Exhibit A Scope of Work
City of Aurora
Corrosion Control Treatment Optimization Study

CDM Smith's scope of work for the Corrosion Control Treatment Optimization Study (CCT) for the City of Aurora (City) is described herein. The scope of work is broken into eight main tasks.

Task 1: Project Quality Management/Kickoff Workshop and Data Collection

1.1 CDM Smith will conduct a Project Quality Management (PQM) and Kickoff Workshop, which is a formal requirement of CDM Smith's Quality Assurance (QA) Program. The PQM Workshop will focus on:

- Reviewing project objectives and setting goals
- Finalizing critical success factors
- Clarifying responsibilities for CDM Smith / City staff
- Identifying points of contacts
- Agreeing on a work plan and schedule that meets the City's objectives
- Anticipating project challenges and managing risks

1.2 CDM Smith will prepare a data collection memorandum that outlines the data and information request to effectively complete the Corrosion Control Study.

1.3 Task 1 Deliverable(s):

- Kickoff meeting agenda and minutes
- Data Collection Memorandum

Task 2: Operational and Existing Data Review

2.1 The purpose of this task is to collect, and review historic water quality data, reports, and other relevant materials. Once the information requested in Task 1 is provided by the City, CDM Smith will review to determine how it will be used in each of the subsequent tasks. Specific items to collect and review include:

- Plant operation data, including chemical addition and water quality targets
- Finished water quality data
- Distribution system water quality data in the system, including chlorine residual, pH, alkalinity, chloride, sulfate, aluminum, iron, and other metal data
- LCR data for last three rounds of sampling
- Available lead profile data at any homes – Provided in RFQ
- Other relevant water quality data information
- Water quality complaint data

2.2 As part of this task, CDM Smith will identify any data gaps requiring additional sampling to develop an understanding of existing water quality in the service area. Using the GIS data, water quality data, available model output for water age, complaint data, and other relevant information, a distribution

system assessment will be completed to understand distribution system water quality issues and potential sites that should be evaluated.

As part of Task 2.2, CDM Smith will review historical profile data and may recommend additional lead profile data be collected to better indicate the effectiveness of the existing corrosion control program. CDM Smith will review historic data and provide recommendations for additional sampling.

2.3 Corrosion Control Study Project Plan

As part of this task, CDM Smith will coordinate with the Illinois Environmental Protection Agency (IEPA) to develop an overall preliminary study approach that will begin with a desktop study. CDM Smith will discuss with the IEPA and document when partial system testing may be appropriate instead of pipe loop testing.

2.4 Task 2 Deliverable(s):

- Technical Memorandum summarizing CDM Smith's review of the systems' historical water treatment, corrosion control, operating practices, and analysis of LCR data
- Corrosion Control Study Project Plan meeting IEPA requirements
- Memorandum of Understanding (MOU) with IEPA for Corrosion Control Study Plan

Task 3: Perform Desk-Top Study Modeling

3.1 CDM Smith will use modeling software to assist in predicting corrosivity. The model can estimate theoretical lead and copper solubility and calculates the three major corrosion indices: Calcium Carbonate Precipitation Potential, Langelier Saturation Index, and Rynzar Stability Index. We will model orthophosphate doses ranging from 1 to 3 mg/l and a range of alkalinity/pH adjustments, in addition to the current corrosion control strategy.

To confirm the model considers the full range of water quality characteristics, CDM Smith will review the water quality data from Task 2 for seasonal or blending changes. Multiple model runs will be performed to evaluate the impact of the corrosion control changes on each unique water quality.

3.2 Task 3 Deliverable(s):

- Technical Memorandum documenting the desktop study, including brief description of each CCT option reviewed and its preliminary viability for the City.
- Recommendation for next steps for pipe loop or partial system testing

Task 4: Harvesting Lead Service Lines

4.1 CDM Smith will develop a lead pipe harvesting protocol. Our experience has shown that the effectiveness of a pipe loop experiment depends on the care and attention exercised in protecting scales on harvested lead pipe. Once lead service line removal sites are identified, CDM Smith will spend two days working with the City to collect the pipes using a step-by-step harvesting procedure to maintain the scale on existing pipes. CDM Smith will install harvested pipes within the pipe loop system for immediate conditioning.

CDM Smith has developed flyers and procedures to help utilities comply with the notification and filter requirements associated with partial and full lead service line replacement (LSLR) under Illinois's Lead

Service Line Replacement and Notification Act. CDM Smith will provide guidance to make sure that the harvesting of LSLs complies with these state requirements.

4.2 Task 4 Deliverable(s):

- Lead pipe harvesting protocol
- Post lead service replacement guidance
- Two days of site visits during City harvesting of lead pipes.
- Installation of harvested pipes in pipe loops

Task 5: Demonstration Study Tools

5.1 CDM Smith will meet with City staff to discuss testing protocol and the number of pipe loops needed to meet all testing objectives. A testing plan and protocol will be developed for review with the City and IEPA. Based on our initial review, we propose the test conditions outlined below to be discussed with the City and the IEPA.

