

**STATE OF CONNECTICUT DEPARTMENT OF PUBLIC HEALTH  
DRINKING WATER SECTION**

**WORKSHEET FOR DETERMINATION OF SAFE YIELD**

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**Applicable Regulations:**

RCSA Section 25-32d-1a (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.

**Background:**

Water companies required to submit a water supply plan are required to evaluate the water supply needs in their service area and propose a strategy to meet such needs. Part of this evaluation includes the determination of 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 (RCSA). This application covers all of the regulatory requirements required of these regulations for calculation of safe yield.

**Applicability:**

To be completed by public water systems supplied by surface water reservoirs or ground water wells. Public water systems whose sources of supply are exclusively from one or more interconnections with another water company(s) and do not have their own reservoir or well supplies do not need to complete this application since the safe yield does not apply to an interconnection as a source of supply.

**Instructions:**

Provide the public water system (PWS) name, public water system identification number (PWSID), and primary town the water system is located. For each source of supply, fill in the well or reservoir name and the associated Water System Facility Identification (WSFID). The WSFID for each source of supply can be obtained from the water quality monitoring schedules available on the Department's website. (<http://www.ct.gov/dph/publicdrinkingwater>). The regulatory sections and subsections are provided at the heading of each section and regulatory divisions or subdivisions are provided along the right hand column for reference.

**Section A – Surface Water Sources (page 3):**

Complete one worksheet for each surface water source. For each source of supply, fill in the reservoir name and the associated WSFID. Check the box or boxes that correlate to the applicable regulation used for calculation of safe yield. If a yield test was determined based on a system of surface water reservoirs then list the name of the reservoir system and include the WSFID numbers for each reservoir that is part of the reservoir system. Provide the final safe yield determined for the methodology used and report the value in gallons per day. Include a copy of the *Public Water System Application For Safe Yield* for each source of supply in the appropriate section of the water supply plan being submitted for review and approval. Include all supporting documentation required of RCSA Section 25-32d-4(a)(11).

**Section B – Ground Water Sources (pages 4-7):**

Complete one worksheet for each groundwater source. For each source of supply, fill in the well name and the associated WSFID. Check the box or boxes that correlate to the applicable regulation used for calculation of safe yield. If a yield test was determined for multiple wells in a well field then list the name of the well field and include the WSFID numbers for well in the well field. Provide the final safe yield determined for the methodology used. Include a copy of the *worksheet for determination of Safe Yield* for each source of supply in the appropriate section of the water supply plan being submitted for review and approval. Include all supporting documentation required of RCSA Section 25-32d-4(b)(4).

Section C – Historical Records (page 8):

Complete one worksheet for each source of supply (surface water or ground water) if the determination of safe yield for the source of supply was established based on available historical records. For each source of supply, fill in the source of supply name and the associated WSFID. Check the box or boxes that correlate to the applicable regulation used for calculation of safe yield. Provide the final safe yield determined based on the historical data used and report the value in gallons per day. Include a copy of the *worksheet for determination of Safe Yield* for each source of supply in the appropriate section of the water supply plan being submitted for review and approval. Include all supporting documentation required of RCSA Section 25-32d-4(c)(3).

Section D – Previously Approved Safe Yield (page 9):

Complete one worksheet for each source of supply (surface water or ground water) if the determination of safe yield for the source of supply was established based on a previously approved safe yield. For each source of supply, fill in the source of supply name and the associated WSFID. Check the box or boxes that correlate to the applicable regulation used for calculation of safe yield. Provide the final safe yield determined based on a previously approved safe yield and report the value in gallons per day. Include a copy of the *worksheet for determination of Safe Yield* for each source of supply in the appropriate section of the water supply plan being submitted for review and approval.

Section E – Other Approved Methods (page 10):

Complete one worksheet for each source of supply (surface water or ground water) if the determination of safe yield for the source of supply was established based on other methods approved by the Department of Public Health and Department of Energy and Environmental Protection. For each source of supply, fill in the source of supply name and the associated WSFID. Check the box or boxes that correlate to the applicable regulation used for calculation of safe yield. Provide the final safe yield determined based on the other approved method used and report the value in gallons per day. Include a copy of the *worksheet for determination of Safe Yield* for each source of supply in the appropriate section of the water supply plan being submitted for review and approval. Provide documentation that both the Department of Public Health and Department of Energy and Environmental Protection approved the method being used for calculation of safe yield. Also provide the supporting data that was used to calculate the safe yield.

