

Drinking Water Program - Engineering Plan Review Checklist – Instructions

Purpose

These checklists apply to a public water system (PWS) requesting construction approval (or operational approval if approval to construct was not granted prior to construction) for the following:

- New construction
- System modifications and/or change of use
- Separation distance waivers

The checklists are based on the plan review requirements as referenced in the State of Alaska Drinking Water regulations, 18 AAC 80 (amended as of December 26, 2014). These checklists supersede all previous versions and are updated as necessary. Please visit the DEC Drinking Water Program website for the latest versions.

The checklists are intended to be used as guidance documents only. Completion of the checklists may not constitute a complete submittal. Additional project information not identified in the checklists may be requested by the Department as a part of the plan review process.

Plan Review Process and Checklist Instructions

The plan review and approval process consists of **two major steps** to obtain certifications for **approval to construct and approval to operate**. A certificate must be obtained from the Department prior to constructing, modifying, and operating a PWS. Submittals must be sent to the engineering coordinator at the office serving the area the PWS is located in. The Department encourages engineers and system owners and operators to contact local DEC engineering techs with plan review questions. Links to a map of the Drinking Water Program engineering contacts *by areas served* and contact information, including office addresses, can be found on our website at <http://dec.alaska.gov/eh/dw/Engineering/index.html>. Plan sets, whether design, as-built, or record drawings, must be submitted with the following:

- Each page sealed, signed, and dated by the Alaska registered professional engineer (P.E.) with responsible charge for construction
- All construction changes clearly shown
- Hardcopy printed on paper no larger than 11-inches by 17-inches *

* 8.5-inch by 11-inch paper may be used if legible at that size. Additional electronic copies may be allowed by the reviewing DEC engineer and must be sent in Adobe portable document format (PDF).

The checklists are used to evaluate the completeness of submitted plans. If a submittal is not complete, it will be returned to the applicant or held until contact is made with the applicant. Formal review is not required to begin until the Department determines the plan submittal is complete and the fee payment is made.

Plan approval requests must be received at least 30 days before the proposed commencement of construction, installation, modification, or improvement for a PWS and at least 60 days before the proposed commencement of construction, installation, modification, or improvement for a PWS project involving state or federal monetary assistance (18 AAC 15.020). In accordance with the Drinking Water regulations, the Department will make every effort to issue its approval or denial of requests within 30 days after receiving all of the plans and information needed. If a submittal is deficient, the Department will notify the owner and their engineer that additional information is needed. Failure of the Department to issue an approval or denial within 30 days does not constitute automatic approval.

Approval to construct requires a submittal to the Department for review which includes engineering construction plans, specifications, and calculations. New community and non-transient non-community water systems must show capacity to operate in compliance with state regulations. After the Department's review is complete, a letter issuing the approval and a copy of a Construction and Operation Certificate with the Approval to Construct section signed will be sent to the owner and their engineer. The steps below outline the forms used for construction approval review:

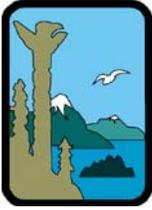
1. *Facility Information Form*: This form compiles owner, operator, and facility contact information and includes an Owner's Statement section. The Owner's Statement must be signed by the owner of the PWS, as the applicant for the request, before a plan review will commence.
2. *Project Information Form*: This form has information about the submitting Alaska registered engineer and the PWS. Section III of the form is used to determine the checklists needed for the review using the following steps:
 - i. Identify the column(s) matching the project scope (i.e. New PWS, Modify Existing PWS, Distribution Extension or Replacement, Waiver, or Water Haul).
 - ii. Identify the checklist in this column that is required based on the water system and project. Mark all boxes for the checklists that apply to the project.
3. *Checklist*: Complete all checklists identified in Section III of the Project Information Form. If an item on the checklist does not apply to the project, indicate on the checklist why the item does not apply. If an element of the project design does not comply with the Drinking Water regulations, the submitting engineer must explain why it cannot be designed to comply and justify that the proposed design is as protective of public health.

Interim approval to operate is a temporary certificate allowing a system to begin operation without submitting all plan review items required for final approval to operate. Submittal requirements will be stated in the letter granting approval to construct. After the Department's review of the request is complete, a letter granting the approval and a copy of the Construction and Operation Certificate, with the Interim Approval to Operate section signed, will be sent to the owner and engineer. Typically, the following must be provided with the request:

- Letter requesting interim approval to operate
- Verification construction has been substantially completed as approved
- Documentation that conditions of approval to construct were met
- Results of any required tests (e.g. pressure or bacteriological tests)

Final approval to operate will be issued after the Department receives and reviews satisfactory documentation that all requirements and conditions specified in the approval to construct letter have been met. A third party sanitary survey or System Inventory Form completed by the registered design engineer and an Emergency Preparedness Compliance Certification will be required as part of the approval to operate for all new PWSs. After the Department's review is complete, a letter granting the approval and a copy of the Construction and Operation Certificate, with the Final Approval to Operate section signed, will be sent to the owner. Typically, the following must be provided in the request:

- Letter requesting final approval to operate
- Verification construction has been completed as approved
- Justification for any construction changes to approved design
- Documentation that conditions of approval to construct were met
- Results of any required tests (e.g. pressure or bacteriological tests)
- Set of as-built or record drawings



Drinking Water Program - Engineering Plan Review Facility Information Form

I. Public Water System Owner

First Name: _____ **Last Name:** _____ **Phone:** _____
Company Name: _____ **Fax:** _____
Mailing Address: _____
City: _____ **State:** _____ **Zip** _____
Email Address: _____

II. Public Water System Operator

First Name: _____ **Last Name:** _____ **Phone:** _____
Certification: _____ **Fax:** _____
Mailing Address: _____
City: _____ **State:** _____ **Zip Code:** _____

III. Public Water System Facility

Facility Name: _____ **Phone:** _____
AKA: _____ **Fax:** _____
Physical Address: _____
Legal Description: Lot: _____ Block: _____ Subdivision: _____ Addition: _____
or
Location: Meridian: _____ Section: _____ Township: _____ Range: _____ Tax Lot: _____

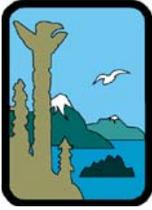
IV. Owner's Statement

Project Name: _____

I have authorized submittal of the enclosed items for the above referenced project. I acknowledge the public water system's responsibility at all times for the quality of the water served by it. By my signature, I certify the information above is correct and my authority to sign this statement (18 AAC 15.030) as the owner of the public water system and applicant for approval of the above listed project is based on one of the following:

- Corporation:** I am a principal executive officer of at least the level of vice president or his/her duly authorized representative, if the representative is responsible for the overall management of the project or operation.
- Partnership:** I am a general partner.
- Sole proprietorship:** I am the proprietor.
- Municipal, State, Federal, or other public facility:** I am either a principal executive officer, ranking elected official or other duly authorized employee.

Owner's Signature **Date** **Printed Name** **Title**



Drinking Water Program - Engineering Plan Review Project Information Form

This form must be attached to a completed and signed Facility Information Form. See the Checklist Instructions.

I. Project Engineer

First Name: _____ **Last Name:** _____ **Phone:** _____
Company Name: _____ **Fax:** _____
Mailing Address: _____
City: _____ **State:** _____ **Zip Code:** _____
Email Address: _____ **AK P.E. License No.:** _____

II. Facility Information

PWSID: _____ **System Classification:** _____
 (for existing water systems) (18 AAC 80.1990)

Community Water System (CWS)
 Non-Transient Non-Community (NTNC)
 Transient Non-Community (TNC)

Number of Service Connections in PWS: _____ (including proposed)
Days per Year of Operation: _____ (number of days)
Dates of Operation: _____ (if seasonal)

Resident Population Served (daily average*): _____ (PWS serves primary place of abode via pipes, delivery, or self-haul)
Non-Transient Population Served (daily average*): _____ (> 6 months/year of PWS use such as students and workers)
Transient Population Served (daily average*): _____ (<6 months/year of PWS use such as customers)
Length of Extension or Replacement (ft): _____ (for projects proposing distribution or transmission main work)

* Daily average refers to an average population that includes only the days water is made available to the public.

Systems Using Hauled Water

PWSID(s) water is obtained from: _____

PWSID(s) of water hauler(s) used: _____

Does or will the facility treat the water it receives? _____

III. Plan Review Checklist: Identify the checklists required for submittal.

Checklist		New PWS	Modify Existing PWS	Distribution	Waiver
No.	Title				
1.0	General	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.0	Capacity Development (CWS/NTNC)	<input type="checkbox"/>	<input type="checkbox"/>		
3.0	Source - Groundwater	<input type="checkbox"/>	<input type="checkbox"/>		
3.1a	Source - GWUDISW Determination	<input type="checkbox"/>	<input type="checkbox"/>		
3.1b	Source - Surface Water / GWUDISW	<input type="checkbox"/>	<input type="checkbox"/>		
3.2a	Source - Other / Rain Catchment	<input type="checkbox"/>	<input type="checkbox"/>		
3.2b	Source - Other / Seawater	<input type="checkbox"/>	<input type="checkbox"/>		
4.0	Storage	<input type="checkbox"/>	<input type="checkbox"/>		
4.1	Storage – Tracer Study Application - <i>DRAFT</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.0	Distribution - Piped	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.1	Distribution - Water Haul Vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.0	Treatment - Surface Water /GWUDISW	<input type="checkbox"/>	<input type="checkbox"/>		
6.1	Treatment - Corrosion Control	<input type="checkbox"/>	<input type="checkbox"/>		
6.2	Treatment - POU and POE	<input type="checkbox"/>	<input type="checkbox"/>		
6.3	Treatment - Membrane Filtration	<input type="checkbox"/>	<input type="checkbox"/>		
6.4	Treatment - Ozone	<input type="checkbox"/>	<input type="checkbox"/>		
6.5	Treatment - Media Filtration	<input type="checkbox"/>	<input type="checkbox"/>		
6.6a	Treatment – UV Disinfection Validation Report	<input type="checkbox"/>	<input type="checkbox"/>		
6.6b	Treatment – UV Disinfection System	<input type="checkbox"/>	<input type="checkbox"/>		
6.7	Treatment - Other	<input type="checkbox"/>	<input type="checkbox"/>		
7.0	Waiver - Source	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
7.1	Waiver - Piped Distribution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.0	Additive - Fluoride	<input type="checkbox"/>	<input type="checkbox"/>		



Drinking Water Program - Engineering Plan Review General Checklist

Project Name: _____ **Date:** _____

Engineer Name: _____ **AK P.E. License No.:** _____

Use of this guide is required for construction of new and modifications to existing public water systems. Plans must be sealed, signed, and dated by an Alaska registered P.E. and submitted in hardcopy and on 11-inch by 17-inch or 8.5-inch by 11-inch paper, if legible. If additional electronic copies are allowed by the reviewing engineer, they should be in Adobe PDF format. Incomplete submittals will not be forwarded to engineering staff for review.

Submittal Requirements	<i>Regulatory Reference</i>
<p>1. Cover Letter and Project Report: Is a cover letter included stating what approval is requested from DEC? Does the submittal include an engineer’s report sealed, signed, and dated by an Alaska registered P.E.? Where in the engineer’s report (specify page, etc.) is a narrative summarizing the project (where, what, why, when, and how) and a description of the basis for design?</p>	<p><i>18 AAC 80.200(b)</i> <i>18 AAC 80.205(a)(4)</i></p>
<p>2. Plan Review Fee: Is the plan review fee included in the submittal? For submittals requesting fee calculation assistance, a submittal may be accepted without the fee payment if there is prior approval from the reviewing engineer and all contact information for the person, agency, or company responsible for the fee payment is provided. A plan review will not be completed until the fee payment is received.</p>	<p><i>18 AAC 80.1910</i></p>
<p>3. Project Drawings: Are construction drawings and specifications included in the submittal? The construction drawings must be sealed, signed, and dated by an Alaska registered P.E. and in hardcopy format unless previous arrangements have been made.</p>	<p><i>18 AAC 80.205(a)(2)</i> <i>12 AAC 36.185</i></p>
<p>4. Master Meter: Where in the submittal (specify document name, page number, etc.) is verification the project complies with the need for a master meter?</p>	<p><i>18 AAC 80.235</i></p>

General Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>5. Asbestos Pipe: If the system is a new community or non-transient non-community public water system, does the submittal include an application for a one time asbestos sampling waiver? Contact the DEC office for a copy of the form.</p> <p>If this is an existing system, where in the submittal are specifications included for any asbestos pipe proposed for the project?</p> <p><i>If a new or existing system finds asbestos-cement pipe anywhere in the distribution or treatment system, DEC must be notified within 48 hours.</i></p>	18 AAC 80.315(b)(2)
<p>6. Contact Information for Engineer Submitting Record Drawings: Where in the submittal (specify document name, page number, etc.) is the name and contact information of the Alaska registered P.E. that will sign, date, and seal the record drawings for operational approval?</p>	18 AAC 80.210(j)(1)
<p>7. Design Criteria and Calculations: Where in the submittal (specify document, page number, etc.) are design criteria, calculations, flow analysis, and other computations (e.g. treatment sizing, disinfection, etc.)?</p>	18 AAC 80.205(a)(4)
<p>8. Corrosivity: If the project proposes to make any change to the source or long-term change in water treatment, where in the submittal has the engineer addressed the potential for each change to affect the corrosiveness of the distributed water and any mitigation that may be necessary? How does the treatment system design accommodate the future needs of adding corrosion control (space for equipment and chemical injection points)?</p>	18 AAC 80.205(c)(5)
<p>9. Manufacturers' Specifications: Where in the submittal (specify document name, page number, etc.) are the manufacturer's specifications for major components and performance curves for the pumps?</p>	18 AAC 80.205(a)(2)
<p>10. Backflow and Cross-Connection: Where in the submittal (specify document name, page number, etc.) are the backflow and cross-connection evaluations?</p>	18 AAC 80.025

General Checklist (continued)

Submittal Requirements	Regulatory Reference
11. Lead Free: Where in the submittal (specify document name, page number, etc.) is it specified the design meets the new lead requirements including: (A) not containing more than 0.2 percent lead when used with respect to solder and flux; and (B) not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures?	<i>Reduction of Lead in Drinking Water Act (amendment of the Safe Drinking Water Act, Section 1417)</i>
12. Chemical Additives NSF 60: Where in the submittal (specify document name, page number, etc.) is documentation that additives proposed for water treatment (e.g. disinfectants, coagulants, oxidizing agents, anti-scalants) are certified by an ANSI accredited organization to conform with ANSI/NSF Standard 60 for use in potable water systems?	<i>18 AAC 80.010(b)(9) 18 AAC 80.30(a)</i>
13. Acrylamide and Epichlorohydrin: Where in the submittal (specify document name, page number, etc.) is documentation of the amount of acrylamide and epichlorohydrin in additives proposed for water treatment including the manufacturer's list of ingredients? Will the operator be trained and have the means to measure and record and annually certify to the Department in writing that the amount of acrylamide and epichlorohydrin at the dose and monomer level does not exceed the regulated percentages?	<i>18 AAC 80.045 40 CFR 141.111</i>
14. Materials in Contact NSF: Where in the submittal (specify document name, page number, etc.) is documentation that all materials proposed for direct contact with the water are certified by an ANSI accredited organization (e.g. UL) to conform with ANSI/NSF Standard 61 or an ANSI/NSF standard with equivalent health requirements? If there are any materials which are not certified in this manner, where in the submittal is the engineering justification for its use?	<i>18 AAC 80.010(b) 18 AAC 80.030(b)</i>
15. Operational Narrative: Where in the submittal (specify document name, page number, etc.) is an operational narrative for the proposed modifications? The operational narrative should include both a description of all unit processes and the operational logic to be followed by the operator or the automated control and alarm systems.	<i>18 AAC 80.205(b)(9)</i>

General Checklist (continued)

Submittal Requirements	Regulatory Reference
16.Operational Control Points: Which drawing sheets show the location of pressure gages, flow meters, rate of flow controllers, sample points, valves, etc. which assist the operator with operating and monitoring the system in compliance with the requirements of 18 AAC 80?	18 AAC 80.205(a)(2)
17.Disinfectant Discharge: Where in the submittal (specify document name, page number, etc.) is documentation that the discharge of chlorinated water used for disinfection is authorized by the State or the water, independent of volume, will meet State water quality standards in 18 AAC 70 and required effluent limits? Information can be obtained by visiting DEC Division of Water webpages at http://dec.alaska.gov/water/wnpspc/stormwater/docs/AKG003000_Hydrostatic_GP_Permit.pdf and http://dec.alaska.gov/water/wnpspc/stormwater/edhsgp.html .	APDES 18 AAC 70
18.Operator Training and Certification: Where in the submittal (specify document name, page number, etc.) is documentation demonstrating the Operator Training and Certification Program has been provided a project schematic and list of proposed additives in order to determine the anticipated system class? Where in the submittal is documentation included demonstrating that the system is working with them to ensure compliance with 18 AAC 74 after construction according the proposed design?	18 AAC 80.007 18 AAC 74
19.Emergency Preparedness: If the submittal involves a community or a non-transient non-community PWS or if it involves a transient non-community PWS serving 1,000 or more people/day, where in the submittal (specify document name, page number, etc.) is the name and contact information of the person that will provide the documentation to satisfy the regulatory emergency preparedness requirements? Documentation will be required for final approval to operate the system.	18 AAC 80.055
20.Wastewater Discharges from Drinking Water Treatment Facilities: If the submittal involves conventional, direct, or membrane filtration or ion exchange, where in the submittal (specify document name, page number, etc.) is the disposal of backwash and reject waters from the treatment facility addressed? Information on permitting the discharge of contained water can be found at http://dec.alaska.gov/Applications/Water/WaterPermitSearch/Search.aspx	18 AAC 72 18 AAC 60 APDES

General Checklist (continued)

Submittal Requirements	Regulatory Reference
21.Service Pressure: Where in the submittal (specify document name, page number, etc.) are calculations showing the design is capable of maintaining at least 20 psi of service pressure at the highest elevation or pressure zone of the proposed distribution main under peak demand flow conditions?	<i>18 AAC 80.205(a)(5)</i>
22.Chemical Mixing Water Source: Which drawing sheet shows the water source for mixing chemicals?	<i>18 AAC 80.205(b)(9)</i>
23.Instrument Air Gaps: Which design drawing shows air gaps for the instruments? The air gaps should be within view of the instrument panel.	<i>18 AAC 80.025</i>
24.Raw Water Sample Tap: Which drawing sheet shows the required raw water sample tap?	<i>18 AAC 80.655 18 AAC 80.205(c)(6)</i>

Capacity Development Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>has worked with the Rural Utility Business Advisor Program (RUBA): The business plan completed with RUBA, documentation of ownership, and a description of any plans for transfer of ownership (If RUBA business plan is provided, skip remaining questions.)</p>	
<p>c.) If the system <u>will</u> sell water to 10 service connections or more, does <u>not</u> fall under the jurisdiction of RCA, and has <u>not</u> worked with RUBA: A completed managerial and financial assessment form provided by the Department, documentation of ownership, and a description of any plans for transfer of ownership (The managerial and financial assessment form is available on the Department's website.)</p>	<i>18 AAC 80.207</i>
<p>d.) If the system <u>will not</u> sell water to 10 service connections or more, does <u>not</u> fall under the jurisdiction of RCA, and has <u>not</u> worked with RUBA: A description of the management and operation structure of the water system and a proposed financial plan including an annual budget estimating system income and operation costs such as water sampling, treatment chemicals, operator training and wages, and equipment maintenance and replacement (pumps, valves, etc.)</p>	<i>18 AAC 80.207</i>
<p>6. Managerial Capacity-Contact Information: Where in the submittal is the name, mailing address, email address, telephone number, and fax number of the system owner, operators, and administrative contacts?</p>	<i>18 AAC 80.207(d)(5)</i>
<p>7. Managerial Capacity-Operator Certification: Where in the submittal is verification each operator is certified under 18 AAC 74 to the extent required?</p>	<i>18 AAC 80.207(d)(5) 18 AAC 80.007 18 AAC 74</i>
<p>8. Other Information: Where in the submittal is other information provided by the owner to demonstrate technical, financial, and managerial capacity as required?</p>	<i>18 AAC 80.207(c)(4)&(d)(6)</i>



Drinking Water Program - Engineering Plan Review Source - Groundwater Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of a new or modification of an existing groundwater source for a public water system. If the project includes a water line from the source, the Distribution - Piped Checklist (Checklist Number 5.0) should be completed for the water line.