CONDITION	***VALUE***	
Pipe Loop Quantity and Location	**Four Pipe Loops/Skids at WTP:** -Baseline (6 Pipes) -pH/Alkalinity adjustment (6 Pipes) -Phosphate at current pH (6 Pipes) -Phosphate at lower pH (6 Pipes) **One Additional Pipe Loop at TBD Distribution System Site**	Three replicates of each material or total of 24 independent sub-loops and 6 for optional loop in Distribution System.
Pipe Loop Materials	Harvested lead (3 Pipes) New copper with leaded solder (3 Pipes)	
Stagnation and Water Use Patterns	30 mins of flow and 7.5 hours of stagnation in three eight-hour cycles per day	

5.2 CDM Smith will develop pipe loop schematic design documents based on test conditions. CDM Smith and the City have identified a location for pipe loop construction based on available space, water, drain and power requirements.

5.3 CDM Smith will procure the pipe loop supplies and construct and install the pipe loops at the selected location. CDM Smith will specify the electrical, water influent, and drainage capacity requirements, and the City will help CDM Smith connect to the power, water and drain connections.

CDM Smith will develop a pipe loop operational plan that includes a conditioning phase and a testing phase. CDM Smith will provide the sampling plan including parameters to be analyzed on a weekly or monthly basis.

5.4 CDM Smith will provide startup and testing of new pipe loops and address any punchlist items. Each loop will be tested for controls and leakage. Following conditioning when chemicals are introduced for the testing phase, CDM Smith will provide startup and testing support for each chemical feed system.

5.5 A pipe loop maintenance plan will be developed for review with the City to understand required checklist on daily basis.

5.6 Weekly sampling and sample result data entry will be completed by CDM Smith. The City will be responsible for daily general inspection of the pipe loops and basic water quality parameter testing. CDM Smith will provide monthly review of the data and conference calls with the City.

CDM Smith will review data from the conditioning phase prior to moving into the testing phases to ensure that the pipe loops are providing repeatable results prior to implementing treatment changes.

It is anticipated that conditioning will take approximately six months and testing will take a minimum of 12-months. During the testing phase, CDM Smith will review the data on a monthly or bi-weekly basis to review findings and discuss any study modifications.

The fee (Exhibit B) is based on the following:

5.6.1 – 26 weeks of conditioning sampling

5.6.2 - 52 weeks of testing sampling

5.6.3 – Analytical testing by First Environmental – Exhibit B.1

5.6.4 – Miscellaneous on-site equipment and supplies needed during sampling

5.6.5 - Review of weekly data and updated of test results

5.6.6 – Monthly meetings with City (assumed to be virtual)

5.6.7 – Interim review meeting with IEPA

5.7 Pipe Scale Analysis

CDM Smith will collect up to four coupons for scale analysis upfront after lead pipes have been harvested. In addition, pipe coupons on the pipe loop systems will be removed after 6 months of testing and at the end of the testing period to evaluate the new scale.

The Fee (Exhibit B) includes up to 18 scale analysis samples to be used throughout the study. Coupons will be removed, preserved and sent by CDM Smith to Washington University (Dr. Dan Giammar) for analysis.

5.8 Partial System Testing

CDM Smith will work with the City and the IEPA to identify if partial system testing will be advantageous to the City. If so, CDM Smith will review the water treatment plant process and the City's distribution system hydraulic model to support the City in identifying where a partial system test could be performed.

5.9 Task 5 Deliverable(s):

- Pipe Loop Study Operations Plan, including:
    - Pipe loop design documents and equipment list
    - Pipe loop O&M manual and SOP
    - Pipe loop sampling plan and testing procedures
    - QA/QC protocols

    - Schedule for assessing water quality changes and performance over time
- Procure, construct, install, connect, and test the pipe loops
- Summary of scale analysis on different coupons tested
- Technical memorandum documenting conditioning phase before moving into testing phase
- Technical Memorandum documenting study findings, secondary impacts of treatment changes and recommendations for optimizing CCT
- Interim review meeting with IEPA
- Monthly meetings with the City to review data and update progress

Task 6: Final Report

6.1 CDM Smith will prepare a final recommended optimal CCT Report with documented rationale based on the results of Tasks 2 through 5. CDM Smith will document which treatment options were reviewed and the reasons why each of the non-selected options were determined to be either not viable or not optimal. CDM Smith will prepare a draft recommendations report and a final report after comments have been incorporated.

6.2 Review meetings with the IEPA and the City will be scheduled to address any review comments prior to finalizing the report and recommended next steps.

6.3 CDM Smith will also present the final findings at City Committee and Council Meetings.

6.4 Task 6 Deliverable(s):

- Draft and Final CCT Reports
- Meeting (and minutes) with the IEPA and the City

Task 7: Conceptual Design of Optimize Corrosion Control Program

7.1 CDM Smith will develop a conceptual design of the proposed CCT with consideration of electrical, I&C, and structural design components. This will include preliminary sizing of the major system components (chemical pumps and tanks), preliminary identification of the location for the chemical system, and layout drawing(s) of the chemical system.

