Scope of Work: Corona Environmental Consulting Source Water Project

Area: National Capitol Region (NCR) drinking water utilities with treatment plants in the District of Columbia, suburban Maryland and Northern Virginia.
The proposed scope includes:

- Characterizing source water quality;
- Identifying key potential contaminant sources throughout the drainage of each intake,
- Aerial image analysis of the drainage within a 10-hour travel time of the intake (average flow conditions or other conditions consistent with state definitions of zones of concern),
- Collecting data for physicochemical property and toxicity for contaminants located within the drainage,
- Characterizing land use within the drainage and within the critical zone near the intake,
- Ranking contaminants in zones of concern with respect to their distance from the intake and their toxicity, and
- Collecting available point of contact information for contaminant sources within the drainage.

Task 1: Preliminary Data Collection

- Acquire and review source water assessment documents for each participating water system;
- Extract, quality assure and geocode data from the source water assessment documents;
- Acquire GIS maps of the drainages and zone of critical concern (ZCC) s for each intake;
- Collect and integrate relevant data maintained at the Interstate Commission for the Potomac River Basin (ICPRB), COG and by the Chesapeake Bay Program office;
- Collect and integrate relevant data from Virginia, Maryland, Pennsylvania and West Virginia State, as well as federal data and private data sources;
- Document the collected datasets and data sources; and
- Determine the scope of PSC analyses (i.e., spatial extent, types of PSCs and level of documentation detail) during an online workshop with COG and utility staff.
- Link data directly to the GIS when possible. Datasets will be manually collected and thoroughly documented where direct links are not possible.

Deliverables

GIS loaded data will be summarized in tables (spreadsheets and printed tables) and available to NCR drinking water utilities in electronic format (shapefiles that may be used in the utilities' GISs).

Task 2: Develop Baseline Water Quality and Quantity Information

Establish baseline water quality information by reviewing:

- Raw water data provided by the NCR drinking water utilities;
- Regional water quality data from ICPRB and the Chesapeake Bay program;
- USGS water quality reports for the watershed;
- National Contaminant Occurrence data (NCOD) and other raw water quality data for the intakes

Data review will entail determining ranges of parameters for each data set and comparing those ranges with national averages or regulatory levels where possible.

Deliverables

- Interim report including:
    - Lists of contaminants of concern for the intakes and descriptions of their occurrence in the source water (e.g., seasonality, variability, etc.) where possible;
    - Basic statistical data on water quality for each intake with comparisons among intakes; and

- Observed minimum, 5th percentile, median, mean, 95th percentile and maximum discharges for intakes on gauged streams (USGS).

- Linked and loaded water quality and quantity data iin the GIS.

Task 3: Potential Contaminant Source Inventory and database development

Task 3a – Potential Contaminant Source Inventory

- Automated identification of potential contaminant sources for the entire catchment (above the intakes) and inventory of potential contaminant sources. Data indicating potential contaminant sources:
  - Toxics Release Inventory (TRI) sites designated as discharging or potential to discharge in stormwater runoff;
  - RCRA permitted sites

Included Facilities	Excluded Facilities
Municipal solid waste landfills	Construction sites
Industrial solid waste landfills (active and capped)	Demolition debris landfills

  - NPDES permitted facilities

Included Facilities	Excluded Facilities
Sewage treatment operation outfalls	Construction storm water permit
CAFO permitted operations	Sites operating under a general permit
Industrial multi-sector permitted sites	
Others as identify by utilities	

  - Additional data sources

Hazardous transport route designations	Permitted above ground storage tanks (ASTs)
Railroad stream crossings	Regulated sites storing large quantities of oil
Airports	Oil and gas operation permits
Power plants	Mining operations
CERCLA sites	

- Verification of each of the sites identified in the 2002 capitol region source water assessment to include determination of operational sites, correct location, and association with contaminants;
- Aerial image analysis within the zone of critical concern[1];
- Quality assure the location and type of feature for the key potential contaminant sites listed above;
- Conduct aerial image analyses in the zone of critical concern to identify above ground storage tanks and other visible features that do not correspond to the key contaminant sites displayed by the GIS.
- Associate the PSCs within the zone of critical concern with contaminants, contaminant masses or volumes, and owners for sites identified during aerial image analyses using available data;
- Confirm site contents for sites within the zone of critical concern. Data gaps will be noted in the system where positive identification is not possible due to privacy, homeland security or commercial concerns. CEC staff will work with utilities to determine a need to pursue additional data.
- Analysis of land use data and characterization of land use in the full drainage for the NCR drinking water utility intakes and in the zone of critical concern.

[1] Zone of Critical Concern is assumed to be the lesser of a 5-hour travel time at average flow conditions or 10 miles above the intake and within a 1000 ft. buffer of stream centerlines. This definition can be refined.

Deliverables:
Report including:

- Lists potential sites of contamination for the entire drainage and the zone of critical concern for each intake.
- Characterization of land use data using 2011 USGS NLCD digital land cover data and parcel within the drainage and in the critical zone.
- Digital data (GIS layers) of the potential sources of contamination.

