.126E-01 m^2/s

Profile definitions:
BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
= or equal to layer depth, if fully mixed
BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
measured horizontally in Y-direction
ZU = upper plume boundary (Z-coordinate)
ZL = lower plume boundary (Z-coordinate)
S = hydrodynamic centerline dilution
C = centerline concentration (includes reaction effects, if any)
TT = Cumulative travel time

Plume Stage 2 (bank attached):

X	Y	Z	S	C	BV	BH	ZU	ZL	TT
428.13	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.25207E+04
445.99	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.26264E+04
463.85	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.27322E+04
481.71	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.28380E+04
499.57	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.29437E+04
517.42	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.30495E+04
535.28	134.11	6.10	29.2	0.242E+01	1.29	304.80	6.10	4.81	.31552E+04

553.14	134.11	6.10	29.2 0.242E+01	1.29	304.80	6.10	4.81	.32610E+04
571.00	134.11	6.10	29.2 0.242E+01	1.29	304.80	6.10	4.81	.33668E+04
588.86	134.11	6.10	29.2 0.242E+01	1.29	304.80	6.10	4.81	.34725E+04
606.72	134.11	6.10	29.2 0.242E+01	1.29	304.80	6.10	4.81	.35783E+04
624.58	134.11	6.10	29.2 0.242E+01	1.29	304.80	6.10	4.81	.36841E+04
642.44	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.37898E+04
660.30	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.38956E+04
678.16	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.40014E+04
696.02	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.41071E+04
713.88	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.42129E+04
731.74	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.43186E+04
749.60	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.44244E+04
767.46	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.45302E+04
785.32	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.46359E+04
803.17	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.47417E+04
821.03	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.48475E+04
838.89	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.49532E+04
856.75	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.50590E+04
874.61	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.51648E+04
892.47	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.52705E+04
910.33	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.53763E+04
928.19	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.54820E+04
946.05	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.55878E+04
963.91	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.56936E+04
981.77	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.57993E+04
999.63	134.11	6.10	29.2 0.241E+01	1.29	304.80	6.10	4.81	.59051E+04
1017.49	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.60109E+04
1035.35	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.61166E+04
1053.21	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.62224E+04
1071.06	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.63282E+04
1088.92	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.64339E+04
1106.78	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.65397E+04
1124.64	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.66454E+04
1142.50	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.67512E+04
1160.36	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.68570E+04
1178.22	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.69627E+04
1196.08	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.70685E+04
1213.94	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.71743E+04
1231.80	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.72800E+04
1249.66	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.73858E+04
1267.52	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.74916E+04
1285.38	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.75973E+04
1303.24	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.77031E+04
1321.10	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.78088E+04
1338.96	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.79146E+04
1356.81	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.80204E+04
1374.67	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.81261E+04
1392.53	134.11	6.10	29.2 0.240E+01	1.29	304.80	6.10	4.81	.82319E+04
1410.39	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.83377E+04
1428.25	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.84434E+04
1446.11	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.85492E+04
1463.97	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.86550E+04
1481.83	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.87607E+04
1499.69	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.88665E+04
1517.55	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.89722E+04
1535.41	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.90780E+04
1553.27	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.91838E+04
1571.13	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.92895E+04
1588.99	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.93953E+04
1606.85	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.95011E+04
1624.71	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.96068E+04
1642.56	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.97126E+04
1660.42	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.98183E+04
1678.28	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.99241E+04
1696.14	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.10030E+05
1714.00	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.10136E+05
1731.86	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.10241E+05
1749.72	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.10347E+05
1767.58	134.11	6.10	29.3 0.239E+01	1.29	304.80	6.10	4.81	.10453E+05
1785.44	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.10559E+05
1803.30	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.10664E+05
1821.16	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.10770E+05
1839.02	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.10876E+05
1856.88	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.10982E+05
1874.74	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11088E+05
1892.60	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11193E+05
1910.46	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11299E+05
1928.31	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11405E+05
1946.17	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11511E+05
1964.03	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11616E+05
1981.89	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11722E+05
1999.75	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11828E+05
2017.61	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.11934E+05
2035.47	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12039E+05
2053.33	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12145E+05
2071.19	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12251E+05
2089.05	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12357E+05
2106.91	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12462E+05
2124.77	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12568E+05
2142.63	134.11	6.10	29.3 0.238E+01	1.29	304.80	6.10	4.80	.12674E+05

