



Gina Thompson <gina.thompson@wyo.gov>

Water Quality Rules, Chapter 12, Water and Waste Advisory Board Meeting comment

1 message

noreply@smartcomment.com <noreply@smartcomment.com>

Sun, Feb 13, 2022 at 1:27 PM

To: tross@nelsonengineering.net

Bcc: gina.thompson@wyo.gov

Thank you for your comments on the Water Quality Rules, Chapter 12, Water and Waste Advisory Board Meeting. Your comments have been received.

Name: Ty Ross

Address: [430 S. Cache St.](#)

City: Jackson

Province: Wyoming

Postal Code: 83001

Email: tross@nelsonengineering.net

Water Quality Rules, Chapter 12, Water and Waste Advisory Board Meeting

Several comments (in green text) within the attached document. All pages containing comments should be marked with a large green asterisk in the upper right corner.

Attachment(s):

WQR_Chapter-12_Strike-And-Underline_TSR_NE.pdf

Ty Ross

Several comments (in green text) within the attached document. All pages containing comments should be marked with a large green asterisk in the upper right corner.



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45

CHAPTER 12

Design and Construction Standards for Public Water Supplies

Section 1. Authority.

These standards are promulgated pursuant to Wyoming Statute (W.S.) §§ 35-11-101 through 35-11-1207 2005. Specifically, W.S. § 35-11-302 requires the ~~a~~Administrator to establish standards for the issuance of permits for construction, installation, ~~or~~ modification, or operation of any public water supply.

Section 2. ~~Purpose.~~ Applicability.

~~The purpose of these standards is to:~~

~~(a) — Ensure that the design and construction of public water supplies meet the purpose of the Environmental Quality Act.~~

~~(b) — Prevent, reduce and eliminate pollution and enhance the waters of the State of Wyoming by ensuring that the design and construction of public water supplies are capable of the required treatment and distribution providing continued operation to protect the health, safety and welfare of the users and operators.~~

~~These standards pertain only to permits required pursuant to Chapter 3, Wyoming Water Quality Rules and Regulations.~~

(a) This Chapter contains the minimum standards for the design and construction of public water supplies that are required to obtain a permit under W.S. § 35-11-301(a)(iii) and Water Quality Rules Chapter 3.

(i) All applicants for a Water Quality Rules Chapter 3 permit to construct, install, modify, or operate a public water supply facility shall comply with all minimum standards of this Chapter.

Per W.S. 35-11-301 (a) (v), "...no permit to operate shall be required..."

(ii) No permit to construct, install, modify, or operate a public water supply facility shall be issued to a facility that does not comply with the minimum standards of this Chapter.

(iii) All public water supply facilities shall be constructed, installed, and operated in accordance with permits issued pursuant to this Chapter.

(b) The construction, installation, or modification of any component of a public water supply facility requires a permit to construct. This is overly broad and appears to indicate that a PTC would be required for routine or emergency maintenance.

Section 3. ~~Intent~~ Timing of Compliance with These Regulations.



46 ~~The design and construction standards included in these regulations are directed toward~~
47 ~~conventional public water systems. These standards impose limiting values of design for which a~~
48 ~~construction, installation, or modification permit application and plans and specifications can be~~
49 ~~evaluated by the division.~~

50
51 ~~The terms “shall” and “must” are used when practice is sufficiently standardized to permit~~
52 ~~specific delineation of requirements or when safeguarding public health or protection of water~~
53 ~~quality justifies such definite action. Other terms, such as “should”, “recommend”, and~~
54 ~~“preferred” indicate desirable procedures or methods which allow deviations provided the~~
55 ~~purpose of these regulations can be accomplished.~~

56
57 ~~The applicant shall use the date referenced copy of other standards referred to in these~~
58 ~~regulations. Where no date is listed for the referenced standards, the standards used shall be~~
59 ~~those in effect when these regulations become effective.~~

60
61 Any facility covered by an individual or general permit issued pursuant to Water Quality
62 Rules, Chapter 3, prior to the effective date of this Chapter shall remain covered under that
63 permit. New construction or modification of existing permitted facilities must obtain
64 authorization under a new permit, in accordance with Water Quality Rules Chapter 3, Section
65 9(a)(iii), subject to the requirements of this Chapter. This section is titled "Timing...", but speaks nothing of it.

66
67 **Section 4. ~~Definitions~~ Incorporation By Reference of Recommended Standards**
68 **for Water Works 2018 Edition.**

69
70 ~~(moved to Section 5) The following definitions supplement those contained in W.S. 35-~~
71 ~~11-103 of the Wyoming Environmental Quality Act.~~

72
73 ~~(moved to Section 5(a))(a) —“Auxiliary source of supply” means any water supply on or~~
74 ~~available to the water user’s system other than an approved public water supply acceptable to the~~
75 ~~water supplier.~~

76
77 ~~These auxiliary waters may include water from another supplier’s public potable water supply or~~
78 ~~any natural source(s), such as a well, spring, river, stream, harbor, and so forth; used waters; or~~
79 ~~industrial fluids. These waters may be contaminated or polluted, they may be objectionable or~~
80 ~~they may be from a water source which the water supplier is uncertain of sanitary control.~~

81
82 ~~(moved to Section 5(b))(b) —“Average daily demand” means the total annual water use~~
83 ~~divided by the number of days the system was in operation.~~

84
85 ~~(moved to Section 4(e))(b) —“Backflow” means the undesirable reversal of flow of~~
86 ~~water or mixtures of water and other liquids, gases, or other substances into the distribution~~
87 ~~system of the public water supply from any other source or sources.~~

88
89 ~~(moved to Section 5(d))(e) —“Backflow incident” means any identified backflow to a~~
90 ~~public water supply distribution system or to the potable water piping within the water user’s~~

91 ~~system benefitting from a water service connection to the public water supply distribution~~
92 ~~system.~~

93
94 ~~(moved to Section 5(e))(d) —“Back pressure” means a form of backflow caused when~~
95 ~~the pressure of the water users’ system is greater than that of the water supply system. This could~~
96 ~~be caused by a pump, elevated tank, elevated piping, boiler, pressurized process, pressurized~~
97 ~~irrigation system, air pressure or any other cause of pressure.~~

98
99 ~~(moved to Section 5(f))(e) —“Back siphonage” means a form of backflow caused by~~
100 ~~negative or reduced pressure in the water supply system. This situation can be caused by loss of~~
101 ~~pressure due to high water demands, a line break, excessive fire fighting flows, etc.~~

102
103 ~~(f) —“Containment” means the practice of installing approved backflow prevention~~
104 ~~devices at the water service connection of the water user in order to protect the public water~~
105 ~~supply from any backflow from the water users system.~~

106
107 ~~(moved to Section 5(g))(g) —“Contamination” means an impairment of a public water~~
108 ~~supply by the introduction or admission of any foreign substance which degrades the quality of~~
109 ~~the potable water or creates a health hazard.~~

110
111 ~~(moved to Section 5(h))(h) —“Cross connection” means any actual or potential~~
112 ~~connection between a potable water supply and any other source or system through which it is~~
113 ~~possible to introduce contamination into the system.~~

114
115 ~~(moved to Section 5(i))(i) —“Degree of hazard” means either a high or low hazard~~
116 ~~situation where a substance may be introduced into a public water supply through a cross~~
117 ~~connection. The degree of hazard or threat to public health is determined by a hazard~~
118 ~~classification.~~

119
120 ~~(moved to Section 5(j))(j) —“Domestic services” means services using potable water for~~
121 ~~ordinary living processes and not for commercial or industrial uses, fire protection systems with~~
122 ~~antifreeze or other chemicals, heating systems, etc. Examples may include residences, churches,~~
123 ~~office buildings, schools, etc.~~

124
125 ~~(moved to Section 5(k))(k) —“Dual check” means a device conforming to ASSE~~
126 ~~Standard #1024 consisting of two independently acting check valves. Dual check valves are~~
127 ~~allowed only for residential water service connections that have a low hazard potential with back~~
128 ~~pressure or backsiphonage under continuous pressure.~~

129
130 ~~(moved to Section 5(l))(l) —“Groundwater source” includes all water obtained from~~
131 ~~dug, drilled, bored, jetted or driven wells; springs which are developed so that the water does not~~
132 ~~flow on the ground and protected to preclude the entrance of surface contamination; and~~
133 ~~collection wells.~~

134

135 ~~(moved to Section 5(m))(m) —“Hazard classification” means a determination by a hazard~~
136 ~~classification surveyor as to high hazard or low hazard and the potential cause of backflow as~~
137 ~~either back pressure or back siphonage.~~

138
139 ~~(moved to Section 5(n))(n) —“Hazard classification survey” means inspection of a~~
140 ~~premises to identify the potable water systems, the location of any potential cross connections to~~
141 ~~the potable water systems, the hazard of the potential backflow, the physical identification of any~~
142 ~~backflow devices or methods present and the inspection status of any backflow devices or~~
143 ~~methods. The hazard classification survey results must be recorded and certified by a qualified~~
144 ~~hazard classification surveyor.~~

145
146 ~~(moved to Section 5(o))(o) —“Hazard classification surveyor” means an individual~~
147 ~~certified by the USC Foundation for Cross Connection Control and Hydraulic Research as~~
148 ~~Cross Connection Control Specialist, the American Association of Sanitary Engineers (ASSE) as~~
149 ~~a Cross Connection Control Surveyor, or by another state certification program approved by the~~
150 ~~administrator, or by a water distribution system operator also certified as a backflow device~~
151 ~~tester employed by the public water supplier for the service where the survey is being conducted.~~

152
153 ~~(moved to Section 5(p))(p) —“High hazard” means a situation created when any~~
154 ~~substance which is or may be introduced into a public water supply poses a threat to public~~
155 ~~health through poisoning, the spread of disease or pathogenic organisms, or any other public~~
156 ~~health concern.~~

157
158 ~~(moved to Section 5(q))(q) —“Isolated” when referring to cross connections means the~~
159 ~~proper approved backflow prevention devices have been installed at each point of cross~~
160 ~~connection within the water user's system. This requires the installation of an approved backflow~~
161 ~~protection device at each source of possible contamination. This type of control has the~~
162 ~~advantage of protecting health within the water user's system as well as protecting the public~~
163 ~~water supply.~~

164
165 ~~(moved to Section 5(r))(r) —“Low hazard” means a situation created when any~~
166 ~~substance which is or may be introduced into a public water supply does not pose a threat to~~
167 ~~public health but which does adversely affect the aesthetic quality of the potable water.~~

168
169 ~~(moved to Section 5(s))(s) —“Maximum daily demand” means the demand for water~~
170 ~~exerted on the system over a period of 24 consecutive hours, for the period during which such~~
171 ~~demand is greatest.~~

172
173 ~~(moved to Section 5(t))(t) —“Maximum hour demand” means the highest single hour~~
174 ~~demand exerted on the system. This may or may not occur on the maximum day.~~

175
176 ~~(moved to Section 5(v))(u) —“Mineralized water” means any water containing more than~~
177 ~~500 mg/L total dissolved solids.~~

178



179 ~~(moved to Section 5(x))(v) —“Offstream reservoir” means a facility into which water is~~
180 ~~pumped during periods of good quality and high stream flow for future release to treatment~~
181 ~~facilities.~~

182
183 ~~(moved to Section 5(y))(w) —“Surface water source” includes all tributary streams and~~
184 ~~drainage basins, natural lakes and artificial reservoirs or impoundments upstream from the point~~
185 ~~of the water supply intake.~~

186
187 ~~(moved to Section 5(z))(x) —“Water service connection” means any water line or pipe~~
188 ~~connected to a distribution supply main or pipe for the purpose of conveying water to a water~~
189 ~~user’s system.~~

190
191 ~~(moved to Section 5(aa))(y) —“Water supplier” means any entity that owns or operates a~~
192 ~~public water supply, whether public or private.~~

193
194 ~~(moved to Section 5(bb))(z) —“Water user” means any entity, whether public or private,~~
195 ~~with a water service connection to a public water supply. The water user is also identified as a~~
196 ~~customer of a public water supply.~~

197
198 ~~(moved to Section 5(cc))(aa) —“Water user’s system” means that portion of the user’s~~
199 ~~water system between the water service connection and the point of use. This system includes all~~
200 ~~pipes, conduits, tanks, fixtures, and appurtenances used to convey, store or utilize water provided~~
201 ~~by the public water supply.~~

202
203 (a) This Chapter incorporates sections of the Recommended Standards for Water
204 Works, Parts 1.1-9.8, 2018 Edition, unless otherwise noted.

(aka the 2018 Ten States Standards or "2018 TSS")

205
206 (b) The State term “Administrator” shall replace the term “reviewing authority” used
207 in the Recommended Standards for Water Works 2018 Edition.

208
209 **Section 5. Facilities and Systems not Specifically Covered by these Standards**
210 **Definitions.**

211
212 ~~(moved to Section 6(a)) This section is provided to encourage new technology and~~
213 ~~equipment and provide a process for evaluating and permitting designs which deviate from these~~
214 ~~regulations. The proposed construction of facilities and processes not in compliance with these~~
215 ~~regulations will be permitted provided that the facility, when constructed, can operate meeting~~
216 ~~the purpose of these regulations.~~

217
218 ~~(moved to Section 6(b))(a) — Each application for a permit to construct a facility under~~
219 ~~this section shall be evaluated on a case-by-case basis using the best available technology. The~~
220 ~~following information should be included with the application:~~

221
222 ~~(moved to Section 6(b)(i))(i) Data obtained from a full scale, comparable~~
223 ~~installation which demonstrates the acceptability of the design; and/or~~
224



225 ~~(moved to Section 6(b)(ii))(ii) — Data obtained from a pilot plant operated~~
226 ~~under the design condition for a sufficient length of time to demonstrate the acceptability of the~~
227 ~~design; and/or~~
228

229 ~~(moved to Section 6(b)(iii))(iii) — Data obtained from a theoretical evaluation~~
230 ~~of the design which demonstrates a reasonable probability of the facility meeting the design~~
231 ~~objectives; and~~
232

233 ~~(moved to Section 6(b)(iv))(iv) — An evaluation of the flexibility of making~~
234 ~~corrective changes to the constructed facility in the event it does not function as planned.~~
235

236 ~~(moved to Section 6(c))(b) — If an applicant wishes to construct a pilot plant to provide~~
237 ~~the data necessary to show the design will meet the purpose of the act, a permit to construct must~~
238 ~~be obtained.~~
239

240 ~~(formerly Section 4)~~ The following definitions supplement those contained in W.S. § 35-
241 11-103 of the Wyoming Environmental Quality Act. ~~(the Act)~~

242
243 ~~(formerly Section 4(a))(a)~~ “Auxiliary source of supply” means any water supply on or
244 available to the water user’s system other than an approved public water supply acceptable to the
245 water supplier. These auxiliary waters may include water from another supplier’s public potable
246 water supply or any natural source(s), such as a well, spring, river, stream, harbor, and so forth;
247 used waters; or industrial fluids. These waters may be contaminated or polluted, they may be
248 objectionable or they may be from a water source ~~which~~ that the water supplier is uncertain of
249 sanitary control.

250
251 ~~(formerly Section 4(b))(b)~~ “Average daily demand” means the total annual water use
252 divided by the number of days the system was in operation.

253
254 ~~(formerly Section 4(b))(c)~~ “Backflow” means the undesirable reversal of flow of
255 water or mixtures of water and other liquids, gases, or other substances into the distribution
256 system of the public water supply from any other source or sources.

257
258 ~~(formerly Section 4(e))(d)~~ “Backflow incident” means any identified backflow to a
259 public water supply distribution system or to the potable water piping within the water user’s
260 system benefitting from a water service connection to the public water supply distribution
261 system.

262
263 ~~(formerly Section 4(d))(e)~~ “Back-pressure” means a form of backflow caused when
264 the pressure of the water users’ system is greater than that of the water supply system. ~~This could~~
265 ~~be~~ whether caused by a pump, elevated tank, elevated piping, boiler, pressurized process,
266 pressurized irrigation system, or air pressure ~~or any other cause of pressure.~~

267
268 ~~(formerly Section 4(e))(f)~~ “Back-siphonage” means a form of backflow caused by
269 negative or reduced pressure in the water supply system. ~~This situation can be~~ whether caused by

270 loss of pressure due to high water demands, a line break, or excessive ~~fire fighting~~ firefighting
271 flows, ~~etc.~~

272
273 ~~(formerly Section 4(f))~~ (f) “Containment” means the practice of installing approved
274 backflow prevention devices at the water service connection of the water user in order to protect
275 the public water supply from any backflow from the water users system.

276
277 ~~(formerly Section 4(g))~~ (g) “Contamination” means an impairment of a public water
278 supply by the introduction or admission of any foreign substance ~~which~~ that degrades the quality
279 of the potable water or creates a health hazard.

280
281 ~~(formerly Section 4(h))~~ (h) “Cross-connection” means any actual or potential
282 connection between a potable water supply and any other source or system through which it is
283 possible to introduce contamination into the system.

284
285 ~~(formerly Section 4(i))~~ (i) “Degree of hazard” means either a high or low hazard
286 situation where a substance may be introduced into a public water supply through a cross-
287 connection. The degree of hazard or threat to public health is determined by a hazard
288 classification.

289
290 ~~(formerly Section 4(j))~~ (j) “Domestic services” means services using potable water for
291 ordinary living processes ~~and not for commercial or industrial uses, fire protection systems with~~
292 ~~antifreeze or other chemicals, heating systems, etc. Examples may include residences, churches,~~
293 ~~office buildings, schools, etc.~~

294
295 ~~(formerly Section 4(k))~~ (k) “Dual check” means a device conforming to American
296 Association of Sanitary Engineers (ASSE) Standard #1024 consisting of two independently
297 acting check valves. ~~Dual check valves are allowed only for residential water service connections~~
298 ~~that have a low hazard potential with back pressure or backsiphonage under continuous pressure.~~

299
300 ~~(formerly Section 4(l))~~ (l) “Groundwater source” includes all water obtained from
301 dug, drilled, bored, jetted or driven wells; springs ~~which~~ that are developed so that the water does
302 not flow on the ground and that are protected to preclude the entrance of surface contamination;
303 and collection wells.

304
305 ~~(formerly Section 4(m))~~ (m) “Hazard classification” means a determination by a hazard
306 classification surveyor as to high hazard or low hazard and the potential cause of backflow as
307 either back-pressure or back-siphonage.

308
309 ~~(formerly Section 4(n))~~ (n) “Hazard ~~e~~Classification ~~s~~Survey” means inspection of a
310 premises to identify the potable water systems, the location of any potential cross connections to
311 the potable water systems, the hazard of the potential backflow, the physical identification of any
312 backflow devices or methods present, and the inspection status of any backflow devices or
313 methods. ~~The hazard classification survey results must be~~ recorded and certified by a qualified
314 ~~h~~Hazard ~~e~~Classification ~~s~~Surveyor.

315



316 ~~(formerly Section 4(e))~~(o) “Hazard ~~e~~Classification ~~s~~Surveyor” means an individual
317 certified by the USC- Foundation for Cross-Connection Control and Hydraulic Research as
318 Cross Connection Control Specialist, (USC-FCCCHR), the ~~American Association of Sanitary~~
319 ~~Engineers (ASSE)~~ as a Cross-Connection Control Surveyor, or ~~by~~ another state certification
320 program submitted with the permit application and approved by the ~~a~~Administrator, or ~~by~~ an
321 individual who is a water distribution system operator also certified as a backflow device tester
322 employed by the public water supplier for the service where the survey is being conducted.

323
324 ~~(formerly Section 4(p))~~(p) “High hazard” means a situation created when any
325 substance ~~which~~ that is or may be introduced into a public water supply poses a threat to public
326 health through poisoning, the spread of disease or pathogenic organisms, or any other public
327 health concern.

328
329 ~~(formerly Section 4(q))~~(q) “Isolated” when referring to cross connections means the
330 properly approved backflow prevention devices have been installed at each point of cross-
331 connection within the water user's system. ~~This requires the installation of an approved backflow~~
332 ~~protection device at each source of possible contamination. This type of control has the~~
333 ~~advantage of protecting health within the water user's system as well as protecting the public~~
334 ~~water supply.~~

335
336 ~~(formerly Section 4(r))~~(r) “Low hazard” means a situation created when any
337 substance ~~which~~ that is or may be introduced into a public water supply does not pose a threat to
338 public health but ~~which~~ that does adversely affect the aesthetic quality of the potable water.

339
340 ~~(formerly Section 4(s))~~(s) “Maximum daily demand” means the demand for water
341 exerted on the system over a period of 24 consecutive hours, for the period during which such
342 demand is greatest.

343
344 ~~(formerly Section 4(t))~~(t) “Maximum hourly demand” means the highest single-hour
345 demand exerted on the system. This may or may not occur on the maximum day.

346
347 (u) “Mechanical sludge equipment” means the equipment used to physically remove
348 solids from a water treatment process. This may include mechanically driven drives that use
349 scrapers or differential water levels to collect the sludge. "mechanical drives" instead?

350
351 ~~(formerly Section 4(u))~~(v) “Mineralized water” means any water containing more than
352 500 mg/L total dissolved solids.

353
354 (w) “Minor field change” means any in-field adjustment due to previously unknown
355 physical constraints of the project site that do not affect the project’s scope. Minor field changes
356 still allow full compliance with the requirements of this Chapter and are shown on the submitted,
357 post-construction as-built plan set for the Division in red.

358
359 ~~(formerly Section 4(v))~~(x) “Offstream reservoir” means a facility into which water is
360 ~~pumped during periods of good quality and high stream flow~~ stored for future release to
361 treatment facilities.

362
363 ~~(formerly Section 4(w))(y)~~ “Surface water source” includes all tributary streams and
364 drainage basins, natural lakes, and artificial reservoirs or impoundments upstream from the point
365 of the water supply intake.

366
367 ~~(formerly Section 4(x))(z)~~ “Water service connection” means any water line or pipe
368 connected to a distribution supply main or pipe for the purpose of conveying water to a water
369 user’s system.

370
371 ~~(formerly Section 4(y))(aa)~~ “Water supplier” means any entity that owns or operates a
372 public water supply, whether public or private.

373
374 ~~(formerly Section 4(z))(bb)~~ “Water user” means any entity, whether public or private,
375 with a water service connection to a public water supply. ~~The water user is also identified as a~~
376 and includes customers of a public water supply.

377
378 ~~(formerly Section 4(aa))(cc)~~ “Water user’s system” means that portion of the user’s
379 water system between the water service connection and the point of use. This system includes all
380 pipes, conduits, tanks, fixtures, and appurtenances used to convey, store, or utilize water
381 provided by the public water supply.

382
383 **Section 6. ~~Engineering Design Report~~ Facilities and Systems not Specifically**
384 **Covered by these Standards.**

385
386 ~~(moved to Section 9(b))(a) — Scope and purpose. An engineering design report shall be~~
387 ~~submitted with each application. The purpose of the report shall be to describe and provide~~
388 ~~technical justification for all aspects of the proposed construction, modifications and/or~~
389 ~~installations. The report should address existing conditions (if any), known or suspected~~
390 ~~problems, proposed actions, and the reasoning used to arrive at those proposed actions. There is~~
391 ~~no minimum or maximum size for the report, provided it meets the purpose of this section.~~

392
393 ~~(moved to Section 9(c))(b) — Water distribution (water works) systems. The engineering~~
394 ~~design report for all new water distribution system extensions shall include:~~

395
396 ~~(moved to Section 9(c)(i))(i) — A description of the service area including sealed~~
397 ~~vicinity plan map(s) of the project with regard to adjacent and proposed development, elevations,~~
398 ~~and topographic features.~~

399
400 ~~(moved to Section 9(c)(ii))(ii) Current and projected system water demand for~~
401 ~~average day, maximum day, maximum hour, needed fire flows and per capita maximum daily~~
402 ~~flows.~~

403
404 ~~(moved to Section 9(c)(iii))(iii) — Information on fire protection and fire flow~~
405 ~~capabilities of the proposed system.~~

406

407 ~~(moved to Section 9(c)(iv))(iv) — Description of high service pumping~~
408 ~~systems and finished water storage facilities.~~

409
410 ~~(moved to Section 9(d))(e) — Treatment facilities. The engineering design report shall~~
411 ~~include:~~

412
413 ~~(moved to Section 9(d)(i))(i) — A description of the facility site and location,~~
414 ~~including a scaled site plan, and:~~

415
416 ~~(moved to Section 9(d)(i)(A))(A) — Present and projected facility~~
417 ~~property boundaries.~~

418
419 ~~(moved to Section 9(d)(i)(B))(B) — Flood protection indicating predicted~~
420 ~~elevation of 25- and 100-year flood stages. The facility shall be protected from damage and be~~
421 ~~capable of being operated~~
422 ~~during the 100-year flood or maximum flood of record, whichever is greater. Flooding resulting~~
423 ~~from ice jams shall be considered.~~

424
425 ~~(moved to Section 9(d)(i)(C))(C) — Present and proposed access.~~

426
427 ~~(moved to Section 9(d)(i)(D))(D) — Distances from current habitation,~~
428 ~~the closest major treated water transmission line, the closest treated water storage facility, and~~
429 ~~the water source.~~

430
431 ~~(moved to Section 9(d)(i)(E))(E) — Fencing and/or security.~~

432
433 ~~(moved to Section 9(d)(i)(F))(F) — Topographic features and contours~~
434 ~~with indicated datum.~~

435
436 ~~(moved to Section 9(d)(i)(G))(G) — Soil and subsurface geological~~
437 ~~characteristics. Provide a soils investigation report of the proposed site suitable for structural~~
438 ~~design of the proposed facilities.~~

439
440 ~~(moved to Section 9(d)(ii))(ii) — A detailed description of the service area for~~
441 ~~the project including a scaled plan showing land use and boundaries.~~

442
443 ~~(moved to Section 9(d)(iii))(iii) — A detailed description of the recycle flows~~
444 ~~and procedures for reclamation of recycle streams.~~

445
446 ~~(moved to Section 9(d)(iv))(iv) — A detailed description of disposal techniques~~
447 ~~for settled solids, including a description of the ultimate disposal of sludge.~~

448
449 ~~(v) — Sources of water supply shall be described to include:~~

450
451 ~~(moved to Section 9(f))(A) — Groundwater sources.~~

452

453 ~~(moved to Section 9)(I) — Geology of aquifer and overlying~~
454 ~~strata.~~

455
456 ~~(H) — Summary of source exploration data, including test well~~
457 ~~depth and method of construction; test pumping rates and duration; and water levels and specific~~
458 ~~yield.~~

459
460 ~~(moved to Section 9(f)(ii)) Water quality, including biological, radiological and chemical~~
461 ~~quality data sufficient to determine necessary treatment processes and compliance with all~~
462 ~~drinking water standards as determined by the administrator. The same water quality data for all~~
463 ~~secondary sources shall also be provided.~~

464
465 ~~(III) — Sources of possible contamination around well and in any~~
466 ~~known recharge areas, including location of any waste sites, industrial facilities and wastewater~~
467 ~~disposal areas.~~

468
469 ~~(B) — Surface water sources.~~

470
471 ~~(moved to Section 9(e)(i))(I) — Safe annual yield, the quantity of~~
472 ~~water available from the source during the average and driest years of record.~~

473
474 ~~(moved to Section 9(e)(i)(A))(II) — Hydrological data, stream~~
475 ~~flows and diversion records.~~

476
477 ~~(moved to Section 9(e)(ii)(III) — Representative water quality~~
478 ~~data, including bacteriological, radiological, chemical and physical data. These data shall be~~
479 ~~sufficient to determine the necessary process and the ability to meet water quality standards.~~

480
481 ~~(IV) — Description of the watershed noting sources of potential~~
482 ~~contamination.~~

483
484 ~~(V) — Description of any anticipated changes in water quality.~~

485
486 ~~(moved to Section 9(e)(i)(A))(VI) — Description of any diversion~~
487 ~~dams, impoundments or reservoirs and appurtenances.~~

488
489 ~~(vi) — Plant design conditions, including:~~

490
491 ~~(A) — Historical and design population.~~

492
493 ~~(B) — Existing and projected maximum daily demand flows and demand~~
494 ~~variations.~~

495
496 ~~(C) — Complete description of existing facilities.~~

497

498 ~~(D) — Where applicable, a complete description of proposed treatment~~
499 ~~process including :~~

500
501 ~~(I) — Unit process design criteria addressing flash mixing,~~
502 ~~flocculation and settling basin size and equipment description; retention times; unit loadings and~~
503 ~~overflow rates; filter area and proposed filtration rate; backwash rate and volume requirements;~~
504 ~~chemical feeder capacities and ranges; and disinfection feeder capacities and ranges.~~

505
506 ~~(II) — Chemical requirements, including dosages and feed rates.~~

507 ~~(III) — Chemical delivery, handling, and storage systems.~~

508
509 ~~(IV) — Waste generation including types and volumes.~~

510
511 ~~(V) — Waste stream recycling, including holding basin capacities,~~
512 ~~pump sizes and recycle rates.~~

513
514 ~~(VI) — Methods of ultimate waste disposal.~~

515
516 ~~(VII) — Low service pumping facilities.~~

517
518 ~~(E) — Description of on-site restrooms and sanitary sewer facilities.~~

519
520 ~~(vii) — Summary of automatic operation and control systems, including basic~~
521 ~~operation, manual override operation, and maintenance requirements.~~

522
523 ~~(viii) — Description of the on-site laboratory facilities and a summary of those~~
524 ~~tests to be conducted on-site. If no on-site laboratory is provided, a description of plant control~~
525 ~~and water quality testing requirements, and where the testing will be conducted shall be included.~~
526 ~~Description of cross-control measures to be provided at chemical feed tanks, filters, washdown~~
527 ~~taps, direct connection to sewer or other relevant protection.~~

528
529 ~~(moved to Section 9(b)(iv))(d) — Hazard classification. The engineering design report~~
530 ~~shall include a hazard classification or specify the default classification identified in Section 14~~
531 ~~(i) (i) (B) which shall be applicable to the project. A hazard classification shall include the~~
532 ~~following:~~

533
534 ~~(moved to Section 9(b)(iv))(i) A determination of the degree of hazard of all water~~
535 ~~service connections to be connected to the proposed project.~~

536
537 ~~(moved to Section 9(b)(iv))(ii) — A determination of the potential cause of~~
538 ~~backflow for all water service connections.~~

539
540 ~~(formerly Section 5) This section is provided to encourage new technology and equipment and~~
541 ~~provide a process for evaluating and permitting designs which deviate from these regulations.~~
542 ~~The proposed construction of facilities and processes not in compliance with these regulations~~

543 will be permitted provided that the facility, when constructed, can operate meeting the purpose of
544 these regulations.

