ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT WATER DIVISION-WATER SUPPLY PROGRAM ADMINISTRATIVE CODE

CHAPTER 335-7-15 SOURCE WATER ASSESSMENT PROGRAM

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335-7-15-.01 Applicability.

This chapter is applicable to all water systems within the state using or proposing to use a groundwater source or a surface water source for water supply, unless specifically exempted by a part of these regulations.

Author: Edgar K. Hughes

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335-7-15-.02 Definitions.

The following words and phrases, unless a different meaning is plainly required by the context, shall have the following meaning:

(a) Analytical methods--the delineation of a Source Water Assessment Area based on the use of uniform flow equations to define the zone of contribution to a pumping well.

(b) Aquifer--a geologic formation, group of formations, or part of a formation that is capable of yielding a significant amount of groundwater to wells and springs.

(c) Conduit flow--the flow of groundwater in karst (carbonate) aquifers through integrated systems of openings ranging from solutionally widened joints and bedding plane partings to pipe-1ike passages. Conduit flow is groundwater flow through a system of irregular conduits and open cave stream channels.

(d) Confined Aquifer--An aquifer overlain by low or impermeable stratigraphy, which puts the aquifer under artesian head conditions.

(e) Contaminant--matter which renders water unfit to use due to its physical, chemical, biological, or radiological properties.

(f) Contaminant source--origin of a known or potential contaminant.

(g) Contaminant source inventory--the synthetic identification, location, and recording of contaminant sources existing within a watershed.

(h) Contamination--matter present which renders water unfit for use by causing a change in its physical, chemical, biological or radiological properties.

(i) Fixed Radius--A circle of specified radius around a well.

(j) Flow boundaries--zones of higher or lower transmissivity, recharge zones, impermeable boundaries, groundwater divides and saddles, and discharge zones that influence flow direction and velocity in an aquifer.

(k) Fracture flow--the groundwater flow along openings produced by the breaking or shattering of rock.

(l) Geologic mapping--the delineation of Source Water Assessment Areas by mapping time-of-travel and flow boundary

criteria using geological observations, geophysical data, and dye-tracing methods.

(m) Geologist--a geologist licensed by the State of Alabama.

(n) Geographic Information System (GIS)--a computer based method of depicting various types of geographic information on a map.

(o) GPS method--determination of latitude and longitude at a point using Global Positioning System (GPS) collected, differentially corrected data to an EPA accepted accuracy of 25 meters at a specified datum (i.e. NAD 83).

(p) Groundwater source--well or spring permitted as a public water supply source by the Department.

(q) Intake--the structure where raw water is removed from source water for the purpose of transferring it to a water treatment plant.

(r) Known contaminant source--contaminant source which has lead to the detection of a regulated or unregulated chemical contaminant, bacteriological contaminant or physical contaminant in the ground or surface source's raw water quality.

(s) Licensed well driller--a driller licensed by the Department, who has direct responsibility and supervision over water supply wells drilled by them and their company.

(t) Numerical modeling method--the delineation of a Source Water Assessment Area using computer models that approximate groundwater flow and/or transport using numerical equations.

(u) Physiographic province--a region of which all parts are similar in geologic structures and climate and which has consequently had a unified geomorphic history; a region whose pattern of relief features or landforms differ significantly from that of adjacent regions.

(v) Porous flow--the flow of groundwater through the connected interstices of unconsolidated sediments.

(w) Potential contaminant source--contaminant source which houses regulated or unregulated chemical contaminants, bacteriological contaminants or physical contaminants which may lead to the detection of these substances in the ground or surface source's raw water.

(x) Public Awareness--the requirement of a water system to notify the public of the susceptibility to contaminant source located in its watershed.

(y) Raw water--water within a watershed used to supply an intake structure.

(z) Significant tributary--a tributary, or subtributary, within a watershed that, due to its location, has the potential to transport contaminant sources and potential contaminant sources into the main raw water source for a surface water treatment plant. Their "significance" can be determined only after a preliminary study of their relative location to known or potential contaminant sources.

(aa) Sinkhole--a funnel shaped depression caused by subterranean drainage.

