Technical Remediation Advisory Committee Agenda

Thursday, November 14, 2024
6:00 pm
Council Chambers - Hybrid with YouTube Recording
24 Church Street West, Elmira, ON, N3B 2Z6
Chair: Councillor Nathan Cadeau

Township of Woolwich
Technical Remediation Advisory Committee
Meeting Minutes

Thursday, June 13, 2024
6:07 p.m. – 8:18 p.m.
Hybrid Meeting
Hosted in Council Chambers and on Zoom
24 Church Street West, Elmira

Present from TRAC:	Councillor Nathan Cadeau, TRAC Chair Mayor Sandy Shantz, Councillor Eric Schwindt *Tiffany Svensson, Technical Expert* Susan Bryant, TRAC Community Member Eric Hodgins, TRAC Community Member Bryan Broomfield, TRAC Community Member Linda Dickson, TRAC Community Member *Ryan Prosser, TRAC Community Member* David Hofbauer, TRAC Community Member Dr. Sebastian Siebel-Achenbach, TRAC Community Member Karl Belan, Region of Waterloo *Mari MacNeil, Region of Waterloo* *Geoff Moroz, Region of Waterloo*
Stakeholders:	*Chris Foster-Pengelly, GRCA* *Hadley Stamm, LANXESS Corporation* *Jason Rice, Ministry of the Environment, Conservation and Parks*
Special Guests:	*Sadie Payne, Former Conestoga College Student* *Nadia LeMoine, Former Conestoga College Student* *Dr. Ulysses Klee, Professor, Conestoga College*
Present from Staff:	Stacey Bruce, Committee Support Specialist Rae Ann Bauman, Executive Officer

Italics indicate a virtual participant.

1. Land Acknowledgement

Chair Councillor Nathan Cadeau read a Land Acknowledgement.

2. Disclosures of Pecuniary Interest

No pecuniary interests were declared.

3. Approval of Previous Minutes

Moved by Linda Dickson
Seconded by Susan Bryant

That the Technical Remediation Advisory Committee (TRAC) minutes of April 25, 2024, be adopted as presented

…Carried.

4. Delegations

None.

5. Electronic Dashboard – EngageWR Platform Discussion

Rae Ann Bauman, Executive Officer presented a draft TRAC page designed in partnership with Waterloo Region's EngageWR electronic dashboard to house information related to this community project and increase public engagement as described in the committee's new Terms of Reference. The draft page includes links to TRAC's Terms of Reference, Woolwich Township's Procedural By-law, agenda and minutes, a key timeline of events, correspondence, documents received, and related resources. Key widget features in the backend of the page for subscriptions, newsfeeds, and forums for registered or anonymous public polls and surveys were demonstrated. It was discussed that Stacey Bruce, Committee Support Specialist, will be the future administrator of the dashboard and capable of further modifying the page for the committee. The next steps in launching the platform live involve finalizing the posted timeline of events and training S. Bruce.

Discussion around this matter covered content requests from the committee, the current file upload size restriction of 100 MB, and further details about the direct electronic link to Wilfrid Laurier's Assuring Protection for Tomorrow's Environment Collection. It was noted that an RFP is currently underway to increase the file upload size restriction to 250 MB. It was also highlighted that links from this community page open in pop-up windows, allowing users to stay connected to the original content. Community members S. Bryant, Dr. Sebastian Siebel-Achenbach, and Eric Hodgins were identified as key contributors to developing project milestones to complete the timeline of events section on the draft page.

There were no further questions regarding this.

At this time in the meeting Rae Ann Bauman left.

6. Advancements in NDMA Remediation – Student Research Presentation

18:19 Bryan Broomfield entered the meeting.

Conestoga College Professor Dr. Ulysses Klee introduced former students Sadie Payne and Nadia LeMoine, who have recently successfully completed their studies and presented past project work from a professional research internship course on advancements in NDMA remediation and investigation strategies to meet Ontario drinking water standards in the Elmira Aquifer pertaining to its removal from groundwater.

The presentation covered the students' research questions, the significance of their results, methods, findings, and study limitations. It addressed the nature of NDMA, its harmful effects, and the longstanding contamination of the Elmira Aquifer, emphasizing the challenges in removing this chemical from groundwater and its impact on the community's water supply. Various remediation techniques such as ex-situ ultraviolet (UV) treatment, reverse osmosis, granular activated carbon, and both ex-situ and in-situ bioremediation strategies using propane oxidizing bacteria were detailed. The presentation discussed the pros and cons, implementation systems, and potential discharge areas for these treatments, drawing insights from a Community Assessment for Public Health Emergency Response (CASPER) literature review and a LANXESS facility tour in Elmira. The study's overall conclusion that a multi-step approach is necessary to effectively treat NDMA in the Elmira Aquifer was underscored.

18:30 David Hofbauer entered the meeting.

The committee raised questions regarding the theoretical and practical aspects of this research. The presenters elaborated on the Canadian and US focus of their study, highlighting successful applications of similar technologies in evidence-based case studies with drinking water standards similar to Ontario. The presenters also described how the case studies they examined commonly applied multiple technological strategies where it was difficult to assess the individual effects of each one. They also discussed LANXESS's successful local use of the technologies studied, emphasizing again the importance of a multi-step remediation approach.

In response to further questions from the committee, the presenters described their interest in studying the technologies, touring the LANXESS facility, and gaining a deeper understanding of this environmental issue. They also explained limiting their focus on NDMA over both it and chlorinated benzene due to the high availability of research materials. The committee further clarified the differences between the ex-situ and targeted in-situ treatment, the availability of microbial bioremediation methods for chlorinated contaminants vs. the limitations around this for NDMA, and the hazards of injecting propane into the contaminated groundwater for propane-oxidizing bacterial treatment were emphasized. The effective application of UV and activated carbon remediation technologies by LANXESS and the energy intensiveness of these treatments were also noted. The remaining NDMA contamination in the aquifer and the technical challenges associated with its treatment, particularly regarding well site selection and aquifer substrate conditions like silt were described by the company. LANXESS spoke to the importance of further consulting with GHD and WSP regarding removing the mass of these contaminants with ex-situ treatments to meet 2028 deadline targets.

The committee discussed the scalability of the technologies presented in the study, focusing on the required scale for remediating 2 million gallons of water daily from the Elmira Aquifer. They noted considerations such as costs, energy demands, and the requirement for full-time personnel to oversee continuous treatment operations. Additionally, the committee explored the study's conclusion on employing a multi-step remediation approach further, emphasizing the importance of the combination of different technological processes in the case study applications to enhance overall efficiency, with each contributing specific capability.

The committee questioned whether evidence from other case studies addressed the effectiveness of technologies at the asymptotic plateau of treatment, similar to the current situation with the pump-and-treat method being used in the Elmira Aquifer. Since this was beyond their study, the presenters could not address this and were unable to respond to this initially, but after further inquiries were made regarding potential future research directions the presenters suggested focusing on comparing reverse osmosis and UV remediation technologies, alongside proposing another LANXESS facility tour in the future for additional insights.

In response to a committee question, it was noted that no other in-situ methods are currently available for NDMA remediation besides the propane oxidizing bacteria treatment, which poses explosion hazards and is unsuitable for community use. Discussions explored the potential for alternative, safer bioremediation treatments, referencing an associated unsuccessful and discontinued in-situ Chemical Oxidation (ISCO) pilot test that took place a decade ago in the central area of Elmira, west of the LANXESS site. The importance of specific aerobic and anaerobic conditions for tailored in-situ bioremediation treatments for different compounds was highlighted.

Additionally, the importance of conducting further site characterization was emphasized for future bioremediation work. However, it was noted that there is already sufficient information available to continue discussions on cleanup options like this due to the extensive prior studies of the site. The localized impact and limited broader scale effectiveness of permanganate-based bioremediation were noted from environmental remediation experience.

The student research presenters were complimented on their comprehensive work by the committee. It was also noted similarly from past LANXESS monthly progress reports that carbon and UV remediation treatments have demonstrated effectiveness.

There was no further discussion regarding this.

7. Review of LANXESS April 2024 Monthly Progress Report

Linda Dickson presented her summary of LANXESS's April 2024 Monthly Progress Report.

Hadley Stamm provided a response that well W3R has been up and running since the end of May, in response to questioning around of the exact date that the wireless equipment was recently installed for well W3R.

The committee further discussed a containment breach that occurred in April beneath the NW portion of the site, specifically north and west of the dam and southwest of the creek. LANXESS explained their efforts to control water levels through extraction well operations relative to the creek, which is typically challenged during high spring water events. Due to significant seasonal high fluctuations in water levels in this area, it was noted that the water lost was diluted, and such events typically do not result in exceedances of contaminant concentrations or adverse impacts. The ministry mentioned that the Environmental Compliance Approval (ECA) has previously been amended to reduce monitoring requirements, but that additional specific

monitoring is required to address data gaps that occur during storm events, particularly in spring months when containment breaches are common like this. It was emphasized that GHD, on behalf of LANXESS, collects surface water samples as close as possible to these events to monitor any potential negative effects through testing.

There was no further discussion regarding this.

8. Updates

7:04 Mari MacNeil entered the meeting.

H. Stamm presented the following LANXESS Elmira – TRAC Update.

LANXESS first provided an informal update on well PW6, noting that its replacement is progressing ahead of schedule, although potential supply chain challenges post-COVID-19 could still affect the overall timeline.

8.1 Human Health and Ecological Risk Assessment (HHERA) Revisions

The company described their discussion of necessary revisions in the HHERA with the ministry on June 12th, 2024. They also highlighted submitting initial comments at the end of May and their request for a formal meeting with the ministry's technical team to plan the execution of this work. The company described that after this technical discussion, they intend to finalize this report, incorporating the additional data collected by the ministry from the creek's floodplain. LANXESS noted also planning to update their progress regarding this at the next TRAC meeting.

8.2 Removal of Canagagigue Creek Hotspots

LANXESS discussed that their next remediation work for the hotspot removal on the creek will depend on findings from the risk assessment. They emphasized their intention to undertake voluntary work on the creek, pending the assessment's outcomes, which may dictate mandatory obligations. The company highlighted uncertainty regarding whether mandated work would differ from voluntary efforts. They expressed a need to clarify regulatory obligations before proceeding with targeted voluntary work.

Questions were raised by the committee regarding the timeline for submission of the final HHERA. LANXESS indicated it is expected to be completed by the end of summer, but that creek cleanup work is unlikely this year. Anticipating additional ministry comments post-submission, the company noted not foreseeing cleanup work commencing until next summer.

The committee questioned perceived delays in cleanup efforts during the preparation of ongoing reports. The company emphasized the importance of understanding the rationale behind cleanup efforts, considering their potential impact, and ensuring alignment with community interests.

The committee provided additional comments on the importance of avoiding unintended impacts on the creek by ensuring accurate identification of contaminant hot spots. The need for a thorough risk assessment before initiating any further work to gain a comprehensive understanding was emphasized.

8.3 Technical Advisory Group (TAG) and the Ministry of the Environment & Parks (MECP) Written Comments on the LANXESS Canagagigue Creek Clam Biomonitoring Program

LANXESS discussed wanting a deeper understanding for this clam biomonitoring work from the HHERA study that is expected to be completed. It was also emphasized that they would like to further understand the analysis of fish tissue data and long-term monitoring obligations under their ECA permit. The company highlighted challenges in obtaining clams for the biomonitoring program due to the Ministry of Natural Resources and Forestry (MNRF) licensing restrictions for introducing them into the creek. The company proposed fish tissue monitoring every 3-5 years as an alternative method for the ministry's consideration.

19:23 Geoff Moroz entered the meeting.

Using alternative clam species abundant in the upstream watershed for in-situ monitoring was suggested in response by the committee. They also recommended that GHD utilize further expertise to provide more detailed insights into creek biology and testing methods. In reply, LANXESS noted interest in exploring a collaboration with EnviroScience Inc., a US-based company specializing in bioremediation.

The ministry provided comment on the consideration of native clam species for biomonitoring, emphasizing the need to understand their upstream source in the Grand River in relation to the LANXESS site and other inputs into the creek system as well as their population size as it must be sufficient to support the study work without negatively impacting the species harvested for this work. The committee further underscored the significance of utilizing expert knowledge to study potential native clam populations for biomonitoring. The importance of understanding clam population size, baseline contaminant exposure, and maintaining a sufficient multiple-year supply of clams from healthy, stable populations with contaminant levels below detection limits for effective monitoring was further emphasized.

There was no further discussion regarding this.

9. 2028 Order Deadline

Regarding the 2028 cleanup deadline, LANXESS stated that it is unfeasible to meet this target set 30 years ago. They emphasized future efforts to address the removal of the mass of remaining aquifer contamination through consultations with GHD and Stantec consultants. They also noted exploring plans around sparging various wells and leveraging Joe Ricker's plume analytics as well as current existing studies to effect change in the environment of the contaminated site.

Discussion around the 2028 deadline and developing a proposal for a remedial framework by 2026 occurred, with ongoing updates on a remediation framework set as a standing future TRAC agenda item. The committee expressed interest in hearing the ministry's response to future proposed frameworks. The company highlighted the slow progress and challenges in their remediation efforts, emphasizing the iterative process of conducting remediation pilot tests to advance the cleanup work.

The committee requested a comprehensive summary of remediation technologies employed and studies acquired, emphasizing the need to revisit the potentially outdated draft remediation framework and technologies used for in situ and ex-situ treatment documents prepared five years ago. The committee decided, after further discussion, to proceed with this while also exploring new strategies through a technical experts meeting. To ensure inclusivity of perspectives, it was determined that the meeting will involve hydrogeologist consultants, representatives from the company and ministry, TRAC's Technical Expert, and community members.

9.1 ACTION: H. Stamm of LANXESS to initiate a Technical Experts Meeting involving hydrogeologist consultants, representatives from the company and ministry, TRAC's Technical Expert, and community members.

The committee discussed reformulating its framework questions for community outreach, emphasizing their current regulatory and technical aspects and the need for public education. The critical role of technical experts in formulating these current draft questions was highlighted.

The committee reviewed the five-year age and potential retooling of these questions, including a follow-up on past discussions from the Technical Advisory Group (TAG) group on questions to pose to the public in consideration of the 2028 order deadline. A technical experts meeting before September was deemed crucial for revising these current draft questions effectively.

The committee discussed answers, feasibility, and relevance of fundamental questions they aim to address, emphasizing the need for responses from those capable of providing answers. They focused on the critical nature of addressing these issues effectively. The audience for the framework questions and considerations regarding existing water in the aquifer for cleanup evaluations were discussed, focusing on containment vs. cleanup strategies to conserve this water supply resource.

The committee also deliberated on the overwhelming weight of these questions for community committee member volunteers to answer compared to mandated experts and the ministry. The balance between expectations and the participatory capacity of the committee was considered.

Discussion focused on the assimilation of treated water into the stream, its current non-usage, and the perception surrounding these issues. The evaluation included the relevance and methodologies of Ontario Drinking Water Standards, prompting a query to the Ministry of the Environment Conservation and Parks (MECP) regarding their establishment, particularly in terms of the public perception of minor exceedances.

9.2 ACTION: The MECP to follow up with their Water Resources Branch regarding the historical establishment of the limits for the key contaminants for the committee.

Concerns were raised about site-specific cleanup criteria from the MECP, contrasting with offsite contamination and the evolution of cleanup approaches over the past decades, varying by regulatory requirements and company-driven initiatives.

The importance of the technical nature of these questions was emphasized. Considerations extended to water conditions and industrial vs. end-use drinking water, as well as the contextual relevance of unanswered questions to generate discussion and input on the 2028 order deadline.

In conclusion, the committee meeting organizers were tasked with determining questions to prioritize for this ongoing future discussion. The company's investment in treating contaminated water intended for discharge into the creek, and reassessing priorities leading up to 2028, was highlighted. The role of technical experts, the committee, and public feedback, alongside the necessity to educate the public and allow experts to shape future directions and question formulations, was underscored.

9.3 ACTION: Chair Councillor N. Cadeau, and Technical Expert Tiffany Svensson, to identify and formulate questions related to developing a remediation framework in preparation for the 2028 order deadline, for future discussion.

There was no further discussion regarding this.

10. Preparing The Spring TRAC Update for Council

The committee discussed preparing a comprehensive update to present to Council on August 27th. This high-level presentation will cover the committee's purpose, recent structural changes, and relevant work. Discussion highlighted the importance of including diverse perspectives and differing views on the committee's direction in the presentation. Committee members were encouraged to propose questions for Council for the presentation via email to Chair Councillor N. Cadeau.

10.1 ACTION: Chair, Councillor N. Cadeau, and Technical Expert T. Svensson will prepare a draft of the presentation, within the next month, which will be circulated to the committee for feedback.

There was no further discussion regarding this.

11. Other Business

11.1 2023 Annual Environmental Report

D. Hofbauer presented his summary of the 2023 Annual Environmental Report, prepared by GHD on behalf of LANXESS.

The committee discussed the notable annual reoccurring recommendation for the plant to develop a labeling system to ensure drums are not stored longer than 90 days, per ministry guidelines. They also reviewed LANXESS's waste disposal practices. It was confirmed there have been no violations and that the plant follows recommended disposal guidelines.

There was no further discussion regarding this.

12. Correspondence

12.1 Alan Marshal's May 14, 2024, Council Meeting Delegation

12.2 LANXESS April 2024 Progress Report Prepared by GHD

12.3 2023 Annual Environmental Report

12.4 Student Research Paper on Advancements in NDMA Remediation

It was noted that four documents were received since the last TRAC committee meeting and there was no further discussion regarding these.

13. Next Meeting

The committee agreed to reschedule the next meeting to September 12th, 2024, at 6:00 pm, moving it a week earlier.

14. Adjournment (8:18 P.M.)

14.1 Card Signing for Ramin Ansari's Retirement

Committee members were invited to sign a card for Ramin Ansari's retirement.

Moved by Dr. S. Siebel-Achenbach
Seconded by Ryan Prosser

The committee adjourns to meet again on Sept 12, 2024.

…Carried.

Recorder: Stacey Bruce, Committee Support Specialist

Township of Woolwich
Technical Remediation Advisory Committee (TRAC)
Meeting Minutes

Thursday, Sept 12, 2024
6:02 p.m. – 8:07 p.m.
Hybrid Meeting
Hosted in Council Chambers and on Zoom
24 Church Street West, Elmira

Present from TRAC:	Councillor Nathan Cadeau, TRAC Chair Mayor Sandy Shantz, Councillor Eric Schwindt Tiffany Svensson, Technical Expert Susan Bryant, TRAC Community Member Bryan Broomfield, TRAC Community Member *Linda Dickson, TRAC Community Member* Dr. Sebastian Siebel-Achenbach, TRAC Community Member Karl Belan, Region of Waterloo
Stakeholders:	*Chris Foster-Pengelly, Grand River Conservation Authority* Hadley Stamm, LANXESS Corporation *Jason Rice, Ministry of the Environment, Conservation and Parks* Lou Almeida, GHD Alan Deal, GHD
Present from Staff:	Stacey Bruce, Committee Support Specialist
Regrets:	Eric Hodgins, TRAC Community Member Ryan Prosser, TRAC Community Member David Hofbauer, TRAC Community Member

Italics indicate a virtual participant.

Call to Order at 6:02 P.M.

Land Acknowledgement

Chair Councillor Nathan Cadeau read a Land Acknowledgement.

Disclosures of Pecuniary Interest

No pecuniary interests were declared.

Approval of Previous Minutes

A vote was held to adopt the Technical Remediation Advisory Committee (TRAC) minutes of June 13, 2024, which carried. However, since the mover was not a voting member, the motion is invalid. Approval of these minutes is deferred to the committee's next meeting, where a new vote will be conducted.

Delegations

None.

Updates

LANXESS Canada Co.

Follow Up Summary from the Sept 10th Technical Experts

It was noted that ten people attended the meeting. Two new technical experts were unable to attend in person but are planning to visit the site at a later date. As an outcome of the meeting, it was highlighted that Jesse Wright, PE, PG – Environmental Engineer, Arcadis, will review the conceptual site model and identify data gaps. This will be completed in 2025. Additionally, Cullen Flanders, Environmental Remediation Engineer, GHD, proposed turning off the interior off-site wells, pending the approval of the Ministry of the Environment Conservation and Parks (MECP) approval, to allow natural conditions to return for monitoring groundwater while continuing peripheral pumping. This approach would involve sampling and analyzing groundwater concentrations, measuring water levels and constituent levels, and conducting pilot and bench-scale tests. It was emphasized that C. Flander's approach aims to enhance NDMA attenuation through the development of in-situ methods, although this may take decades. An example was provided of a similar site with NDMA remediation in California that also relies on ultraviolet destruction. Additionally, the meeting discussed ideas for direct water recirculation to address contaminants in soil. It was noted another approach could involve applying treated water to areas of source concentrations, where NDMA is bound in soil, or along the southern front of the plume to follow the pumping path and flush out their persistent environmental presence. However, it was noted that this would require the development of significant infrastructure, although it could use the currently treated water for remediation.

Mayor Sandy Shantz joined the meeting virtually at this point.