545
546 ~~(formerly Section 5)~~(a) Each application for a permit to construct a facility under
547 this section shall be evaluated on a case-by-case basis using the best available technology. ~~The~~
548 ~~following information should be included with the application:~~The Administrator may approve
549 applications demonstrating the constructed facility can meet the purpose of the Act and this
550 Chapter.

551
552 (b) The following information shall be included with the application for a permit to
553 construct, install, modify, or operate a public water supply facility not specifically covered by
554 these standards:

555
556 ~~(formerly Section 5(a)(i))~~(i) Data obtained from a full scale, comparable
557 installation ~~which~~ that demonstrates the acceptability of the design; ~~and/or~~

558
559 ~~(formerly Section 5(a)(ii))~~(ii) Data obtained from a pilot plant operated under the
560 design condition for a sufficient length of time to demonstrate the acceptability of the design;
561 ~~and/or~~

562
563 ~~(formerly Section 5(a)(iii))~~(iii) Data obtained from a theoretical evaluation
564 of the design ~~which~~ demonstrates a reasonable probability ~~of that~~ the facility will ~~meeting~~ the
565 design objectives; ~~and~~.

566
567 ~~(formerly Section 5(a)(iv))~~(iv) An evaluation of the flexibility of making
568 corrective changes to the constructed facility in the event it does not function as planned.

569
570 ~~(formerly Section 5(b))~~(c) If an applicant wishes to construct a pilot plant to provide
571 the data necessary to ~~show the design will~~ meet the ~~purpose~~ requirements of ~~the act~~ this Section,
572 the applicant must obtain a permit to construct ~~must be obtained~~.

573
574 **Section 7. ~~Plans and Specifications Content~~ Permits, Permit Application, and**
575 **Recordkeeping Requirements.**

576
577 ~~(moved to Section 8(b))(a)~~—All plans for water works and treatment facilities shall have
578 a suitable title showing the following:

579
580 ~~(moved to Section 8(b))(i)~~—Name of owner and location of project.

581
582 ~~(ii)~~—North arrow and drawing scale.

583
584 ~~(iii)~~—Name, Wyoming registration number, and seal or signature of the
585 engineer.

586
587 ~~(b)~~—All plans shall contain a site plan of the proposed project with topography and
588 boundaries of the project. Datum used shall be indicated.

589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634

~~(moved to Section 8(c))(c) — Water lines. Plans for transmission and distribution lines shall include:~~

~~(moved to Section 8(c)(i))(i) — A detailed plan view at a legible scale of each reach of the water line showing all existing and proposed streets, adjacent structures, physical features, and existing locations of utilities. The location and size of all water lines, valves, access manholes, air vacuum release stations, thrust blocking, and other appurtenances shall be indicated. Pertinent elevations shall be indicated on all appurtenances.~~

~~(moved to Section 8(c)(ii))(ii) Profiles of all water lines shall be shown on the same sheet as the plan view at legible horizontal and vertical scales, with a profile of existing and finished surfaces, pipe size and material, valve size, material and type. The location of all special features such as access manholes, concrete encasements, casing pipes, blowoff valves, and airvacuum relief valves, etc., shall be shown.~~

~~(moved to Section 8(c)(iii))(iii) — Special detail drawings scaled and dimensioned to show the following:~~

~~(moved to Section 8(c)(iii)(A))(A) — The bottom of the stream, the elevation of the high and low water levels, and other topographical features at all locations where the water line is near or crosses streams or lakes.~~

~~(moved to Section 8(c)(iii)(B))(B) — Cross-section drawing of the pipe bedding.~~

~~(moved to Section 8(c)(iii)(C))(C) — Additional features not otherwise covered by specifications.~~

~~(moved to Section 8(c)(iv))(iv) — Location of any sewer lines within 30 feet (9 m) horizontally. Sewers that cross water lines shall be shown on the profile drawings.~~

~~(moved to Section 8(d))(d) — Storage tanks, pumping stations and treatment facilities. Plans shall be submitted showing the relation of the proposed project to the remainder of the system. Layouts and detail plans shall show the following:~~

~~(moved to Section 8(d)(i))(i) — Site location and layout including topographic and physical features, proposed arrangement of pumping or treatment units, existing facilities, existing and proposed piping and valving arrangements, access drive, power supply, fencing, embankments, clearwells, waste and sludge ponds, etc.~~

~~(moved to Section 8(d)(ii))(ii) — Schematic flow diagram(s) and hydraulic profile(s) for facility treated water, and flow diagram for sludge and wastewater flows.~~

~~(moved to Section 8(d)(iv))(iii) — Plan(s) and section view(s) of each treatment facility process unit with specific construction details, features and pertinent~~

635 elevations. Details of each unit should include, but are not limited to: inlet and outlet devices,
636 baffles, valves, arrangement of automatic control devices, mixers, motors, chemical feeders,
637 sludge scrapers, sludge disposal, or other mechanical devices.

638
639 ~~(moved to Section 8(e))(e) — Wells. Plan and profile drawings of well construction shall~~
640 ~~be submitted showing diameter and depth of drill holes, casing and liner diameters and depths,~~
641 ~~grouting depths, elevation and designation of geological formations, water levels, and other~~
642 ~~details to describe the proposed well completely.~~

643
644 ~~(moved to Section 8(f))(f) — Specifications. Technical specifications shall accompany~~
645 ~~the plans for new water lines, pump stations, treatment facilities, wells, or~~
646 ~~additions/modifications to existing systems or facilities . Where plans are for extensions to water~~
647 ~~distribution systems, the specifications may be omitted, provided it is stated that the work is to be~~
648 ~~constructed under specifications authorized by the Water Quality Division. Specifications on file~~
649 ~~must conform to this standard. The specifications accompanying construction drawings shall~~
650 ~~include:~~

651
652 ~~(moved to Section 8(f)(i))(i) — Identification of construction materials.~~

653
654 ~~(moved to Section 8(f)(ii))(ii) The type, size, strength, operating characteristics,~~
655 ~~rating or requirements for all mechanical and electrical equipment, including machinery, valves,~~
656 ~~piping, electrical apparatus, wiring and meters; laboratory fixtures and equipment; operating~~
657 ~~tools; special appurtenances; and chemicals, when applicable.~~

658
659 ~~(moved to Section 8(f)(iii))(iii) — Construction and installation procedure for~~
660 ~~materials and equipment.~~

661
662 ~~(moved to Section 8(f)(iv))(iv) — Requirements and tests of materials and~~
663 ~~equipment to meet design standards.~~

664
665 ~~(moved to Section 8(f)(v))(v) Performance tests for operation of completed works~~
666 ~~and component units.~~

667
668 ~~(moved to Section 8(f)(vi))(vi) — Specialized requirements for tests, analyses,~~
669 ~~disinfection techniques, and other special needs.~~

670
671 ~~(vii) — Requirements for well construction and testing. The collection of the~~
672 ~~following must be recorded and reported to the Wyoming Department of Environmental Quality,~~
673 ~~Water Quality Division.~~

674
675 ~~(moved to Section 8(e)(vi))(A) — Geological data.~~

676
677 ~~(moved to Section 8(e)(x))(B) — Well construction data. Well~~
678 ~~construction data shall include screen locations, size of screen openings, screen intervals,~~
679 ~~accurate records of drill hole diameters and depths, assembled order, size and length of casing~~

680 ~~and liners, casing wall thickness, grouting depths, formations penetrated, water levels, and~~
681 ~~location of any blast charges.~~

682
683 ~~(moved to Section 8(e)(xii))(C) — Well test data. Well test data shall~~
684 ~~include test pump capacity—head characteristics; static water level; depth of test pump setting;~~
685 ~~time of starting and ending each test cycle; pumping rate; pumping water level; drawdown; and~~
686 ~~water recovery rate and levels.~~

687
688 ~~(moved to Section 8(f)(vii))(g) — Technical specifications shall require that all water~~
689 ~~service connections will be provided with backflow prevention devices in accordance with the~~
690 ~~requirements of Section 14 (i) of these regulations.~~

691
692 (a) Applications for a permit to construct, install, modify, or operate a public water
693 supply shall comply with the requirements of Water Quality Rules Chapter 3, Section 6.

694
695 (b) The application shall include the following components:

696
697 (i) An engineering design report that meets the requirements of Section 8 of
698 this Chapter;

699
700 (ii) A construction plan that meets the applicable requirements of Sections 9,
701 10, 11, 12, 13, 14, 15, and 16 of this Chapter;

702
703 (iii) An operation and maintenance plan that meets the requirements of Section
704 17 of this Chapter; and

705
706 (iv) Any additional information required by the Administrator.

707
708 (c) The application and components required by this Chapter shall be submitted to the
709 Division in a format required by the Administrator.

710
711 (d) The application shall include certification under penalty of perjury that the
712 applicant has secured and will maintain permission for Department personnel and their invitees
713 to access the facility, including permission to:

714
715 (A) Access the land where the facility is located;

716
717 (B) Collect resource data as defined by W.S. § 6-3-414(e)(iv); and

718
719 (C) Enter and cross all properties necessary to access the facility if the
720 facility cannot be directly accessed from a public road.

721
722 (e) Sections of permit applications that represent engineering work shall be sealed,
723 signed, and dated by a licensed professional engineer as required by W.S. § 33-29-601.

724

725 (f) Sections of permit applications that represent geologic work shall be sealed,
726 signed, and dated by a licensed professional geologist as required by W.S. § 33-41-115.

727
728 (g) The Administrator may allow an alternative two-step permitting and application
729 procedure for wells and water storage tank project applicants that meet the following
730 requirements:

731
732 (i) Applicants shall submit all materials required under Water Quality Rules
733 Chapter 3 and this Chapter when submitting the initial permit application.

734
735 (ii) For applications that include wells, two individual permits will be issued.

736
737 (A) The initially issued permit will authorize the well to be
738 constructed, developed, and tested;

739
740 (B) Applicants shall submit well test data and water quality data for
741 Administrator approval; and

742
743 (C) Upon approval of the well test data and water quality data, the
744 Administrator shall authorize connection of the distribution system to the well.

745
746 (iii) Applicants for water storage tanks may follow an alternative procedure
747 when the final plans and specifications for the tank cannot be submitted with the initial permit
748 application due to project bidding constraints.

749
750 (A) After submitting the initial permit application, applicants shall
751 ensure the project bidding documentation includes a requirement that the final tank design
752 complies with the requirements of this Chapter;

753
754 (C) The applicant shall submit for the Administrator's review and
755 approval final drawings and specifications for the tank that demonstrate the design is consistent
756 with the requirements of this Chapter; and

757
758 (D) Applicants that follow the alternative procedure in this paragraph
759 shall not begin construction of the water storage tank or its foundation until the Administrator
760 authorizes the storage tank construction.

761
762 (iv) Applicants that use the two-step permitting and application procedures in
763 this Section shall request a pre-application meeting with the applicable Division district engineer
764 prior to submission of the permit application package to ensure efficient coordination of all
765 reports, plans, and specifications submittals, and Division review timelines.

766
767 **Section 8. ~~General Design Considerations~~ Plans and Specifications.**

768
769 ~~(moved to Section 10(b))(a) Design basis. The capacity of the water treatment or water~~
770 ~~production system shall be designed for the maximum daily demand at the design year. Where~~

771 ~~water use records are not available to establish water use, the equivalent per capita water use~~
772 ~~shall be at least 125 gpd (475 liters per day) and 340 gpd (1,285 liters per day) to size facilities~~
773 ~~for average and maximum daily water demand, respectively.~~

774
775 (b) ~~—Siting requirements.~~

776
777 (moved to Section 10(d)(ii))(i) ~~—Location. Treatment facilities shall be~~
778 ~~located such that no sources of pollution may affect the quality of the water supply or treatment~~
779 ~~system. The facilities shall not be located within 500 feet of landfills, garbage dumps, or~~
780 ~~wastewater treatment systems.~~

781
782 (moved to Section 10(d)(iii))(ii) ~~—Flood protection. All treatment process~~
783 ~~structures, mechanical equipment, and electrical equipment shall be protected from the~~
784 ~~maximum flood of record or the 100-year flood, whichever is greater. The treatment facilities~~
785 ~~shall remain fully operational and accessible during the 100-year flood.~~

786
787 (moved to Section 10(e))(c) ~~—Level of treatment. Treatment shall be provided to~~
788 ~~produce a potable water that is bacteriologically, chemically, radiologically, and physically safe~~
789 ~~as determined by the administrator.~~

790
791 (i) ~~—Surface supplies. Treatment shall include:~~

792
793 (A) ~~—Chemical addition/coagulation, flocculation, sedimentation,~~
794 ~~filtration and disinfection; or~~

795
796 (B) ~~—Where the raw water maximum turbidity is less than 50 TU and is~~
797 ~~not attributable to clay and maximum color is less than 30 TU, treatment facilities may include~~
798 ~~slow sand filtration and disinfection; or~~

799
800 (C) ~~—Where the maximum monthly average raw water turbidity is less~~
801 ~~than 25 TU, the color is less than 30 TU and fecal coliform organisms are less than 100 mpn/100~~
802 ~~ml, treatment facilities may be diatomaceous earth filters and disinfection.~~

803
804 (ii) ~~—Groundwater supplies. Groundwater supply facilities shall provide~~
805 ~~disinfection equipment and connections, as a minimum.~~

806
807 (d) ~~—Hydraulic and treatment reliability.~~

808
809 (moved to Section 10(f))(i) ~~—Multiple units. Treatment facilities with 100,000~~
810 ~~gallons per day (gpd) (378.5 m³/day) capacity and over shall provide duplicate units, as a~~
811 ~~minimum, for chemical feed, flocculation, sedimentation, filtration and disinfection. (moved to~~
812 ~~Section 10(g))Treatment facilities under 100,000 gpd (378.5 m³/day) capacity shall provide~~
813 ~~duplicate units as described above or may provide finished water system storage equal to twice~~
814 ~~the maximum daily demand.~~

815

816 ~~(moved to Section 10(h))(ii) Multiple equipment. All treatment facility pumping~~
817 ~~shall provide the maximum daily flow with the largest single unit not in service. Finished water~~
818 ~~pumping in combination with finished water storage that floats on the distribution systems shall~~
819 ~~provide the maximum hour flow with the single largest unit not in service. When fire protection~~
820 ~~is provided, pumping and finished water storage that floats on the system shall provide the fire~~
821 ~~demand plus the maximum daily demand, or the maximum hour demand, whichever is greater.~~
822

823 ~~(moved to Section 10(i))(iii) Alternative power source. Where the finished water~~
824 ~~storage volume that floats on the distribution system is not capable of supplying the maximum~~
825 ~~daily demand, an alternative power shall be provided for the finished water pumps. The~~
826 ~~combined finished water storage volume and pumping capacity supplied by alternative power~~
827 ~~shall be at least adequate to provide the maximum daily demand. Acceptable alternative power~~
828 ~~sources include an engine generator, engine drive pumps, or a second independent electrical~~
829 ~~supply.~~
830

831 ~~(moved to Section 10(j))(e) Housing. Process equipment, including filters and~~
832 ~~appurtenances, disinfection, chemical feed and storage, electrical and controls, and pipe galleries~~
833 ~~shall be housed.~~
834

835 ~~(f) Electrical.~~
836

837 ~~(moved to Section 10(s))(i) Equipment location. Service transformers and other~~
838 ~~critical electrical equipment shall be located above the 100-year flood and above-grade.~~
839 ~~Transformers shall be located so that they are remote or protected by substantial barriers from~~
840 ~~traffic. Motor controls shall be located in superstructures and in rooms that do not contain~~
841 ~~corrosive atmospheres.~~
842

843 ~~(ii) Code requirements. Electrical design shall comply with the National~~
844 ~~Electrical Code as enacted and amended by the Wyoming Department of Fire Prevention and~~
845 ~~Electrical Safety. Areas in which the occurrence of explosive concentrations of hazardous~~
846 ~~gases, flammable fluids, or explosive dusts can occur shall be designed for hazardous locations~~
847 ~~in accordance with the National Electrical Code Class 1, Groups C and D, Division 1 locations.~~
848

849 ~~(g) Structural.~~
850

851 ~~(moved to Section 8(n))(i) Construction materials. Construction materials~~
852 ~~shall be selected, apportioned, and/or protected to provide water tightness, corrosion protection,~~
853 ~~and resistance to weather variations.~~
854

855 ~~(moved to Section 8(o))(ii) Coatings. Coatings used to protect structures,~~
856 ~~equipment, and piping shall be suitable for atmospheres containing moisture and low~~
857 ~~concentrations of chlorine. Surfaces exposed in chemical areas shall be protected from chemical~~
858 ~~attack. Paints shall not contain lead, mercury, or other toxic metals or chemicals.~~
859

860 ~~(moved to Section 8(c))(iii) Geological conditions. Structural design shall~~
861 ~~consider the seismic zone, groundwater, and soil support. Soils investigations shall be made, or~~
862 ~~adequate previous soils investigations shall be available to develop structural design.~~

863 ~~(h) Safety. The Wyoming Occupational Health and Safety (OHS) Rules and~~
864 ~~Regulations shall be complied with. The following items shall also be provided:~~

865 ~~(i) Instruction manuals. Instruction manuals shall be provided for all~~
866 ~~mechanical and electrical equipment describing operation, maintenance, and safety.~~

867 ~~(ii) Handrails. In addition to all Wyoming OHS requirements, barriers~~
868 ~~around treatment basins shall be provided.~~

869 ~~(iii) Warning signs. Warning signs for pipes or hose bibs containing~~
870 ~~nontreated water, electrical hazards, mechanical hazards, chemical hazards, or other unsafe~~
871 ~~features shall be provided. Warning signs shall be permanently attached to the structure or~~
872 ~~appropriate equipment.~~

873 ~~(iv) Equipment guards. Shields to protect operators from rotating or moving~~
874 ~~machinery shall be provided.~~

875 ~~(v) Lighting. Provisions shall be made to light walkways, paths, and other~~
876 ~~accessways around basins, in buildings and on the site. All areas shall be lit in a manner that the~~
877 ~~failure of one lighting fixture will not cause an area to be dark, or the loss of power will not~~
878 ~~cause a room or enclosed area to be dark.~~

879 ~~(vi) Climate conditions. Design of facilities such as exposed stairs, walkways,~~
880 ~~and sidewalks shall include nonskid surfaces.~~

881 ~~(i) Instrumentation.~~

882 ~~(moved to Section 10(t))(i) Metering. The treatment facility shall have a flow~~
883 ~~measuring device provided for raw water influent and clear well effluent. The accuracy of the~~
884 ~~device shall be at least plus or minus two percent of span.~~

885 ~~(moved to Section 10(t))(ii) Type. All flow meters shall provide totalized flow.~~
886 ~~For plants with a maximum daily flow of 50,000 gpd (189 m³/d) or more, the meter shall also~~
887 ~~include recording of instantaneous flow rate.~~

888 ~~(moved to Section 10(t)(i))(iii) Controls. Automatic controls shall be~~
889 ~~designed to permit manual override.~~

890 ~~(moved to Section 10(u))(iv) Alarms. High effluent turbidity and chlorine leaks~~
891 ~~(when chlorine gas is used) shall be alarmed at an attended location.~~

892

905 ~~(j) — Sample taps. Sample taps shall be provided so that water samples can be obtained~~
906 ~~from each water source and from appropriate locations in each unit operation of treatment. Taps~~
907 ~~shall be consistent with sampling needs and shall not be of the petcock type. Taps used for~~
908 ~~obtaining samples for bacteriological analysis shall be of the smooth-nosed type without interior~~
909 ~~or exterior threads, shall not be of the mixing type, and shall not have a screen, aerator, or other~~
910 ~~such appurtenance.~~

911
912 ~~(moved to Section 10(r))(k) — Ventilation. All enclosed spaces shall be provided with~~
913 ~~forced ventilation, except pumping station wetwells or clearwells. In areas where there are open~~
914 ~~treatment units exposed to the room, ventilation shall be provided to limit relative humidity to~~
915 ~~less than 85 percent but not less than 6 air changes per hour. In electrical and equipment rooms,~~
916 ~~ventilation shall be provided to limit the temperature rise in the room to less than 15° F (8° C)~~
917 ~~above ambient, but not less than 6 air changes per hour. Rooms housing chlorine storage and/or~~
918 ~~feeders shall have provisions for exhausting the room contents in 2 minutes and continuous~~
919 ~~ventilation to provide not less than~~
920 ~~12 air changes per hour.~~

921
922 ~~(l) — Dewatering of treatment units. All treatment units, channels, basins, clearwells~~
923 ~~and wetwells shall be provided with drains or sumps that facilitate draining the unit for access~~
924 ~~and maintenance. Drainage shall be to the process waste system, filter washwater system or~~
925 ~~sanitary sewer. (moved to Section 10(l)) Basin slabs shall be designed to successfully resist the~~
926 ~~hydrostatic uplift pressure or an area dewatering system shall be provided. Considerations must~~
927 ~~be given in structural design to long span breakage in basins designed to resist uplift.~~

928
929 ~~(moved to Section 10(k))(m) — Cold weather protection. All equipment not required to be~~
930 ~~in or on open basins (such as clarifier drives and flocculator) shall be housed in heated, lighted,~~
931 ~~and ventilated structures. (moved to Section 10(m)) Structure entrances shall be above grade.~~
932 ~~(moved to Section 10(l)) Piping shall be buried below frost level, placed in heated structures, or~~
933 ~~provided with heat and insulated.~~

934
935 ~~(n) — Chemical storage. All chemical storage shall be housed or buried. Areas~~
936 ~~designated for storage of specific chemicals shall be separated from areas designated for other~~
937 ~~reactive chemicals. Liquid storage containers shall be isolated from other portions of the~~
938 ~~structure by a curb that will contain ruptured tank contents. Concrete floors, walls, and curbs in~~
939 ~~chemical storage and feed areas shall be coated to protect the concrete from aggressive~~
940 ~~chemicals. Floors in polymer feed and storage areas shall be provided with nonslip surfaces.~~
941 ~~Rooms for chlorine storage and feed equipment shall be gastight and be provided with entry~~
942 ~~from outdoors. All toxic chemical storage areas shall be provided with lighting and ventilation~~
943 ~~switched from outside the room near the door. All toxic chemical storage areas shall be provided~~
944 ~~with windows either in the door or near the door to permit viewing the room from outside.~~
945 ~~Explosive chemicals shall be stored to protect operations personnel and equipment from injury or~~
946 ~~damage.~~

947
948 ~~(o) — Facility water supply. The facility water supply service line and the plant finished~~
949 ~~water sample tap shall be supplied from a source of finished water at a point where all chemicals~~
950 ~~have been thoroughly mixed, and the required disinfectant contact time has been achieved.~~

951 ~~There shall be no cross-connections between the facility water supply service line and any~~
952 ~~pipng, troughs, tanks, or other treatment units containing wastewater, treatment chemicals, raw~~
953 ~~or partially treated water. The potable plant water supply line shall have provisions to prevent~~
954 ~~backflow.~~

955
956 ~~(moved to Section 10(b))(p) Design capacities. The plant capacity shall include~~
957 ~~maximum daily water demand, filter backwash quantities, and industrial water use. In the~~
958 ~~absence of data, filter backwash quantity shall be five percent of the maximum daily demand.~~

959
960 ~~(moved to Section 10(v))(q) Monitoring equipment. Water treatment plants having a~~
961 ~~capacity of 0.5 mgd (1892.6 m³/d) or more shall be provided with continuous finished water~~
962 ~~turbidimeters (including recorders).~~

963
964 ~~(r) Labels. All process piping shall be labeled to identify materials being conveyed.~~

965
966 (a) 2018 TSS, parts 1.2 through 1.6 are herein incorporated by reference for plans,
967 specifications, design criteria, revisions to approved plans, and additional information required.

968
969 ~~(formerly Section 7(a))(b)~~ All plans for waterworks and treatment facilities shall ~~have~~
970 ~~a suitable title showing the following also include~~ the name of the real estate owner, ~~(formerly~~
971 ~~Section 7(a)(i)) Name of~~ the owner of the project, and the location of the project.

972
973 ~~(formerly Section 7(e))(c) Water lines.~~ Plans for transmission and distribution lines
974 shall include:

975
976 ~~(formerly Section 7(e)(i))(i)~~ A detailed plan view at a legible scale of each reach
977 of the water line showing all existing and proposed streets, adjacent structures, physical features,
978 and existing locations of utilities. The location and size of all water lines, valves, access
979 manholes, air-vacuum release stations, thrust blocking, and other appurtenances shall be
980 indicated. Pertinent elevations shall be indicated on all appurtenances.

981
982 ~~(formerly Section 7(e)(ii))(ii)~~ Profiles of all water lines shall be shown on the
983 same sheet as the plan view at legible horizontal and vertical scales, with a profile of existing and
984 finished surfaces, pipe size and material, valve size, material and type. The location of all special
985 features such as access manholes, concrete encasements, casing pipes, blowoff valves, and air-
986 vacuum relief valves, ~~etc.~~, shall be shown.