Submittal Requirements	Regulatory Reference
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- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <p>1. Source Well Location: Where in the submittal (specify sheet number, page number, etc.) is a site plan showing the location or proposed location of the source well, its protective radius regardless of property boundaries, and all potential sources of contamination within 500 feet of the well? This should include below grade sewer lines regardless of whether they are under a building. Where in the submittal has the submitting engineer identified situations needing a separation distance waiver?</p> | <p><i>18 AAC 80.205(a)(2)</i>
<i>18 AAC 80.205(b)(3)</i>
<i>18 AAC 80.020</i>
<i>(Table A)</i></p> |
| <p>2. Longitude/Latitude Location: Where in the submittal (specify document name, page number, etc.) is a completed Alaska Public Water System Locational Data Collection Form (Longitude/Latitude Form) for each well? The form can be found on the Department's website.</p> | <p><i>18 AAC 80.205(b)(4)</i>
<i>18 AAC</i>
<i>80.015(c)(1)(B)</i></p> |
| <p>3. Drain: If the well is in a well house and there is a drain pipe in the building, where in the submittal (specify document name, page number, etc.) is a drawing or description of what each drain is connected to and where it drains?</p> | <p><i>18 AAC 80.015(b)(7)</i></p> |
| <p>4. Contaminated Sites: Where in the submittal (specify document name, page number, etc.) is information noting the DEC Contaminated Sites webmap has been consulted for locating contaminated sites with potential to affect the well?</p> | <p><i>18 AAC 80.020(a)</i></p> |
| <p>5. Well Log: Where in the submittal (specify document name, page number, etc.) are the requirements for a well log specified, or in the case of a pre-constructed well, where in the submittal is a well log for the new source describing the elements listed in 18 AAC 80.210(h) and the location of any impermeable layer?</p> | <p><i>18 AAC 80.210(h)</i>
<i>18 AAC</i>
<i>80.015(c)(1)(A)</i></p> |

Source - Groundwater Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>6. Source Water Protection and Flow Capacity: Where in the submittal (specify sheet number, page number, division, section, etc.) are the detailed drawings and specifications showing the source meets the source water protection and capacity requirements? This should include well casing size and type, grouting type and depths, screen type and level, surface grading, sanitary seal, casing termination above ground or well house floor level, and the proposed well capacity test method.</p>	<p><i>18 AAC 80.205(a)(2)</i> <i>18 AAC 80.015</i></p>
<p>7. Groundwater under the Direct Influence of Surface Water (GWUDISW): If the depth of the source is 50 feet or less below ground (to the first opening or screened interval) or within 500 feet of a surface water, is the information in the GWUDISW Determination Checklist (Checklist No. 3.1a) included? Please contact the DEC Drinking Water Program prior to completing the GWUDISW checklist.</p> <p>Surface water is defined in 40 CFR 141.2 as “all water which is open to the atmosphere and subject to surface runoff.”</p>	<p><i>18 AAC 80.605</i> <i>18 AAC 80.1990(a)</i> <i>(64), (66), and (140)</i></p>
<p>8. Raw Water Analyses: For a new source which has been constructed, where in the submittal (specify document name, page number, etc.) are results of raw water analyses? For a proposed source, where in the submittal (specify document name, page number, etc.) is the proposed raw water quality sampling plan?</p>	<p><i>18 AAC 80.205(c)(2)</i> <i>Table B</i></p>
<p>9. Disinfection: Which specification (specify page number, division, section, etc.) requires the well to be disinfected and flushed in accordance with AWWA Standard C654?</p>	<p><i>18 AAC 80.010(d)(2)</i></p>
<p>10. Pump Information: Where in the submittal (specify document name, page number, etc.) are the source pump specifications including its make, model, and pump curve?</p>	<p><i>18 AAC 80.205(b)(9)</i></p>
<p>11. Service Pressure: If the source pump will be used to meet distribution pressure and flow, where in the submittal (specify document name, page number, etc.) are engineering calculations showing the pump is capable of maintaining at least 20 psi of service pressure at the highest service elevation or pressure zone of the distribution under peak demand flow conditions?</p>	<p><i>18 AAC 80.205(a)(5)</i></p>

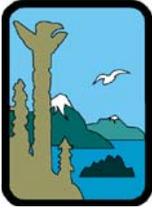
Source - Groundwater Checklist (continued)

Submittal Requirements

Regulatory Reference

- 12. Water Rights:** Where in the submittal (specify document name, page number, etc.) is a copy of the receipt for an Alaska Department of Natural Resources water rights application for each well?

*AS 46.15
Inter-agency
agreement*



Drinking Water Program - Engineering Plan Review Source - GWUDISW Determination Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for a source that is 50 feet or less below ground (to the first opening or screened interval) or within 500 feet of a surface water. **Please contact your local Drinking Water Program prior to completing this checklist;** contact information can be found here: dec.alaska.gov/eh/dw/Engineering.

The intent of this checklist is to guide an engineer, hydrologist, or other qualified individual, in gathering and analyzing existing information to support a source determination. Drinking water sources must be determined to be groundwater (GW), groundwater under the direct influence of surface water (GWUDISW) or surface water to establish regulatory requirements. Please see 18 AAC 80.1990(a) (64), (66), and (140) for source definitions.

If the existing information does not result in a conclusive groundwater determination, then in the interest of protecting public health, treatment may be required. The Drinking Water Program will work with the system on any proposed source improvements or advanced studies that would be necessary to complete a source determination. **Plans for source modifications or advanced studies MUST be approved by the Drinking Water Program before implementation.**

Submittal Considerations	Regulatory Reference
<p>1. Source Construction and Current Condition: Provide information about the construction of the source, such as a well log, aquifer test or well yield results, construction drawings, photographs, etc. Discuss current condition of the source, whether the source construction complies with 18 AAC 80.015, and if it is adequately protected from surface runoff. Have any modifications been made since original construction?</p>	<p>18 AAC 80.015 18 AAC 80.605(c)(1)(A) 18 AAC 80.605 (c)(2)</p>
<p>2. Proximity to Surface Water: Provide a site plan showing the location of the source and the horizontal distance from all surface waters within 500 feet regardless of property lines or ownership. Discuss the risk of flooding. Photographs, if available, are encouraged.</p>	<p>18 AAC 80.605(c)(1)(A)</p>
<p>3. Aquifer Characteristics: Discuss the thickness and lateral extent of confining layers, if any. Provide existing information that may be useful in this evaluation such as proximal well logs or hydrogeological assessments.</p>	<p>18 AAC 80.605(c)(2)(C)</p>

Source - GWUDISW Determination Checklist (continued)

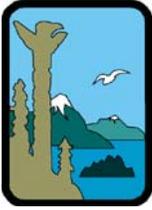
Submittal Considerations	Regulatory Reference
4. Water Elevations: What are the relative elevations of the static water level of the source and the nearby surface waters? Include how elevations were determined and any information describing significant variations in static water level and nearby surface water with pumping, precipitation, and seasons.	<i>18 AAC 80.605(c)</i>
5. Waterborne Disease History: Have there been any waterborne disease outbreaks directly related to the water source? If so, discuss the history/circumstances.	<i>18 AAC 80.605(c)(1)(C)</i>
6. Raw Water Quality: Are there any existing laboratory results for biological quality, turbidity, or other water quality parameters that may be useful for comparing the source to nearby surface water? If so, discuss your interpretation of how the water quality data supports a source water determination.	<i>18 AAC 80.605(c)(1)(B)</i>
7. Proximity to Other Potential Pathways: Surface water may easily infiltrate the subsurface through abandoned, improperly maintained, or improperly constructed boreholes, pits, or wells. Are there potential pathways on the property or nearby?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.605(c)</i>
8. Other Information: Is there any other existing information that may assist the Department in making a source determination?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.605(c)</i>

Advanced Studies*

The Department may require collection of additional information to make a source determination. Examples of additional information could include those listed below from 18 AAC 80.605(c)(3-5):

- **DEC Drinking Water Program Field Assessment:** A field assessment by the Department would include a thorough inspection of the source construction and surrounding area.
- **Water Quality Assessment Plan:** This plan would be structured to compare and evaluate the source and nearby surface water by assessing physical, biological, and chemical characteristics for significant and relatively rapid shifts in water quality parameters such as turbidity, temperature, conductivity, and pH which closely correlate to climatological or surface water conditions.
- **Advanced Testing Plan:** A plan for advanced water quality testing and analysis may include microscopic analysis of particulate matter, particle count analysis, specific ion ratio, or tracers/dyes.

*** Contact the reviewing Drinking Water Program office first to determine if these items are required, and to obtain approval of the data collection, analysis, and evaluation plan.**



Drinking Water Program - Engineering Plan Review Source - Surface Water / GWUDISW Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for all new or modification of existing surface water or groundwater under the direct influence of surface water (GWUDISW) sources for a public water system. If the project includes a water line from the source, the Distribution - Piped Checklist (Checklist Number 5.0) should be completed for the water line.

Submittal Requirements	Regulatory Reference
1. Drawings and Specifications: Are the drawings and specifications included in the submittal for construction of the water source, including location, casing and piping materials, screen sizing, intake details, anchoring, well grouting, source protection details, and the proposed test (drawdown) pumping methods?	<i>18 AAC 80.205(a)(2)</i>
2. Erosion, Icing, and Siltation: Where in the submittal (specify document name, page number, etc.) have the issues of erosion, icing, and siltation been addressed?	<i>18 AAC 80.205(b)(9)</i>
3. Routine Intake Maintenance: Where in the submittal (specify document name, page number, etc.) have provisions for routine intake maintenance been provided? Where in the submittal does the engineer indicate the project will provide the system with an operations and maintenance manual that will include the recommended source cleaning procedures and schedule?	<i>18 AAC 80.205(b)(9)</i>
4. Source Intake Adjustability: Where in the submittal (specify document name, page number, etc.) has the need for flexibility to use different intake levels been addressed?	<i>18 AAC 80.205(b)(9)</i>
5. Site Plan: Where in the submittal (specify document name, page number, etc.) is a site plan showing the location or proposed location of the source intake, its protective radius regardless of property boundaries, and all potential sources of contamination within 500 feet of the source well or intake? Where in the submittal has the submitting engineer identified situations needing a separation distance waiver?	<i>18 AAC 80.205(b)(3)</i>

Source - Surface Water / GWUDISW Checklist (continued)

Submittal Requirements	Regulatory Reference
6. Contaminated Sites: Where in the submittal (specify document name, page number, etc.) is information noting the DEC Contaminated Sites webmap has been consulted for locating contaminated sites with potential to affect the source?	<i>18 AAC 80.020(a)</i>
7. Raw Water Analysis: For a new source which has been constructed, where in the submittal (specify document name, page number, etc.) are results of the raw water analysis? For a proposed source, where is the submittal (specify document name, page number, etc.) is the proposed raw water quality sample results?	<i>18 AAC 80.205(c)(2)</i> <i>Table B</i>
8. Seasonal Source Water Contamination: Where in the submittal (specify document name, page number, etc.) has seasonal contamination of the source water been evaluated such as seasonal turbidity, stormwater runoff, animal migration, and salmon spawning?	<i>18 AAC 80.205(b)(9)</i>
9. Location: Where in the submittal is a completed Alaska Public Water System Locational Data Collection Form (Longitude/Latitude Form) for each source well or intake? The form is available on the Department's website .	<i>18 AAC 80.205(b)(4)</i> <i>80.015(c)(1)(B)</i>
10. Water Rights: Where in the submittal (specify document name, page number, etc.) is a copy of the receipt for an Alaska Department of Natural Resources water rights application for each proposed water source?	<i>AS 46.15 Inter-agency agreement</i>
11. LT2 Sampling: Where in the submittal is the name and contact information provided for the person that will be working with DEC to set up LT2 sampling?	<i>18 AAC 80.205(b)(9)</i>
12. Pump Information: Where in the submittal (specify document name, page number, etc.) are the source pump specifications including its make, model, and pump curve?	<i>18 AAC 80.205(b)(9)</i>
13. Service Pressure: If the source pump will be used to meet distribution pressure and flow, where in the submittal (specify document name, page number, etc.) are engineering calculations showing the pump is capable of maintaining at least 20 psi of service pressure at the highest service elevation or pressure zone of the distribution under peak demand flow conditions?	<i>18 AAC 80.205(a)(5)</i>



Drinking Water Program - Engineering Plan Review Source - Other / Rain Catchment Checklist

cProject Name: _____ **Date:** _____

Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of a new or modification of an existing rain catchment source for a public water system. If the project includes a water line from the source, the Distribution - Piped Checklist (Checklist Number 5.0) should be completed for the water line. For treatment of rainwater catchment sources, use the Treatment - SW/GWUDISW Checklist (Checklist 6.0).

Submittal Requirements	Regulatory Reference
1. Source Protection: Are drawings and specifications included in the submittal for construction of the catchment including roofing and piping materials, paint, gutter material, liner material, first flush diverter details or alternate means of screening out debris, and other source protection details?	18 AAC 80.205(a)(2)
2. Source Production: Where in the submittal (specify document name, page number, etc.) is source production information including average rainfall, catchment area, icing prevention, and if this is the sole water source or will be used to augment another water source?	18 AAC 80.205(b)(9)
3. Raw Water Testing: Where in the submittal (specify document name, page number, etc.) is the proposed raw water quality sample results? Samples need to be collected from the catchment and taken at a time indicative of typical water quality.	18 AAC 80.205 (c)(2) Table B
4. Pump Information: Where in the submittal (specify document name, page number, etc.) are the source pump specifications including its make, model, and pump curve?	18 AAC 80.205(b)(9)
5. Service Pressure: If the raw water source pump will also be used to meet distribution pressure and flow, where in the submittal (specify document name, page number, etc.) are engineering calculations showing the pump is capable of maintaining at least 20 psi of service pressure at the highest service elevation or pressure zone of the distribution under peak demand flow conditions?	18 AAC 80.205(a)(5)

Source - Other / Rain Catchment Checklist (continued)

Submittal Requirements	Regulatory Reference
6. Backflow/Cross-Connection Prevention: If the rain water catchment also provides water for non-potable use, where in the submittal is an analysis of cross-connection prevention between potable and non-potable water?	<i>18 AAC 80.025</i>
7. Sources of Contamination: Where in the submittal (specify document name, page number, etc.) is an analysis of situations with the potential to contaminate the source such as debris accumulation and overhanging trees, and fisheries, spawning, or nesting areas that could attract birds? Does the submittal include a site plan showing the location or proposed location of the source, its protective radius regardless of property boundaries, and all potential sources of contamination within 500 feet of it? Where in the submittal has the submitting engineer identified situations needing a separation distance waiver?	<i>18 AAC 80.205(b)(3)</i>
8. Location: Where in the submittal is a completed Alaska Public Water System Locational Data Collection Form (Longitude/Latitude Form) for each source intake? The form can be found the Department's website .	<i>18 AAC 80.205(b)(4)</i> <i>18 AAC 80.015(c)(1)(B)</i>
9. Water Rights: Where in the submittal (specify document name, page number, etc.) is a copy of the receipt for an Alaska Department of Natural Resources water rights application for each source?	<i>AS 46.15</i> <i>Inter-agency agreement</i>



Drinking Water Program - Engineering Plan Review Source - Other / Seawater Checklist

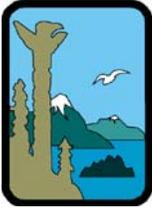
Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of new or modification of existing seawater sources for a public water system. If the project includes a water line from the source, the Distribution - Piped Checklist (Checklist Number 5.0) should be completed for the water line.

Submittal Requirements	Regulatory Reference
1. Drawings and Specifications: Are drawings and specifications included in the submittal for construction of the water source, including location, casing and piping materials, screen sizing, and anchoring?	<i>18 AAC 80.205(a)(2)</i>
2. Source Production: Where in the submittal (specify document name, page number, etc.) is source production information including catchment area, icing prevention, and if this is the sole water source or will it be used to augment another water source?	<i>18 AAC 80.205(b)(9)</i>
3. Routine Intake Maintenance: Where in the submittal (specify document name, page number, etc.) have provisions for routine intake maintenance been provided? Where in the submittal does the engineer indicate the project will provide the system with an operations and maintenance manual that will include the recommended source cleaning procedures and schedule?	<i>18 AAC 80.205(b)(9)</i>
4. Intake Depth: Where in the submittal (specify document name, page number, etc.) has the need for flexibility to use different intake levels been addressed?	<i>18 AAC 80.205(b)(9)</i>
5. Raw Water Testing: For a new source which has been constructed, where in the submittal (specify document name, page number, etc.) are results of the raw water analysis? For a proposed source, where is the submittal (specify document name, page number, etc.) is the proposed raw water quality sample results?	<i>18 AAC 80.205 (c)(2)</i> <i>Table B</i>

Source - Other / Seawater Checklist (continued)

Submittal Requirements	Regulatory Reference
6. Pump Information: Where in the submittal (specify document name, page number, etc.) are the source pump specifications including its make, model, pump curve, and appropriateness for use with seawater as well as potable water?	<i>18 AAC 80.205(b)(9)</i>
7. Backflow Prevention: For seawater systems that also provide water for non-potable uses, where in the submittal is an analysis of the cross-connection prevention for the potable water system?	<i>18 AAC 80.025</i>
8. Sources of Contamination: Where in the submittal (specify document name, page number, etc.) is a site plan showing the location or proposed location of the source intake, its protective radius, and all potential sources of contamination within 500 feet of the source intake including wastewater systems and their point of discharge and petroleum tanks and lines? This may include potential contamination sources originating from on land, onboard the public water system's platform or ship, or any other platform or ship stationed within the source's protective radius and stationary for any length of time. Where in the submittal has the submitting engineer identified situations needing a separation distance waiver?	<i>18 AAC 80.205(b)(3)</i>
9. Location: Where in the submittal is a completed Alaska Public Water System Locational Data Collection Form (Latitude/Longitude Form) for each well or intake? The form is available on the Department's website .	<i>18 AAC 80.205(b)(4)</i>



Drinking Water Program - Engineering Plan Review Storage Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

Use of the guide is required for the construction of new or the modification of existing storage systems. Storage includes water holding tanks and hydropneumatic pressure tanks used for storage capacity.

Submittal Requirements	Regulatory Reference
1. Storage Drawings and Specifications: Which drawings and specifications (specify sheet, page number, division, section, etc.) cover construction of the storage system including details of baffling and inlet and outlet piping?	<i>18 AAC 80.205(a)(2)</i>
2. Interior Coating NSF: If the project proposes an interior coating where in the submittal (specify document name, page number, division, section, etc.) is documentation the product will be certified by an ANSI accredited organization to conform with ANSI/NSF Standard 61 or an ANSI/NSF standard with equivalent health requirements? If the proposed product is not certified in this manner, where in the submittal is the engineering justification for its use?	<i>18 AAC 80.030(b)</i>
3. Interior Coating Curing: Where in the submittal are measures discussed to prevent potential taste and odor problems associated with elevated VOCs resulting from inadequate curing? This issue can be more pronounced when tanks hold water for long detention times.	<i>18 AAC 80.030(b)</i>
4. Compressed Air: If compressed air is proposed to pressurize hydropneumatic tanks, where in the submittal (specify document name, page number, etc.) is information proving source air quality will not add contaminants to the water?	<i>18 AAC 80.205(b)(8)</i>
5. Safe Access: Where in the submittal (specify document name, page number, etc.) is a discussion of how the design provides safe access for operation, maintenance, and inspection such as ladder cages and railings around hatches?	<i>18 AAC 80.205(b)(9)</i>

Storage Checklist (continued)

Submittal Requirements	Regulatory Reference
6. Vent and Overflow Screens: Which drawing sheet shows that vents and overflow lines are screened?	<i>18 AAC 80.025</i>
7. Overflow Air Gap: Which drawing sheet shows that the tank overflow discharge has an air gap of at least two overflow discharge pipe diameters above the surrounding area or discharge point?	<i>18 AAC 80.025</i>
8. Tank Safety: Which drawing sheet shows mitigation of the potential for erosion that may put the tank foundation at risk for failure?	<i>18 AAC 80.025</i>
9. Storage Disinfection: Where in the submittal (specify document name, page number, etc.) is it specified that storage tanks will be disinfected in accordance with AWWA Standard C652 before use?	<i>18 AAC 80.010(d)(2)</i>
10. Storage Capacity: Where in the submittal (specify document name, page number, etc.) is a calculation demonstrating source capacity is more than instantaneous peak demand or proposed storage capacity is adequate?	<i>18 AAC 80.205(a)(4)</i>
11. Raw Water Tank Maintenance: If a raw water tank(s) is proposed, where in the submittal (specify document name, page number, etc.) is it shown that the engineer has considered the costs and staff time for cleaning the tanks? Raw water storage tanks may require frequent cleaning. The O&M manual will need to contain information on frequency and method of storage tank cleaning needed to control biological growth.	<i>18 AAC 80.205(b)(9)</i>



Alaska Department of Environmental Conservation
 Division of Environmental Health / Division of Water
Drinking Water Engineering Submittal

General Information Form

I. Submittal Information

Project Name: _____

DEC Municipal Grants and Loan Funded Project

Project Description: _____

II. Facility Information

Facility Name: _____ **Phone:** _____

AKA: _____ **Fax:** _____

Physical Address: _____

Drinking Water System ID (PWSID): _____

Legal Description: Lot: _____ Block: _____ Subdivision: _____ Addition: _____

or

Location: Meridian: _____ Section: _____ Township: _____ Range: _____ Tax Lot: _____

III. System Owner

First Name: _____ **Last Name:** _____ **Phone:** _____

Company Name: _____ **Fax:** _____

Mailing Address: _____

City: _____ **State:** _____ **Zip** _____

Email Address: _____

IV. Owner's Statement

I have authorized submittal of the enclosed items for the above referenced project. I acknowledge the public water system's responsibility at all times for the quality of the water served by it. By my signature, I certify the information above is correct and my authority to sign this statement (18 AAC 15.030) as the owner of the public water system and applicant for approval of the above listed project is based on one of the following:

- Corporation:** I am a principal executive officer of at least the level of vice president or his/her duly authorized representative, if the representative is responsible for the overall management of the project or operation.
- Partnership:** I am a general partner.
- Sole proprietorship:** I am the proprietor.
- Municipal, State, Federal or other public facility:** I am either a principal executive officer, ranking elected official, or other duly authorized employee.

Owner's Signature

Date

This form must be attached to a completed and signed General Information Form.