In response to a question, the next steps after the Technical Experts meeting were outlined to the committee. It was noted that this includes addressing unresolved details from past studies, such as the 2017 in-situ chemical oxidation (ISCO) and tracer study and presenting this work to the TRAC committee to enhance transparency. It was pointed out that in the ISCO study, the chemical oxidant showed its effectiveness is limited to within 13 meters of the injection point and would require millions of liters for broader application due to this limitation in spatial effectiveness. However, it was highlighted that the solution could still be useful as a tool to treat the mass of constituents of concern in areas lacking existing infrastructure. Other plans described included completing and submitting the unfinished 2018 Technical Evaluation Study alongside the currently proposed groundwater bench and pilot test proposals for future Ministry review. Long-term plans were also described, involving preparing a report evaluating remedial technical alternatives in terms of their feasibility, such as thermal remediation, which may not be suitable for Elmira's deep NDMA plume. It was noted that J. Wright will refine the conceptual site model by next summer. Additionally, it was recommended to propose new remediation

objectives and, once approved by the MECP, to develop a new draft control order. Considering the council's education on the issue, timing will be aimed at accommodating a submission before the next election. It was noted that this process will involve legal reviews, community input, and MECP review timelines. Additionally, planned updates to GHD's 3D conceptual site model, which will illustrate geology, NDMA and chlorobenzene mass, and impacts overlaid on street level geographical maps, were discussed. It was noted these updates will be shared with the TRAC committee in the future, once completed.

Summer Fieldwork Updates

Replacement of Well PW5

Commissioning of on-site containment well PW6

Investigating Well Extraction Pumping Rates

Comments were provided regarding outstanding work from 2024, noting that current efforts involve addressing issues with on-site containment well PW4 by performing an active carbon replacement as an initial troubleshooting step, and that equipment will be cleaned, inspected, and replaced as needed. The installation of on-site containment well PW6 was noted to be underway and on track for completion by the end of the year. It was emphasized that work on well PW6's power supply is being finalized to LANXESS plant and code requirements.

In response to the committee's question about the expected end of life for wells PW5 and PW4, it was noted that PW5, installed in 2005, is nearing the end of its service life, while PW4, installed in the 1980s and operational since the early 1990s, is also approaching the end of its effective use. Comment was provided that the lifespan of these wells is influenced by their maintenance and installation history. GHD further mentioned that 7 wells were recently replaced in the on-site upper aquifer containment system. They highlighted that well replacement and performance are continuously assessed. Additionally, the MECP and GHD discussed the ECA requirement for continuous monitoring of select wells, which are equipped with data loggers to facilitate and ensure ongoing maintenance.

Progress Update on LANXESS 2024 Work Plan

Several key efforts planned for 2025 were discussed, including submitting annual monitoring and audit reports for 2024. The need to complete a hazards analysis of the Containment and Treatment System (CTS) to ensure safe operation guidelines are met, along with continuing discussions with the MECP on the off-site aquifer Remedial Framework and the preparation and submission of the Canagagigue Creek Human Health Environmental Risk Assessment (HHERA), was noted. It was also mentioned that the creek HHERA was recently discussed further with the MECP at the end of August but a response to comments has not been finalized, although additional data sets have been provided by the MECP. The assessment of off-site groundwater extraction target rates was also outlined, alongside the proposed update of Joe Ricker's plume stability analysis for groundwater remediation. Of note, a similar long-term pump

and treat method remediation modeling work to be presented by J. Ricker at the upcoming October RemTech Conference this year in Alberta from LANXESS's Clover Bar site that helped the company stop the spread of contamination and monitor natural attenuation processes at the site was mentioned. Work to redevelop the on-site containment well PW5 was also noted.

The performance of wells, particularly PW4 and PW5, was discussed, highlighting their underperformance and the plan to replace PW5 with PW6 by the end of the year. Ongoing efforts to monitor and redevelop wells across the site to maintain groundwater containment were also addressed. The committee discussed concerns about pumping rates and containment stability for these critical wells. The end of the lifetime of well PW5 and its replacement with PW6 were underscored. It was noted that the evaluation of the underperforming well PW4 by a contractor revealed that while the well's performance is within expected limits, it is not meeting its targets. Based on troubleshooting efforts to date, higher pressures in PW4 suggest a buildup of fine materials from the use of regenerated carbon in the carbon treatment system rather than an equipment issue, which is not related to performance or differential pressure. It was highlighted that wells are continuously monitored in accordance with the ECA, and GHD is working to address issues, although this process takes time. PW6 is expected to be operational by the end of the year. GHD commented that they are focused on balancing pumping rates to maintain containment, with minor deviations of up to 5% unlikely to result in immediate loss of containment. The explanation was provided that flow can be adjusted to restore containment if needed, and further investigations into well maintenance by GHD are ongoing.

In response to the committee's questioning, seasonal fluctuations in groundwater levels and pumping rates were discussed, noting that shallow groundwater rates vary between 30-40 gpm in spring and 20 gpm in late summer. In contrast, it was noted deep groundwater typically shows less seasonal variation. Recent difficulties by GHD in maintaining pumping rates were attributed to a regional decline in groundwater levels, including a 1.5-meter drop last year, which has since risen by 1 meter, as observed and confirmed by the Region of Waterloo in their regional groundwater monitoring programs. This pattern, now in recovery, was attributed by the Region of Waterloo to potentially low external sources contributing to recharge from a dry year in 2022 with minimal snowpack.

In response to the Ministry's inquiry about having more than one pre-approved outside well technician or contractor available, GHD stated that they are actively seeking additional contractors and are continually exploring options for well maintenance and drilling. Currently, Lotowater in Paris, Ontario, which is also used by the Region of Waterloo, was noted as the primary contractor. Additionally, Well Initiatives Limited from the Guelph area was suggested to GHD by the Region, although it is known they have fewer staff available. It was noted, however, that at this time no other contractors in the area are known.

The committee inquired about the status of data collection for the HHERA. It was noted that all data has been collected and shared with LANXESS and Stantec consultants. The Ministry added that they are finalizing a technical report for their fall 2023 floodplain soil study on select properties along the creek and that the data and report will be shared with the TRAC committee after the information has been shared with the private landowners.

In response to the committee's questioning, it was clarified why the regenerating carbon recently implemented in the upper aquifer (UA) carbon tower is being operationally discontinued. The decision was noted to be due to this practice resulting in decreasing carbon grain size and increasing carbon fines content, which is thought to be contributing to the current buildup of pressures observed in the UA tower. It was explained that to address these backpressure issues, the regenerated carbon is now being replaced with "virgin" carbon.

In response to further committee questions, it was clarified that well monitoring involves tracking water levels in real-time using data loggers, which show seasonal fluctuations where water levels are higher in spring and lower in late summer and winter. It was noted this monitoring is ongoing, with targets adjusted based on historical data and current conditions. GHD emphasized using both data logger information and manual measurements to assess well performance, with warning levels set for specific parameters to manage potential issues. The committee expressed further concerns about reverse flow and containment loss, and it was noted the company is currently addressing this through sampling. The committee additionally discussed developing warning points based on differential pumping rates to monitor and address any drop in well performance. It was noted that while the wells needing monitoring are identified, water levels frequently falling below target rates is concerning. It was concluded that these fluctuations will be further considered, particularly in relation to water elevation levels.

At 18:39 Mayor S. Shantz entered the meeting in person.

<u>GHD/Alan Deal Historic Location of Dense Non-Aqueous Phase Liquids (DNAPL) & LANXESS Off Site Isotopic Analysis Study</u>

Alan Deal, GHD presented a 2018 study focused on Chlorobenzene Source Evaluation. It was emphasized that in its pure form, chlorobenzene exists as a dense non-aqueous phase liquid (DNAPL), as its density is greater than water, and it is highly insoluble, typically sinking to the bottom of a water table. The "one percent rule" of chlorobenzene's aqueous solubility was reviewed, suggesting that DNAPL may be present when groundwater concentrations exceed 1 percent of its effective aqueous solubility, which for chlorobenzene is 4,900 µg/L.

A key observation from the early 1990s at the LANXESS site was revisited, focusing on well P4W and monitoring well OW88. A diagram from the current conceptual site model was presented, illustrating chlorobenzene being released at the surface in the vicinity of where these wells are now located and a mass of DNAPL migrating down through the Upper Aquifer and fractures in the Upper Aquitard into the Upper Municipal Aquifer near well PW4. It was noted that while chlorobenzene has since been purged from monitoring well OW88, it still remains in the Upper Aquifer today. In contrast, it was discussed that insufficient chlorobenzene was present at the subsurface near well OW88 to penetrate the subsurface depths and migrate within the Upper Municipal Aquifer, as it adhered to the soil during migration from higher elevations.

The capture of this chlorobenzene by the Upper Aquifer Contaminant System was highlighted, along with historical chlorobenzene concentration models showing plume areas in both the

Upper Municipal Aquifer (1990) and the Lower Municipal Aquifer (1998) after the containment system became operational. These models illustrated changes in the plume size, migration, and chlorobenzene reductions over time.

The remaining areas of concern regarding the presence of DNAPLs were also addressed. Monitoring data from wells PW4 and W4 revealed gradual decreases in chlorobenzene concentrations on logarithmic scales. However, it was discussed that sustained high concentrations of chlorobenzene from well PW4 suggest the continued presence of residual DNAPL in the Upper Municipal Aquifer. At the same time, declining concentrations in W4 indicate that DNAPL is likely no longer present in that area.

In response to a question from the committee about using the proposed direct water recirculation method to pump treated water to address this contamination, it was explained that while this method might help flush out some of the concentrations toward the treatment system, it would not be very efficient because DNAPL is strongly bound to surface sediments.

An overview was provided on the completed Chlorobenzene Source Evaluation, covering four key activities: reviewing historic chlorobenzene users, installing and sampling a new monitoring well, analyzing samples for volatile organic compounds (VOCs), and conducting isotope analysis. It was noted the review of historic chlorobenzene users in the Environmental Risk Information Services (ERIS) database identified several facilities in Elmira that currently or previously used chlorinated solvents. The former Varnicolour facility at 84 Howard Avenue was discussed further in relation to historical chlorobenzene concentration models showing plume areas in both the Upper Municipal Aquifer (1990) and the Lower Municipal Aquifer (1998), where these properties were highlighted to be located directly west and southeast of the contaminant plume.

It was described that a new monitoring well nest was installed as part of this evaluation to investigate any potential chlorobenzene source north of the plume. It was noted that the investigation indicated that chlorobenzene was present in samples from wells OW187-36 and OW187-39, but at relatively low levels, significantly less than the Ontario Drinking Water Quality Standards (ODWQS). It was emphasized that these results ruled out the possibility of an unknown additional source of chlorobenzene mass in the municipal aquifer north of the existing plume.

An overview of a VOC sample analysis investigation, led by consultant Peritus on behalf of the property owner at 84 Howard Avenue and shared with GHD, was provided. This investigation was noted to have been conducted to support a Record of Site Condition (RSC) submission to the MECP. It documented contamination on and around the property that overlaps with LANXESS's well monitoring data. It was highlighted that Upper Aquifer monitoring well MW45 at 84 Howard Avenue detected VOCs including 1,1-dichloroethane, cis-1,2-dichloroethene, trichloroethene, and trans-1,2-dichloroethene, but not chlorobenzene.

It was further noted that cis-1,2-dichloroethene concentrations were above applicable standards on the 84 Howard Avenue property attributed to known past contaminant spills from

Varnicolour's solvent recycling operations. Depictions of VOC plumes of benzene, cis-1,2-dichloroethene, trichloroethene, and vinyl chloride were shown, further indicating their presence on or in the proximity to the 84 Howard Avenue site.

It was discussed that this VOC analysis concluded that trichloroethene, cis-1,2-dichloroethene, and vinyl chloride are present in the Upper Municipal Aquifer and originate from the 84 Howard Avenue property as a source. However, it was noted that these VOCs are not contaminants of concern (COCs) at the LANXESS site, although they are directly in the flow path from 84 Howard Avenue to LANXESS. In addition, it was further noted that the LANXESS site continues to be a source of chlorobenzene.

The results from a limited data set of groundwater samples collected from six wells and analyzed for chlorine and carbon isotopes by Tracer Technologies Inc. in February 2019 was described. It was noted that the analysis aimed to determine if isotopes could identify multiple sources of chlorobenzene, but no correlations could be made.

In response to concerns about offsite VOC contamination of the aquifer, it was emphasized that there is no risk to the public from this because the contaminated water is deep underground, not being pumped for use, and contained within LANXESS's off-site collection system, where it will be treated.

Regarding concerns of potential indoor air contamination issues from the VOCs at the 84 Howard Avenue property, which now includes the Elmira Pump Company, the MECP noted that the property owner has not yet submitted a Record of Site Condition. However, the owner's pursuit of this record has been previously discussed with the Ministry's Guelph District Office.

Questions were raised about whether the current collection and treatment system is designed to handle existing conditions, including dissolved VOCs and chlorobenzene. Concerns were also expressed about the potential future use of the aquifer as a drinking water source and the impact of these additional VOCs on this. It was emphasized that the current treatment system effectively manages this contamination and noted that only one of the VOCs associated with 84 Howard Avenue exceeded Ontario Drinking Water Quality Standards (ODWQS).

It was further explained that LANXESS's offsite groundwater collection and treatment system is focused on the Upper and Lower Municipal Aquifers and that they have no influence on the Upper Aquifer in the area of 84 Howard Avenue, which is not a usable drinking water source, but that the company's water collection and treatment is focused on the deeper aquifer water.

Clarification was provided that the chlorobenzene in the Upper Aquifer is not actively being treated. The non-aqueous nature of this DNAPL contamination, its limited migration through groundwater, and its minimal risk were further described. The potential for addressing this pollution with future enhancements to the collection and treatment system, such as C. Flanders' proposed observations of natural attenuation conditions, was also discussed.

It was clarified that the VOCs present at the 84 Howard Avenue site are included in GHD's comprehensive contaminant scans of groundwater influent to treatment system, and LANXESS's activated carbon treatment system effectively removes all such VOCs. It was also noted that recent models indicate that most off-site chlorobenzene concentrations in the municipal aquifers are expected to be treated by the 2028 order deadline.

In response to the committee's questions, it was confirmed that no DNAPLs are present off-site or at on-site pumping well PW4. It was explained that off-site well W8 has high chlorobenzene concentrations, but it remains unclear if these will decrease or stabilize under active pumping. The source of this contamination—whether DNAPL or dissolved phase—has not yet been identified. It was explained that if pumping was stopped, concentrations could rise under natural conditions if an unknown source of chlorobenzene remains. The low likelihood of DNAPL migrating off-site due to its non-aqueous nature and adherence to sediment was also clarified, with concerns limited to the LANXESS plant and not extending off-site.

There was no further discussion regarding this.

2028 Order Deadline and Remediation Framework Discussion

Draft discussion questions around the 2028 Order deadline and LANXESS' 2018 Remediation Framework were considered. It was noted that at the recent Technical Experts meeting, the focus was on aligning priorities for the water supply, community engagement, and managing time constraints before 2026. The committee discussed refining open-ended questions, clarifying responsibilities, and proposing a phased approach to address these issues. It was noted that coordination with LANXESS, the Ministry, and the Region of Waterloo is needed to draft a new control order, with LANXESS expected to propose a timeline by Q3 of 2025. Additionally, community engagement through TRAC's efforts was discussed, including expectations for LANXESS to provide a proposal for revised remediation objectives with reasonable options for consideration. The need for community assistance with these efforts over the next 2-3 years was highlighted, and it was noted that this topic will remain a standing item on the committee's agenda for further discussion.

Fall Presentation to Council

The recent well-received biannual presentation to the council was mentioned, along with plans for the next presentation tentatively scheduled for February 2025. A LANXESS 2024 work plan, offered by GHD, is expected to be included in the next TRAC update to the Township's council if timing permits. It was suggested that making these presentations accessible through TRAC's EngageWR project website could enhance community engagement. It was determined that the next presentation should focus on high-level key outcomes from the recent Technical Experts meeting, outline the committee's current work, and detail the process leading up to the 2028 control order deadline. Since Council is familiar with J. Ricker's recent plume stability presentations, it was noted that these can be referenced. It was also suggested that information from LANXESS on the current draft remediation framework questions, LANXESS's proposed

project work, and discussions on potential non-potable municipal aquifer water usage be included.

At this point in the meeting, Chris Foster Pengelly left.

Other Business

It was noted that LANXESS has a new Plant Manager, Rob Arndt, who is open to meeting with the TRAC committee.

Ontario Drinking Water Quality Standards for NDMA

In response to a question raised at the June 13, 2024 TRAC meeting, the MECP provided background information on the Ontario Drinking Water Quality Standard (ODWQS) for NDMA, focusing on the age of these limits and their variability across jurisdictions. It was noted that Ontario established a strict NDMA standard of 0.009 ug/L in 1991 due to contamination in Elmira's municipal aquifers, which was later formalized under the *Safe Drinking Water Act*, 2003. This was based on NDMA's classification as a probable carcinogen in humans and animals. For comparison, Health Canada has higher threshold limits (0.04 ug/L) based on lifetime cancer risks of 1 in 100,000 people. While the MECP does not find Health Canada's derivation problematic, Ontario's stricter limit remains to ensure optimal water treatment and chlorination processes that prevent NDMA formation. The Ministry emphasized that it does not plan to amend the current ODWQS for NDMA based on current science.

It was noted by the committee that it is beneficial to cleanup efforts to know the current ODWQS for NDMA will remain unchanged.

Correspondence

The following three documents were received since the last June 12, 2024, TRAC committee meeting:

- LANXESS May 2024 Progress Report Prepared by GHD
- LANXESS June 2024 Progress Report Prepared by GHD
- LANXESS July 2024 Progress Report Prepared by GHD
- LANXESS August 2024 Progress Report Prepared by GHD

Review of LANXESS May, June & July Monthly Progress Reports

This item was noted but not discussed further.

Next Meeting – November 14, 2024

Fall Meeting Schedule

The committee canceled their October 10, 2024, meeting and will meet again on November 14, 2024, when essential items are expected for discussion.

Adjournment (8:07 P.M.)

Moved by Dr. Sebastian Siebel-Achenbach
Seconded by Susan Bryant

The committee adjourns to meet again on Nov 14, 2024.

…Carried.

Recorder: Stacey Bruce, Committee Support Specialist

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Our ref: 11192137-LTR-60

15 October 2024

Ms. Lubna Hussain
Director, West Central Region
Ontario Ministry of the Environment
119 King Street West, 12th floor
Hamilton, ON
L8P 4Y7

LANXESS Canada Co./Cie (LANXESS) Progress Report September 2024

Dear Ms. Hussain

This letter presents a summary of the September 2024 LANXESS Progress Report.

The following noteworthy items regarding the Combined Groundwater Collection and Treatment System (CTS) are discussed in the report text.

The average monthly pumping rates of PW4, PW5, W5A, W9, and E7 were less than their Target Average pumping rates during September 2024. The PW4 pumping rate was reduced to 1.3 litres per second (L/s) during the first half of the month due to a buildup of carbon fines in the UA Carbon Tower which had resulted in plugging of the tower screens and pore spaces within the granular activated carbon in the tower. LANXESS discontinued the use of regenerated carbon and has switched to virgin carbon for the foreseeable future to reduce the carbon fines in the tower and has completed additional carbon change outs within the tower. Additionally, on September 19, 2024, LANXESS backflushed all screens on the UA tower, which allowed additional flow from PW4. PW5 continued operating at a reduced pumping rate in September 2024. Despite not meeting the Target Average pumping rate, hydraulic monitoring data indicate PW5 currently generates an effective groundwater capture zone. LANXESS is in the process of connecting the new replacement well PW6 to the existing treatment system infrastructure and is working towards bringing the well online. The pumping rate of W5A was below its Target Average pumping rate in September 2024. The well is unable to maintain its pumping rate; LANXESS will schedule inspection and rehabilitation of the well, subject to contractor availability. W9 continued pumping at a reduced rate during September 2024. The well pump is running at maximum capacity, therefore, LANXESS believes that the decreased pumping rate is due to an issue with the pump/motor and/or decreased well efficiency. LANXESS has scheduled inspection of the pump/motor and possible video inspection for the week of October 7, 2024. The E7 average daily pumping rate was less than its Target Average pumping rate in September 2024 due to issues with the wipers on Train B. Train B repeatedly shut down between September 12 and September 25, 2024 due to pump pressure alarms on the main pump PLC. LANXESS' Rayox contractor investigated the issue and determined that the Train B wipers and the solenoid valve that runs the Train B wipers were not operating correctly. These were replaced and Train B was restarted on September 25, 2024 at its target pumping rate.

During September 2024, the CTS operated within the Effluent Limits and within the Effluent Objectives for all compounds.

Please refer to the detailed information in the Progress Report for further information on these items.

Regards

Luis Almeida
Project Manager

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AB/kf/60

Encl.