987
988 ~~(formerly Section 7(e)(iii))(iii)~~ Special detail drawings scaled and
989 dimensioned to show the following:

990
991 ~~(formerly Section 7(e)(iii)(A))(A)~~ At all locations where the water line
992 is within 10 feet or crosses streams or lakes, ~~the~~ the bottom of the stream, the elevation of the high-
993 and low water levels, and other topographical features ~~at all locations where the water line is~~
994 ~~near or crosses streams or lakes.~~

995

996 ~~(formerly Section 7(e)(iii)(B))~~(B) A ~~C~~cross-section drawing of the pipe
997 bedding; and
998
999 ~~(formerly Section 7(e)(iii)(C))~~(C) Additional features not otherwise
1000 covered by specifications.
1001
1002 ~~(formerly Section 7(e)(iv))~~(iv) The ~~L~~location of any sewer lines within 30
1003 feet ~~(9 m)~~ horizontally of water lines. Sewers that cross water lines shall be shown on the profile
1004 drawings.
1005
1006 ~~(formerly Section 7(d))~~(d) Plans for ~~S~~storage tanks, pumping stations, and water
1007 treatment facilities. ~~Plans shall be submitted showing~~ the relation of the proposed project to the
1008 remainder of the system. Layouts and detail plans shall ~~show the following~~ include:
1009
1010 ~~(formerly Section 7(d)(i))~~(i) The ~~S~~site location and layout including: topographic
1011 ~~and physical features, proposed arrangement of pumping or treatment units, existing facilities,~~
1012 ~~existing and proposed piping and valving arrangements, access drive, power supply, fencing,~~
1013 ~~embankments, clearwells, waste and sludge ponds, etc.~~
1014
1015 ~~(formerly Section 7(d)(i))~~(A) ~~†~~Topographic and physical features,
1016 including embankments;
1017
1018 ~~(formerly Section 7(d)(i))~~(B) The proposed arrangement of pumping or
1019 treatment units; ;
1020
1021 ~~(formerly Section 7(d)(i))~~(C) ~~e~~Existing facilities; ;
1022
1023 ~~(formerly Section 7(d)(i))~~(D) ~~e~~Existing and proposed piping and valving
1024 arrangements; ;
1025
1026 ~~(formerly Section 7(d)(i))~~(E) ~~access drive,~~ The route to access the facility;
1027
1028 ~~(formerly Section 7(d)(i))~~(F) The power supply; ;
1029
1030 ~~(formerly Section 7(d)(i))~~(G) ~~†~~Fencing; and
1031
1032 ~~(formerly Section 7(d)(i))~~(H) The proposed location of ~~embankments,~~
1033 clearwells, waste ponds, and sludge ponds, ~~etc.~~
1034
1035 ~~(formerly Section 7(d)(ii))~~(ii) Schematic flow diagram(s) and hydraulic profile(s)
1036 for facility treated water, ~~and flow diagram for sludge and wastewater flows~~; ;
1037
1038 ~~(formerly Section 7(d)(ii))~~(iii) A flow diagram for sludge and wastewater
1039 flows; and
1040

1041 ~~(formerly Section 7(d)(iii))~~(iv) Plan(s) and section view(s) of each
1042 treatment facility process unit with specific construction details, features, and pertinent
1043 elevations. Details of each unit ~~should~~ shall include, but are not limited to: inlet and outlet
1044 devices, baffles, valves, arrangement of automatic control devices, mixers, motors, chemical
1045 feeders, sludge scrapers, sludge disposal, or other mechanical devices.

1046
1047 (v) The plans or contractor-furnished information shall indicate the Wyoming
1048 registered engineer providing the design.

1049
1050 ~~(formerly Section 7(e))~~(e) Wells. Plans and profile drawings of well construction shall
1051 ~~be submitted~~ include: showing diameter and depth of drill holes, casing and liner diameters and
1052 ~~depths, grouting depths, elevation and designation of geological formations, water levels, and~~
1053 ~~other details to describe the proposed well completely.~~

1054
1055 ~~(formerly Section 7(e))~~(i) The diameter and depth of drill holes;

1056
1057 ~~(formerly Section 7(e))~~(ii) Casing and liner diameters and depths;

1058
1059 ~~(formerly Section 7(e))~~(iii) Assembled order, size, and length of casing and
1060 liners;

1061
1062 ~~(formerly Section 7(f)(vii)(B))~~(iv) Casing wall thickness;

1063
1064 ~~(formerly Section 7(f)(vii)(B))~~(v) GROUTING depths;

1065
1066 ~~(formerly Section 7(f)(vii)(A))~~(vi) Geological data;

1067
1068 ~~(formerly Section 9(b)(ii)(B))~~(vii) Plumbness and alignment requirements.
1069 ~~Every well shall be tested for plumbness and alignment in accordance with AWWA A-100. The~~
1070 well test method and allowable tolerance ~~shall be stated in the specifications.~~ ;

1071
1072 ~~(formerly Section 9(b)(iii)(B)(V)(1.))~~(viii) The Locations of all caisson
1073 construction joints and porthole assemblies ~~shall be indicated~~ on drawings, if a radial water
1074 collector is proposed; ~~The caisson wall shall be reinforced to withstand the forces to which it~~
1075 ~~will be subjected. The top of the caisson shall be covered with a watertight floor. The pump~~
1076 ~~discharge piping shall not be placed through the caisson walls.~~

1077
1078 ~~(formerly Section 7(e))~~(ix) The elevation and designation of geological
1079 formations, water levels, formations penetrated, and other details to describe the proposed well
1080 completely.;

1081
1082 ~~(formerly Section 7(f)(vii)(B))~~(x) Well construction data. ~~Well construction~~
1083 ~~data shall include s~~Screen locations, size of screen openings, and screen intervals; and accurate
1084 ~~records of drill hole diameters and depths, assembled order, size and length of casing and liners,~~
1085 ~~casing wall thickness, grouting depths, formations penetrated, water levels, and location of any~~
1086 ~~blast charges~~

1087
1088 ~~(formerly Section 7(f)(vii)(B)(xi))~~ The location of any blast charges; and

1089
1090 ~~(formerly Section 7(f)(vii)(e)(xii))~~ (C) — Well test data. Well test data shall
1091 include including: test pump capacity—head characteristics; static water level; depth of test pump
1092 setting; time of starting and ending each test cycle; pumping rate; pumping water level;
1093 drawdown; and water recovery rate and levels.

1094
1095 ~~(formerly Section 7(f)(vii)(C)(A))~~ Test pump capacity-head
1096 characteristics;

1097
1098 ~~(formerly Section 7(f)(vii)(C)(B))~~ sStatic water level;

1099
1100 ~~(formerly Section 7(f)(vii)(C)(C))~~ dDepth of test pump setting;

1101
1102 ~~(formerly Section 7(f)(vii)(C)(D))~~ tTime of starting and ending each
1103 test cycle;

1104
1105 ~~(formerly Section 7(f)(vii)(C)(E))~~ pPumping rate;

1106
1107 ~~(formerly Section 7(f)(vii)(C)(F))~~ pPumping water level;

1108
1109 ~~(formerly Section 7(f)(vii)(C)(G))~~ dDrawdown; and

1110
1111 ~~(formerly Section 7(f)(vii)(C)(H))~~ wWater recovery rate and levels.

1112
1113 ~~(formerly Section 7(f))~~ (e) Specifications. Technical specifications shall accompany
1114 ~~the p~~Plans for new water lines, pump stations, treatment facilities, wells, storage, or
1115 additions/modifications to existing systems or facilities shall be accompanied by technical
1116 specifications. ~~Where plans are for extensions to water distribution systems, the specifications~~
1117 ~~may be omitted, provided it is stated that the work is to be constructed under specifications~~
1118 ~~authorized by the Water Quality Division. Specifications on file must conform to this standard.~~
1119 When technical specifications have been independently permitted by the Division for statewide
1120 use, the project may reference the title, date, and permit approval identification number in lieu of
1121 providing technical specifications. The specifications accompanying construction drawings shall
1122 include:

1123
1124 ~~(formerly Section 7(f)(i))~~ (i) Identification of construction materials;

1125
1126 ~~(formerly Section 7(f)(ii))~~ (ii) The type, size, strength, operating characteristics,
1127 rating or requirements for all mechanical and electrical equipment, including machinery, valves,
1128 piping, electrical apparatus, wiring, and meters; laboratory fixtures and equipment; operating
1129 tools; special appurtenances; and chemicals, when applicable;

1130
1131 ~~(formerly Section 7(f)(iii))~~ (iii) Construction and installation procedure for
1132 materials and equipment;

1133
1134 ~~(formerly Section 7(f)(iv)(iv)~~ (iv) Requirements and tests of materials and equipment
1135 to meet design standards.;

1136
1137 ~~(formerly Section 7(f)(v)(v)~~ (v) Performance tests for the operation of completed
1138 works and component units.;

1139
1140 ~~(formerly Section 7(f)(vi)(vi)~~ (vi) Specialized requirements for tests, analyses,
1141 disinfection techniques, and other special needs.;

1142
1143 ~~(formerly Section 7(g)(vii)~~ (vii) ~~Technical specifications shall require A~~
1144 demonstration that all water service connections will be provided with backflow prevention
1145 devices in accordance with the requirements of Section ~~14 (i)~~ 16 (l) of ~~these regulations~~ this
1146 Chapter.

1147
1148 **Section 9** **Engineering Design Report.**

1149
1150 ~~(a) — Surface water.~~

1151
1152 ~~(i) — Structures.~~

1153
1154 ~~(A) — Design of reservoir or river intake structures.~~

1155
1156 ~~(I) — Facilities for withdrawal of water from more than one level~~
1157 ~~shall be provided in impoundments if the maximum water depth at the intake is greater than 20~~
1158 ~~feet (6.1 m). All ports or intake gates shall be located above the bottom of the stream, lake, or~~
1159 ~~impoundment. The lowest intake point shall be located at sufficient depth to be kept submerged~~
1160 ~~at low water levels.~~

1161
1162 ~~(II) — Where water temperatures are 34° F (1° C) or less, the~~
1163 ~~velocity of flow into the intake structure shall not exceed 0.5 feet per second (.152 m/s). Where~~
1164 ~~intakes are located in shady reaches of a stream, facilities shall be available to diffuse air into the~~
1165 ~~flow stream at a point in front of the intake pipe.~~

1166
1167 ~~(III) — Inspection manholes shall be located a maximum of every~~
1168 ~~1,000 feet (304.8 m) for pipe sizes 24 inches (0.61 m) and larger. Where pipelines operate by~~
1169 ~~gravity and the hydraulic gradeline is below the ground surface, concrete manholes may be used.~~
1170 ~~Where the pipeline is pressurized or the hydraulic gradeline is above ground, bolted and gasketed~~
1171 ~~access ways shall be used.~~

1172
1173 ~~(IV) — Devices shall be provided to minimize entry of fish and~~
1174 ~~debris from the intake structure.~~

1175
1176 ~~(B) — Offstream reservoir. Offstream reservoirs shall be constructed to~~
1177 ~~assure that:~~

1178

1179 ~~(I) Water quality is protected by controlling runoff into the~~
1180 ~~reservoir.~~

1181
1182 ~~(H) Dikes are structurally sound and protected against wave~~
1183 ~~action and erosion.~~

1184
1185 ~~(ii) Impoundments and reservoirs. The site of any impoundment or reservoir~~
1186 ~~shall be cleared of all brush, trees, and other vegetation to the high water elevation.~~

1187
1188 ~~(moved to Section 11(d))(iii) Raw water supply piping. No customer service~~
1189 ~~connection shall be provided from the raw water transmission line to the treatment plant, unless~~
1190 ~~there are provisions to treat the water to meet these standards, or the sole purpose of the service~~
1191 ~~is for irrigation or agricultural water use.~~

1192
1193 ~~(moved to Section 11(e))(b) Groundwater.~~

1194
1195 ~~(moved to Section 11(e)(i))(i) Number and capacity. The total developed~~
1196 ~~groundwater source, along with other water sources, shall provide a combined capacity that shall~~
1197 ~~equal or exceed the design maximum daily demand. A minimum of 2 wells, or 1 well and~~
1198 ~~finished water storage equal to twice the maximum daily demand shall be provided. Where 2~~
1199 ~~wells are provided, the sources shall be capable of equaling or exceeding the design average~~
1200 ~~daily demand with the largest producing well out of service.~~

1201
1202 ~~(A) General considerations.~~

1203
1204 ~~(I) Every well shall be protected from and remain operational~~
1205 ~~during the 100-year flood or the largest flood of record, whichever is greater.~~

1206
1207 ~~(II) All wells shall be disinfected after construction, repair, or~~
1208 ~~when work is done on the pump, before the well is placed in service. Disinfection procedures~~
1209 ~~shall be those specified in AWWA A-100 for disinfection of wells.~~

1210
1211 ~~(moved to Section 11(e)(ii))(B)(B) Relation to sources of pollution.~~
1212 ~~Every well shall be located further from any of the sources of pollution listed below. The~~
1213 ~~isolation distances listed below apply when domestic wastewater is the only wastewater present.~~

1214
1215 ~~(moved to Section 11(e)(ii)(A))(I) If the domestic sewage flow~~
1216 ~~is less than 2,000 gallons per day (7,560 L/day), the following minimum isolation distance shall~~
1217 ~~be maintained:~~

1218
1219 ~~Moved to Section 11(e)(ii)(A)~~

| <u>Source of Domestic Wastewater</u> | <u>Minimum Distance to Well</u> |
|--------------------------------------|---------------------------------|
| Sewer | 50 feet (15.2 m) |
| Septic tank | 50 feet (15.2 m) |

| | |
|----------------|-------------------|
| Disposal field | 100 feet (30.5 m) |
| Seepage pit | 100 feet (30.5 m) |
| Cesspool | 100 feet (30.5 m) |

1220
1221
1222
1223
1224

~~Moved to Section 11(e)(ii)(B))(II)~~

~~(II)—If the domestic sewage flow is greater than 2,000 gpd (7,560 L/day) but less than 10,000 gpd (37,800 L/day), the following minimum isolation distances shall be maintained:~~

| <u>Source of Domestic Wastewater</u> | <u>Minimum Distance to Well</u> |
|--------------------------------------|---------------------------------|
| Sewer | 50 feet (15.2 m) |
| Septic tank | 50 feet (15.2 m) |
| Disposal field | 200 feet (61 m) |
| Seepage pit | 200 feet (61 m) |
| Cesspool | 200 feet (61 m) |

1225
1226
1227
1228
1229

~~Moved to Section 11(e)(ii)(B))(III)—For systems larger than 10,000~~

~~gallons per day (37,800 L/day), the isolation distance shall be determined by a hydrogeological study, in accordance with the requirements of Section 15 of Chapter 3 Water Quality Rules and Regulations, but shall not be less than those listed above.~~

1230
1231
1232
1233

~~(IV)—For wastewaters other than domestic wastewater, the isolation~~

~~distance required shall be determined by a hydrogeological study, in accordance with the requirements of Section 15 of Chapter 3 Water Quality Rules and Regulations.~~

1234
1235

~~Moved to Section 11(e)(iii))(C)—Relation to buildings.~~

1236
1237
1238
1239
1240

~~Moved to Section 11(e)(iii)(A))(I)—When a well is adjacent to~~

~~the building, the well shall be located so that the centerline, extended vertically, will clear any projection from the building by not less than 3 feet (0.91 m), and will clear any power line by not less than 10 feet (3.05 m).~~

1241
1242
1243
1244
1245
1246

~~Moved to Section 11(e)(iii))(II)—When a well is to be located~~

~~inside a building, the top of the casing and any other well opening shall not terminate in the basement of the building, or in any pit or space that is below natural ground surface unless the well is completed with a properly protected submersible pump. Wells located in a structure must be accessible to pull the casing or the pump. The structure shall have overhead access.~~

1247
1248
1249

~~Moved to Section 11(e)(iii))(D)—Relation to property lines. Every~~

~~well shall be located at least 10 feet (3.05 m) from any property line.~~

1250
1251
1252

~~Moved to Section 11(e)(iv))(ii)—Testing and records.~~

1253 ~~Moved to Section 11(e)(iv)(A))(A)—Yield and drawdown tests. Yield~~
1254 ~~and drawdown tests shall be performed on every production well after construction or~~
1255 ~~subsequent treatment and prior to placement of the permanent pump. The test methods shall be~~
1256 ~~clearly indicated in the specifications. The test pump capacity, at maximum anticipated~~
1257 ~~drawdown, shall be at least 1.5 times the design rate anticipated. The test shall provide for~~
1258 ~~continuous pumping for at least 24 hours or until stabilized drawdown has continued for at least~~
1259 ~~6 hours when test pumped at 1.5 times the design pumping rate.~~

1261 ~~(moved to Section 11(e)(iv)(B))(B)—Plumbness and alignment~~
1262 ~~requirements. Every well shall be tested for plumbness and alignment in accordance with~~
1263 ~~AWWA A-100. The test method and allowable tolerance shall be stated in the specifications.~~

1264
1265 (iii)—Well construction.

1266
1267 ~~(moved to Section 11(e)(vi))(A)—Protection during construction.~~
1268 ~~During any well construction or modification, the well and surrounding area must be adequately~~
1269 ~~protected to prevent any groundwater contamination. Surface water must be diverted away from~~
1270 ~~the construction area.~~

1271
1272 ~~(moved to Section 11(e)(vii))(B)—Well types and construction~~
1273 ~~methods.~~

1274
1275 ~~moved to Section 11(e)(vii)(A))(I)—Dug wells. Dug wells shall~~
1276 ~~be used only where geological conditions preclude the possibility of developing an acceptable~~
1277 ~~drilled well.~~

1278
1279 (1.)—Every dug well, other than the buried slab type,
1280 shall be constructed with a surface curbing of concrete, brick, tile or metal, extending from the
1281 aquifer to above the ground surface. Concrete grout, at least 6 inches (0.15 m) thick, shall be
1282 placed between the excavated hole and the curbing for a minimum depth of 10 feet (3.05 m)
1283 below original or final ground elevation, whichever is lower, or to the bottom of the hole, if it is
1284 less than 10 feet (3.05 m).

1285
1286 (2.)—The well lining in the producing zone shall readily
1287 admit water, and shall be structurally sound to withstand external pressures.

1288
1289 (3.)—The well cover or platform shall be reinforced
1290 concrete with a minimum thickness of 4 inches (10 cm). The top of the platform shall be sloped
1291 to drain to all sides. The platform shall rest on and overlap the well curbing by at least 2 inches
1292 (5 cm), or it may be cast with the curbing or the concrete grout. Adequately sized pipe sleeve(s)
1293 shall be cast in place in the platform to accommodate the type of pump, pump piping or wiring
1294 proposed for the well. Pump discharge piping shall not be placed through the well casing or
1295 wall.

1296
1297 (4.)—A buried slab type of construction may be used if
1298 the dug well is greater than 10 feet (3.05 m) deep. The well lining shall be terminated a

1299 ~~minimum of 10 feet (3.05 m) below the original or final ground elevation, whichever is lower. A~~
1300 ~~steel reinforced concrete slab or platform, at least 4 inches (10 cm) thick, shall rest on and~~
1301 ~~overlap the lining. A standard unperforated well casing shall extend from the concrete slab to at~~
1302 ~~least 12 inches (30 cm) above the original or final ground surface, whichever is higher. This~~
1303 ~~casing shall be firmly imbedded in the slab or connected to a pipe cast in the slab to ensure that~~
1304 ~~the connection is watertight. The excavation above the slab shall be backfilled with a bentonite~~
1305 ~~slurry or clean earth thoroughly tamped to minimize settling.~~

1306
1307 (II) ~~— Drilled, driven, jetted, or bored wells.~~

1308
1309 (1.) ~~— A drilled well may be constructed through an~~
1310 ~~existing dug well provided that an unperforated casing extends to at least 12 inches (30 cm)~~
1311 ~~above the original ground or final surface, whichever is higher. A seal of concrete, at least 2 feet~~
1312 ~~(0.61 m) thick, shall be placed in the bottom of the dug well to prevent the direct movement of~~
1313 ~~water from the dug well into the drilled well. The original dug well shall be adequately protected~~
1314 ~~from contamination as described above.~~

1315
1316 ~~(moved to Section 11(e)(vii)(B))(2.) Every drilled, driven,~~
1317 ~~jetted, or bored well shall have an unperforated casing that extends from a minimum of 12 inches~~
1318 ~~(30 cm) above ground surface to at least 10 feet (3.05 m) below ground surface. In~~
1319 ~~unconsolidated formations, this casing shall extend to the water table or below. In consolidated~~
1320 ~~formations, the casing may be terminated in rock or watertight clay above the water table.~~

1321
1322 (III) ~~— Sand or gravel wells. If clay or hard pan is encountered~~
1323 ~~above the waterbearing formation, the permanent casing and grout shall extend through such~~
1324 ~~materials. If a sand or gravel aquifer is overlaid only by permeable soils, the permanent casing~~
1325 ~~and grout shall extend to at least 20 feet (6.1 m) below original or final ground elevation,~~
1326 ~~whichever is lower. If a temporary outer casing is used, it shall be completely withdrawn as~~
1327 ~~grout is applied.~~

1328
1329 (IV) ~~— Gravel pack wells. The diameter of an oversized drill hole~~
1330 ~~designed for the placement of an artificial gravel pack shall allow a thickness of gravel or sand~~
1331 ~~outside the casing sufficient to block the movement of natural materials into the well. The size~~
1332 ~~of the openings in the casing or screen shall be based on the size of the gravel or sand used in the~~
1333 ~~gravel pack.~~

1334
1335 (1.) ~~— Gravel pack shall be well rounded particles, 95~~
1336 ~~percent siliceous material, that are smooth and uniform, free of foreign material, properly sized,~~
1337 ~~washed, and then disinfected immediately prior to or during placement. Gravel pack shall be~~
1338 ~~placed in one uniformly continuous operation.~~

1339
1340 (2.) ~~— After completion, the well shall be overpumped,~~
1341 ~~surged, or otherwise developed to ensure free entry of water without sediment. A gravel packed~~
1342 ~~well shall be sealed in one of two ways to prevent pollution to the groundwater supply:~~

1343

1344 ~~(moved to Section 11(e)(vii)(C)(I))(2.)~~ If a permanent surface casing is not
1345 installed, the annular opening between the casing and the drill hole shall be sealed in the top 10
1346 feet (3.05 m) with concrete or cement grout.

1347
1348 ~~(moved to Section 11(e)(vii)(C)(II))(2.)~~ If a permanent surface casing is installed, it
1349 shall extend to a depth of at least 10 feet (3.05 m). The annular opening between this outer
1350 casing and the inner casing shall be covered with a metal or cement seal.

1351
1352 ~~(3.)~~ Gravel refill pipes, when used, shall be Schedule 40
1353 steel pipe incorporated within the pump foundation and terminated with screwed or welded caps
1354 at least 12 inches (30 cm) above the pump house floor or concrete apron. Gravel refill pipes
1355 located in the grouted annular opening shall be surrounded by a minimum of 1 1/2 inches (3.8
1356 cm) of grout. Protection from leakage of grout into the gravel pack or screen shall be provided.

1357
1358 ~~(V)~~ Radial water collector.

1359
1360 ~~(moved to Section 8(e)(viii))(1.)~~ Locations of all
1361 caisson construction joints and porthole assemblies shall be indicated on drawings. The caisson
1362 wall shall be reinforced to withstand the forces to which it will be subjected. The top of the
1363 caisson shall be covered with a watertight floor. The pump discharge piping shall not be placed
1364 through the caisson walls.

1365
1366 ~~(2.)~~ Provisions shall be made to assure that radial
1367 collectors are essentially horizontal.

1368
1369 ~~(3.)~~ All openings in the floor shall be curbed and
1370 protected from entrance of foreign material.

1371
1372 ~~(VI)~~ Infiltration lines. Where an infiltration line is used, the
1373 source shall be considered a surface source requiring treatment defined in Section 8(e) (i) unless,
1374 (1) the water system owner is in complete control of the surrounding property for a distance of
1375 500 feet around the periphery of the infiltration system; (2) the area is fenced to exclude trespass;
1376 and (3) the infiltration collection lines are a minimum of 40 inches below the ground surface at
1377 all points within the infiltration collection system.

1378
1379 ~~(VII)~~ Limestone or sandstone wells. In consolidated formations,
1380 casing shall be driven a minimum of 5 feet into firm bedrock and cemented into place.

1381
1382 ~~(VIII)~~ Artesian wells.