(bb) Source Water Assessment Area (SWAA)--the surface and subsurface area surrounding a spring, water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield or the systematic identification of contaminant sources within a watershed area and the relative susceptibility to these contamination sources.

(cc) Source Water Protection Area (SWPA)--the critical, or special, area in the immediate vicinity of a surface water plant intake that is closely scrutinized for contaminant sources.

(dd) State boundary--the boundary between two or more States which share a common watershed. It is the upper limit for a watershed that exists in more than one State.

(ee) Stratigraphic pinch-out--the termination or end of a stratum, vein, or other body of rock that narrows or thins progressively in a given horizontal direction until it disappears and the rocks it once separated are in contact.

(ff) Susceptibility analysis--the determination of the relative impact a contaminant source in a watershed has on the quality of a raw water source used for a public water supply system.

(gg) Susceptibility determination--the evaluation of a known or potential source of contamination to degrade the quality of a drinking water source. Contaminant sources shall be listed as low, moderate, or highly likely to impact a drinking water source.

(hh) Time-of-Travel (TOT)--the analytical time-of-travel is based on the maximum time for a contaminant to reach a well according to regional groundwater patterns and velocities. Time periods of 180 days and 10 years are used for determining the time-related capture zones or source water assessment areas.

(ii) Tributary--a side stream that discharges flow to the main stream of a watershed.

(jj) Unconfined aquifer--an aquifer in which there are no confining beds between the zone of saturation and the surface. An aquifer in which there is a saturated and unsaturated zone.

(kk) Watershed--the entire land area drained by a stream or system of streams such that all streams originating in the area are discharged through a single outlet at an intake. It is usually identified by the hydrologic boundary or surface topography.

(ll) Watershed delineation--the identification of a watershed's topographic boundary.

(mm) Watershed map--a map which depicts the location of the intake of a water system, the boundary of the watershed serving the intake, the location of the Source Water Protection Area, and locations of contaminant sources within the watershed.

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335-7-15-.03 Source Water Assessment Program For A Groundwater Source.

(1) All public water supply systems using a groundwater source for its drinking water must have a completed and approved Source Water Assessment Program (SWAP) meeting the requirements of rules 335-7-15-.03 through 335-7-15-.10 and 335-7-15-.16 no later than February 6, 2003.

(2) A completed SWAP must include the following: Source Water Assessment Area (SWAA) delineation, contaminant inventory within the SWAA, a susceptibility analysis of each contaminant source in the inventory and completion of the public awareness requirements.

(3) Written notification that the delineation, contaminant inventory, and the susceptibility analysis have been updated and the public awareness requirements have been met must be received at the time a water system applies for renewal of its general operating permit.

(4) Wells constructed after the effective date of these regulations must meet all requirements of the program before placing the source into service.

(5) Groundwater sources that have been designated as groundwater under the direct influence of surface water must meet the Source Water Assessment Requirements for both groundwater and surface water sources unless a surface source water assessment is deemed unnecessary by the Department.

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335-7-15-.04 SWAA Delineation For A Groundwater Community Water Source.

All community groundwater systems shall delineate appropriate SWAA I and II in accordance with the requirements of this section.

(a) The delineated SWAA shall be drawn on a 24" X 36" US Geological Survey (USGS) 7.5 minutes topographic quadrangle (more than one sheet may be used if necessary). Color photos or color print copies shall be used. The delineation may utilize natural or man made structures to define the SWAA as long as these structures are located in close proximity to the calculated or mapped SWAA boundary.

(b) A geologist licensed in Alabama shall perform all SWAA area delineations, other than the fixed radius method.

(c) To identify aquifer flow characteristics, a potentiometric map shall be constructed using local water level measurements and show gradient and flow direction.

(d) The degree of confinement shall be determined by geologic or hydrologic approaches and using the documents listed in 335-7-15-.04. Geologic, graphical and drilling logs, geologic descriptions of local stratigraphy, and cross-sections derived from local stratigraphy shall be included and used to determine confinement.

(e) Geologic, geophysical, graphical and drilling logs, geologic descriptions of local stratigraphy, physiographic description, description of the hydrogeology and cross-sections derived from local stratigraphy shall be included in the report.