Copy to: Jason Rice, MECP
Rob Arndt, LANXESS
Hadley Stamm, LANXESS
LANXESS Public Distribution List
Esther Wearing, MECP
Jamie Petznick, LANXESS
Michelle Yantzi, LANXESS

September 2024

Progress Report
LANXESS Canada Co./Cie
Elmira, Ontario

GHD has prepared this report on behalf of LANXESS Canada Co./Cie (LANXESS) and submitted it to the Ontario Ministry of the Environment, Conservation and Parks (MECP). This report complies with the administrative reporting requirements of the November 4, 1991 Control Order (Control Order), the Amended Environmental Compliance Approval (ECA) No. 0831-BX6JGD (Combined On-Site and Off-Site Groundwater Collection and Treatment Systems [CTS]), and Certificate of Approval (C of A) No. 4-0025-94-976 (E7/E9 Treatment Facility).

Unless otherwise stated, all data included in this report were collected in September 2024.

The Progress Report is organized as follows:

1. Monitoring and Analytical Data

A summary of the LANXESS monitoring programs is provided in Table 1.

A summary of the analytical results for the CTS is presented in Attachment A.

A summary of the analytical results from the monthly August 2024 Environmental Appeal Board (EAB) monitoring of discharges to surface water through storm water outfalls 0200, 0400 and 0800, and the storm water drainage system (SWS), is included in Attachment B. Attachment B is not required under the Control Order but is provided for review. Due to delays with the analytical data, the analytical results from the monthly September EAB monitoring will be provided in the October Progress Report.

A summary of the analytical results for groundwater samples collected as part of the 2024 Off-Site Routine Groundwater Monitoring (R.G.M.) Program is presented in Attachment C.

LANXESS collected confirmatory volatile organic compound (VOC) samples from monitoring well OW127-4 in September 2024. This well is part of the Creek Bank Groundwater Monitoring Program. A summary of the analytical results for groundwater samples collected as part of the confirmatory sampling event in September 2024 is presented in Attachment D.

LANXESS collected monthly groundwater samples from the Upper Municipal Aquifer (MU) sentry wells on August 29, 2024 and September 19, 2024, and results are presented in Attachment E.

2. Correspondence, Meetings, and Events

September 12, 2024	August 2024 Progress Report submitted to MECP West Central Region (WCR)
September 12, 2024	Technical Remediation Advisory Committee (TRAC) Meeting

3. CTS Monitoring and Performance

A schematic process flow diagram of the CTS is provided on Figure A.1 (Attachment A).

The September 2024 average pumping rates for the CTS containment wells PW4 and PW5, the CTS extraction wells W3R, W5A, W5B, W6A, W6B, W8 and W9, the Upper Aquifer Containment System (UA CS) wells, and E7, as compared to the target average pumping rates, are listed below, and shown graphically on Figures A.2 and A.3 (Attachment A).

Average Daily Pumping Rates		
September 2024 (Litres/second [L/s])		
Containment and Extraction Wells	**Target Average (1)**	**Average**
On Site Wells		
PW4	2.9	1.5
PW5	1.8	1.6
Upper Aquifer Wells	--	0.6
Off Site Wells		
W3R	18.5	21.5
W5A	4.5	1.8
W5B	4.2	4.3
W6A	0.20	0.36
W6B	0.30	0.40
W8	0.05	0.09
W9	13.6	9.7
E7	23.9	20.9
Yara	--	0.2

Notes:

(1) As wells and treatment system components require periodic downtime for maintenance, the Target Average pumping rate is set at 90% of the set point rate. GHD recommends that LANXESS maintain the target pumping rates greater than or equal to these rates.

With the exceptions discussed below, the containment and extraction wells, including the UA CS wells, are operating as intended.

The PW4 average monthly pumping rate was less than its Target Average pumping rate in September 2024. The PW4 pumping rate was reduced to 1.3 L/s during the first half of the month. This was due to a buildup of carbon fines in the UA Carbon Tower which had resulted in plugging of the tower screens and pore spaces within the granular activated carbon in the tower. Additional fines were inadvertently added to the UA Carbon Tower in late July 2024 when the carbon was replaced and backwashed in the W4 Carbon Adsorber. LANXESS discontinued the use of regenerated carbon and has switched to virgin carbon for the foreseeable future to reduce the carbon fines in the tower and has completed additional carbon change outs within the tower. Additionally, on September 19, 2024, LANXESS backflushed all screens on the UA tower, which allowed additional flow from PW4. During the plant-wide annual hydro shutdown, on September 21, 2024, carbon fines within the system plugged the Rayox A UV system. Additional downtime was required to clean out the Rayox system and feed tank. PW4 was restarted on September 26, 2024 at its target pumping rate.

As detailed in ECA No. 0831-BX6JGD, LANXESS shall measure and maintain on-site containment at the western site boundary between monitoring wells OW58-13 and OW105d. If the water level in on-Site monitoring well OW62-17 is not at least 1 centimetre (cm) lower than the water level in off Site monitoring

well CH-47E, LANXESS shall adjust pumping rates to maintain containment, and if containment is not attained within five working days (or in the event of routine maintenance, equipment repair, or circumstances beyond LANXESS' control, the elevation differential required need not be maintained for periods of time up to two weeks), LANXESS will initiate monthly groundwater sampling for chlorobenzene and n-nitrosodimethylamine (NDMA) analyses, collected from six off-Site sentry monitoring wells. While PW4 was operating at a reduced pumping rate, this 1 cm differential could not be maintained. LANXESS collected groundwater samples from off-Site MU sentry monitoring wells OW58-13, OW165-17, CH-47E, CH-97B, CH-56B, and CH-89B on August 29, 2024 and on September 19, 2024. Tables E.1 and E.2 (Attachment E) provide the MU sentry well results. Figures E.1 through E.6 (Attachment E) present the NDMA and chlorobenzene results for March 2008 through September 2024. GHD completed statistical analyses on the MU sentry well data to identify trends in the concentrations of NDMA and chlorobenzene in groundwater samples collected from these wells. The following table summarizes the trend analysis results:

Trend Analysis Results		
Monitoring Wells	**NDMA Trends**	**Chlorobenzene Trends**
OW58-13	>50% ND	100% ND
OW165-17	>50% ND	>50% ND
CH-89B	>50% ND	>50% ND
CH-47E	**Decreasing Trend**	**Decreasing Trend**
CH-56B	**Decreasing Trend**	**Decreasing Trend**
CH-97B	>50% ND	>50% ND

GHD did not complete the trend analysis for the OW58-13, OW165-17, CH-89B, and CH-97B data sets because the majority of the results were non-detect and the statistical model is not valid for data sets where the chemical of interest was not detected in the majority of the samples. GHD identified statistically significant decreasing trends in NDMA and chlorobenzene concentrations over time in the groundwater samples collected from MU sentry wells CH-47E and CH-56B. The decreasing trends and the persistence of the non-detect results for NDMA and chlorobenzene in the groundwater samples from OW58-13, OW165-17, CH-89B and CH-97B provide an independent line of evidence that the on-Site MU containment wells continue to achieve hydraulic containment of the most heavily impacted groundwater beneath the southwest portion of the Site in 2024. LANXESS will complete the semi-annual sampling as part of the MU Sentry Well Monitoring Program in October 2024 and provide similar trend analyses in the October Progress Report.

PW5 continued operating at a reduced pumping rate in September 2024. The well is currently unable to maintain its Target Average pumping rate. PW6 is being installed as a replacement well to maintain the Target Average pumping rate. PW6 is on schedule for completion by the end of the year as previously committed to by LANXESS.The PW5 Target Average pumping rate is an internal operational guideline LANXESS uses when operating extraction/containment wells, which includes a significant safety factor. Despite not meeting the Target Average pumping rate, hydraulic monitoring data indicate PW5 currently generates an effective groundwater capture zone. LANXESS is in the process of connecting new replacement well PW6 to the existing treatment system infrastructure and is working towards bringing the well online. The communication and power lines are scheduled to be installed in October 2024.

W5A continued pumping at a reduced rate (between 2.2 L/s and 2.5 L/s) in September 2024 as the well is unable to maintain its target pumping rate (4.5 L/s). LANXESS will schedule inspection and rehabilitation of the well, subject to contractor availability.

W9 continued pumping at a reduced rate during September 2024. The well pump is running at maximum capacity, therefore, LANXESS believes that the decreased pumping rate is due to an issue with the pump/motor and/or decreased well efficiency. Due to delays with contractor availability, LANXESS has scheduled inspection of the pump/motor and possible video inspection for the week of October 7, 2024. Additionally, W9 was shut down from September 23, 2024 through September 26, 2024 to complete the annual service and maintenance on the Trojan UV system.

The E7 average daily pumping rate was less than its Target Average pumping rate in September 2024 due to issues with the wipers on Train B. Train B repeatedly shut down between September 12 and September 25, 2024 due to pump pressure alarms on the main pump PLC. LANXESS' Rayox contractor investigated the issue and determined that the Train B wipers and the solenoid valve that runs the Train B wipers were not operating correctly. These were replaced and Train B was restarted on September 25, 2024 at its target pumping rate.

a) Bypass or Upset Conditions

The bypass or upset conditions encountered in the CTS are summarized in Table A.1 (Attachment A).

b) Data Summary and Interpretation

Table A.2 (Attachment A) presents the analytical results for the CTS samples collected in September 2024 and summarizes the effluent pH and temperature. The discharge pH was between 7.22 and 7.32 Standard Units (su), which is within the ECA discharge limit pH range of 5.5 to 9.5 su. The effluent temperature was between 13.8 and 14.4 degrees Celsius (°C), which is less than the discharge limit of 25°C.

The ATS removed ammonia to concentrations that were less than those required by the ECA.

The Combined Discharge Effluent[1] met the Effluent Limits and Effluent Objectives for all indicator parameters in September 2024.

Table A.3 (Attachment A) summarizes the effluent discharge flow rates. The total flow rate of treated groundwater discharged to the Creek via SS+890 was 34.5 L/s. The total flow rate of additional treated groundwater discharged to the Creek via Shirt Factory Creek (at storm water outfall 0800) was 6.7 L/s. The total flow rate of the combined treated groundwater discharged to the Creek (SS+890 discharge plus Shirt Factory Creek discharge) was 41.2 L/s, which was less than the discharge Effluent Limit of 92.2 L/s.

c) Supplementary Data

As part of the ongoing monitoring of on-Site carbon treatment performance, on September 3, 2024, LANXESS collected samples from the carbon tower influent (GCI) and carbon tower effluent (GCE) for VOC and base/neutral and acid extractable compound (BNA) analyses. Table A.4 (Attachment A) presents the GCI and GCE analytical results.

On September 3, 2024, LANXESS collected samples from the influent to and treated effluent from the portable carbon adsorbers installed to pre-treat groundwater from UA CS wells U+500 and U+560. ECA No. 0831-BX6JGD does not require the collection of groundwater samples from UA CS wells; however, LANXESS has been collecting these samples on a voluntary basis to monitor and improve the performance of the on-Site granular activated carbon (GAC) Tower. LANXESS analyzed the samples for VOCs and BNAs. Table A.4 (Attachment A) presents the analytical results for the influent and pre-treated effluent samples from the U+500 and U+560 containment wells.

d) Routine Maintenance

Routine maintenance tasks completed on the CTS in September 2024 are summarized in Table A.5 (Attachment A). These activities are completed by LANXESS personnel as part of on-going preventative maintenance and system inspections. These maintenance activities do not typically cause a system bypass or shutdown and are not required by the Control Order or ECA. This information is being provided to demonstrate LANXESS' commitment to proactively maintain the CTS and ensure continued operations.

e) Receiver Water Quality Data

As per Amended ECA No-0831-BX6JGD, the receiver water quality monitoring program has been reduced from monthly to once every three (3) months. LANXESS will complete the next quarterly routine monitoring event in October 2024.

---

[1] The Combined Discharge Effluent value was calculated by multiplying the average flow rates by the concentration of the analytes at the SS+890 GE outfall and the additional effluent discharge location via Shirt Factory Creek.

Summary of Efforts Made and Results Achieved

During September 2024, the CTS operated within the Effluent Limits and within the Effluent Objectives for all compounds.

4. Remedial Action Plan

There are no new activities to report for this item in September 2024.

5. E7 AOP

The average E7 pumping rate (20.9 L/s) was less than its recommended Target Average pumping rate (23.9 L/s) during September 2024 due to issues with the Train B wipers and associated solenoid valve. The influent sample collected on September 23, 2024 contained NDMA at a concentration of 0.01 micrograms per litre (µg/L). NDMA was not detected in the effluent sample collected on September 23, 2024 (reporting detection limit [RDL] = 0.01 µg/L).

6. Environmental Audit

There are no new activities to report for this item in September 2024.

7. Remediation of Former Operating Pond Area

There are no new activities to report for this item in September 2024.

8. Additional Work/Studies

There are no new activities to report for this item in September 2024.

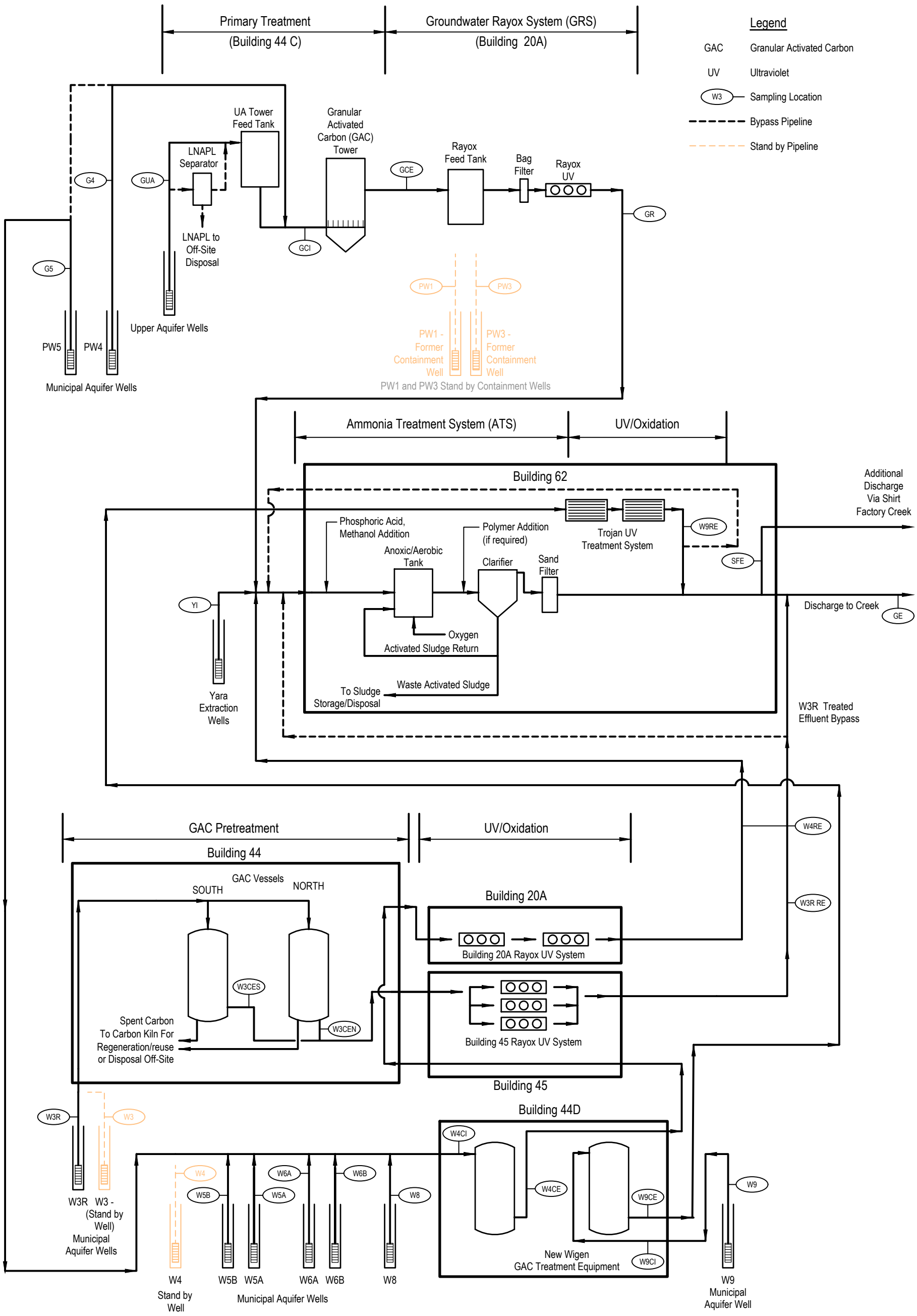
Table 1

Monitoring Program Summary
LANXESS Canada Co./Cie
Elmira, Ontario

Media and Sampling Program	Parameters	Frequency	September 2024 Results Location
Treatment System			
Off-Site Groundwater Collection and Treatment System (Off-Site CTS) Influent	Offsite Broad Scan (Schedule D)	Annual	-
On-Site Groundwater Collection and Treatment System (On-Site CTS) Influent	Effluent Broad Scan (Schedule C)	Annual	-
Combined On-Site and Off-Site Groundwater Collection and Treatment Systems (CTS) Effluent	Indicator parameters	Monthly	Attachment A
	Effluent Broad Scan (Schedule C)	Quarterly	-
CTS Effluent - Acute Toxicity	Not applicable	Quarterly	-
CTS Effluent - Chronic Toxicity	Not applicable	Semi-annual	-
Surface Water			
Environmental Appeal Board (EAB) Sampling	Select VOCs, semi-volatile organic compounds (SVOCs), pesticides, general chemistry	Monthly	Attachment B
Primary Surface Water Quality Monitoring	Indicator parameters	Quarterly	-
	Effluent Broad Scan (Schedule C)	Quarterly	-
Secondary Surface Water Quality Monitoring	Indicator parameters	Quarterly	-
	Effluent Broad Scan (Schedule C)	Quarterly	-
Upper Aquifer Hydraulic Containment Requirement	Schedule E	As required	-
Receiver Biomonitoring Program – Clams	See Biomonitoring Reports	Biennial (Even Years)	-
Receiver Biomonitoring Program – Benthic		Biennial (Odd Years)	-
Groundwater			
Groundwater Elevation Monitoring Program (GEMP)	Elevation	Semi-annual	-
Upper Municipal Aquifer (MU) Sentry Well Monitoring Program	n-Nitrosodimethylamine (NDMA), chlorobenzene	Semi-annual	Attachment E
NAPL Monitoring Program (NMP)	Elevation	Annual	-
Creek Bank Groundwater Monitoring Program – Spring Round	NDMA, chlorobenzene	Annual	-
Creek Bank Groundwater Monitoring Program – Summer Round	Selected pesticides and volatile organic compounds (VOCs)	Annual	Attachment D
Off-Site Sentry Well Monitoring Program	NDMA +/- chlorobenzene	Annual	Attachment C
Off-Site Plume Monitoring Program	NDMA +/- chlorobenzene	Biennial (Odd Years)	-

Attachment A

Analytical Results
Collection and Treatment System



LANXESS CANADA CO./CIE
ELMIRA, ONTARIO

Project No. **11192137**
Date **October 2024**

TREATMENT SYSTEM PROCESS FLOW SCHEMATIC

FIGURE A.1

Filename: N:\CA\Waterloo\Projects\662\11192137\Digital_Design\ACAD 2020\Figures\LTR-GEMP2024SEPTEMBER-DIR060\11192137-GHD-00-00-LTR-EN-D101_WA-GEMP2024SEPTEMBER-DIR060.dwg
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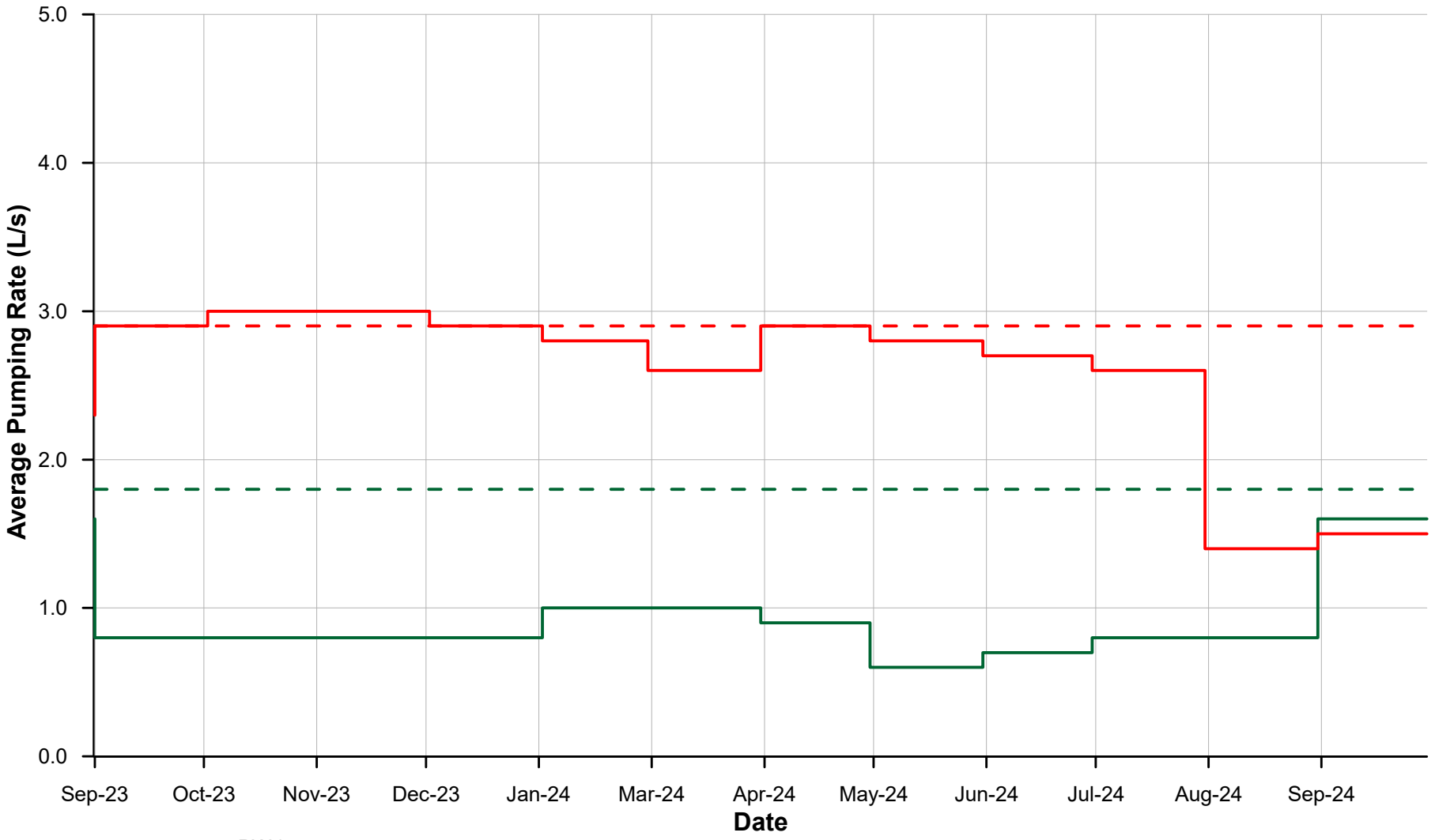


figure A.2

ON-SITE EXTRACTION WELL AVERAGE VS. TARGET PUMPING RATES

LANXESS CANADA CO./CIE

Elmira, Ontario

*Note: Target pumping rates were updated based on the average daily pumping rates recommended in the 2015 Model Check Point Analysis (GHD, June 2016). The Target Average pumping rates are 90% of the recommended daily Set Point pumping rates since the wells and treatment system components require periodic downtime for maintenance.