1383
1384 ~~(moved to Section 11(e)(vii)(C)(1.)~~ When artesian water
1385 is encountered in a well, unperforated casing shall extend into the confining layer overlying the
1386 artesian zone. This casing shall be adequately sealed with cement grout into the confining zone
1387 to prevent both surface and subsurface leakage from the artesian zone. The method of
1388 construction shall be such that during the placing of the grout and the time required for it to set,
1389 no water shall flow through or around the annular space outside the casing, and no water

1390 ~~pressure sufficient to disturb the grout prior to final set shall occur. After the grout has set~~
1391 ~~completely, drilling operations may be continued into the artesian zone. If leakage occurs~~
1392 ~~around the well casing or adjacent to the well, the well shall be recompleted with any seals,~~
1393 ~~packers or casing necessary to eliminate the leakage completely.~~

1394
1395 ~~(2.)—If water flows at the surface, the well shall be~~
1396 ~~equipped with valved pipe connections, watertight pump connections, or receiving reservoirs set~~
1397 ~~at an altitude so that flow can be stopped completely. There shall be no direct connection~~
1398 ~~between any discharge pipe and a sewer or other source of pollution.~~

1399
1400 ~~(moved to Section 11(e)(vii)(E)(I)(IX))—Wells that penetrate~~
1401 ~~more than one aquifer.~~

1402
1403 ~~(moved to Section 11(e)(vii)(E)(I)(1.))—Where a well~~
1404 ~~penetrates more than one aquifer or water-bearing strata, every aquifer and/or strata shall be~~
1405 ~~sealed off to prevent migration of water from one aquifer or strata to another. Strata shall be~~
1406 ~~sealed off by placing impervious material opposite the strata and opposite the confining~~
1407 ~~formation(s). The seal shall extend above and below the strata no less than 10 feet. The sealing~~
1408 ~~material shall fill the annular space in the interval to be sealed, and the surrounding void spaces~~
1409 ~~which might absorb the sealing material. The sealing material shall be placed from the bottom to~~
1410 ~~the top of the interval to be sealed.~~

1411
1412 ~~(2.)—Sealing material shall consist of neat cement, cement~~
1413 ~~grout, or bentonite clay.~~

1414
1415 ~~(moved to Section 11(e)(vii)(E)(X))—Wells that encounter~~
1416 ~~mineralized or polluted water.~~

1417
1418 ~~(moved to Section 11(e)(vii)(E)(1.))—Any time during the~~
1419 ~~construction of a well that mineralized water or water known to be polluted is encountered, the~~
1420 ~~aquifer or aquifers containing such inferior quality water shall be adequately cased or sealed off~~
1421 ~~so that water shall not enter the well, nor will it move up or down the annular space outside the~~
1422 ~~well casing. If necessary, special seals or packers shall be installed to prevent movement of~~
1423 ~~inferior quality water. Mineralized water may be used if it can be properly treated to meet all~~
1424 ~~drinking water quality standards as determined by the administrator. When mineralized water is~~
1425 ~~encountered, it shall not be mixed with any other waters from different aquifers within the well.~~
1426 ~~If a well is penetrating multiple aquifers, mineralized water shall be excluded from the well if~~
1427 ~~water is taken from other non-mineralized aquifers.~~

1428
1429 ~~(moved to Section 11(e)(vii)(C)(2.))—In gravel packed~~
1430 ~~wells, aquifers containing inferior quality water shall be sealed by pressure grouting, or with~~
1431 ~~special packers or seals, to prevent such water from moving vertically in gravel packed portions~~
1432 ~~of the well.~~

1433
1434 ~~(XI)—Conversion of existing oil or gas wells, or exploration test~~
1435 ~~holes, into water wells.~~

1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481

~~(moved to Section 11(e)(vii)(F) (1.) Existing oil and gas wells, seismic test holes, or mineral exploration holes may be converted for use as water wells provided that the wells can be completed to conform to the minimum construction standards cited in this chapter. This does not relieve the applicant from obtaining appropriate permits.~~

~~(2.) Information on the geologic conditions encountered in the well at the time of the original drilling shall be used to determine what special construction standards shall be met in order to eliminate all movement of pollutants into the well or along the annular space surrounding the casing. If no original geologic information is available, an electric or other geophysical log is required to supplement known information.~~

~~(C) Construction materials.~~

~~(moved to Section 11(e)(vii)(E)(I) Casing. The casing shall provide structural stability to prevent casing collapse during installation as well as drill hole wall integrity when installed, be of required size to convey liquid at a specified injection/recovery rate and pressure, and be of required size to allow for sampling.~~

~~(1.) Temporary steel casing. Temporary steel casing used for construction shall be capable of withstanding the structural load imposed during its installation and removal.~~

~~(2.) Permanent steel casing. Permanent steel casing pipe shall be new pipe meeting AWWA Standard A-100 specifications for water well construction. The casing shall have full circumferential welds or threaded coupling joints to assure a watertight construction.~~

~~a. Standard and line pipe. This material shall meet one of the following specifications:~~

~~API Std. 5L, "Specifications for Line Pipe."~~

~~API Std. 5LX, "Specifications for High-Test Line Pipe."~~

~~ASTM A53 "Standard Specification for Pipe Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless."~~

~~ASTM A120 "Standard Specifications for Pipe, Steel, Black and Hot Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses."~~

~~ASTM A134 "Standards Specifications for Electric-Fusion (arc) Welded Steel Plate Pipe (sizes NPS 16 inches and over)."~~

1482 ~~ASTM A135 "Standard Specifications for~~
1483 ~~Electric-Resistance-Welded Steel Pipe." ASTM A139 "Standard Specification for Electric-~~
1484 ~~Fusion (arc)-Welded Steel Pipe (Sizes 4" and over)."~~

1485
1486 ~~ASTM A211 "Standard Specifications for~~
1487 ~~Spiral-Welded Steel or Iron Pipe." AWWA C200 "AWWA Standard for Steel Water Pipe 6~~
1488 ~~inches and Larger."~~

1489
1490 b. ~~Structural steel. This material shall meet one of the~~
1491 ~~following specifications:~~

1492
1493 ~~ASTM A36 "Standard Specification for Structural~~
1494 ~~Steel."~~

1495
1496 ~~ASTM A242 "Standard Specifications for High~~
1497 ~~Strength Low Alloy Structural Steel." ASTM A283 "Standard Specification for Low and~~
1498 ~~Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars of Structural Quality."~~

1499
1500 ~~ASTM A441 "Tentative Specifications for High-~~
1501 ~~Strength Low Alloy Structural Manganese Vanadium Steel."~~

1502
1503 ~~ASTM A570 "Standard Specification for Hot-~~
1504 ~~Rolled Carbon Steel Sheet and Strip, Structural Quality."~~

1505
1506 ~~(moved to Section 11(e)(viii)(A))c. High-strength carbon~~
1507 ~~steel sheets or "well casing steel". Each sheet of material shall contain mill markings which will~~
1508 ~~identify the manufacturer and specify that the material is well casing steel which complies with~~
1509 ~~the chemical and physical properties published by the manufacturer.~~

1510
1511 ~~(moved to Section 11(e)(viii)(B))d. Stainless steel~~
1512 ~~casing shall meet the provisions of ASTM A409 "Standard Specification for Welded Large~~
1513 ~~Diameter Austenitic Steel Pipe for Corrosive or High Temperature Service".~~

1514
1515 ~~(moved to Section 11(e)(viii)(C))3. Nonferrous casing materials.~~
1516 ~~Nonferrous or plastic material may be used as a well casing. It must be resistant to the~~
1517 ~~corrosiveness of the water and to the stresses to which it will be subjected during installation,~~
1518 ~~grouting, and operation. The material shall be nontoxic. All joints shall be durable and~~
1519 ~~watertight.~~

1520
1521 ~~(moved to Section 11(e)(viii)(C)(I))a.~~
1522 ~~Thermoplastics. This material shall meet the requirements of ASTM F 480 "Standard~~
1523 ~~Specification for Thermoplastic Water Well Casing Pipe and Couplings made in Standard~~
1524 ~~Dimension Ratios (SDR)".~~

1525
1526 ~~(moved to Section 11(e)(viii)(C)(II))b. Thermosets.~~
1527 ~~This material shall meet the requirements of the following specifications:~~

1528
1529 moved to Section 11(e)(viii)(C)(II)b. ——— ASTM
1530 D2996 "Standard Specification for Filament Wound Reinforced Thermosetting Resin Pipe."
1531

1532 (moved to Section 11(e)(viii)(C)(II)b. ——— ASTM
1533 D2997 "Standard Specification for Centrifugally Cast Reinforced Thermosetting Resin Pipe."
1534

1535 (moved to Section 11(e)(viii)(C)(II)b. ASTM
1536 D3517 "Standard Specification for Reinforced Plastic Mortar Pressure Pipe." AWWA C950
1537 "AWWA Standards for Glass-Fiber-Reinforced Thermosetting-Resin Pressure Pipe."
1538

1539 moved to Section 11(e)(viii)(C)(II)c. ——— Concrete pipe
1540 used for casing should conform to one of the following specifications:
1541

1542 moved to Section 11(e)(viii)(C)(II)(1.)c. ——— ASTM
1543 C14 "Standard Specifications for Concrete Sewer, Storm Drain, and Culvert Pipe."
1544

1545 moved to Section 11(e)(viii)(C)(II)(2.)c. ——— ASTM
1546 C76 "Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe."
1547

1548 moved to Section 11(e)(viii)(C)(II)(3.)c.
1549 ——— AWWA C300 "AWWA Standards for Reinforced Concrete Pressure Pipe, Steel Cylinder
1550 Type, for Water and Other Liquids."
1551

1552 moved to Section 11(e)(viii)(C)(II)(4.)c.
1553 ——— AWWA C301 "AWWA Standards for Prestressed Concrete Pressure Pipe, Steel Cylinder
1554 Type, for Water and Other Liquids."
1555

1556 moved to Section 11(e)(viii)(D)(formerly Section
1557 9(b)(iii)(C)(I)(4.)) ——— Casing diameter. The casing diameter (inside diameter) shall be a
1558 minimum of one size larger than the largest dimension/diameter of the pump or pumping
1559 structure. If a reduction in casing diameter is made, there shall be adequate overlap of the casing
1560 to prevent misalignment and to prevent the movement of unstable sediment into the well. To
1561 prevent the migration of mineralized, polluted, or otherwise inferior quality water, lead or
1562 neoprene packers shall be installed to seal the annular space between casings.
1563

1564 (II) ——— Packers. Packers shall be material that will not impart taste, odor,
1565 toxic substance, or bacterial contamination to the well water.
1566

1567 (III) ——— Screens.
1568

1569 (1.) ——— Screens shall be constructed of materials resistant to
1570 damage by chemical action of groundwater or cleaning operations, and have size of openings
1571 based on sieve analysis of formation and/or gravel-pack materials. The screen shall have
1572 sufficient diameter to provide adequate specific capacity and low aperture entrance velocity. The
1573 entrance velocity shall not exceed 0.1 feet per second (3 cm/sec).

1574
1575 (2.)—The screen shall be installed so that the pumping water
1576 level remains above the screen under all operating conditions, and shall be provided with a
1577 bottom plate or washdown bottom fitting of the same material as the screen.
1578

1579 (moved to Section 11(e)(x)(B))(3.)—For a nonhomogeneous
1580 aquifer having a uniformity coefficient less than 3.0 and an effective grain size less than 0.01
1581 inches, an artificial filter or screen shall be used.
1582

1583 (IV)—Grout and grouting requirements. All permanent well casing,
1584 except driven Schedule 40 steel casing, shall be surrounded by a minimum of 2 inches (5.1 cm)
1585 of grout. All temporary construction casings shall be removed. Where removal is not possible
1586 or practical, the casing shall be withdrawn at least 5 feet to ensure grout contact with the native
1587 formation.
1588

1589 (1.)—Neat cement grout. Cement conforming to ASTM Standard
1590 C150 and water, with not more than 6 gallons (13.62 L) of water per sack of cement, must be
1591 used for 2 inch (5.1 cm) openings. Additives used to increase fluidity must meet ASTM C494.
1592

1593 (2.)—Concrete grout. Equal parts of cement conforming to
1594 ASTM Standard C150 and sand, with not more than 6 gallons (13.62 L) of water per sack of
1595 cement, may be used for openings larger than 2 inches (5.1 cm). Where an annular opening
1596 larger than 4 inches (10 cm) is available, gravel not larger than 1/2 inch (1.27 cm) in size may be
1597 added.
1598

1599 (3.)—Clay seal.—Where an annular opening greater than 6
1600 inches (15.2 cm) is available a clay seal of clean local clay mixed with at least 10 percent
1601 swelling bentonite may be used.
1602

1603 (4.)—Application. Prior to grouting through creviced or
1604 fractured formations, bentonite or similar materials may be added to the annular opening in the
1605 manner indicated for grouting. After cement grouting is applied, work on the well shall be
1606 discontinued until the cement or concrete grout has properly set.
1607

1608 Sufficient annular opening shall be provided to permit a minimum of 2 inches (5.1 cm) of
1609 grout around permanent casings, including couplings.
1610

1611 When the annular opening is 4 or more inches (10 cm) and less than 100 feet (30.5 m) in
1612 depth and concrete grout is used, the grout may be placed by gravity through a grout pipe
1613 installed to the bottom of the annular opening in one continuous operation until the annular
1614 opening is filled.
1615

1616 When the annular opening exceeds 6 inches (15.2 cm), and less than 100 feet (30.5 m) in
1617 depth and a clay seal is used, it may be placed by gravity.
1618

1619 (5.)—Guides. The casing must be provided with sufficient guides
1620 welded to the casing to permit unobstructed flow and uniform thickness of grout.

1621
1622 (V)—Upper terminal well construction.

1623
1624 (1.)—Permanent casing for all groundwater sources shall project
1625 at least 12 inches (30.5 cm) above the pumphouse floor or concrete apron surface and at least 18
1626 inches (0.46 m) above final ground surface. The concrete floor or apron shall slope away from
1627 the casing at a slope of 1 inch per foot (8.33 cm/m).

1628
1629 (2.)—Where a well house is constructed, the floor surface shall
1630 be at least 6 inches (15.2 cm) above the final ground elevation and shall slope away from the
1631 casing at a slope of 1/2 inch per foot (4.16 cm/m).

1632
1633 (3.)—Sites subject to flooding shall be provided with an earthen
1634 berm surrounding the casing and terminating at an elevation at least 2 feet (0.61 m) above the
1635 highest known flood elevation, or other suitable protection shall be provided.

1636
1637 (4.)—The top of the well casing at sites subject to flooding shall
1638 terminate at least 3 feet (0.91 m) above the 100-year flood level or the highest known flood
1639 elevation, whichever is higher.

1640
1641 (5.)—The casing and/or well house shall be protected from
1642 entrance by animals.

1643
1644 (VI)—Development.

1645
1646 (1.)—Every well shall be developed to remove the native silts
1647 and clays, drilling mud or finer fraction of the gravel pack. Development shall continue until the
1648 maximum specific capacity is obtained from the completed well.

1649
1650 (2.)—Where chemical conditioning is required, the specifications
1651 shall include provisions for blasting and cleaning. Special attention shall be given to assure that
1652 the grouting and casing are not damaged by the blasting.

1653
1654 (VII)—Capping requirements. A welded metal plate or a threaded cap
1655 shall be used for capping a well. A properly fitted, firmly driven, solid wooden plug may be
1656 used for capping a well until pumping equipment is installed. At all times during the progress of
1657 work, the contractor shall provide protection to prevent tampering with the well or entrance of
1658 surface water or foreign materials.

1659
1660 (D)—Well pumps, discharge piping and appurtenances.

1661
1662 (I)—Line shaft pumps. Wells equipped with line shaft pumps shall
1663 have the casing firmly connected to the pump structure or have the casing inserted into a recess
1664 extending at least 1/2-inch into the pump base, have the pump foundation and base designed to

1665 prevent water from coming into contact with the joint, and avoid the use of oil lubrication at
1666 pump settings less than 400 feet (122 m).

1667
1668 moved to Section 11(e)(xxiii)(II)—Submersible pumps. Where a
1669 submersible pump is used, the top of the casing shall be effectively sealed against the entrance of
1670 water under all conditions of vibration or movement of conductors or cables. The electrical
1671 cable shall be firmly attached to the rise pipe at 20-foot (6.1 m) intervals or less, and the pump
1672 shall be located at a point above the top of the well screen.

1673
1674 (III)—Discharge piping.

1675
1676 (1.)—The discharge piping shall have control valves and
1677 appurtenances located above the wellhouse floor. The piping shall be protected against the
1678 entrance of contamination and be equipped with a check valve, a shutoff valve, a pressure gauge,
1679 a means of measuring flow, and a smooth-nosed sampling tap located at a point where positive
1680 pressure is maintained. Where a submersible pump is used, a check valve shall be located in the
1681 casing in addition to the check valve located above ground to prevent negative pressures on the
1682 discharge piping.

1683
1684 (2.)—For pipes equipped with an air release vacuum relief valve,
1685 the valve shall be located upstream from the check valve, with exhaust/relief piping terminating
1686 in a downturned position at least 18 inches (0.46 m) above the floor and covered with a 24 mesh
1687 corrosion-resistant screen. The discharge piping shall be valved to permit test pumping and
1688 control of each well.

1689
1690 (3.)—All exposed piping, valves and appurtenances shall be
1691 protected against physical damage and freezing.

1692
1693 (4.)—The piping shall be properly anchored to prevent
1694 movement, and shall be protected against surge or water hammer.

1695
1696 (5.)—The discharge piping shall be provided with a means of
1697 pumping to waste, but shall not be directly connected to a sewer.

1698
1699 (moved to Section 11(e)(xxiv))(IV)—Pitless well units. A pitless adaptor
1700 or well house shall be used where needed to protect the water system from freezing. moved to
1701 Section 11(e)(xxiv) A frost pit may be used only in conjunction with a properly protected pitless
1702 adaptor.

1703
1704 (1.)—All pitless units shall be shop fabricated from the point of
1705 connection with the well casing to the unit cap or cover. They shall be threaded or welded to the
1706 well casing, and be of watertight construction throughout. The materials and weight shall be at
1707 least equivalent and compatible to the casing.

1708
1709 (2.)—Pitless units shall have field connection to the lateral
1710 discharge from the pitless unit of threaded, flanged or mechanical joint connection, and the top



1711 of the pitless unit shall terminate at least 18 inches (0.46 m) above final ground elevation or 3
1712 feet above the 100-year flood level or the highest known flood elevation, whichever is higher.

1713
1714 (3.)—Provisions shall be made to disinfect the well. The unit
1715 shall have facilities to measure water levels in the well; a cover at the upper terminal of the well
1716 that will prevent the entrance of contamination; a contamination-proof entrance connection for
1717 electrical cable; an inside diameter as great as that of the well casing, up to and including casing
1718 diameters of 12 inches (30.5 cm), to facilitate work and repair on the well, pump, or well screen;
1719 and at least one check valve within the well casing.

1720
1721 (V)—Casing vent. Provisions shall be made for venting the well casing
1722 to atmosphere. The vent shall terminate in a downturned position, at or above the top of the
1723 casing or pitless unit in a minimum 1 1/2-inch (3.8 cm) diameter opening covered with a 24
1724 mesh corrosion-resistant screen. The pipe connecting the casing to the vent shall be of adequate
1725 size to provide rapid venting of the casing.

1726
1727 (moved to Section 11(e)(xxvi))(vi)—Water level management. Every
1728 well greater than 4 inches (10 cm) in diameter shall be equipped with an access port that will
1729 allow for the measurement of the depth to the water surface; or in the case of a flowing artesian
1730 well, with a pressure gauge that will indicate pressure. An air line used for level measurement
1731 shall be provided on all wells greater than 4 inches (10 cm) in diameter. Installation of water
1732 level measuring equipment shall be made using corrosion-resistant materials attached firmly to
1733 the drop pipe or pump column and in such a manner as to prevent entrance of foreign materials.

1734
1735 (moved to Section 11(e)(xxvii))(VII) Discharge measuring device. Every
1736 well shall be piped so that a device capable of measuring the total well discharge can be placed
1737 in operation at the well for well testing. Every well field (or when only one well is present,
1738 every well) shall have a device capable of measuring the total discharge.

1739
1740 (VIII)—Observation wells. Observation wells shall be constructed in
1741 accordance with the requirements for permanent wells if they are to remain in service after
1742 completion of a water supply well. They shall be protected at the upper terminal to preclude
1743 entrance of foreign materials.

1744
1745 moved to Section 11(e)(xxviii))(IX)—Well abandonment. Test wells and
1746 groundwater sources which are not in use shall be sealed in accordance with requirements of
1747 Chapter 26, Water Quality Rules and Regulations.

1748
1749 moved to Section 11(e)(xxviii))(IX) Wells shall be sealed by filling with neat cement
1750 grout. The filling materials shall be applied to the well hole through a pipe, tremie, or bailer.

1751
1752 (a) 2018 TSS, parts 1.1.1-1.1.2, 1.1.4-1.1.10, and 1.1.17, engineer’s report; 1.1.7.1,
1753 surface water sources; 1.1.7.2(a-g), groundwater sources; 1.1.1.15, pumping facilities; and
1754 1.1.16, storage, are herein incorporated by reference.

1755

Wrong reference #, and why not just specify parts 1.1.15-1.1.17? The specific surface and ground water subsections are included generally under 1.1.7 - why call them out specifically?

1756 ~~(formerly Section 6(a))(b)~~ Scope and purpose. An engineering design report shall be
1757 submitted with each application. ~~The purpose of the report shall be to describe and provide~~
1758 ~~technical justification for all aspects of the proposed construction, modifications and/or~~
1759 ~~installations. The report should address existing conditions (if any), known or suspected~~
1760 ~~problems, proposed actions, and the reasoning used to arrive at those proposed actions. There is~~
1761 ~~no minimum or maximum size for the report, provided it meets the purpose of this section. and~~
1762 shall include:

1763
1764 (i) A description by narrative, analyses, and calculations of the project
1765 purpose and intent in order to support the project plans and specifications;

1766
1767 (ii) A description of known or suspected problems, needs, or requirements,
1768 and the reasoning used to arrive at the proposed solution;

1769
1770 (iii) An identification of problems and solutions related to but not limited to
1771 the following:

1772
1773 (A) Water quantity and/or quality;

1774
1775 (B) Compliance with the Safe Drinking Water Act, 42 U.S.C. §300f et
1776 seq.; and

1777
1778 (C) Operational requirements, redundancy, maintenance, and
1779 reliability.

1780
1781 (iv) A determination of the degree of hazard of all water service connections to
1782 be connected to the proposed project. A hazard classification shall be identified for each
1783 connection and recommended mitigation measures shall be described for each hazard.

1784
1785 ~~(formerly Section 6(b))(c)~~ Water distribution (water works) systems. The engineering
1786 design report for all new water distribution system extensions shall include:

1787
1788 ~~(formerly Section 6(b)(i))(i)~~ (i) A description of the service area including scaled
1789 vicinity plan map(s) of the project with regard to adjacent and proposed development, elevations,
1790 and topographic features.;

1791
1792 ~~(formerly Section 6(b)(ii))(ii)~~ (ii) Current and projected system water demand for
1793 average ~~day~~ daily demand, maximum ~~day~~ daily demand, maximum ~~hour~~ hourly demand, needed
1794 fire flows and per capita maximum daily flows.;

1795
1796 ~~(formerly Section 6(b)(iii))(iii)~~ (iii) Information on fire protection and fire flow
1797 capabilities of the proposed system.; and

1798
1799 ~~(formerly Section 6(b)(iv))(iv)~~ (iv) A ~~D~~description of high service pumping
1800 systems and finished water storage facilities.

1801

1802 ~~(formerly Section 6(e))(d)~~ Treatment facilities. The engineering design report for all
1803 treatment facilities shall include:

1804
1805 ~~(formerly Section 6(e)(i))(i)~~ (i) A description of the facility site and location,
1806 including a scaled site plan, and:

1807
1808 ~~(formerly Section 6(e)(i)(A))(A)~~ (A) Present and projected facility
1809 property boundaries;

1810
1811 ~~(formerly Section 6(e)(i)(B))(B)~~ (B) Flood protection indicating predicted
1812 elevation of 25- and 100-year flood stages. ~~The facility shall be protected from damage and be~~
1813 ~~capable of being operated during the 100-year flood or maximum flood of record, whichever is~~
1814 ~~greater. Flooding resulting from ice jams shall be considered.~~

1815
1816 ~~(formerly Section 6(e)(i)(C))(C)~~ (C) Present and proposed access. ~~for the~~
1817 purpose of operation, maintenance, and compliance inspection;

1818
1819 ~~(formerly Section 6(e)(i)(D))(D)~~ (D) Distances from: ~~current habitation,~~
1820 ~~the closest major treated water transmission line, the closest treated water storage facility, and~~
1821 ~~the water source.~~

1822
1823 ~~(formerly Section 6(e)(i)(D))(I)~~ (I) ~~e~~Current habitation;

1824
1825 ~~(formerly Section 6(e)(i)(D))(II)~~ (II) ~~t~~The closest major treated
1826 water transmission line;

1827
1828 ~~(formerly Section 6(e)(i)(D))(III)~~ (III) ~~t~~The closest treated water
1829 storage facility; and

1830
1831 ~~(formerly Section 6(e)(i)(D))(IV)~~ (IV) ~~t~~The water source.

1832
1833 ~~(formerly Section 6(e)(i)(E))(E)~~ (E) Fencing and/or security;

1834
1835 ~~(formerly Section 6(e)(i)(F))(F)~~ (F) Topographic features and contours
1836 with indicated datum; and

1837
1838 ~~(formerly Section 6(e)(i)(G))(G)~~ (G) Soil and subsurface geological
1839 characteristics; including ~~Provide~~ a soils investigation report of the proposed site suitable for
1840 structural design of the proposed facilities.

1841
1842 ~~(formerly Section 6(e)(ii))(ii)~~ (ii) A ~~detailed~~ description of the service area, for the
1843 project including a scaled vicinity plan ~~showing land use and boundaries~~ map(s) of the project
1844 with regard to adjacent and proposed development, elevations, and topographic features .

1845
1846 ~~(formerly Section 6(e)(iii))(iii)~~ (iii) A detailed description of the recycle flows
1847 and procedures for reclamation of recycle streams.

1848
1849 ~~(formerly Section 6(e)(iv))(iv)~~ A detailed description of disposal techniques
1850 for settled solids, including a description of the ultimate disposal of sludge.

1851
1852 ~~(formerly Section 6(e)(v)(B))(e)~~ Engineering design reports for new Ssurface water
1853 sources shall include:

1854
1855 ~~(formerly Section 6(e)(v)(B)(I))(i)~~ Safe annual yield, A description of the
1856 quantity of water quantity available ~~from the source~~ during ~~the~~ average and driest years of
1857 record: that contains:

1858
1859 ~~(formerly Section 6(e)(v)(B)(II))(A)~~ Hydrological data, stream flows and
1860 The description shall include any diversion records; and

1861
1862 ~~(formerly Section 6(e)(v)(B)(VI))(B)~~ The Ddescription shall include of
1863 any diversion dams, impoundments or reservoirs ~~and appurtenances that may impact design~~
1864 considerations or long-term water availability.

1865
1866 ~~(formerly Section 6(e)(v)(B)(III))(ii)~~ A tabulation of Representative water quality
1867 data; that describes the including bacteriological biological, radiological, and chemical and
1868 physical data. water quality ~~These data shall be~~ sufficient to determine ~~the~~ necessary treatment
1869 processes and the ability to meet water quality standards.

1870
1871 (A) Surface water source testing shall include at least one sampling
1872 event during spring runoff and at least one sampling event during late summer or early fall low
1873 flow.

1874
1875 (B) The data shall be sufficient for the Division to determine that the
1876 processes safely and reliably comply with water quality standards required by 40 CFR Part 141.

1877
1878
1879 ~~(formerly Section 6(e)(v)(A))(f)~~ Engineering design reports for new Ggroundwater
1880 sources shall include:

1881
1882 ~~(formerly Section 6(e)(v)(A)(I))(i)~~ A description of the Ggeology of the
1883 aquifer(s) and overlying strata; and

1884
1885 ~~(formerly Section 6(e)(v)(A)(II))(ii)~~ Tabulated Wwater quality; testing data
1886 including for biological, radiological and chemical water quality data sufficient to determine
1887 necessary treatment processes. ~~and compliance with all drinking water standards as determined~~
1888 ~~by the administrator. The same water quality data for all secondary sources shall also be~~
1889 ~~provided.~~ This data shall be sufficient for the Administrator to determine that the processes safely
1890 and reliably meet water quality standards required by 40 CFR Part 141.

1891
1892 (ii) A summary of the likely drilling and completion challenges that will be
1893 faced, including a description of the engineering design, management, monitoring, and drilling

1894 and completion practices that will be used to successfully construct the well in accordance with
1895 this Chapter.

1896
1897 (iii) For wells that will be drilled through multiple aquifers, applicants shall
1898 request a pre-application meeting with the Division to discuss:

1899
1900 (A) The boring advancement, well sealing, well development, and
1901 methods used to determine the adequacy of the well seal; and

1902
1903 (B) The methods that will be used to overcome lost circulation, bore
1904 instability, and deviations from vertical alignment.

1905
1906 (g) Engineering design reports for conversion of an existing well into a public water
1907 supply well shall include:

1908
1909 (i) The information required in paragraph (e) of this Section.

1910
1911 (ii) A recording of a narrated video of the well accompanied by a written
1912 description of the location, shape, and estimated size of any holes, breaches, corroded areas in
1913 the casing, if any.

1914
1915 (A) If any damage to the casing is found, the applicant shall describe
1916 how defective areas will be repaired and if there is a need for additional well bond logging.

1917
1918 (B) If well bond logging is not recommended, the applicant shall
1919 provide technical justification and an alternative means of certifying the adequacy of the well
1920 seal to protect the water source.

1921
1922 (iii) The submission of the State Engineer's Office (SEO) Statement of
1923 Completion and Description of Well.

1924
1925 (h) Engineering design reports for new water treatment facilities shall include:

1926
1927 (i) A description of all water treatment chemical requirements, including
1928 dosage and feed rates, delivery, handling, and storage;

1929
1930 (ii) A description of automatic operation and control systems, including basic
1931 operation, manual override operation, and maintenance requirements; and

1932
1933 (iii) A description of the on-site laboratory facilities and a summary of those
1934 tests to be conducted on-site. If no on-site laboratory is provided, a description of plant control
1935 and water quality testing requirements, and where the testing will be conducted shall be included.

1936
1937 (i) Engineering design reports for water treatment facility modifications shall
1938 describe:

1939



- 1940 (i) The purpose of the facility modification;
1941
1942 (ii) All proposed new equipment, tankage, and chemical treatment processes,
1943 including a description of the modification(s) effect on treatment system reliability, water
1944 quantity and quality; and
1945
1946 (iii) A listing of the new equipment design criteria and the associated
1947 chemicals.
1948
1949 (j) Engineering design reports for water main upsizing or looping projects shall
1950 describe the purpose of the water main upsizing or looping project and shall include:
1951
1952 (A) Hydraulic analysis that demonstrates how peak hour, average day,
1953 maximum day, and maximum day plus fire flows will be improved by upsizing; and
1954
1955 (B) A table that summarizes the hydraulic model results.
1956
1957 (k) Engineering design reports for water main removal and replacements shall
1958 describe the purpose of the replacement and identify the existing main size, material type, and
1959 condition, and shall include:
1960
1961 (A) For any main replacement(s), the replacement main size, material type,
1962 and dimension ratio;
1963
1964 (B) For projects that consist of main replacements in multiple discrete
1965 locations, an aerial image that shows all replacement pipeline segments, including new valves,
1966 with called-out pipe diameters and lengths;
1967
1968 (C) A description of the protective measures that will be taken at locations
1969 where the new water main will cross a sewer or storm sewer when standard horizontal and
1970 vertical separations cannot be met; and
1971
1972 (D) For projects where asbestos cement may be encountered, a discussion of
1973 the disposal, or abandonment method to be used.
1974
1975 (l) Engineering design reports for new water mains shall describe the purpose of the
1976 new water main. If the water main will provide service to a new development:
1977
1978 (i) The modeling result from a hydraulic analysis that demonstrates that at
1979 maximum day demand plus current State of Wyoming-required fire flow, or the fire flow of an
1980 authority having jurisdiction, the pressure in the municipal distribution system will not fall below
1981 20 pounds per square inch (psi).
1982
1983 (ii) The hydraulic model shall:
1984
1985 (A) Be calibrated based on fire hydrant test flow data; and

What if looping is proposed simply as a measure of redundancy?