I. Lead Person Conducting Tracer Test:

First Name: _____ **Last Name:** _____ **Phone:** _____
Title: _____ **License:** _____
Company: _____ **Fax:** _____
Mailing: _____
City: _____ **State:** _____ **Zip:** _____
Email Address: _____

II. Lead System Operator During Test:

First Name: _____ **Last Name:** _____ **Phone:** _____
Title: _____ **License:** _____
Company: _____ **Fax:** _____
Mailing: _____
City: _____ **State:** _____ **Zip:** _____
Email Address: _____

III. Roles and Responsibilities:

Describe the roles and responsibilities of those that will be present during the tracer study test.

Tracer Study Overview:

Please provide a brief overview of the tracer study proposed including the dates/times of test, and drinking water system operation during test (offline/ fully operational and operating within design parameters).

IV. System Information:

System Schematic Attached

Please attach a system schematic showing the unit processes (identify any being tested), the point of tracer addition, sampling location(s), flow meters (used in the tracer study), and any other locations referenced in this submittal or pertinent to the test.

Reactor Cross Section Attached

Please attach a cross sectional diagram showing the baffling structures and dimensions of the reactor(s) evaluated.

a. System Flows and Reservoir Levels

Summarize system flows and reservoir levels and describe how they were estimated (please attach any supporting calculations or historical flow data).

Season	Average Treatment Flow in Plant (gpm)	Average Clearwell Level (ft)	Peak Hourly Demand (gpm)	Average Flow into Distribution (gpm)

b. Unit Processes

List all treatment unit processes (including pre-chlorination, flocculation, sedimentation, filter pumps, pressure filtration, GAC, post chlorination, clearwell contact time).

c. Process(s) Evaluated in the Tracer Test

Describe in detail the reactor(s) that will be evaluated during the tracer test including the following items.

i. Reactor Type(s)

Describe the function of the reactor(s) to be tested.

ii. Reactor Dimensions

Describe the dimensions and configuration of the reactors to be tested. If there are two or more reactors indicate if the reactors are operated in series or parallel.

iii. Inlet / Outlet Configuration

Describe the inlet and outlet configuration through the tested reactor(s).

iv. Number of Baffles and L:W or L:D Ratio and Projected t10/T

Indicate the number of baffles in the reactor(s) tested and the L:W or L:D ratio. For basins, the length is the longest path that the water can travel. The width is the average width of the travel channel. For pipelines, please indicate the length to inner diameter ratio.

v. Other (as applicable)

d. Exit Flow (pump or gravity), Flow Control and Flow Metering

Describe the exit flow, how it is controlled, and the flow metering of the flow.

e. Water Discharges Associated with Tracer Study

Describe the water discharge associated with the tracer study. Items should include the rate of discharge, the total volume of discharge; the best management practices used to address erosion or icing issues; and the location and description of the discharge point.

f. Other

Provide any other information that is pertinent to the tracer test.

V. Tracer Test Method and Dosing

a. Test Method

- Step-Dose
- Modified Step-Dose
- Cumulative Volume
- Other (alternate test method must be approved by DEC prior to conducting test)

Briefly discuss why the selected test method was chosen.

b. Tracer Type

Select which tracer will be used and enter its commercial purity and specific gravity.

Dry Anhydrous Tracer Material							
	Tracer Ion	Tracer Material	MW, g/mol	Ion MW, g/mol	Ion MW, g/mol	*Solubility g/L	¹ Purity %
<input type="checkbox"/>	Na	NaCl	58.44	22.99 as Na+	35.45 as Cl-	357	
<input type="checkbox"/>	Cl	NaCl	58.44	22.99 as Na+	35.45 as Cl-	357	
<input type="checkbox"/>	Ca	CaCl ₂	110.98	40.08 as Ca+	35.45 as Cl-	595	
<input type="checkbox"/>	Cl	CaCl ₂	110.98	40.08 as Ca+	35.45 as Cl-	595	
<input type="checkbox"/>	Li	LiCl	42.39	6.94 as Li+	35.45 as Cl-	692	
<input type="checkbox"/>	F	NaF	41.99	22.99 as Na+	18.00 as F-	36.6	

Dry Hydrated Tracer Material							
	Tracer Ion	Tracer Material	MW, g/mol	Ion MW, g/mol	Ion MW, g/mol	* CaCl ₂ Solubility g/L	CaCl ₂ %
<input type="checkbox"/>	Cl	CaCl ₂ *H ₂ O	129	40.08 as Ca+	35.45 as Cl-	357	86.03
<input type="checkbox"/>	Cl	CaCl ₂ *2H ₂ O	147	22.99 as Na+	35.45 as Cl-	357	75.49
<input type="checkbox"/>	Cl	CaCl ₂ *4H ₂ O	183	22.99 as Na+	35.45 as Cl-	357	60.63
<input type="checkbox"/>	Cl	CaCl ₂ *6H ₂ O	219	22.99 as Na+	35.45 as Cl-	357	50.66

*Solubility at 0 °C

Liquid Tracer Material							
	Tracer	Material	MW, g/mol	Ion MW, g/mol	Ion MW, g/mol	² SG	¹ Purity %
<input type="checkbox"/>	Ca	CaCl ₂	110.98	40.08 as Ca+	35.45 as Cl-		
<input type="checkbox"/>	Cl	CaCl ₂	110.98	40.08 as Ca+	35.45 as Cl-		
<input type="checkbox"/>	F	H ₂ SiF ₆	144.09	-	18.00 as F-		

1. The % purity of the tracer material stated on the Certificate of Analysis.
2. The specific gravity of the purchase liquid material stated on the Certificate of Analysis.

c. Indicate the background level of the chosen tracer and the basis for the background determination

d. Tracer Dosage Summary

Summarize the flow rates and projected tracer dosages that will be used during continuous tracer feed tests.

Date	Test #	Tested Flow (gpm)	Tank Level (ft)	Tank Residence Time (hours)	Pipeline Residence Time (min)	Tracer Run Time* (hours)	Tracer Dosage Ion, (mg/l)

*tracer run time is based on the tank residence time since it is the longest.

e. Chemical Feed Pump – Continuous Tracer Feed

Identify the chemical feed pump used, the pump capacity, and the calibration cylinder volume used to verify the dosage rate.

f. Tracer Injection

Please describe the tracer injection points and any pipe bends or mixing before the reactor (the tracer injection point should be noted on the attached schematic).

VI. Tracer Analysis

Provide the following information for each test.

a. Tracer Sampling Location(s)

Please describe the tracer sampling locations (the tracer injection point should be noted on the attached schematic) and methods. Discuss how the samples will be taken, whether the sample line will flow continuously and the approximate flow (mL/min) and the residence detention time of the sample line.

b. Tracer Sample Frequency

Test 1:			
Time Segment	Sample Time Range (minutes to minutes)	Sample Frequency minutes	Number of Samples
		Total	

- If an electronic spreadsheet is used, please provide a copy of the “live” (unlocked and enabled) spreadsheet. The spreadsheet should include a summary tab that lists the equations used in the spreadsheet.
- Please provide photos of the tracer test including reactor being tested, equipment set-up, tracer injection location, and sampling location(s).

DRAFT



Alaska Department of Environmental Conservation
Division of Environmental Health / Division of Water
Drinking Water Engineering Submittal

Tracer Study Discussion and References

Tracer studies are used to determine the efficiency of a disinfection reactor ([Code of Federal Regulations 40 CFR Part 141](#) definition of “Disinfectant Contact Time”). Tracer studies are simple in concept; a tracer is added prior to the inlet of a structure and the concentration is measured at the outlet. However, conducting a tracer study can be very challenging. To maximize the potential for success of a tracer study, you must submit a tracer study plan to the department before conducting a tracer study. The following information is provided to help prepare and submit a tracer study plan. Sample information is included in grey, to provide additional guidance on the type of information expected.

General Information

A “General Information Form” should be included in all submittals to the Department of Environmental Conservation Drinking Water Program (DEC DWP) engineering section. This form will identify the project (in this case the project is a tracer study), the facility (the public water system tested), and the system owner.

Tracer Study Proposal

This section provides contact information for the people involved with the test including their roles and responsibilities, and describes the basic aspects of the tracer study.

System Information

The section on system information provides the system configuration details needed to assess the tracer study proposal. A current, labeled schematic must be attached to the submittal. In order to prepare a tracer study plan, an estimate of the expected flows and baffle factor will be necessary.

Flow Rates and Reservoir Levels: A minimum of three flow ranges must be tested, with four flow ranges recommended ([Tracer Studies in Water Treatment Facilities: A Protocol and Case Studies](#)). In specific circumstances, such as with a system that will only ever experience a single flow rate or a system that has been modeled using computational fluid dynamics, testing of fewer flow ranges may be approved. One of the tested flow regimes should include typical flow rates and tank conditions for peak hourly flow. The other chosen flow ranges should bracket the expected flow regimes for the system. The basic premise is that the baffling efficiency (T10/T) should be fairly constant over the range of flows tested. Studies have shown that the baffling efficiency is slightly lower at lower flow rates. However, a significant variation in baffling efficiency may reveal issues with the ways that the tracer study was conducted or even issues with the facility itself, such as construction anomalies. The highest flow rate tested should be at least 91 percent of the highest flow rate expected through the portion of the facility evaluated. Computational fluid dynamic (CFD) modeling can be used to minimize the number of flow conditions tested. At least one tracer study should be conducted to field validate the CFD modeling results.

EPA guidance ([Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources](#), Appendix C: Determination of Disinfectant Contact Time) recommends conducting tests at the minimum normal operating level in storage reservoirs or clearwells. Additionally, it is recommended that the tank level be kept constant during the test. However, some studies suggest that a constant tank level may not represent a worst case condition with respect to hydraulic efficiency and the determination of baffle factor. Therefore, it is recommended that one tested flow regime represent actual expected flow conditions during peak flow. If during peak flow demand conditions the inlet and outlet flows are not equal, then the changing level of the reservoir should be noted.

Baffle Factor Estimate: A rough estimate of the expected baffle factor may be obtained by determining the Length: Width or Length: Diameter ratio of the reactor vessel. The following diagrams show how to determine an L:W ratio for rectangular and circular reactor with interior baffles. After determining the L:W ratio and the estimated velocity, the attached graph may also be used to estimate the corresponding baffle factor. This graph is based on multiple data sets including data from the California Department of Public Health.

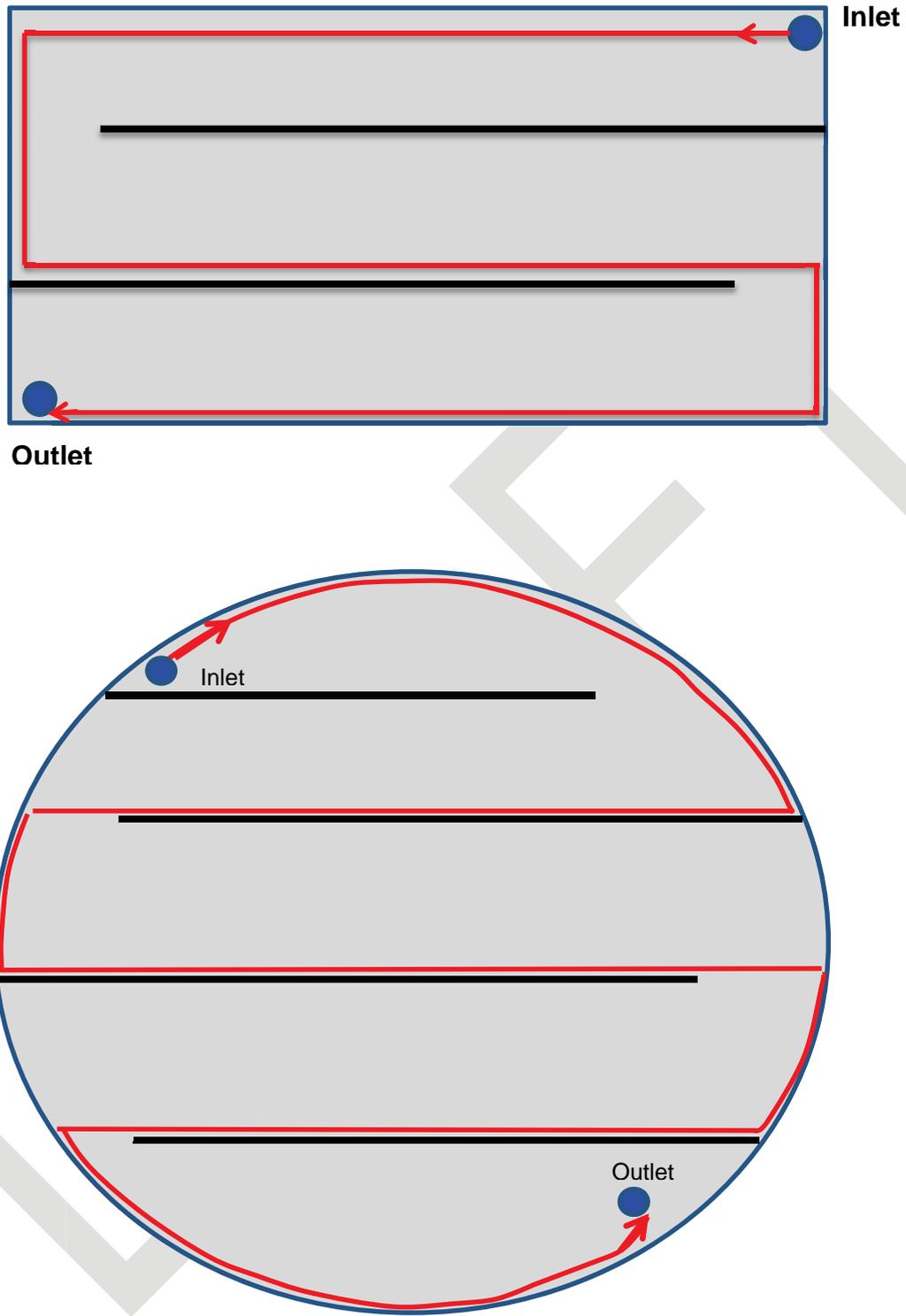
The provided diagrams and graphs are intended to be used in planning a tracer study for a baffled tank. However, the actual baffle factor may not match, depending on system specific hydraulics, the construction details of the baffles, the age of the baffles, and the flow rates tested.

An L:D ratio for a pipeline can be calculated using the inner pipe diameter and the total flow length of the pipe.

Exit Flow, Flow Control, and Flow Metering: After estimating the baffle factor and evaluating the flows that will be tested during the tracer study, it is important to determine how the flow and tank levels will be controlled during the tracer test. An accurate measure of flow rate is critical to obtaining accurate tracer study results. The flow meters used in the test must be calibrated within the manufacturer's recommendations, and flows must be field validated at the beginning and end of the test.

The impact of the tracer study must also be evaluated against the normal operational demands of the system (can the system provide both water for the test AND the water needed normal system operations?). The timing of the tracer study must accommodate needed system processes (including filter backwash).

Figure 1: Determining Length to Width (L:W) Ratio for Rectangular and Circular Reactors



Length is longest flow path (red line).

Width is the average channel width for each flow path.

Figure 2: Length-to-Width Ratios vs t_{10}/T – for Baffled Tanks

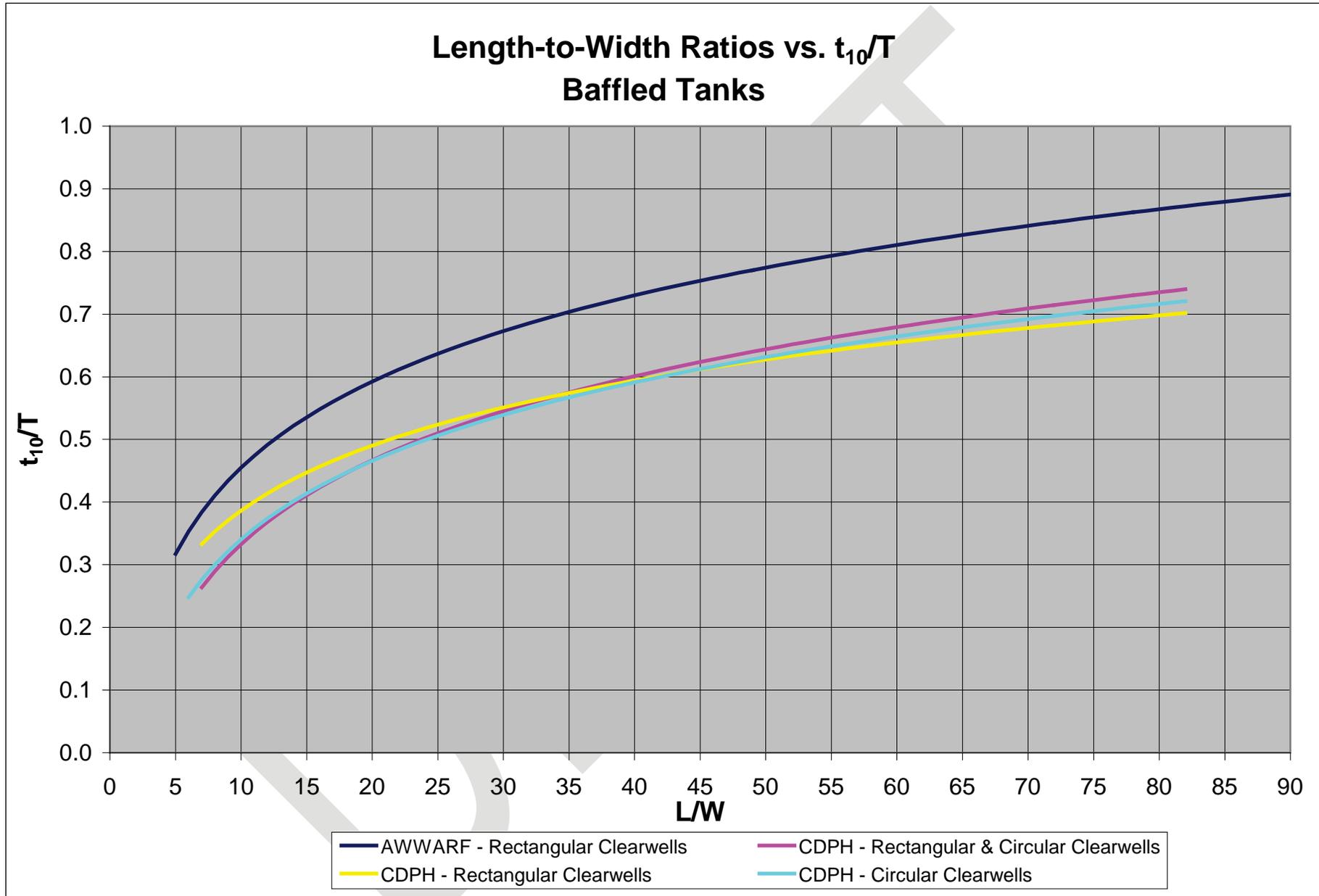
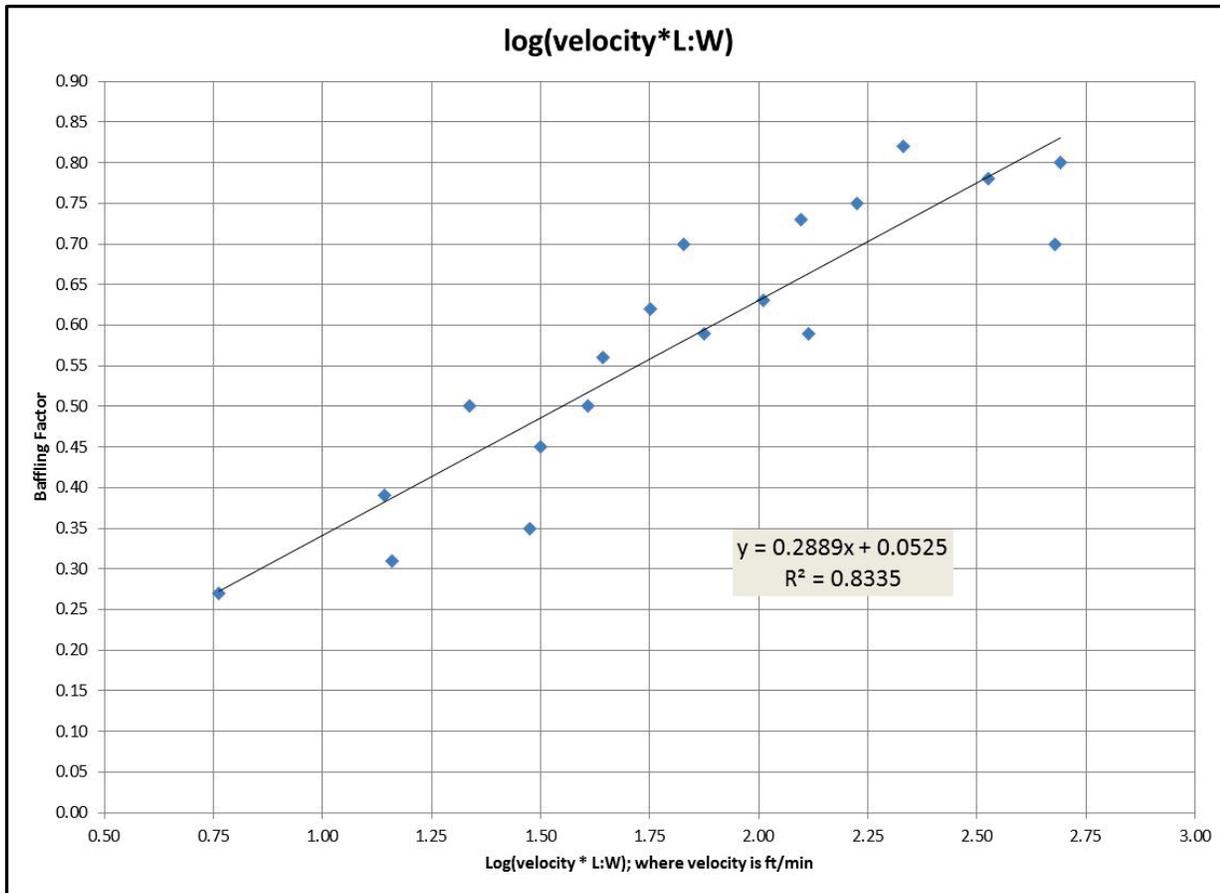


Figure 3: Baffling Factor for Different Flows and L:W Ratios



Water Discharges Associated with Tracer Study:

The discharge water associated with the test must be considered. Any discharges must be managed to avoid disrupting or overloading the existing wastewater system, and to avoid erosion/icing issues.