(f) Construction of the SWAA shall be according to Table 1. All data and calculations used to determine the SWAA shall be included in the report. One of the following methods should be used.

1. Fixed radius (400 feet or 1000 feet radius).

2. Analytical methods or numerical modeling for Time of Travel (TOT) with hydrogeological mapping of flow boundaries.

3. Conduit flow. SWAA for wells in karst or conduit flow aquifers should be established using hydrogeological mapping of flow boundaries and karst features such as sinkholes and sinking stream, lineament analyses and dye tracer tests.

4. Special Conditions.

(i) Confined aquifers.

(ii) The SWAA I for public water supply wells in coastal plain confined aquifers, with the top of the first screened interval at 600 feet below ground surface or greater, may be established by a 400 foot fixed radius. A SWAA II is not required.

(iii) A waiver from the full TOT SWAA delineation requirement may be requested of the Department by systems that have wells with the first screened interval less than 600 feet below ground surface. If the aquifer is under confined conditions waivers may be considered based on site-specific considerations such as degree of confinement.

(g) Gulf Coast aquifers. Wells that have been identified as being in the coastal zone of Alabama shall comply with the Alabama Coastal Area Management Program Regulations (Division 335-8) as well as this chapter.

(h) Wellfields. Systems with large wellfields, where wellhead areas may overlap, may define a SWAA I and II that encompasses all of the wells to create a composite SWAA I and II. This area shall be based on cumulative drawdown and interference of all the wells in the wellfield.

Table 1
Alabama Source Water Assessment Area (SWAA) Delineation Criteria & Threshold

	Porous: porous flow	**Karst: porous flow**	**Karst: conduit flow**	**Fractured: porous flow**	**Fractured: conduit flow**
SWAA I	180-day TOT or 400 ft radius*	180-day TOT or 400 ft radius*	1000 ft radius	180-day TOT or 400 ft radius*	1000 ft radius
SWAA II	10-year TOT with hydrogeologic flow boundaries	Hydrogeologic flow boundaries and TOT (where appropriate)	Hydrogeologic flow boundaries and dye tracing	10-year TOT with hydrogeologic flow boundaries	Hydrogeologic flow boundaries and dye tracing (where appropriate)

* Whichever is greater
Author: Edgar K. Hughes, Dennis D. Harrison
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335-7-15-.05 SWAA Delineation For A Groundwater Transient Non-Community Water Source.

(1) All public water systems designated by the Department as Transient Non-Community water systems utilizing a groundwater source shall use a fixed 400-foot radius extending from the groundwater source as the SWAA I.

(2) A SWAA II is not required for these systems.
Author: Edgar K. Hughes
Statutory Authority: Code of Ala. 1975, §§22-23-33, 22-23-49, 22-22A-5, 22-22A-6.
History: **New Rule:** Filed November 7, 2005; effective December 12, 2005.

335-7-15-.06 SWAA Delineation For A Groundwater Non-Transient Non-Community Water Source.

(1) All water systems designated by the Department as Non-Transient Non-Community water systems utilizing a groundwater source shall use a fixed 1,000-foot radius extending from the groundwater source as the SWAA I.

(2) A SWAA II is not required for these systems.
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History: **New Rule:** Filed November 7, 2005; effective December 12, 2005.

335-7-15-.07 Contaminant Inventory Development For A Groundwater Source.

(1) All known and potential contaminant sources shall be located in SWAA I.

(2) Known and potential contaminant sources shall be located in SWAA II.

(3) A chart listing all contaminant sources indicated in the inventory shall be developed and include contaminant source identification number, type of source, owner's name, owner's address, owner's telephone number, names of the contaminants which can be released from the source, and latitude and longitude of the source using the GPS method.
Author: Edgar K. Hughes, Dennis D. Harrison
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335-7-15-.08 Susceptibility Analysis For A Groundwater Source.

A representative of the water system and a representative of the Department shall perform the susceptibility analysis. Contaminant sources shall be classified as high, moderate or non-susceptible to contaminating the water source. Contaminant sources shall be ranked according to a comparative analysis procedure using information such as:

(a) Distance of potential contaminant source from the groundwater source.