1986
1987 (B) Identify any impacts the new fire flow demand will have on
1988 finished storage and pumping systems over the required fire flow duration;

1989
1990 (iii) The normal system working pressure shall be greater than 35 psi.

1991
1992 **Section 10. ~~Treatment~~ Design Requirements for Preliminary Treatment and**
1993 **Redundancy.**

1994
1995 ~~(moved to Section 12(b))(a) Design capacity. The capacity of the water treatment or~~
1996 ~~water production system shall be designed for the maximum daily demand at the design year.~~

1997
1998 ~~(moved to Section 12(b)(i))(b) Presedimentation. Raw waters which have~~
1999 ~~episodes of turbidity in excess of 1,000 TU for a period of one week or longer shall be presettled.~~

2000
2001 ~~(moved to Section 12(b)(ii))(i) Detention time. Basins without mechanical~~
2002 ~~sludge collection equipment shall have a minimum detention time of three days. Basins with~~
2003 ~~mechanical sludge collection equipment shall have a minimum detention time of three hours.~~

2004
2005 ~~(ii) Inlet. Inlet flow shall be evenly dispersed along the inlet of the basin.~~

2006
2007 ~~(moved to Section 12(b)(iv))(iii) Drains. Basins shall have a minimum of one~~
2008 ~~8-inch (20 cm) drain line to completely dewater the facility.~~

2009
2010 ~~(moved to Section 12(b)(iii))(iv) Bottom slope. Basins shall have a bottom~~
2011 ~~slope to drain of 1/4 inch per foot (20 mm/m) without mechanical sludge collection equipment~~
2012 ~~and 2 inches per foot (16 cm/m) with mechanical sludge collection equipment.~~

2013
2014 ~~(v) Bypass. Basin bypass provisions shall be included in the process piping.~~

2015
2016 ~~(moved to Section 12(c))(c) Rapid mix. Rapid dispersal of chemicals throughout the~~
2017 ~~water shall be accomplished by mechanical mixers, jet mixers, static mixers, or hydraulic jump.~~

2018
2019 ~~(moved to Section 12(c)(i))(i) Mixing intensity. For mechanical mixers, the~~
2020 ~~minimum Gt (velocity gradient (sec⁻¹) x t (sec)) provided at maximum daily flow shall be~~
2021 ~~27,000.~~

2022
2023 ~~(moved to Section 12(c)(ii))(ii) Mixing time. The detention time in a flash~~
2024 ~~mixing chamber shall not exceed 30 seconds at maximum daily flow conditions.~~

2025
2026 ~~(moved to Section 12(c)(iii))(iii) Drain. The basin shall have a drain.~~

2027
2028 ~~(moved to Section 12(d)(i))(d) Flocculation. The low velocity agitation of~~
2029 ~~chemically treated water shall be accomplished by mechanical flocculators.~~

2030

2031 ~~(moved to Section 12(d)(ii))(i) — Detention time. A minimum of 10 minutes~~
2032 ~~detention time shall be provided.~~

2033
2034 ~~(moved to Section 12(d)(iv))(ii) — Mixing intensity. The velocity gradient (G~~
2035 ~~value) imposed shall be adjustable by providing variable speed drives or shall be designed to be~~
2036 ~~30 sec⁻¹ if a single basin is provided, 20 sec⁻¹ in the final basin of a two stage system, and 10~~
2037 ~~sec⁻¹ in the final basin of a three stage system. For a single speed drive system, the tip speed of~~
2038 ~~the mixer shall not exceed 3 feet per second (0.91 m/sec). Variable speed drives shall provide tip~~
2039 ~~speeds of 0.5 to 3.0 feet per second (0.15-0.91 m/sec).~~

2040
2041 ~~(moved to Section 12(d)(iii))(iii) — Drains. Flocculation basins shall have a~~
2042 ~~minimum of one drain line to dewater the facility.~~

2043
2044 ~~(moved to Section 12(d)(vi))(iv) — Piping. The velocity of flocculated water~~
2045 ~~through pipes or conduits to settling basins shall not be less than 0.5 or greater than 1.5 feet per~~
2046 ~~second (0.15-0.46 m/sec).~~

2047
2048 ~~(moved to Section 12(e))(e) — Sedimentation basins.~~

2049
2050 ~~(moved to Section 12(e)(i))(i) Diameter. The maximum diameter in circular basins~~
2051 ~~shall be 80 feet.~~

2052
2053 ~~(moved to Section 12(e)(v))(ii) — Overflow rate. The basin overflow rate shall~~
2054 ~~not exceed 1,000 gpd/ft² (41 m³/m²d) at design conditions.~~

2055
2056 ~~(iii) — Weir loading rate. Weir loading rates shall not exceed 20,000 gpd/ft (2480~~
2057 ~~m³/md) of length. The weir length shall be computed as the length of the centerline of the~~
2058 ~~launder. Where the weir is located at 3/4 the radius, the weir may be loaded at 36,000 gpd/ft~~
2059 ~~(4464 m³/m·d).~~

2060
2061 ~~(moved to Section 12(e)(ii))(iv) — Side water depth. The minimum basin side~~
2062 ~~water depth shall be 8 feet (2.43 m) if mechanical sludge collection equipment is provided or~~
2063 ~~basins or basin sludge hopper segments are less than 100 square feet (9.3 m²) in surface area and~~
2064 ~~15 feet (4.6 m) if basins are manually cleaned. Mechanical sludge collection equipment includes~~
2065 ~~mechanically driven drives that use scrapers or differential water level to collect the sludge.~~

2066
2067 ~~(moved to Section 12(e)(iii))(v) — Freeboard. The outer walls of settling basins~~
2068 ~~shall extend at least 12 inches (30.5 cm) above the surrounding ground and provide at least 12~~
2069 ~~inches (30.5 cm) of freeboard to the water surface. Where basin walls are less than 4 feet (1.22~~
2070 ~~m) above the surrounding ground, a fence or other debris barrier shall be provided on the wall.~~

2071
2072 ~~(vi) — Inlet devices. Inlets shall be designed to distribute the water equally and at~~
2073 ~~uniform velocities. Open ports, submerged ports, and similar entrance arrangements are required.~~
2074 ~~A baffle should be constructed across the basin close to the inlet end and should project several~~
2075 ~~feet below the water surface to dissipate inlet velocities and provide uniform flows across the~~
2076 ~~basin.~~

2077
2078 (vii) ~~—Velocity. The velocity through settling basins shall not exceed 0.5 feet per~~
2079 ~~minute (0.15 m/min). The basins must be designed to minimize short-circuiting.~~

2080
2081 (moved to Section 12(e)(vi))(viii) ~~—Sludge collection. If settleable organics are~~
2082 ~~present in the water or if there is a history of organically related taste and odor problems,~~
2083 ~~mechanical sludge collection shall be provided.~~

2084
2085 (moved to Section 12(e)(vii))(ix) ~~—Sludge removal. Sludge removal design~~
2086 ~~shall provide that sludge pipes shall be not less than 6 inches (15.2 cm) in diameter and arranged~~
2087 ~~to facilitate cleaning. Valves on the sludge line shall be located outside the tank.~~

2088
2089 (x) ~~—Flushing lines. Flushing lines or hydrants shall be provided near the~~
2090 ~~basins.~~

2091
2092 (moved to Section 12(e)(iv))(xi) ~~—Drainage. Basin bottoms shall slope toward~~
2093 ~~the drain at not less than 1 inch per foot (8 cm/m) where mechanical sludge collection equipment~~
2094 ~~is provided and 1/4 inch per foot (2 cm/m) where no mechanical sludge collection equipment is~~
2095 ~~provided.~~

2096
2097 (moved to Section 12(f))(f) ~~—Softening sedimentation—clarification. Conventional~~
2098 ~~sedimentation—clarification as described above shall be provided in softening operations, except~~
2099 ~~for softening a groundwater supply of constant quality. Where a groundwater supply is softened,~~
2100 ~~the requirements may be modified as follows:~~

2101
2102 (moved to Section 12(f)(i))(i) ~~Overflow rate. The basin overflow rate at the design~~
2103 ~~flow shall not exceed 2,100 gpd/ft² (86 m³/m²·d).~~

2104
2105 (moved to Section 12(f)(ii))(ii) ~~—Sludge. Mechanical sludge removal shall be~~
2106 ~~provided and shall be designed to handle a load of 40 lbs/foot (60 kg/m) of collector scraper arm~~
2107 ~~length.~~

2108
2109 (iii) ~~—Other design considerations shall be the same as conventional~~
2110 ~~sedimentation—clarification.~~

2111
2112 (moved to Section 12(g))(g) ~~—Solids contact units. These treatment units are acceptable~~
2113 ~~for combined softening and clarification of well water where water quality characteristics are not~~
2114 ~~variable and flow rates are uniform. The units shall be designed to meet the criteria detailed~~
2115 ~~previously.~~

2116
2117 (moved to Section 12(g)(i))(i) ~~Such units may be considered for use as clarifiers~~
2118 ~~without softening when they are designed to meet the criteria detailed in the conventional~~
2119 ~~sedimentation—clarification.~~

2120
2121 (moved to Section 12(g)(ii))(ii) ~~—These units may also be used for other~~
2122 ~~treatment purposes, such as rapid mixing, flocculation, etc., when the individual components of~~

2123 ~~the solids contact units are designed in accordance with the design criteria for that individual~~
2124 ~~treatment process as described above.~~

2125
2126 ~~(moved to Section 12(h))(h) Settling tube clarifiers. Shallow depth sedimentation~~
2127 ~~devices or tube clarifier systems of the essentially horizontal or steeply inclined types may be~~
2128 ~~used when designed as follows:~~

2129
2130 ~~(moved to Section 12(h)(iii))(i) Sludge removal. Sludge shall be removed~~
2131 ~~using 45 or steeper hopped bottoms, or mechanical devices that move the sludge to hoppers, or~~
2132 ~~devices that remove settled sludge from the basin floor using differential hydraulic level.~~

2133
2134 ~~(moved to Section 12(h)(iv))(ii) Tube cleaning. A method of tube cleaning~~
2135 ~~shall be provided. This may include a provision for obtaining a rapid reduction in clarifier water~~
2136 ~~surface elevation, a water jet spray system, or an air scour system. Where cleaning is automatic,~~
2137 ~~controls shall be provided to cease clarifier operation during tube cleaning and a 20 minute rest~~
2138 ~~period.~~

2139
2140 ~~(moved to Section 12(h)(ii))(iii) Tube placement. Tops of tubes shall be more~~
2141 ~~than 12 inches (0.3 m) from the underside of the launder and more than 18 inches (0.46 m) from~~
2142 ~~the water surface.~~

2143
2144 ~~(moved to Section 12(h)(i))(iv) Loading rates. The maximum overflow rate~~
2145 ~~shall be less than 2.0 gpm/sq ft (62.7 m³/m²·d) based on the surface area of the basin covered by~~
2146 ~~the tubes.~~

2147
2148 ~~(moved to Section 12(h)(ii))(v) Effluent launderers. The spacing between~~
2149 ~~effluent launderers shall not exceed three times the distance from the water surface to the top of~~
2150 ~~the tube modules.~~

2151
2152 ~~(moved to Section 12(i))(i) Filtration.~~

2153
2154 ~~(moved to Section 12(i)(i))(i) Pressure granular media filters. Vertical or~~
2155 ~~horizontal pressure filters shall not be used for filtration of surface waters. Pressure filters may~~
2156 ~~be used for groundwater filtration, including iron and manganese removal.~~

2157
2158 ~~(ii) Gravity filters.~~

2159
2160 ~~(moved to Section 12(ii))(A) Slow rate sand filters. These types of filters~~
2161 ~~may be used when maximum raw water turbidity is less than 50 TUs and the turbidity present is~~
2162 ~~not attributable to colloidal clay. Maximum color shall not exceed 30 units.~~

2163
2164 ~~(1) Loading rates. The allowable loading rates at maximum~~
2165 ~~daily demands shall not exceed 0.1 gpm/ft² (5.9 m³/m²·d) unless satisfactory pilot testing is~~
2166 ~~completed prior to design which shows a higher rate is appropriate.~~

2167

2168 (H)——Number of filters. At least two units shall be provided.
2169 Where only two units are provided, each shall be capable of meeting the plant design capacity at
2170 the maximum filtration rate. Where more than two filter units are provided, the filters shall be
2171 capable of meeting the plant design at the maximum filtration rate with one filter removed from
2172 service.

2173
2174 (III)——Underdrains. Each filter unit shall be equipped with a main
2175 drain and an adequate number of lateral underdrains to collect the filtered water. The underdrains
2176 shall be so spaced that the maximum velocity of the water flow in the lateral underdrain will not
2177 exceed 0.75 feet per second (0.22 m/sec). The maximum spacing of the laterals shall not exceed
2178 12 feet (3.7 m).

2179
2180 (IV)——Filter material. Filter sand shall be placed on graded gravel
2181 layers for a minimum sand depth of 30 inches (0.76 m). The effective size shall be between 0.15
2182 mm and 0.35 mm. The uniformity coefficient shall not exceed 2.0. The sand shall be clean and
2183 free from foreign matter. The supporting gravel shall conform to the size and depth distribution
2184 provided for rapid rate gravity filters.

2185
2186 (V)——Depth of water on filter beds. Design shall provide a depth
2187 of at least 3 feet (0.91 m) of water over the sand. Influent water shall enter the water surface at a
2188 velocity of less than 2 feet per second (0.61 m/sec). An overflow shall be provided at the
2189 maximum water surface elevation.

2190
2191 (VI)——Appurtenances. Each filter shall be equipped with loss of
2192 head gauge; an orifice, Venturi meter, or other suitable metering device installed on each filter to
2193 control the rate of filtration; and an effluent pipe designed to maintain the water level above the
2194 top of the filter sand.

2195
2196 (VII)——Covers. When covers are provided for temperature or
2197 sunlight control, they shall be designed to allow adequate headroom above the top of the sand
2198 and adequate access ports or manholes.

2199
2200 (B)——Rapid rate filters.

2201
2202 (I)——Loading rates. The maximum allowable loading rates at
2203 maximum daily demands shall not exceed 3 gpm/ft² (177 m³/m²·d) for single media filters or 5
2204 gpm/ft² (295 m³/m²·d) for dual or mixed media filters. Each filter shall have a rate limiting
2205 device to prevent the filter from exceeding the maximum rate.

2206
2207 (II)——Filter compartment design. The filter media compartment
2208 shall be constructed of durable material not subject to corrosion or decay and structurally capable
2209 of supporting the loads to which it will be subjected.

2210
2211 (1.)——There shall be an atmospheric break between
2212 filtered and non-filtered water, accomplished by double wall construction.

2213

2214 (2.)—The compartment walls shall be vertical and shall
2215 not protrude into the filter media.

2216
2217 (3.)—There shall be a minimum of 2½ feet (0.76 m) of
2218 headroom above the top of the filter compartment walls.

2219
2220 (4.)—Neither floor nor roof drainage shall enter the filter.
2221 If the top of the filter compartment is at floor level, a minimum 4 inch curb shall be constructed
2222 around the box.

2223
2224 (5.)—Walkways or observation platforms shall be
2225 provided for each filter compartment. Walk ways around the filter shall be a minimum of 24
2226 inches wide.

2227
2228 (6.)—Effluent line shall be trapped or submerged below
2229 the low water level in the clearwell to prevent air from entering the filter bottom. The velocity in
2230 the filter influent line shall not exceed 4 feet per second (1.2 m/sec). An overflow from the
2231 influent of the filter compartment shall be provided.

2232
2233 (7.)—The distance between the operating water level in
2234 the filter and the high water level in the clearwell or effluent trap shall be 10 feet (3.05 m)
2235 minimum. The minimum operating water level over the media shall be 3 feet (0.91 m), and the
2236 minimum depth of the filter box shall be 8-1/2 feet (2.6 m).

2237
2238 (III)—Washwater troughs. (moved to Section 12(i)(ii)(A)) Washwater
2239 troughs shall be constructed to provide for not more than 6 feet (1.8 m) clear distance between
2240 troughs. The troughs shall not cover more than 25 percent of filter area.

2241
2242 (moved to Section 12(i)(ii)(B))(1.)—Minimum clearance
2243 between the bottom of trough and top of unexpanded media shall be 12 inches (30.5 cm).

2244
2245 (moved to Section 12(i)(ii)(C))(2.)—Minimum distance
2246 between the weir of the trough and the unexpanded media shall be 30 inches (0.76 m).

2247
2248 (moved to Section 12(i)(ii)(E))(3.)—The trough and
2249 washwater waste line shall be sized to carry a filter backwash rate of 20 gpm/ft² (1181 m³/m²·d)
2250 plus a surface wash rate of 2.0 gpm/ft² (118 m³/m²·d).

2251
2252 (IV)—Backwash system.

2253
2254 (moved to Section 12(i)(ii)(F))(1.)—The backwash system shall
2255 be sized to provide a minimum backwash flow rate of 20 gpm/ft² (1181 m³/m²·d). Washwater
2256 storage shall be designed to provide two 20 minute washes in rapid succession. Where multiple
2257 units are not required and only one filter compartment is present, backwash storage capabilities
2258 may be reduced to provide one 20 minute backwash. Where pumps are used to provide backwash
2259 to the filter or to supply water to a washwater tank, the washwater pumps shall be in duplicate.

2260
2261 ~~(moved to Section 12(i)(ii)(H))(2.)—The backwash and~~
2262 ~~surface wash washwater supply shall be filtered and disinfected.~~

2263
2264 ~~(moved to Section 12(i)(ii)(I))(3.)—Washwater rate shall~~
2265 ~~be controlled by a separate valve, manual or automatic, on the main washwater line. Washwater~~
2266 ~~flow rates shall be metered and indicated.~~

2267
2268 ~~(moved to Section 12(i)(ii)(J))(4.)—Air-assisted backwash~~
2269 ~~systems may be used when the design precludes disturbing the gravel support.~~

2270
2271 ~~(moved to Section 12(i)(ii)(K))(5.)—A surface wash~~
2272 ~~system shall be provided. The system shall be capable of supplying 0.5 gpm/ft² (29.5 m³/m²·d)~~
2273 ~~for system with rotating arms and 2.0 gpm/ft² (118 m³/m²·d) with fixed nozzles, at a minimum~~
2274 ~~pressure of 50 psi (344 kPa). The surface wash shall use filtered and disinfected water or air and~~
2275 ~~filtered disinfected water. The supply system shall be provided with adequate backflow~~
2276 ~~prevention.~~

2277
2278 ~~(V)———Filter materials. For rapid rate filters, coarse to fine beds of~~
2279 ~~mixed or dual media or fine to coarse single media beds may be used.~~

2280
2281 ~~1.——Types of filter media:~~

2282 ~~a.~~
2283 ~~a.——Anthracite. Clean crushed anthracite, or a~~
2284 ~~combination of anthracite and other media shall have an effective size of 0.45 mm—0.55 mm~~
2285 ~~with uniformity coefficient not greater than 1.65 when used alone, or an effective size of 0.8 mm~~
2286 ~~—1.2 mm with a uniformity coefficient not greater than 1.65 when used as a cap. The anthracite~~
2287 ~~shall meet the requirements of AWWA B100.~~

2288
2289 ~~b.——Sand. Sand shall have an effective size of~~
2290 ~~0.45 mm to 0.55 mm, a uniformity coefficient of not greater than 1.65, and shall meet the~~
2291 ~~requirements of AWWA B100.~~

2292
2293 ~~(c.)——Granular activated carbon (GAC). Granular~~
2294 ~~activated carbon media may be used in place of anthracite. There must be means for periodic~~
2295 ~~treatment of granular activated carbon filter material for control of bacterial and other growths.~~
2296 ~~Provisions must be made for replacement or regeneration if GAC is used for filtration.~~

2297
2298 ~~(d.)——Torpedo sand or garnet. A layer of torpedo~~
2299 ~~sand or garnet shall be used as a supporting media for filter sand.~~

2300
2301 ~~2.——Sand for single media beds. The media shall be~~
2302 ~~clean silica sand having a depth of not less than 24 inches (0.61 m), an effective size of from~~
2303 ~~0.45 mm to 0.55 mm, and a uniformity coefficient not greater than 1.65. A 3 inch (7.6 cm) layer~~
2304 ~~of torpedo sand or other high density material shall be used as a supporting media for the filter~~

2305 ~~sand. The material shall have an effective size of 0.8 mm to 2.0 mm, and a uniformity coefficient~~
2306 ~~not greater than 1.7.~~

2307
2308 ~~(moved to Section 12(i)(iii)) 3. Anthracite for single~~
2309 ~~media beds. Clean crushed anthracite or a combination of sand and anthracite may be used. Such~~
2310 ~~media shall have an effective size from 0.45 mm to 0.55 mm, and a uniformity coefficient not~~
2311 ~~greater than 1.65.~~

2312
2313 ~~(moved to Section 12(i)(iii)(A)) 4. Gravel. When used as a~~
2314 ~~supporting media, gravel shall consist of coarse aggregate in which a high proportion of the~~
2315 ~~particles are rounded and tend toward a generally spherical or equidimensional shape. (moved to~~
2316 ~~It shall possess sufficient strength and hardness to resist degradation during handling and use, be~~
2317 ~~substantially free of harmful materials, and exceed the minimum density requirement. The gravel~~
2318 ~~shall meet the requirements of~~
2319 ~~AWWA B100.~~

2320
2321 ~~(moved to Section 12(i)(ix)) 5. Multi-media. Filter beds of~~
2322 ~~this type shall contain a depth of fine media made up of anthracite coal, specific gravity 1.5;~~
2323 ~~silica sand, specific gravity 2.6; and garnet sand or ilomite, specific gravity 4.2—4.5.~~

2324
2325 ~~(moved to Section 12(i)(ix)(A)) a. Bed~~
2326 ~~depths and distribution of the media shall be determined by the water quality, but shall not be~~
2327 ~~less than 10 inches (0.25 m) of fine sand and 24 inches (0.61 m) of coal. The relative size of the~~
2328 ~~particles shall be such that hydraulic grading of the material during backwash will result in a~~
2329 ~~filter bed with pore space graded progressively from coarse to fine in the direction of filtration~~
2330 ~~(down).~~

2331
2332 ~~(moved to Section 12(i)(ix)(B)) b. The multi-~~
2333 ~~media shall be supported on two layers of special high density gravel placed above the~~
2334 ~~conventional silica gravel supporting bed. The special gravel shall have a specific gravity not~~
2335 ~~less than 4.2. The bottom layer shall consist of particles passing No. 5 and retained on No. 12~~
2336 ~~U.S. mesh sieves and shall be 1-1/2 inches (3.8 cm) thick. The top layer shall consist of particles~~
2337 ~~passing No. 12 and retained on No. 20 U.S. mesh sieves, and shall be 1-1/2 inches (3.8 cm)~~
2338 ~~thick.~~

2339
2340 ~~(moved to Section 12(i)(iv)) 6. Dual media. Coal sand filters~~
2341 ~~shall consist of a coarse coal layer above a layer of fine sand. The media shall consist of not less~~
2342 ~~than 8 inches (20 cm) of sand and 15 inches (0.38 m) of coal on a torpedo sand or garnet layer~~
2343 ~~support of not less than 3 inches (7.8 cm) on the gravel support.~~

2344
2345 ~~(moved to Section 12(i)(v))(VI) Filter bottoms. Acceptable~~
2346 ~~filter bottoms and strainer systems shall be limited to pipe, perforated pipe laterals, tile block and~~
2347 ~~perforated tile block. Perforated plate bottoms or plastic nozzles shall not be used.~~

2348
2349 ~~(moved to Section 12(i)(vi))(VII) Appurtenances. Every filter~~
2350 ~~shall have influent and effluent sampling taps; indicating loss of head gauge; indicating effluent~~

2351 turbidimeter; a waste drain for draining the filter compartment to waste; and a filter rate flow
2352 meter. Every filter shall provide polymer feed facilities including polymer mixing and storage
2353 tank and at least one feed pump for each filter compartment. On plants having a capacity in
2354 excess of 0.5 MGD, recorders shall be provided on the turbidimeters.

2355
2356 (moved to Section 12(i)(vii))(VIII) Filter rate control. Filter rate
2357 control shall be such that the filter is not surged. Filter rate of flow shall not change at a rate
2358 greater than 0.3 gpm/ft² (17.7 m³/m²·d) per minute. Filters that stop and restart during a cycle
2359 shall have a filter to waste system installed. Declining flow rate filters shall not be used unless
2360 the flow rate for each filter is controlled to rates less than allowed in 10 (i)(ii)(B) and there are
2361 four or more individual filters.

2362
2363 (moved to Section 12(i)(viii))(IX) — A filter to waste cycle shall
2364 be provided after the filter backwash operation. The filter to waste cycle shall be at least 10
2365 minutes.

2366
2367 (moved to Section 12(i)(x))(j) — Diatomaceous earth filtration. These types of filters
2368 may be used as the filtration process to remove turbidity from surface waters where turbidities
2369 entering the filters do not exceed 25 TU and where total raw water coliforms do not exceed 100
2370 organisms/100 ml. These filters may be used where the raw water quality exceeds the above
2371 limits when flocculation and sedimentation are used preceding the filters. Diatomaceous earth
2372 filters may also be used for removal of iron from groundwaters.

2373
2374 (moved to Section 12(i)(x)(B))(i) — Types of filters. Pressure or vacuum
2375 diatomaceous earth filtration units will be considered for approval.

2376
2377 (moved to Section 12(i)(ix)(C))(ii) — Precoat. A precoating system shall be
2378 provided.

2379
2380 (A) — A uniform precoat shall be applied hydraulically to each septum by
2381 introducing a precoat slurry to the filter influent line and employing a filter to waste or
2382 recirculation system.

2383
2384 (B) — Feed capabilities. Diatomaceous earth in the amount of 0.20 lb/ft²
2385 (1 Kg/m²) minimum of filter area shall be used with recirculation. When precoating is
2386 accomplished with a filter to waste system, 0.3 lbs/ft² (1.5 Kg/m²) minimum shall be provided.

2387
2388 (iii) — Body feed. A body feed system to apply diatomaceous earth slurry
2389 continuously during the filter run shall be provided. Continuous mixing of the body feed slurry
2390 tank during the filter cycle shall be provided.

2391
2392 (iv) — Filtration.

2393
2394 (A) — Rate of filtration. The maximum rate of filtration shall not exceed
2395 1.5 gpm/ft² (88.6 m³/m²·d) of septum area. The filtration rate shall be controlled by a positive
2396 means.

