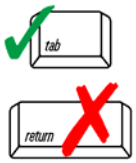
**Massachusetts Department of Environmental Protection**
Bureau of Resource Protection – Drinking Water Program

# Water Supply Facility Checklist for Ultraviolet (UV) Disinfection for Permit Review/Approval

## Instructions to Applicant

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.




The purpose of this Drinking Water Program (DWP) Facility Checklist is to assist the public water systems to prepare drinking water program permit applications that comply with current MassDEP regulations, policies, and guidelines. Completion of this checklist ensures that the applicant has considered all minimum permitting aspects identified by the MassDEP Drinking Water Program. MassDEP may require additional information as regulations, standards or procedures are implemented or revised.

A Massachusetts registered professional engineer must complete the appropriate section(s) of the checklist for the permit requested (including any brief explanations), sign the certification statement, and submit this checklist, brief explanations (where noted), and certification with the permit application (BRP WS 23A, BRP WS 23B, BRP WS 23C, BRP WS 24, BRP WS 25, BRP WS 29, BRP WS 34, or other BRP WS). The DWP staff will use these documents to expedite the review/approval of the permit application.

MassDEP Guidelines & Policies for Public Water Systems:
http://www.mass.gov/dep/water/laws/policies.htm#dwguid

MassDEP Drinking Water Regulations 310 CMR 22.00:
http://www.mass.gov/dep/service/regulations/310cmr22.doc

For this particular checklist it is understood the following words when used shall mean Ultraviolet: “unit”, “UV”, “reactor”, “device”, “chamber”, “system” or “lamps”.

**If more than one chemical application or treatment plant is proposed, a separate checklist will be required.**

N/A means “not applicable.”

## A. Facility Information

PWS Name

City/Town | PWS ID # | Source Code #

Treatment Facility | Permit Application #

Check form submitted: ☐ BRP WS 34 ☐ BRP WS 29 ☐ BRP WS 25

☐ BRP WS 24 ☐ BRP WS 23C ☐ BRP WS 23B ☐ BRP WS 23A

☐ other BRP WS

MassDEP Transmittal #

**This treatment is considered**: ☐ Permanent ☐ Temporary ☐ Optional ☐ Emergency ☐ N/A

# Water Supply Facility Checklist for Ultraviolet (UV) Disinfection for Permit Review/Approval

## B. Project Checklist

**1. Brief Project description**. Include any waiver sought from MassDEP requirements.

**2. Treatment**

Answer the following questions regarding treatment. Please note that the questions and sections correspond with the standards contained in the Massachusetts Department of Environmental Protection Drinking Water Program's latest editions of Guidelines and Policies for Public Water Systems.

| **Chapter 1.2.12 Simultaneous Compliance** | **Yes** | **No** | **N/A** |
|---|---|---|---|
| 1. Has a determination been made of any UV simultaneous compliance issues, such as, an impact of summer-winter water temperatures, turbidity, hardness, dissolved iron, dissolved manganese, Cryptosporidium, Giardia, etc.? | ☐ | ☐ | ☐ |
| 2. Was above summary of simultaneous compliance issues found discussed in the submitted specifications or other documents? | ☐ | ☐ | ☐ |
| 3. Will all "simultaneous compliance" issues be tracked and reported to MassDEP after installation for at least 12 months? | ☐ | ☐ | ☐ |
| **Chapter 2 - General Design Considerations** | | | |
| 1. Is a representative labeled raw water sample available that is a smooth-nosed type without exterior or interior threads, and without aerators or screens present, and is not of the petcock type? | ☐ | ☐ | ☐ |
| **Chapter 5.1 Treatment – General Information** | | | |
| 1. Was a pilot study or in-plant demonstration, including the engineer's design recommendations, submitted to and approved by MassDEP prior to preparing plans and specifications? | ☐ | ☐ | ☐ |
| 2. Will the engineer submit a copy of these proposed UV plans and specifications in one hard copy and one electronic copy on a compact disk or memory stick in PDF format for MassDEP approval? | ☐ | ☐ | ☐ |
| 3. Will the UV system be overseen by a certified operator who has been properly trained in the operation and maintenance of each piece of equipment, and will records of such training, signed by both the trainer and the operator, be maintained? | ☐ | ☐ | ☐ |