(b) Depth and construction characteristics of the well or spring.

(c) Contaminant type.

(d) Potential for contamination event.

(e) Concentration of contaminant(s) in the source water.

(f) Upon completion of the Susceptibility Analysis, the contaminant source inventory shall be revised according the Analyses. Each contaminant source shall be located on the SWAA maps using its identification number, with the following color codes: red for highly susceptible, yellow for moderately susceptible, and green for non-susceptible.

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335-7-15-.09 Observation Wells.

For community water systems an observation well/wells shall be constructed at an appropriate distance from the production well, to facilitate determination of the storage coefficient and transmissivity during the aquifer test.

(a) A temporary or test well may be used as the observation well if satisfactory information can be obtained.

(b) If the temporary well is converted to the production well, an observation well must be installed at an appropriate distance from the production well or at an alternate distance approved by the Department.

(c) The observation well shall be a minimum of two inches in diameter and shall penetrate the strata utilized by the production well or wells.

(d) The observation well screen shall be placed at approximately the same depth as the central portion of the screened zone or zones in the production well.

(e) Construction of the observation well shall be according to the latest edition of the ASTM Subcommittee D18.21, Design and Installation of Groundwater Monitoring Wells in Aquifers.

(f) Storage coefficient and other aquifer characteristics determined for existing wells in a Coastal Plain Province well field, may be used for delineating the SWAA areas for an additional well in the well field if constructed similar to others in the well field.

(g) If the SWAA can be determined without constructing an observation well, a request for an exemption from constructing an observation well may be requested after submittal of all supporting information.

Author: Edgar K. Hughes, Dennis D. Harrison

Statutory Authority: Code of Ala. 1975, §§22-23-33, 22-23-49, 22-22A-5, 22-22A-6.
History: **New Rule:** Filed November 7, 2005; effective December 12, 2005. **Amended:** Filed December 18, 2007; effective January 22, 2008.

335-7-15-.10 Aquifer Test.

An aquifer test of a finished community system production well shall be conducted to determine the aquifer storage coefficient and transmissivity. The test method shall be clearly outlined in the engineering specifications for the project and the test procedure shall be continuous with adequate provisions taken to prevent disruption of the test. The calculated storage coefficient and transmissivity values shall be used to determine the SWAA.

(a) Several days before initiating the aquifer test, the well shall be pumped for several hours to determine the following:

1. The maximum anticipated drawdown,

2. The approximate capacity of the well, and

3. If the pump discharge will affect recharge to the well during the anticipated period of the aquifer test.

(b) Steps shall be taken to assure accuracy of the drawdown during the aquifer test.

1. Accurate drawdown readings shall be taken in both the production and observation wells simultaneously. Readings will be taken every 2 minutes for the first hour, every 5 minutes for the next hour, every 10 minutes for the next 2 hours, every 30 minutes for the next 2 hours and then hourly until the end of the test.

2. Drawdown data collected during the period of testing shall be corrected for changes in barometric pressure and tidal oscillations.

3. Recovery water level data shall be determined and recorded simultaneously for both the observation well and production well.

4. The aquifer test shall be conducted for the continuous period required to stabilize the water level at the design capacity.

5. If the aquifer test cannot be conducted according to requirements of this paragraph, a written request shall

be submitted to the Department supporting a waiver of this method.

(c) An aquifer test exemption may be granted for wells completed in karst formations under conduit flow conditions and for confined wells with sources of water greater than 600 feet deep. Waivers from the aquifer test can be considered by the Department after receipt of well logs, documented confining layers, proposed construction standards and a waiver request from the applicant.

(d) A public water system with a proposed well exempted from the aquifer test must conduct a capacity test in accordance with 335-7-5-.09.

Author: Edgar K. Hughes
Statutory Authority: Code of Ala. 1975, §§22-23-33, 22-23-49, 22-22A-5, 22-22A-6.
History: **New Rule:** Filed November 7, 2005; effective December 12, 2005.

335-7-15-.11 Source Water Assessment For A Surface Source.

(1) Source water assessment for a surface water source consists of: delineation of watershed, contaminant source inventory, susceptibility analysis, contingency plans and public awareness, as required by this chapter.