Discharges to a wastewater system (treatment as well as collection) must be evaluated to determine whether the increased loading from the test will adversely affect the system.

Discharges to the surface that meet the following conditions will not be required to apply for a discharge permit:

1. The discharged water is potable drinking water and originates only from the tracer study test;
2. Is discharged at a rate less than or equal to 50 gallons per minute and less than 30,000 gallons total; and
3. Is located on the property of the system being tested, is at least 100 feet from the nearest surface water body, and is at least 200 feet from any drinking water system intake.

Discharges that do not meet all of the above conditions should contact:

Wade Strickland – Division of Water
Discharge Authorization Program
555 Cordova St
Anchorage, AK 99501
907-269-7580
wade.strickland@alaska.gov

Tracer Test Method and Dosing

The choice of the optimum tracer test method, tracer type and the specific dosing requirements for the tracer test are dependent on the specific system characteristics.

Test Method: The two main type of tracer studies are step does tests and slug dose tests. Slug dose tests can result in density current effects because very concentrated solutions are needed to conduct the study. This can be further exaggerated by temperature differences in the water used in the study. We generally recommend using a step does approach because of this issue and other disadvantages of the slug dose approach.

Two variations of the step dose method that were developed by Guy Schott, may also be performed: the modified-step dose method and the V10 method. The modified step dose method can use significantly less water (approximately one HRT), but requires careful chemical and flow control, and is based on identifying when the effluent concentration is at 25% of the influent dosage concentration. The approximate equation for determining dosage for the desired peak concentration is:

$$\text{Dose} = 5.314 \cdot C_{\text{out}} \cdot \exp^{-2.2491 \cdot BF}$$

where *BF* is the estimated baffle factor

The V10 method is based on a correlation between flow rate (time) and volume. This method is suitable in situations where there are non-steady-state flows. Non-steady-state flows include flow interruptions due to backwash, periods where the plant is not operating, or instances where the inlet and outlet flows are significantly different. Specifically, V10 is the recorded total volume of water that has exited the reactor from start to t_{10} when 10% of the tracer mass has exited the reactor.

Where:

$$\frac{t_{10}}{T} \propto \frac{V_{C10}}{Vol} \quad V_{10} = \sum_{t_0}^{t_{10}} \text{Flow} \cdot \text{Time}$$

The V10 method also requires careful calculation and precise control of the chemical dose and flow rates. It is also important to provide details on plan operation during the tracer test (including plant flow, booster pump flow, total production, tracer concentration, tank levels).

Tracer Type: Various tracers can be used, though there is no one ideal tracer. The most commonly used and reviewed ones are fluoride, lithium, sodium, chloride, and calcium. The reactor chosen should be stable with a replicable analytic technique.

Tracer Dosage: The amount of tracer needed is also be an important consideration. The dosing and amount of chemical needed should be estimated prior to the tracer test. It is recommended that a tracer dose at least 20 mg/L above background level be used during the test. The following equations are provided to assist in calculating the tracer study dosages.

Tracer Study Dosage Calculation Equations

Equation 1: Dosage Calculation

$$\text{Dosage, mg/L} = \frac{(2.642 \bullet \text{chemical feed rate (mL/min)} \bullet \text{SG} \bullet \% \text{ Strength of Measured Tracer})}{\text{plant flow rate, gpm}}$$

Equation 2: Specific Gravity (SG)

$$\text{SG} = \frac{\text{Mass Weight of Solution}}{\text{Mass Weight of Water of Equal Volume}}$$

Equation 3: Calculate new Specific Gravity after Dilution

$$\text{SG}_2 \text{ of Diluted Solution} = \frac{(\text{SG}_1 \times \text{Vol. of Chemical Solution}_1 + \text{Vol. of Water Added})}{(\text{Vol. of Chemical Solution}_1 + \text{Vol. of Water Added})}$$

Equation 4: Calculate new % Solution Strength after Dilution

$$\% \text{ Solution Strength}_2 \text{ of Diluted Solution} = \frac{(\text{SG}_1 \bullet \text{Vol. of Chemical Solution}_1 \bullet \% \text{ Solution Strength of Measured Tracer}_1)}{(\text{SG}_1 \bullet \text{Vol. of Chemical Solution}_1 + \text{Vol. of Water Added})}$$

Equation 5: Chemical feed rate (mL/min) based on target ion dosage and desired % tracer solubility.

$$\text{Chemical Feed Rate (mL/min)} = \frac{(\text{x Ion Dosage, mg/L}) \bullet (\text{Flow, gpm}) \bullet 3,785,000}{(\% \text{ Tracer Purity}) \bullet (\% \text{ Ion of Tracer}) \bullet (\% \text{ of Solubility}) \bullet (\text{Tracer Solubility, g/L})}$$

Tracer Analysis

Tracer Sampling Locations

Lag times associated with the sample locations should be addressed in the sampling plan.

Tracer Sampling Frequency

It is important to sample for the tracer often enough, especially shortly after the start of the test, so that the baffling efficiency (T10/T) can be clearly identified. T10 is the time it takes for 10 percent of the tracer to break through and T is the mean hydraulic residence time.

Suggested Sample Frequency

Segments	Sample Frequency	Time Range
Segment 1	$T \times (0.03-0.05)^*$	0 to $(0.5303BF^2 + 0.307BF + 0.014) \times T$
Segment 2 Critical Region (t10)	$T \times (0.01-0.02)^*$	$(0.5303BF^2 + 0.307BF + 0.014) \times T$ to $(-0.683BF^2 + 1.617BF + 0.0625) \times T$
Segment 3	$T \times (0.03-0.05)^*$	$(-0.683BF^2 + 1.617BF + 0.0625$ to $1.1) \times T$
Segment 4	$T \times (0.05-0.1)^*$	1.1T to 3T

BF (0-1) is the estimated baffling factor that would be achieved if a tracer study were conducted.

*Baffling factor increment constants (# to #)

T = Residence Time of Reactor(s) (minutes)

Example of Suggested Sample Frequency

CDPH

Sample Frequency – Example for T = 200 minutes, BF = 0.4 (estimated)

Segments	Sample Frequency	Time Range minutes	Number Of Samples
Segment 1	$T \times (0.03-0.05)$ 6 – 10 min	0 to $(0.5303BF^2 + 0.307BF + 0.014)T$ 0 to 44 min	4 to 7
Segment 2 Critical Region	$T \times (0.01-0.02)$ 2 – 4 min	$(0.5303BF^2 + 0.307BF + 0.014)T$ to $(-0.683BF^2 + 1.617BF + 0.0625)T$ 44 to 120 min	19 to 38
Segment 3	$T \times (0.03-0.05)$ 6 – 10 min	$(-0.683BF^2 + 1.617BF + 0.0625)T$ To 1.1T 120 to 220 min	10 to 16
Segment 4	$T \times (0.05-0.1)$ 10 – 20 min	1.1T to 3T 220 to 600 min	19 to 38
		Total Samples	52 to 99

Samples should also be collected shortly after the point of tracer injection at a frequency of 0.10T to confirm constant tracer addition and accurately estimate tracer recovery. In addition, flow and clearwell level measurements should be collected continuously.

Tracer Results

Following completion of the tracer study, a baffle factor will be awarded based upon the submitted results. The tracer study result submittal should include the following information:

- Please discuss any discrepancies from the proposed tracer study plan that was submitted and reviewed by DEC. Please address any project specific issues that were requested in the DEC review.
- The instrumentation used in the tracer study test is critical in the evaluation of the tracer study data. The instruments of interest include the chemical test equipment as well as flow meters. Please provide the following information on tracer study data and instrumentation:
 - Equipment summary and calibration information for the equipment used in the tracer study test.
 - Attach the calibration check field notes (a check on the validity of the current calibration, not a recalibration).
- Please provide a copy of field data sheets. Each data sheet should include the following:
 - The name of the reactor tested, the name of the recorder, and the date;
 - The instrument(s) from which the data was obtained (flow meter, analytical equipment);
 - The temperature of the water before tracer injection and at each tracer sampling point. If the water temperature varies significantly, then the temperature should be monitored throughout the test.
 - The background concentration of the tracer should be monitored in the water before tracer injection periodically throughout the test.
- If an electronic spreadsheet is used, please provide a copy of the “live” (unlocked and enabled) spreadsheet. The spreadsheet should include a summary tab that lists the equations used in the spreadsheet.
- Please provide photos of the tracer test including reactor being tested, equipment set-up, tracer injection location, and sampling location(s).



Drinking Water Program - Engineering Plan Review Distribution - Piped Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of new, the modification of existing, and/or the extension of existing water distribution mains and raw water transmission lines.

Submittal Requirements	Regulatory Reference
1. Drawings and Specifications: Which drawings and specifications (specify sheet number, page number, division, section, etc.) cover construction of the distribution system and raw water transmission lines including piping materials, jointing, thrust blocking, bedding, and the plan and profile of the water mains?	<i>18 AAC 80.205(a)(2)</i>
2. Flow: Where in the submittal (specify document, page number, etc.) are calculations used as basis of design for the line sizing, peak demand flow rates, and velocities?	<i>18 AAC 80.205(a)(4)</i> <i>18 AAC 80.205(b)(2)</i>
3. Dead End Lines: If the proposed distribution configuration creates dead end lines, where in the submittal (specify document, page number, etc.) has the engineer addressed how they will be operated and maintained to avoid adverse water quality affects?	<i>18 AAC 80.205(b)(9)</i>
4. Freeze Protection: Where in the submittal (specify document name, page number, etc.) is freeze-protection design information?	<i>18 AAC 80.205(a)(4)</i>
5. Thrust Blocking: Where in the submittal (specify document name, page number, etc.) is thrust blocking design information?	<i>18 AAC 80.205(a)(4)</i>
6. Flushing: Where in the submittal (specify document name, page number, etc.) is flushing information including which areas can be isolated during flushing?	<i>18 AAC 80.205(b)(9)</i>

Distribution – Piped Checklist (continued)

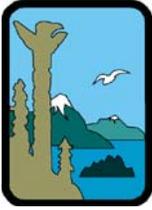
Submittal Requirements	Regulatory Reference
7. Seasonal System Startup: If this is a seasonal system, where in the submittal (specify document name, page number, etc.) is information on startup procedures?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.025</i>
8. Seasonal System Shutdown: If this is a seasonal system, where in the submittal (specify document name, page number, etc.) is information on how it is drained or prepared for the time it is not in operation? Issues may include the use of antifreeze, draining to sumps, and potential cross-connection or contamination.	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.025</i>
9. Service Pressure: Where in the submittal (specify document name, page number, etc.) are calculations showing the design is capable of maintaining at least 20 psi of service pressure at the highest elevation or pressure zone of the proposed distribution main under peak demand flow conditions?	<i>18 AAC 80.205(a)(5)</i>
10. Temporary Distribution: If the project proposes to replace a water distribution main in a community or non-transient non-community water system, where in the submittal (specify document name, page number, etc.) is information on how distribution will be provided during construction?	<i>18 AAC 80.207(d)(4)</i>
11. Water Line Disinfection: Which specifications (specify page number, division, section, etc.) address disinfection of the water mains and transmission lines?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.010(d)(2)</i>
12. Contaminated Sites: Where in the submittal (specify document name, page number, etc.) is documentation that the Contaminated Sites Program’s web map has been consulted to determine the proximity of the project to contaminated sites? If the project is going to be near or go through an active contaminated site, where in the submittal is documentation that the DEC Contaminated Sites Program staff was contacted regarding proper site controls for dealing with contaminated soils and/or groundwater? Where in the submittal are design considerations for protecting the water in the lines from contamination when the lines are located in contaminated soils?	<i>18 AAC 80.205(b)(9)</i>

Distribution – Piped Checklist (continued)

Submittal Requirements	Regulatory Reference
13a. Sewer Main Within 10 feet or at a Crossing: Where in the submittal (specify document name, page number, etc.) is documentation showing portions of sewer mains within 10 horizontal feet of a water main are or will be designed and constructed in a manner equivalent to the requirements for a potable water line?	18 AAC 80.020(f)(3)(B)
13b. Testing Sewer Main Within 10 feet or at a Crossing: Where in the submittal (specify document name, page number, etc.) is documentation showing portions of sewer mains within 10 horizontal feet of a water main are or will be pressure tested to ensure watertightness or enclosed in a carrier pipe of similar strength or stronger and with similar ratings as the actual pipe? Where in the submittal (specify document name, page number, division, section, etc.) are test pressure, duration, and passing criteria specified?	18 AAC 80.020(f)(3)(B)
13c. Sewer Main in Separate Trench: Where in the submittal (specify document name, page number, etc.) is documentation showing portions of sewer mains within 10 horizontal feet of, or crossing a water main, are or will be constructed in a separate trench or excavation from potable water mains?	18 AAC 80.020(f)(3)(C)
14a. Water Mains Above Sewer at Crossings: If the project involves any crossing of water and sewer mains, where in the submittal (specify document name, page number, etc.) is documentation showing the water mains will be located above the sewer mains to the maximum extent possible and the vertical distance between them?	18 AAC 80.020(f)(3)(D)(i)
14b. Water Mains Below Sewer Mains at Crossings: If any crossing of water and sewer mains will have a water main below a sewer main, where in the submittal (specify document name, page number, etc.) is documentation showing the sewer main trench is or will be constructed of a Type 4 or Type 5 bedding described in AWWA Standard C600-05, Installation of Ductile–Iron Water Mains and Their Appurtenances?	18 AAC 80.020 (f)(3)(D)(ii)
14c. Water Main Joints at Crossings: Where in the submittal (specify document name, page number, etc.) is documentation showing that at crossings of water and sewer mains, water main joints will be at least nine feet from all sewer main joints?	18 AAC 80.020 (f)(3)(D)(iii)

Distribution – Piped Checklist (continued)

Submittal Requirements	Regulatory Reference
14d. Vertical Separation at Crossings: Where in the submittal (specify document name, page number, etc.) is documentation showing that at crossings of water and sewer mains, water mains will be at least 18 vertical inches from sewer mains?	18 AAC 80.020 (f)(3)(D)(iv)
Notes: If 13a-c cannot be met for any length of water main within 10 feet of a sewer main or if 13a-14d cannot be met for a crossing of water and sewer mains, a separation distance waiver may be required; see Waiver Checklist – Piped Distribution (Checklist No. 7.1). For projects with multiple lengths of water main within 10 feet of a sewer main or multiple water/sewer main crossings, where in the submittal is a summary table listing each instance where the horizontal distance or prescriptive conditions at crossings are not met? The table should include the location (i.e. station) and a description of how each of the conditions in 13a-c (horizontal installations) or 13a-14d (crossings) are met for those locations. <i>Storm sewer lines and associated catch basins, manholes, and lift stations need to maintain the same separation distance from water mains as sewer mains and their associated manholes and lift stations.</i>	
15. Separation to Septic System: Where in the submittal (specify document name, page number, etc.) is documentation showing there will be no septic tanks, soil absorption systems, or line connecting them directly above or below at any distance or within 10 horizontal feet of a water main?	18 AAC 80.020 (f)(1)
16. HDPE Pipe: If the project proposes HDPE water mains, has the submitting engineer: <ol style="list-style-type: none">Consulted with the manufacturer to ensure the appropriate resin was selected for the climateSpecified the manufacturer’s weldability testing recommendationsSpecified joint constructionSpecified the welder qualifications, fusion QA/QC, and equipment certification, maintenance, and calibration for fused joints	18 AAC 80.205(b)(9)



Drinking Water Program - Engineering Plan Review Distribution - Water Haul Vehicle Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for all water haul vehicles used for distributing potable water as part of a water hauler public water system or a community’s public water system. If allowed by the reviewing engineer during plan review and depending on staff availability and logistics, a truck inspection by DEC engineering staff may be conducted in lieu of as-built drawings.

Submittal Requirements	<i>Regulatory Reference</i>
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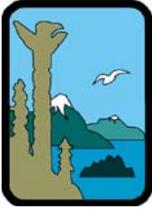
- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <p>1. Source Water: Where in the submittal (specify document name, page number, etc.) is the name and PWSID of the water supplier? <u>Note</u> that a water hauler must only obtain water from a public water system with DEC approval to operate and having a system classification equal to or higher than the water hauler.</p> | <i>18 AAC 80.310(e)</i> |
| <p>2. Potable Water Markings: Where in the submittal (specify document name, page number, etc.) are the specifications for the location with respect to inlets and outlets of “Potable Water Only” marks?</p> | <i>18 AAC 80.220(e)</i> |
| <p>3. Vehicle Identification: Where in the submittal (specify document name, page number, etc.) is the vehicle’s unique tank identification information (i.e. tank serial number and volume) and a description of its posted location on the vehicle?</p> | <i>18 AAC 80.200</i> |
| <p>4. Design Documentation: Where in the submittal (specify document name, page number, etc.) are plans and specifications for the water haul vehicle? The plans should include a schematic drawing and make, model, and specifications for all drinking water system components, including potable water storage tank, baffling, piping, valves, fittings, inlet and outlet configuration, tank venting and screening, potable water pump, flow meter, backflow prevention, on-board hosing, hose reel, cabinets, and overflows, as applicable.</p> | <i>18 AAC 80.220(a)</i> |

Distribution - Water Haul Vehicle Checklist (continued)

Submittal Requirements	Regulatory Reference
5. Materials in Contact NSF: Where in the submittal (specify document name, page number, etc.) is documentation that all materials proposed for direct contact with the water are certified by an ANSI accredited organization to conform with ANSI/NSF Standard 61 or an ANSI/NSF standard with equivalent health requirements? If a material or component does not meet this requirement, provide engineering justification for its use.	<i>18 AAC 80.010(b)(10)</i> <i>18 AAC 80.030(b)(3)</i>
6. Previous Tank Use: If the potable storage tank is not new, where in the submittal (specify document name, page number, etc.) is documentation of its prior uses? If the tank was previously used for any non-potable water application, where in the submittal is the proposed cleaning/conditioning procedure to prepare the tank for potable water use?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.220</i>
7. Tank Openings: Where in the submittal (specify document name, page number, etc.) is design information showing tank hatches, inlets, outlets, and other openings, with the exception of vents, have tight fitting seals/covers when the tank openings are not in use?	<i>40 CFR 141.714</i> <i>40 CFR 141.511</i>
8. Vents: Where in the submittal (specify document name, page number, etc.) is design information showing vent location and that it is directed away from engine exhaust, faced downward, screened, and designed to minimize icing. If the vent will be unscreened during winter conditions, where in the submittal (specify document name, page number, etc.) is the mitigation for the open vent discussed?	<i>18 AAC 80.205(b)(9)</i>
9. Water Pump: Where in the submittal (specify document name, page number, etc.) are the pump specifications including its make, model, and pump curve?	<i>18 AAC 80.205(a)(2)</i>
10. Cabinets (Pump-boxes/Dog-boxes): Where in the submittal (specify document name, page number, etc.) is design information showing that cabinets which house valves, inlets, outlets, hoses and reels, fittings, etc. have a bottom drain or equivalent measure to protect against contamination?	<i>18 AAC 80.025</i> <i>18 AAC 80.220</i>
11. Backflow Prevention: Where in the submittal (specify document name, page number, etc.) is a description of how the haul vehicle's potable water storage tank will be adequately protected from backflow during all normal operations (i.e. during delivery) and how the source will be protected from backflow while filling the tank?	<i>18 AAC 80.025</i>

Distribution - Water Haul Vehicle Checklist (continued)

Submittal Requirements	Regulatory Reference
12. Lubricants: Where in the submittal (specify document name, page number, etc.) are specifications for the lubricants used on wetted components showing they are certified to ANSI/NSF Standard 60 or to food grade standards?	<i>18 AAC 80.205</i>
13. Disinfection: Where in the submittal (specify document name, page number, etc.) are proposed standards for how the wetted components will be cleaned, flushed, disinfected, and sampled before the vehicle is put into service after construction?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.010(d)(2)</i>
14. Standard Operating Procedures (SOP): Does the submittal (specify document name, page number, etc.) include a copy of the SOP manual for the haul vehicle? The manual should be located in the haul vehicle and at minimum address the following: <ol style="list-style-type: none"><li><u>Sanitary Operation:</u> Hose storage and handling, system cleaning, flushing, disinfection, and sampling procedures, and routine maintenance and inspection schedules.<li><u>Record Keeping:</u> A dated log of maintaining, inspecting, cleaning, disinfecting, sampling, and hauling source, fill volumes, delivery locations, and delivery amounts.<li><u>Cross-connection Prevention:</u> Cross-connection prevention in the full range of operating conditions and configurations expected. At a minimum this should incorporate a double check valve for side or bottom filling or an air gap for top filling of either the haul vehicle's or delivery location's potable storage tank.	<i>18 AAC 80.025</i> <i>18 AAC 80.220</i>



Drinking Water Program - Engineering Plan Review Treatment - Surface Water / GWUDISW Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of a new or modification of an existing water treatment system for a surface water or groundwater under the direct influence of surface water (GWUDISW) source. This information is used to evaluate treatment effectiveness for systems using a surface water or GWUDISW source.

