

Source Water Protection Measures**Source Water Protection Measures****25-32d-1. [REPEALED]**

(Repealed effective August 10, 2000.)

25-32d-1a. Definitions

As used in Sections 25-32d-1a to 25-32d-6, inclusive, of the Regulations of Connecticut State Agencies:

- (1) "1 in 100 occurrence frequency" means the 1 in 100 year recurrence interval for the critical dry period or the one percent non-exceedance probability for the critical drawdown duration.
- (2) "Active source" means a department approved source of supply which meets state and federal water quality standards, with adequate department approved treatment facilities as needed, or for which compliance schedules are in place. An active source is one that is permanently connected to the system and may include, but need not be limited to, a seasonal or standby source of supply that may be used intermittently or on a partial year basis.
- (3) "Adequate water supply" means a quantity of water sufficient to meet demands even in a critical dry period.
- (4) "Available water" means the maximum amount of water a company can dependably supply, taking into account the following reductions applied to safe yield: any limitations imposed by hydraulics, treatment, well pump capabilities, reductions of well yield due to clogging that can be corrected with redevelopment, transmission mains, permit conditions, source construction limitations, approval limitations, or operational considerations; and the safe yield of active sources and water supplied according to contract, provided that the contract is not subject to cancellation or suspension and assures the availability of water throughout a period of drought and that the supply is reliable.
- (5) "Average daily demand" means the total annual production from all sources of supply divided by the number of days in that calendar year.
- (6) "Commissioner" means the Commissioner of Public Health or his designated representative.
- (7) "Complete plan" means a plan that satisfies the content requirements of Sections 25-32d-2 through 25-32d-4, inclusive, of the Regulations of Connecticut State Agencies and that is technically adequate for its intended purpose.
- (8) "Conservation" or "water conservation" means measures designed to promote efficient use of water and to eliminate waste of water.
- (9) "Consumptive losses" means any water uses which do not result in the water being discharged back into the water source at or near the withdrawal point in substantially the same quality and quantity as prior to use.
- (10) "Critical drawdown duration" means the length of time for a reservoir to go from full to the bottom of usable storage for single-year cycle reservoirs, and from full to the bottom of usable storage without spilling in the intervening period for multi-year cycle reservoirs.
- (11) "Critical dry period" means the historic drought event for which yield is the least. For surface water sources of supply the critical dry period has both a critical drawdown duration and a 1 in 100 occurrence frequency. For ground water sources of supply the critical dry period is the 180 day pumping event with no precipitation recharge and a seven day duration and a one in ten year recurrence frequency of the stream flow.
- (12) "Critical system component" means any water system component or facility necessary to deliver, with at least twenty-five pounds per square inch of pressure, one hundred percent of the average daily demand of the system or any portion of the system that it serves.
- (13) "Demand management" means conservation measures which provide assistance for

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- consumers to use water economically and efficiently and that may achieve permanent water savings.
- (14) "Department" means the Department of Public Health or its designated representative.
- (15) "Emergency source" means a source of supply identified by the water company within its water supply emergency contingency plan for possible use at various stages of an emergency. An emergency source is not an active source and is not considered part of available water. An emergency source may be prohibited from use as a source of supply due to contractual limitations, lack of water quality monitoring, known or suspected water quality limitations, the need for additional treatment prior to use, or the absence of any required state and local approval.
- (16) "Flashboards" means temporary or semi-permanent structures across the spillway of a reservoir. Elashboards increase water levels and storage volumes that are designed to be released during flood events.
- (17) "Inactive source" means a source of supply that is not used or maintained as an active or emergency source of supply, but has not been abandoned in accordance with Section 25-33k of the Connecticut General Statutes, is not routinely monitored, and is physically disconnected from the system.
- (18) "Initial plan" means the first plan for a water company ever requested by the commissioner pursuant to Section 25-32d of the Connecticut General Statutes.
- (19) "Major users" means the ten water customers with the greatest annual volumes of water use for the most recent calendar year and all other users with individual meters or estimated use exceeding an annual average of 50,000 gallons of water per day based on the most recent calendar year.
- (20) "Margin of safety" means the unitless ratio of available water to demand.
- (21) "Mass balance methodology" means a technique based on the continuity equation, in which the sum of all water inflows minus the sum of all water outflows is equal to the change in storage. Inflows include streamflow, direct precipitation, diversions, routing from upstream reservoirs, ground water discharge, and supplementation from wells. Outflows include water supply withdrawals, streamflow releases, evaporation, diversions, consumptive losses, groundwater recharge, uncontrolled releases downstream orspills from the reservoir, and dam leakage.
- (22) "Maximum month demand" means the highest water demand in a month calculated by dividing the total production from all sources of supply for each calendar month by the number of days in that month and expressed in gallons per day.
- (23) "Minimum stream flow releases" means water released from a reservoir for the purpose of providing a specified flow rate downstream of a dam. The flow requirements may be fixed or variable.
- (24) "Modified plan" means any amendments, modifications or page revisions to an initial or revised plan as requested by the commissioner or submitted by a water company in order to satisfy the requirements for completeness or plan approval.
- (25) "Non-revenue water" means the difference between total annual metered water production and the sum of annual metered water consumption plus any other properly estimated revenue-producing unmetered water.
- (26) "Peak day demand" means the annual maximum daily rate of water use measured in gallons per day.
- (27) "Planning periods" means time periods for projecting future demands for planning to meet future water supply needs. Planning periods are five years from the time of plan preparation and twenty years (20) and fifty (50) years from the last decennial census.
- (28) "Regional planning organization" means regional planning agencies as defined in Sections 8-31 a through 8-37b, inclusive, of the Connecticut General Statutes, regional councils of elected officials as defined in Sections 4- 124c through 4-124h, inclusive, of the Connecticut General Statutes, where such councils have undertaken to exercise the powers of a regional planning agency and regional councils of governments as defined in Sections 4-124i through 4-124p, inclusive, of the Connecticut General Statutes.