# Water Supply Facility Checklist for Ultraviolet (UV) Disinfection for Permit Review/Approval

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| **Chapter 5.4 Disinfection** | | | |
| 1. If primary disinfection is accomplished using ultraviolet light for treating surface water or groundwater under the direct influence, is chlorine added to provide a residual disinfectant as noted in 5.4.1(4)(a)(1) Demonstration of Maintaining a Residual? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.1 General** | | | |
| 1. Is type of proposed UV lamps considered either low pressure mercury vapor lamps (LP), low pressure high-output mercury vapor lamps (LPHO), or medium pressure mercury vapor lamps (MP)? (Note: other types of lamps may require new technology approval.) | ☐ | ☐ | ☐ |
| 2. When the source of microbial contamination is believed to be related to a problem in the distribution system, UV disinfection is not used alone? | ☐ | ☐ | ☐ |
| 3. After reading Table 1, write in target UV dose requirements in millijoules per centimeter squared (mJ/cm2) that you expect to deliver to the treated water: _____ | | | ☐ |
| 4. After reading Table 1, write in log inactivation that you expect to deliver: _____ | | | ☐ |
| **Chapter 5.4.6.2 Water Quality** | | | |
| 1. Has at least 1 year of representative water quality parameters (as shown in Table 2) been collected at a point immediately upstream of proposed UV installation point, and at a frequency as specified? | ☐ | ☐ | ☐ |
| 2. Has a summary discussion of above 13 parameters in Table 2 been submitted to MassDEP for approval? | ☐ | ☐ | ☐ |
| 3. Did above 13 parameters meet the recommended limits as specified in Table 2? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.3 Validation** | | | |
| 1. Will a UV Validation Test Plan be submitted to MassDEP for review and approval? If the UV reactor to be installed is necessary in order to comply with the disinfection requirements of the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) or Ground Water Rule (GWR), then a Validation Test Plan is required. **If answer is no, then no Validation Test Plan is required, and omit all questions in section Chapter 5.4.6.3 Validation, and proceed to part Chapter 5.4.6.4 Hydraulics.** | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 2. Was the submitted Validation Test Plan accompanied by MassDEP permit BRP WS 21, Approval to Conduct Pilot Study? (This permit consists of an approval to conduct a pilot study to determine the adequacy of the treatment process to deliver water of good quality that meets the standards established by MassDEP.) | ☐ | ☐ | ☐ |
| 3. Will the submitted Validation Test Plan include the following items? | | | |
| (a) Description of UV reactor to be validated (wetted dimension, baffles, lamps, UV sensors, optical properties)? | ☐ | ☐ | ☐ |
| (b) Justification for the type of UV reactor to be validated? | ☐ | ☐ | ☐ |
| (c) Description of the validation test? | ☐ | ☐ | ☐ |
| (d) Description of the treatment process train where the UV reactor(s) is to be installed? | ☐ | ☐ | ☐ |
| (e) List of key personnel, laboratories and institutions/companies overseeing the testing and preparation of the reports? | ☐ | ☐ | ☐ |
| (f) Validation testing schedule? | ☐ | ☐ | ☐ |
| (g) Discussion of the standard testing approach to be used (e.g. intensity set point approach, calculated dose approach)? | ☐ | ☐ | ☐ |
| (h) The operating parameters and ranges to be tested (flow, UV transmittance, lamp aging, and fouling factors)? | ☐ | ☐ | ☐ |
| (i) A method of accounting for non-uniform lamp aging? | ☐ | ☐ | ☐ |
| (j) Description of all equipment (including analyzers and sensors) to be used? | ☐ | ☐ | ☐ |
| (k) Schematic of all equipment and piping (including pipe sizes, sample tap locations, meter(s), in-line analyzers, pump(s), valve locations)? | ☐ | ☐ | ☐ |
| (l) Description and justification of the non-pathogenic challenge organism(s) to be used? | ☐ | ☐ | ☐ |
| (m) The parameters to be monitored (flow, UV intensity, UV transmittance, lamp status, electrical power consumption, challenge organism concentration), and frequency of monitoring? | ☐ | ☐ | ☐ |
| (n) A wastewater disposal plan (for on-site validation testing only)? | ☐ | ☐ | ☐ |
| 4. Will the Validation Test Plan submittal include the 24 questions and yes/no answers from EPA's *UV Guidance Manual*, dated November 2006, or most recent edition titled: "Checklist 5.2 Key Elements of the Validation Test Plan"? | ☐ | ☐ | ☐ |
| 5. UV reactors can be validated either off-site or on-site. Typically, off-site validation is done before installation at an approved testing facility. Reactors that are tested at an approved offsite facility that receive MassDEP validation approval for a specific installation are considered as 'prevalidated'. Is the proposed UV reactor considered "prevalidated"? | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 6. Will the primary steps for the UV Reactor Validation Test consist of the following?: | | | |