2160.49	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.12780E+05
2178.35	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.12885E+05
2196.21	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.12991E+05
2214.06	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13097E+05
2231.92	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13203E+05
2249.78	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13309E+05
2267.64	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13414E+05
2285.50	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13520E+05
2303.36	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13626E+05
2321.22	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13732E+05
2339.08	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13837E+05
2356.94	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.13943E+05
2374.80	134.11	6.10	29.3	0.237E+01	1.29	304.80	6.10	4.80	.14049E+05
2392.66	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14155E+05
2410.52	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14260E+05
2428.38	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14366E+05
2446.24	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14472E+05
2464.10	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14578E+05
2481.96	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14683E+05
2499.81	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14789E+05
2517.67	134.11	6.10	29.4	0.237E+01	1.29	304.80	6.10	4.80	.14895E+05
2535.53	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15001E+05
2553.39	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15107E+05
2571.25	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15212E+05
2589.11	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15318E+05
2606.97	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15424E+05
2624.83	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15530E+05
2642.69	134.11	6.10	29.4	0.236E+01	1.29	304.80	6.10	4.80	.15635E+05
2660.55	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.15741E+05
2678.41	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.15847E+05
2696.27	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.15953E+05
2714.13	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16058E+05
2731.99	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16164E+05
2749.85	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16270E+05
2767.71	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16376E+05
2785.56	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16481E+05
2803.42	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16587E+05
2821.28	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16693E+05
2839.14	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16799E+05
2857.00	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.16905E+05
2874.86	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.17010E+05
2892.72	134.11	6.10	29.4	0.236E+01	1.30	304.80	6.10	4.80	.17116E+05
2910.58	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17222E+05
2928.44	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17328E+05
2946.30	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17433E+05
2964.16	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17539E+05
2982.02	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17645E+05
2999.88	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17751E+05
3017.74	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17856E+05
3035.60	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.17962E+05
3053.46	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18068E+05
3071.31	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18174E+05
3089.17	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18279E+05
3107.03	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18385E+05
3124.89	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18491E+05
3142.75	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18597E+05
3160.61	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18702E+05
3178.47	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18808E+05
3196.33	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.18914E+05
3214.19	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.19020E+05
3232.05	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.19126E+05
3249.91	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.19231E+05
3267.77	134.11	6.10	29.4	0.235E+01	1.30	304.80	6.10	4.80	.19337E+05
3285.63	134.11	6.10	29.4	0.234E+01	1.30	304.80	6.10	4.80	.19443E+05
3303.49	134.11	6.10	29.4	0.234E+01	1.30	304.80	6.10	4.80	.19549E+05
3321.35	134.11	6.10	29.4	0.234E+01	1.30	304.80	6.10	4.80	.19654E+05
3339.21	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.19760E+05
3357.06	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.19866E+05
3374.92	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.19972E+05
3392.78	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20077E+05
3410.64	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20183E+05
3428.50	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20289E+05
3446.36	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20395E+05
3464.22	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20500E+05
3482.08	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20606E+05
3499.94	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20712E+05
3517.80	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20818E+05
3535.66	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.20924E+05
3553.52	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.21029E+05
3571.38	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.21135E+05
3589.24	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.21241E+05
3607.10	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.21347E+05
3624.96	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.21452E+05
3642.81	134.11	6.10	29.5	0.234E+01	1.30	304.80	6.10	4.80	.21558E+05
3660.67	134.11	6.10	29.5	0.233E+01	1.30	304.80	6.10	4.80	.21664E+05
3678.53	134.11	6.10	29.5	0.233E+01	1.30	304.80	6.10	4.80	.21770E+05
3696.39	134.11	6.10	29.5	0.233E+01	1.30	304.80	6.10	4.80	.21875E+05
3714.25	134.11	6.10	29.5	0.233E+01	1.30	304.80	6.10	4.80	.21981E+05
3732.11	134.11	6.10	29.5	0.233E+01	1.30	304.80	6.10	4.80	.22087E+05
3749.97	134.11	6.10	29.5	0.233E+01	1.30	304.80	6.10	4.80	.22193E+05

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   3767.83   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22298E+05
   3785.69   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22404E+05
   3803.55   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22510E+05
   3821.41   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22616E+05
   3839.27   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22721E+05
   3857.13   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22827E+05
   3874.99   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .22933E+05
   3892.85   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.80   .23039E+05
   3910.71   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.79   .23145E+05
   3928.56   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.79   .23250E+05
   3946.42   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.79   .23356E+05
   3964.28   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.79   .23462E+05
   3982.14   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.79   .23568E+05
   4000.00   134.11    6.10    29.5 0.233E+01   1.30   304.80    6.10    4.79   .23673E+05
 Cumulative travel time =       23673.3516 sec  (    6.58 hrs)

 Simulation limit based on maximum specified distance =   4000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT
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CORMIX2: Multiport Diffuser Discharges       End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222222
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