(2) Assessments of proposed new water supply sources must be completed and approved by the Department prior to issuance of a construction permit for the intake.

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Statutory Authority: Code of Ala. 1975, §§22-23-33, 22-23-49, 22-22A-5, 22-22A-6.
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335-7-15-.12 Delineation Of Watersheds.

Watersheds for all surface water intakes shall be delineated using the Hydrologic Unit Code (HUC), or other approved methods. Delineated watersheds shall extend upstream and laterally from intakes to the watershed topographic boundary, the next upstream dam (where applicable), and to the adjacent state boundary. Watersheds shall be depicted on US Geological Survey (USGS) topographic maps using a suitable scale between 1:100,000 and 1:24,000. Map overlays and the Geographical Information System (GIS), or other approved methods, may be used to depict various types of information such as large land areas, for the watershed

and the Source Water Protection Area (SWPA). Maps of watershed delineations must show the location of intakes and known and potential contaminant sources, using the Global Positioning System (GPS) coordinates. The SWPA is the area designated for close scrutiny by the contaminant source inventory and protection, and shall be shown on the watershed map, or overlay, in accordance with the following:

(a) For river runs, creeks, and streams: The SWPA area shall extend from ¼ mile downstream of an intake (where practicable) to:

1. Fifteen (15) miles upstream of the intake,

2. One-quarter mile below the next upstream intake,

3. The next upstream dam, or

4. The state boundary.

5. The SWPA shall extend laterally from the intake for a minimum distance of 500 feet beyond the edge of the body of water at summer pool elevation serving the intake. Special conditions, such as an area of known potential or suspected contaminant sources, may require the width of the SWPA to exceed 500 feet. Significant tributaries (tributaries draining an area of known, potential, or suspected contaminants) entering the SWPA shall be included as a part of the SWPA for a minimum of one mile upstream of the tributary and laterally to each side of the tributary for a minimum of 500 feet.

(b) For lakes and reservoirs with water surface areas exceeding 1000 acres the SWPA shall extend from ¼ mile downstream of the intake (where practicable) to:

1. Five (5) miles upstream of the intake in all directions of potential flow toward the intake,

2. A minimum of 500 feet inland for land falling within the above five mile distance of potential flow towards the intake.

3. A minimum of one mile upstream and a minimum of 500 feet to each side of significant tributaries falling within the above five mile distance of flow towards the intake.

(c) For lakes and reservoirs with water surface areas equal to or less than 1000 acres the SWPA shall extend from ¼ mile downstream of the intake (where practicable) to:

1. A minimum of 500 feet inland for the entire body of water or waters;

2. A minimum of one mile upstream and a minimum of 500 feet to each side of significant tributaries to the body of water.

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335-7-15-.13 Contaminant Source Inventory Development For A Surface Source.

Source water protection areas (SWPA) shall be inventoried for known and potential contaminant sources. Information on existing contaminants sources shall be obtained by reviewing records available from Local, State, and Federal permitting and monitoring agencies plus on-site field surveys conducted by water system personnel. Information on non-permitted contaminant sources shall be obtained by on-site field surveys conducted by water system personnel their or designees.

(a) Information on all contaminant sources identified from records and by water systems shall be recorded in tabular form and include:

1. Contaminant source identification.

2. Contaminant source nature, specific contaminate present at the site, and relative amount.

3. Contaminant source location by longitude and latitude as determined by GPS units of activity, such as crops or pasture (animals grazing) can be located by one point indicate most probable entry of runoff to the water source.

4. Name, address, and telephone number of owner or generator of the contaminant source.

5. Name of the regulatory agency that permitted and monitors the contaminant source.

6. Identify contaminant sources as to whether or not they are regulated.

(b) Contaminant sources identified above shall be plotted on an overlay of the watershed map. Contaminant sources associated with large areas of land shall be plotted using GIS

information, when available. Otherwise, the approximate area and location shall be shown on the watershed map.

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335-7-15-.14 Susceptibility Analysis For A Surface Source.

Upon completion of the contaminant source inventory, a representative of the water system and a representative of the Department shall jointly perform a susceptibility analysis of all contaminant sources identified in the contaminant source inventory.