Submittal Requirements	Regulatory Reference
<p>1. Construction Documents: Does the submittal include drawings and specifications for construction of the proposed treatment system? Which sheets include a schematic, profile, and scaled plan view depicting the location of the treatment unit(s) within the treatment process? Which specifications include make, model, and description of key system components?</p>	18 AAC 80.205(a)(2)
<p>2. Treatment Objectives: Where in the submittal is an explanation of the treatment objective for each unit process and a description of the proposed technology? This should include an explanation of how the proposed treatment has been selected and its suitability for removing contaminants and treating the full range of water qualities expected from this source as well as a discussion of the target pathogens (e.g. <i>Giardia</i>, <i>Cryptosporidium</i>, and/or viruses) and the design minimum log-inactivation achieved for each applicable pathogen. In addition, include the design criteria used for selecting and sizing the system and relevant calculations. <u>Please note</u> that rain catchment and seawater systems are subject to a treatment technique requirement of 4-log virus and 3-log <i>Giardia</i> removal/inactivation.</p>	18 AAC 80.205(b)(2&5)
<p>3. Raw Water Quality: Where in the submittal are the characteristics of the watershed and surrounding hydrogeology, physical condition of the water source, and results of laboratory analyses of untreated water for biological quality, TOC, turbidity and any other contaminants the proposed treatment system is designed to remove? The data needs to adequately show variations in water quality for seasons the plant will be treating water. Are there any raw water quality characteristics that may limit or interfere with the treatment process? Where in the submittal is a discussion of how potential water quality interference constituents will be addressed using the proposed treatment method? The discussion should include whether or not pre-treatment is required to remove interfering constituents present in raw water.</p>	18 AAC 80.205(c)(1)(A) 18 AAC 80.205(c)(3)(B)

Treatment - Surface Water / GWUDISW Checklist (continued)

Submittal Requirements	Regulatory Reference
4. WTP Disinfection: Where in the submittal is it specified that the water treatment plant will be disinfected in accordance with AWWA Standard C653? Please note that some membrane manufacturers may specify a maximum oxidant limit to prevent damage to membranes.	<i>18 AAC 80.010(d)(2)</i>
5. Sample taps: Which design drawing shows the location of compliance and operational sample points in the water treatment plant? Which specification requires the project to provide fixed labels on all compliance sample taps?	<i>18 AAC 80.655 18 AAC 80.205(c)(6)</i>
6. Treatment Startup: Where in the submittal is a discussion of how the plant startup will be implemented including details on any temporary piping and the anticipated startup schedule? If the project is a modification or replaces a water treatment plant, where in the submittal is a discussion of how the transition will be made from the existing system to the new?	<i>18 AAC 80.205(b)(9) 18 AAC 80.205(c)(1)(A)</i>
7. Chemical Dosage: Where in the submittal is a description of chemical feed pumps including their suitability for the chemical being injected and the calculations showing they are properly sized for the water flow rates and chemical dosages anticipated? Where in the submittal are design dosages calculated? Where in the submittal is the make and model of dosing pumps used for chemical addition?	<i>18 AAC 80.205(b)(9)</i>
8. Additives NSF: Where in the submittal is documentation showing all chemicals in the treatment process are certified to ANSI/NSF Standard 60?	<i>18 AAC 80.030(a)</i>
9. Chemical Overfeed Protection: Where in the submittal are the design features that provide chemical overfeed protection and backflow prevention during system operation and shutdown?	<i>18 AAC 80.205(b)(9) 18 AAC 80.025</i>
10. Dose Monitoring Equipment: Where in the submittal is a summary of monitoring equipment proposed for dosing chemicals? Are maintenance and calibration instructions included in the operation and maintenance manual?	<i>18 AAC 80.205(b)(9)</i>

Treatment - Surface Water / GWUDISW Checklist (continued)

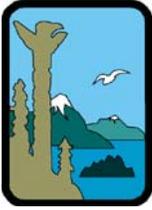
Submittal Requirements	Regulatory Reference
11. Shutdown Events: Where in the submittal is an explanation of how the public water system water demand will be met during scheduled shutdown events?	<i>18 AAC 80.205(b)(2)</i>
12. Alarms: Where in the submittal is an operational narrative describing how the system will function when producing potable water, including a description of system alarms, their trigger settings, and follow-up actions (e.g. auto shut-off, filter to-waste) and control system interlocks to prevent serving water that does not meet regulatory requirements? This should include a description of the system's capability for effective and safe manual operation.	<i>18 AAC 80.205(b)(9)</i>
13. Operator On-Site Training: Where in the submittal is a written plan for training the water system operator(s) to operate the new treatment components? The plan should include who will provide the training, the scheduled date of training relative to the proposed system startup, training forms to be used, and spreadsheets and schedules the operator will be provided.	<i>18 AAC 80.007</i>
14. O&M Manual: Where in the submittal is a description of the main contents of the O&M manual and the schedule for providing it to the system operator?	<i>18 AAC 80.205(b)(9)</i>
15. Treatment Performance Verification: If required, where in the submittal is objective and verifiable third-party data to support performance claims of the manufacturer? This may be verification the device is certified by an ANSI accredited laboratory to conform to ANSI/NSF Standard 53 for removal of the contaminant in question.	<i>18 AAC 80.010(b)(14)</i> <i>18 AAC 80.205(b)(5)</i>
16. Pilot Testing: Does the submittal include a report of the pilot test used to select the proposed treatment? Depending on system size, complexity, and treatment objectives, pilot testing may be necessary for up to one year using raw water from the public water system source. The report should provide monthly raw water and treated water sample results. If applicable, it should include change out/regeneration frequency information. In addition, it should describe any operation and maintenance problems experienced during the pilot phase and how they will be addressed during system-wide use.	<i>18 AAC 80.205(b)(5)</i>

Treatment - Surface Water / GWUDISW Checklist (continued)

Submittal Requirements	Regulatory Reference
17. Power Supply: Where in the submittal are design details showing an uninterruptible power supply tied to critical electronic equipment? This is important for power conditioning and to provide enough backup power for proper system and valve shutdown at the water treatment plant.	<i>18 AAC 80.205(b)(9)</i>
18. Heat Exchangers: Where in the submittal is it specified that all heat exchangers are double wall?	<i>18 AAC 80.025</i>
19. Conventional or Direct Filtration Backwash: If the proposed treatment is conventional or direct filtration, where in the submittal has the engineer discussed backwash triggers, duration, and frequency? Where in the submittal are design calculations covering loading rates, backwashing rates, volume of backwash water, and other items necessary to assess the efficiency of the proposed filtration process? Where in the submittal has the engineer addressed the selection of filtration media, resins, coagulants, oxidizing agents, and filter aids to achieve a finished water turbidity meeting the performance limit of 0.3 NTU?	<i>18 AAC 80.600</i> <i>18 AAC 80.610</i>
20. Cartridge or Bag Filters Selection Basis: If the proposed treatment includes cartridge or bag filters, where in the submittal are make and model of the filters and filter housings identified and the basis of their selection discussed? Where in the submittal is information on the maximum flow rate and differential pressure for each filter? Where in the submittal is sufficient information showing how the proposed system design will address the full range of raw water qualities expected and provide a finished water turbidity of 1 NTU or lower at least 95% of the time?	<i>18 AAC 80.610(a)</i>
21. Cartridge or Bag Filters NSF Certification: If the proposed treatment will use cartridge or bag filters, where in the submittal is it specified the filters and filter housings be certified to ANSI/NSF Standard 53 for cyst removal or be approved by the Department? The Department maintains a list of approved alternative filters on its website under “Technical Guidance.”	<i>18 AAC 80.030(b)(1)(A)</i>
22. Disinfection: Where in the submittal has the engineer identified and justified the disinfection parameters and assumptions used in the proposed design such as pH, temperature, disinfectant dosage, disinfectant demand, residual disinfectant concentration, design log inactivation criteria, design flow rate, hydraulic efficiency factor, and contact time? Where in the submittal is the first user’s location identified?	<i>18 AAC 80.635(d)</i>

Treatment - Surface Water / GWUDISW Checklist (continued)

Submittal Requirements	Regulatory Reference
23. Backwash Water: If the proposed filtration system includes a backwash process, where in the submittal is appropriate backflow prevention assembly on the backwash water supply line shown and specified? Where in the submittal is an air gap of at least two-pipe diameters on the backwash waste line shown?	<i>18 AAC 80.025</i>
24. Distribution Chlorine Residual: Where in the submittal are documentation, calculations, and specifications showing the public water system will be able to maintain 0.2 mg/L minimum chlorine residual at the distribution system entry point?	<i>18 AAC 80.635(d)</i>
25. Turbidimeters: For systems proposing conventional or direct filtration, where in the submittal are specifications showing the type, quantity, and placement of turbidimeters are adequate to meet the combined and individual filter turbidity monitoring requirements of the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and Interim Enhanced Surface Water Treatment Rule (IESWTR)?	<i>40 CFR 141 40 CFR 174 40 CFR 550 40 CFR 560</i>
26. Turbidity Data: For systems utilizing continuous turbidity monitoring, where in the submittal is a discussion of how the operator will record turbidity data results at least every 15 minutes, download the data for analysis and interpretation, and electronically store the data for at least three years? Where in the submittal is a State approved protocol to validate the continuous turbidity measurement?	<i>18 AAC 80.205(c)(1)(A) 40 CFR Subpart T</i>
27. Disinfection By-products: Where in the submittal is an evaluation of the water's disinfection by-product formation potential?	<i>18 AAC 80.205(c)(4)</i>



Drinking Water Program - Engineering Plan Review Treatment - Corrosion Control Checklist

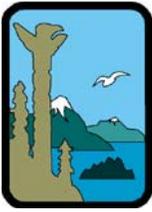
Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of new or modification of existing corrosion control treatment systems.

Submittal Requirements	Regulatory Reference
1. Review Fee: Is the plan review fee for designation of optimal corrosion control treatment included with this submittal? If not, where in the submittal is documentation that the plan review fee has been paid?	<i>18 AAC 80.1910 (a)(9)</i>
2. Design Documents: Are drawings and specifications for construction of the proposed corrosion control treatment system included in the submittal?	<i>18 AAC 80.205(a)(2)</i>
3. Corrosion Control Studies: Where in the submittal (specify document name, page number, division, section, etc.) is an evaluation of the effectiveness of each of the following corrosion control treatments and appropriate combinations to identify the optimal corrosion control treatment: alkalinity and pH adjustment, calcium hardness adjustment, and the addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples? Computer software used to evaluate corrosion control methods and parameters should be identified and pertinent reference information included.	<i>40 CFR 141.82(c)</i>
4. Water Quality Parameters: Where in the submittal (specify document name, page number, division, section, etc.) are test results collected before and after evaluating each corrosion control method for iron, manganese, lead, calcium, copper, conductivity, pH, orthophosphate or silicate inhibitors (if used), alkalinity, and water temperature?	<i>40 CFR 141.82(c)(3)</i>
5. Treatment Constraints: Where in the submittal (specify document name, page number, division, section, etc.) are all chemical and physical constraints identified that would be anticipated to limit or prohibit the use of a particular treatment method and documentation showing why the method is or is not expected to work for this system?	<i>40 CFR 141 Subpart I 40 CFR 141.82(c)(4)</i>

Treatment - Corrosion Control Checklist (continued)

Submittal Requirements	Regulatory Reference
6. Treatment Effects: Where in the submittal (specify document name, page number, division, section, etc.) is an evaluation of the effects the recommended corrosion control method is expected to have on other water quality treatment processes at this plant and the finished water?	<i>40 CFR 141 Subpart I 40 CFR 141.82(c)(5)</i>
7. Chemical Monitoring Equipment: Where in the submittal (specify document name, page number, division, section, etc.) are the model, make, and specifications of all proposed monitoring equipment to optimize chemical dosing?	<i>18 AAC 80.205(b)(9)</i>
8. Sample Taps: Which drawing shows the proposed location of all necessary sample taps or other sampling points?	<i>18 AAC 80.205(b)(9)</i>
9. Disinfection: Where in the submittal (specify document name, page number, division, section, etc.) is a specification that treatment plant components affected by the project will be flushed, disinfected, and sampled in accordance with AWWA Standard C653 before use?	<i>18 AAC 80.010(d)(2)</i>
10. Bottled Water, or POU or POE Treatment Devices: If bottled water, or a point of use, or point of entry treatment device is proposed, where in the submittal (specify document name, page number, division, section, etc.) is documentation that the requirements of 18 AAC 80.365 will be met? The Treatment - POU and POE Checklist (Checklist Number 6.2) must be completed for proposed point of use (POU) and point of entry (POE) treatment devices.	<i>18 AAC 80.365</i>



Drinking Water Program - Engineering Plan Review Treatment - Point of Use (POU) and Point of Entry (POE) Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of a new or modification of an existing treatment system that includes point of use (POU) or point of entry (POE) treatment devices to achieve compliance with an MCL.

Note: POU treatment units may only be used on a temporary basis or if required by the Department as a condition of granting a variance or an exemption [18 AAC 80.365(b) or (c)]. POU treatment devices should not be used to treat for certain contaminants, such as radioactive contaminants and most volatile organic contaminants (VOCs), that would require protection against inhalation or contact exposure to these contaminants at untreated taps. POU treatment units may only be used if required by the Department as a condition of granting a variance [18 AAC 80.365(b)(1)].

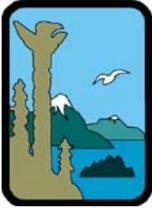
Submittal Requirements	Regulatory Reference
1. Variance or Exemption Application: Does the submittal include a completed variance or exemption application and the applicable fee payment?	<i>18 AAC 80.1910(e) 18 AAC 80.370 18 AAC 80.371 18 AAC 80.375</i>
2. Engineering Design Review: Where in the submittal (specify document name, page number, etc.) are sealed engineering design review of treatment device including plans, a certification of performance, and field testing results for the treatment device? This should include the make, model, manufacturer specifications, and an evaluation of its suitability for this purpose including objective and verifiable third-party data to support performance claims of the manufacturer. This may be in the form of verification the device is certified by an ANSI accredited laboratory to conform to ANSI/NSF Standard 53 for removal of the contaminant of interest.	<i>18 AAC 80.010(b)(14) 18 AAC 80.225(c)(18) 18 AAC 80.360(b) 18 AAC 80.365(f)(2)</i>
3. Raw Water Quality: Where in the submittal (specify document name, page number, etc.) are laboratory analyses results of untreated water for the contaminant(s) that will be treated using treatment devices? The results must reflect year-round changes in water quality and discussions of any contaminants with the potential to interfere with the treatment system and how the system will accommodate potential interference.	<i>18 AAC 80.200(f) 18 AAC 80.300(a) 18 AAC 80.310(b)</i>

Treatment - POU and POE Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>4. Breakthrough: Where in the submittal is information about the breakthrough curve characteristics (time to breakthrough, steepness of breakthrough curve) for the proposed POU or POE device taking into consideration the on-site water quality characteristics, and a discussion of the measures recommended to prevent operation of the units past the point where the maximum contaminant level (MCL) may be exceeded?</p>	<i>18 AAC 80.205(b)(9)</i>
<p>5. Heterotrophic Bacteria: For water treated with activated carbon, where in the submittal (specify document name, page number, etc.) is documentation the design and application of the treatment device address the potential for increasing concentrations of heterotrophic bacteria?</p>	<i>CFR 141.100 (d)(2)</i> <i>18 AAC 80.360(b)</i> <i>18 AAC 80.365(g)(2)</i> <i>18 AAC 80.360(e)</i>
<p>6. O&M Manual: Does the submittal include a draft operations and maintenance manual? The manual should include physical measurements and observations such as total flow treated and the condition of the treatment device and show the treatment devices will be maintained by a manufacturer authorized or certified representative according to the manufacturer's specifications. The manual should include the maintenance schedule, identify the person or contractor that will perform the work, and detail the record keeping method to be used.</p>	<i>18 AAC 80.360 (d)</i>
<p>7. Alarms: Where in the submittal (specify document name, page number, etc.) is verification the units will have audible or visual warnings to automatically notify customers of operational problems.</p>	<i>18 AAC 80.205 (b)(9)</i>
<p>8. Monitoring Plan/Compliance Strategy Plan: Does the submittal include a DEC approved monitoring plan? If not, where in the submittal (specify document name, page number, etc.) is documentation the owner has contacted the DEC compliance specialist serving in the region of the public water system (PWS) to determine the monitoring plan for the system utilizing POU or POE treatment including sample protocol, water analysis, sample site location, and monitoring frequency required? The compliance strategy plan must be signed by the PWS owner or authorized administrator and indicate that all POU and POE treatment units are controlled and maintained by the PWS to ensure proper operation and maintenance of the devices and compliance with maximum contaminant levels (MCLs).</p>	<i>18 AAC 80.300</i> <i>18 AAC 80.360(c)</i> <i>18 AAC 80.360(d)</i> <i>18 AAC 80.360(e)</i> <i>18 AAC 80.365(f)</i> <i>18 AAC 80.365(g)(1)</i>

Treatment - POU and POE Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>9. Project Location: Where in the submittal (specify document name, page number, etc.) is property location information (i.e. legal description) where each POU and POE device is installed and all water taps with the potential to serve drinking water proposed for treatment device installation?</p>	<p><i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.365</i></p>
<p>10. Customer Notification: Where in the submittal (specify document name, page number, etc.) is verification of how the PWS customers are informed of the contaminant of interest, directed to obtain drinking water only from taps where POU devices are installed, and provided instructions and contact information for responding to POU alarms? The emergency contact information should be on each treatment device.</p>	<p><i>18 AAC 80.360(f)</i></p>
<p>11. Access Agreement: Does the submittal include a copy of the access and maintenance agreement for all residents, lease holders, renters, and relevant non-transient users of the PWS? The agreement must be signed by 100% of the customers connected to the PWS for approval of this treatment method.</p>	<p><i>CFR 141.100(e)</i></p>
<p>12. Customer Rights: If a POE treatment device is proposed, where in the submittal (specify document name, page number, etc.) has the owner provided assurance the rights of the public water system's customer are conveyed with the title upon sale of the building?</p>	<p><i>18 AAC 80.360(f)</i> <i>CFR 141.100(e)</i></p>



Drinking Water Program - Engineering Plan Review Treatment - Membrane Filtration Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of a new or modification of an existing membrane filtration treatment system whose treatment objective is reduction of a primary contaminant. It may also be applicable when the treatment goal is removal of a secondary contaminant. Membrane filtration includes reverse osmosis (RO), nano-, ultra-, and micro-filtration systems. Information and guidance on the use of membranes for microbial treatment can be obtained in the EPA Membrane Filtration Guidance Manual (MFGM), November 2005, (EPA 815-R-06-009), available at <http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/compliance.cfm>.