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- (29) "Revised plan" means any subsequent plan requested by the commissioner or submitted by a water company pursuant to Section 25-32d of the Connecticut General Statutes after the initial plan and excluding modified plans.
- (30) "Safe yield" means the maximum dependable quantity of water per unit of time which may flow or be pumped continuously from a source of supply during a critical dry period without consideration of available water limitations.
- (31) "Source of supply" means any well, spring, reservoir, stream, river or other location where water is siphoned, pumped, channeled, or withdrawn for water supply purposes, including interconnections with other water companies.
- (32) "Stabilization" means a condition measured during a pumping test when no more than a total of 0.25 feet of drawdown occurs over the last twelve hours prior to completion of the test or, where drawdown cannot be determined to that accuracy due to equipment inadequacy, no more than a total of 1.0 foot.
- (33) "State agency" means the Department of Public Health, the Department of Environmental Protection, the Department of Public Utility Control, or the Office of Policy and Management, as applicable.
- (34) "Supply deficient" means a supply of available water insufficient to meet average daily demand, maximum month demand, or peak day demand.
- (35) "Supply management" means conservation measures which improve the efficiency of and eliminate waste in the production and distribution of water within a system.
- (36) "Usable storage" means the difference between total storage volume of a water supply reservoir and the remaining volume below the minimum operational level, intake pipe elevation, or water elevation above which water can be treated to meet water quality standards, whichever is least.
- (37) "User category" means metered residential, metered commercial, metered industrial, metered public authorities, unmetered residential, unmetered commercial, unmetered industrial, unmetered public authorities, and non-revenue water. Residential includes apartments and condominiums.
- (38) "Water company" or "company" means a water company as defined in Section 25-32a of the Connecticut General Statutes.
- (39) "Water supply emergency contingency plan" means response procedures and preparations for water supply emergencies due to contamination, power outages, drought, flood or failure of any or all critical system components by natural or manmade events.
- (40) "Water supply emergency" means any event that may adversely impact the quality or quantity of potable water supplies such that it may not be sufficient to serve customers in accordance with the provisions of the Public Health Code.
- (41) "Water supply system" means any combination of interconnected sources and facilities for the purposes of supplying potable water which are owned and operated by the same water company.
- (42) "Watershed" means land from which water drains into a water company's source of supply.
(Added effective August 10, 2000.)

25-32d-2. Preparation of plans and schedule for submission

- (a) Each water company supplying water to 1,000 or more persons or 250 or more consumers, and any other water company requested by the commissioner, shall submit a water supply plan for approval in conformance with Sections 25-32d- 1a through 25-32d-6, inclusive, of the Regulations of Connecticut State Agencies.
- (b) If the commissioner requests a water company to submit an initial plan, the water company shall submit the plan within two years from the date of the request.
- (c) If the commissioner requests a water company to submit a revised plan, the water company shall submit the plan within one year from the date of the request.
- (d) In preparing the plan, the water company shall:

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- (1) Provide a separate analysis for each water supply system;
 - (2) use gallons as a unit of measure; and
 - (3) use the most current national geodetic vertical datum from the National Geodetic Survey, unless otherwise specified.
- (Added effective August 10, 2000.)

25-32d-3. Contents of the plan

Each water supply plan submitted shall evaluate the water supply needs in the service area of the water company and propose a strategy to meet such needs. The plan shall contain:

- (a) A description of the existing water supply system, including:
 - (1) The legislative or franchise authority for the areas proposed to be served by the plan;
 - (2) a list and description of: water company owned lands; service areas; sources of supply, including active, emergency and inactive sources, with a description of what portion of the service area is served by each source of supply; pump stations; and storage and treatment facilities;
 - (3) a map of: water company owned lands, service areas, sources of supply, interconnections, pumping stations, pressure zones, watershed boundaries, storage and treatment facilities;
 - (4) a map and description of existing transmission and distribution facilities, including age, materials, capacity and condition, if known;
 - (5) a description of meter reading and testing program and extent of metering;
 - (6) a schematic of the water supply system's hydraulic profile;
 - (7) a general discussion of the water supply system's fire flow capabilities;
 - (8) the calculation of the safe yield of each source of supply in accordance with Section 25-32d-4 of the Regulations of Connecticut State Agencies;
 - (9) a summary of monthly system production data by sources of supply and a summary of system average daily demands, maximum month demands and peak day demands for the previous five years;
 - (10) a list, description, and map of existing interconnections, and the quantities of water sold to or purchased from other water companies during the previous five years, and any limitations on their use;
 - (11) a history of water quality violations in each water supply system for the previous five years and a trend analysis for water quality parameters that may be approaching water quality standards;
 - (12) a description of the watershed inspection program required pursuant to subsection (b) of Section 19-13-B102 of the Regulations of Connecticut State Agencies and the cross connection inspection program required pursuant to subsection (f) of Section 19-13-B102 of the Regulations of Connecticut State Agencies, and demonstration of compliance with certification requirements pursuant to Sections 25-32-7a through 25-32-14, inclusive, of the Regulations of Connecticut State Agencies;
 - (13) a description of existing state, local, and regional land use plans, policies, classifications and zoning as they relate to source protection; and
 - (14) identification of potential and historic pollution sources which may affect sources of supply.
- (b) An analysis of present and future water supply demands for the five, twenty, and fifty year planning periods, including:
 - (1) A description of the present population distribution patterns and population served;
 - (2) data and an evaluation of current and historic water use in each water supply system for the past five years of record, or since the most recent submittal of a water supply plan, including average daily, maximum month and peak day demands and sales to other water companies. Water companies that have this