Certification

The public water system owner or administrative contact is requested to sign, date and print their name certifying the information submitted for safe yield is accurate to the best of their knowledge and was determined in accordance with the applicable Regulations of Connecticut State Agencies.

**CALCULATION OF SAFE YIELD**

Date:
PWS Name:
PWSID:
Town:

**A SURFACE WATER SOURCES**

**RCSA Section 25-32d-4(a)**

**Calculation of Safe Yield for Surface Water Sources**

<input type="checkbox"/>	<p>1. The surface water safe yield analyses was 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 by 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.</p> <p>Name of individual performing yield test: _____</p> <p><input type="checkbox"/> Degree: _____</p> <p>Years of experience in surface water analysis: _____</p> <p>Accredited college or University: _____</p> <p><input type="checkbox"/> Professional engineer licensed in accordance with Chapter 391 of the Connecticut General Statutes.</p> <p>P.E. License number: _____</p> <p>Years of experience in surface water analysis: _____</p>	(a)
<input type="checkbox"/>	<p>2. Safe yield shall was calculated using a mathematical mass balance methodology and was based on a ninety-nine percent dry year or a critical dry period with a 1 in 100 occurrence frequency and was 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.</p>	(a)
<input type="checkbox"/>	<p>3. Safe yield was determined based upon an analysis of the stream flow for a ninety nine percent dry year assuming a seven day average flow duration since a mass balance analysis cannot be performed due to insufficient usable storage volume. (i.e.: a run of the river type situation or diversions)</p>	(a)

WSFID	Source of Supply Name	Safe Yield (GPD):

**CALCULATION OF SAFE YIELD**

Date:
PWS Name:
PWSID:
Town:

<b>B</b>	<b>GROUND WATER SOURCES</b>	
<b><u>RCSA Section 25-32d-4(b)</u></b>		
<b>Safe yield of all active wells shall be computed based upon simultaneous pumping tests of all wells in the well field and adjusted for the maximum drawdown available during a critical dry period.</b>		
<input type="checkbox"/>	<p>1. The ground water safe yield analyses was 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.</p> <p>Name of individual performing yield test: _____</p> <p><input type="checkbox"/> Degree: _____</p> <p>Years of experience in ground water analysis: _____</p> <p>Accredited college or University: _____</p> <p><input type="checkbox"/> Professional engineer licensed in accordance with Chapter 391 of the Connecticut General Statutes.</p> <p>P.E. License number: _____</p> <p>Years of experience in ground water analysis: _____</p>	(b)
<b><u>RCSA Section 25-32d-4(b)(1)</u></b>		
<input type="checkbox"/>	<p>2. <b>The standard method of adjusting pump test data to account for critical dry period was used.</b>  <i>(If the standard method was used to adjust pump test data applies, also complete either #3 or #4 below)</i></p>	
<input type="checkbox"/>	<p>3. The safe yield was computed based on a standard method of adjusting pumping test data to account for the critical dry period was based on one of the following:</p> <p><input type="checkbox"/> For all ground water sources, a multiplier of seventy-five percent, equivalent to an eighteen hour pumping day, was applied to the pumping test rate. This adjustment factor was applied for calculating and making adjustments for the critical dry period. The resulting safe yield was reported in units of both gallons per minute, and gallons per day.</p> <p><input type="checkbox"/> In addition to the critical dry period adjustment factor, an additional multiplier of ninety percent was applied to bedrock or consolidated aquifer ground water sources.</p> <p>Date(s) the pump test was conducted: _____</p>	(A)
<input type="checkbox"/>	<p>4. The safe yield was computed based on pumping test data that was analyzed and adjusted for the critical dry period using methodologies appropriate to the hydrogeologic setting and published methodologies as <u>approved by the department</u> *.</p> <p>Date(s) the pump test was conducted: _____</p> <p>* Include a copy of the correspondence from the Department with approval of the published methodology appropriate to the hydrogeologic setting. Analytical methods used in this section shall account for all criteria in RCSA Section 25-32d-4(b)(1)(B)(i) through 25-32d-4(b)(1)(B)(v). Please note that previous approval of a water supply plan where safe yield was calculated using a published methodology does not in itself qualify as Department approval of the methodology.</p>	(B)