Submittal Requirements	Regulatory Reference
1. Design Documents: Does the submittal include drawings and specifications for construction of the treatment system?	<i>18 AAC 80.205(a)(2)</i>
2. Treatment Objectives: Where in the submittal (specify document name, page number, etc.) is an explanation of the treatment objectives? This should include how the proposed treatment was selected and its suitability for treating this water source. The design should address the full range of raw water quality expected and the basis of design for any pre-treatment required for the membrane system to meet its treatment objective.	<i>18 AAC 80.205(a)(4)</i> <i>18 AAC 80.205(b)(5)</i>
3. Water Quality: Does the submittal include results of laboratory analyses of untreated water for contaminants the proposed treatment system is designed to remove? Where in the submittal (specify document name, page number, etc.) is the range of values for each contaminant discussed (i.e. seasonal variability)?	<i>18 AAC 80.205(c)(1)(A)</i>
4. Performance Verification: Where in the submittal (specify document name, page number, etc.) are objective and verifiable data to support performance claims, including third party certifications, data from independent third parties, pilot study data, the manufacturer's test data, and approvals from other states, countries, or federal agencies? The information must be sufficient for the Department to verify the effectiveness of the membrane system to meet its treatment objective under the site specific conditions.	<i>18 AAC 80.205(b)(5)</i> <i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.205(c)(1)(B)</i>

Treatment - Membrane Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
5. Design Calculations: Where in the submittal (specify document name, page number, etc.) are design calculations covering loading rates and backwash/back flush/reverse flow rates, duration, frequency, event triggers, and other items necessary to assess the hydraulic efficiency of the proposed treatment process?	<i>18 AAC 80.205(a)(4)</i>
6. Manufacturer's Specifications: What part of the submittal contains the detailed manufacturer's specifications for the proposed membrane filtration system?	<i>18 AAC 80.205(a)(2)</i>
7. Chemical Cleaning: Where in the submittal (specify document name, page number, etc.) is a description of the chemical cleaning process (i.e. clean-in-place) including information on chemicals used, documentation of each chemical's ANSI/NSF Standard 60 certification, cleaning duration, cleaning frequency, source of rinse water, disposal of spent chemicals and rinse water, and measures to prevent introduction of cleaning chemicals (or traces thereof) into the drinking water?	<i>18 AAC 80.010(b)(9)</i> <i>18 AAC 80.030</i>
8. Disinfection: What section of the submittal (specify document name, page number, etc.) contains the specification that after installation all treatment system components in direct contact with potable water will be disinfected in accordance with AWWA Standard C653 or similar procedure? <u>Please note</u> that some manufacturers may specify a maximum oxidant limit to prevent damage to the membranes.	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.010(d)(2)</i>
9. Shutdowns: Where in the submittal (specify document name, page number, etc.) is an explanation of how the public water system's water demand will be met during scheduled shutdown events such as chemical cleaning and direct integrity testing?	<i>18 AAC 80.205(b)(9)</i>
10. Compressed Air: If compressed air is used for membrane processes such as backwash and integrity testing, where in the submittal (specify document name, page number, etc.) has the engineer shown how air quality will be managed to prevent introduction of contaminants into the water and specified that an oil-less compressor/blower and food grade lubricants will be used?	<i>18 AAC 80.205(b)(8)</i>
11. Monitoring Scheme: Where in the submittal (specify document name, page number, etc.) is a description of the monitoring scheme that will be used to assess process efficiency and reliability during daily operation?	<i>18 AAC 80.205(c)(1)(B)</i>

Treatment - Membrane Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
12. Effects on Other Unit Processes: For new RO or NF membrane systems installed in existing public water systems, what part of the submittal (specify document name, page number, etc.) includes an evaluation of potential effects from water quality changes (e.g. pH and corrosivity) on downstream processes and the distribution system? Any mitigating treatment (e.g. corrosion inhibitors, blending, pH adjustment) should also be described.	<i>18 AAC 80.205(b)(9)</i>
13. Processes: For automated membrane treatment systems, where in the submittal (specify document name, page number, etc.) are the process and instrumentation diagrams, PLC logic loop descriptions, and a process control narrative?	<i>18 AAC 80.205(a)(2)</i> <i>18 AAC 80.205(b)(9)</i>
14. Automation and Alarms: Where in the submittal (specify document name, page number, etc.) is a description of reliability features including system alarms, critical alarm triggers, alarm follow-up actions (e.g. auto shut-off, filter-to-waste), and the system's capability for effective and safe manual operation?	<i>18 AAC 80.205(b)(9)</i>
15. Power Supply: Where in the submittal (specify document name, page number, etc.) is a power quality analysis to determine if an uninterruptible power supply (UPS) is required for critical electronic equipment and alarms system?	<i>18 AAC 80.205(b)(9)</i>
16. Sample Taps: Which design drawing shows the location of compliance and operational sample points in the water treatment plant? Which specification requires the project to provide fixed labels on all compliance sample taps?	<i>18 AAC 80.655</i> <i>18 AAC 80.205(c)(6)</i>
17. Chemical Feed Pumps: Where in the submittal (specify document name, page number, etc.) has the engineer addressed the selection of chemical feed pumps including their suitability for the chemical being injected and the calculations showing they are properly sized for the water flow rates and chemical dosages necessary?	<i>18 AAC 80.205(b)(9)</i>
18. Chemical Overfeed & Backflow Protection: What part of the specifications or drawings addresses overfeed protection for chemical feed systems and backflow prevention on water supply lines/taps used for chemical mixing solutions?	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.025</i>

Treatment - Membrane Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
19. Heat Exchangers: Where in the submittal (specify document name, page number, etc.) is it specified that all heat exchangers for drinking water be double wall?	<i>18 AAC 80.025</i>
20. Waste Stream Management: Where in the submittal (specify document name, page number, etc.) is the disposal of backwash/backflow/reverse flow water, reject/concentrate, monitoring equipment waste streams, and solid waste addressed? Proper air-gaps should be specified and shown in drawings for waste streams prior to discharge to sewer lines/floor drains. The engineer must identify required wastewater and solid waste disposal permits and a schedule for applying for them. If a backwash wastewater surge tank is specified, where in the submittal are calculations showing the adequacy of its storage capacity with respect to wastewater generated during each backwash and effluent pumping capacity?	<i>APDES 18 AAC 72 18 AAC 60 18 AAC 80.025</i>
21. O&M Manual: Where in the submittal (specify document name, page number, etc.) is information on the schedule and responsible party for completing the system's O&M manual? <u>Please note</u> that at least a draft version will be required when applying for interim operational approval.	<i>18 AAC 80.207 (b)(3)(A)</i>
22. Startup: Where in the submittal (specify document name, page number, etc.) is a discussion of how the plant startup will be implemented including details on any temporary piping and the anticipated startup schedule? If the project is a replacement of a water treatment plant, where in the submittal is a discussion of how the transition will be made from the existing system to the new? Where in the submittal (specify document name, page number, etc.) is a description of functional and performance tests that will be performed during commissioning/startup? <u>Please note</u> that copies of these tests results will be requested for operational approval.	<i>18 AAC 80.205(b)(9) MFGM Section 8.0</i>
23. Operator On-site Training: Where in the submittal (specify document name, page number, etc.) is a written plan for training the water system operator(s) to operate the membrane treatment system? The plan should include at a minimum, who will provide the training, the scheduled date of training relative to the proposed system startup, and general content of the training.	<i>18 AAC 80.007 MFGM section 8.8</i>

Treatment - Membrane Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
Questions below pertain to membrane filtration used as a microbial barrier.	
24. Direct Integrity Testing: Where in the submittal (specify document name, page number, etc.) is a description of the method used for direct integrity testing (DIT) of the membrane including information on what triggers a DIT, frequency of routine DITs, resolution of the test (must be able to detected defects $\leq 3 \mu\text{m}$), and its sensitivity (max log removal value that can be reliably verified by the DIT). Where in the submittal (specify document name, page number, etc.) are calculations to show how the DIT resolution and sensitivity were determined? Membranes that cannot be direct integrity tested are assigned microbial removal credits similar to bag/cartridge filters.	40 CFR 141.719(b)(3) MFGM Section 4.0
25. Indirect Integrity Monitoring: Where in the submittal (specify document name, page number, etc.) is a description of the methods used for continuous indirect integrity monitoring of the membrane including parameters monitored, sampling frequency, and instrument resolution and sensitivity?	40 CFR 141.719(b)(4) MFGM section 5.0
26. Turbidity Monitoring: Where in the submittal (specify document name, page number, etc.) is a description of turbidity monitoring? For continuous monitoring, the description should include turbidimeter specifications and sample point locations.	40 CFR 141.1703 40 CFR 141.500 40 CFR 141.503
27. Target Microbe Removal Verification: Where in the submittal (specify document name, page number, etc.) is an independent, third-party verification or challenge testing report documenting the membrane's log-removal efficiency achieved for the target pathogenic microorganism? The report must document how the challenge test meets the criteria in 40 CFR 141.719(b)(2)(i) through (vii). <u>Please note</u> that rain catchment and seawater systems are subject to a treatment technique requirement of 4-log virus and 3-log <i>Giardia</i> removal/inactivation.	40 CFR 141.719(b)(2) MFGM sections 1.3 & 3.0 MFGM Appendix E 18 AAC 80.615(b)(2)
28. Quality Control Release Value (QCRV): Where in the validation/challenge testing report (specify page number, etc.) is a QCRV for a non-destructive performance test (NDPT) derived? The QCRV is the NDPT criteria applied by the manufacturer to similar production membrane modules that were not directly challenge tested to verify that they will perform as well as the validated modules.	40 CFR 141.719(b)(2)(vii) MFGM Section 3.6



Drinking Water Program - Engineering Plan Review Treatment - Ozone Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction or modification of any treatment system that includes ozone treatment to reduce a primary contaminant or if ozone is a necessary pre-treatment for the removal of a primary contaminant. If ozone is proposed for disinfection of a surface water (SW) or groundwater under the direct influence of surface water (GWUDISW) source, please also use the Treatment – SW/GWUDISW Checklist (Checklist Number 6.0).

Submittal Requirements	Regulatory Reference
1. Design Documents: Where in the submittal (specify document name, page number, etc.) are the drawings and specifications for construction of the treatment system including the ozone generator, its feed gas system, the ozone/water contact chambers, the ozone destruct unit(s), and the ozone generator power supply? Indicate how the ozone generator will be protected from the entry of non-conditioned gasses and provide a power quality analysis to determine if an uninterruptible power supply (UPS) is required for critical electronic equipment and system alarms?	<i>18 AAC 80.205(a)(2)</i> <i>18 AAC 80.205(b)(9)</i>
2. Treatment Objective: Where in the submittal (specify document name, page number, etc.) is a description of the treatment objective(s) for the ozone system?	<i>18 AAC 80.205(b)(5)</i> <i>18 AAC 80.205(a)(4)</i>
3. Sample Taps: Which design drawing shows the location of compliance and operational sample points in the water treatment plant? Which specification requires the project to provide fixed labels on all compliance sample taps?	<i>18 AAC 80.655</i> <i>18 AAC 80.205(c)(6)</i>
4. Chemical Feed Pumps: Where in the submittal (specify document name, page number, etc.) has the engineer addressed the selection of chemical feed pumps including their suitability for the chemical being injected and the calculations showing they are properly sized for the water flow rates and chemical dosages necessary?	<i>18 AAC 80.205(b)(9)</i>

Treatment - Ozone Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>5. Water Quality: Does the submittal include results of laboratory analyses of untreated water for contaminants the proposed treatment system is designed to remove? At a minimum, these results should include: the contaminant of interest, iron, manganese, color, total organic carbon, hydrogen sulfide, pH, turbidity, and bromide. Multiple sets of sample results may be necessary to address the full range of seasonal water quality variability expected.</p>	<p><i>18 AAC 80.205(c)(1)(A)</i></p>
<p>6. Treatment Scheme: Where in the submittal (specify document name, page number, etc.) does the engineer explain how the proposed treatment scheme is suited for the source water quality including descriptions of any pre- and post-ozonation treatment required to achieve the intended treatment goal?</p>	<p><i>18 AAC 80.205(b)(5)</i></p>
<p>7. Chemical Overfeed Protection: Where in the specifications is appropriate overfeed protection for chemical feed systems and backflow prevention on water supply taps for chemical mixing solutions?</p>	<p><i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.025</i></p>
<p>8. Performance Verification: Where in the submittal (specify document name, page number, etc.) are objective and verifiable data to support performance claims, including third party certifications, data from independent third parties, pilot study data, the manufacturer's test data, and approvals from other states, countries, or federal agencies? The information must be sufficient for the Department to verify the effectiveness of the ozone system to meet its treatment objective under the site specific conditions.</p>	<p><i>18 AAC 80.205(b)(5)</i></p>
<p>9. Manufacturer's Specifications: Are detailed manufacturer's specifications for the proposed ozone system included in the submittal?</p>	<p><i>18 AAC 80.205(a)(2)</i></p>
<p>10. Automation and Alarms: Where in the submittal (specify document name, page number, etc.) is a description of reliability features including system alarms, critical alarm triggers, alarm follow-up actions (e.g. auto shut-off, filter-to-waste), air venting, and the system's capability for effective and safe manual operation?</p>	<p><i>18 AAC 80.205(b)(9)</i></p>

Treatment - Ozone Checklist (continued)

Submittal Requirements	Regulatory Reference
11. Oxidation: Where in the submittal (specify document name, page number, etc.) has the engineer provided design calculations for the theoretical ozone oxidation of inorganic and organic constituents necessary to assess the ozone generation unit sizing is within a reasonable factor of safety? Calculations should use the source water quality sampling results and consider source water variability.	18 AAC 80.205(a)(4)
12. Dissolution: Where in the submittal (specify document name, page number, etc.) has the engineer provided a discussion of the method of ozone dissolution (e.g. bubble diffusion, venturi injection, side stream injection) and the expected ozone transfer efficiency at the injection point(s) including the expected and required ozone dose delivered to the water? For a proposed ozone disinfection system, the discussion must provide justification for the location of each injection point.	18 AAC 80.205(b)(5)
13. Compressed Air: If compressed air is proposed, where in the submittal (specify document name, page number, etc.) has the engineer shown how air quality will be managed to prevent contaminants from being introduced into the water and that an oilless compressor/blower or food grade lubricants are specified?	18 AAC 80.205(b)(8)
14. Monitoring Scheme: Where in the submittal (specify document name, page number, etc.) is a description of the monitoring scheme that will be used to assess process efficiency and reliability during daily operation?	18 AAC 80.205(c)(1)(B)
15. Startup Disinfection: What section of the submittal (specify document name, page number, etc.) contains the specification that after installation, all treatment system components in direct contact with potable water will be disinfected in accordance with AWWA Standard C653 or a similar procedure?	18 AAC 80.010(d)(2) 18 AAC 80.205(b)(9)
16. O&M Manual: Where in the submittal (specify document name, page number, etc.) is information on the schedule and responsible party for completing the system's O&M manual? Please note that at least a draft version will be required when requesting interim operational approval.	18 AAC 80.207

Treatment - Ozone Checklist (continued)

Submittal Requirements	Regulatory Reference	
17. Startup: Where in the submittal (specify document name, page number, etc.) is a discussion of how the plant startup will be implemented including details on any temporary piping and the anticipated startup schedule? If the project is a modification or replacement of an existing water treatment system, where in the submittal is a discussion of how the transition will be made from the existing system to the new and a description of functional and performance tests that will be performed during commissioning/startup? Please note that copies of these tests results may be requested for operational approval.	<i>18 AAC 80.205(b)(9)</i>	
18. Operator On-site Training: Where in the submittal (specify document name, page number, etc.) is a written plan for training the water system operator(s) to operate and maintain the ozone treatment system? The plan should include at a minimum, who will provide the training, the scheduled date of training relative to the proposed system startup, and general content of the training.	<i>18 AAC 80.007</i>	
<u>Questions below pertain to ozone used for disinfection credit.</u>		Regulatory Reference
19. CT Calculations: Where in the submittal (specify document name, page number, etc.) are calculations showing the system's ability to meet the required CT for the inactivation of each target pathogen including all assumptions, minimum residual concentration to meet CT, the CT calculation method employed, and how the contact chamber/tank baffle factor (i.e. hydraulic efficiency) was determined, including results of tracer studies if available?	<i>18 AAC 80.205(a)(4)</i>	
20. Controls: Which drawings and specifications provide information on the measures used to ensure CT will be met at all times (e.g. flow monitoring, flow restriction devices, ozone level alarm systems, auto-shutoff mechanisms, etc.)?	<i>18 AAC 80.205(a)(2)</i>	
21. Ozone Meters: Which drawings and specifications provide information on the ozone residual meter(s) and their proposed location(s)? Location selection must consider potential interferences and the point where residual concentration used for CT must be monitored.	<i>18 AAC 80.205(a)(2)</i>	



Drinking Water Program - Engineering Plan Review Treatment - Media Filtration Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of new or modification of an existing treatment system utilizing media filtration. Media filtration includes granular filtration and ion exchange systems.

Submittal Requirements	Regulatory Reference
1. Design Documents: Does the submittal include drawings and specifications for construction of the treatment system? Which design sheet(s) include a schematic, profile, and scaled plan view depicting the placement and location of the treatment unit(s) within the treatment process? Which plan sheet(s) or specification(s) detail the make, model, and description of key system components?	<i>18 AAC 80.205(a)(2)</i>
2. Treatment Objectives: Where in the submittal (specify document name, page number, etc.) is the treatment objective for the proposed media filtration identified? Where in the submittal is an explanation of how the proposed treatment has been selected and its suitability for treating this water source? Does the submittal discuss how the design will address the full range of seasonal variations in water quality expected during operation?	<i>18 AAC 80.205(a)(4)</i> <i>18 AAC 80.205(b)(5)</i>
3. Water Quality: Where in the submittal (specify document name, page number, etc.) are analytical results characterizing the complete range of water quality the system will be expected to treat?	<i>18 AAC 80.205(c)(1)(A)</i>
4. Interferences: Where in the submittal (specify document name, page number, etc.) does the engineer discuss if raw water has any contaminants with the potential to interfere with the proposed treatment system? If so, where in the submittal is a discussion of how the system will accommodate potential interference? Pre-treatment may be required if interfering raw water contaminants are consistently at high levels.	<i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.205(c)(6)</i>

Treatment - Media Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
5. Design Calculations: Where in the submittal (specify document name, page number, etc.) are design calculations for loading rates, backwash rates, and volume of backwash water, individual amounts or dosages of filtration media, resins, coagulants, oxidizing agents, and filter aids, and other items necessary to determine efficiency of the proposed treatment?	18 AAC 80.205(a)(4)
6. Chemical Feed Pumps: Where in the submittal (specify document name, page number, etc.) has the engineer addressed the selection of the chemical feed pump(s) and documented its suitability for the chemical being injected and provided the calculations showing it is properly sized for the water flow rates and chemical dosages necessary?	18 AAC 80.205(b)(9)
7. Chemical Overfeed Protection: Where in the specifications (specify page number, division, section, etc.) is appropriate overfeed protection for chemical feed systems?	18 AAC 80.205(b)(9)
8. Heat Exchangers: Where in the submittal (specify document name, page number, etc.) is it specified that all heat exchangers are double wall?	18 AAC 80.025
9. Backflow Prevention: Where in the submittal (specify document name, page number, etc.) has backflow prevention been addressed for the following items (if used): <ul style="list-style-type: none">• Backwash water supply line• Backwash waste line• Filter surface wash	18 AAC 80.025
10. Redundancy: Where in the submittal (specify document name, page number, etc.) has the engineer considered the need for redundant media filtration units? Redundancy may be required due to the acuteness and concentration of the contaminant.	18 AAC 80.205(b)(9)
11. Shutdowns: Where in the submittal (specify document name, page number, etc.) is an explanation of how the public water system water demand will be met during scheduled shutdown events such as backwashing?	18 AAC 80.205(b)(9)

Treatment - Media Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
<p>12. Construction Specifications: Where in the construction specifications are requirements for the following:</p> <ul style="list-style-type: none">• Newly installed components disinfected to AWWA Standard C653• Components in contact with water certified to ANSI/NSF Standard 61• Chemical additives certified to ANSI/NSF Standard 60	<i>18 AAC 80.205(a)(2)</i>
<p>13. Sample Taps: Which drawing sheet shows where sample taps for compliance and operations monitoring will be installed? Which construction specification indicates compliance taps need to be clearly labeled?</p>	<i>18 AAC 80.655 18 AAC 80.205(c)(6)</i>
<p>14. O&M Manual: Where in the submittal (specify document name, page number, etc.) is information on the schedule and responsible party for completing the system's O&M manual? <u>Please note</u> that at least a draft version clearly stating the operational limits for the system will be required when applying for interim operational approval.</p>	<i>18 AAC 80.207 (b)(3)(A)</i>
<p>15. Backwash: Where in the submittal (specify document name, page number, etc.) has the engineer discussed backwash duration, frequency, and triggers? If a backwash wastewater surge tank is specified, where in the submittal are calculations showing the adequacy of its storage capacity with respect to wastewater generated during each backwash and effluent pumping capacity? Which design drawing identifies the source of water for backwashing? Proper air gaps should be specified and shown in drawings for waste streams prior to discharge to sewer lines/floor drains.</p>	<i>18 AAC 80.205(b)(9)</i>
<p>16. Compressed Air: If compressed air is used for processes such as backwash, where in the submittal (specify document name, page number, etc.) has the engineer shown how air quality will be managed to prevent contaminants introduced into the water and that an oilless compressor/blower or food grade lubricants are used?</p>	<i>18 AAC 80.205(b)(8)</i>
<p>17. Monitoring Scheme: Where in the submittal (specify document name, page number, etc.) is a description of the monitoring scheme that will be used to assess process efficiency and reliability during daily operation?</p>	<i>18 AAC 80.205(c)(1)(B)</i>

Treatment - Media Filtration Checklist (continued)

Submittal Requirements	Regulatory Reference
18. Automation and Alarms: Where in the submittal (specify document name, page number, etc.) is a description of reliability features including system alarms, critical alarm triggers, alarm follow-up actions (e.g. auto shut-off, filter-to-waste), and the system's capability for effective and safe manual operation.	<i>18 AAC 80.205(b)(9)</i>
19. Power Supply: Where in the submittal (specify document name, page number, etc.) is a power quality analysis to determine if an uninterruptible power supply (UPS) is required for critical electronic equipment and alarms system?	<i>18 AAC 80.205(b)(9)</i>
20. Startup: Where in the submittal (specify document name, page number, etc.) is a discussion of how the plant startup will be implemented including details on any temporary piping and the anticipated startup schedule? If the project is a modification or replaces a water treatment plant, where in the submittal is a discussion of how the transition will be made from the existing system to the new? Where in the submittal (specify document name, page number, etc.) is a description of functional and performance tests that will be performed during commissioning/startup? <u>Please note</u> that copies of these tests results will be requested for operational approval.	<i>18 AAC 80.205(b)(9)</i>
21. Operator On-site Training: Where in the submittal (specify document name, page number, etc.) is a written plan for training the water system operator(s) to operate the media filtration system? The plan should include at a minimum, who will provide the training, the scheduled date of training relative to the proposed system startup, and general content of the training.	<i>18 AAC 80.007</i>



Drinking Water Program - Engineering Plan Review Treatment – Ultraviolet (UV) Disinfection Validation Report Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is applicable to construction or modification of surface water treatment systems intending to install UV disinfection. In order for a UV disinfection system to receive inactivation credits for regulated microbiological contaminants (e.g. *Giardia*, *Cryptosporidium*, viruses) it must be validated by an independent third party. Full-scale UV reactor validation testing results must document the operating conditions (e.g. flow, UV intensity, UVT, etc.) under which the reactor can deliver the required dose to achieve the desired inactivation credit. This checklist outlines basic elements of UV validation reports the State will evaluate. Since review of validation reports can take time, design engineers are encouraged to submit UV validation reports for DEC review at least 30 days prior to submittal of design plans. If a UV reactor has been previously approved in the State it may not be necessary to review its validation report. Also if a UV reactor is being proposed for 0.5-log inactivation of *Giardia* or *Cryptosporidium*, the level of review of the validation report may be less detailed. Contact DEC for more information if these situations apply. Additional information and guidance on UV system validation can be found in the EPA *UV Disinfection Guidance Manual* (UVDGM), November 2006, (EPA 815-R-06-007), which is available on the EPA website at <http://water.epa.gov/lawsregs/rulesregs/sdwa/lt2/compliance.cfm>. Other useful UV system references include: AWWA Standard F110-12 “*Ultraviolet Disinfection Systems for Drinking Water*,” August 2012; “*Ultraviolet Disinfection-Guidelines for Drinking Water and Water Reuse*” National Water Research Institute (NWRI), 3rd ed., August, 2012. For UV system design review requirements please refer to DEC checklist 6.6b.