| (a) Bench-scale collimated beam test using the approved challenge microorganism(s)? | ☐ | ☐ | ☐ |
| (b) Full scale UV reactor test using the approved challenge microorganism(s)? | ☐ | ☐ | ☐ |
| c) Determination of the reduction equivalent dose (RED)? | ☐ | ☐ | ☐ |
| (d) Derivation of the validation factor (VF)? | ☐ | ☐ | ☐ |
| (e) Calculation of the UV reactor's validated dose? | ☐ | ☐ | ☐ |
| 7. Will the UV reactor validation testing be overseen by a third party that is independent of the UV manufacturer and is competent in UV technology? | ☐ | ☐ | ☐ |
| 8. Once validation testing begins, any changes or revisions are prohibited unless prior approval is obtained from MassDEP. Were any changes or revisions not made? | ☐ | ☐ | ☐ |
| 9. Will a Validation Report be submitted by a third party to MassDEP for review and approval? | ☐ | ☐ | ☐ |
| 10. Was the submitted Validation Report accompanied by MassDEP permit BRP WS 22, Approval of Pilot Study Report? (This permit allows the applicant to demonstrate the appropriateness of an UV treatment process for meeting the minimum drinking water requirements.) http://www.mass.gov/dep/water/approvals/ws22.pdf | ☐ | ☐ | ☐ |
| 11. Will the Validation Report include the 24 questions and yes/no answers from EPA's *UV Guidance Manual*, dated November 2006 or most recent edition titled: "Checklist 5.3 Key Elements of the Validation Report"? | ☐ | ☐ | ☐ |
| 12. Will the Validation Report include a discussion of the following items? | | | |
| (a) Executive summary stating the log credit achieved for the validated dose and range of operating conditions? | ☐ | ☐ | ☐ |
| (b) Summary of all test results, including collimated beam results? | ☐ | ☐ | ☐ |
| (c) All validation calculations (e.g., RED, VF)? | ☐ | ☐ | ☐ |
| (d) QA/QC checks? | ☐ | ☐ | ☐ |
| (e) Description of any variations in the actual validation test from MassDEP approved validation test plan? | ☐ | ☐ | ☐ |
| (f) Discussion on any potential impacts to or from upstream and downstream treatment processes? | ☐ | ☐ | ☐ |
| (g) Proposed schedule for final UV design submittal to MassDEP and anticipated installation date? | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 13. Unless otherwise approved in writing by MassDEP, will the final UV design and installation be done with equipment and in a configuration identical to that which was used in the validation test? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.4 Hydraulics** | | | |
| 1. Will the minimum, maximum, and average flow rates be provided? | ☐ | ☐ | ☐ |
| 2. Will the expected pressure drop through the reaction chamber at maximum flow rate be provided? | ☐ | ☐ | ☐ |
| 3. Will the UV reactor chamber be fully enclosed and be plug flow type? | ☐ | ☐ | ☐ |
| 4. Will the UV reactor be flowing full under all hydraulic conditions? | ☐ | ☐ | ☐ |
| 5. Will only closed UV channel units be used? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.5 Materials** | | | |
| 1. Will the UV housing be stainless steel 304 or 316L? | ☐ | ☐ | ☐ |
| 2. Will the materials exposed to UV irradiation, including the piping and isolation valves immediately upstream and downstream of the reactor unit, be constructed of materials that are resistant to UV light? | ☐ | ☐ | ☐ |
| 3. Will the materials exposed to UV irradiation not impart any undesirable taste, odor, color, and/or toxic materials into the water as a result of the presence of toxic constituents in materials of construction or as a result of physical or chemical changes resulting from exposure from UV energy? | ☐ | ☐ | ☐ |
| 4. Will all UV components be constructed of materials suitable to withstand the temperatures generated during normal operation? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.6 UV Design Criteria** | | | |
| 1. For systems utilizing UV reactors for compliance with the SWTR, IESWTR, LT1ESWTR, LT2ESWTR and GWR, is the minimum UV dose (reduction equivalent dose) dictated by the corresponding desired log inactivation as defined in EPA's UV dose requirements (see Table 1 in Chapter 5.4.6.1.d)? | ☐ | ☐ | ☐ |
| 2. Will the UV reactor operate within the validated range 95% of the time each month (in above question 1)? | ☐ | ☐ | ☐ |
| 3. Will the UV reactor provide a minimum dosage of 40,000 microwatt-seconds per square centimeter (40 mJ/cm2)? | ☐ | ☐ | ☐ |
| 4. Will the UV reactor be certified to (most recent) NSF/ANSI - Ultraviolet Microbiological Water Treatment Systems, Standard 55 for Class A units? | ☐ | ☐ | ☐ |
| 5. Will the required minimum dosage be achieved by the unit at the manufacturer's specified end of lamp life? | ☐ | ☐ | ☐ |
| 6. Will this minimum dosage be applied throughout the reaction chamber? | ☐ | ☐ | ☐ |