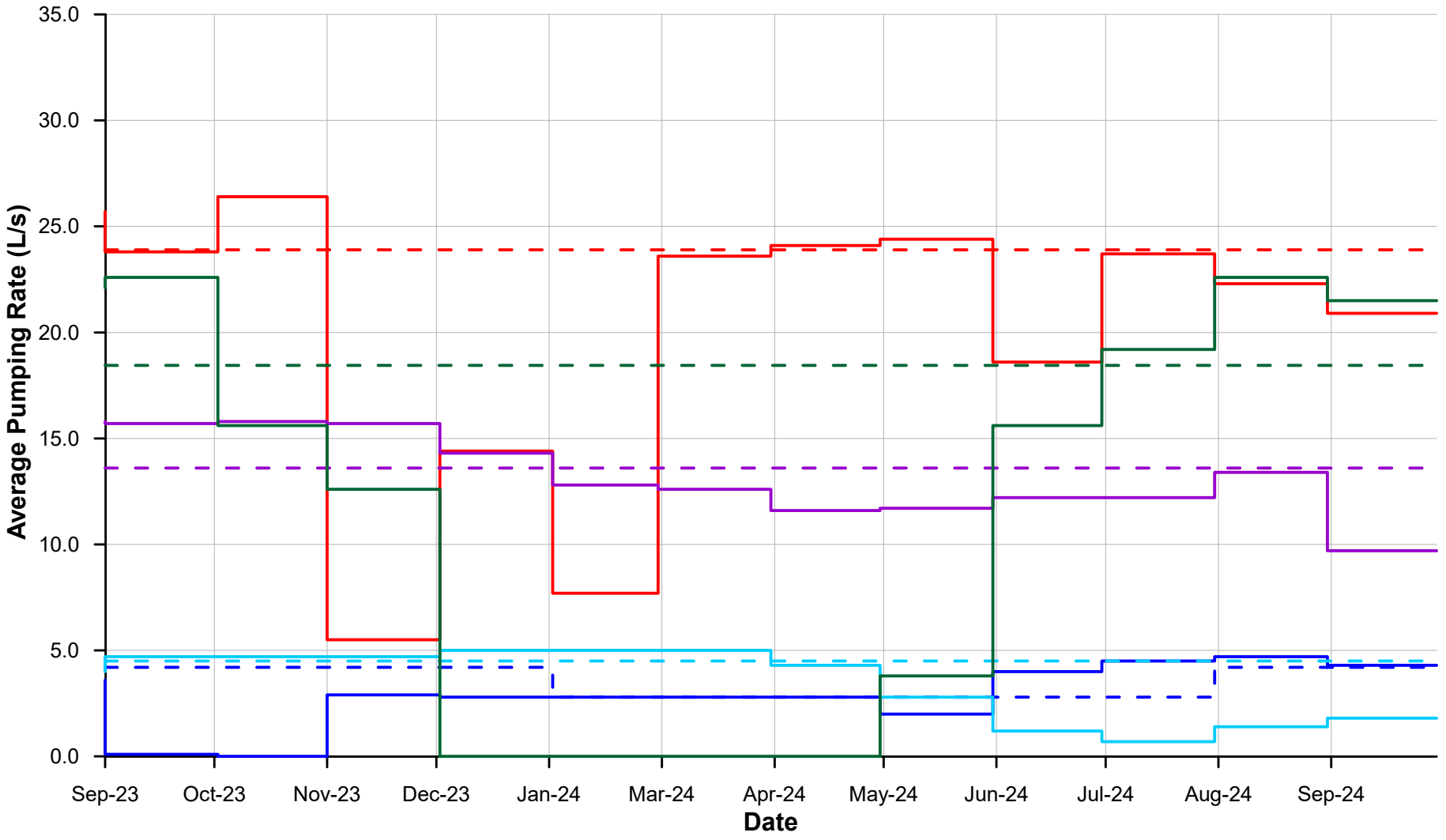


figure A.3a
OFF-SITE EXTRACTION WELL AVERAGE VS. TARGET PUMPING RATES
LANXESS CANADA CO./CIE
Elmira, Ontario

*Note: Target pumping rates were updated based on the average daily pumping rates recommended in the 2015 Model Check Point Analysis (GHD, June 2016). The Target Average pumping rates are 90% of the recommended daily Set Point pumping rates since the wells and treatment system components require periodic downtime for maintenance.

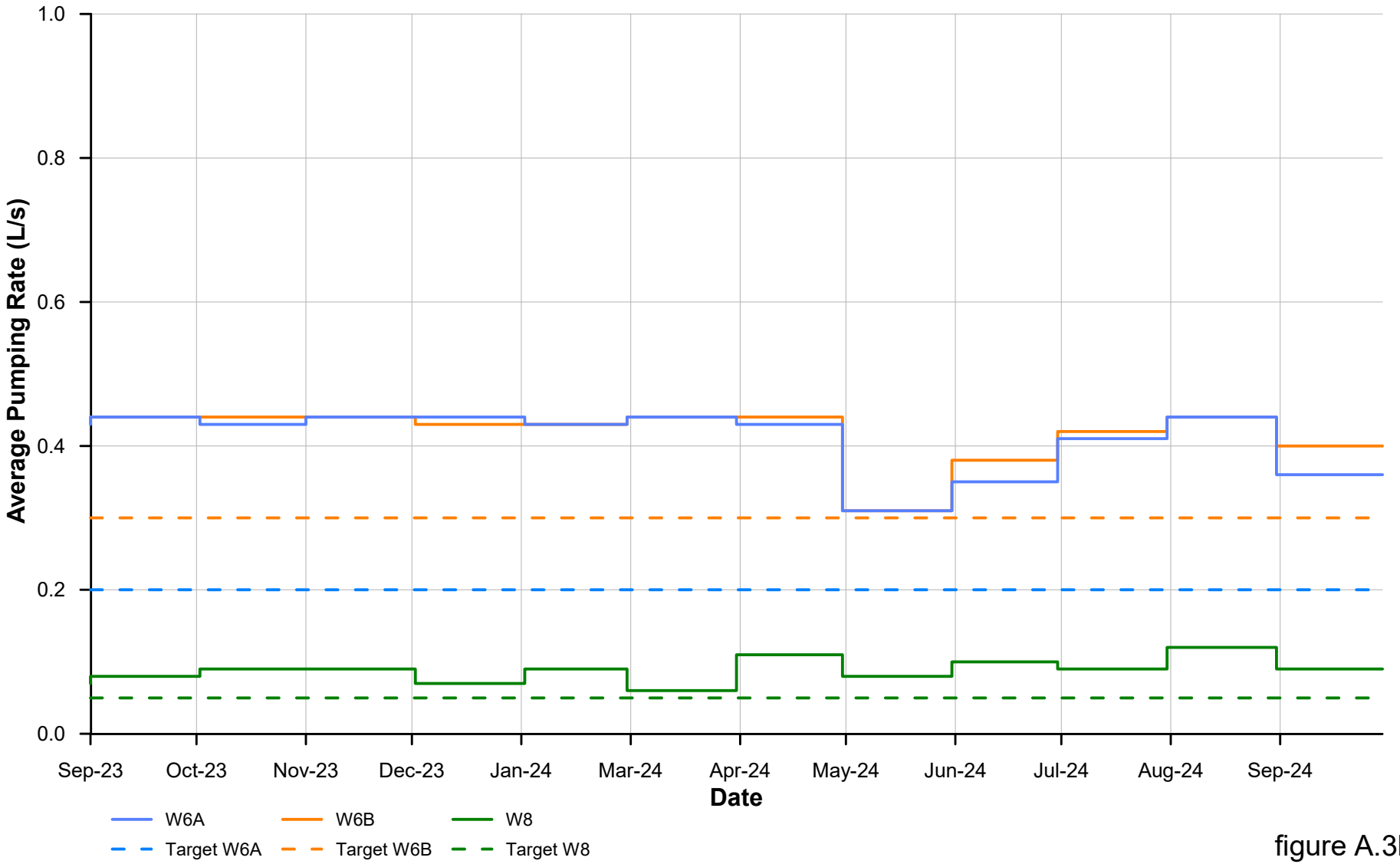


figure A.3b
OFF-SITE EXTRACTION WELL AVERAGE
VS. TARGET PUMPING RATES
LANXESS CANADA CO./CIE
Elmira, Ontario

*Note: Target pumping rates were updated based on the average daily pumping rates recommended in the 2015 Model Check Point Analysis (GHD, June 2016). The Target Average pumping rates are 90% of the recommended daily Set Point pumping rates since the wells and treatment system components require periodic downtime for maintenance.

LANXESS has reduced the W6A and W6B target average pumping rates as a result of reduced well capacity.

Table A.1

Performance - Combined On-Site and Off-Site Groundwater Collection and Treatment System
Bypass/Upset Conditions - September 2024
LANXESS Canada Co./Cie
Elmira, Ontario

ON-SITE GROUNDWATER CONTAINMENT AND TREATMENT SYSTEM

September 21	Shut down at 04:45 for annual plant-wide hydro shut down, plus additional downtime due to plugging of the Rayox system, and restarted September 26, 2024 at 13:30

OFF-SITE GROUNDWATER COLLECTION AND TREATMENT SYSTEM

W3R Groundwater Rayox System

September 21	Shut down at 04:45 for annual plant-wide hydro shut down, and restarted at 17:25
September 24	Shut down at 20:50 for Rayox lamp replacement, and restarted September 26, 2024 at 18:40
September 27	Shut down at 05:30 for scheduled maintenance, and restarted at 11:25

W5A/W5B/W6A/W6B/W8 Groundwater Rayox System [1]

September 21	Shut down at 04:45 for annual plant-wide hydro shut down, and restarted September 22, 2024 at 05:25
September 22	Shut down at 10:00 due to plugging of Rayox A, and restarted at 11:35
September 25	Shut down at 10:20 for cleaning of the Rayox A feed tank, and restarted September 26, 2024 at 16:00

W9 Groundwater Trojan UV/Oxidation System

September 21	Shut down at 04:45 for annual plant-wide hydro shut down, and restarted September 22, 2024 at 06:30
September 22	Shut down at 10:00 due to plugging of Rayox A, and restarted at 12:00
September 23	Shut down at 10:25 to complete the annual service on the Trojan UV system, and restarted September 26, 2024 at 18:15
September 30	Shut down at 10:35 due to a critical alarm on the Trojan system, and restarted October 2, 2024 at 12:30

Note:

[1] Groundwater pumped by PW5 is treated in the W5A/W5B/W6A/W6B/W8 Groundwater Rayox System and PW5 is, therefore, shut down when the W4/W5A/W5B/W6A/W6B/W8 system is shut down.

Table A.2

Combined On-Site and Off-Site Groundwater Containment and Treatment System
Analytical Results [1]
September 2024
LANXESS Canada Co./Cie
Elmira, Ontario

Sample Date	Parameter [2] [3]	Primary Treatment								Secondary Treatment				Tertiary Treatment		Combined Discharge Effluent[4]	Combined Discharge Effluent		
		W3R CEN	W3R CES	W4 CI	W4 CE	W9 CI	W9 CE	GCI	GCE	W3R RE	W4 RE	W9 RE	GR	SFE	GE		Limit	Adjusted Limit [5]	Objective
3-Sep-24	Ammonia-N (mg/L)													0.123	0.143	0.140	0.84[6]	0.84	0.62
3-Sep-24	Total Phosphorus (mg/L)													0.0487	0.138	0.123	0.5	0.5	--
3-Sep-24	BOD_5 (mg/L)													ND(2.0)	ND(2.0)	ND(2.0)	15	15	--
3-Sep-24	Total Cyanide (µg/L)													ND(2)	ND(2)	ND(2)	14	14	ND(5)
3-Sep-24	Formaldehyde (µg/L)													ND(2.0)	ND(2.0)	ND(2.0)	24	24	ND(5)
3-Sep-24	pH (s.u.)													7.32	7.22	7.24	5.5 - 9.5	5.5 - 9.5	--
3-Sep-24	Temperature (°C)													13.8	14.4	14.3	<25	<25	--
3-Sep-24	Chlorobenzene (µg/L)	1.46	2.74	68.2	ND(0.20)	20	2.26	1520	33.6	0.72	ND(0.20)	1.06	8.56	0.89	0.44	0.47	10	11.2	ND(0.5)
17-Sep-24	Chlorobenzene (µg/L)									0.84	ND(0.20)	0.35	33.0	0.29	0.46				
3-Sep-24	Toluene (µg/L)							135	0.77					0.79	ND(0.20)	0.21	5	5.6	ND(0.4)
3-Sep-24	1,1-Dichloroethane (µg/L)							ND(0.20)	ND(0.20)					ND(0.20)	ND(0.20)	ND(0.20)	10	10	ND(1)
3-Sep-24	g-BHC (Lindane) (µg/L)													ND(0.0030)	ND(0.0030)	ND(0.0030)	0.14	0.16	ND(0.003)
3-Sep-24	n-Nitrosodimethylamine (NDMA) (µg/L)[7]									ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	0.14	0.16	ND(0.01)
17-Sep-24	NDMA (µg/L)[7]									ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)				
3-Sep-24	n-Nitrosodiethylamine (NDEA) (µg/L)[7]									ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	4	4	ND(0.06)
17-Sep-24	NDEA (µg/L)[7]									ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)				
3-Sep-24	Nitrosomorpholine (NMOR) (µg/L)[7]									ND(0.06)	ND(0.06)	ND(0.06)	0.09	ND(0.06)	ND(0.06)	ND(0.06)	4	4.5	ND(0.06)
17-Sep-24	NMOR (µg/L)[7]									ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)	ND(0.06)				
3-Sep-24	Benzothiazole (µg/L)							97.2	ND(2.0)					ND(2.0)	ND(2.0)	ND(2.0)	4	4.5	ND(2)
3-Sep-24	Carboxin (µg/L)							98.2	0.219					ND(0.100)	ND(0.100)	ND(0.100)	7	7.8	ND(2)

SS+890 Discharge (GE) Flow Rate	34.5 L/s
Shirt Factory Creek Discharge (SFE) Flow Rate	6.7 L/s
Total Combined Discharge Effluent Flow	41.2 L/s

Table A.2

Combined On-Site and Off-Site Groundwater Containment and Treatment System
Analytical Results [1]
September 2024
LANXESS Canada Co./Cie
Elmira, Ontario

Notes:

[1]	All samples analyzed by ALS Canada Ltd. unless otherwise noted.		
[2]	"Parameters" are the parameters identified in ECA No. 0831-BX6JGD.		
[3]	The Sample Locations are coded as follows:		
W3R CEN	W3R North Carbon Adsorber Effluent.	W3R CES	W3R South Carbon Adsorber Effluent.
W4CI	W4 Carbon Adsorber Influent. The influent may include influent from W5A, W5B, W6A, W6B, W8 and PW5.		
W4CE	W4 Carbon Adsorber Effluent. The effluent may include effluent from W5A, W5B, W6A, W6B, W8 and PW5.		
W9CI	W9 Carbon Adsorber Influent.	W9CE	W9 Carbon Adsorber Effluent.
GCI	On-Site Carbon Tower Influent.	GCE	On-Site Carbon Tower Effluent.
W3R RE	Effluent from the W3R UV system.		
W4 RE	Effluent from the W4 UV system prior to treatment through the ATS. The effluent may include effluent from W5A, W5B, W6A, W6B, W8 and PW5.		
W9 RE	Effluent from the W9 Trojan UV/oxidation system.	GR	On-Site Groundwater Rayox Effluent.
SFE	Additional Effluent Discharge via Shirt Factory Creek.	GE	Effluent Discharge to Canagaguige Creek.
[4]	The Combined Discharge Effluent value is a calculated value determined by using average flow data from GE Effluent Discharge via SS+880 and Additional Effluent Discharge via Shift Factory Creek and monthly sample results from GE and SFE.		
[5]	Adjusted Effluent Requirements are applicable to monthly average discharge flows greater than 46.0 L/s.		
[6]	Total Ammonia Discharge Effluent Limit value is the greater of: calculated concentration, or 0.84 mg/L (May-October) or 2.4 mg/L (November-April) as per ECA No. 0831-BX6JGD.		
[7]	Samples analyzed by the LANXESS lab, Elmira Ontario.		
ND(RDL)	Not detected at the associated reporting detection limit.		

Table A.3

Combined On-Site and Off-Site Groundwater Collection and Treatment System Flow Rates
September 2024
LANXESS Canada Co./Cie
Elmira, Ontario

Date	On-Site Flow Rate [1] (L/s)	Off-Site Flow Rate [2] (L/s)	ATS Influent Flow Rate [3] (L/s)	W3R Bypass Flow Rate (L/s)	W9 Bypass Flow Rate (L/s)	SS+890 Discharge Flow Rate (L/s)	Shirt Factory Creek Discharge Flow Rate (L/s)	Total Combined Discharge Effluent Flow Rate [4] (L/s)
9/1/2024	2.1	44.9	11.6	23.7	12.2	38.3	9.1	47.4
9/2/2024	2.1	44.6	11.4	23.7	12.0	38.1	9.0	47.1
9/3/2024	2.1	44.4	11.4	23.7	11.8	38.2	8.6	46.8
9/4/2024	2.1	44.1	11.3	23.7	11.6	37.7	8.9	46.5
9/5/2024	2.1	42.1	9.4	23.7	11.5	38.1	6.5	44.5
9/6/2024	2.1	41.6	9.0	23.7	11.3	38.3	5.7	44.0
9/7/2024	2.1	41.4	9.0	23.7	11.2	38.4	5.4	43.9
9/8/2024	2.1	41.2	9.0	23.7	11.0	38.0	5.7	43.7
9/9/2024	2.1	41.1	8.9	23.7	10.9	38.2	5.3	43.4
9/10/2024	2.1	42.9	10.8	23.7	10.7	37.8	7.4	45.2
9/11/2024	2.1	43.3	11.4	23.7	10.6	37.9	7.8	45.7
9/12/2024	2.1	42.9	11.2	23.7	10.5	37.6	7.7	45.3
9/13/2024	2.1	42.3	10.7	23.7	10.4	37.7	7.0	44.7
9/14/2024	2.1	42.6	11.1	23.7	10.2	37.6	7.4	45.0
9/15/2024	2.1	42.5	11.1	23.7	10.1	37.7	7.2	44.9
9/16/2024	2.1	41.7	10.3	22.9	10.8	36.8	7.2	44.0
9/17/2024	2.6	44.3	10.8	23.7	12.6	37.6	9.5	47.1
9/18/2024	2.9	45.8	12.6	23.7	12.6	37.5	11.4	48.9
9/19/2024	3.3	45.7	12.9	23.7	12.6	37.4	11.8	49.1
9/20/2024	3.3	43.2	11.0	23.7	12.0	37.3	9.3	46.7
9/21/2024	1.2	16.8	2.6	10.6	4.8	16.6	1.5	18.1
9/22/2024	0.0	38.0	6.1	23.7	8.4	33.8	4.3	38.1
9/23/2024	0.0	38.3	9.3	23.7	5.5	35.4	3.1	38.5
9/24/2024	0.0	28.8	9.3	19.7	0.0	28.9	0.1	29.0
9/25/2024	0.0	3.9	4.1	0.0	0.0	4.1	0.0	4.1
9/26/2024	1.5	11.7	4.5	5.3	3.4	10.6	2.6	13.2
9/27/2024	3.3	39.8	12.5	18.1	12.6	35.6	7.5	43.1
9/28/2024	3.2	45.4	12.4	23.7	12.6	38.9	9.7	48.7
9/29/2024	3.2	45.4	12.4	23.7	12.6	38.6	10.0	48.6
9/30/2024	3.3	38.1	12.6	23.7	5.3	37.2	4.4	41.6
Average	**2.1**	**39.0**	**10.0**	**21.5**	**9.7**	**34.5**	**6.7**	**41.2**
Minimum	**0.0**	**3.9**	**2.6**	**0.0**	**0.0**	**4.1**	**0.0**	**4.1**
Maximum	**3.3**	**45.8**	**12.9**	**23.7**	**12.6**	**38.9**	**11.8**	**49.1**

Notes:

L/s Litres per second
[1] The ECA requires that the influent flow rate to the on-Site Treatment System be less than 5 L/s.
[2] The ECA requires that the influent flow rate to the off-Site Treatment System be less than 87.2 L/s.
[3] The ECA requires that the influent flow rate to the Ammonia Treatment System be less than 46 L/s.
[4] The ECA requires that the monthly average effluent discharge flow rate be less than 92.2 L/s.