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- (3) data compiled by user categories shall provide data in that form;
 - (4) a description of local, state and regional land use plans, policies and zoning as related to projected water demands and future service areas;
 - (5) projected water demands for the five, twenty and fifty year planning periods, A 4 including sales to other water companies, based on user categories if data is available, and local land use plans and zoning regulations;
 - (6) an assessment of population changes within existing and future service areas for the five, twenty, and fifty year planning periods using the Office of Policy and Management's most current population data and projections, including an explanation of any deviations thereto and maps depicting the existing and future service areas;
 - (7) identification of any sources of supply that will no longer be used to meet system demands or any sources of supply to be abandoned;
 - (8) an analysis of the relationship between available water and average daily demand as determined for the most recent representative period of record not affected by unusual demand conditions such as drought or a significant temporary increase in demand, maximum month demand and peak day demand and the margin of safety to be maintained by the water company currently and for the five, twenty, and fifty year planning periods;
 - (9) demonstration that the margin of safety is sufficient to meet the water company's current and future needs considering factors such as potential increases or decreases in demand, the time required to bring new sources of supply on line, potential losses of sources of supply or decreased capacities, land area available for development, available interconnections and other factors which may increase or reduce supply or demand;
 - (10) an analysis of any treatment limitations, water quality concerns, or distribution system limitations and the ability to meet demands currently and for the five, twenty and fifty year planning periods; and
 - (11) an analysis of any system improvements necessary to minimize the effect of a water supply emergency on critical system components as identified in subdivision (1) of subsection (d) of this section.
- (c) An assessment of potential alternative sources of supply, including:
- (1) An analysis of alternatives to allow the use of inactive or emergency sources of supply and the safe yield of existing active sources of supply beyond any current limitations in order to meet demands currently and in the five, twenty and fifty year planning periods;
 - (2) an evaluation of potential new sources of supply and a description of existing state, local and regional land use plans, policies, classifications and zoning as they relate to source development;
 - (3) identification of potential or historic pollution sources which may affect any new source of supply; and
 - (4) a demonstration of the ability of the selected alternatives to meet future system demands, including a conceptual implementation plan.
- (d) A water supply emergency contingency plan, including emergencies due to contamination of water, power outages, drought, flood or failure of any or all critical system components. Such water supply emergency contingency plan shall include:
- (1) A list identifying critical system components and potential water supply emergencies that may affect them including contamination, power outages, drought, flood or failure, but excluding routine events, such as water main breaks and inoperable valves;
 - (2) a description of the level of service to be sustained during water supply emergencies, including identification of priority users, procedures for public notification of priority users, and the means for provision of essential potable water to priority users where priority is based on the potential risk to health,

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- safety and welfare posed by the curtailment of service; and procedures for advance notice to users for which service may be suspended if rationing is required and for implementation of rationing and use bans;
- (3) procedures for responding to toxic spills or hazardous materials that may contaminate a watershed or aquifer used for drinking water;
 - (4) an inventory of equipment needs and availability, including location of existing emergency equipment, generators and spill response materials, identification of additional emergency equipment needs, and procedures for obtaining additional equipment or services;
 - (5) a list prioritizing emergency sources, including interconnections and independent industrial and commercial water supplies within the service area, and describing contractual, technical and financial requirements for their use, a schedule for activation, available yield and known water quality problems or limitations;
 - (6) procedures for notification of local, state and federal officials and the public;
 - (7) a description of duties and responsibilities of key personnel involved in emergency response actions, and a procedure for contacting and scheduling staff;
 - (8) a description of five stages of response during water supply emergencies of increasing severity, including identification of trigger levels which initiate each stage based on water supply availability, reservoir storage levels, or critical operational indicators, including storage tank recovery, pumping capacity, or for groundwater dependent systems, the number of hours of continuous well pump operation. The five stages of response shall include: a water supply alert, a water supply advisory, a water supply emergency--phase I, a water supply emergency--phase II, and a water supply emergency--phase III. Triggers shall give sufficient lead time to adequately implement response actions. The plan shall include the following stages and actions unless otherwise approved by the department:
 - (A) a list of actions to be taken in a water supply alert, including contacting the department, measures to evaluate the water supply availability and demand situation, review and update of water supply emergency contingency plan, and developing media information plan;
 - (B) a list of actions to be taken in a water supply advisory, including contacting the department, reevaluation of emergency source options, schedule for obtaining emergency equipment, implementation of internal measures to maximize use of existing active sources, promotion of voluntary conservation in residential, commercial and industrial facilities to reduce demand by ten percent from previous nondrought average for the appropriate month, preparation for mandatory conservation including necessary enforcement mechanisms, activation of the budget process for funding necessary projects and those actions required under a water supply alert;
 - (C) a list of actions to be taken in a water supply emergency--phase I, including contacting the department, preparing emergency sources for use, implementation of first phase of mandatory conservation to reduce demand by an additional five percent for a total of fifteen percent from previous non- drought average for the appropriate month, coordination with local officials concerning alternative facilities for obtaining water, reevaluation of priority among users and those actions required under previous water supply emergency contingency plan stages;
 - (D) a list of actions to be taken in a water supply emergency--phase II, including contacting the department, activation of emergency sources upon department approval, institution of second phase of mandatory conservation to reduce demand by an additional five percent for a total of

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depending upon the condition of the system, and shall include at least the following information:

- (A) goals and objectives for demand management;
- (B) strategies to reduce maximum month and peak day demands;
- (C) existing demand management elements including a detailed description of each element with the dates or period of introduction;
- (D) alternative demand management solutions to supply deficiencies, if applicable, including the feasibility of establishing a no demand increase policy for new service connections, which would require potential customers to invest in water saving programs within the existing system which would save the amount of water needed to serve new development;
- (E) a program to provide technical assistance to major users in the performance of water audits and in the formulation and implementation of retrofitting. Such programs shall:
 - (i) provide a list of the current major users with their annual water use for the last year of record in gallons per day, and type of use, prioritizing those which have the greatest potential to conserve water;
 - (ii) describe and evaluate the water audit programs available to the major users, including the following categories of water use: process, sanitary, domestic, heating, cooling and outdoor, for each customer; the areas in which overall efficiency of water use can be improved, and an estimate of water savings if improvements are made;
 - (iii) address recycling, reuse, process changes, replacement or retrofitting, and other efficiency measures; the areas in which peak demands can be reduced and the estimated amount of the reductions; leak detection services which can be offered to consumers; a written report to the customer, with specific recommendations, projected water savings, implementation cost estimates and pay-back period estimates;
 - (iv) report on past program accomplishments since the last water supply plan, including the number of audits performed, and a summary of estimated water use reduction achieved; and
 - (v) describe any additional technical assistance that has been undertaken or is planned;
- (F) plumbing retrofit programs that:
 - (i) briefly describe any residential retrofit program since the last water supply plan; and
 - (ii) describe how water companies that are supply deficient or anticipate development of a new source of supply within the next ten years will investigate ways to encourage residences to retrofit with additional efficient and water-conserving appliances and fixtures and ways to encourage the retrofitting of process and domestic uses of commercial, industrial, and institutional users;
- (G) water rates and pricing information that:
 - (i) discusses the present rate structure; and
 - (ii) assesses rate structure alternatives and frequency of billing to evaluate their anticipated impact on water conservation. Rate structure alternatives to be assessed include: eliminating or consolidating the blocks of existing declining block rate structures; implementing a separate uniform metered rate for

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- each user category or for all consumption by the elimination of declining block rates; minimizing customer service charge that will recover no more than the minimum costs of reading meters, billing of customers, and meter-related costs; implementing seasonally increased rate structures to reduce peak demands; implementing an inclining block structure for all metered consumption or for each user category; for water companies not regulated by the Department of Public Utility Control, assessing enterprise fund accounting with a program for establishing full-cost pricing and self-sustaining budgets; and
- (H) a public education program that:
 - (i) addresses water conservation for all residential, industrial, commercial, institutional, agricultural, and public authority customers, and evaluates the following components for inclusion: advice to local hydrant users about proper utilization and maintenance of hydrants; bill stuffers; consumer education on self monitoring using home water meters; displays at home shows, fairs, libraries, and town halls; displays or information regarding water efficient plantings and gardening methods and native landscaping; education program for municipal and water company employees; notification to customers with unusually high recorded uses to check for household leaks; newspaper and magazine articles; pamphlets, handbooks, posters, newsletters, and billboards; information to homeowners on more efficient means of watering lawns and ornamental shrubs; speakers on various water conservation topics; and school programs. If there is an existing program, it shall discuss how it can be continued or, if necessary, what improvements should be made in the program;
 - (ii) describes how the program of public education will be implemented; and
 - (iii) addresses compliance with Sections 25-32k and 25-321 of the Connecticut customers, without charge, educational materials or information on water conservation.
 - (4) The supply management section of the water conservation plan shall:
 - (A) state the goals and objectives for supply management;
 - (B) discuss a meter management program, with the discussion including:
 - (i) a schedule for one hundred percent source metering in compliance with subsection (n) of Section 19-13-B102 of the Regulations of Connecticut State Agencies within five years, if all sources of supply are not currently metered; details on the current source meter reading, testing, calibrating, repair, and replacement program; the adequacy of the metering program and a schedule of activities necessary to correct deficiencies and to achieve source metering objectives; and the extent of metering of other major system components; and
 - (ii) the extent of consumer metering, plans to expand metering, and the current frequency of meter testing, maintenance and calibration, and the replacement rate; the benefits of metering all individual, residential, commercial, industrial, and public authority customers, if no metering is in place or if there is only partial metering; whether existing meters are of appropriate size and design type; and if meter downsizing should be implemented to reduce lost water;

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- (C) determine, by means of an annual evaluation of the water supply system, the amount, location, and causes of non-revenue water; discuss the annual water system evaluation process based on the actual evaluation data from the previous five years, or if such data is unavailable, on the most current calendar or fiscal year data; and discuss the results and conclusions of such evaluations and where applicable plans to reduce non--revenue water; and
 - (D) discuss the current leak detection and repair program and any plans to expand leak detection efforts and plans to reduce water lost from leaks, including the following:
 - (i) an explanation of the method used for leak detection and description of the sensitivity of the equipment used;
 - (ii) a discussion based upon the most recent leak detection survey, if one has been performed, of the number of leaks found, the number fixed, the estimated amount of water saved, and the existing leakage rate in gallons per day per mile;
 - (iii) a discussion of the existing and projected costs of this program and an evaluation of the cost effectiveness of further distribution system rehabilitation to correct sources of lost water; and
 - (iv) if leak detection and repair objectives have been achieved, a discussion of the planned continuing maintenance program to retain and achieve the lowest leakage rate feasible; and
 - (E) evaluate the effects that a pressure reducing program would have with respect to water conservation and discuss plans to reduce water losses through pressure reduction.
- (5) A five year implementation plan shall be developed providing a schedule and estimated budget for implementing selected demand and supply management measures.
- (6) This analysis of the impacts of water conservation practices shall discuss the procedures and criteria to measure the effectiveness of the water conservation measures to be implemented.
- (Added effective August 10, 2000.)