Task 3b. Contaminants database

- Collect and include chemical, physical, toxicological and safety information in the GIS contaminants database for each contaminant identified in the zone of concern for intakes.
- Collect data on components of mixtures, where available, and describe typical formulations;
- Conduct literature searches for toxicity data or contaminants with uncertain or unavailable dose-response data.
- Apply uncertainty factors to available animal toxicology parameters to estimate human toxicological data. Estimates will be flagged and noted when risk rankings are reported.
- **Deliverables:**
- Electronic database of contaminant data
- Gaps analysis identifying unknown contaminant properties and assessing whether the data gaps are critical.

Task 4: Susceptibility Analysis

- Compare the susceptibility of the plants/intakes to each of the positively identified contaminants in their drainages using contaminant site and property data.
- Rank contaminants in respect to intake proximity.
- Rank sites with respect to onsite contaminant toxicity.

Deliverable: Incorporate results from the two analyses into the final report and data system.

Task 5: Deliverables Final Report, Data Transfer, Deliverables and GIS Training and Support

- Reports summarizing findings for each water treatment plant
- A geographic information system (GIS) to include:
  - Data used to develop the written reports;
  - Tools that may be used for additional source water analyses;
  - Data on each of the contaminants known to be stored (and potentially spilled) in the critical zone of the intakes, and features that allow automatic generation of reports;
  - Data linked directly to its source where feasible;
  - AST, PSC and contaminant datasets to utilities in a useable format, as agreed upon during the facilitated workshop (e.g. online GIS tool access, GIS shapefiles, Access database, Excel spreadsheets, hardcopy printouts).
- Utility staff will receive access and training on the GIS via an in-person workshop;
- A final report with PSC and contaminant data collected and the final risk rankings for all PSCs.
- Access to CEC staff for problem solving and consulting.

Source Water Assessment and Source Water Protection

Safe Drinking Water Act (SDWA) amendments required state primacy agencies to conduct source water assessments (SWAPs) for public drinking water utilities. The level SWAP detail was left to the states' discretion and SDWA has no requirement for updates. SWAPs produced by states have been provided to public water suppliers and disseminated to other stakeholders (the community).

Although SDWA has no specific requirements for source water protection (SWP), state agencies, AWWA and others in the drinking water community recognized the importance of SWP as component of the multiple barrier approach essential to safe drinking water. AWWA developed and refined source water protection standards. The SWP activities described in the proposal are consistent with, and in some cases exceed, the AWWA guidance[2]. The AWWA Standard G300 outlines SWP elements as:

- A SWP vision statement
- Source water characterization
- Statement of program goals and objectives
- An action plan
- Implementation of SWP practices
- SWP program evaluation and revision.

AWWA G300 required elements of source water characterizations are presented in Table 1. The work proposed herein focuses on source water characterization, including delineation, water quality and quantity data, contaminant sources and land use. The work also contributes to emergency preparedness and health safety management.

Table 1. Elements of a Comprehensive Source Water and Source Water Protection Area Characterization

Element	Description
Delineation	Utility delineates source waters and areas of concern (for both surface and ground waters)
Water quality and quantity data	Water quality data from the point of withdrawal from the source and from other locations within the watershed are assembled and used to identify water quality issues and to formulate monitoring plans
Contaminant sources and land use	Points of concern should be identified, along with documentary information supporting their selection as points of concern. Plans should be in place to monitor future activities and development that can affect the watershed.
Compliance with regulatory requirements	The utility should identify local, state, federal and other regulations that apply to the utility and source water protection area and make those regulations accessible.
Security planning and implementation	The utility should have plans that address the response of personnel in the event of a security incident.
Emergency preparedness and response	The utility shall document emergency response plans (with specific instructions to personnel) for use in an emergency.
Health safety management	The utility shall document the health and safety procedures that are designed to safeguard employees and visitors engaged in operational activities pertaining to watershed management.
Stakeholders	The utility shall identify source water area stakeholders, their roles and existing initiatives in which they may be engaged.

[2] Sham, C.H., Gullick, R.W., Long, S.C., and Kenel, P.P. 2010. Source Water Protection: Operational Guide to AWWA Standard G300. American Water Works Association, Denver, CO.

G300 specifies that source water protection programs address the following potential sources (not an all-inclusive list):

- Stormwater runoff (potentially containing pathogens, nutrients heavy metals organic compounds and sediment);
- Treated and untreated municipal wastewater discharges;
- Combined and sanitary sewer overflows;
- Septic systems;
- Abandoned, injection and production wells;
- Animal waste from livestock, pets, and wildlife;
- Agricultural, commercial and residential use of fertilizers and pesticides;
- Fuel and other chemical use storage, transportation and disposal (e.g. above ground and underground storage tanks);
- Mining and oil and gas extraction;
- Solid waste and hazardous waste disposal sites (including Superfund sites);
- Commercial and industrial establishments;
- Changes in land-use patterns such as new residential and commercial developments or intensification of agriculture;
- Accidental and deliberate spills or releases of contaminants
- Highways and transportations systems such as airports (including deicing and other maintenance activities.