2397
2398
2399
2400
2401
2402
2403
2404
2405
2406
2407
2408
2409
2410
2411
2412
2413
2414
2415
2416
2417
2418
2419
2420
2421
2422
2423
2424
2425
2426
2427
2428
2429
2430
2431
2432
2433
2434
2435
2436
2437
2438
2439
2440
2441

~~(B) — Head loss. The head loss shall not exceed 30 psi (206 kPa) for pressure diatomaceous earth filters, or a vacuum of 15 inches of mercury (50.8 kPa) for vacuum system.~~

~~(C) — Recirculation. A recirculation or holding pump shall be provided to maintain differential pressure across the filter when the unit is not in operation in order to prevent the filter cake from dropping off the filter elements. A minimum recirculation rate of 0.1 gallons per minute per square foot (5.9 m³/m²·d) of filter area shall be provided. The filter control system shall prevent automatic restart after power failure.~~

~~(D) — Septum or filter element. The filter elements shall be structurally capable of withstanding maximum pressure and velocity variations during filtration and cleaning cycles, and shall be spaced so that not less than 2 inches (5.1 cm) are provided between elements or between any element and a wall.~~

~~(E) — Inlet design. The filter influent shall be designed to prevent scour of the diatomaceous earth from the filter element.~~

~~(v) — Appurtenances. Every filter shall provide sampling taps for raw and filtered water; loss of head or differential pressure gauge; rate of flow indicator, with totalizer; and a throttling valve used to reduce rates during adverse raw water conditions.~~

~~(vi) — Monitoring. A continuous monitoring turbidimeter is required on the filter effluent from each filter unit for plants treating surface water.~~

~~(moved to Section 12(j))(k) — Disinfection. Chlorine, chlorine dioxide, ozone or other disinfectant as approved by the administrator may be used for disinfection. Where the primary disinfectant is ozone, chlorination equipment shall be provided to enable maintaining a residual disinfectant throughout the distribution system. Automatic proportioning of disinfectant feed to flow rate is required where the plant flow control is automatic.~~

~~(moved to Section 12(j)(i))(i) Chlorination equipment.~~

~~(moved to Section 12(j)(i)(A))(A) — Type. Solution feed gas chlorinators or hypochlorite feeders of the positive displacement type shall be provided.~~

~~(B) — Capacity. The chlorinator capacity shall be such that a minimum 5 mg/L disinfection dose can be added on the maximum day. The equipment shall be of such design that it will operate accurately over the desired feeding range.~~

~~(moved to Section 12(j)(i)(D))(C) — Standby equipment. Standby equipment of sufficient capacity shall be available to replace the largest chlorinator unit, except for a well water system providing no treatment other than disinfection.~~

2442 ~~(D) Automatic switchover. Automatic switch-over of chlorine~~
2443 ~~cylinders shall be provided.~~

2444
2445 ~~(moved to Section 12(j)(i)(B))(E) Diffuser. The chlorine solution~~
2446 ~~injection/diffuser shall provide a rapid and thorough mix with all the water being treated. If the~~
2447 ~~application point is to a pipeline discharging to a clearwell, the chlorine shall be added to the~~
2448 ~~center of the pipe at least 10 pipe diameters upstream of the discharge into the clearwell.~~

2449
2450 ~~(moved to Section 12(j)(i)(C))(F) Injector/Eductor. For gas feed~~
2451 ~~chlorinators, the injector/eductor shall be selected based on solution water pressure, injector~~
2452 ~~waterflow rate, feed point backpressure, and chlorine solution line length and size. The~~
2453 ~~maximum feed point backpressure shall not exceed 110 psi (759 kPa). Where backpressure~~
2454 ~~exceeds 110 psi (750 kPa), a chlorine solution pump shall be used. Gauges shall be provided for~~
2455 ~~chlorine solution pressure, feed water pressure and chlorine gas pressure, or vacuum.~~

2456
2457 ~~(moved to Section 12(j)(ii))(ii) Points of application and contact time.~~

2458
2459 ~~(A) At plants treating surface water, provisions shall be made for~~
2460 ~~applying disinfectant to the raw water, filter influent, and filtered water.~~

2461
2462 ~~(B) For plants treating groundwater, provisions shall be made for~~
2463 ~~applying disinfectant to a point in the finished water supply line prior to any commercial,~~
2464 ~~industrial, or municipal user. Agricultural users may remove water from the supply line prior to~~
2465 ~~disinfectant application point.~~

2466
2467 ~~(C) Where free chlorine residual is provided, 1/2 hour contact time~~
2468 ~~shall be provided for groundwaters and 2 hours for surface waters. Where combined residual~~
2469 ~~chlorination is provided, 2 hours contact time for groundwater and 3 hours contact for surface~~
2470 ~~water shall be provided.~~

2471
2472 ~~(D) When chlorine is applied to a groundwater source for the purpose~~
2473 ~~of maintaining a residual, no contact time is required.~~

2474
2475 ~~(iii) Testing equipment. Chlorine residual test equipment recognized in the~~
2476 ~~15th Edition of Standard Methods for the Examination of Water and Wastewater shall be~~
2477 ~~provided and shall be capable of measuring residuals to the nearest 0.1 mg/L in the range below~~
2478 ~~0.5 mg/L, to the nearest 0.3 mg/L between 0.5 mg/L and 1.0 mg/L and to the nearest 0.5 mg/L~~
2479 ~~between 1.0 mg/L and 2.0 mg/L.~~

2480
2481 ~~(iv) Chlorinator piping.~~

2482
2483 ~~(A) Cross-connection protection. The chlorinator water supply piping~~
2484 ~~shall be designed to prevent contamination of the treated water supply. At all facilities treating~~
2485 ~~surface water, pre- and post-chlorination systems shall be independent to prevent possible~~
2486 ~~siphoning of partially treated water into the clearwell. The water supply to each eductor shall~~

2487 ~~have a separate shutoff valve. No master shutoff will be allowed. Chlorine solution feed water~~
2488 ~~shall be finished water.~~

2489
2490 (B) ~~—Pipe material. The pipes carrying liquid or gaseous chlorine shall~~
2491 ~~be Schedule 80 black steel pipe with forged steel fittings. Bushings shall not be used. Vacuum~~
2492 ~~pipng for gaseous chlorine may be polyethylene tubing. Gas piping between the chlorine~~
2493 ~~pressure reducing valve of the chlorinator and the ejector shall be PVC or polyethylene. Piping~~
2494 ~~for aqueous solutions of chlorine beyond the ejector shall be PVC, fiberglass or steel pipe lined~~
2495 ~~with PVC or saran.~~

2496
2497 (v) ~~—Maximum withdrawal. The maximum withdrawal rate of gaseous chlorine~~
2498 ~~shall be limited to 40 lbs/day (18.1 kg/day) for 100 or 150 lb (45.4 or 68.0 kg) cylinders and 400~~
2499 ~~lbs/day (181 kg/day) for 2,000 lb (907 kg) cylinders, unless chlorine evaporators are employed.~~

2500
2501 (vi) ~~—Ozonation equipment.~~

2502
2503 (A) ~~—Capacity. The ozonator capacity shall be such that an applied dose~~
2504 ~~of at least 10 mg/L can be attained at the maximum daily flows. The equipment shall be of such~~
2505 ~~design that it will operate 5 percent over the desired feeding range.~~

2506
2507 (B) ~~—Piping. Injection equipment and piping in contact with ozonated air~~
2508 ~~and air water emulsions shall be of stainless steel, teflon or other material resistant to ozone.~~
2509 ~~Valves carrying ozonized air shall be made of metal coated with ozone resistant materials.~~

2510
2511 (C) ~~—Application. Ozone may be applied to the water directly as a gas or~~
2512 ~~by an injector system similar to a chlorine injector system. In gas applications, depth of~~
2513 ~~submergence of the diffusers shall be a minimum of 10 feet (3.05 m). Diffusion shall be fine~~
2514 ~~bubble or mixed.~~

2515
2516 (D) ~~—Contact time and point of application. Ozone shall be applied at a~~
2517 ~~point which will provide contact time not less than 30 minutes. At plants treating surface water,~~
2518 ~~provisions should be made for applying a disinfectant to the raw water, filter influent, filtered~~
2519 ~~water and final contact basin. At plants treating groundwater, provisions should be made for~~
2520 ~~applying ozone to the clear well inlet.~~

2521
2522 (E) ~~—Testing equipment. Testing equipment shall enable measurement~~
2523 ~~of residuals to the nearest 0.1 mg/L in the range below 0.5 mg/L and to the nearest 0.2 mg/L~~
2524 ~~above 0.5 mg/L.~~

2525
2526 (F) ~~—Ozone destruct. An ozone destruct device shall be provided to~~
2527 ~~destruct all ozone contractor off gases.~~

2528
2529 (G) ~~—The use of ozone for disinfection will be allowed only if a chlorine~~
2530 ~~or combined chlorine residual is provided in the distribution system.~~

2531
2532 (I) ~~—Softening.~~

2533
2534
2535
2536
2537
2538
2539
2540
2541
2542
2543
2544
2545
2546
2547
2548
2549
2550
2551
2552
2553
2554
2555
2556
2557
2558
2559
2560
2561
2562
2563
2564
2565
2566
2567
2568
2569
2570
2571
2572
2573
2574
2575
2576
2577

~~(i) Lime or lime soda process. Design standards for rapid mix, flocculation and sedimentation are the same as for conventional treatment previously outlined. Lime or lime soda softened effluent shall be filtered.~~

~~(A) Hydraulics. When split treatment is used, the bypass line shall be sized to carry total plant flow, and a means of measuring and splitting the flow shall be provided.~~

~~(B) Chemical feed point. Lime and recycled sludge shall be fed directly into the rapid mix basin.~~

~~(C) Stabilization. Provisions shall be made to chemically stabilize waters softened by the lime or lime soda process.~~

~~(D) Sludge collection. Mechanical sludge removal equipment shall be provided in the sedimentation basin. Sludge recycling to the rapid mix shall be provided.~~

~~(E) Disinfection. The use of excess lime shall not be considered a substitute for disinfection. Disinfection, as previously outlined, shall be provided.~~

~~(ii) Cation exchange process.~~

~~(A) Pretreatment requirements. Pretreatment is required when the content of iron, manganese, or a combination of the two, is 1 mg/L or more. Water with 5 units or more turbidity shall not be applied directly to the cation exchange softener.~~

~~(B) Design. The units may be of pressure or gravity type, of either an upflow or downflow design. Automatic regeneration based on volume of water softened shall be used. A manual override shall be provided on all automatic controls.~~

~~(C) Exchange capacity. The design capacity for hardness removal shall not exceed 20,000 grains per cubic foot (45,880 g/L) when resin is regenerated with 0.3 pounds (.14 kg) of salt per kilograin (2.29 g/L) of hardness removed.~~

~~(D) Depth of resin. The depth of the exchange resin shall not be less than 2 feet (0.6 m).~~

~~(E) Flow rates. The flow applied to the softening unit shall not exceed 7 gpm/ft² (413 m³/m²·d) of bed area. The minimum backwash rate shall be 6 gpm/ft² (354 m³/m²·d) of bed area or shall provide a minimum of 150 percent bed expansion at winter water temperatures. A positive means of controlling flow must be present.~~

~~(F) Underdrains and supporting gravel. The bottoms, strainer systems and support for the exchange resin shall conform to criteria provided for rapid rate gravity filters.~~

2578 ~~(G) — Brine distribution. Facilities shall be included for even distribution~~
2579 ~~of the brine over the entire surface of both upflow and downflow units.~~

2580
2581 ~~(H) — Cross-connection control. Backwash, rinse and air relief discharge~~
2582 ~~pipes shall be installed in such a manner as to prevent any possibility of back siphonage.~~

2583
2584 ~~(I) — Bypass piping and equipment. A by-pass shall be provided around~~
2585 ~~softening units to produce a blended water of desirable hardness. Totalizing meters must be~~
2586 ~~installed on the bypass line and on each softener unit. An automatic proportioning or regulating~~
2587 ~~device and shutoff valve shall be provided on the bypass line.~~

2588
2589 ~~(J) — Additional limitations.~~

2590
2591 ~~(I) — Silica gel resins shall not be used for waters having a pH~~
2592 ~~above 8.4 or containing less than 6 mg/L silica and shall not be used when iron is present.~~

2593
2594 ~~(II) — When the applied water contains a chlorine residual, the~~
2595 ~~cation-exchange resin shall be a type that is not damaged by residual chlorine.~~

2596
2597 ~~(III) — Phenolic resin shall not be used.~~

2598
2599 ~~(K) — Brine and salt storage tanks.~~

2600
2601 ~~(I) — Salt dissolving or brine tanks and wet salt storage tanks~~
2602 ~~shall be covered and constructed of corrosion-resistant materials.~~

2603
2604 ~~(II) — The makeup water inlet shall be protected from back~~
2605 ~~siphonage. Water for filling the tank shall be distributed over the entire surface by pipes above~~
2606 ~~the maximum brine level in the tank. The tanks shall be provided with an automatic declining~~
2607 ~~level control system on the makeup water line.~~

2608
2609 ~~(III) — Wet salt storage basins shall be equipped with manholes or~~
2610 ~~hatchways for access and for direct dumping of salt from truck or railcar. Openings shall be~~
2611 ~~provided with raised curbs and watertight covers having overlapping edges similar to those~~
2612 ~~required for finished water reservoirs.~~

2613
2614 ~~(IV) — Overflows, if provided, must be turned down, have a proper~~
2615 ~~free-fall discharge and be protected with corrosion-resistant screens or self-closing flap valves.~~

2616
2617 ~~(V) — Two wet salt storage tanks or compartments designed to~~
2618 ~~operate independently shall be provided.~~

2619
2620 ~~(VI) — The salt shall be supported on graduated layers of gravel~~
2621 ~~under which is a suitable means of collecting the brine.~~

2622

2623 ~~(L) — Salt and brine storage capacity. Total salt storage capacity shall~~
2624 ~~provide for at least 30 days of operation.~~

2625
2626 ~~(M) — Brine pump or eductor. An eductor may be used to transfer brine~~
2627 ~~from the brine tank to the softeners. If a pump is used, a brine measuring tank or means of~~
2628 ~~metering shall be provided to obtain proper dilution.~~

2629
2630 ~~(N) — Stabilization. Facilities for stabilizing corrosion control shall be~~
2631 ~~provided.~~

2632
2633 ~~(O) — Construction materials. Pipes and contact materials shall be~~
2634 ~~resistant to the aggressiveness of salt. Plastic and red brass are acceptable piping materials. Steel~~
2635 ~~and concrete shall be coated with a non-leaching protective coating which is compatible with salt~~
2636 ~~and brine.~~

2637
2638 ~~(P) — Housing. Bagged salt and dry bulk salt storage shall be enclosed~~
2639 ~~and separated from other operating areas in order to prevent damage to equipment.~~

2640
2641 ~~(m) — Aeration. Aeration may be used to help remove tastes and odors due to dissolved~~
2642 ~~gases from decomposing organic matter; to reduce or remove objectionable amounts of carbon~~
2643 ~~dioxide, hydrogen sulfide, etc.; to introduce oxygen to assist in iron and/or manganese removal;~~
2644 ~~and to strip volatile organic compounds for controlling the formation of trihalomethanes by~~
2645 ~~removing the trihalomethane precursors.~~

2646
2647 ~~(i) — Natural draft aeration — tray type. The design shall provide perforations in~~
2648 ~~the distribution pan to provide uniform distribution of water over the top tray. The discharge~~
2649 ~~shall be through a series of three or more trays. Tray material shall be resistant to aggressiveness~~
2650 ~~of the water and dissolved gases. The loading rate shall not exceed five gpm/ft² (203 L/m²) of~~
2651 ~~total tray area.~~

2652
2653 ~~(ii) — Forced or induced draft aeration. Devices shall:~~

2654
2655 ~~(A) — Be constructed and located so that air introduced into the column~~
2656 ~~shall be free from obnoxious fumes, dust, and dirt. All sections of the aerator shall be easily~~
2657 ~~reached or removed for maintenance.~~

2658
2659 ~~(B) — Provide distribution of water uniformly over the top tray and~~
2660 ~~discharge through a series of five or more trays.~~

2661
2662 ~~(C) — Be constructed so that the water outlet is adequately sealed to~~
2663 ~~prevent unwarranted loss of air. Material shall be resistant to the aggressiveness of the water and~~
2664 ~~dissolved gases. Loading shall be provided at a rate not to exceed five gpm/ft² (203 L/m²) of~~
2665 ~~total tray area.~~

2666
2667 ~~(iii) — Pressure aeration. Pressure aeration may be used for oxidation purposes~~
2668 ~~only; it is not acceptable for removing dissolved gases.~~

- 2669
2670 (iv) — Protection of aerators. All aerators except those discharging to lime
2671 softening or clarification plants shall be protected from contamination by birds and insects by
2672 using louvers and 24 mesh screen.
2673
2674 (v) — Disinfection. Disinfection must be provided as a final treatment to all
2675 waters receiving aeration treatment.
2676
2677 (vi) — Bypass. A bypass shall be provided around all aeration units.
2678
2679 (vii) — Volatile organics removal. Volatile organic compounds may be stripped
2680 by packed tower or diffused aeration methods.
2681
2682 (n) — Iron and manganese control. Iron and manganese control, as used here, refers
2683 solely to treatment processes designed specifically for this purpose.
2684
2685 (i) — Removal by oxidation, detention, and filtration.
2686
2687 (A) — Oxidation. Oxidation may be accomplished by aeration or by
2688 chemical oxidation using chlorine, potassium permanganate, ozone, hydrogen peroxide, or
2689 chlorine dioxide.
2690
2691 (B) — Detention following aeration. A minimum detention time of 20
2692 minutes shall be provided following aeration. The detention basin shall be designed as a holding
2693 tank with sufficient baffling to prevent short-circuiting. Sedimentation basins shall be provided
2694 when treating water with iron and/or manganese above 2 mg/L, or where chemical coagulation is
2695 used to reduce the load on the filters. Provisions for sludge removal shall be made.
2696
2697 (C) — Filtration. Gravity or pressure filters shall be provided. Where
2698 pressure filters are used, the following criteria supplements that found in Section 10(i).
2699
2700 (I) — Rate of filtration. The rate shall not exceed 3 gpm/ft² (176
2701 m³/m²·d) of filter area.
2702
2703 (II) — Design criteria. The filters shall have a minimum side wall
2704 shell height of 5 feet, and an air release valve on the highest point of each filter. Each filter shall
2705 have a means to observe the wastewater during backwashing and also a manhole to facilitate
2706 inspection and repairs.
2707
2708 (ii) — Removal by the lime-soda softening process. These processes shall
2709 conform to the lime-soda process in Section 10(i).
2710
2711 (iii) — Removal by manganese greensand filtration. Provide feed capability of
2712 potassium permanganate to the influent of a manganese greensand filter.
2713

2714 ~~(A) — An anthracite media cap of at least 6 inches (0.15 m) shall be~~
2715 ~~provided over manganese green sand.~~

2716
2717 ~~(B) — The filtration rate shall not exceed 4 gpm/ft² (236 m³/m²·d).~~

2718
2719 ~~(C) — Provide a minimum backwash capability of 12 gpm/ft² (708~~
2720 ~~m³/m²·d), with a rate control device.~~

2721
2722 ~~(D) — Air washing or surface washing is required.~~

2723
2724 ~~(iv) — Removal by ion exchange. This process of iron and manganese removal~~
2725 ~~shall not be used for water containing more than 0.3 mg/L of iron, manganese or combination of~~
2726 ~~the two. This process is not acceptable where either the raw water or washwater contains~~
2727 ~~dissolved oxygen.~~

2728
2729 ~~(v) — Sequestration by polyphosphates. This process shall not be used when~~
2730 ~~iron, manganese or a combination of the two as exceeds 1.0 mg/L. The total phosphate applied~~
2731 ~~shall not exceed 10 mg/L as PO₄. Where phosphate treatment is used, facilities shall be provided~~
2732 ~~for maintaining a 0.5 mg/L free or combined chlorine residual at remote points in the distribution~~
2733 ~~system.~~

2734
2735 ~~(A) — The stock phosphate solution tank shall be covered. Facilities shall~~
2736 ~~be provided for disinfecting the solution tank. The facilities shall be capable of providing a~~
2737 ~~minimum of 10 mg/L free chlorine residual.~~

2738
2739 ~~(B) — Polyphosphates shall not be applied ahead of iron and manganese~~
2740 ~~removal treatment. The point of application shall be prior to any aeration, oxidation or~~
2741 ~~disinfection if no iron or manganese removal treatment is provided.~~

2742
2743 ~~(vi) — Sequestration by sodium silicates. Sodium silicate sequestration of iron~~
2744 ~~and manganese shall be used for groundwater supplies prior to air contact. Rapid oxidation of the~~
2745 ~~metal ions by chlorine, chlorine dioxide, ozone, hydrogen peroxide, or other strong oxidant must~~
2746 ~~accompany or closely precede the sodium silicate addition. Injection of sodium silicate shall not~~
2747 ~~occur at a point more than 15 seconds after oxidation feed point. Feed and dilution equipment~~
2748 ~~shall be sized on the basis of feed solutions stronger than 5 percent silica as SiO₂. Sodium silicate~~
2749 ~~addition may be used only on water containing up to 2 mg/L of iron, manganese or a~~
2750 ~~combination of the two. Sodium silicate addition shall not be used on waters where 20 mg/L or~~
2751 ~~more SiO₂ is required or where the amount of added and naturally occurring silicate will exceed~~
2752 ~~60 mg/L as SiO₂.~~

2753
2754 ~~(A) — Facilities shall be provided for maintaining a chlorine residual of~~
2755 ~~0.5 mg/L throughout the distribution system.~~

2756
2757 ~~(B) — Sodium silicate shall not be applied ahead of iron or manganese~~
2758 ~~removal treatment.~~

2759

2760 ~~(vii) — Testing equipment. Testing equipment shall be provided for all iron and~~
2761 ~~manganese control plants.~~

2762
2763 ~~(A) — The equipment should have the capacity to measure the iron~~
2764 ~~content to a minimum of 0.1 mg/L and the manganese content to a minimum of 0.05 mg/L.~~

2765
2766 ~~(B) — Where polyphosphate sequestration is practiced, phosphate testing~~
2767 ~~equipment shall be provided.~~

2768
2769 ~~(moved to Section 12(1)(o)) — Fluoridation and defluoridation.~~

2770
2771 ~~(moved to Section 12(1)(i)(i)) — Fluoride compound storage. Storage tanks shall be~~
2772 ~~covered; all storage shall be inside a building. Storage tanks for hydrofluosilic acid shall be~~
2773 ~~vented to the atmosphere at a point outside the building.~~

2774
2775 ~~(moved to Section 12(1)(ii)(ii)) — Chemical feed equipment. Fluoride feed~~
2776 ~~equipment shall meet the following requirements.~~

2777
2778 ~~(moved to Section 12(1)(ii)(A))(A) — Scales or loss of weight recorders~~
2779 ~~shall be provided for dry chemical feeds. Feeders shall be accurate to within five percent of any~~
2780 ~~desired feed rate.~~

2781
2782 ~~(moved to Section 12(1)(ii)(B))(B) — The point of application of~~
2783 ~~hydrofluosilic acid, if into a horizontal pipe, shall be in the lower half of the pipe. Fluoride~~
2784 ~~compound shall not be added before lime soda softening or ion exchange softening.~~

2785
2786 ~~(moved to Section 12(1)(ii)(C))(C) — A fluoride solution shall be applied~~
2787 ~~by a positive displacement pump having a stroke rate not less than 20 nor more than 95 strokes~~
2788 ~~per minute. Fluoride solutions shall not be injected to a point of negative pressure.~~

2789
2790 ~~(moved to Section 12(1)(ii)(E))(D) — All fluoride feed lines and dilution~~
2791 ~~water lines shall be isolated from potable water supplies by either an air gap above the solution~~
2792 ~~tank or a reduced pressure principal backflow preventor.~~

2793
2794 ~~(moved to Section 12(1)(ii)(F))(E) — Water used for sodium fluoride~~
2795 ~~dissolution shall have a hardness not exceeding 50 mg/L. Softening shall be provided for the~~
2796 ~~solution water where hardness exceeds 45 mg/L.~~

2797
2798 ~~(moved to Section 12(1)(ii)(G))(F) — Flow meters for treated flow rate and~~
2799 ~~fluoride solution water shall be provided.~~

2800
2801 ~~(iii) — Protective equipment. Protective equipment, including air purifying~~
2802 ~~respirators approved by the National Institute of Occupational Safety and Health and emergency~~
2803 ~~showers, shall be provided for operators handling fluoride compounds.~~

2804
2805 ~~(iv) — Dust control.~~

2806
2807 ~~(moved to Section 12(1)(iii))(A) — Provisions shall be made to allow the~~
2808 ~~transfer of dry fluoride compounds from shipping containers to storage bins or hoppers in such a~~
2809 ~~way as to minimize the quantity of fluoride dust which may enter the room in which the~~
2810 ~~equipment is installed. The enclosure shall be provided with an exhaust fan and dust filter which~~
2811 ~~places the hopper under a negative pressure. Air exhausted from fluoride handling equipment~~
2812 ~~shall discharge through a dust filter to the outside atmosphere of the building. The discharge~~
2813 ~~shall not be located near a building fresh air intake.~~

2814
2815 ~~(moved to Section 12(1)(iii)(C))(B) — A floor drain shall be provided.~~

2816
2817 ~~(v) — Testing equipment. Equipment shall be provided for measuring the~~
2818 ~~quantity of fluoride in the water.~~

2819
2820 ~~(vi) — Defluoridation. Where fluoride removal is required the following methods~~
2821 ~~are acceptable:~~

2822
2823 ~~(moved to Section 12(1)(iv)(A))(A) — Activated alumina may be employed~~
2824 ~~in open gravity filter tanks or pressure filter tanks. The minimum media depth shall be 5 feet.~~
2825 ~~The units shall not be loaded at a rate exceeding 4 gallons per minute per square foot (236~~
2826 ~~m³/m²-d). The activated alumina media shall be in mesh sizes ranging from 28 to 48.~~
2827 ~~Regeneration facilities shall be provided to regenerate the media. These shall include both weak~~
2828 ~~caustic and weak acid systems.~~

2829
2830 ~~(moved to Section 12(1)(iv)(F))(B) — Bone char filtration or lime softening~~
2831 ~~with magnesium addition.~~

2832
2833 ~~(p) — Stabilization. Stabilized water is a water that does not tend to corrode the pipe~~
2834 ~~nor deposit large quantities of scale.~~

2835
2836 ~~(i) — Carbon dioxide addition.~~

2837
2838 ~~(A) — Recarbonation basin design shall provide a minimum total~~
2839 ~~detention time of 20 minutes. Two compartments consisting of a mixing compartment having a~~
2840 ~~detention time of at least three minutes and a reaction compartment are required. Each~~
2841 ~~compartment shall have a minimum depth of 8 feet (2.4 m).~~

2842
2843 ~~(B) — Plants generating carbon dioxide from combustion shall have top~~
2844 ~~recarbonation tanks in order to dissipate carbon monoxide gas. Care shall be taken to prevent the~~
2845 ~~basin off-gases from entering any treatment plant structure.~~

2846
2847 ~~(C) — The recarbonation basin shall be sloped to a drain.~~

2848
2849 ~~(ii) — Acid addition. Facilities shall be provided for feeding both acid and~~
2850 ~~alkalinity, such as sodium carbonate, lime or sodium bicarbonate.~~

2851

2852 ~~(iii) — Polyphosphates. The feeding of polyphosphates is applicable for~~
2853 ~~sequestering calcium in lime softened water, corrosion control, and in conjunction with alkali~~
2854 ~~feed following ion exchange softening. Chlorination equipment and feed points shall be available~~
2855 ~~to chlorinate the phosphate solution tank to maintain a 10 mg/L free chlorine residual and to~~
2856 ~~maintain a 0.5 mg/L residual in the distribution system.~~

2857
2858 ~~(moved to 12 (n)(vii))(iv) — Alkali feed. Unstable water created by ion exchange~~
2859 ~~softening shall be stabilized by an alkali feed. An alkali feeder shall be provided for all ion~~
2860 ~~exchange water softening plants.~~

2861
2862 ~~(moved to 12 (n)(viii))(v) — Control. Laboratory equipment shall be provided~~
2863 ~~for determining the effectiveness of stabilization treatment. This shall include testing equipment~~
2864 ~~for hardness, calcium, alkalinity, pH and magnesium, as a minimum.~~

2865
2866 ~~(moved to Section 12(m))(q) Taste and odor control. Provision shall be made for the~~
2867 ~~control of taste and odor at all surface water treatment plants.~~

2868
2869 ~~(i) — Flexibility. Plants treating water that is known to have taste and odor~~
2870 ~~problems shall be provided with equipment that makes at least two of the control processes~~
2871 ~~available.~~

2872
2873 ~~(ii) — Chlorination. When chlorination is used for the removal of some~~
2874 ~~objectionable odors, two hours of contact time must be provided to complete the chemical~~
2875 ~~reactions involved.~~

2876
2877 ~~(iii) — Chlorine dioxide. Chlorine dioxide can be used in the treatment of any~~
2878 ~~taste and odor that is treatable by an oxidizing compound. Provisions shall be made for proper~~
2879 ~~storing and handling of the sodium chlorite to eliminate any danger of explosion.~~

