GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

AOPC SSTL Report Worksheet
Standard Operating Procedure (SOP)

Georgia Risk-based Corrective Action (GRBCA) -
Applicable Threshold Level Determination at Petroleum Sites

Area of Potential Contamination (AOPC) SSTL Report User Guide:

AOPC Receptors: AOPC or "offsite" is defined by being outside the area of contamination (AOC) and within 500-feet of the release point. Receptors in the AOPC may exist in any direction from the highest GW benzene concentration MW, (MW^{Cmax}) located within the AOC. The Receptor Field Survey results are critical to this step. Of the six (6) receptors types evaluated in the GRBCA workbook process, five (5) of the six (6) receptors are evaluated in the AOPC SSTL worksheet. All five (5) receptor types may be present. Distance from (MW^{Cmax}) is a factor in the calculations. Within each receptor type, multiple receptors may be present, but only one of each receptor type present will be used for evaluation.

GW Secondary Source Evaluation of AOPC Receptors: A near receptor MW (MW^{NR}) is identified and included in the receptor evaluation. The selected (MW^{NR}), is considered a secondary source for evaluated receptors. The purpose of this secondary source evaluation results from an expanding GW contaminant plume toward a receptor caused by (1) variability in GW migration rates transporting contaminants, where contaminant transport exceeds attenuation and/or (2) the impact of a very large or ongoing release resulting in high advection. Both possibilities may result in increased risk of exposure to a nearby receptor. The user will identify (MW^{NR}) by targeting a GW benzene MW with approximately half the concentration (if present) and located between (MW^{Cmax}) and the receptor.

Determination of GW Alternate Concentration Limits (ACLs): This worksheet calculates the GW impact from (MW^{Cmax}) to each AOPC receptor. If the calculated impact exceeds a receptor's applicable MCLs, ISWQs or RBTLs, then the workbook back-calculates the AOC (MW^{Cmax}) SSTLs that are protective of the receptor. If more than one offsite receptor fails this comparison, then the workbook will compare each failing receptor and select the lowest, back calculated, AOC (MW^{Cmax}) SSTLs, which is the AOPC Receptor Most at Risk. These SSTLs will then be included in Table 1, Site Summary Report worksheet and will be compared with the AOC Report SSTLs. The lowest SSTLs determined from this comparison will be the GW ACLs for the release.

1. **Domenico Equation Parameters**

    A. **Enter the soil and GW parameter values and Data Source reference information.**

    > **Table 1A: Domenico Source Area Soil and GW Parameters**

    In column 3- Value, enter the following data:
    1. **Hydraulic gradient (i).** The hydraulic gradient must be from data collected during the most recent groundwater gauging/monitoring event.

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2. **I_{COVER}-** The infiltration rate (**I**) of water through soil is a RAR default value of 30 cm/yr. The total percent of the <u>soil contaminant plume</u> covered by relatively impermeable material (i.e., pavement, concrete, buildings, etc.) defines **I_{COVER}** and reduces the infiltration rate. Enter the **I_{COVER}** as a percent value and not a decimal value.

    i. **Example-** if **I_{COVER}** is 80%, then enter "80." The maximum allowable **I_{COVER}** is 95% ("95").

    ii. A satellite image-based vicinity map (ArcGIS, Google Earth or other program) is the recommended method to most accurately determine the site's **I_{COVER}** percentage.

3. **Groundwater Source Width** (S_W).

    i. (S_W) is measured **perpendicular** to groundwater flow (in feet) in the horizontal plane.

    ii. If the groundwater plume is not be fully delineated, extrapolation and/or estimation techniques are used to determine GW S_W on standards found in the Quick Reference Guide. Additionally, each **MW^{NR}** will also include an S_W value; however, GW COC concentrations beyond the source area are more representative of a Secondary Source Width (**SSw**). The GW source width is selected based on benzene concentration.

        a. If benzene is not present, enter the width based on MTBE concentration, and so forth, in this order: toluene, total xylenes, ethyl benzene and naphthalene.

        b. If groundwater concentrations are encountered in only one monitoring well, a source width of half the distance between this well and the next down gradient well is used.

4. **Vadose Zone Soil Source Width** (**W**)

    i. (**W**) is measured **parallel** to groundwater flow direction (in feet).

    ii. If the soil plume is not fully delineated, extrapolation and/or estimation techniques are used to determine plume widths to the residential RBTLs listed in REFERENCE 3, Soil and GW Delineation Standards found in the Quick Reference Guide. The source width is to be selected based on benzene concentration.

        a. If benzene is not present, enter the sample results based on the following order of maximum concentration: MTBE, toluene, total xylenes, ethyl benzene and naphthalene.

        b. If soil concentrations are not identified above residential RBTLs or are encountered in only one soil boring, a source width of five (5) feet is used.