Table A.4

Supplementary Sample Analytical Results
September 2024
LANXESS Canada Co./Cie
Elmira, Ontario

Sample Location:	**UA500I**	**UA500CE**	**UA560I**	**UA560CE**	**GCI**	**GCE**
Sample Date:	**9/3/2024**	**9/3/2024**	**9/3/2024**	**9/3/2024**	**9/3/2024**	**9/3/2024**
Parameter [µg/L]						
Volatile Organic Compounds (VOCs)						
Benzene	22.8	1.96	25.6	ND(0.20)	9.8	ND(0.20)
Chlorobenzene	1130	45.1	646	ND(0.20)	1520	33.6
1,1-Dichloroethane	ND(0.20)	ND(0.20)	ND(0.20)	ND(0.20)	ND(0.20)	ND(0.20)
Ethylbenzene	109	3.98	66.3	ND(0.20)	17.6	ND(0.20)
Toluene	10100	404	12400	0.51	135	0.77
m/p-Xylenes [1]	199	6.35	143	ND(0.40)	10.9	ND(0.40)
o-Xylene [1]	129	4.69	93.9	ND(0.20)	9.62	ND(0.20)
Base/Neutral and Acid Extractable Compounds (BNAs)						
Aniline	2010	193	2960	ND(2.0)	75.2	ND(2.0)
Benzothiazole	1400	65.5	31.8	ND(2.0)	97.2	ND(2.0)
Carboxin (Oxathiin)	2000	98.5	1580	ND(0.100)	98.2	0.219
2-Chlorophenol	17.5	1.16	0.42	ND(0.30)	5.01	ND(0.30)
2-Mercaptobenzothiazole	3300	128	ND(50)	ND(20)	232	ND(20)
2,4-Dichlorophenol	86.3 J+	3.98 J+	0.42	ND(0.20)	0.34	ND(0.20)
2,6-Dichlorophenol	9.55	0.62	0.26	ND(0.20)	0.24	ND(0.20)
2,4,5-Trichlorophenol	36.3	1.39	ND(0.20)	ND(0.20)	ND(0.20)	ND(0.20)
2,4,6-Trichlorophenol	11.3	0.69	ND(0.20)	ND(0.20)	ND(0.20)	ND(0.20)

Notes:

UA500I	Influent to the installed UA500R portable carbon drum.
UA500CE	Effluent from the installed UA500R portable carbon drum.
UA560I	Influent to the installed UA560 portable carbon drum.
UA560CE	Effluent from the installed UA560 portable carbon drum.
GCI	Carbon Tower Influent.
GCE	Carbon Tower Effluent.
ND(RDL)	Not detected at the associated reporting detection limit.
J+	The result is an estimated quantity, but the result may be biased high.
[1]	Samples analyzed for m,p-Xylenes and o-Xylene only.
	No separate analysis for Total Xylenes.

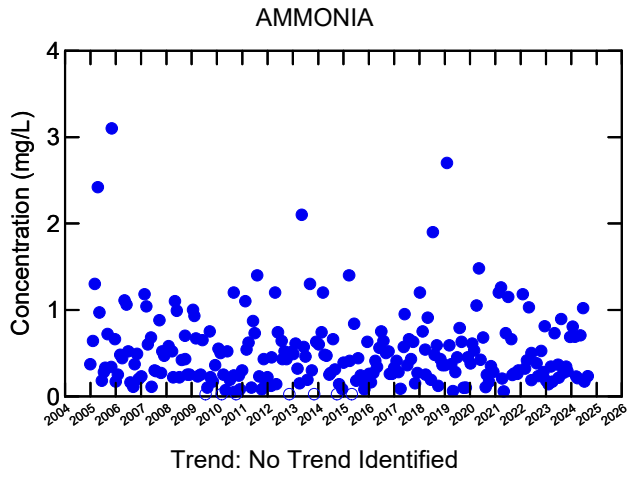
Table A.5

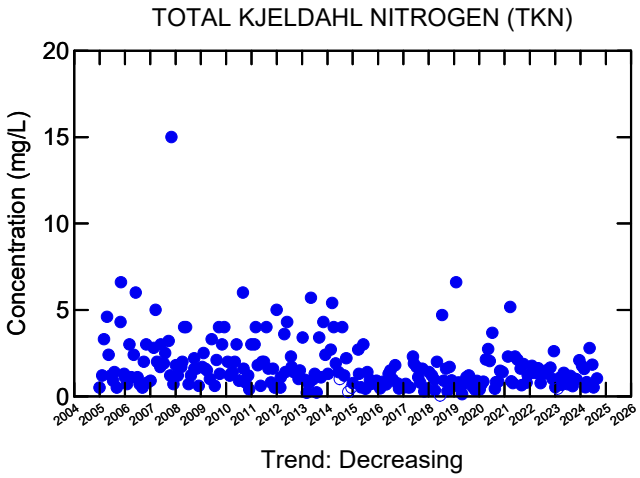
Maintenance Summary
On-Site and Off-Site Groundwater Collection and Treatment System
September 2024
LANXESS Canada Co./Cie
Elmira, Ontario

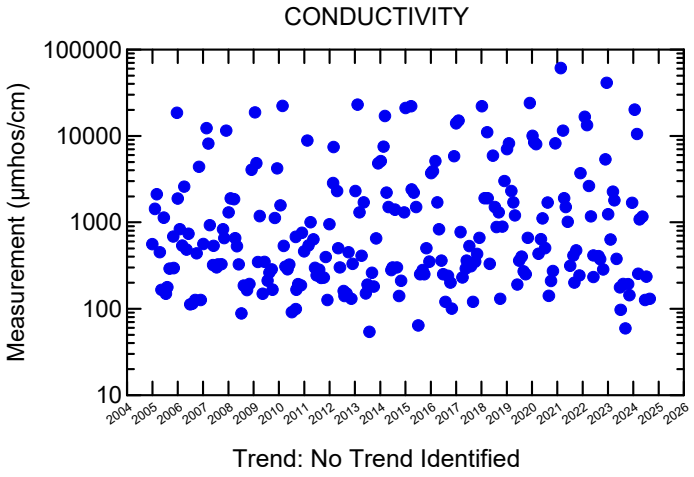
Start Date	Description	Work Type
09/03/2024	Check 44-PG-201 (44PM-45) - UA+500 Carbon System Pressure	Instrumentation
09/03/2024	Check 44-PG-202 (44PM-45) - UA+560 Carbon System Pressure	Instrumentation
09/03/2024	Check 62-PG-204 (62PM-23) - North Clarifier RAS Pump Pressure Guage	Instrumentation
09/03/2024	Check 62-PG-205 (62PM-23) - South Clarifier RAS Pump Pressure Guage	Instrumentation
09/03/2024	Check 62-PG-206 (62PM-23) - North Aeration Pump Pressure	Instrumentation
09/03/2024	Check 62-PG-201 (62PM-23) - South Aeration Pump Pressure	Instrumentation
09/04/2024	Check/Replace Bearings on North Aeration Pump	Mechanical
09/05/2024	Check 62-AIT-901 (62PM-13) - Nitrification Tank pH	Instrumentation
09/05/2024	Check 62-AIT-904 (62-ICP-904) - Nitrification Tank Dissolved O2	Instrumentation
09/05/2024	Check 62-AIT-790 (62PM-26) - Creek Water pH Transmitter	Instrumentation
09/05/2024	Rayox A Wipers #4 & #6 Sticking	Electrical
09/18/2024	Check 20-LT-322B (20PM-059) - W6B Well Level Transmitter	Instrumentation
09/18/2024	E7/E9 Rayox B Shutting Down on Pressure	Electrical
09/18/2024	Check 62-AIT-841 (62PM-02) - Nitrification Tank Anoxic pH	Instrumentation
09/18/2024	Check 62-AIT-844 (62PM-01) - Nitrification Tank Dissolved O2	Instrumentation
09/18/2024	Check 62-AIT-842 (62PM-10) - Nitrification Tank Anoxic ORP	Instrumentation
09/18/2024	Check 62-AIT-843 (62PM-04) - Nitrification Tank Aeration pH	Instrumentation
09/18/2024	Check 44-LT-302 (44PM-55) - W8 Well Level Transmitter	Instrumentation
09/18/2024	Check 44-LT-312 (44PM-056) - W9 Well Level Transmitter	Instrumentation
09/24/2024	Add Camlock Fitting to Bldg. #44D Backwash Tank Sump Line	Piping
09/25/2024	Open Bldg. #20A Rayox Feed Tank For Cleaning	Mechanical
09/30/2024	Check 62-TT-790 (62PM-25) - Creek Water pH Transmitter	Instrumentation

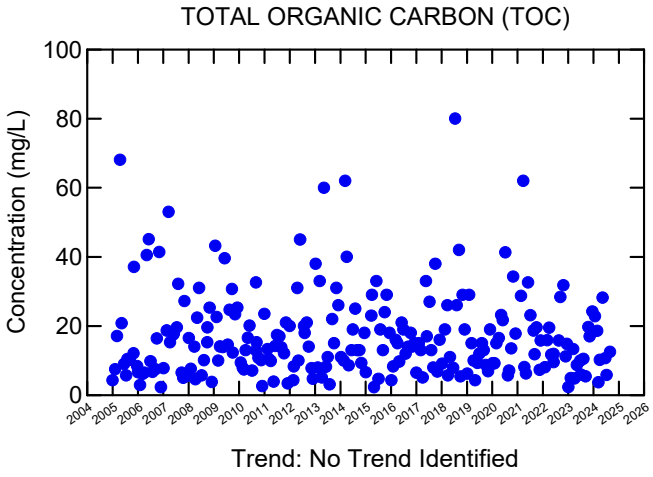
Attachment B

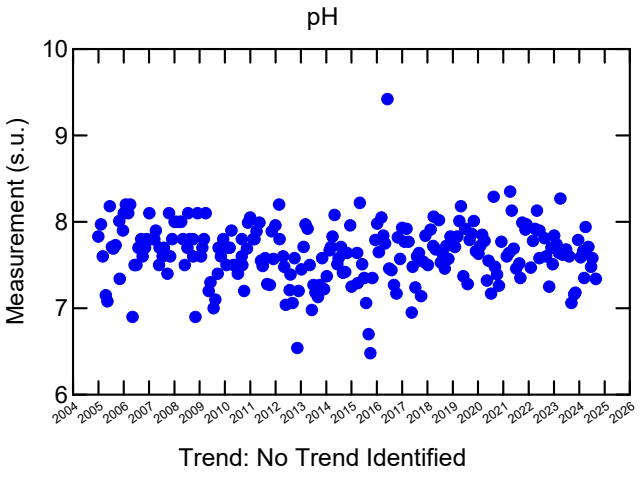
EAB Data











Legend:

- Detected Result
- Non-detect (plotted at one half the detection limit)

Notes:

Any detection limits elevated above target detection limit and/or detected values were not included in the trend analysis.

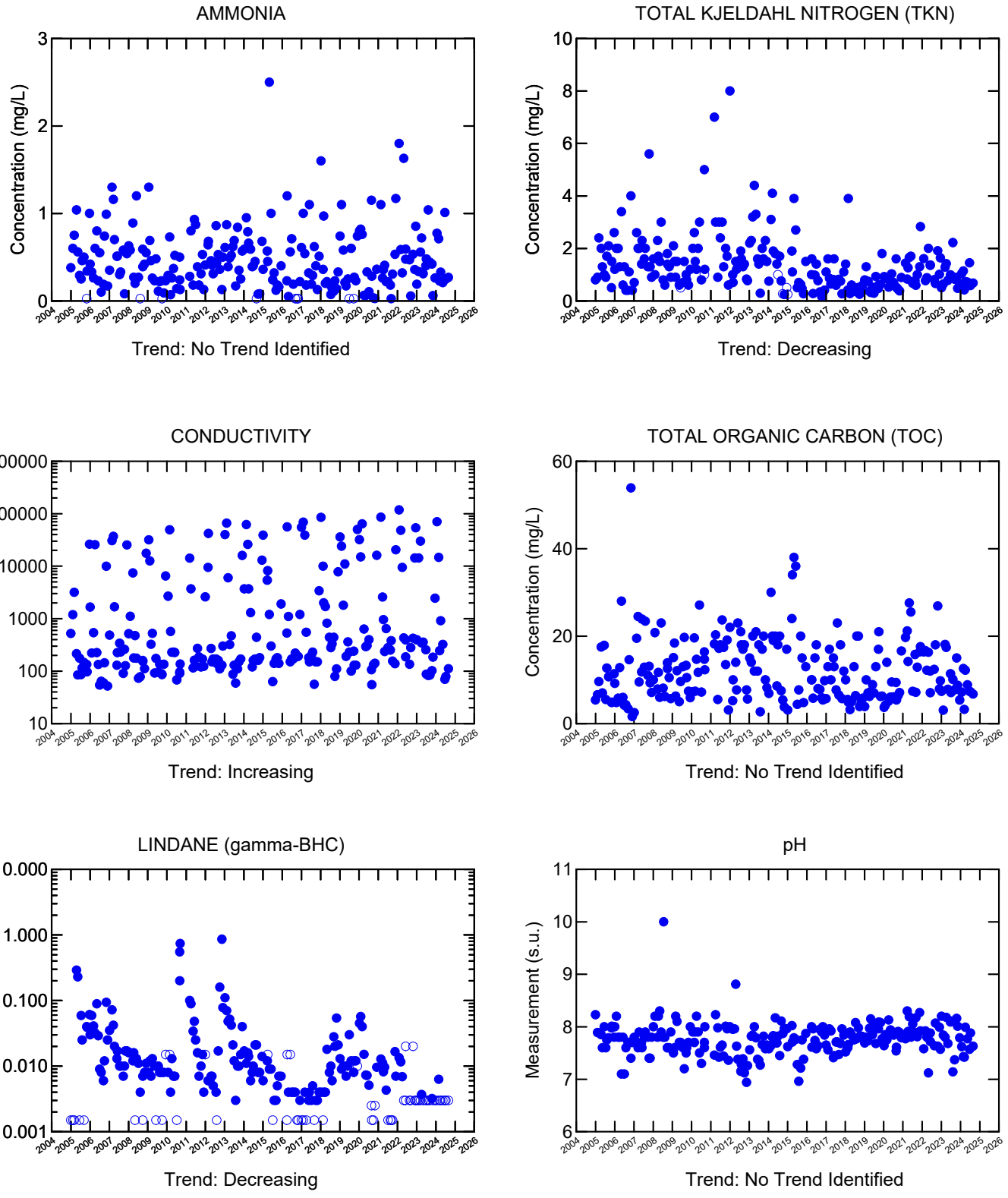
No Trend: trend analysis did not detect a significant trend above 95 percent confidence.

LANXESS Canada Co./Cie
Elmira, Ontario

ANALYTE CONCENTRATION vs. TIME
STORM WATER OUTFALL 0200

Project No. **11192137-38**
Date: **Oct 3, 2024**

FIGURE B.1



Legend:

- Detected Result
- Non-detect (plotted at one half the detection limit)

Notes:

Any detection limits elevated above target detection limit and/or detected values were not included in the trend analysis.

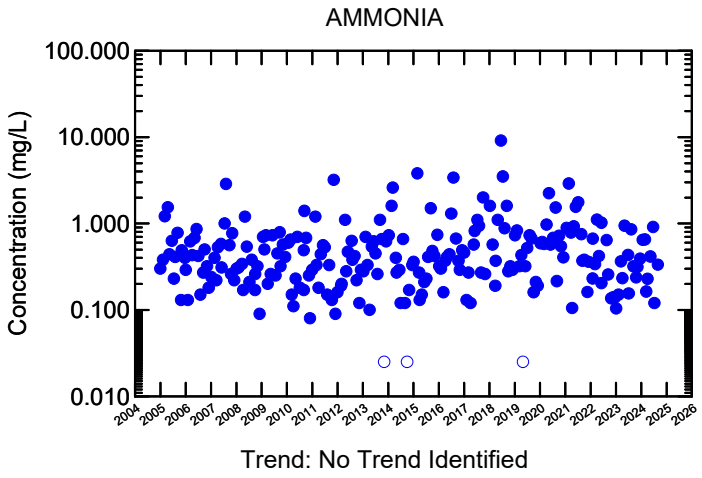
No Trend: trend analysis did not detect a significant trend above 95 percent confidence.

LANXESS Canada Co./Cie
Elmira, Ontario

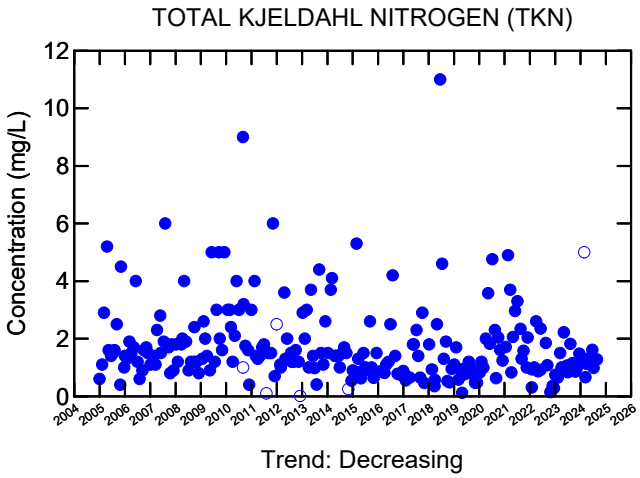
ANALYTE CONCENTRATION vs. TIME
STORM WATER OUTFALL 0400

Project No. **11192137-38**
Date: **Oct 3, 2024**

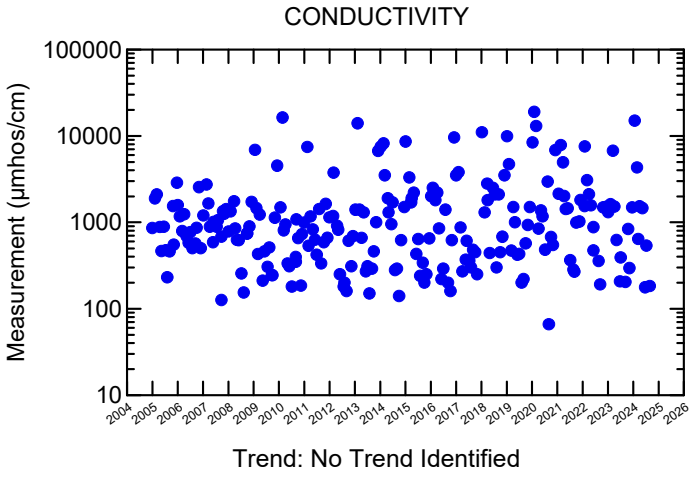
FIGURE B.2



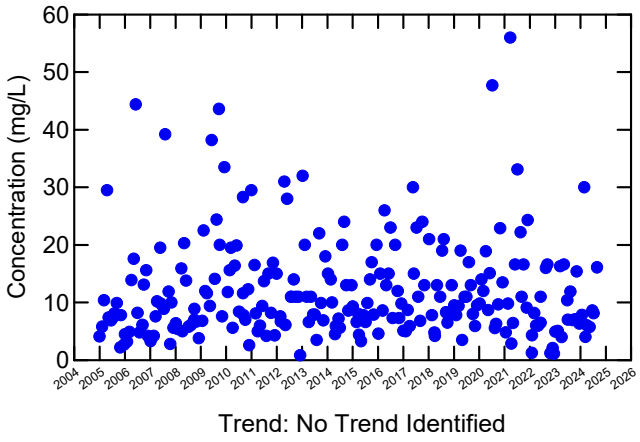
Trend: No Trend Identified



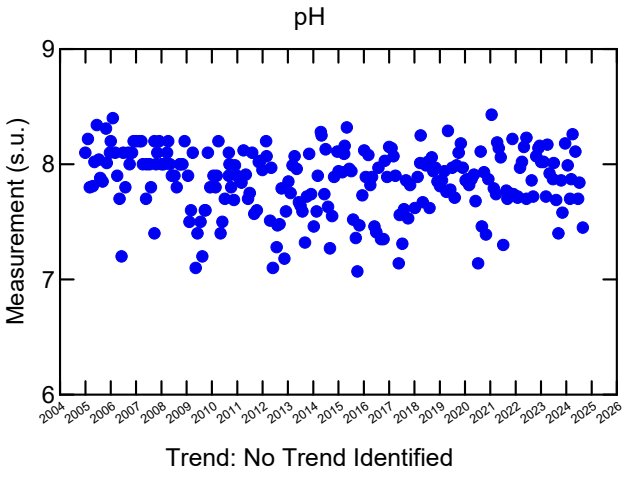
Trend: Decreasing



Trend: No Trend Identified



Trend: No Trend Identified



Trend: No Trend Identified

Legend:

- Detected Result
- Non-detect (plotted at one half the detection limit)

Notes:

Any detection limits elevated above target detection limit and/or detected values were not included in the trend analysis.