2880
2881 ~~(iv) — Powdered activated carbon. Provisions shall allow the addition of carbon~~
2882 ~~to the presedimentation basin influent, rapid mix basin, and clarifier effluent. Carbon feed~~
2883 ~~equipment shall be capable of feeding from 0 to 40 mg/L at plant design flows.~~

2884
2885 ~~(iv) — A provision shall be made for adequate dust control. Powdered activated~~
2886 ~~carbon shall be handled as a potentially combustible material. It shall be stored and used in a~~
2887 ~~building or compartment as nearly fireproof as possible. Carbon feeder rooms shall be designed~~
2888 ~~for hazardous locations, National Electric Code, Class 1, Groups C and D, Division 1.~~

2889
2890 ~~(moved to Section 12(m)(i))(v) — Granular activated carbon adsorption units.~~
2891 ~~Open or closed carbon contacting may be used for taste and odor control by adsorption of~~
2892 ~~organics. The loading rate shall not exceed 10 gpm/ft² (236 m³/m²·d). The minimum empty bed~~
2893 ~~contact time shall be 20 minutes. Provisions shall be made for moving carbon to and from the~~
2894 ~~contactors.~~

2895

2896 ~~(vi) — Potassium permanganate. The application point shall be in the raw water~~
2897 ~~or ahead of the clarifier influent. Facilities shall be capable of feeding not less than 10 mg/L of~~
2898 ~~permanganate.~~

2899
2900 ~~(moved to Section 12(m)(iii))(vii) — Ozone. Thirty minutes of contact time must~~
2901 ~~be provided to complete the chemical reactions involved. The facilities shall be capable of an~~
2902 ~~applied ozone feed rate of 15 mg/L minimum.~~

2903
2904 ~~(moved to Section 12(n))(r) — Microscreening. A microscreen will be allowed as a~~
2905 ~~mechanical supplement to treatment. The microscreening shall be capable of removing~~
2906 ~~suspended matter from the water by straining. It may be used to reduce nuisance organisms and~~
2907 ~~organic loadings. It shall not be~~
2908 ~~used in place of filtration or coagulation.~~

2909
2910 ~~(moved to Section 12(n)(iii))(i) — Screens shall be of a corrosion resistant~~
2911 ~~material, plastic or stainless steel.~~

2912
2913 ~~(moved to Section 12(n)(iv))(ii) — Bypass piping shall be provided around the~~
2914 ~~unit.~~

2915
2916 ~~(moved to Section 12(n)(v))(iii) — Protection against back siphonage shall be~~
2917 ~~provided when potable water is used for washing the screen.~~

2918
2919 ~~(moved to Section 12(n)(vi))(iv) — Washwaters shall be wasted and not~~
2920 ~~recycled to the microscreen.~~

2921
2922 ~~(s) — Organics removal by granular carbon adsorption.~~

2923
2924 ~~(moved to Section 12(m)(i)(C))(i) — Adsorption of organics on granular activated~~
2925 ~~carbon. Water to be treated may be contacted with granular activated carbon. The pH of the~~
2926 ~~water shall be less than 9.0. The turbidity of the applied water shall be less than 2 TU when~~
2927 ~~packed beds are used.~~

2928
2929 ~~(ii) — Contact time. The carbon beds or columns shall provide a minimum of 20~~
2930 ~~minutes of empty bed contact time at design flow. Surface loading rates shall not exceed 10~~
2931 ~~gpm/ft² (590 m³/m²·d).~~

2932
2933 ~~(iii) — Carbon bed or column design.~~

2934
2935 ~~(moved to Section 12(m)(i)(E))(A) — If an upflow countercurrent~~
2936 ~~contactors is used, it may be either packed or expanded. A single unit is acceptable. If a~~
2937 ~~downflow contactor is used, two or more beds in parallel are required.~~

2938
2939 ~~(moved to Section 12(m)(i)(F))(B) — Contactors may be designed as open~~
2940 ~~gravity units, or pressure beds. They may be constructed of concrete, steel, or fiberglass~~

2941 ~~reinforced plastic. Steel vessels shall be protected against corrosion by coaltar epoxy coating,~~
2942 ~~rubber or glass lining, or other means.~~

2943
2944 ~~(moved to Section 12(m)(i)(H))(C) — All carbon beds or columns shall be~~
2945 ~~equipped with provisions for flow reversal and bed expansion. Combination downflow filter~~
2946 ~~contactors shall have backwashing facilities to provide up to 50 percent bed expansion and shall~~
2947 ~~meet the same backwash criteria as rapid filters.~~

2948
2949 ~~(D) — Inlet and outlet screens shall be 304 or 316 stainless steel or other~~
2950 ~~suitable materials.~~

2951
2952 ~~(E) — Carbon beds and columns shall have a means for removing spent~~
2953 ~~carbon and introducing makeup or regenerated carbon.~~

2954
2955 ~~(F) — Pressure contactors shall be equipped with air vacuum release~~
2956 ~~valves fitted with a stainless steel screen, slot size 0.036 mm (0.14 inches), to prevent plugging~~
2957 ~~with carbon.~~

2958
2959 ~~(t) — Radionuclides. Where radionuclide removal is practiced, the waste shall be~~
2960 ~~evaluated for its classification as a hazardous or low level radioactive waste and disposed of as~~
2961 ~~required by the Nuclear Regulatory Commission or other appropriate authority.~~

2962
2963 ~~(u) — Waste handling and disposal. Disposal of any waste sludge or liquid shall meet all~~
2964 ~~the requirements of Chapter 11 of the Water Quality Rules and Regulations where applicable.~~

2965
2966 ~~(moved to Section 12(r)(i))(i) — Sanitary and laboratory wastes. The sanitary~~
2967 ~~and laboratory wastes from water treatment plants, pumping stations, etc., shall not be recycled~~
2968 ~~to any part of the water plant. Waste from these facilities must be discharged directly to a~~
2969 ~~sanitary sewer system when feasible, or to an on-site waste treatment facility permitted by the~~
2970 ~~Wyoming Department of Environmental Quality.~~

2971
2972 ~~(moved to Section 12(r)(ii))(ii) — Brine waste. The waste from ion exchange~~
2973 ~~plants, demineralization plants, etc., may not be recycled to the plant. Where discharging to a~~
2974 ~~sanitary sewer, a holding tank shall be provided to prevent the overloading of the sewer and/or~~
2975 ~~interference with the waste treatment processes. The effect of brine discharge to sewage lagoons~~
2976 ~~may depend on the rate of evaporation from the lagoons. Where disposal to an off-site waste~~
2977 ~~treatment system is proposed, it must be demonstrated that the sewer and the facility have the~~
2978 ~~required capacity and dilution capability. The impact on any treatment system discharge shall be~~
2979 ~~evaluated.~~

2980
2981 ~~(iii) — Lime softening sludge. Acceptable methods of treatment and disposal are~~
2982 ~~as follows:~~

2983
2984 ~~(A) — Sludge lagoons. Lagoons shall be designed on the basis of~~
2985 ~~providing a surface area of 0.7 acres (.28 ha) per million gallons per day (3785 m³/day) (average~~
2986 ~~day) per 100 mg/L of hardness removed, based on a usable lagoon depth of 5 feet (1.5 m). At~~

2987 ~~least 2 lagoons shall be provided. An acceptable means of final sludge disposal must be~~
2988 ~~provided. Provisions must be made for convenient cleaning of the lagoons.~~

2989
2990 ~~(moved to Section 12(r)(iii)(A))(A) — The design of lagoons shall provide for location~~
2991 ~~above the 100-year flood or adequately protected from the 100-year flood. There shall be means~~
2992 ~~of diverting surface water runoff so that it does not flow into the lagoons. Minimum free board~~
2993 ~~of 3 feet (0.66 m) shall be present. An adjustable decanting device for recycling the overflow~~
2994 ~~shall be present. There shall be an accessible effluent sampling point.~~

2995
2996 ~~(moved to Section 12(r)(iv))(B) — Land application of liquid lime~~
2997 ~~sludge shall comply with Part E of Chapter 11 of the Water Quality Rules and Regulations.~~

2998
2999 ~~(moved to Section 12(r)(v))(C) — Disposal at a suitable landfill~~
3000 ~~shall be authorized by the Solid Waste Management Program of the Department of~~
3001 ~~Environmental Quality.~~

3002
3003 ~~(moved to Section 12(r)(vi))(D) — Mechanical dewatering of sludge may be~~
3004 ~~employed.~~

3005
3006 ~~(moved to Section 12(r)(vii))(E) — Recalcination of sludge may be~~
3007 ~~employed.~~

3008
3009 ~~(moved to Section 12(r)(viii))(F) — Lime sludge drying beds shall not be~~
3010 ~~used.~~

3011
3012 ~~(moved to Section 12(s))(iv) — Alum sludge.~~

3013
3014 ~~(moved to Section 12(s)(i))(A) — Lagooning may be used as a storage~~
3015 ~~and interim disposal method for alum sludge. The volume of alum sludge storage lagoons shall~~
3016 ~~be at least 100,000 gallons (378.5 m³) per 1,000,000 gpd (3,785 m³/d) of treatment plant~~
3017 ~~capacity.~~

3018
3019 ~~(moved to Section 12(s)(ii))(B) — Discharge of alum sludge to sanitary~~
3020 ~~sewers may be used only when the sewage system has the capability to adequately handle the~~
3021 ~~flow and sludge.~~

3022
3023 ~~(moved to Section 12(s)(iii))(C) — Mechanical dewatering of sludge~~
3024 ~~may be employed.~~

3025
3026 ~~(moved to Section 12(s)(iv))(D) — Alum sludge drying beds may be~~
3027 ~~used.~~

3028
3029 ~~(moved to Section 12(s)(v))(E) — Alum sludge may be acid treated and~~
3030 ~~recovered.~~

3031

3032 ~~(moved to Section 12(s)(vi))(F) Disposal at a suitable landfill shall be~~
3033 ~~authorized by the Solid Waste Management Program of the Department of Environmental~~
3034 ~~Quality.~~

3035
3036 ~~(v) Iron and manganese waste. Waste filter washwater from iron and~~
3037 ~~manganese removal plants may be disposed by filtration, by lagooning, or by discharge to the~~
3038 ~~sewer system.~~

3039
3040 ~~(A) Sand filters. Sand filters should have a total filter area of not less~~
3041 ~~than 100 square feet (9.29 m²) in a minimum of 2 compartments. The filter shall have sufficient~~
3042 ~~surface area and capacity to contain, in a volume of 2 feet (0.61 m) above the level of the sand,~~
3043 ~~the entire volume of washwater produced by washing the production filters.~~

3044
3045 ~~(I) The filter shall not be subject to flooding by surface runoff~~
3046 ~~or flood waters. Finished grade elevation shall be such as to facilitate maintenance, cleaning and~~
3047 ~~removal of surface sand as required.~~

3048
3049 ~~(II) The filter media shall consist of a minimum of 12 inches~~
3050 ~~(30.4 cm) of sand, 3 inches (7.6 cm) of supporting small gravel or torpedo sand, and 9 inches~~
3051 ~~(0.22 m) of gravel in graded layers. All sand and gravel shall be washed to remove fines. Filter~~
3052 ~~sand shall have an effective size of 0.3 to 0.5 mm and a uniformity coefficient not to exceed 3.5.~~

3053
3054 ~~(III) The filter shall be provided with an underdrain collection~~
3055 ~~system, and provision shall be made for an accessible sample point.~~

3056
3057 ~~(IV) Overflow devices from these filters shall not be permitted.~~

3058
3059 ~~(V) Where freezing may occur, provisions shall be made for~~
3060 ~~covering the filters during the winter months.~~

3061
3062 ~~(VI) Iron and manganese waste filters shall provide an~~
3063 ~~atmosphere air break between adjacent compartments that contain finished water and unfiltered~~
3064 ~~water.~~

3065
3066 ~~(B) Washwater recovery lagoons. Filter backwash wastewater may be~~
3067 ~~recovered by washwater recovery lagoons. Decanted filter backwash wastewater from the~~
3068 ~~lagoons shall be recycled to the head of the plant. Lagoons shall provide 250,000 gallons of~~
3069 ~~storage (946 m³) for each 1,000,000 gallons per day (3,785 m³/day) of treatment capacity.~~
3070 ~~Lagoons shall have a minimum usable depth of 3 feet (0.91 m), a length 4 times the width, and a~~
3071 ~~width of at least 3 times the water depth.~~

3072
3073 (a) 2018 TSS, parts 2.8.1 and 2.9, testing and monitoring equipment; 2.10, sample
3074 taps; 2.11, facility water supply; 2.14, piping color code; and 5.0-5.4, chemical application, are
3075 herein incorporated by reference.

3076

3077 ~~(formerly Section 8(a))(b)~~ Design basis. The proposed design shall demonstrate the
3078 capacity of the water treatment or water production system ~~shall be~~ is designed for the maximum
3079 daily demand at the design year based on historical usage records. ~~Where water use records are~~
3080 ~~not available to establish water use, the equivalent per capita water use shall be at least 125 gpd~~
3081 ~~(475 liters per day) and 340 gpd (1,285 liters per day) to size facilities for average and maximum~~
3082 ~~daily water demand, respectively.~~

3083
3084 ~~(formerly Section 8(a))(i)~~ Where water use records are not available to
3085 establish water use, the design shall include an equivalent per capita water use ~~shall be~~ of at least
3086 125 gallons per day (gpd) ~~(475 liters per day)~~ for average daily water demand and 340 gpd
3087 ~~(1,285 liters per day) to size facilities for average and maximum daily water demand,~~
3088 ~~respectively.~~

Speak to whether the prescribed #s include some irrigation component, and/or whether irrigation should be considered separately.

3089
3090 ~~(formerly Section 8(p))(ii)~~ Design capacities. The plant capacity design shall
3091 include ~~maximum daily water demand, filter backwash quantities, and industrial water use.~~ In
3092 ~~the absence of data, filter backwash quantity shall be five percent of the maximum daily demand.~~
3093 documentation of the consideration of:

3094
3095 ~~(formerly Section 8(p))(A)~~ Mmaximum daily water demand;:

3096
3097 ~~(formerly Section 8(p))(B)~~ Agricultural water use;

3098
3099 ~~(formerly Section 8(p))(C)~~ and Industrial water use;: and

3100
3101 ~~(formerly Section 8(p))(D)~~ Filter backwash quantities. In the absence
3102 of data, filter backwash quantity shall be five percent of the maximum daily demand.

3103
3104 ~~(formerly Section 8(g)(iii))(c)~~ Geological conditions. The Structural design shall
3105 demonstrate consideration of the seismic zone, groundwater, and soil support. ~~Soils~~
3106 ~~investigations shall be made, or adequate previous soils investigations shall be available to~~
3107 ~~develop structural design.:~~

3108
3109 ~~(formerly Section 8(g)(iii))(i)~~ The seismic zone;:

3110
3111 ~~(formerly Section 8(g)(iii))(ii)~~ Groundwater; and

3112
3113 ~~(formerly Section 8(g)(iii))(iii)~~ Soil support.

3114
3115 ~~(formerly Section 8(g)(iii))(A)~~ The applicant shall conduct Soils
3116 investigations ~~shall be made, or include documentation of~~ adequate previous soils investigations
3117 ~~shall be available used~~ to develop the structural design.

3118
3119 ~~(formerly Section 8(l))(B)~~ Basin slabs shall be designed to successfully
3120 resist the hydrostatic uplift pressure or shall include an area dewatering system ~~or an area~~
3121 ~~dewatering system shall be provided.~~

3122

3123 ~~(formerly Section 8(1))(C)~~ The applicant shall demonstrate
3124 Considerations ~~must be given in structural design to of~~ long-span breakage in basins designed to
3125 resist uplift.

3126
3127 ~~(formerly Section 8(b)(i))(d) Location.~~ Proposed Treatment facilities locations shall ~~be~~
3128 ~~located such~~ demonstrate that:

3129
3130 ~~(formerly Section 8(b)(i))(i)~~ (i) No sources of pollution ~~may~~ will affect the quality
3131 of the water supply or treatment system-;

3132
3133 ~~(formerly Section 8(b)(i))(ii)~~ (ii) The ~~facilities~~ facility shall not be located location is
3134 not within 500 feet of landfills, garbage dumps, or wastewater treatment systems-; and

3135
3136 ~~(formerly Section 8(b)(i))(iii)~~ Flood protection. All treatment process
3137 structures, mechanical equipment, and electrical equipment ~~shall~~ will be protected, accessible,
3138 and remain fully operational during ~~from~~ the maximum flood of record or the 100-year flood,
3139 whichever is greater. ~~The treatment facilities shall remain fully operational and accessible during~~
3140 ~~the 100-year flood.~~

3141
3142 ~~(formerly Section 8(e))(e)~~ Level of treatment. Proposed Treatment shall ~~be provided~~
3143 ~~to demonstrate the facility will~~ produce potable water that is bacteriologically, chemically,
3144 radiologically, and physically safe, ~~as determined by the administrator as required by 40 CFR~~
3145 Part 141.

3146
3147 ~~(formerly Section 8(d)(i))(f)~~ Multiple units. ~~Designs for proposed T~~reatment facilities
3148 with 100,000 ~~gallons per day (gpd) (378.5 m³/day)~~ capacity and over shall ~~provide~~ include
3149 duplicate units, as a minimum, for chemical feed, flocculation, clarification, sedimentation,
3150 filtration, and disinfection.

3151
3152 ~~(formerly Section 8(d)(i))(g)~~ Designs for proposed Treatment facilities under 100,000
3153 gpd ~~(378.5 m³/day)~~ capacity shall ~~provide~~ include:

3154
3155 ~~(formerly Section 8(d)(i))(i)~~ (i) Duplicate units as described ~~above~~ in paragraph (e)
3156 of this Section; or ~~may provide~~

3157
3158 ~~(formerly Section 8(d)(i))(ii)~~ (ii) ~~f~~inished water system storage equal to twice the
3159 maximum daily demand-; and

3160
3161 (iii) Demonstration of consideration of plant design flexibility to account for
3162 future changes in source water quality, unexpected need to modify process piping, service area
3163 expansion, changing treatment technologies, and equipment life cycles and upgrades.

3164
3165 ~~(formerly Section 8(d)(i))(h)~~ Multiple equipment. All treatment facility pumping shall
3166 provide the maximum daily demand flow with the largest single-unit not in service. Finished
3167 water pumping in combination with finished water storage that floats on the distribution systems
3168 shall provide the maximum hourly demand with the largest single-unit not in service. ~~When~~ For

3169 designs that include fire protection ~~is provided~~, pumping, and finished water storage that floats
3170 on the system shall provide the fire demand plus the maximum daily demand, or the maximum
3171 hourly demand, whichever is greater.

3172
3173 ~~(formerly Section 8(d)(iii))(i) Alternative power source.~~ Where the finished water storage
3174 volume that floats on the distribution system is not capable of supplying the maximum daily
3175 demand, an the proposed design shall include alternative power ~~shall be provided~~ for the finished
3176 water pumps. ~~The combined finished water storage volume and pumping capacity supplied by~~
3177 ~~alternative power shall be at least adequate to provide the maximum daily demand. Acceptable~~
3178 ~~alternative power sources include an engine generator, engine drive pumps, or a second~~
3179 ~~independent electrical supply.~~

3180
3181 ~~(formerly Section 8(d)(iii))(i)~~ (i) The combined finished water storage volume and
3182 pumping capacity supplied by alternative power shall be at least adequate to provide the
3183 maximum daily demand.

3184
3185 ~~(formerly Section 8(d)(iii))(ii)~~ (ii) Acceptable alternative power sources
3186 include ~~an engine generators~~, engine drive pumps, or a second independent electrical supply that
3187 provides sufficient power to run the system.

3188
3189 ~~(formerly Section 8(e))(j) Housing.~~ Process equipment, filters and appurtenances,
3190 disinfection, chemical feed and storage, electrical and controls, and pipe galleries shall be ~~housed~~
3191 located in suitable structures.

3192
3193 ~~(formerly Section 8(m))(k)~~ (k) All equipment not required to be in or on open basins,
3194 ~~(such as clarifier drives and flocculators),~~ shall be located in heated, lighted, and ventilated
3195 structures. ~~Structure entrances shall be above grade. Piping shall be buried below frost level,~~
3196 ~~placed in heated structures, or provided with heat and insulated.~~

3197
3198 ~~(formerly Section 8(m))(l)~~ (l) Piping shall be buried below frost level, placed in heated
3199 structures, or provided with heat and insulated.

3200
3201 ~~(formerly Section 8(m))(m)~~ (m) Structure entrances shall be above grade.

3202
3203 ~~(formerly Section 8(g)(i))(n) onstruction materials.~~ Selected cConstruction materials
3204 shall ~~be selected, apportioned, and/or protected to~~ provide water tightness, corrosion protection,
3205 and resistance to weather variations.

3206
3207 ~~(formerly Section 8(g)(ii))(o) Coatings.~~ Coatings used to protect structures, equipment,
3208 and piping shall be suitable for atmospheres containing moisture and low concentrations of
3209 chlorine. ~~Surfaces exposed in chemical areas shall be protected from chemical attack. Paints~~
3210 ~~shall not contain lead, mercury, or other toxic metals or chemicals.~~

3211
3212
3213 ~~(formerly Section 8(g)(ii))(p)~~ (p) Surfaces exposed in chemical areas shall be protected from
3214 chemical attack.

3215
3216 ~~(formerly Section 8(g)(ii))(q)~~ Paints shall not contain lead, mercury, or other toxic metals
3217 or chemicals.

3218
3219 ~~(formerly Section 8(k))(r)~~ Ventilation. All enclosed spaces shall be provided with
3220 forced ventilation, except pumping station wetwells or clearwells. ~~In areas where there are open~~
3221 ~~treatment units exposed to the room, ventilation shall be provided to limit relative humidity to~~
3222 ~~less than 85 percent but not less than 6 air changes per hour. In electrical and equipment rooms,~~
3223 ~~ventilation shall be provided to limit the temperature rise in the room to less than 15° F (8° C)~~
3224 ~~above ambient, but not less than 6 air changes per hour. Rooms housing chlorine storage and/or~~
3225 ~~feeders shall have provisions for exhausting the room contents in 2 minutes and continuous~~
3226 ~~ventilation to provide not less than~~
3227 ~~12 air changes per hour.~~

3228
3229 ~~(formerly Section 8(k))(i)~~ In areas where there are open treatment units
3230 exposed to the room, ventilation shall be provided to limit relative humidity to less than 85
3231 percent but not less than six air changes per hour.

3232
3233 ~~(formerly Section 8(k))(ii)~~ In electrical and equipment rooms, Ventilation in
3234 electrical and equipment rooms shall ~~be provided to~~ limit the temperature rise in the room to less
3235 than 15 °F (8° C) degrees Fahrenheit above ambient, ~~but not less than with at least~~ six air
3236 changes per hour. ~~Rooms housing chlorine storage and/or feeders shall have provisions for~~
3237 ~~exhausting the room contents in 2 minutes and continuous ventilation to provide not less than 12~~
3238 ~~air changes per hour.~~

3239
3240 ~~(formerly Section 8(f)(i))(s)~~ Equipment location. Service transformers and other critical
3241 electrical equipment shall be located above the 100-year flood and above grade. Transformers
3242 shall be located so that they are remote or protected by substantial barriers from traffic. Motor
3243 controls shall be located in superstructures and in rooms that do not contain corrosive
3244 atmospheres.

3245
3246 ~~(formerly Section 8(i)(i))(t)~~ Metering. ~~All~~ The treatment facility facilities shall have a
3247 flow measuring device provided for raw water influent and clear well effluent and ~~(formerly~~
3248 ~~Section 8(i)(i)) All flow meters each shall provide totalized flow~~. The accuracy of the device
3249 shall be at least plus or minus two percent of span.

3250
3251 ~~(formerly Section 8(i)(iii))(i)~~ Controls. Automatic controls shall be designed to
3252 permit manual override.

3253
3254 ~~(formerly Section 8(i)(ii))(ii)~~ Type. ~~All flow meters shall provide totalized flow.~~
3255 For plants with a maximum daily flow of 50,000 gpd ~~(189 m³/d)~~ or more, the meter shall also
3256 record the instantaneous flow rate.

3257
3258 ~~(formerly Section 8(i)(iv))(u)~~ Alarms. There shall be an alarm for High effluent turbidity
3259 and chlorine leaks ~~(when chlorine gas is used) shall be alarmed at an attended location. The~~
3260 alarm shall be located at an attended location.

3261
3262 ~~(formerly Section 8(q))(v) Monitoring equipment.~~ Water treatment plants with a
3263 capacity of ~~0.5 mgd (1892.6 m³/d)~~ 500,000 gpd or more shall be provided with continuous
3264 finished water turbidimeters (including recorders).