	<input type="checkbox"/> The 180 day projection shows the water level would be at or below the pump intake; therefore a reduced pumping rate was calculated based on specific capacity at the end of the pump test so the water level remains above the pump intake.  Specific capacity used to calculate reduced pumping rate (gpm/foot): _____	
<input type="checkbox"/>	15. Drawdown tests were run simultaneously for all wells located in the same wellfield.	(D)
<input type="checkbox"/>	16. Drawdown tests were not run simultaneously for all wells located in the same wellfield because interference effects during the drawdown tests were: <input type="checkbox"/> minimal (typically demonstrated through use of hydrographs from the pumping test) <input type="checkbox"/> estimated through use of analytical methods and/or models	(D)
<input type="checkbox"/>	17. The maximum pumping rate was limited by the Department due to concern that contaminants would be drawn into the well field during the test.	(E)
<input type="checkbox"/>	18. The pump test was conducted following a period of five days during which precipitation did not exceed one-half inch during any twenty-four hour period, and one inch during any seventy-two hour period.	(F)
<input type="checkbox"/>	19. Precipitation at the site of the pumping test was monitored daily beginning one week prior to the start-up of pumping through completion of the test using equipment capable of measuring precipitation to within one hundredth (0.01) of one inch.	(F)
<input type="checkbox"/>	20. Water level measurements were collected daily for at least one week prior to the start of the pump test from: <input type="checkbox"/> pumping well <input type="checkbox"/> nearby monitoring wells	(F)
<input type="checkbox"/>	21. For a period of 3 days prior to the start of the pump test, the existing developed wells in the well field were: <input type="checkbox"/> shut down <input type="checkbox"/> not shut down because it was not feasible; therefore the Department approved a minimum pumping rate during the background shut down period.	(F)
<input type="checkbox"/>	22. Drawdown measurements in each pumping well were recorded: <input type="checkbox"/> hourly <input type="checkbox"/> Other frequency that accurately measures drawdown to properly document the trend leading up to stabilization and for proper analysis of pumping test data. Other frequency: _____	(G)
<input type="checkbox"/>	23. Ground water level measurements were recorded with: <input type="checkbox"/> a measuring tape <input type="checkbox"/> an electric line <input type="checkbox"/> a pressure transducer accurate to two one hundreds (0.02) of a foot <input type="checkbox"/> airline readings were used because direct access to the water level was not feasible without performing major modifications to the well.	(H)
<input type="checkbox"/>	24. The water withdrawn from the well was discharged to an area that did not interfere with the pump test.	(I)
<input type="checkbox"/>	25. All surface water bodies within 500 feet of the pumping well were measured to the nearest two one hundredths (0.02) of a foot at least twice daily during the pumping test.	(J)
<input type="checkbox"/>	26. Variations in the criteria outlined in #7 through #25 of this document were used to calculate safe yield to demonstrate there was no noticeable effect or the effect was negated through use of analytical methods. Check all the numbered boxes associated with the criteria used to determine safe yield in which a variation was used: <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17 <input type="checkbox"/> 18 <input type="checkbox"/> 19 <input type="checkbox"/> 20 <input type="checkbox"/> 21 <input type="checkbox"/> 22 <input type="checkbox"/> 23 <input type="checkbox"/> 24	(K)