25-32d-4. Calculation of safe yield

- (a) Surface water sources. Safe yield shall be developed using a mathematical mass balance methodology and shall be based on a ninety-nine percent dry year or a critical dry period with a 1 in 100 occurrence frequency and shall be based on the usable storage capacity of a reservoir which can be used without additional equipment or treatment, except that the safe yield may be less due to requirements for the passing of minimum stream flows or other release requirements. The statistical frequency analysis shall be performed by developing a low flow duration curve using the adjusted stream gaging data for the critical drawdown duration. All surface water safe yield analyses shall be performed by an individual with a minimum of five years experience in surface water analysis and a bachelor's or advanced degree from an accredited college or university in hydrology or related engineering field, or a professional engineer licensed in accordance with Chapter 391 of the Connecticut General Statutes with a minimum of five years experience in surface water analysis. For cases where a mass balance analysis cannot be performed due to insufficient usable storage volume, such as run of the river type situations or diversions, the safe yield shall be determined based upon an analysis of the streamflow for a ninety nine percent dry year assuming a seven day average flow duration. Information developed for other sections of the water supply plan may be referenced, if appropriate. The methodology for determining the safe yield of surface water supplies shall include the following:
- (1) Inflow into the reservoir shall be based on gaged streamflow data collected from

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within the watershed or calculated from measured historical reservoir levels. Where such data is not available, unregulated stream gaged data from another watershed (external) which closely approximates the watershed of interest shall be used as determined by a verification analysis of historic inflows or reservoir levels versus the selected gage. Factors to consider when selecting the external gaging station shall include amount of stratified drift, land uses, slope, stream length, length of record, vegetation and geomorphology. The selected stream gage flow record or historic inflow record shall be of sufficient length and period of record as necessary to perform the required frequency analysis in subdivision (10) of this subsection. In cases where historic reservoir data is insufficient or unavailable for a verification procedure, then the selected gage shall have similar watershed characteristics and worst case low flows.

- (2) Operating rules. The operating rules for the movement of water, reservoir conditions, and operation of the reservoir or reservoir system shall be listed and described. Reservoir conditions shall include the total and usable reservoir storage capacity; top and bottom elevation of the reservoir dam; spillway elevation, length and type; elevations and diameters of water supply intakes; and use of flashboards. Operating rules shall address conjunctive use of multiple reservoirs or wells, diversions, alternate release patterns, and operation of reservoirs in series or parallel. Operating rules shall be utilized in performing safe yield calculations.
- (3) Computational interval. The mass balance analysis shall utilize a computational interval of no more than one month. Daily flow analysis may be required to appropriately model flood skimming diversions or low flow diversions unless truncated flow hydrographs are developed.
- (4) Diversions. The safe yield analysis model shall include any diversions of water into or out of the watershed. The operating characteristics, flow capacity of the diversions and the runoff to the point of diversion shall be provided. Both existing and proposed diversions shall be analyzed, provided such proposed diversions are identified as needed within the five year planning period.
- (5) Withdrawal rates. The reservoir outflow due to water withdrawal shall be varied on a monthly basis, based upon historic withdrawals for the last five year period of record. All supportive data shall be provided.
- (6) The safe yield analysis shall be extended to determine the time to refill after the critical dry period assuming normal system operation, annual withdrawal rates equal to the calculated safe yield and inflow from the period immediately following the critical dry period.
- (7) The safe yield of surface water sources shall be analyzed as a combined multiple reservoir system based upon a flow routing analysis and specified operating rules, unless previously approved by the department.
- (8) Safe yield model inflow.
 - (A) Developing inflow record. The flow record for the chosen streamflow gage shall be adjusted to the watershed being analyzed by a ratio of the watershed area being analyzed to the watershed area of the selected streamflow gage. Further adjustment may be necessary to calibrate the safe yield model based upon verification procedures.
 - (B) Verification of safe yield model. In cases where an external stream gage is utilized, the inflow data shall be verified by comparing the end of period storage levels predicted from the chosen streamflow gage record against the actual measured historical reservoir levels from a representative dry period. Operating rules indicated to be in use during the chosen dry period shall be used for the verification procedure.
 - (C) Period of record. The entire period of record using mass balance methodology shall be analyzed to determine the critical dry period.

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- (D) Usable storage. The reservoir yield shall be developed using usable storage capacity based on bathymetric or topographic surveys and shall factor in sediment deposition. The calculation of usable storage excludes storage based on flashboards and water that cannot be accessed without special use of pumps or other emergency techniques.
 - (E) Direct precipitation. Direct precipitation on the surface area of the reservoir shall be calculated using the closest representative precipitation gage for the historic critical dry period or the ninety nine percent exceedance. Published data shall be used where possible. If unpublished data is used the data shall be submitted in support of the analysis. Water companies may choose to use the net impact of the direct precipitation minus the evaporation. The precipitation data shall be based on an interval no greater than one month.
- (9) Safe yield model outflow
- (A) Evaporation rates. The safe yield analysis shall incorporate monthly evaporation rates computed over the surface area of the reservoir either as calculated at the end of each computational interval or, assuming a constant surface area based upon two-thirds of usable storage capacity. Monthly evaporation rates as listed in this sub-paragraph shall be used in the safe yield analysis:

Evaporation rates (inches per month)

| | |
|-----------|------|
| January | 0.85 |
| February | 0.93 |
| March | 1.51 |
| April | 2.15 |
| May | 4.15 |
| June | 5.10 |
| July | 5.61 |
| August | 5.25 |
| September | 3.64 |
| October | 2.60 |
| November | 1.66 |
| December | 1.34 |