(a) Contaminant sources shall be analyzed for their susceptibility to impact raw water quality. Contaminant sources shall be classed as highly susceptible, moderately susceptible, or not susceptible to impacting raw water quality after consideration of, but not limited to, the following factors:

1. Contaminant source nature, location, type, and source.

2. Concentration and volume of contaminant source after consideration of time of travel to the intake, and dilution.

3. Likelihood the contaminant source can be removed or diverted from the intake by emergency operations measures.

(b) All contaminants shall be plotted on the watershed map by using latitudes and longitudes based on GPS methods. The contaminants sources shall be identified by name and by legend on the map, using color codes to identify their susceptibility classification. The susceptibility codes to be used are:

1. Red: Highly susceptible

2. Yellow: Moderately susceptible

3. Green: Low susceptible.

Author: Edgar K. Hughes
Statutory Authority: Code of Ala. 1975, §§22-23-33, 22-23-49, 22-22A-5, 22-22A-6.
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335-7-15-.15 Contingency Plans For A Surface Water Source.

The water system shall submit to the Department for approval contingency activities for potential contaminant sources rated highly susceptible to entering the intake which may rapidly cause the raw water to be difficult to properly treat. Upon approval of their contingency plans, water systems shall implement them immediately and incorporate them into their Standard Operating Procedure (SOP). Contingency actions may include, but not be limited to the following items, individually, and in combination:

(a) Temporarily closing of the treatment plant,

(b) Obtaining raw water from another approved source,

(c) Obtaining finished water from another public water system,

(d) Developing adequate distribution storage for the expected duration of the contamination event,

(e) Using emergency containment devices to exclude contaminant sources from intakes.

(f) During periods when a treatment plant is closed due to the presence of excessive contaminants, it shall remain out of service until monitoring by the water system indicates the contaminant is no longer a threat to the treatment process or quality of finished water. The water system shall keep the Department informed of the status of its raw water quality whenever a contamination event results in the closure of a plant and shall furnish monitoring results to the Department. Treatment plants shall not be returned to service until approval has been received from the Department.

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335-7-15-.16 Public Awareness.

Source water assessment is complete when the water system makes the public aware of the condition of its raw water supply, including its susceptibility to contamination. This can be accomplished by performing all of the following:

(a) Presenting an oral report to the consumers of the system's water at a public meeting within 90 days after receiving notification from the Department that the susceptibility analysis has been completed and contingency plans have been approved. The report must include a list of all contaminant sources to which the water system's source water is susceptible, the susceptibility rating of the contaminant source, and a map showing the location of contaminant sources identified in the contaminant inventory. For groundwater sources, the map must indicate the SWAA I and SWAA II and the location of the contaminant sources identified in the contaminant inventory. Water system management should attempt to answer reasonable questions asked by the public relating to source water quality and should make the public aware of other options available for reviewing assessment results.

(b) Allowing individual members of the public to review all assessment documents during normal business hours of operation at the water system's office. Assessment documents must be maintained on display at the system's water office for easy access by the public.

(c) Providing copies of the assessment documents to members of the public upon request after payment of a nominal reproduction fee.

(d) Including an abbreviated report in the system's annual consumer confidence report. The report must include the information contained in paragraph (a) above and must inform the public of the other options available for reviewing the assessment results.

(e) Responding within 45 days to reasonable written questions by the public relating to the quality of its source water. The water system must maintain a file of questions asked by the public and the water system's response to such inquiries.

(f) In lieu of 335-7-15-15(a), NTNC and Non-community water systems may post a copy of the SWPA contaminant inventory, susceptibility analysis, and contingency plan in a location convenient to the consuming public.

Author: Edgar K. Hughes, Dennis D. Harrison
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335-7-15-.17 Updating Of Assessments.

After the initial approval by the Department, the assessment must be updated by the water system when there is a significant change to any portion of the assessment. These changes shall be included in the source water assessment review performed at the time the water system is completing the application for a renewal of the facility's operating permit.

Author: Edgar K. Hughes

Statutory Authority: Code of Ala. 1975, §§22-23-33, 22-23-49, 22-22A-5, 22-22A-6.

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