These questions are geared for UV reactor validations based on biosimetry (as defined in UVDGM section 5.2). Other validation approaches such as those based on computational fluid dynamics (CFD) or chemical actinometry are not currently accepted in Alaska.

Submittal Requirements

Reference

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 1. Validation Protocol: Where in the submittal is the validation protocol used to validate the proposed UV unit identified? | <i>40 CFR
141.720(d)(2)
UVDGM 5.2.2</i> |
| 2. LT2ESWTR Requirements: Where in the submittal is documentation of how the validation testing meets the minimum regulatory requirements for UV reactor validation in the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)? | <i>40 CFR
141.720(d)(2)
UVDGM Table 5.1</i> |
| 3. Testing Organization Qualifications: Where in the submittal is documentation of the qualifications and certifications/accreditations of the independent third-party organization that conducted the validation and the laboratory that performed the microbiological analyses? | <i>UVDGM 5.2.3</i> |

Treatment - Ultraviolet (UV) Disinfection Validation Report Checklist (continued)

Submittal Requirements

Reference

- 4. Validation Report:** Does the submittal include a copy of the full validation report together with an executive summary? If the validation report is in a language other than English, a copy translated in English must be included. *UVDGM 5.11*
- 5. Executive Summary Contents:** Verify the executive summary contains the following minimum elements - validated dose or range of validated doses; inactivation credit achieved for the target pathogens based on the LT2ESWTR UV dose requirements; validated operating conditions (e.g. flow, UVT); and UV intensity set-points (for UV intensity set-point approach) or dose monitoring equation (for calculated dose approach). *UVDGM 5.11.3
40 CFR
141.720(d)(1)*
- 6. Validation Report Contents:** Verify the full validation report contains the following key elements - full scale reactor testing results with data for each test condition evaluated; collimated beam testing results; QA/QC checks (e.g. microbiological work QA/QC, measurement uncertainties of all sensors & meters); calculations of the validated dose including intensity set points and dose equations, as applicable; log-inactivation calculations and derivation of validation factors; and validated operating conditions. *UVDGM 5.11.3
UVDGM checklist 5.3*
- 7. UV Reactor Description:** Where in the validation report is a detailed technical description of the tested UV reactor including specifications of critical components (e.g. lamps, quartz sleeves & sensor ports, UV intensity & UVT sensors) and wetted dimensions? Please review UVDGM checklist 5.1 for details. Data on the spectral response of the UV intensity sensor should be included. *UVDGM 5.4.8, 5.5.4,
5.11, and D.3
AWWA F110-12 Sec.
4.6.1.2
NWRI Guidelines
Chapter 3 Sec. 2*
- 8. Hydraulic Conditions:** Where in the validation report is a description of the hydraulic conditions of the validated reactor setup (e.g. inlet and outlet piping configurations)? *UVDGM 3.6 & 5.4.5
AWWA F110-12 Sec.
4.1.6.2(7)*
- 9. Biodosimetry Test Stand:** Where in the validation report is a diagram of the full-scale biodosimetry test stand showing ports for injection of microorganisms and chemicals, sample locations, means for assuring proper mixing prior to sample taps, online monitoring equipment, and flow meters? *UVDGM 5.4
NWRI Guidelines
Chapter 3 Sec. 2*

Treatment - Ultraviolet (UV) Disinfection Validation Report Checklist (continued)

Submittal Requirements

Reference

- 10. Water Quality:** Where in the validation report is a discussion of the water quality characteristics used at the test facility including UVT at 254 nm, turbidity, and parameters that could affect fouling of reactor quartz sleeves (e.g. calcium, alkalinity, hardness, iron, manganese, pH, temperature)? If a medium pressure lamp reactor is validated, where in the submittal are UVT scans results covering the germicidal range from 200 nm to 300 nm, with and without a UV absorbing chemical added?
- UVDGM 5.4.1
NWRI Guidelines
Chapter 3 Sec. 2*
- 11. Monitoring Equipment:** Where in the validation report are specifications of the monitoring equipment used during validation testing, including information on equipment accuracy and latest calibration certificates?
- UVDGM 5.5
UVDGM Checklist 5.2*
- 12. Set-Point Dose Monitoring Approach:** For reactors using the UV intensity set-point dose monitoring approach, where in the validation report is a discussion of critical alarm systems (e.g. visual alarm, failsafe shutoff) tested during validation including results of those tests? Results should include UV intensity sensor readings at the triggered alarm condition.
- 13. Lamp Fouling and Aging Factor:** Where in the validation report are details on the lamp fouling and aging factor used during validation such as: how was the value derived/selected; how was it incorporated/ accounted for during validation (e.g. aged lamps, power turndown, or combination); was non-uniform lamp aging potential evaluated and accounted for?
- UVDGM 5.4.6 & 5.6
NWRI Guidelines
Chapter 3 Sec. 4*
- 14. Validation Report QA/QC:** Where in the validation report are answers to UVDGM checklist 5.4 (Review of Quality Assurance/Quality Control) and checklist 5.5 (Review of Key Validation Report Elements)?
- UVDGM 5.12 &
UVDGM Checklists
5.4 & 5.5*
- 15. Challenge Microorganism:** Where in the validation report is detailed information about the challenge microorganism used in validation, such as: protocols for growth and enumeration; published range for UV dose-response (if other than MS2 bacteriophage or *Bacillus subtilis*); and suitability for use as a surrogate for the target pathogens of interest?
- UVDGM 5.3*

Treatment - Ultraviolet (UV) Disinfection Validation Report Checklist (continued)

Submittal Requirements

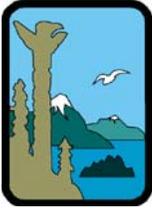
Reference

16. Microbial Action Spectra (MP Reactors): For medium pressure (MP) reactor validation, where in the validation report is an evaluation of bias issues resulting from differences of action spectra between the challenge and target microorganisms (i.e. ratio of germicidal outputs as determined by UVDGM equation D.3)? If an action spectra correction factor is specified, the evaluation must include a discussion of how it will be incorporated into the validated dose and a peer-reviewed action spectra for the challenge microorganism if it is not MS2. The actual emission spectra of the validated reactor UV lamps should be used in the bias analysis.

*UVDGM D.4.1
AWWA F110-12 Sec.
4.6.1.3*

17. Water UV Absorbance Spectra (MP Reactors): For MP reactor validation, where in the validation report is an evaluation of bias issues resulting from differences in UV absorbance spectra between the validation water and the water treatment facility water, as well as bias due to non-ideal UV intensity sensor location (polychromatic bias)?

*UVDGM D.4.2 &
D.4.3*



Drinking Water Program - Engineering Plan Review Treatment – Ultraviolet (UV) Disinfection System Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of new or modifications of existing surface water treatment systems utilizing UV disinfection. Additional information and guidance can be obtained in the EPA *UV Disinfection Guidance Manual* (UVDGM), November 2006, (EPA 815-R-06-007). Tables referenced in this checklist refer to the *UVDGM*, which can be downloaded from the EPA website at <http://water.epa.gov/lawsregs/rulesregs/sdwa/t2/compliance.cfm>. Other useful UV system design references include: AWWA Standard F110-12 “*Ultraviolet Disinfection Systems for Drinking Water*,” August 2012; “*Ultraviolet Disinfection-Guidelines for Drinking Water and Water Reuse*” National Water Research Institute (NWRI), 3rd ed., August, 2012.

Approval of a UV disinfection system for microbial treatment credit will be contingent on DEC’s approval of the third party validation of the proposed UV reactor make and model. Design engineers are highly encouraged to contact their local DEC engineer early in the UV selection process to verify if the proposed UV reactor has been approved by the State. If not, a validation report needs to be submitted for DEC review (See checklist 6.6a) at least 30 days prior to the construction approval request. Please be advised that sufficient water quality data to support the proposed design (e.g. UV Transmittance) may take up to a year to collect and will be requested as part of the construction approval submittal for the UV system.

Submittal Requirements

Reference

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 1. Treatment Objectives: What is the treatment objective for the proposed technology? What are the target pathogens (e.g. <i>Giardia</i> , <i>Cryptosporidium</i> , and/or viruses) and what are the design minimum log-inactivation credits for each of these pathogens? | <i>18 AAC 80.205(a)(4) and (b)(5)&(9)</i>
<i>40 CFR 141.720(d)</i>
<i>UVDGM 1.4 and 3.4.2</i> |
| 2. Minimum UV Dose: What is the proposed minimum operational dose to achieve the desired level of inactivation? Will this dose include an added safety margin (e.g. 10%-20%) to provide flexibility and reduce occurrence of off-specification events? | <i>UVDGM 3.4.2</i> |
| 3. Dose Monitoring: Explain the selected dose monitoring strategy – Will the system use the calculated dose, set-line, or set-point approach? | <i>UVDGM 3.5.2</i> |
| 4. Validation: Has the specific make and model of the proposed UV unit been validated by a third party? Has DEC reviewed and approved this UV system’s validation report or certificate? If not, please include information required in checklist 6.6a. | <i>40 CFR 141.720(d)(2)</i> |

Treatment – Ultraviolet (UV) Disinfection System Checklist (continued)

Submittal Requirements

Reference

- 5. Design Documents:** Provide drawings and specifications covering construction of the treatment system. Include a schematic profile and scaled plan view drawing depicting the placement and location of the UV unit(s) within the treatment process. Specifications should cover make, model, and description of key UV system components (e.g. reactor vessel, lamps, sleeves, and sensors). *18 AAC 80.205(a)(2)
UVDGM 4.6
UVDGM Checklist 5.1
NWRI Guidelines
Chapter 1 Sec. 8*
- 6. Design Criteria:** Provide design criteria used for selecting and sizing the proposed UV disinfection system. Include relevant calculations such as water demand analysis. *UVDGM 3.4.3*
- 7. UV Transmittance:** Provide UV transmittance (UVT) measurements at 254 nm and associated design analysis (e.g. cumulative frequency diagram) for the water to be treated by the UV reactor; UVT samples should be analyzed unfiltered. Weekly measurements collected over 2 to 3 months will be the minimum data expected for stable sources of water. Weekly measurements for 6 to 12 months will be the minimum data expected for sources with varying water quality. More frequent sampling may be needed to capture water quality events (e.g. major rain events, lake turnover, etc.). Data collected should address the range of UVT expected during operation; include the design UVT value in the data analysis. Was correlation of UVT with WTP flow considered in the analysis? If MP lamps will be used, include UVT scans in the germicidal range (200-300 nm) sufficient to cover expected seasonal variations; this will help in estimating a site specific action spectra correction factor. For unfiltered systems, consider capturing UVT data that includes high turbidity events and algal blooms. *UVDGM Table 3.2 &
Secs. 3.4.4.1 & 3.4.4.3
AWWA F110-12
Sec. 4.2.4.2*
- 8. Water Quality Interferences:** Address potential water quality constituents in the raw or filtered water that could interfere with UV disinfection (e.g. algae, iron, manganese, calcium, alkalinity, hardness, ORP, pH, organics, color, turbidity, upstream treatment chemicals). Are these constituents within the manufacturer's acceptable ranges and/or within the ranges accounted for during validation testing? If pretreatment is required, provide design criteria for pre-treatment process. *UVDGM 2.5.1, 3.4.4,
& 3.4.4.2*
- 9. UV Interference:** Address UV interference with other treatment processes or equipment (e.g. reduction of chlorine residual, UV degradation of materials like gaskets, glass, and plastics of nearby inline components such as water meters, and valves). *UVDGM 2.5.2 &
3.2.1*
- 10. Fouling and Aging Factors:** Justify the fouling and aging factors selected for this design and the source water characteristics. *UVDGM 3.4.5*

Treatment – Ultraviolet (UV) Disinfection System Checklist (continued)

Submittal Requirements

Reference

- 11. Filtration Avoidance:** For filtration avoidance (i.e. unfiltered) systems, explain how the proposed design will control debris that could cause sleeves and UV lamps to break. *UVDGM 4.5.1*
- 12. Redundancy:** What level of redundancy will be considered in the UV system design? Unfiltered water systems will be expected to have some level of redundancy in their UV system design (e.g. n+1 UV reactors). *UVDGM 3.8.1*
- 13. Distribution System Disinfectant Residual:** What secondary disinfectant will be used to maintain a disinfectant residual in the distribution system? Will additional virus inactivation be provided with the secondary disinfectant? Please provide relevant design criteria and calculations. Note: for unfiltered systems, LT2 requires the use of two disinfectants to achieve the combined disinfection requirements for *Giardia*, *Cryptosporidium*, and viruses. *UVDGM 3.2.1*
40 CFR 141.712(d)
- 14. Mercury Contamination:** Should a UV lamp break, what engineered design features and O&M measures will be in place to control mercury contamination? *UVDGM Appendix E*
- 15. Disinfection Benchmark:** For existing unfiltered systems modifying disinfection, has a disinfection benchmark been established? *40 CFR 141.540*
- 16. Electric Power Quality:** Has an electric power quality assessment been performed to ensure the power source will meet the manufacturer’s specification and tolerances for the selected UV system? Have potential electrical harmonic distortion issues caused by the UV system on other electrical systems been addressed? Are UV reactors provided with GFI circuitry? *UVDGM 3.4.6 & 4.4*
IEEE Standard 519
NWRI Guidelines
Chapter 1 Sec. 4
- 17. Backup Power:** How will the UV system design address power outages? Are backup power and power conditioning equipment specified (e.g. UPS, generators)? If so, how will the power supply transition be managed? *UVDGM 3.4.6 & 4.4*
NWRI Guidelines
Chapter 1 Sec. 4
- 18. Spare Parts:** What inventory of critical spare parts will be kept at the water treatment plant? *UVDGM 6.3.3*

Treatment – Ultraviolet (UV) Disinfection System Checklist (continued)

Submittal Requirements

Reference

- 19. Diversion Piping:** Will there be diversion piping installed after the UV unit to prevent water not treated to specifications from entering the distribution system (i.e. treat-to-waste piping)?
- 20. Hydraulic Design:** Describe the proposed UV facility hydraulic design. How will inlet and outlet piping configuration ensure a UV dose delivery equal to or greater than during validation testing? Will piping configuration ensure the reactor is flooded (i.e. all lamps submerged) during normal operation?
- 21. Alarms and Controls:** Please describe UV system alarms and control system interlocks. This should include alarm follow-up actions (e.g. auto shut-off) and the system's capability for effective and safe manual operation.
- 22. Flow Control:** How will flow be regulated and monitored to ensure the UV system is operating within its validated flow rate?
- 23. ANSI/NSF Standard Certification:** Provide documentation that wetted components of the reactor have been certified to meet ANSI/NSF Standard 61 or equivalent ANSI/NSF standard that evaluates materials for drinking water contact applications.
- 24. UV Cleaning Systems:** Describe quartz sleeve and UV sensor window cleaning system. If chemicals are used, provide documentation they have been certified to meet ANSI/NSF Standard 60?
- 25. Cross-connection:** Has the UV design addressed potential cross connection issues (e.g. cooling water for MP reactors)?
- 26. Operator On-site Training:** Will the water system operator(s) be trained to operate the UV unit? Who will provide the training? What will be the scheduled date for training relative to the proposed system startup?

*40 CFR
141.720(d)(2)(i)
UVDGM 3.6.2, 4.1 &
E.2.1.3, AWWA
F110-12 Sec.5.2.1.4*

*UVDGM 4.3.3 &
Table 4.2*

UVDGM 4.1.2

*18 AAC 80.030
AWWA F110-12
Sec. 4.4.1.1;*

*18 AAC 80.030
NWRI Guidelines
Chapter 1 Sec. 3*

18 AAC 80.025

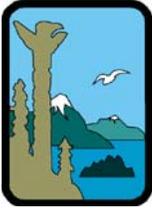
*18 AAC 80.007
UVDGM 6.7.2*

Treatment – Ultraviolet (UV) Disinfection System Checklist (continued)

Submittal Requirements	Reference
27. Startup Testing: Provide a description of functional and performance tests required during startup. Please note that copies of these tests will be requested for operational approval.	<i>UVDGM 6.1.3-6.1.5</i>
28. O&M Manual: Provide information on the main contents of the O&M manual and the timing for its completion. Please refer to recommended O&M activities in UVDGM tables 6.3 and 6.4.	<i>UVDGM 6.1.1, 6.2, 6.3, & 6.4, AWWA F110-12 Sec. 5.3 NWRI Guidelines Chapter 1 Sec. 8</i>
29. Monitoring and Recording: Describe proposed UV system monitoring/recording equipment, activities, and frequencies (refer to UVDGM tables 6.7 and 6.8 for recommendations). Has the design of the UV monitoring and recording equipment and the O&M manual considered regulatory monitoring and reporting requirements the operator will need to fulfill? (See DEC Monthly Operator Reports.)	<i>40 CFR 141.720(d)(3) 40 CFR 141.721(f) UVDGM 6.4 & 6.5</i>
30. Lamp Status: How will the lamp status be monitored? Please note lamp status may be monitored with UV intensity sensors if each lamp has a dedicated UV intensity sensor.	
31. Calibration: Describe how, and how often, the calibration of key UV system sensors will be verified (UV intensity, UVT, flow meters). Will a designated “reference” UV intensity sensor be available to the operator? If so, how often will the reference sensor be calibrated?	<i>40 CFR 141.720(d)(3) UVDGM 6.4.1.1, 6.4.1.2, & 6.3.2.3</i>
32. UV Lamp Disposal: How will spent UV lamps be disposed of (they are considered hazardous waste under RCRA)? Does the manufacturer have a recycling program?	<i>UVDGM 6.3.2.6</i>
<hr/> <u>Additional submittal requirements for systems using the calculated dose monitoring approaches</u>	
33. Dose: Provide the validated UV dose range. What will be the minimum operational validated dose and its associated target pathogen inactivation credit?	<i>40 CFR 141.720(d)(1) UVDGM 3.5 & 5.10</i>

Treatment – Ultraviolet (UV) Disinfection System Checklist (continued)

Submittal Requirements	Reference
<p>34. Dose Calculation: Will the relative UV intensity term (S/S_0) in the calculated dose equation be based on the lowest measured lamp intensity in the reactor? Provide an example calculation of UV dose at worst-case conditions of UVT, flow, and UV intensity (e.g. design fouling/aging factor). Please include all relevant validation factor parameters.</p>	<i>UVDGM Table B.11</i>
<p>35. UVT Calibration: What means will be provided for calibration verification of online UVT analyzers?</p>	<i>UVDGM 6.4.1.2 AWWA F110-12 Sec. 4.5.7</i>
<p>36. P&ID: Provide process and instrumentation diagrams, PLC logic loop descriptions, and a process control narrative. Please include alarm descriptions and triggers.</p>	<i>UVDGM 4.3</i>
<p>37. O&M Manual: Will the O&M manual include UV system operational curves to allow the operator to visually verify the delivered dose given key input parameters (e.g. flow, UV intensity, UVT)?</p>	
<p>38. Manual Override: Is there a manual override of dose monitoring equation inputs to temporarily keep the UV system running in case a sensor malfunctions? Are emergency operations addressed in the O&M manual?</p>	<i>UVDGM 6.1.1 & 6.4.1.2</i>
<p>39. Access to PLC Equations: Will operators or field commissioning staff have access to the programmed dose monitoring equation parameters? DEC may request access during inspection to verify the programmed equation is the same as the validated one.</p>	<i>AWWA F110-12 Sec. 4.6.2</i>
<hr/> <u>Additional submittal requirements for systems using the set-point dose monitoring approach</u> <hr/>	
<p>40. Set-point Conditions: Please summarize the set-point conditions (e.g. flow, UV intensity, lamp status values). What will be the validated dose at set-point and its associated target pathogen inactivation credit?</p>	<i>UVDGM 3.5.2.1 & 5.6.1</i>
<p>41. UV Transmittance: Will UV transmittance be measured (note: not typically required for set-point based systems)? If so, how?</p>	



Drinking Water Program - Engineering Plan Review Treatment - Other Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of a new or modification of an existing treatment system not applicable to any other treatment checklist.