# Water Supply Facility Checklist for Ultraviolet (UV) Disinfection for Permit Review/Approval

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 7. Will the selected UV reactor be capable of providing the required dosage under all hydraulic and water quality conditions? | ☐ | ☐ | ☐ |
| 8. Will the UV reactor be designed to provide the specified minimum dosage at the peak instantaneous flow rate to be expected through the reactor? | ☐ | ☐ | ☐ |
| 9. Will automatic flow control devices be installed to ensure that the maximum design flow rate is not exceeded? | ☐ | ☐ | ☐ |
| 10. Will the estimated power consumption of the unit(s) under design operating conditions be provided? | ☐ | ☐ | ☐ |
| 11. Will at least one redundant UV reactor be provided (unless otherwise approved in writing by MassDEP)? | ☐ | ☐ | ☐ |
| 12. Will the well or booster pump(s) have adequate pressure capability to maintain minimum water pressure after the water treatment device? | ☐ | ☐ | ☐ |
| 13. Will each UV reactor be equipped with a minimum of one inline (duty) sensor and one spare (reference) sensor? | ☐ | ☐ | ☐ |
| 14. Will the UV reactor be designed so that the duty sensor(s) can be readily removed and checked against the reference sensor(s)? | ☐ | ☐ | ☐ |
| 15. Will the UV sensor(s) meet the following criteria? | | | |
| a. Will the duty sensor be installed in the wall of the disinfection chamber at the point of greatest distance from the lamps? | ☐ | ☐ | ☐ |
| b. Will documentation be provided that demonstrates that all sensors meet the National Institute of Standards & Technology (NIST) traceable measurements with an uncertainty of (plus or minus) 15% or less at an 80% confidence level? | ☐ | ☐ | ☐ |
| c. Will the duty sensor continuously measure the UV intensity produced by the lamp(s) and be provided with a unit mounted UV intensity meter? | ☐ | ☐ | ☐ |
| d. For units equipped with more than one sensor, will the meter display the average percent intensity based upon the point source summation (PSS) method? | ☐ | ☐ | ☐ |
| e. Will intensity meters display numerical UV intensity values ranging from zero to one hundred? | ☐ | ☐ | ☐ |
| f. Intensity meters that indicate low, medium, or high UV intensity are *not used.* | ☐ | ☐ | ☐ |
| g. Will sensors and intensity meters be properly calibrated to account for lamp geometry? | ☐ | ☐ | ☐ |
| 16. Will at least one inline UV transmittance monitor be installed upstream of the UV treatment for all systems that are complying with the SWTR, IESWTR, LT1ESWTR, LT2ESWTR and GWR? | ☐ | ☐ | ☐ |
| 17. Will the UV system have ground fault interrupt circuitry? | ☐ | ☐ | ☐ |
| 18. Will the UV system be installed on a designated electrical circuit? | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 19. Will the reactor be designed to prevent short-circuiting? | ☐ | ☐ | ☐ |
| 20. Will lamps be enclosed in quartz sleeves in order to maintain the lamp surface near its optimum operating temperature? | ☐ | ☐ | ☐ |
| 21. Will lamp assemblies be insulated from direct contact with the influent water? | ☐ | ☐ | ☐ |
| 22. Will lamp sleeves be annealed to remove internal stress? | ☐ | ☐ | ☐ |
| 23. Will the UV reactor be designed to permit either mechanical or physical cleaning of the quartz sleeve? | ☐ | ☐ | ☐ |
| 24. Will each UV reactor be provided with an elapsed time meter, which accurately monitors the hours that the unit's lamp is on? | ☐ | ☐ | ☐ |
| 25. Will the UV reactor be designed with an electrical interlock such that it will automatically stop water flow in the event of a power failure and/or voltage interruption, and the unit shall go back on line only when adequate UV intensity has been restored? | ☐ | ☐ | ☐ |
| 26. Will a flow or time delay mechanism wired in series with the well or service pump be provided to permit a sufficient time for lamp warm up per manufacturer's recommendations before water flows from the unit upon start up? | ☐ | ☐ | ☐ |
| 27. Where there is extended no-flow periods and fixtures are located a short distance downstream of the unit, will consideration be given to UV unit shutdown between operating cycles to prevent heat build-up in the water due to the UV lamp? | ☐ | ☐ | ☐ |
| 28. Will the UV reactor be provided with an audible and visual alarm set to go off and trigger flow shut-down when the UV intensity monitor indicates that insufficient UV light (as specified in item 1 or 2) above is reaching the sensor? | ☐ | ☐ | ☐ |
| 29. Will the UV reactor be provided with an audible and visual alarm set to go off and trigger flow shut-down during a lamp or ballast failure? | ☐ | ☐ | ☐ |
| 30. Will the UV reactor be provided with an audible and visual alarm set to go off and trigger flow shut-down during a mechanical wiper failure (if applicable)? | ☐ | ☐ | ☐ |
| 31. Will the UV reactor be provided with an audible and visual alarm set to go off and trigger flow shut-down whenever the hour meter indicates that the useful life of the bulb as recommended by the manufacturer has expired? | ☐ | ☐ | ☐ |
| 32. Will the UV reactor be provided with an audible and visual alarm set to go off and trigger flow shut-down whenever there is high reactor temperature? | ☐ | ☐ | ☐ |