- (B) Consumptive losses to the watershed shall be evaluated.
 - (C) Dam leakage. Leakage rates shall be based upon field measurements or data obtained from the Department of Environmental Protection. If data is not available, then use of an estimated value is acceptable.
 - (D) Minimum streamflow releases. The minimum streamflow release shall be determined in accordance with Sections 26-141a-1 through 26-141a-26, inclusive, of the Regulations of Connecticut State Agencies and, where applicable, Sections 22a-365 through 22a-378, inclusive, of the Connecticut General Statutes, and the regulations adopted pursuant to Section 22a-377 of the Connecticut General Statutes. This requirement may be met by dam leakage and required riparian releases which equal or exceed the required minimum releases.
- (10) 1 in 100 occurrence frequency. A statistical frequency analysis shall be performed using a Log-Pearson Type III distribution analysis to confirm that the average inflows over the critical drawdown duration equal or exceed a 1 in 100 occurrence frequency. A minimum of thirty years of streamflow record is required, unless otherwise approved by the department. The computed 1 in 100 occurrence frequency flow for the specified critical drawdown duration shall then

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be compared to the average flows for the same historic period. If necessary to meet or exceed the 1 in 100 occurrence frequency requirement, the inflow record shall be modified by a ratio adjustment and the mass balance analysis shall be rerun accordingly.

- (A) All low-flow data used in computing Log-Pearson Type III frequencies shall be non-zero values. If zero values have occurred, then the statistical parameters, such as mean, standard deviation, and skew, shall be adjusted as recommended by the United States Geological Survey in technical memorandum number 89.11, available from the United States Geological Survey.
 - (B) For critical drawdown durations exceeding three hundred and sixty five days, the data to be used in the frequency analysis shall be non-independent values based upon flow periods equal to the critical drawdown duration within consecutive overlapping years.
 - (C) If the inflow record utilized in the safe yield analysis exceeds the 1 in 100 occurrence frequency, then, at the water company's option, the inflow record may be modified by a ratio adjustment to exactly meet but not be under the 1 in 100 occurrence frequency requirement and the mass balance analysis rerun accordingly.
- (11) Submittal requirements. The water companies required to submit plans shall submit information on the dam leakage quantities, precipitation, riparian releases, minimum streamflow releases or an indication of exemption to such releases, critical drawdown duration, drought duration, 1 in 100 year low flow value, frequency analysis. safe yield computations including input and output, schematic of the reservoir system and stage or storage tables and curves, and the stage or area tables and curves, for approval. All sources of data used in the safe yield analysis shall be referenced. A summary graph of reservoir storage versus time for the critical dry period and extended to refill shall be submitted.
- (b) Ground water sources. Safe yield of all active wells shall be computed based upon simultaneous pumping tests of all wells in the wellfield and adjusted for the maximum drawdown available during a critical dry period. The pumping tests shall be performed in accordance with subdivision (3) of this subsection. Ground watersafe yield analyses shall be performed by an individual with a minimum of five years experience in ground water analysis in a glaciated geomorphological setting and a bachelor's or advanced degree from an accredited college or university in a ground water related science or related engineering field, or by a professional engineer licensed in accordance with Chapter 391 of the Connecticut General Statutes with a minimum of five years experience in ground water analysis in a glaciated geomorphological setting.
- (1) The standard method of adjusting pumping test data to account for the critical dry period shall be based on one of the following:
 - (A) For all ground water sources, a multiplier of seventy-five percent, equivalent to an eighteen hour pumping day, shall be applied to the pumping test rate. This adjustment factor shall be applied for calculating and making adjustments for the critical dry period. The resulting safe yield shall be reported in units of both gallons per minute, and gallons or million gallons per day. In addition to the critical dry period adjustment factor, an additional multiplier of ninety percent shall be applied to bedrock or consolidated aquifer ground water sources.
 - (B) Pumping test data shall be analyzed and adjusted for the critical dry period using methodologies appropriate to the hydrogeologic setting and published methodologies as approved by the department. Analytical methodologies shall include steps to:
 - (i) correct pumping test data for significant ambient water level variations. The corrections shall be based on precipitation and

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- static water level influences observed prior to and during the pumping test;
 - (ii) analyze impacts from no-flow boundaries, surface waters, existing pumping wells and any other hydrogeologic influences as evidenced by pumping test data;
 - (iii) project a 180 day pumping event assuming no precipitation recharge;
 - (iv) use analytical methodologies or modeling techniques to determine safe yield and adjust for the critical dry period. At un-gaged sites, regional equations or baseflow measurements, in conjunction with United States Geological Survey Open-File Report 9 1-244, available from the United States Geological Survey, or Connecticut Water Resources Bulletin Number 34, available from the State of Connecticut Department of Environmental Protection, or other reference deemed comparable by the commissioner, shall be used to estimate the streamflow condition with a seven day duration and a one in ten year recurrence frequency; and
 - (v) demonstrate that the water levels at the end of the critical dry period shall be maintained above the intakes.
- (2) An alternative method for analyzing pumping test data may be made at the water company's option in cases where stabilized water levels are above the pump intake or water levels did not stabilize and predicted water levels are above the pump intake after an extrapolation of drawdown over 180 days of pumping. The alternative method may be used in such cases to indicate the additional yield of the well above the installed pumping capacity at the time of the pumping test and, if stabilization did not occur, show that the aquifer has sufficient storage to sustain pumping at the higher rate during the critical dry period and is intended to indicate the maximum well yield attainable with pump replacement, modification, or increased capacity. The alternate method shall meet the following criteria:
- (A) Analytical methodologies or modeling techniques appropriate to the hydrogeological setting and published methodologies as approved by the department shall be applied to predict water levels at the higher pumping rate.
 - (B) The analysis technique shall take into account mutual interference effects on all wells located in the same wellfield.
 - (C) Corrections for the critical dry period shall be performed in accordance with sub-paragraphs (A) or (B) of subdivision (1) of this subsection.
- (3) Wellfield pumping tests used in determining safe yield shall satisfy the following criteria:
- (A) A pumping test shall be conducted with all wells in the wellfield pumping simultaneously to determine time-drawdown characteristics of the pumped wells. The rate of pumping of all wells shall be constant throughout the pumping test. Each well shall be individually metered. For wellfields with more than one well, existing data from individual, non-simultaneous pumping tests of each well in the wellfield that meet the other pumping test requirements may be utilized, provided corrections are made for mutual interference.
 - (B) Pumping test duration. The pumping test shall be conducted for at least the minimum duration as required in Section 19-13-B51k of the Regulations of Connecticut State Agencies.
 - (C) Stabilization. Stabilization shall be achieved for the last twelve hours prior to completion of the pumping test. If, after the required pumping test duration, stabilization is not achieved then the pumping test shall be