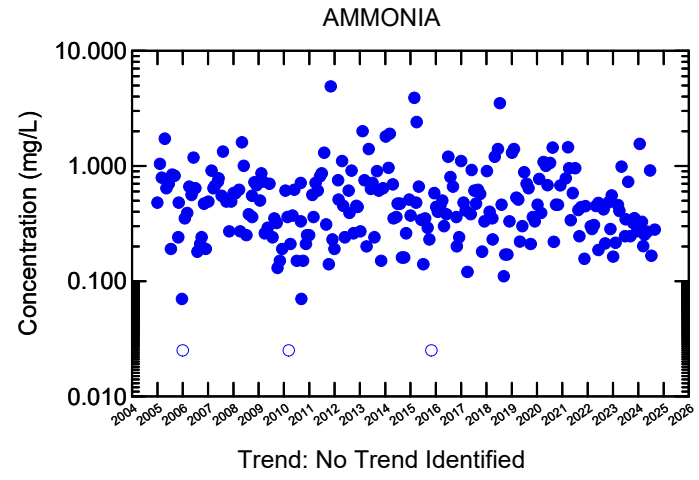
No Trend: trend analysis did not detect a significant trend above 95 percent confidence.

LANXESS Canada Co./Cie
Elmira, Ontario

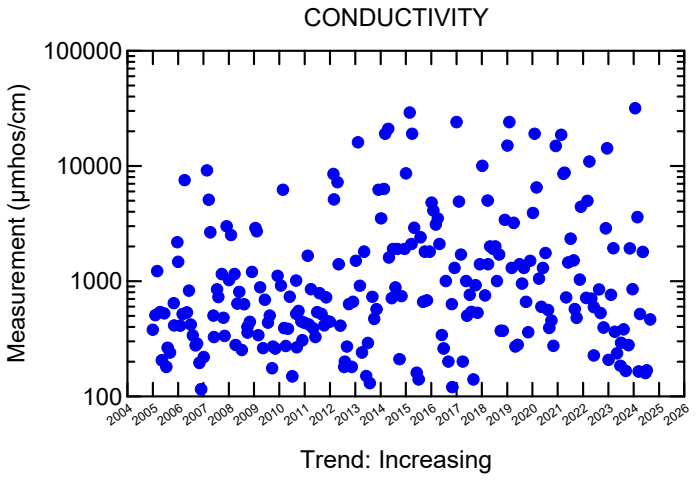
ANALYTE CONCENTRATION vs. TIME
STORM WATER OUTFALL 0800

Project No. **11192137-38**
Date: **Oct 3, 2024**

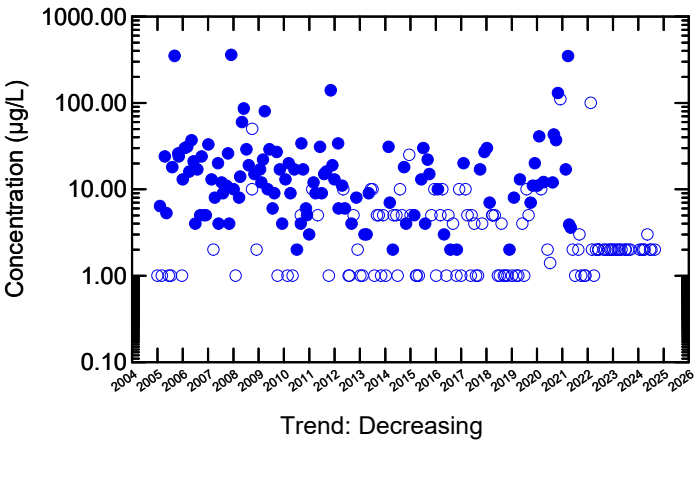
FIGURE B.3



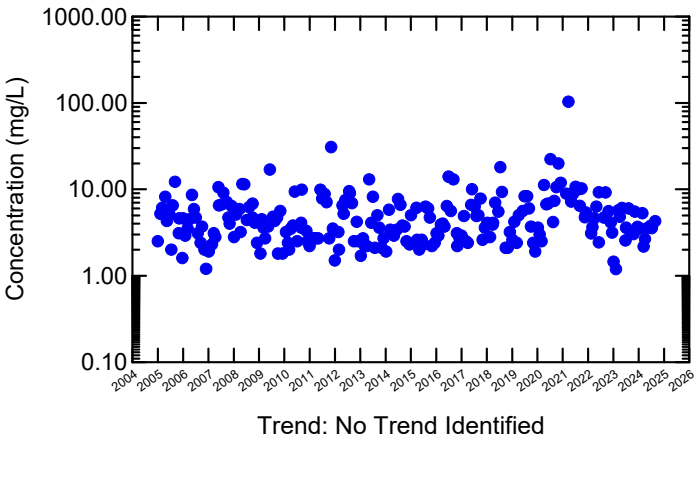
Trend: No Trend Identified



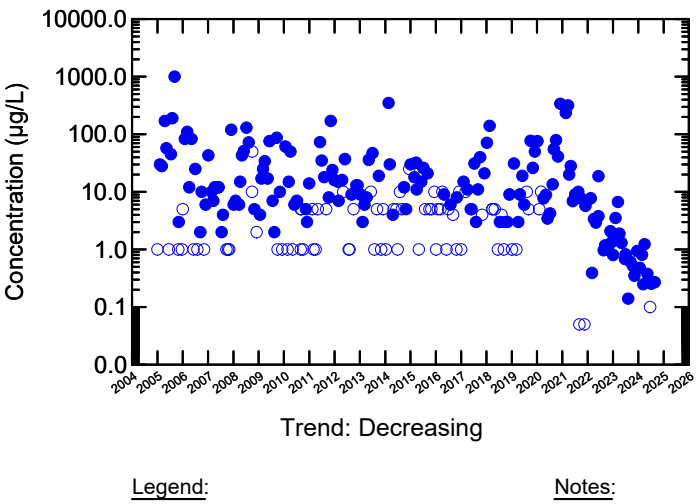
Trend: Increasing



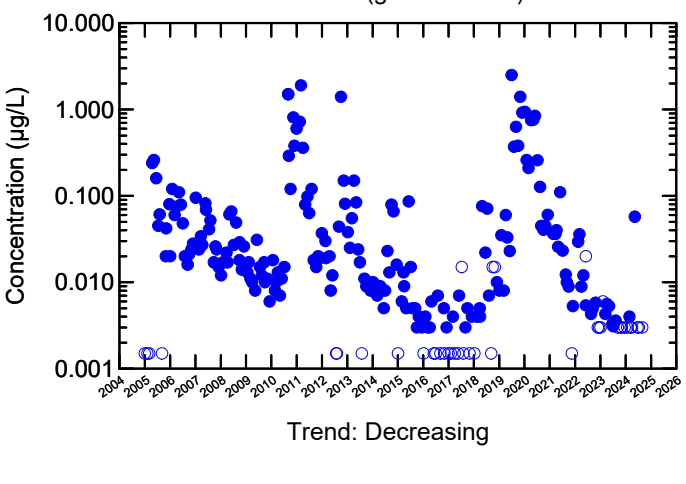
Trend: Decreasing



Trend: No Trend Identified



Trend: Decreasing



Trend: Decreasing

Legend:

- Detected Result
- Non-detect (plotted at one half the detection limit)

Notes:

Any detection limits elevated above target detection limit and/or detected values were not included in the trend analysis.

No Trend: trend analysis did not detect a significant trend above 95 percent confidence.

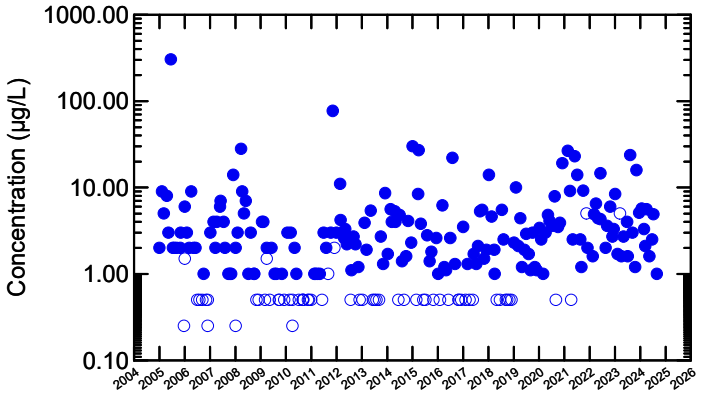
LANXESS Canada Co./Cie
Elmira, Ontario

ANALYTE CONCENTRATION vs. TIME
STORM WATER SEWER

Project No. **11192137-38**
Date: **Oct 3, 2024**

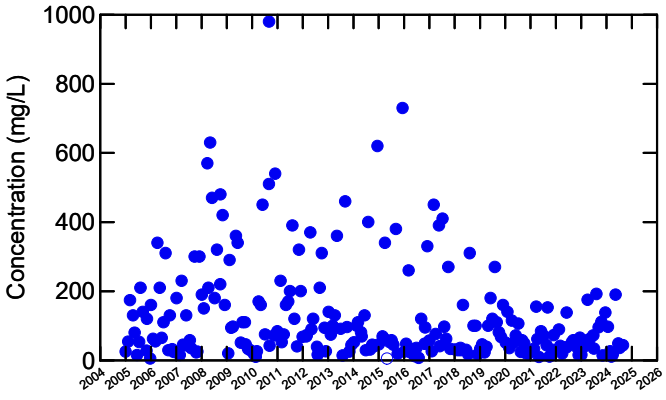
FIGURE B.4

PHENOLICS (TOTAL)



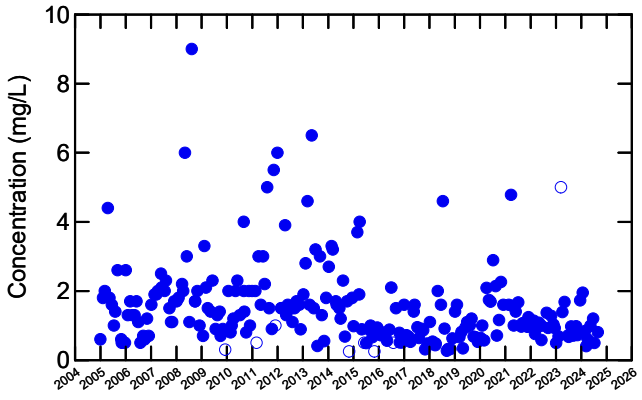
Trend: Increasing

TOTAL SUSPENDED SOLIDS (TSS)



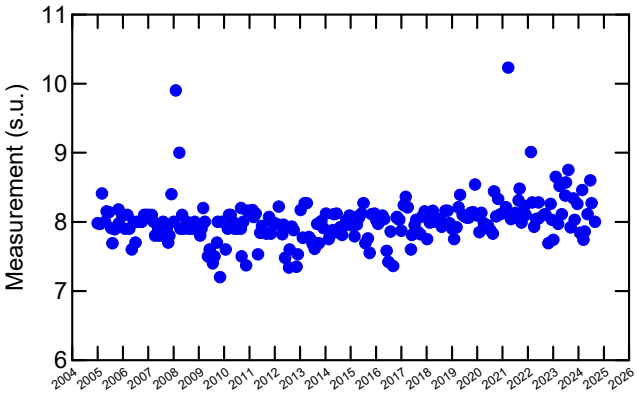
Trend: Decreasing

TOTAL KJELDAHL NITROGEN (TKN)



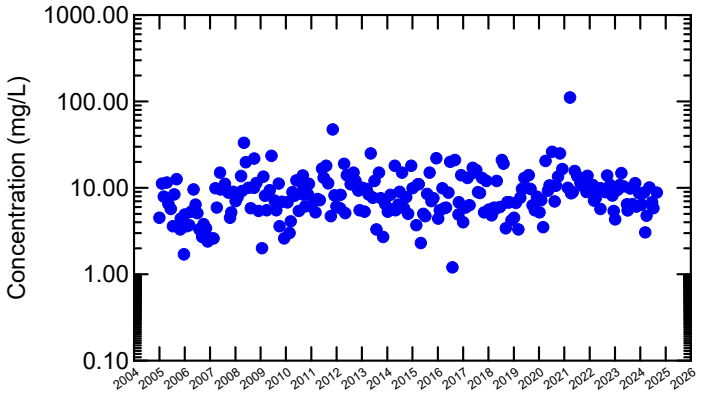
Trend: Decreasing

pH



Trend: Increasing

TOTAL ORGANIC CARBON (TOC)



Trend: Increasing

Legend:

- Detected Result
- Non-detect (plotted at one half the detection limit)

Notes:

Any detection limits elevated above target detection limit and/or detected values were not included in the trend analysis.

No Trend: trend analysis did not detect a significant trend above 95 percent confidence.

LANXESS Canada Co./Cie
Elmira, Ontario

ANALYTE CONCENTRATION vs. TIME
STORM WATER SEWER

Project No. **11192137-38**
Date: **Oct 3, 2024**

FIGURE B.5

Table B.1

Environmental Appeal Board (EAB)
Analytical Results - August 2024
LANXESS Canada Co./Cie
Elmira, Ontario

Sample Location:		**Storm Water Sewer**	**Storm Water Outfall 0200**	**Storm Water Outfall 0400**	**Storm Water Outfall 0800**
Sample ID:		**SWS 083024**	**0200 083024**	**0400 083024**	**0800 083024**
Sample Date:		**8/30/2024**	**8/30/2024**	**8/30/2024**	**8/30/2024**
Parameters	**Units**				
General Chemistry					
Ammonia-N	mg/L	0.280	0.233	0.268	0.334
Conductivity	umhos/cm	465	130	111	183
Cyanide (total)	mg/L	ND(0.0020)	0.0022	0.0034	0.0020
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.28 J	--	--	--
pH, lab	s.u.	8.00	7.34	7.63	7.45
Phenolics (total)	mg/L	0.0010	--	--	--
Sulfide	mg/L	0.043	0.024	ND(0.018)	0.021
Total kjeldahl nitrogen (TKN)	mg/L	0.807	1.03	0.679	1.28
Total organic carbon (TOC)	mg/L	8.83	12.5	6.74	16.1
Total suspended solids (TSS)	mg/L	43.7 J	--	--	--
Herbicides					
2,4,5-TP (Silvex)	µg/L	ND(0.500)	ND(0.500)	ND(0.500)	ND(0.500)
2,4-DB	µg/L	ND(0.500)	ND(0.500)	ND(0.500)	ND(0.500)
2,4-Dichlorophenoxyacetic acid (2,4-D)	µg/L	ND(0.500)	ND(0.500)	ND(0.500)	3.00
Pesticides					
gamma-BHC (lindane)	µg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Semi-Volatiles					
2-Mercaptobenzothiazole	µg/L	ND(20)	ND(20)	ND(20)	ND(20)
Aniline	µg/L	ND(2.0) UJ	ND(2.0) UJ	ND(2.0) UJ	ND(2.0) UJ
Benzothiazole	µg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Carboxin	µg/L	0.270	ND(0.100)	ND(0.100)	ND(0.100)
N-Nitrosodiethylamine	µg/L	ND(0.06) UJ	ND(0.06) UJ	ND(0.06) UJ	ND(0.06) UJ
N-Nitrosodimethylamine	µg/L	ND(0.01) UJ	ND(0.01) UJ	ND(0.01) UJ	ND(0.01) UJ
N-Nitrosodi-n-butylamine	µg/L	ND(0.06) UJ	ND(0.06) UJ	ND(0.06) UJ	ND(0.06) UJ
N-Nitrosodiphenylamine	µg/L	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
N-Nitrosodiphenylamine + Diphenylamine	µg/L	ND(0.40)	ND(0.40)	ND(0.40)	ND(0.40)
Nitrosomorpholine	µg/L	ND(0.06) UJ	ND(0.06) UJ	ND(0.06) UJ	ND(0.06) UJ
Volatiles					
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND(20)	ND(20)	ND(20)	ND(20)
Ethylbenzene	µg/L	ND(0.20)	ND(0.20)	0.20	ND(0.20)
m&p-Xylenes	µg/L	ND(0.40)	ND(0.40)	0.99	ND(0.40)
o-Xylene	µg/L	ND(0.20)	ND(0.20)	0.46	ND(0.20)
Toluene	µg/L	ND(0.20)	ND(0.20)	ND(0.20)	0.31
Misc					
Oil and grease	mg/L	ND(5.0)	--	--	--

Notes:

ND(RDL)	Not detected at the associated reporting detection limit.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
--	The parameter was not analyzed for.

Attachment C

Analytical Results
Off-Site Routine Groundwater Monitoring Program

Table C.1

2024 Off-Site Routine Groundwater Monitoring
August 2024 Analytical Results
LANXESS Canada Co./Cie
Elmira, Ontario

Sample Location:		**OW15d**	**OW15i**	**OW16d**	**OW16i**
Sample ID:		**GW-4432-081924-AB-035**	**GW-4432-081924-AB-036**	**GW-4432-081924-AB-037**	**GW-4432-081924-AB-038**
Sample Date:		**8/19/2024**	**8/19/2024**	**8/19/2024**	**8/19/2024**
Sample Type:		**Original**	**Original**	**Original**	**Original**
Parameters	**Units**				
Field Parameters					
Conductivity	mS/cm	1.69	0.783	1.79	1.86
pH	s.u.	7.39	7.64	7.64	7.60
Temperature	Deg C	10.34	10.18	10.89	10.64
Turbidity	NTU	60.5	11.2	>1000	46.2
Semi-Volatiles					
n-Nitrosodimethylamine (NDMA)	µg/L	ND(0.00360)	0.0307	ND(0.00270)	0.142
Volatiles					
Chlorobenzene	µg/L	--	--	ND(0.20)	--

Notes:

ND(RDL) Not detected at the associated reporting detection limit.
J+ The result is an estimated quantity, but the result may be biased high.
-- The parameter was not analyzed for.

2024 Off-Site Routine Groundwater Monitoring
August 2024 Analytical Results
LANXESS Canada Co./Cie
Elmira, Ontario

Sample Location:		**OW16i**	**OW69-13**	**OW174-48**	**OW175-21**
Sample ID:		**GW-4432-081924-AB-039**	**GW-4432-081924-AB-041**	**GW-4432-081224-AN-105**	**GW-4432-081224-AN-104**
Sample Date:		**8/19/2024**	**8/19/2024**	**8/12/2024**	**8/12/2024**
Sample Type:		**Field Duplicate**	**Original**	**Original**	**Original**
Parameters	**Units**				
Field Parameters					
Conductivity	mS/cm	1.86	0.885	1.05	0.747
pH	s.u.	7.60	7.94	7.39	7.51
Temperature	Deg C	10.64	12.79	14.64	12.28
Turbidity	NTU	46.2	3.2	130	29.8
Semi-Volatiles					
n-Nitrosodimethylamine (NDMA)	µg/L	0.150	0.0327	ND(0.00310)	ND(0.00390)
Volatiles					
Chlorobenzene	µg/L	--	--	--	--

Notes:

ND(RDL) Not detected at the associated reporting detection limit.
J+ The result is an estimated quantity, but the result may be biased high.
-- The parameter was not analyzed for.