| 33. Will an early warning alarm be provided for both the intensity meter and hour meter, to notify the operator when either the minimum design dosage (as specified in item 1 or 2 above) or the useful life of the bulb is within 10% of the shut down set points? (This alarm is not required to shut the system down.) | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 34. In situations where gravity flow through the unit exists, will the system have either provisions for automatic emergency power or automatic flow shut down in the event of power failure? | ☐ | ☐ | ☐ |
| 35. UV water treatment devices that are operated on a seasonal basis shall be inspected and cleaned prior to use at the start of each operating season. The UV water treatment system, including filters, shall be disinfected prior to placing the water treatment system back into operation. Will a procedure for shutting down and starting up the UV treatment system be developed and submitted to MassDEP for approval and be listed in the SOP? (See also Chapter 5.4.6 (9) "Maintenance"). | ☐ | ☐ | ☐ |
| 36. If the UV reactor is installed for reasons other than compliance with the SWTR, IESWTR, LT1SWTR, LT2ESWTR and GWR, and it is the only form of disinfection used in a community system, redundancy may be required by MassDEP. Will this secondary or back-up form of disinfection be installed and ready for operation if the primary UV reactor fails or is taken off-line? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.7 Installation** | | | |
| 1. Will the UV reactor design be approved by MassDEP prior to reactor installation? | ☐ | ☐ | ☐ |
| 2. Will the UV reactor be installed in a protected enclosure not subject to extremes of temperature that could cause malfunction? | ☐ | ☐ | ☐ |
| 3. Will each UV reactor have the capability of being easily isolated or taken out of service for replacement or repair? | ☐ | ☐ | ☐ |
| 4. Are there no bypass lines around the reactor? | ☐ | ☐ | ☐ |
| 5. Will any UV reactor that is installed and is in a 'standby' mode, be either physically disconnected from the process piping or be equipped with an open drain vent, so as to prohibit any flow from a leaking valve to pass through the reactor? | ☐ | ☐ | ☐ |
| 6. If the UV reactor is installed in an area that is normally unattended (i.e., basement, utility room, etc.), is the alarm (see Chapter 5.4.6.6) located in an area that is occupied by personnel familiar with the alarm and the procedures to report the alarm? | ☐ | ☐ | ☐ |
| 7. Will a minimum of 5 pipe diameters of straight pipe upstream and downstream of each UV reactor be installed? | ☐ | ☐ | ☐ |
| 8. Will validated reactors be installed in an identical configuration at the facility as was tested during validation? | ☐ | ☐ | ☐ |
| 9. Is there a (labeled) smooth-nosed sampling tap installed upstream and downstream of each UV reactor? | ☐ | ☐ | ☐ |
| 10. Will each UV reactor be equipped with a dedicated flow meter? | ☐ | ☐ | ☐ |
| 11. Will the UV reactor installation configuration allow ease of access for visual inspection, disassembly, repairs, and replacement? | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| **Chapter 5.4.6.8 Spare Parts** | | | |
| 1. Will all UV reactors installed for compliance with the SWTR, IESWTR, LT1ESWTR, LT2ESWTR and GWR have spare parts (minimum of 2 UV lamps, etc.) as described in section 6.3.3 of EPA's UV Guidance Manual, November 2006, or most recent revisions? See link: http://www.epa.gov/ogwdw000/disinfection/lt2/pdfs/guide_lt2_uvguidance.pdf | ☐ | ☐ | ☐ |
| 2. Will all other reactors (question 1 above) consisting of only a single unit be supplied with a spare lamp, spare electrical ballast, and a spare reference sensor? | ☐ | ☐ | ☐ |
| 3. Will all spare UV lamps conform to the original lamp specifications? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.9 Maintenance** | | | |
| 1. Will an operations and maintenance manual be submitted to MassDEP for approval before the UV reactor goes on-line? The manual shall conform to MassDEP Policy 93-02 (Operation and Maintenance Manual), address the 10 items listed in Chapter 5.4.6.9 (b), and shall include a separate section that describes the actions required to insure the delivery of treated water in the event of a failure of the UV reactor. See MassDEP O & M policy link: http://www.mass.gov/dep/water/laws/9302.pdf. | ☐ | ☐ | ☐ |
| 2. Upon installation will an operation and maintenance manual including a parts list and parts order form be supplied to the owner/operator of the UV reactor and as described in question 1 above? | ☐ | ☐ | ☐ |
| 3. Upon installation will the PWS applicant installing UV reactors in order to comply with the requirements of the SWTR, IESWTR, LT1ESWTR, LT2ESWTR and GWR perform routine maintenance as outlined in Section 6.3 of EPA's UV Guidance Manual, November 2006, or most recent revisions? | ☐ | ☐ | ☐ |
| 4. Upon installation for all other UV reactors, will the PWS applicant perform the 4 check and replace minimum maintenance items listed in Chapter 5.4.6.9 (c)? | ☐ | ☐ | ☐ |
| **Chapter 5.4.6.10. Reporting Requirements** | | | |
| 1. Upon installation will the PWS applicant submit the necessary monthly reports to MassDEP that demonstrates that 95% of the water treated (by volume) was within the approved validated specifications (for 8 items listed in this Chapter 5.4.6.10 a) for all UV reactors installed for compliance with the SWTR, IESWTR, LT1ESWTR, LT2ESWTR and GWR? | ☐ | ☐ | ☐ |