Submittal Requirements	Regulatory Reference
1. Treatment Objectives: Where in the submittal (specify document name, page number, etc.) is an explanation of the treatment objectives including any contaminant(s) of concern? This should include how the proposed treatment was selected and its suitability for treating the full range of raw water quality expected from this water source.	<i>18 AAC 80.205(a)(4)</i> <i>18 AAC 80.205(b)(5)</i>
2. Water Quality: Where in the submittal (specify document name, page number, etc.) are results of laboratory analyses of untreated water for contaminant(s) the proposed treatment system is being designed to remove? Where in the submittal is the range of values for each contaminant discussed (i.e. seasonal variability)?	<i>18 AAC 80.205(c)</i>
3. Design Documents: Does the submittal include drawings and specifications for construction of the treatment system?	<i>18 AAC 80.205(a)(2)</i>
4. Design Calculations: Where in the submittal (specify document name, page number, etc.) are design calculations covering efficiency and effectiveness of the proposed treatment process?	<i>18 AAC 80.205(a)(4)</i>
5. Alternative Filtration: For filtration using cartridge or bag filters, where in the submittal (specify document name, page number, etc.) does the engineer identify and justify the type(s) of proposed units? The submittal will need to include make and model of the filters as well as information on the maximum flow rate and differential pressure for each filter selected. Estimates of intervals between filter changing will be needed to address the suitability of this technology for this water quality as well as how and where the spent filters will be disposed.	<i>18 AAC 80.205(b)(9)</i>

Treatment - Other Checklist (continued)

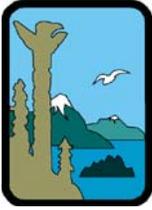
Submittal Requirements	Regulatory Reference
<p>6. Chemical Feed: If the submittal includes chemical feed systems, where in the submittal (specify document name, page number, etc.) is the following documented:</p> <ol style="list-style-type: none">Chemical feed pump's suitability for the chemical being injectedCalculations showing pump is properly sized for the water flow rates and chemical dosages necessaryChemical feed system has appropriate overfeed protectionWater supply for mixing chemical solutions has appropriate backflow prevention	<p><i>18 AAC 80.205(b)(9)</i> <i>18 AAC 80.025</i></p>
<p>7. Effects on Other Unit Processes: If the treatment will be installed in an existing public water system, what part of the submittal (specify document name, page number, etc.) includes an evaluation of potential effects from water quality changes (e.g. pH and corrosivity) on downstream processes and the distribution system? Any mitigating treatment (e.g. corrosion inhibitors, blending, pH adjustment) should also be described.</p>	<p><i>18 AAC 80.205(b)(9)</i></p>
<p>8. Monitoring Scheme: Where in the submittal (specify document name, page number, etc.) is a description of the monitoring scheme that will be used to assess process efficiency and reliability during daily operation?</p>	<p><i>18 AAC 80.205(c)(1)(B)</i></p>
<p>9. Sample Taps: Which design drawing shows the location of compliance and operational sample points in the water treatment plant? Which specification requires the project to provide fixed labels on all compliance sample taps?</p>	<p><i>18 AAC 80.655</i> <i>18 AAC 80.205(c)(6)</i></p>
<p>10. Manufacturer's Specifications: Are detailed manufacturer's specifications for the proposed equipment included in the submittal?</p>	<p><i>18 AAC 80.205(a)(2)</i></p>
<p>11. Performance Verification: Where in the submittal (specify document name, page number, etc.) are objective and verifiable data to support performance claims, such as independent third party certifications/data, pilot study data, manufacturer's test data, and/or approvals from other states, countries, or federal agencies? The information must be sufficient for the Department to verify the effectiveness of the system to meet its treatment objective under the site specific conditions.</p>	<p><i>18 AAC 80.205(b)(9)</i></p>

Treatment - Other Checklist (continued)

Submittal Requirements	Regulatory Reference
12. Automation and Alarms: Where in the submittal (specify document name, page number, etc.) is a description of reliability features including system alarms, critical alarm triggers, alarm follow-up actions (e.g. auto shut-off, filter-to-waste), and the system's capability for effective and safe manual operation.	<i>18 AAC 80.205(b)(9)</i>
13. Shutdowns: Where in the submittal (specify document name, page number, etc.) is an explanation of how the public water system water demand will be met during scheduled shutdown events such as maintenance?	<i>18 AAC 80.205(b)(9)</i>
14. Power Supply: Where in the submittal (specify document name, page number, etc.) is a power quality analysis to determine if an uninterruptible power supply (UPS) is required for critical electronic equipment and alarms system?	<i>18 AAC 80.205(b)(9)</i>
15. Heat Exchangers: Where in the submittal (specify document name, page number, etc.) is it specified that all heat exchangers are double wall?	<i>18 AAC 80.025</i>
16. Disinfection after Installation: What section of the submittal (specify document name, page number, etc.) contains the specification that after installation, all newly installed components in direct contact with potable water will be disinfected in accordance with AWWA Standard C653 or similar procedure?	<i>18 AAC 80.010(d)(2)</i> <i>18 AAC 80.205(b)(9)</i>
17. Startup: Where in the submittal (specify document name, page number, etc.) is a discussion of how the plant startup will be implemented including details on any temporary piping and the anticipated startup schedule? If the project is a modification or replaces a water treatment plant, where in the submittal is a discussion of how the transition will be made from the existing system to the new?	<i>18 AAC 80.205(b)(9)</i>
18. O&M Manual: Where in the submittal (specify document name, page number, etc.) is information on the schedule and responsible party for completing the system's O&M manual? <u>Please note</u> that at least a draft version will be required when applying for interim operational approval.	<i>18 AAC 80.207</i>

Treatment - Other Checklist (continued)

Submittal Requirements	Regulatory Reference
19. Operator On-site Training: Where in the submittal (specify document name, page number, etc.) is a written plan for training the water system operator(s) to operate the treatment system? The plan should include at a minimum, who will provide the training, the scheduled date of training relative to the proposed system startup, and general content of the training.	<i>18 AAC 80.007</i>
20. Compressed Air: If compressed air is used in contact, where in the submittal (specify document name, page number, etc.) has the engineer shown how air quality will be managed to prevent contaminants introduced into the water and that an oilless compressor/blower or food grade lubricants are used?	<i>18 AAC 80.205(b)(8)</i>



Drinking Water Program - Engineering Plan Review Waiver Checklist - Source

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

Use of this guide is required as a part of a separation distance waiver request between a community, non-transient non-community, or transient non-community drinking water source such as a well, infiltration gallery, or intake and a potential source of contamination such as septic systems, sewer lines, fuel tanks, storm drains, etc..

Waiver requests must be accompanied by the facility and project information forms in the Plan Review Application (see Checklist 0.0).

Submittal Requirements

Regulatory Reference

- 1. Waiver Request:** The submittal must include a sealed engineer’s report clearly identifying the separation distance waiver(s) requested, justifying the lesser distance(s), and explaining how the lesser distance(s) do not threaten public health. Information outlined below should be included in the report.

*18 AAC
80.020(c)(1-2)
18 AAC
80.020(c)(4)(C)(i)*

- 2. Waiver Fee and Contact Information:** Is the waiver review fee included in the submittal? For submittals requesting fee calculation assistance, a submittal may be accepted without the fee payment if there is prior approval from the reviewing engineer and all contact information for the person, agency, or company responsible for fee payment is provided. A waiver review will not be completed until the fee payment is received.

*18 AAC
80.1910(a)(11)*

- 3. Design Considerations:** Where in the engineer’s report are discussions of the construction methods, environmental factors (e.g. soil classifications, groundwater conditions, surface topography, and geology), and any proposed mitigation techniques supportive of the waiver(s)? Where in the drawings (specify sheet number, etc.) are details of the system design addressing environmental factors?

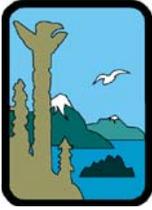
*18 AAC
80.020(c)(2-3)
18 AAC
80.020(c)(4)(C)(i)*

- 4. Plans and Engineering Drawings:** Does the report include a set of plans consisting of scaled drawings and an accurate description and location of potential sources of contamination, surface waters, groundwater, and existing and potential drinking water sources within the protective radius of the well? The drawings must be sealed, signed, and dated on each page by an Alaska registered P.E. and in hardcopy format unless previous arrangements have been made.

18 AAC 80.020(c)(4)

Waiver Checklist - Source (continued)

Submittal Requirements	Regulatory Reference
5. Water Source Protection: Where in the report (specify page number, etc.) are details of the system design that will prevent contamination of the source(s) at the lesser separation distance(s)?	18 AAC 80.020(c)(4)(C)(ii)
6. Risk Mitigation: Where in the report (specify page number, etc.) are details of the component(s) or object(s) posing a potential risk (wastewater system, sewer etc.) and details showing they are constructed and operated in an approved manner, meet minimum engineering standards, and do not present a substantial risk to the water system?	18 AAC 80.020 (c)(2) 18 AAC 80.020 (c)(4)(C-D)
7. Other Site Information: Where in the report (specify page number, etc.) is any other information that may assist the Department in assessing the effect of the proposed lesser separation distance on the public drinking water system?	18 AAC 80.020(c)(4)(D)



Drinking Water Program - Engineering Plan Review Waiver Checklist – Piped Distribution

Project Name: _____

Date: _____

Engineer Name: _____

AK P.E. License
No.: _____

Use of this guide is required as a part of a separation distance waiver request between a community, non-transient non-community, or transient non-community piped distribution system and a potential source of contamination such as septic systems, sewer lines, fuel tanks, storm drains, etc. as discussed in 18 AAC 80.020 (water) and 18 AAC 72.020 (wastewater). **Waiver requests must be accompanied by the facility and project information forms in the Plan Review Application (see Checklist 0.0).**

Submittal Requirements

Regulatory Reference

1. Waiver Request: The submittal must include a sealed engineer’s report clearly identifying the separation distance waiver(s) requested and the reason the separation distance cannot be met, justifying the lesser distance(s), and explaining how the lesser distance(s) do not threaten public health. Information outlined below should be included in the report.

*18 AAC
80.020(f)(3)(A)*

2. Fee: Is the waiver requested for a reduction of the separation requirement to a sewer line, or part of a septic system? If the request includes sanitary or storm sewer lines, how many feet of water line will be subject to the waiver? The waiver review fee required under 18 AAC 80.1910(a)(11) shall be included with all waiver requests. For submittals requesting fee calculation assistance, a submittal may be accepted without the fee payment if there is prior approval from the reviewing engineer and all contact information for the person, agency, or company responsible for fee payment is provided. A waiver review will not be completed until the fee payment is received.

*18 AAC
80.1910(a)(11)*

3. Protective of Public Health: Where in the report (specify document name, page number, etc.) is justification showing the design, management, and operations of the distribution system and the potential risk(s) are protective of public health? This may include a discussion of construction methods, environmental factors, proposed mitigation techniques, weld logs, field verification notes, etc..

18 AAC 80.020 (g)

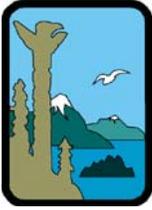
Waiver Checklist – Piped Distribution (continued)

Submittal Requirements

Regulatory Reference

- 4. Waiver Type:** Where in the report is a description of the condition(s) in the Distribution - Piped Checklist (Checklist Number 5.0) numbers 13a-15 for which a waiver is being requested? Information should include all required horizontal and vertical separation distances not met, their location(s), and the details of each condition in 13a-c for sewer lines within 10 feet of a water line and 13a-14d for each sewer line crossing a water line.

18 AAC 80.020 (g)



Drinking Water Program - Engineering Plan Review Additive - Fluoride Checklist

Project Name: _____ **Date:** _____
Engineer Name: _____ **AK P.E. License No.:** _____

This checklist is required for the construction of new, or modification of existing, systems adding fluoride. It is intended for systems using sodium fluoride or sodium fluorosilicate; if a system proposes using fluorosilicic acid, then contact the Drinking Water Program for additional requirements. Additional information and guidance can be obtained from the CDC Morbidity and Mortality Weekly Report (MMWR) *Engineering and Administrative Recommendations for Water Fluoridation, 1995* and the *Ten States Standards Recommended Standards for Water Works*.

Submittal Requirements	Reference
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1. Chemical Additive: Where in the submittal (specify document, page number, etc.) is the ANSI/NSF Standard 60 certification and a manufacturer’s affidavit of compliance with AWWA standard B701 or B702 for the specific fluoride compound proposed?	<i>18 AAC 80.030 CDC MMWR Vol 44 No. RR-13 III A.18</i>
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2. Design Documents: Are plans and specifications provided that cover construction of the fluoride related equipment, including but not limited to:	<i>18 AAC 80.200(b) Ten States Standards 5.0.1</i>
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- Descriptions of feed and testing equipment
- Location of feeder, piping layout, injection point, and sample tap
- Procedures for operations and controls
- Details of system components including tanks (with capacity, drains, overflow, and vent), pumps, piping, valves, injection quill, backflow prevention devices, air gaps, secondary containment, and safety eye washes and showers

3. Design Calculations: Where in the submittal (specify document, page, etc.) are design calculations covering:	<i>Ten States Standards 5.0.4 CDC MMWR Vol 44 No. RR-13</i>
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- a. Water production (maximum, average, and minimum)
- b. Proposed minimum (non-zero), average, and maximum fluoride dosages
- c. Solution strength or purity and specific gravity or bulk density

4. Natural Fluoride: Where in the submittal (specify document, page, etc.) are laboratory test results of raw water background fluoride levels?	<i>18 AAC 80.205(c)(1)(A) CDC MMWR Vol 44 No. RR-13</i>
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Additive - Fluoride Checklist (continued)

Submittal Requirements

Reference

- 5. Dosage Verification:** Where in the submittal (specify document, page, etc.) are provisions for the operator to measure the quantities of fluoride used and water treated on a daily basis? Include an assessment of the accuracy of these methods compared to published recommendations of 5% of daily change.
- 18 AAC
80.205(c)(1)(A)
Ten States Standards
5.0.4, 5.1.2 and
5.4.7.b.3.*
- 6. Saturator Make-Up Water:** Where in the submittal are specifications for a meter (or other method for measuring water quantity added) and backflow protection?
- Ten States Standards
5.4.7.b.11*
- 7. Chemical Feed Pump:** Where in the submittal (specify document, page, etc.) is the fluoride feed pump's suitability addressed including calculations showing it is properly sized for the system and its max and min capacity? Feeder capacity should be no more than twice the average flow feed rate. A pressure relief valve should be provided on the pump discharge line and the priming switch should be spring-loaded.
- 18 AAC 80.205(a)(4)
Ten States Standards
5.1.4 and 5.4.7.b.4.
CDC MMWR Vol 44
No. RR-13 III.A.11.
and Exhibit B*
- 8. Feed Control:** Where in the engineer's report are feed control design details such as automation, manual controls override capabilities, means to measure dosed flow stream, how chemical feed rates are maintained proportional to the water flow, calibration tubes or mass flow monitors, and feeder accuracy?
- Ten States Standards
5.1.2 and 5.4.7*
- 9. Power Supply:** Where in the submittal (specify document, page, etc.) is the electrical outlet specified for the fluoride feed pump? It should be hardwired or have a nonstandard receptacle, and shall be interconnected in series with the well or service pump or have flow pacing.
- Ten States Standards
5.4.7.b.10
CDC MMWR Vol 44
No. RR-13 III.A*
- 10. Overfeed Prevention:** Where in the submittal (specify document, page, etc.) is a discussion of secondary devices or methods that will be used to ensure the fluoride solution cannot be siphoned or overfed into the water supply? These may include flow or pressure switches, break boxes, discharge at a point of positive pressure, vacuum relief, air gap, anti-siphon device, or other suitable means or combinations.
- Ten States Standards
5.1.5 and 5.4.7.c*
- 11. Anti-siphon Feed Line:** Where in the submittal (specify document, page, etc.) are diaphragm operated anti-siphon devices shown? One device shall be located on the discharge side of the fluoride saturator feed pump. A second device shall be located at the injection point unless a peristaltic pump or suitable air gap is used.
- Ten States Standards
5.4.7.b.1
CDC MMWR Vol 44
No. RR-13, III.A.7*

Additive - Fluoride Checklist (continued)

Submittal Requirements

Reference

- 12. High Hazard Situations:** If the application point is substantially lower than the metering pump (> 4 feet), where in the submittal (specify document, page, etc.) does the design provide for either a dual head feed pump or two separate pumps?
Note: A physical break box may be required and the anti-siphon device at the discharge side of the pump may be omitted.
- Ten States Standards*
5.4.7.b.2
CDC MMWR Vol 44
No. RR-13, III.A.9
- 13. Injection Point Location:** Where in the submittal (specify document, page, etc.) is the placement of the point of application specified and its relative spacing to any other chemical injection points? If fluoride is added into a horizontal pipe, it shall be in the lower half of the pipe, preferably at a 45 degree angle from the bottom of the pipe and protruding into the pipe one third of the pipe diameter.
- Ten States Standards*
5.4.7.b.6
- 14. Injection Pressure:** Where in the submittal (specify document, page, etc.) are the flows and pressures at the point of application addressed? Fluoride solutions shall be injected at a point of uniform flow and continuous positive pressure unless a suitable air gap is provided. If fluoride is injected under pressure, a corporation stop valve should be provided and must have a safety chain to protect the operator.
- Ten States Standards*
5.4.7.b.9
CDC MMWR Vol 44
No. RR-13
- 15. Injection Mixing:** Where in the submittal (specify document, page, etc.) is the location of the first customer identified? If the first customer is less than 100 feet from the fluoride injection point, where in the submittal have methods been included to ensure adequate mixing?
- CDC MMWR Vol 44*
No. RR-13, III.A.12
- 16. Water Hardness:** Where in the submittal (specify document, page, etc.) is an analysis of water hardness? Softening should be considered for make-up water used for sodium fluoride dissolution if hardness exceeds 50 mg/L as calcium carbonate and will be required if hardness exceeds 75 mg/L as calcium carbonate. Where in the submittal is information on water softening if existing/proposed? Fluoride shall not be added before lime-soda softening or ion exchange softening.
- Ten States Standards*
5.4.7.b.5 & 8
CDC MMWR Vol 44
No. RR-13, III.B.3
- 17. Chemical Dust:** Where in the submittal (specify document, page, etc.) are provisions described that will be provided to minimize creation of dust and protect against fluoride dust exposure?
- Ten States Standards*
5.4.7.e.

Additive - Fluoride Checklist (continued)

Submittal Requirements

Reference

- 18. Operator Personal Protective Equipment (PPE):** Where in the submittal (specify document, page, etc.) are PPE included for operators who will be handling fluoride compounds? These may include rubber gloves, a dust respirator certified by NIOSH for toxic dusts, an apron or other protective clothing, goggles or face mask, a deluge shower, eye washing device, and other protective equipment as necessary. Where in the submittal is the location shown where overexposure emergency procedures will be posted?
- Ten States Standards
5.3.4 and 5.4.7.d;
CDC MMWR Vol 44
No. RR-13*
- 19. Chemical Storage:** Where in the submittal (specify document, page, etc.) is the storage area identified and a description of how fluoride chemicals will be stored? They should be isolated from other chemicals to prevent contamination.
- Ten States Standards
5.4.7.a*
- 20. Monitoring Equipment:** Where in the submittal (specify document, page, etc.) are details regarding the fluoride analyzer equipment to be used by the operator?
- Ten States Standards
5.4.7.f.
CDC MMWR Vol 44
No. RR-13*
- 21. Cross-Connection Control:** Where in the submittal are specifications requiring any drain or overflow from the fluoride chemical feeder and storage tank to terminate at least six inches or two pipe diameters, whichever is greater, above the overflow rim of the receiving sump, conduit, or waste receptacle?
- 18 AAC 80.025
Ten States Standards
5.1.6*
- 22. Materials in Contact:** Where in the submittal (specify document, page, etc.) is documentation showing all wetted equipment components are certified to ANSI/NSF Standard 61 or an approved equivalent?
- 18 AAC 80.030*
- 23. Disinfection Post-Install:** Where in the submittal (specify document, page, etc.) is it specified that components in contact with water will be disinfected in accordance with the most recent version of AWWA Standard C653 before use?
- 18 AAC 80.010(d)(2)*
- 24. Operator Certification:** Where in the submittal (specify document, page, etc.) is verification the system has an operator certified in accordance with 18 AAC 74, Water and Wastewater Operator Certification and Training? Fluoride cannot be added to a public water system at any time without an adequately certified operator.
- 18 AAC 80.007
18 AAC 74*

Additive - Fluoride Checklist (continued)

Submittal Requirements

Reference

- 25. On-site Operator Training:** Where in the submittal (specify document, page, etc.) is contact information for the personnel or office that will train the operator on site a minimum of 6 hours in system specific fluoride operation, maintenance, safety, and emergency procedures? Proof of training conducted must be submitted with the request for final approval to operate. Start-up training must address:
- Information specific to the water plant and equipment
 - Procedures on how to test finished water fluoride concentration
 - Reporting requirements to the State
 - Information on public health benefits of fluoride and the role of water plant personnel in providing those benefits
- 26. O&M Manual:** Where in the submittal (specify document, page, etc.) is information on the schedule and responsible party for completing the fluoride section of the O&M manual? Please note: at least a draft version will be required when applying for interim operational approval. This should include, but is not limited to:
- Equipment maintenance and calibration schedules
 - Emergency and public notification procedures in case of system overfeed
 - Chemical safety procedures
- 27. Operations Records:** Where in the submittal (specify document, page, etc.) are copies of the draft forms which the operator will use for recording daily operations such as dosage calculations, daily level of finished water fluoride, fluoride refills (date and quantity of both chemical and water), and saturator and feed lines cleaning, etc.? Please note: a copy of the final versions of these forms will be required for interim operational approval.
- 28. Chemical Piping:** Where in the submittal (specify document, page, etc.) is it specified that fluoride piping and pumping stations will be labeled to facilitate identification? Ten States Standards recommends light blue with a red band.
- 29. Facility Fact Sheet:** Where in the submittal (specify document, page, etc.) is contact information for the personnel or office that will submit Exhibit B in the CDC MMWR *Engineering and Administrative Recommendations for Water Fluoridation, 1995* as part of the system's request for final operational approval?

*CDC MMWR Vol 44
No. RR-13:1.D.2*

18 AAC 80.207

*CDC MMWR Vol 44
No. RR-13*

*Ten States Standards
2.14*

*CDC MMWR Vol 44
No. RR-13*