2024 Off-Site Routine Groundwater Monitoring
August 2024 Analytical Results
LANXESS Canada Co./Cie
Elmira, Ontario

Sample Location:		**OW175-37**	**OW175-44**	**OW175-44**	**OW191-26**
Sample ID:		**GW-4432-081224-AN-103**	**GW-4432-081224-AN-100**	**GW-4432-081224-AN-101**	**GW-4432-081924-AB-034**
Sample Date:		**8/12/2024**	**8/12/2024**	**8/12/2024**	**8/19/2024**
Sample Type:		**Original**	**Original**	**Field Duplicate**	**Original**
Parameters	**Units**				
Field Parameters					
Conductivity	mS/cm	1.48	2.10	2.10	1.27
pH	s.u.	7.39	7.29	7.29	7.03
Temperature	Deg C	13.12	13.34	13.34	10.06
Turbidity	NTU	124	0.0	0.0	26.5
Semi-Volatiles					
n-Nitrosodimethylamine (NDMA)	µg/L	0.662 J+	0.130 J+	0.134 J+	ND(0.00360)
Volatiles					
Chlorobenzene	µg/L	--	--	--	--

Notes:

ND(RDL) Not detected at the associated reporting detection limit.
J+ The result is an estimated quantity, but the result may be biased high.
-- The parameter was not analyzed for.

Attachment D

Analytical Results
Creek Bank Groundwater Monitoring Program

Table D.1

2024 Creek Bank Groundwater Monitoring Program
September 2024 Analytical Data
LANXESS Canada Co./Cie
Elmira, Ontario

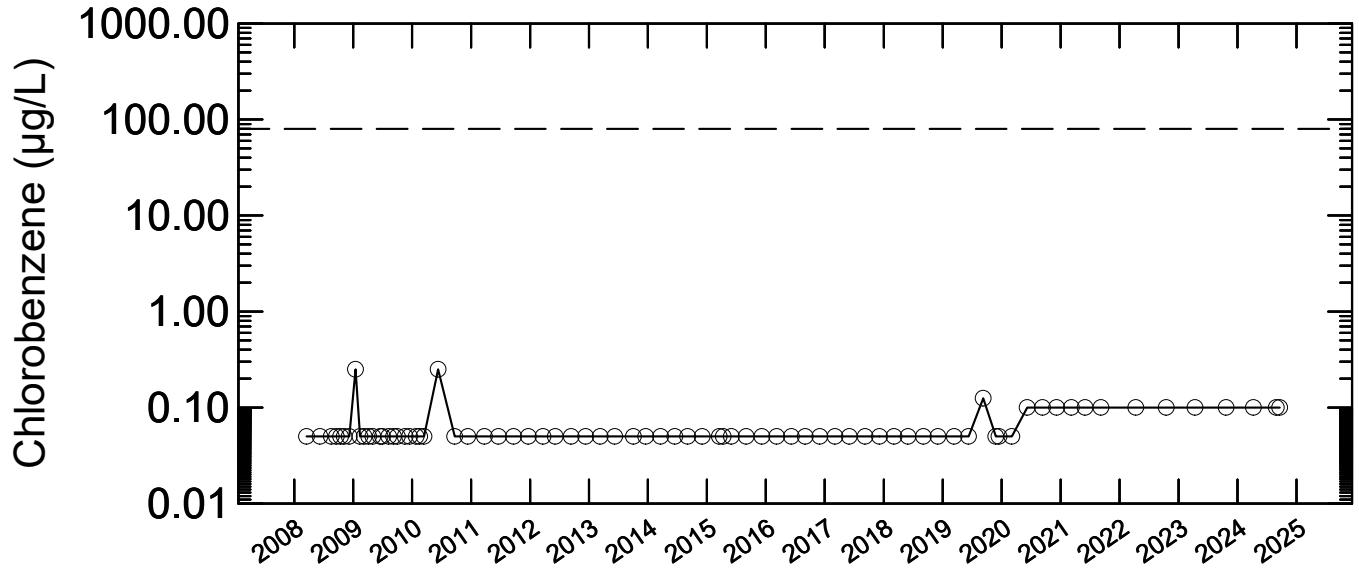
Sample Location:			**OW127-4**
Sample ID:		**Ontario**	**GW-5380-0905024-AB-001**
Sample Date:		**Table 8** [1]	**9/5/2024**
Sample Type:			**Original**
Parameters	**Units**		
Field Parameters			
Conductivity	mS/cm	-	6.68
Dissolved oxygen (DO)	mg/L	-	1.57
Oxidation reduction potential (ORP)	millivolts	-	-83
pH	s.u.	-	7.14
Temperature	Deg C	-	17.35
Turbidity	NTU	-	1.5
Volatiles			
Benzene	µg/L	5	3.74
Chlorobenzene	µg/L	30	32.1
Chloroform (Trichloromethane)	µg/L	2.4	ND(1.00)
1,2-Dichlorobenzene	µg/L	3	0.62
1,3-Dichlorobenzene	µg/L	59	ND(0.50)
1,4-Dichlorobenzene	µg/L	1	0.76
1,1-Dichloroethane	µg/L	5	ND(0.20)
1,2-Dichloroethane	µg/L	1.6	ND(0.50)
1,1-Dichloroethylene	µg/L	1.6	ND(0.50)
cis-1,2-Dichloroethylene	µg/L	1.6	ND(0.50)
trans-1,2-Dichloroethylene	µg/L	1.6	ND(0.50)
1,2-Dichloropropane	µg/L	5	ND(0.50)
Ethylbenzene	µg/L	2.4	ND(0.20)
1,1,1,2-Tetrachloroethane	µg/L	1.1	ND(0.50)
1,1,2,2-Tetrachloroethane	µg/L	1	ND(0.50)
Tetrachloroethylene	µg/L	1.6	ND(0.50)
Toluene	µg/L	22	ND(0.20)
1,1,1-Trichloroethane	µg/L	200	ND(0.50)
1,1,2-Trichloroethane	µg/L	4.7	ND(0.50)
Trichloroethylene	µg/L	1.6	ND(0.20)
Vinyl Chloride	µg/L	0.5	ND(0.50)
m&p-Xylenes	µg/L	300	ND(0.40)
o-Xylene	µg/L	300	ND(0.20)

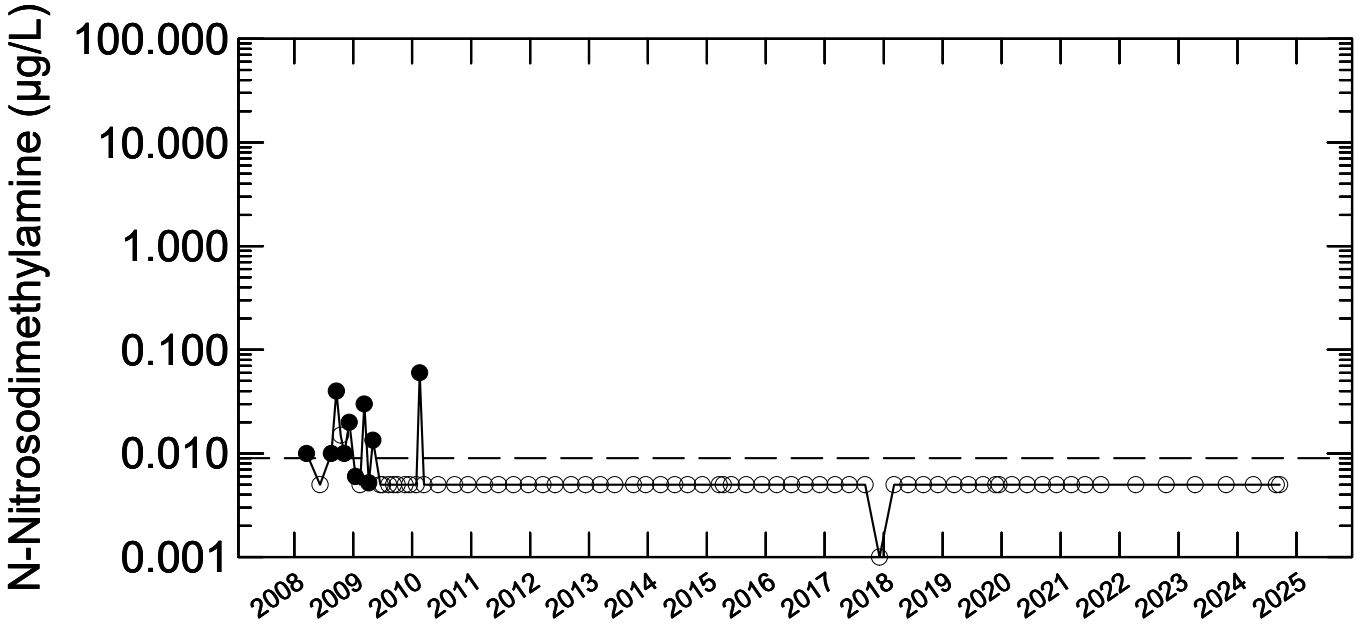
Note:

ND(RDL)	Not detected at the associated reporting detection limit.
[1]	Table 8 Generic Site Condition Standards for Use within 30 meters of a Water Body in a Potable Groundwater Condition . "Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario", Standards Development Branch, Ontario Ministry of the Environment, April 15, 2011.
-	No Table 8 Standard specified.
32.1	Concentration greater than associated Table 8 Standard.

Attachment E

Analytical Results
MU Sentry Well Monitoring Program





Legend:

● Detected Result

○ Non-detect

— — Ontario Drinking Water Standard

Note:

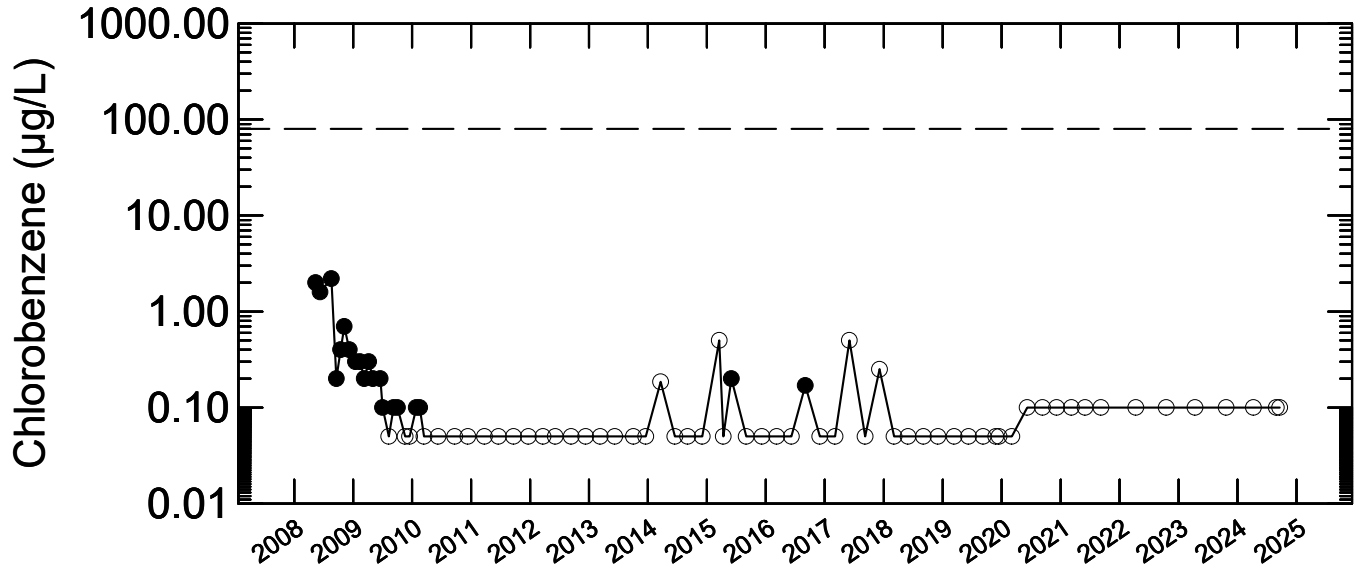
Non-detects are shown as one half the laboratory detection limit

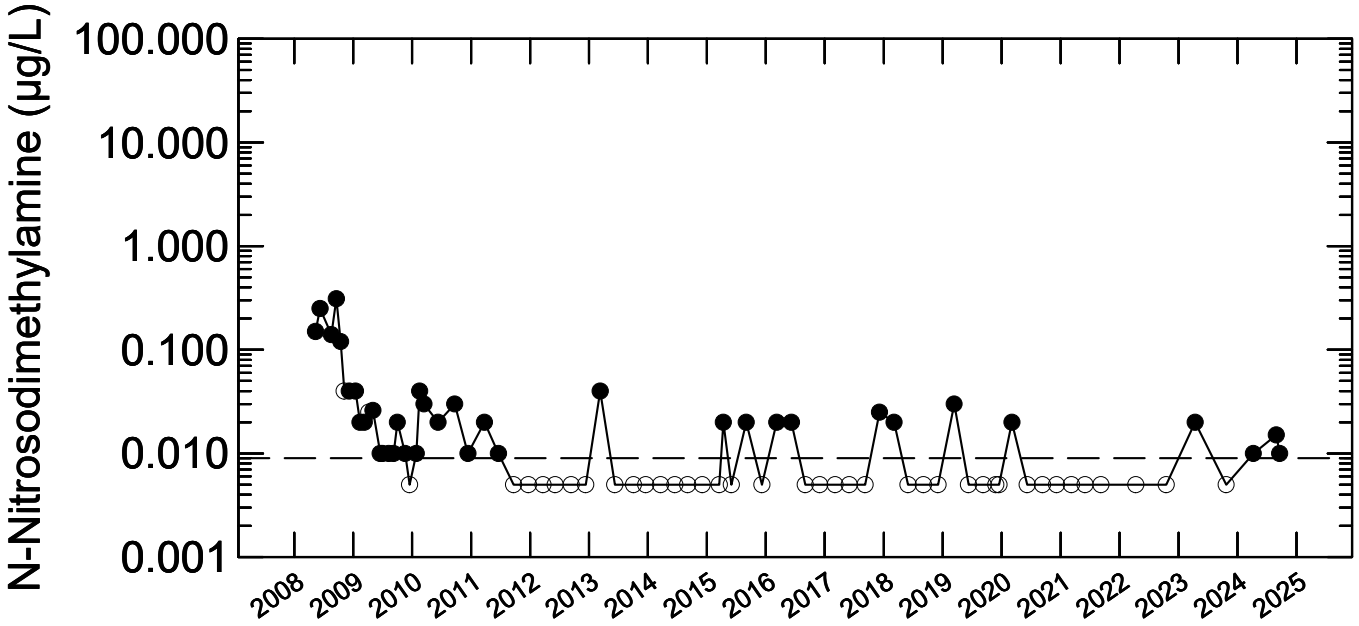
Evaluation of Groundwater Analytical Data
Lanxess Canada Co./Cie
Elmira, Ontario

Project No. **11192137**
Date: **Oct 1, 2024**

MU SENTRY WELL OW58-13

FIGURE E.1





Legend:

● Detected Result

○ Non-detect

— — Ontario Drinking Water Standard

Note:

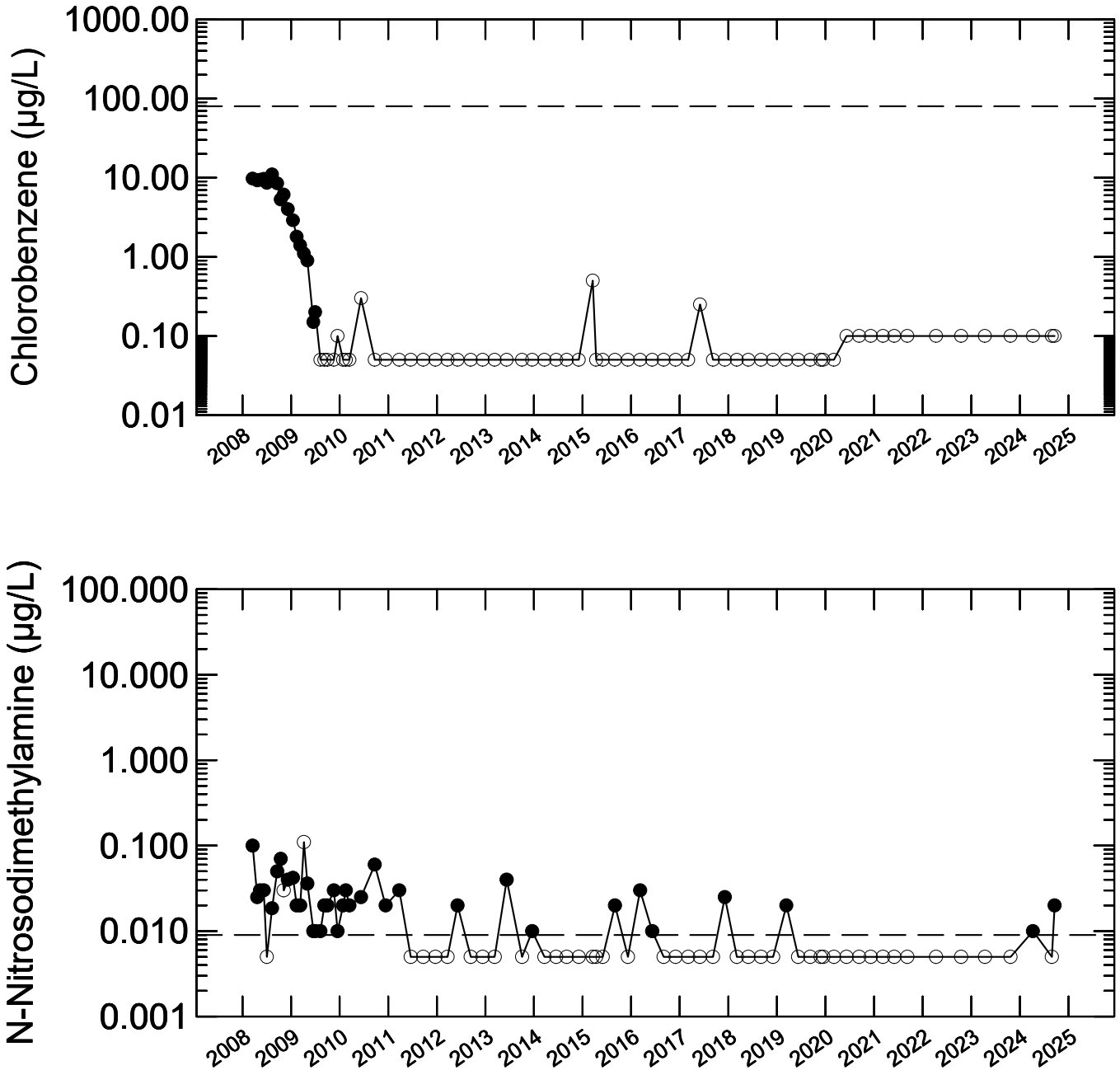
Non-detects are shown as one half the laboratory detection limit

Evaluation of Groundwater Analytical Data
Lanxess Canada Co./Cie
Elmira, Ontario

Project No. **11192137**
Date: **Oct 1, 2024**

MU SENTRY WELL OW165-17

FIGURE E.2



Legend:

● Detected Result

○ Non-detect

— — Ontario Drinking Water Standard

Note:

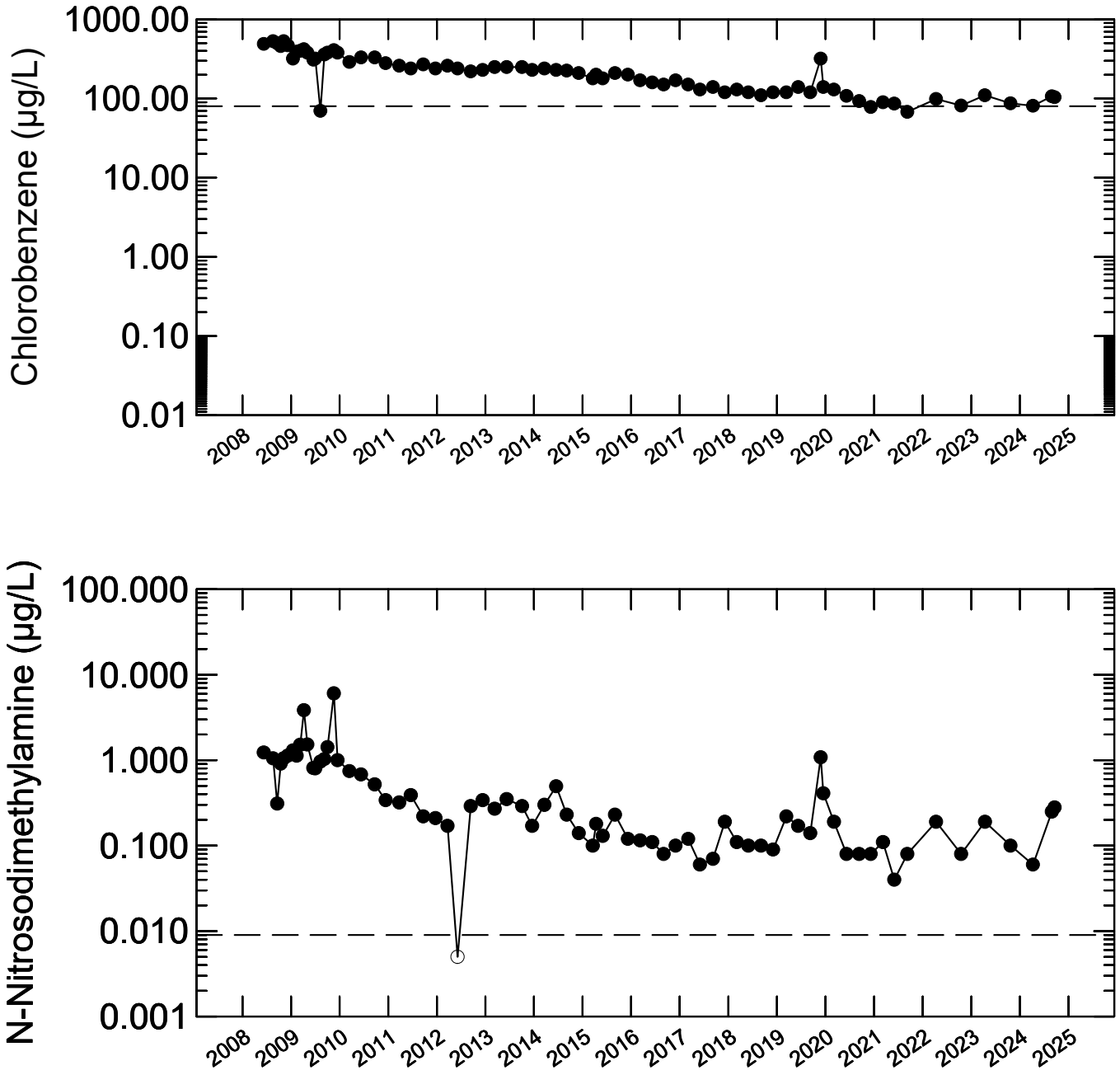
Non-detects are shown as one half the laboratory detection limit