    NOTE: The <u>groundwater source depth</u> (S_D) is a default value.

5. **Data Source Entry Cells** section

    i. If Data Source references in Table 1A, are the same as the RBTL worksheet, select the **black** and **red** checkbox to import these references on this worksheet.

5a. *<u>Page or Fig ID #</u>-* Enter the specific page, figure, or table number where the data is documented.

5b. *<u>Date</u>-* Using the calendar, enter the date of the data source

5c. *<u>Report Name</u>-* Using the dropdown menu, select the report name where the data originated.

B. Domenico Distance Parameter- AOC GW Petroleum Source Area MW Distance to AOPC Receptor

Table 1B: AOC GW Release Source MW^{Cmax} ID#:

MW^{Cmax} = Maximum Concentration AOC MW

Table 1B identifies the onsite GW source area maximum COC concentration MW, (**MW^{Cmax}**). From this well, all distances to receptors are recorded and source area related Domenico calculations are published.

    i. No data entry is required.

ii. The workbook will populate this MW ID # in the light blue/gray cell. MW^{Cmax} is used to measure distances (feet) to all evaluated AOPC Receptors. These distances are then entered in Table 1C, Column 2a, in the related Receptor row.

C. Domenico Distances Parameters (GW Contamination Source Areas to Receptors)

<div style="border: 2px solid black; background-color: yellow; padding: 10px; display: inline-block;">
Table 1C: Domenico Distances from GW Contamination Source Areas to Receptors
</div>

By default, all AOPC receptors in Table 1C, 1D and 2 are shaded gray. IF all receptor cells are shaded gray, indicating that no AOPC receptors were identified after the RBTL and AOC SSTL worksheets were completed, then the AOPC worksheet is not required. Any AOPC receptor cells shaded white are activated and will require data entry.

1. **Applicable Receptors-** Receptor Types that may be evaluated are defined below:

    i. dww: Drinking Water Well - Nonpublic (private) groundwater withdrawal point or public (local water authority or municipal) groundwater withdrawal point. Exposure pathway is tap water ingestion but can also include dermal contact and indoor air vapor inhalation.

    ii. swi: Surface Water Intake – almost always managed by a local water authority or municipality. Exposure pathway is tap water ingestion and can also include dermal contact and indoor air vapor inhalation.

    iii. pwb: Surface Water - Perennial Water Body (I.e., lake, stream, pond, estuary). Exposure pathway is dermal contact, incidental ingestion due to recreation, incidental outdoor air vapor intrusion.

    iv. res: Residence - the single residential structure located offsite and outside the AOC, nearest and down gradient, or cross gradient to the release point. Exposure pathway is groundwater to indoor air vapor intrusion.

    v. nonres: Nonresidence - the single nonresidential (commercial) structure located offsite and outside the AOC, nearest and down gradient, or cross gradient to the release point. Exposure pathway is groundwater to indoor air vapor intrusion.

2. **AOC MW^{Cmax} Release Source Distance to Receptor-** For each activated (white) receptor cell in this column, enter the measured distance determined from a satellite view map equipped with distance measuring tools or a survey. Assumed distances are discouraged. Deactivated (gray) cells require no action.

3. **AOPC MW^{NR} Secondary Source Distance to Receptor**

3a. **Distance to Receptor-** For each activated (white) receptor cell in this column, enter the measured distance determined from a satellite view map equipped with distance measuring tools or a survey. Enter the distance from each applicable **MW^{NR}** to each corresponding receptor. Assumed distances are discouraged. Deactivated (gray) cells require no action.

3b. **MW-ID#-** For each activated (white) receptor cell in this column, enter the MW-ID of the MW used for the near receptor evaluation. This MW ideally has half or less the AOC MW^{Cmax} groundwater benzene concentration.

    i. If the MW ID# is listed in the dropdown menu, then select the MW ID # and the RAR Workbook will enter it in Column 3b and in Item #2, Table 2, Groundwater Analytical Results from Nearest Receptor MW. The RAR workbook will also populate the Sample Date and all previously entered COC concentration values into Table 2, Groundwater Analytical Results from Nearest Receptor MW.

    ii. If the cell was selected by tabbing, the user may enter the applicable MW without using the drop down. The manually entered MW ID # will also populate data into Table 2,

Groundwater Analytical Results from Nearest Receptor MW. If the information is not already populated, the user will enter the Sample Date and applicable COC concentration values for this MW.