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| 2. For all other systems (question 1 above) with UV reactors upon installation, will the PWS applicant submit the necessary monthly reports to MassDEP that include the daily volume of water treated and a daily UV intensity reading? | ☐ | ☐ | ☐ |
| 3. In question 1 above, upon installation, will the applicant submit an additional monthly report that calculates the total monthly volume of treated water that was off specification as a percentage of the total volume of treated water for the month? | ☐ | ☐ | ☐ |
| 4. Will the applicant's records regarding routine UV equipment calibration and maintenance be maintained at the treatment facility and be made available to MassDEP upon request? | ☐ | ☐ | ☐ |
| **Chapter 6.1.14 Housing** | | | |
| 1. Are floor surfaces smooth, impervious, slip-proof and well drained? | ☐ | ☐ | ☐ |
| 2. Is adequate ventilation and heating provided that conforms to all local and/or state codes? | ☐ | ☐ | ☐ |
| **Chapter 6.3 Operator Safety** | | | |
| 1. Will a standard operating procedure (SOP) for UV treatment be posted in a protective shop envelope on the wall near the UV treatment unit for the operator after construction? | ☐ | ☐ | ☐ |
| 2. Will a UV-resistant face shield be available for operator(s) to wear? | ☐ | ☐ | ☐ |
| 3. To minimize the danger of exposure and shock, will warning signs be posted near the UV reactor? | ☐ | ☐ | ☐ |
| 4. As broken lamps may release mercury, will the operator(s) be trained in proper mercury cleanup and disposal procedures to prevent mercury inhalation or absorption through the skin, and will the SOP include this item? | ☐ | ☐ | ☐ |
| 5. After installation will a material safety data sheet (MSDS) for UV treatment lamps be readily available on site for all employees? | ☐ | ☐ | ☐ |
| **Chapter 12 Emergency Response Planning Requirements** | | | |
| 1. Will the standard operating procedure (SOP) include procedures to test all UV alarms and controls (both high and low) quarterly? | ☐ | ☐ | ☐ |
| 2. Will the applicant's emergency response plan (ERP) be updated to include the ultraviolet system additional emergency procedures and notification pursuant to 310 CMR 22.04(13) and MassDEP Guidelines and Policies for Public Water Supplies, Chapter 12 - Emergency Response Planning Requirements Guidance including Appendix O - Handbook for Water Supply Emergencies? http://www.mass.gov/dep/water/laws/policies.htm#dwguid http://www.mass.gov/dep/water/drinking/systems.htm#emerresp | ☐ | ☐ | ☐ |