Evaluation of Groundwater Analytical Data
Lanxess Canada Co./Cie
Elmira, Ontario

Project No. **11192137**
Date: **Oct 1, 2024**

MU SENTRY WELL CH-89B

FIGURE E.3



Legend:

● Detected Result

○ Non-detect

— — Ontario Drinking Water Standard

Note:

Non-detects are shown as one half the laboratory detection limit

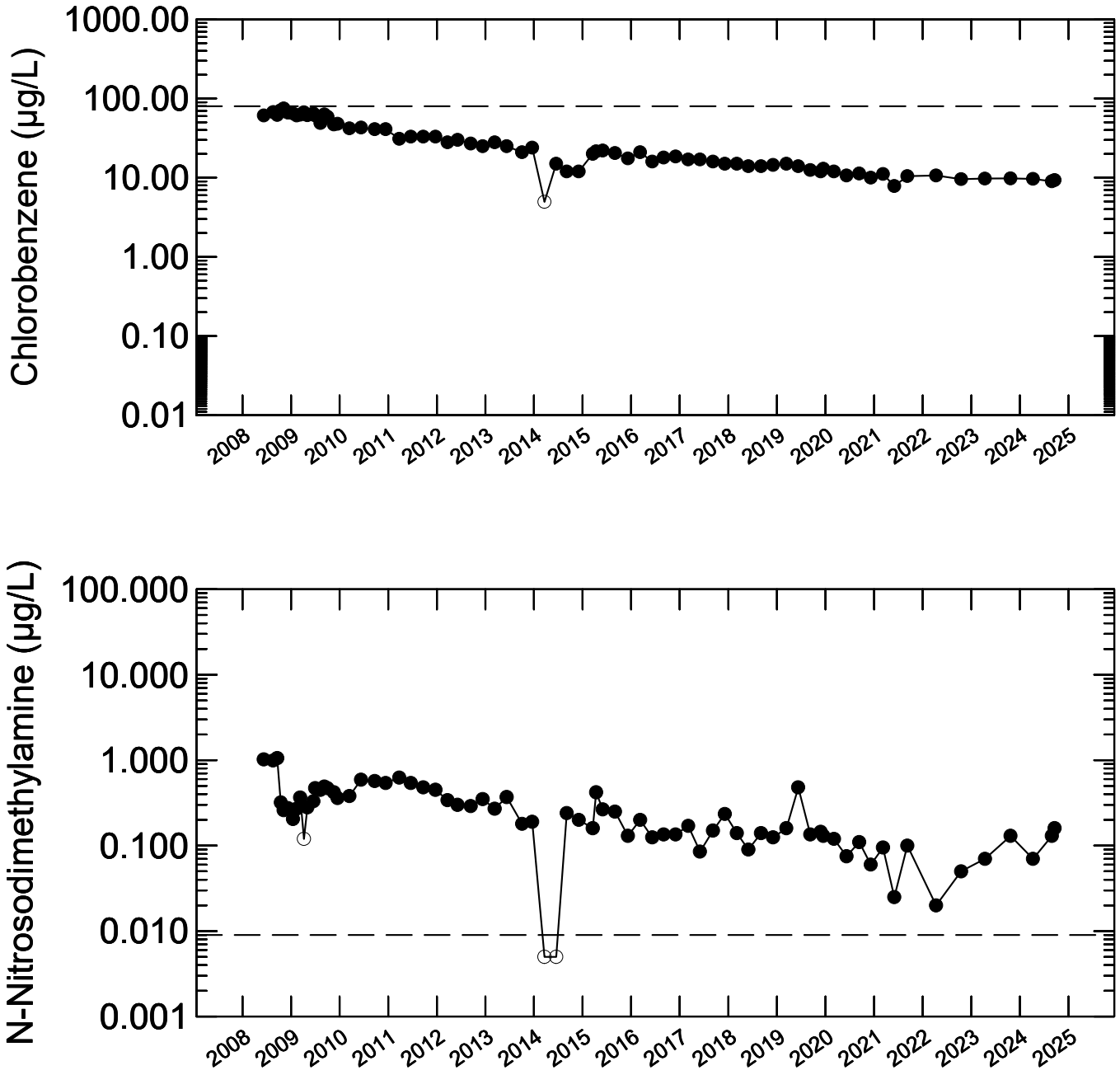
GHD

Evaluation of Groundwater Analytical Data
Lanxess Canada Co./Cie
Elmira, Ontario

Project No. **11192137**
Date: **Oct 1, 2024**

MU SENTRY WELL CH-47E

FIGURE E.4



Legend:

● Detected Result

○ Non-detect

— — Ontario Drinking Water Standard

Note:

Non-detects are shown as one half the laboratory detection limit

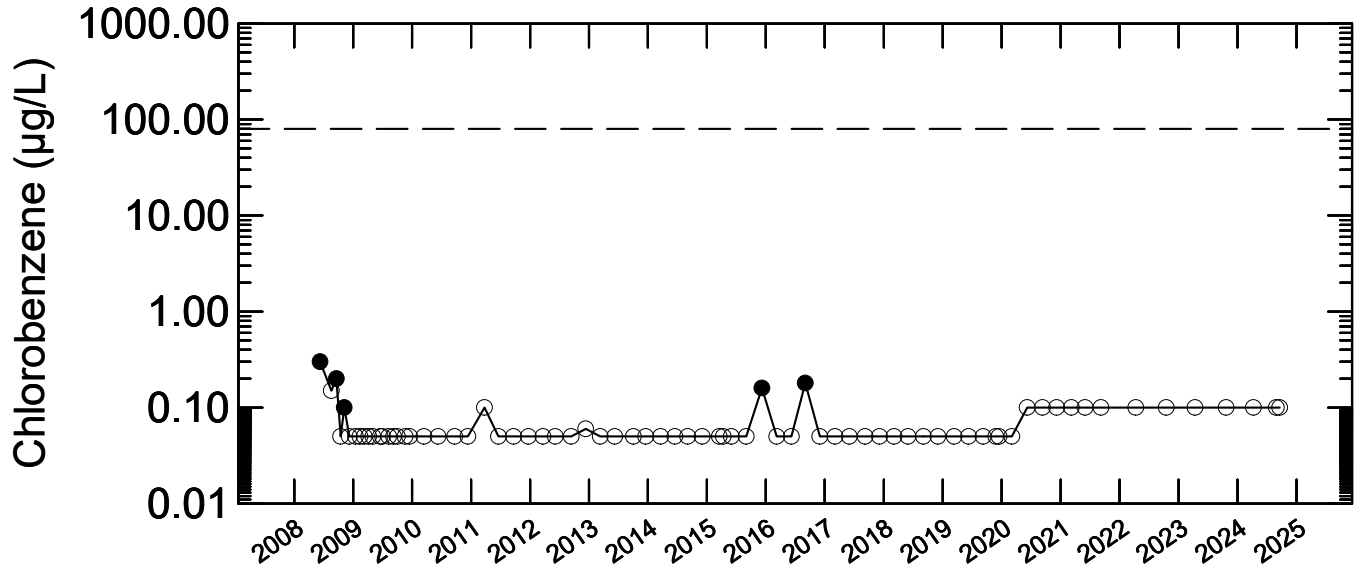
GHD

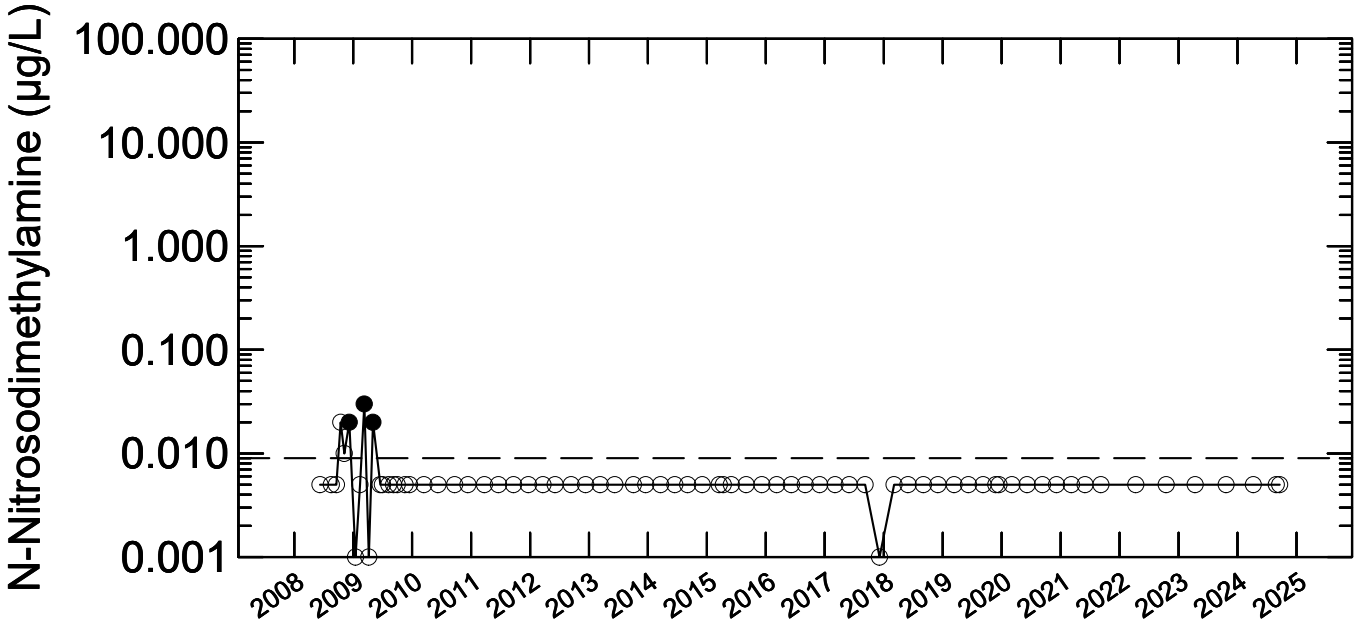
Evaluation of Groundwater Analytical Data
Lanxess Canada Co./Cie
Elmira, Ontario

Project No. **11192137**
Date: **Oct 1, 2024**

MU SENTRY WELL CH-56B

FIGURE E.5





Legend:

● Detected Result

○ Non-detect

— — Ontario Drinking Water Standard

Note:

Non-detects are shown as one half the laboratory detection limit

Evaluation of Groundwater Analytical Data
Lanxess Canada Co./Cie
Elmira, Ontario

Project No. **11192137**
Date: **Oct 1, 2024**

MU SENTRY WELL CH-97B

FIGURE E.6

Table E.1

Sentry Well Analytical Results - Chlorobenzene
LANXESS Canada Co./Cie
Elmira, Ontario

	Sample Location[1][2]					
	OW58-13	OW165-17	CH-89B	CH-47E	CH-56B	CH-97B
Aquifer Designation	**MU**	**MU**	**MU**	**MU**	**MU**	**MU**
Sample Date						
6-Mar-17	ND (0.1)	ND (0.1)	ND (0.1)	150	17 / 17	ND (0.1)
2-Jun-17	ND (0.1)	ND (1.0)	ND (0.5)	130	17 / 17	ND (0.1)
8-Sep-17	ND (0.1)	ND (0.1)	ND (0.1)	140	16 / 16	ND (0.1)
6-Dec-17	ND (0.1)	ND (0.5)	ND (0.1)	120	15 / 15	ND (0.1)
6-Mar-18	ND (0.1)	ND (0.1)	ND (0.1)	130	15 / 15	ND (0.1)
1-Jun-18	ND (0.1)	ND (0.1)	ND (0.1)	120	14 / 14	ND (0.1)
4-Sep-18	ND (0.1)	ND (0.1)	ND (0.1)	110	14 / 14	ND (0.1)
3-Dec-18	ND (0.1)	ND (0.1)	ND (0.1)	120	14 / 15	ND (0.1)
13-Mar-19	ND (0.1)	ND (0.1)	ND (0.1)	120	15 / 15	ND (0.1)
10-Jun-19	ND (0.1)	ND (0.1)	ND (0.1)	140	14 / 14	ND (0.1)
9-Sep-19	ND (0.25)	ND (0.1)	ND (0.1)	120	13 / 12	ND (0.1)
26-Nov-19	ND (0.1)	ND (0.1)	ND (0.1)	320	12 / 12	ND (0.1)
16-Dec-19	ND (0.1)	ND (0.1)	ND (0.1)	140	13 / 13	ND (0.1)
15-Jan-20	--	--	--	140 / 140	--	--
5-Mar-20	ND (0.1)	ND (0.1)	ND (0.1)	130	12 / 12	ND (0.1)
8-Jun-20	ND (0.2)	ND (0.2)	ND (0.2)	108	10.5 / 10.8	ND (0.2)
11-Sep-20	ND (0.2)	ND (0.2)	ND (0.2)	92.7	11.3 / 11.2	ND (0.2)
7-Dec-20	ND (0.2)	ND (0.2)	ND (0.2)	78.0	10.2 / 9.82	ND (0.2)
9-Mar-21	ND (0.2)	ND (0.2)	ND (0.2)	89.7	11.0 / 11.3	ND (0.2)
2-Jun-21	ND (0.2)	ND (0.2)	ND (0.2)	86.3	7.97 / 7.75	ND (0.2)
8-Sep-21	ND (0.2)	ND (0.2)	ND (0.2)	67.8	9.88 / 11.1	ND (0.2)
12-Apr-22	ND (0.2)	ND (0.2)	ND (0.2)	98.8	10.7 / 10.6	ND (0.2)
17-Oct-22	ND (0.2)	ND (0.2)	ND (0.2)	81.4	9.52 / 9.66	ND (0.2)
14-Apr-23	ND (0.2)	ND (0.2)	ND (0.2)	110	9.74 / 9.76	ND (0.2)
23-Oct-23	ND (0.2)	ND (0.2)	ND (0.2)	87.0	9.82 / 9.77	ND (0.2)
9-Apr-24	ND (0.2)	ND (0.2)	ND (0.2)	80.9	9.76 / 9.55	ND (0.2)
29-Aug-24	ND (0.2)	ND (0.2)	ND (0.2)	107	9.03 / 9.00	ND (0.2)
19-Sep-24	ND (0.2)	ND (0.2)	ND (0.2)	104	9.26 / 9.38	ND (0.2)

Notes:

9.8 / 9.7	Result / Duplicate Result
ND(RDL)	Not detected (ND) at the associated reporting detection limit (RDL).
[1]	From March 2008 until March 2020, samples analysed by Bureau Veritas (formerly Maxxam Analytics Inc.) unless otherwise noted. From June 2020 onward, samples analyzed by ALS Canada Ltd, unless otherwise noted.
[2]	Sample results are in micrograms per litre (µg/L) unless otherwise noted.
--	The parameter was not analyzed for.

Table E.2

Sentry Well Analytical Results - NDMA
LANXESS Canada Co./Cie
Elmira, Ontario

	Sample Location[1][2]					
	OW58-13	**OW165-17**	**CH-89B**	**CH-47E**	**CH-56B**	**CH-97B**
Aquifer Designation	**MU**	**MU**	**MU**	**MU**	**MU**	**MU**
Sample Date						
6-Mar-17	ND (0.01)	ND (0.01)	ND (0.01)	0.12	0.19 / 0.15	ND (0.01)
2-Jun-17	ND (0.01)	ND (0.01)	ND (0.01)	0.06	0.08 / 0.09	ND (0.01)
8-Sep-17	ND (0.01)	ND (0.01)	ND (0.01)	0.07	0.10 J / 0.20 J	ND (0.01)
6-Dec-17	ND (0.002)[4]	0.025[4]	0.025[4]	0.19[4]	0.23[4] / 0.24[4]	ND (0.002)[4]
6-Mar-18	ND (0.01)	0.02	ND (0.01)	0.11	0.14 / 0.14	ND (0.01)
1-Jun-18	ND (0.01)	ND (0.01)	ND (0.01)	0.10	0.09 / 0.09	ND (0.01)
4-Sep-18	ND (0.01)	ND (0.01)	ND (0.01)	0.10	0.12 / 0.16	ND (0.01)
3-Dec-18	ND (0.01)	ND (0.01)	ND (0.01)	0.09	0.13 / 0.12	ND (0.01)
13-Mar-19	ND (0.01)	0.03	0.02	0.22	0.18 / 0.14	ND (0.01)
10-Jun-19	ND (0.01)	ND (0.01)	ND (0.01)	0.17	0.15 J / 0.81 J	ND (0.01)
9-Sep-19	ND (0.01)	ND (0.01)	ND (0.01)	0.14	0.14 / 0.13	ND (0.01)
26-Nov-19	ND (0.01)	ND (0.01)	ND (0.01)	1.08	0.14 / 0.15	ND (0.01)
16-Dec-19	ND (0.01)	ND (0.01)	ND (0.01)	0.41	0.12 / 0.14	ND (0.01)
15-Jan-20	--	--	--	0.36 / 0.36	--	--
5-Mar-20	ND (0.01)	0.02	ND (0.01)	0.19	0.12 / 0.12	ND (0.01)
8-Jun-20	ND (0.01)	ND (0.01)	ND (0.01)	0.08	0.08 / 0.07	ND (0.01)
11-Sep-20	ND (0.01)	ND (0.01)	ND (0.01)	0.08	0.11 / 0.11	ND (0.01)
7-Dec-20	ND (0.01)	ND (0.01)	ND (0.01)	0.08	0.06 / 0.06	ND (0.01)
9-Mar-21	ND (0.01)	ND (0.01)	ND (0.01)	0.11	0.09 / 0.10	ND (0.01)
2-Jun-21	ND (0.01)	ND (0.01)	ND (0.01)	0.04	0.03 / 0.02	ND (0.01)
8-Sep-21	ND (0.01)	ND (0.01)	ND (0.01)	0.08	0.10 / 0.10	ND (0.01)
12-Apr-22	ND (0.01)	ND (0.01)	ND (0.01)	0.19	0.02 / 0.02	ND (0.01)
17-Oct-22	ND (0.01)	ND (0.01)	ND (0.01)	0.08	0.05 / 0.05	ND (0.01)
14-Apr-23	ND (0.01)	0.02	ND (0.01)	0.19	0.08 / 0.06	ND (0.01)
23-Oct-23	ND (0.01)	ND (0.01)	ND (0.01)	0.10	0.13 / 0.13	ND (0.01)
9-Apr-24	ND (0.01)	0.01	0.01	0.06	0.07 / 0.07	ND (0.01)
29-Aug-24	ND (0.01)	0.0151[5]	ND (0.01)	0.25	0.14 / 0.12	ND (0.01)
19-Sep-24	ND (0.01)	0.01	0.02	0.28	0.16 / 0.16	ND (0.01)

Notes:

9.8 / 9.7	Result / Duplicate Result.
0.03 | 0.042	Result | Split Sample Result (different laboratories reporting).
ND(RDL)	Not detected (ND) at the associated reporting detection limit (RDL).
[1]	Samples analyzed by LANXESS Technology Centre, Ontario, unless otherwise noted.
[2]	Sample results are in micrograms per litre (µg/L) unless otherwise noted.
[3]	Split samples analyzed by Bureau Veritas (formerly Maxxam Analytics Inc.)
[4]	Samples analyzed by Bureau Veritas (formerly Maxxam Analytics Inc.)
[5]	Sample analyzed by ALS Canada Ltd.
--	The parameter was not analyzed for.
J	Estimated concentration.