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- extended, or an analysis and extrapolation of pumping test drawdown versus time data shall be performed to show whether there is sufficient storage in the aquifer to sustain the pumping rate for 180 days of continual operation and maintain water levels above the pump intake. If the projection shows the pump intake would be reached, a reduced pumping rate shall be calculated based on specific capacity at the end of the pumping test such that the pumping level at the reduced rate remains above the pump intake.
- (D) Interference effects. The drawdown tests shall run simultaneously for all wells located within the same wellfield unless interference effects can be shown to be minimal or can be properly estimated using analytical methodologies or modeling techniques.
- (E) Where contaminants can reasonably be expected to be drawn into the wellfield during the test, the maximum pumping rate may be further limited by the department.
- (F) Antecedent conditions
- (i) The pumping test shall be conducted following a period of five days during which precipitation does not exceed one-half inch during any twenty-four hour period, and one inch in any seventy-two hour period.
 - (ii) Precipitation at the site of the pumping test shall be monitored daily beginning one week prior to start-up of pumping through completion of the pumping test, where applicable, using equipment capable of measuring precipitation to within one hundredth (0.01) of one inch.
 - (iii) Water level measurements in the pumping well or nearby monitoring wells shall be collected at least daily for at least one week prior to the start of testing.
 - (iv) For currently developed wells, the wellfield shall be shut down for at least three days prior to the start of testing, unless such shut down is not feasible and the department approves pumping at the minimum possible rate for the background shut down period.
- (G) Drawdown measurements. Drawdown in each pumping well shall be measured hourly, or at such frequency that accurately measures drawdown to properly document the trend leading up to stabilization, and as necessary for proper analysis of pumping test data.
- (H) Ground water level measurement accuracy. Ground water level measurements shall be obtained with a measuring tape, electric line, or pressure transducer accurate to two one hundredths (0.02) of a foot; unless direct access is not feasible without performing major modifications to the well, then airline readings may be utilized.
- (I) Discharge of pumped water. The water withdrawn from the well during a pumping test shall be discharged so as not to interfere with the test.
- (J) Surface water levels shall be measured to the nearest two one hundredths (0.02) of a foot and recorded at least twice daily during the duration of the pumping test for all surface water bodies within 500 feet of the pumping well.
- (K) The criteria in subparagraphs (A) through (I) of this subdivision shall be used in calculating safe yield, unless the water company demonstrates to the department that any variations from these criteria had no noticeable effect or that the effect can be negated through the use of analytical methods. Induced infiltration tests performed in accordance with subparagraph (B) of subdivision (4) of subsection (d) of Section 22a-354b-l of the Regulations of Connecticut State Agencies regarding 4

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- level A mapping are considered to fully meet the pumping test requirements.
- (4) Submittal requirements. The following items shall be submitted in support of the calculated ground water safe yield:
- (A) static water level before pumping;
 - (B) date, time and duration of pump test;
 - (C) pumping rate in gallons per minute;
 - (D) drawdown records of time and measured water;
 - (E) date, time and amounts of precipitation;
 - (F) location of discharge point;
 - (G) well driller's log;
 - (H) physical well data regarding well construction, screen lengths and intervals, well development and diameter;
 - (I) graphs of drawdown or depth to water versus time plotted arithmetically if stabilization was achieved, or plotted on semi-logarithmic paper and extrapolated to 180 days if stabilization was not achieved;
 - (J) static water levels without any pumping and stabilized water levels during continuous pumping;
 - (K) rated pump capacity and pump curves;
 - (L) limitations on pumping, if any;
 - (M) other pertinent ground water modeling or testing data if utilized; and
 - (N) justification, description and reference information for use of selected methodology.
- (c) Where sufficient historical records are available, data on the safe yield of any sources available during a critical dry period may be used if approved by the department.
- (1) For existing wells, production records spanning a dry period of low streamflow recharge and below normal precipitation recharge may be used if approved by the department, provided that a sufficient margin of safety is maintained as demonstrated in subdivision (8) of subsection (b) of section 25-32d-3 of the Regulations of Connecticut State Agencies, that a new or expanded source of supply or a new or revised diversion permit is not needed within the five year planning period, and that the well or wells can be shown to have consistently produced the average rate over a multi-year period of record on an annual basis and over the seasonal low water table period extending from July to November. In such cases where historic production records are proposed to be used for calculating groundwater safe yield, the critical period adjustment in subparagraphs (A) and (B) of subdivision (1) of subsection (b) of this section shall be applied.
- (2) The average production rate shall be based upon metered production records at each individual source of supply and the approved yield shall not exceed the current installed pump or treatment capacity.
- (3) The following data shall be provided to the department:
- (A) historic long term production records encompassing a representative dry period, including average day, maximum month average day, and peak day withdrawal rates; and
 - (B) available information as listed in subdivision (11) of subsection (a) of this section and subdivision (4) of subsection (b) of this section.
- (d) Safe yield analyses previously performed that substantially meet the requirements of this section may be submitted in lieu of the study required by this section and shall be reviewed by the department on a case by case basis.
- (e) The reduction in safe yield imposed by any constraints such as hydraulic considerations, system losses, treatment limitations, or interference effects shall be considered in the calculation of available water for all active sources.
- (f) Other methods may be used provided that they are approved by the Department of

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Public Health and the Department of Environmental Protection and ensure an adequate water supply.