CDM Smith will provide a preliminary list of considerations for permitting and potential building code concerns.

7.2 CDM Smith will prepare an opinion of probable construction cost (OPCC) for the recommended improvements.

7.3 Task 7 Deliverable(s):

- Technical Memorandum with a conceptual design of the proposed CCT
- Concept Design Review Meeting
- Preliminary layout drawings
- Engineers' opinion of probable construction cost

Task 8 Project Management Activities and Progress Meetings/Workshops

Activities CDM Smith will complete as part of the project management task include:

8.1 Communications and Project Management Plan

Prepare a Communications and Project Management Plan to include procedures and protocols that will support effective coordination of the CDM Smith Project Team. The Project Management Plan will define the work tasks, budgets, responsibility, deliverables, and schedule milestones to effectively manage and deliver the project.

The CDM Smith Project Team will develop a schedule to meet the milestones outlined in the Project Management Plan. A draft project schedule will be submitted at the Project Quality Management and Kick-off Workshop. Once the project schedule is finalized, it will be maintained throughout the project to reflect actual progress and will include any changes requested by the City.

As part of the Work Plan, a Quality Control plan and procedures will be included.

8.2 Project Team SharePoint Site

Establish and maintain an electronic SharePoint site for the duration of the project incorporating meeting agendas, summaries, outstanding issues list, frozen issues list, draft and final project deliverables, and other items.

8.3 Internal Coordination Meetings

Conduct internal coordination meetings with the CDM Smith Project Team to ensure effective communication throughout the project. Internal coordination meetings will be conducted as necessary within each phase of the project to accomplish this goal. This task includes preparing meeting materials as necessary to support such meetings and preparing meeting summaries and action item lists as required.

8.4 Monthly Reporting and Project Administration

Prepare monthly status reports of project progress, expenditures to date, cost-to-budget information, and submit these reports in conjunction with monthly services invoices. Monthly invoices will include a breakdown of costs incurred during the invoicing period, including back-up costs for any lab costs.

8.5 Project Management

CDM Smith will provide project management support including schedule and budget tracking with updates provided as part of the monthly progress reports.

8.6 Project Workshops

Our approach and scope are built around a series of workshops associated with the project to review deliverables and address comments and concerns from the IEPA and the City. We anticipate up to four workshops for this Study as follows (in addition to three meetings noted below in assumption):

- Project Kickoff
- Desktop analysis – After review of data and completion of desktop review
- Pipe loop study results (Draft Report)

- Conceptual design of recommended alternative

8.7 Task 8 Deliverable(s):

- Project Work Plan
- Sharepoint Site
- Monthly progress status reports
- Workshop minutes

Fee and Method of Payment

CDM Smith will complete the above scope of services for the not-to-exceed fee provided in Exhibit B with monthly invoices consistent with the work performed. The fee will be billed on a time and materials basis with monthly invoices consistent with work performed. Average hourly rates are included for each labor category and is shown on Exhibit B. Labor cost will be billed at an ELM of 3.1 and project direct costs and lab expenses will be billed at cost. The breakdown of lab costs is shown in Exhibit B.1.

Scope of Work and Fee Assumptions

- The City will provide historical water quality data for the existing process, including water quality data with different ground water versus surface water blend ratios. This information will be used in the desktop analysis. Existing data will be provided in digital format – preferrably in excel or access format. Our fee does not include any hydraulic modeling of the City's system. It is assumed that the City will be able to provide the necessary information on areas of high water age and water quality changes in the distribution system.
- Eight meetings are included in the Scope of Work – kickoff meeting, meeting to review testing plan, meeting to review pipe loop design, interim data review meeting, draft report review meeting, review meeting to discuss the conceptual design, monthly update meetings/conference calls, plus one additional meeting as needed.
- One face to face meeting with IEPA in Springfield. An additional three virutal meetings with the IEPA to discuss testing plan, review interim results and final report
- Two weeks on-site are assumed for the initial pipe loop installation and adding chemical dosing in the testing phase.
- Exhibit B.1 provides a breakdown of lab analysis for pipe loop testing. Exhibit B.2 provides a breakdown of pipe loop costs.
- Harvesting of lead service lines is assumed to be done by the City. CDM Smith will be onsite for 2 days during initial pipe harvesting.
- The fee includes building, installing, connecting and testing the pipe loops. The City will provide connection points for power, water, and drainage to the pipe loop area. The cost of pipe loops includes a $20,000 allowance for water, drain, and power connections to the pipe loops. It is assumed the tap/tee, valve and RPZ for the selected feed line will be done by City staff or City's mechnical contractor.
- Only a conceptual design of the recommended improvement is included. Detailed design and implementation of recommended improvements are not included. The conceptual design will

include layout drawings for the major components (tanks and metering pumps) and requirements for electrical systems and loading. It will **not** include a full code review.

- Partial system testing is not included in the Scope of Work and will be added separately if required by IEPA.
- Chemicals for pipe loops will be purchased by the City. Based on the quantity of chemicals needed, this cost is anticipated to be neglibile.
- Analytical costs associated with the fifth pipe loop is **not** included in the Fee.