# Water Supply Facility Checklist for Ultraviolet (UV) Disinfection for Permit Review/Approval

## B. Project Checklist (cont'd)

| | Yes | No | N/A |
|---|---|---|---|
| **3. Certified Operator Staffing & Treatment Plant Classification** | | | |
| 1. With the proposed UV treatment process, indicate the water treatment plant classification for this facility pursuant to 310 CMR 22.11B(4)(a): ☐ VSS ☐ 1-T ☐ 11-T ☐ 111-T ☐ 1V-T ☐ 1-D ☐ 11-D ☐ 111-D or ☐ 1V-D | | | ☐ |
| 2. Does the applicant's proposed staffing plan comply with the Certified Operator provisions of 310 CMR 22.11B? Submittal of plan is required prior to receiving MassDEP on-line treatment approval. | ☐ | ☐ | ☐ |

**4. Detailed Explanation**

Please attach a brief explanation for any question answered "No" and "N/A" in the checklist. The brief explanation should explain why the applicant/applicant's engineer does not feel this item is necessary to maintain the integrity of the design and/or operation of the facility.

Detailed explanation of the following question(s) is attached:

| Section # | Page # | Question # |
|---|---|---|
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**Massachusetts Department of Environmental Protection**
Bureau of Resource Protection – Drinking Water Program

# Water Supply Facility Checklist for Ultraviolet (UV) Disinfection for Permit Review/Approval

## C. Certification

### A. Applicant's Engineer

I hereby certify, as a Professional Engineer registered in Massachusetts, that the Drinking Water Facilities Checklist is a true and accurate representation on the information contained in my plans and specifications submitted with this permit application.

| | |
|---|---|
| | |

Signature/Stamp of Professional Engineer

Signature/Stamp of Second Professional Engineer (if needed)

Date

Date

Printed Name

Printed Name

Title

Title

Employer

Employer

Phone Number | Email Address

Phone Number | Email Address

### B. Applicant

This checklist and attached permit application are submitted on behalf of water representative:

City/Town

Address

PWS Name | PWS ID # | Phone Number

Applicant Name/Title

Email Address

Applicant Signature

Date