(Added effective August 10, 2000.)

25-32d-5. Submittal, completeness and approval

- (a) Plan submittal
- (1) The water company shall submit to the department three copies of the initial plan, revised plan or modified plan.
 - (2) At the time of plan submittal the water company shall also provide four copies of the initial plan, revised plan or modified plan to the commissioner of Environmental Protection, two copies to the executive secretary of the Department of Public Utility Control, one copy to the secretary of the Office of Policy and Management, and one copy to each regional planning organization covering any portion of the company's existing or proposed source or service area.
 - (3) The department shall notify each chief elected official, local health official and regional planning organization covering any portion of the company's existing or proposed source or service area of the existence of the plan and the opportunity to comment thereon.
 - (4) A copy of the initial plan, revised plan or modified plan shall be maintained on file by the water company, at a water company business office located nearest to the sources of supply and service areas considered in the plan, for review by interested persons during normal business hours. The water company shall notify the department at the time of submission as to the location and hours that the plan is available for public review.
- (b) Mechanism for determining plan completeness
- (1) The Department of Environmental Protection and the Department of Public Utility Control, in the case of any plan which may impact any water company regulated by the Department of Public Utility Control, shall have sixty days upon receipt of the initial plan, revised plan or modified plan to comment to the department on the completeness of the plan. Failure of either the Department of Environmental Protection or the Department of Public Utility Control, in the case of any plan which may impact any water company regulated by the Department of Public Utility Control, to comment within sixty days shall be deemed acceptance that the plan is complete as submitted.
 - (2) The commissioner shall notify the water company in writing if a plan is deemed to be incomplete and shall request additional information necessary to deem the plan complete. The schedule for submission of modifications shall be determined by the commissioner.
 - (3) When the commissioner makes a determination and notifies the water company that the plan is complete, the commissioner shall concurrently send notice of the determination of completeness to the Department of Environmental Protection, the Department of Public Utility Control and the Office of Policy and Management.
- (c) Process for plan approval, modification, or rejection
- (1) The Department of Environmental Protection and the Department of Public Utility Control, in the case of any plan which may impact any water company regulated by the Department of Public Utility Control, shall have ninety (90) days upon notice that a plan is deemed complete to comment on the plan. In the event that either the Department of Environmental Protection or the Department of Public Utility Control, in the case of any plan which may impact any water company regulated by the Department of Public Utility Control, fails to provide written comments within ninety (90) days, the Department of Public Health shall notify, in writing, both department of such failure, and in sixty (60) days from issuance of

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such notice, the Department of Public Health shall make a determination on approval, modification, or rejection of the plan using all available information. If within sixty (60) days following the issuance of such notice, the Department of Public Utility Control or the Department of Environmental Protection provides written comment on such plan, the Department of Public Health shall approve or reject such plan as appropriate based on such comments. If within sixty (60) days of the issuance of the above notice, the Department of Public Utility Control or the Department of Environmental Protection fails to provide written comments on such plan, such department shall upon expiration of such sixty (60) day period issue a letter concurring with such plan and the Department of Public Health shall approve or reject such plan as the Department of Public Health deems appropriate. Notwithstanding the above, the Department of Public Health may reject any plan deemed acceptable to the Department of Public Utility Control and the Department Environmental Protection.

- (2) The department in making a decision to approve, modify or reject a plan shall consider the following:
 - (A) the ability of the company to provide a pure, adequate and reliable water supply for present and projected future customers;
 - (B) adequate provision for the protection of the quality of future and existing sources;
 - (C) comments from state agencies; and
 - (D) consistency with state regulations and statutes.
 - (3) Within sixty days after the Department of Environmental Protection and the Department of Public Utility Control, in the case of a water company regulated by that agency, have commented to the department regarding whether a plan should be approved, or in no case more than one hundred and fifty days after written notice that the plan has been deemed complete, the commissioner shall advise the water company whether the plan is rejected, approved or approved with conditions.
 - (4) If the commissioner fails to approve or reject the plan within the timeframes required by Section 25-32d(c) of the Connecticut General Statutes and this subsection. the plan shall be deemed approved as submitted.
 - (5) If the commissioner rejects the plan, he shall advise the water company in writing that the plan is being rejected and the reason the plan cannot be approved as submitted.
 - (6) Appeal procedures. The water company may appeal to the commissioner the department's determination that a plan is not complete or the department's decision to modify or reject a plan, in accordance with Chapter 54 of the Connecticut General Statutes.
- (d) Approved plan distribution. The company shall submit ten copies of the final approved plan or approved modified pages to the department, which shall distribute copies to the Department of Environmental Protection, the Department of Public Utility Control and the Office of Policy and Management. The company shall submit one copy of the approved plan or approved modified pages to each regional planning organization and notice of the approved plan to all local health departments, and municipal planning departments or agencies, covering any portion of the existing or proposed source or service areas. One copy of the approved plan shall be provided by the water company to any such agency requesting a copy.
(Added effective August 10, 2000.)

25-32d-6. Failure to submit a plan

Any failure to submit a water supply plan in accordance with Sections 25- 32d-1a through 25-32d-5, inclusive, of the Regulations of Connecticut State Agencies shall be subject to civil penalties in accordance with Section 25- 32e of the Connecticut General Statutes and Section 25-32e-1 of

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the Regulations of Connecticut State Agencies.
(Added effective August 10, 2000.)