	For each box check provide supporting documentation with this application to demonstrate why the variation applies. The Department will review the supporting data and make a decision if the supporting documentation for any variations used are adequate and justified.	
<input type="checkbox"/>	27.Data from an induced infiltration test performed in accordance with subparagraph (B) of subdivision (4) of subsection (d) of Section 22a-354b-1 of the Regulations of Connecticut State Agencies regarding level A mapping were used to fully meet the pumping test requirements.	(K)
<b><u>RCSA Section 25-32d-4(b)(4)</u></b> <b>Submittal Requirements</b>		
<input type="checkbox"/>	28.The following items have been submitted in support of the calculated ground water safe yield: <input type="checkbox"/> static water level before pumping; <input type="checkbox"/> date, time and duration of pump test; <input type="checkbox"/> pumping rate in gallons per minute; <input type="checkbox"/> drawdown records of time and measured water; <input type="checkbox"/> date, time and amounts of precipitation; <input type="checkbox"/> location of discharge point; <input type="checkbox"/> well driller's log; <input type="checkbox"/> physical well data regarding well construction, screen lengths and intervals, well development and diameter; <input type="checkbox"/> 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; <input type="checkbox"/> static water levels without any pumping and stabilized water levels during continuous pumping; <input type="checkbox"/> rated pump capacity and pump curves; <input type="checkbox"/> limitations on pumping, if any; <input type="checkbox"/> other pertinent ground water modeling or testing data if utilized; <input type="checkbox"/> justification, description and reference information for use of selected methodology.	(A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N)
	<b>WSFID</b>	<b>Source of Supply Name</b>
		<b>Safe Yield (GPD):</b>

**CALCULATION OF SAFE YIELD**

Date:
PWS Name:
PWSID:
Town:

**C USE OF HISTORICAL RECORDS**

**RCSA Section 25-32d-4(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.**

- |                          |   |     |
|--------------------------|---|-----|
| <input type="checkbox"/> | <p>1. Data on the safe yield of sources of supply during a critical dry period are being provided for consideration by the Department for approval. The following criteria are being met with the data being submitted for Department review:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> For existing wells, production records spanning a dry period of low stream flow recharge and below normal precipitation recharge.</li> <li><input type="checkbox"/> A sufficient margin of safety is maintained as demonstrated of Section 25-32d-3(b)(8) of the Regulations of Connecticut State Agencies.</li> <li><input type="checkbox"/> A new or expanded source of supply or a new or revised diversion permit is not needed within the five year planning period.</li> <li><input type="checkbox"/> The well or wells 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.</li> <li><input type="checkbox"/> Historic production records are proposed to be used for calculating groundwater safe yield, therefore critical period adjustments have been applied in accordance with Sections 25-32d-4(b)(1)(A) and (B).</li> </ul> | (1) |
| <input type="checkbox"/> | <p>2. The average production rate is based upon metered production records at each individual source of supply and the approved yield does not exceed the current installed pump or treatment capacity.</p>   | (2) |
| <input type="checkbox"/> | <p>3. The following data is being provided to the department:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> historic long term production records encompassing a representative dry period, including average day, maximum month average day, and peak day withdrawal rates.</li> <li><input type="checkbox"/> available information listed in RCSA Section 25-32d-4(a)(11) for surface water supplies.</li> <li><input type="checkbox"/> available information listed in RCSA Section 25-32d-4(b)(4) for groundwater supplies.</li> </ul>  | (3) |

<b>WSFID</b>	<b>Source of Supply Name</b>	<b>Safe Yield (GPD):</b>



**CALCULATION OF SAFE YIELD**

Date:
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**D PREVIOUSLY APPROVED SAFE YIELD**

**RCSA Section 25-32d-4(d)**

Safe yield analyses previously performed that substantially meets the requirements of Section 25-32d-4 of the Regulations of Connecticut State Agencies has been submitted in lieu of the study required.

Please note: Submittal of data for justification of safe yield under this section will be reviewed by the Department on a case by case basis.

<b>WSFID</b>	<b>Source of Supply Name</b>	<b>Safe Yield (GPD):</b>

**CALCULATION OF SAFE YIELD**

Date:  
PWS Name:  
PWSID:  
Town:

<b>E</b>	<b>OTHER METHODS</b>	
	<b><u>RCSA Section 25-32d-4(f)</u></b>	
<input type="checkbox"/>	Other methods for determining safe yield that are approved by the Department of Public Health and the Department of Energy and Environmental Protection and ensure an adequate water supply are being provided.	
	<b>WSFID</b>	<b>Source of Supply Name</b>
		<b>Safe Yield (GPD):</b>

My signature below certifies that the information provided on this worksheet for determination of safe yield for the public water system and source(s) of supply indicated is accurate to the best of my knowledge and complies with the applicable Regulations of Connecticut State Agencies.

\_\_\_\_\_ (Signature of public water system Owner or Administrative contact)      \_\_\_\_\_ (Date)

\_\_\_\_\_ (Print or type name)