4. *MW^{NR}* **Secondary Source groundwater plume width** (*SS_W*)- For each activated (white) receptor cell in this column, if the *MW^{NR}* data was entered into RBTL GW Analytical Results Table 9, then the activated cells in this column will be prepopulated with workbook calculated groundwater secondary source width (*SS_W*)result. If the user has an accurate *SS_W* value, it may be entered; however, the workbook provides a calculated result using the following equation below:

$$\text{Sw at } \mathbf{MW^{Cmax}} \times ([C_{benz} \text{ at } \mathbf{MW^{AOC}}]/[C_{benz} \text{ at } \mathbf{MW^{NR}}]) = \mathbf{SSw} \text{ at } \mathbf{MW^{NR}} \text{ receptor}$$

D. Domenico Depth to GW Parameter

Table 1D: Domenico Depth to GW Parameter

Distance for Residence and / or Nonresidence (refer to Table 1C, Domenico Distances from GW Contamination Source Areas to Receptors).

    i.   If a distance for a residence and/or nonresidence were entered, for the nearest MW selected, enter the most recent depth to groundwater.

        a.   The depth to groundwater for the nearest offsite residence and nonresidence is important for the vapor intrusion evaluation.

        b.   If the distance between MWNR and the residence and/or nonresidence receptor is ≥ two hundred fifty (250) feet, then the GW depth at the residence and/or nonresidence receptor is not considered representative and will be addressed in the VI Summary Report recommendations.

        c.   All other receptors listed in Table 1B (AOC GW Petroleum Source Area MW Distance to AOPC Receptor) are direct exposure receptors and the distance calculation does not require depth to groundwater at the receptor.

1. **MW ID#** - Enter the MW ID # used for the data reference
2. **Depth to GW**- Enter the most recent GW elevation for the MW referenced
3. **Is FP present?** - Use the dropdown menu for selection. If FP is present, select "Yes." If FP is not present, select "No."
4. **Is a FPc present?** – Use the dropdown menu for selection. If a FPc (free product condition) is present, select "Yes." If not, select "No."

E. Data Source Reference for Table 1C and 1D: Table 1E and 1F

Table 1E: Data Source for Table 1C, above	Table 1F: Data Source for Table 1D, above

1. If Data Source references in Table 1A (Domenico Equation Parameter), are the same as the RBTL worksheet, select the black and red checkbox to import these references on this worksheet.

    i.   Manual selection can be made by using the dropdown menu. Select the report name where the data originated. Select the date cell and from the calendar or the Date Selection History Table select the report date. Select the correct response for the distance measurement references used for Figure Name.

2. **Groundwater Analytical Results Table**

<div style="border: 2px solid #c8a400; background-color: #f5d800; padding: 10px;">
Table 2: Groundwater Analytical Results from Nearest Receptor MW
</div>

This table adds MW Analytical Results that were not included in RBTL Report GW Table 9 Analytical Results.

> i. If a MW ID # is present and COCs not populated, enter the most recent COC analytical results in Table 2 for any well ID # listed. Columns shaded Gray are not applicable to this evaluation.

After entering data and completing checkbox selections above, the user will see a red **STOP** sign.

> a. Review all entries for accuracy.
> b. Select the **activated** (green with white text) **Green** command button. Selection will be "1. Calculate AOPC SSTLs & Compare COC Concentrations"

3. **Comparison of calculated AOPC GW SSTLs to RBTLs at each applicable AOPC receptor: Results**

Two (2) groundwater tables will be provided for each receptor selected. The first table evaluates the receptor using the AOC maximum groundwater benzene concentration. The second table evaluates the receptor using the monitoring well nearest the receptor with groundwater with detectable COCs.

> i. Each of these tables contain the following elements:
> a. The calculated maximum groundwater contaminant concentration at the receptor. If the calculated concentration is <0.0001 µg/L, then "BRV" (Below Reportable Values) will be displayed.
>
> b. The RBTL for the applicable receptor. All AOPC receptors are compared using the RBTLS except the AOPC residence and nonresidence for the VI pathway, which compares using the SSTLs. The reason for this is similar information assembled to determine the SSTLs for AOC structure is included in the workbook for the two (2) AOPC structures. This excludes detailed soil information within thirty (30) feet of the AOPC structure because typically, GW is the only driving AOPC source for AOPC receptors.
>
> ii. The results of the comparison between the calculated concentration at the receptor and the applicable RBTL (displayed in the "Below RBTLs Y/N" column).
> a. "Yes" indicates that the calculated COC concentration at the receptor is lower than the applicable RBTL.
> > i. When a "Yes" answer is displayed (passing the RBTL/SSTL comparison), then the AOC column that displays the AOC concentration protective of the receptor will display "N/A" because a back calculated safe concentration is not necessary to complete.
> b. "NO" indicates that the calculated COC concentration at the receptor is at or above the applicable RBTL/SSTL. All "NO" answers will be highlighted a coral color.
> > i. For "NO" answers that fail the RBTL/SSTL comparison, the contaminant concentration level that may be left within the AOC or at the MW with benzene concentrations nearest to the receptor that is protective of the receptor will be displayed. These levels are determined by performing a back calculation from the receptor to the selected sources.