3265 **Section 11. ~~Chemical Application~~ Source Development.**

3266 ~~(a) General.~~

3267
3268
3269
3270 ~~(i) Chemical application. Chemicals shall be applied by such means as to~~
3271 ~~prevent backflow or back siphonage between multiple points of feed through common~~
3272 ~~manifolds.~~

3273
3274 ~~(ii) General equipment design. General equipment design shall be such that:~~

3275
3276 ~~(A) Feeders will be able to supply the necessary amounts of chemical~~
3277 ~~throughout the feed range at all times.~~

3278
3279 ~~(B) Chemical contact materials and surfaces are resistant to the~~
3280 ~~aggressiveness of the chemical solution.~~

3281
3282 ~~(C) Corrosive chemicals are introduced in such a manner as to~~
3283 ~~minimize potential for corrosion.~~

3284
3285 ~~(D) Chemicals that are incompatible are not stored or handled together.~~

3286
3287 ~~(E) All chemicals are conducted from the feeder to the point of~~
3288 ~~application in separate conduits.~~

3289
3290 ~~(F) Chemical feeders and pumps operate at no lower than 20 percent~~
3291 ~~of the feed range.~~

3292
3293 ~~(G) Slurry type chemicals, especially lime, are fed by gravity where~~
3294 ~~practical.~~

3295
3296 ~~(moved to Section 13(b))(b) Facility design.~~

3297
3298 ~~(moved to Section 13(b)(i))(i) Number of feeders. A separate feeder shall~~
3299 ~~be provided for each chemical applied.~~

3300
3301 ~~(ii) Control. Feeders may be manually or automatically controlled. Automatic~~
3302 ~~controls shall be designed to allow override by manual controls. Where plant flow rates are not~~
3303 ~~manually controlled, chemical feed rates shall be automatically proportioned to flow.~~

3304
3305 ~~Calibration cylinders shall be provided for each chemical system, enabling exact~~
3306 ~~measurement of chemical feed dose.~~

3307
3308 (iii) — ~~Dry chemical feeders. Dry chemical feeders shall measure chemicals~~
3309 ~~volumetrically or gravimetrically; they shall be provided with a solution water system and mixer~~
3310 ~~in the solution tank and; shall completely enclose chemicals to prevent emission of dust to the~~
3311 ~~operating room.~~

3312
3313 (iv) — ~~Positive displacement pumps. Positive displacement pumps shall be sized~~
3314 ~~for the maximum pressure at the point of injection. A backpressure valve shall be provided in~~
3315 ~~instances where chemicals can flow by gravity through the pump and pump check valves.~~

3316
3317 (v) — ~~Liquid chemical feeders — siphon control. Liquid chemical feeders shall be~~
3318 ~~such that chemical solutions cannot be siphoned into the water supply.~~

3319
3320 (vi) — ~~Cross-connection control. Cross-connection control must be provided to~~
3321 ~~assure that the service water lines discharging to solution tanks shall be protected from backflow~~
3322 ~~and that liquid chemical solutions cannot be siphoned through solution feeders into the water~~
3323 ~~supply. No direct connection shall exist between any sewer and a drain or overflow from the~~
3324 ~~feeder, solution chamber or tank. All drains shall terminate at least 6 inches (0.15 m) or 2 pipe~~
3325 ~~diameters, whichever is greater, above the overflow rim of a receiving sump, conduit or waste~~
3326 ~~receptacle.~~

3327
3328 (vii) — ~~In-plant water supply. The in-plant water supply shall be of sufficient~~
3329 ~~quantity and pressure to meet the chemical system needs. A minimum capability of 15 gpm at 50~~
3330 ~~psi is required.~~

3331
3332 There shall be a new means of controlling and measuring the water when used for
3333 ~~preparing specific solution concentrations by dilution, i.e., rotometer and control valve. The~~
3334 ~~water shall be properly treated for hardness when hardness affects the chemical solution.~~

3335
3336 (viii) — ~~Storage of chemicals.~~

3337
3338 (A) — ~~Storage space or tank volume shall be provided for at least 30 days~~
3339 ~~of chemical supply. The storage shall provide protection from intermixing of 2 different~~
3340 ~~chemicals.~~

3341
3342 (B) — ~~Storage tanks and pipelines for liquid chemicals shall be specific to~~
3343 ~~the chemical and not for alternates.~~

3344
3345 (C) — ~~Liquid chemical storage tanks must have a liquid level indicator,~~
3346 ~~an overflow and a receiving basin or drain capable of receiving accidental spills or over-flows,~~
3347 ~~and be located in a contained area sized to store the total contents of a ruptured tank.~~

3348
3349 (moved to Section 13(b)(ii))(D) — ~~All chemical storage tanks shall be~~
3350 ~~constructed of materials which are resistant to the chemical which they store. The tank shall not~~
3351 ~~lose its structural integrity through chemical action or be subject to corrosion.~~

3352

3353 ~~(ix) — Solution and slurry tanks.~~

3354
3355 ~~(A) — Feed and dilution systems shall be designed to maintain uniform~~
3356 ~~strength of solution in solution tanks. A mixer shall be provided to mix the tank contents when~~
3357 ~~batching solutions. Continuous agitation shall be provided to maintain slurries in suspension. A~~
3358 ~~means shall be provided to measure the solution level in the tank. Chemical solution tanks shall~~
3359 ~~have a cover. Large tanks with access openings shall have such openings curbed and fitted with~~
3360 ~~overhanging covers.~~

3361
3362 ~~(B) — Subsurface locations for solution tanks shall be free from sources~~
3363 ~~of possible contamination, and assure positive drainage for groundwaters, accumulated water,~~
3364 ~~chemical spills and overflows.~~

3365
3366 ~~(C) — Overflow pipes, when provided, shall be turned downward, with~~
3367 ~~the end screened. They shall have a free fall discharge and be located where noticeable.~~

3368
3369 ~~(D) — Acid storage tanks must be vented to the outside atmosphere, but~~
3370 ~~not through vents shared with any other material.~~

3371
3372 ~~(E) — Each tank shall be provided with a valved drain, protected against~~
3373 ~~backflow by an air gap of 6 inches (0.15 m) or 2 pipe diameters, whichever is greater.~~

3374
3375 ~~(x) — Day tanks.~~

3376
3377 ~~(A) — Day tanks shall be provided where bulk storage of liquid chemical~~
3378 ~~is provided and a dilute solution is to be fed, or where chemicals are manually batched. Day~~
3379 ~~tanks shall meet the requirements of solution tanks. Tanks shall be properly labeled to designate~~
3380 ~~the chemical contained.~~

3381
3382 ~~(B) — Hand pumps may be used to transfer chemicals from a carboy or~~
3383 ~~drum. A tip rack may be used to permit withdrawal into a bucket from a spigot. Where motor-~~
3384 ~~driven transfer pumps are provided, a liquid level limit switch and an overflow from the day tank~~
3385 ~~shall be provided.~~

3386
3387 ~~(C) — Continuous agitation shall be provided to maintain chemical~~
3388 ~~slurries in suspension. A mixer shall be provided to mix the initial dilution.~~

3389
3390 ~~(xi) — Feed lines:~~

3391
3392 ~~(A) — Shall be of durable material, resistant to the chemical handled.~~

3393
3394 ~~(B) — Shall be readily accessible for maintenance when located within~~
3395 ~~structures.~~

3396
3397 ~~(C) — Shall be protected against freezing.~~

3398

3399 ~~(D) — Shall be readily cleanable by using plugged crosses for 90° bends.~~

3400

3401 ~~(E) — Shall slope upward from the chemical source to the feeder when~~
3402 ~~conveying gases.~~

3403

3404 ~~(F) — Shall be designed consistent with scale forming or solids-~~
3405 ~~depositing properties of the water, chemical, solution, or mixtures conveyed.~~

3406

3407 ~~(G) — Shall be color coded.~~

3408

3409 ~~(H) — Shall have a connection for a flushing line.~~

3410

3411 ~~(xii) — Handling.~~

3412

3413 ~~(A) — Carts, elevators and other appropriate means shall be provided for~~
3414 ~~lifting chemical containers.~~

3415

3416 ~~(B) — Provisions shall be made for the transfer of dry chemicals from~~
3417 ~~shipping containers to storage bins or hoppers to minimize the quantity of dust which may enter~~
3418 ~~the room in which the equipment is installed. Provisions shall also be made for disposing of~~
3419 ~~empty bags, drums or barrels which will minimize exposure to dusts. Control may be provided~~
3420 ~~by using:~~

3421

3422 ~~(I) — Vacuum/pneumatic equipment or closed conveyor systems.~~

3423

3424 ~~(II) — Facilities for emptying shipping containers in special~~
3425 ~~enclosures.~~

3426

3427 ~~(III) — Exhaust fans and dust filters which put the hoppers or bins~~
3428 ~~under negative pressure.~~

3429

3430 ~~(C) — Provision shall be made for measuring quantities of chemicals used~~
3431 ~~to prepare feed solutions.~~

3432

3433 ~~(xiii) — Housing. Floor surfaces shall be smooth and impervious, slip resistant and~~
3434 ~~well drained with 2.5 percent minimum slope. Vents from feeders, storage facilities and~~
3435 ~~equipment exhaust shall discharge to the outside atmosphere above grade and remote from air~~
3436 ~~intakes.~~

3437

3438 ~~(e) — Specific chemicals.~~

3439

3440 ~~(i) — Chlorine gas.~~

3441

3442 ~~(A) — Respiratory protection equipment. Respiratory protection~~
3443 ~~equipment, meeting the requirements of the National Institute of Occupational Safety and Health~~
3444 ~~(NIOSH), shall be available where chlorine gas is handled, and shall be stored at a convenient~~

3445 location, but not inside any room where chlorine is used or stored. The units shall use
3446 compressed air, have at least a 30-minute capacity, and be compatible with or exactly the same as
3447 units used by the fire department responsible for the plant.
3448

3449 (B) — Chlorine leak detection. Where ton containers are used, or where
3450 plants store more than 1000 lbs (454 kg) of chlorine, continuous electronic chlorine leak
3451 detection equipment shall be provided.
3452

3453 (C) — Repair kits. Repair kits approved by the Chlorine Institute shall be
3454 provided for plants employing chlorine gas chlorination. The chlorine repair kits shall be
3455 available for each size container stored at the facility.
3456

3457 (D) — Feed and storage areas. Chlorine gas feed and storage shall be
3458 enclosed and separated from other operating areas. The chlorine room shall be provided with a
3459 shatter resistant window installed in an interior wall. The room shall be constructed in such a
3460 manner that all openings between the chlorine room and the remainder of the plant are sealed.
3461 The doors shall be equipped with panic hardware, assuring ready means of exit and opening
3462 outward only to the building exterior.
3463

3464 (E) — Ventilation. Where chlorine gas is used, the room shall
3465 have an exhaust ventilating system with a capacity which provides one complete air change
3466 every two minutes. The ventilating system shall take suction within 18 inches (0.46 m) of the
3467 floor, as far as practical from the door and air inlet, with the point of discharge so located as not
3468 to contaminate air intakes to any rooms or structures.
3469

3470 Air intakes shall be through louvers near the ceiling. Louvers for chlorine room
3471 air intake and exhaust shall facilitate airtight closure.
3472

3473 Separate switches for the fan and lights shall be located outside of the chlorine
3474 room and at the inspection window. Outside switches shall be protected from vandalism. A
3475 signal light indicating fan operation shall be provided at each entrance when the fan can be
3476 controlled from more than one point.
3477

3478 Vents from feeders and storage shall discharge to the outside atmosphere, above
3479 grade. The room location shall be on the prevailing downwind side of the building away from
3480 entrances, windows, louvers, walkways, etc.
3481

3482 Floor drains shall discharge to the outside of the building and shall not be
3483 connected to other internal or external drainage systems.
3484

3485 (F) — Cylinders. Full and empty cylinders of chlorine gas shall be
3486 isolated from operating areas, restrained in position to prevent upset, stored in rooms separate
3487 from ammonia storage, and stored in areas not in direct sunlight or exposed to excessive heat.
3488



3489 ~~(G) Heating. Chlorinator rooms shall be heated to 60° F (15.6° C) and~~
3490 ~~be protected from excessive heat. Cylinders and gas lines shall be protected from temperatures~~
3491 ~~above that of the feed equipment.~~

3492
3493 ~~(H) Feed lines. Pressurized chlorine feed lines shall not carry chlorine~~
3494 ~~gas beyond the chlorinator room.~~

3495
3496 ~~(ii) Acids and caustics:~~

3497
3498 ~~(A) Acids and caustics shall be kept in closed corrosion-resistant~~
3499 ~~shipping containers or in covered bulk storage units.~~

3500
3501 ~~(B) Acids and caustics shall be pumped in undiluted form from~~
3502 ~~original containers or bulk storage units through suitable pipe or hose to the point of treatment or~~
3503 ~~to a covered day tank.~~

3504
3505 ~~(C) An emergency deluge shower and eye wash shall be provided~~
3506 ~~where corrosive chemicals are stored or used.~~

3507
3508 ~~(iii) Sodium chlorite. Provisions shall be made for proper storage and handling~~
3509 ~~of sodium chlorite to eliminate any danger of explosion. No hydrocarbons or organics shall be~~
3510 ~~stored with sodium chlorite.~~

3511
3512 (a) 2018 TSS, parts 3.1.4.1, design of intake structures; 3.1.4.3, off-stream raw water
3513 storage reservoirs; 3.1.6, impoundments and reservoirs; 3.2.1.1, source capacity; 3.2.4.3-3.2.4.4,
3514 surface or temporary steel casing and permanent steel casing pipe; 3.2.4.5-3.2.4.6, polyvinyl
3515 chloride plastic (PVC) well casing and other nonferrous casing materials; 3.2.4.8, screens;
3516 3.2.4.9, grouting requirements for public water supply wells; 3.2.4.10, upper terminal well
3517 construction; 3.2.4.11, development; 3.2.4.12, disinfection of every new, modified, or
3518 reconditioned groundwater source; 3.2.4.13, capping requirements; 3.2.5, testing and records;
3519 3.2.6.1, sand or gravel wells; 3.2.6.2, gravel pack material; 3.2.6.4, infiltration lines; 3.2.6.5,
3520 limestone or sandstone wells; 3.2.7, well pumps, discharge piping, and appurtenances; 3.2.7.3,
3521 discharge piping; 3.2.7.4, pitless well units; 3.2.7.6, casing vent requirements; 3.2.7.7, water
3522 level measurement; and 3.2.7.8, observation wells, are herein incorporated by reference.

This extensive cross
reference will breed
confusion.

3523
3524 (b) Surface water intake structures that operate in the winter shall be capable of
3525 minimizing the formation of ice on the intake.

3526
3527 (c) Transmission lines and interconnecting process piping shall be capable of
3528 withstanding the forces and conditions they will be subject to and comply with the following
3529 specifications for water service, as applicable:

3530
3531 (i) AWWA C200;

3532
3533 (ii) AWWA C207;

3534

3535 (iii) AWWA C208;
3536
3537 (iv) AWWA C220;
3538
3539 (v) AWWA C228;
3540
3541 (vi) AWWA C300;
3542
3543 (vi) AWWA C301;
3544
3545 (vi) AWWA C302;
3546
3547 (vi) AWWA C303;
3548
3549 (vi) AWWA C304;
3550
3551 (xi) AWWA C900;
3552
3553 (vi) AWWA C901;
3554
3555 (vi) AWWA C903;
3556
3557 (vi) AWWA C904;
3558
3559 (vi) AWWA C906;
3560
3561 (vi) AWWA C907;
3562
3563 (vi) AWWA C909;
3564
3565 (vi) AWWA C950;
3566
3567 (vi) ASTM A53;
3568
3569 (vi) ASTM A134;
3570
3571 (vi) ASTM A135;
3572
3573 (vi) ASTM A139;
3574
3575 (vi) ASTM D2846;
3576
3577 (vi) ASTM F480;
3578
3579 (vi) ASTM F645;
3580

- 3581 (vi) ASTM F877;
- 3582
- 3583 (vi) ASTM F23891;
- 3584
- 3585 (vi) ASTM F2806;
- 3586
- 3587 (vi) ASTM F2855;
- 3588
- 3589 (vi) ASTM F2969;
- 3590
- 3591 (vi) API 5L:
- 3592
- 3593 (A) Grade B;
- 3594
- 3595 (B) Grade X42;
- 3596
- 3597 (C) Grade X46;
- 3598
- 3599 (D) Grade X52;
- 3600
- 3601 (E) Grade X56;
- 3602
- 3603 (F) Grade X60;
- 3604
- 3605 (G) Grade X65;
- 3606
- 3607 (H) Grade X70; or
- 3608
- 3609 (I) Grade X80.
- 3610

3611 ~~(formerly Section 9(a)(iii))(d)~~ Raw water supply piping. No Designs shall
3612 not include any customer service connection ~~shall be provided~~ from the raw water transmission
3613 line to the treatment plant; unless there are provisions to treat the water to meet ~~these standards~~
3614 the requirements of this Chapter, or the sole purpose of the service is for irrigation or agricultural
3615 water use. For irrigation agricultural services, applicants shall conduct a hazard classification and
3616 implement appropriate backflow prevention.

3617
3618 ~~(formerly Section 9(b))(e)~~ Designs that include Ggroundwater source development
3619 shall comply with the following requirements:

3620
3621 ~~(formerly Section 9(b)(i))(i)~~ Number and capacity. The total developed
3622 groundwater source, along with other water sources, shall provide a combined capacity that shall
3623 equal or exceed the design maximum daily demand. Proposed designs shall include Aa
3624 minimum of 2 two wells supplying twice the maximum daily demand, or 1 one well and finished
3625 water storage that together equal to twice the maximum daily demand shall be provided. Where 2



3626 wells are provided, the sources shall be capable of equaling or exceeding the design average
3627 daily demand with the largest producing well out of service.

3628
3629 ~~(formerly Section 9(b)(i)(B))(ii)~~ Relation to sources of pollution. Every well
3630 shall be located further from any of the sources of pollution listed below. The Wells shall
3631 maintain the following minimum isolation distances ~~listed below~~ apply when domestic
3632 wastewater is the only wastewater present.;

3633
3634 ~~(formerly Section 9(b)(i)(B)(I))(A)~~ If domestic wastewater is the only
3635 wastewater present and the design domestic sewage flow is less than 2,000 ~~gallons per day~~ gpd
3636 ~~(7,560 L/day)~~, the following minimum isolation distance shall be maintained:

3637
3638 ~~(formerly Section 9(b)(i)(A)(II)(A))~~ Table 1. Isolation Distances for Domestic Sewage Flows
3639 Less than 2,000 gpd

| <u>Source of Domestic Wastewater</u> | <u>Minimum Distance to Well</u> |
|--|---------------------------------|
| Sewer | 50 feet |
| Septic tank | 50 feet |
| Disposal field | 100 feet (30.5 m) |
| Seepage pit | 100 feet (30.5 m) |
| Cesspool | 100 feet (30.5 m) |
| <u>Storm and Sanitary Sewer Collection Systems</u> | <u>50 feet</u> |
| <u>Septic tank</u> | <u>50 feet</u> |
| <u>Absorption system</u> | <u>200 feet</u> |

3640
3641 ~~(formerly Section 9(b)(i)(B)(II))(B)~~ If domestic wastewater is the only
3642 wastewater present and the design domestic sewage flow is greater than 2,000 gpd ~~(7,560 L/day)~~
3643 but less than 10,000 gpd ~~(37,800 L/day)~~, the following minimum isolation distances shall be
3644 maintained:

3645
3646 Table 2. Isolation Distances for Domestic Sewage Flows Greater than 2,000 gpd

| <u>Source of Domestic Wastewater</u> | <u>Minimum Distance to Well</u> |
|--|---------------------------------|
| Sewer | 50 feet |
| Septic tank | 50 feet |
| Disposal field | 200 feet |
| Seepage pit | 200 feet |
| Cesspool | 200 feet |
| <u>Storm and Sanitary Sewer Collection Systems</u> | <u>50 feet</u> |

See subsequent notes in Section 16 RE
table naming convention. Possibly call
these out as Table 11-1 and 11-2.



| | |
|--------------------------|-----------------|
| <u>Septic tank</u> | <u>50 feet</u> |
| <u>Absorption system</u> | <u>500 feet</u> |

3647
3648
3649
3650
3651
3652
3653
3654
3655
3656
3657
3658
3659
3660
3661
3662
3663
3664
3665
3666
3667
3668
3669
3670
3671
3672
3673
3674
3675
3676
3677
3678
3679
3680
3681
3682
3683
3684
3685
3686
3687
3688
3689

~~(formerly Section 9(b)(i)(B)(III))(C)~~ For systems larger If domestic wastewater is the only wastewater present and the design domestic sewage flow is greater than 10,000 gallons per day (37,800 L/day), or non-domestic wastewater is present the required isolation distance shall be determined by a hydrogeological subsurface study, in accordance with the requirements of ~~Section 15 of Chapter 3 Water Quality Rules and Regulations~~ Water Quality Rules Chapter 3, Section 17(b), but shall not be less than those ~~listed above~~ required Tables 1 and 2 of this Section.

~~(formerly Section 9(b)(i)(C))(iii)~~ Relation to Wells shall maintain the following minimum isolation distances from buildings and property lines:

~~(formerly Section 9(b)(i)(C)(I))(A)~~ When a well is adjacent to the outside of a building, the well shall be located so that the centerline radius from the surface casing, extended vertically, will clear any projection from the building ~~by not less than 3 feet (0.91 m), and or will~~ clear any power line by not less than 10 feet ~~(3.05 m).~~

~~(formerly Section 9(b)(i)(C)(II))(B)~~ When a well is ~~to be~~ located inside a building, the top of the casing and any other well opening shall not terminate in the basement of the building, or in any pit or space that is below natural ground surface unless the well is completed with a properly protected submersible pump or provided with provisions for drainage to the ground surface that is not subject to flooding by surface water. Wells located in a structure ~~must shall~~ be accessible to pull the casing or the pump. The structure shall have overhead access.

~~(formerly Section 9(b)(i)(D))(C)~~ Relation to property lines. ~~Every~~ Wells shall be located at least 10 feet ~~(3.05 m)~~ from any property line.

~~(formerly Section 9(b)(ii)(iv))~~ Wells shall complete ~~T~~ testing and maintain records as follows:

Systems employing wells...

~~(formerly Section 9(b)(ii)(A))(A)~~ Yield and drawdown tests. Yield and drawdown tests shall be performed on every production well after construction or subsequent treatment and prior to placement of the permanent pump. The test methods shall be clearly indicated in the specifications. The test pump capacity, at maximum anticipated drawdown, shall be at least 1.5 times the design rate anticipated. The test shall provide for continuous pumping for at least 24 hours or until stabilized drawdown has continued for at least ~~6~~ six hours when test pumped at 1.5 times the design pumping rate.

~~(formerly Section 9(b)(ii)(B))(B)~~ Plumbness and alignment requirements. Every well shall be tested for plumbness and alignment in accordance with AWWA ~~A-100~~ A100. ~~The test method and allowable tolerance shall be stated in the specifications.~~

3690
3691 (v) In addition to meeting the requirements of Section 8 of this Chapter, plans for
3692 wells developed through acidizing activities shall also include:

3693
3694 (A) Information on the geology of the area that contains descriptions
3695 of:

3696
3697 (I) Known or potential faults, fractures, springs, karst features
3698 (such as sinkholes and other similar features) within a one-mile radius of the proposed well; and

3699
3700 (II) Faults and fractures that may extend from the acidized zone
3701 into overlying and underlying geologic formations and a description of any measures that will be
3702 taken to ensure that the acidized solution does not migrate into any of those geologic formations.

3703
3704 (B) For wells developed within a radius of one mile of existing wells,
3705 applicants shall submit plans that analyze the risk and mitigation measures to be taken to prevent
3706 impacts to those wells. The submitted plans shall include the risk and mitigation measures for
3707 any potential effects to each existing well.

3708
3709 (C) Existing information on the location of other wells (such as water
3710 supply, oil and gas, mineral development wells) within a one-mile radius of the proposed well,
3711 including any wells that intercept the acidized zone, and for wells that intercept the acidized
3712 zone:

3713
3714 (I) An analysis of whether or not those wells that intercept the
3715 acidized zone have been properly plugged and abandoned;

3716
3717 (II) An analysis of whether or not those wells have been
3718 properly cased and cemented; and

3719
3720 (III) A description of what measures will be or have been taken
3721 to prevent the acidized solution from migrating vertically in the annular space or casing of the
3722 existing wells into overlying or underlying geologic formations.

3723
3724 (D) A description of the borehole drilling phase and what measures
3725 will be taken to minimize the introduction of lost circulation materials into aquifers when
3726 encountering under-pressured geologic formations or other factors that may lead to a loss of
3727 circulation;

3728
3729 (E) A description of the acid injection process and the measures that
3730 will be taken to ensure that injection pressures do not create fractures in the overlying and
3731 underlying geologic formations and through which the acidized solution may migrate;

3732
3733 (F) A description of the volume and content of the acid and any other
3734 chemical compounds to be used during acidizing activities, including the management of the acid



3735 and chemical compounds prior to acidizing and final disposition of any acid, water, or chemical
3736 mixtures recovered from the well after acidizing activities are completed;

3737
3738 (G) A description of the measures that will be or have been taken to
3739 ensure that the recovery of the acidized solution is of sufficient duration and volume to eliminate
3740 the potential for acidic impacts to other wells completed within the injection zone; and

3741
3742 (H) A description of the methods to be performed to establish the
3743 placement and integrity of the annular seal and casing prior to acidization of the well.

3744
3745 ~~(formerly Section 9(b)(iii)(A))(vi) Protection during construction.~~ During any
3746 well construction or modification, the well and surrounding area ~~must~~ shall be adequately
3747 protected to prevent any groundwater contamination. Surface water ~~must~~ shall be diverted away
3748 from the construction area.

3749
3750 ~~(formerly Section 9(b)(iii)(B))(vii) All Wells types and shall comply with the~~
3751 following construction methods standards;

3752
3753 ~~(formerly Section 9(b)(iii)(I))(A) Dug wells.~~ Dug wells shall be ~~used~~
3754 ~~only where geological conditions preclude the possibility of developing an acceptable drilled~~
3755 ~~well constructed according to the State Engineer's standards;~~

wells that employ a
concrete apron

~~(formerly Section 9(b)(iii)(II)(2.))(B) Every drilled, driven, jetted, or bored well~~
3758 ~~shall have an unperforated casing that extends from a minimum of 12 inches (30 cm) above~~
3759 ~~ground the surface for concrete and 18 inches above natural ground surface to at least 10 feet~~
3760 ~~(3.05 m) below ground surface. In unconsolidated formations, this casing shall extend to the~~
3761 ~~water table or below. In consolidated formations, the casing may be terminated in rock or~~
3762 ~~watertight clay above the water table. The design shall demonstrate compliance with Water~~
3763 Quality Rules, Chapter 26.

3764
3765 ~~(formerly Section 9(b)(iii)(B)(X)(2.))(C) In gravel-packed wells,~~
3766 ~~aquifers containing inferior quality water shall be sealed by pressure grouting, or with special~~
3767 ~~packers or seals, to prevent such water from moving vertically in gravel-packed portions of the~~
3768 ~~well. Gravel-packed wells shall meet the following sealing requirements:~~

3769
3770 ~~(formerly Section 9(b)(iii)(IV)(2.))(I) If a permanent surface~~
3771 ~~casing is not installed, the annular opening between the casing and the drill hole shall be sealed~~
3772 ~~in the top 10 feet (3.05 m) with concrete or cement grout; or~~

3773
3774 ~~(formerly Section 9(b)(iii)(IV)(2.))(II) If a permanent surface~~
3775 ~~casing is installed, it shall extend to a depth of at least 10 feet (3.05 m). The annular opening~~
3776 ~~between this outer casing and the inner casing shall be covered with a metal or cement seal.~~

3777
3778 ~~(formerly Section 9(b)(iii)(IV)(1.))(D) When artesian~~
3779 naturally flowing water is encountered in a well, unperforated casing shall extend into the
3780 confining layer overlying the ~~artesian~~ water-bearing zone. This casing shall be adequately sealed

3781 with cement grout into the confining zone to prevent both surface and subsurface leakage from
3782 the ~~artesian water-bearing~~ zone. The method of construction shall be such that during the
3783 placing of the grout and the time required for it to set, no water shall flow through or around the
3784 annular space outside the casing, and no water pressure sufficient to disturb the grout prior to
3785 final set shall occur. ~~After the grout has set completely, d~~Drilling operations ~~may~~ shall not be
3786 continued into the ~~artesian water-bearing~~ zone until the grout has set completely. If leakage
3787 occurs around the well casing or adjacent to the well, the well shall be recompleted with any
3788 seals, packers or casing necessary to eliminate the leakage completely.

3789
3790 (I) Flowing wells shall be constructed to control the flow of
3791 water from the well. The well grouting shall be engineered to prevent the movement of water
3792 along the well casing and to prevent the migration of pressurized water into upper aquifers. A
3793 flow control device shall be installed into the wellhead to control the flow of water from the well.
3794 Overflows shall discharge a minimum of 18 inches above grade and flood level and discharge to
3795 an effective drainage structure.

3796
3797 (II) There shall be no direct connection between any discharge
3798 pipe and a sewer or other source of pollution.

3799
3800 ~~(formerly Section 9(b)(iii)(B)(X)(1.))(E)~~ Any time during the
3801 construction of a well that If mineralized water or water known to be polluted is encountered
3802 during the construction of a well, the aquifer or aquifers containing such inferior quality water
3803 shall be adequately cased or sealed off ~~so that to prevent~~ water ~~shall not from~~ entering the well,
3804 ~~nor will it move and to prevent water from moving~~ up or down the annular space; and outside
3805 ~~the well casing. If necessary, special seals or packers shall be installed to prevent movement of~~
3806 ~~inferior quality water. Mineralized water may be used if it can be properly treated to meet all~~
3807 ~~drinking water quality standards as determined by the administrator. When mineralized water is~~
3808 ~~encountered, it shall not be mixed with any other waters from different aquifers within the well.~~

3809
3810 ~~(formerly Section 9(b)(iii)(B)(X)(1.))(I)~~ If a well is penetrating
3811 multiple aquifers, mineralized water shall be excluded from the well if water is taken from other
3812 non-mineralized aquifers. If a For wells is that penetrating penetrate multiple aquifers,
3813 mineralized water shall be excluded from the well if water is taken from other, non-mineralized
3814 aquifers.

3815
3816 (II) Applications that propose to use mMineralized water ~~may~~
3817 be used as a public water supply shall demonstrate if it can be properly the treatment to meet
3818 all will comply with the drinking water quality standards ~~as determined by the administrator~~
3819 required by the 40 CFR Part 141.

3820
3821 ~~(formerly Section 9(b)(iii)(B)(XI)(1.))(F)~~ Existing oil ~~and or~~ gas wells,
3822 ~~seismic test holes, private water wells, or mineral~~ exploration test holes that can be completed to
3823 conform to all minimum construction standards required by this Chapter may be converted for
3824 use as a public water supply wells, ~~provided that the wells can be completed to conform to the~~
3825 ~~minimum construction standards cited in this chapter. This does not relieve the applicant from~~



3826 ~~obtaining appropriate permits.~~ The permit application shall identify all actions to be completed to
3827 achieve compliance with this Chapter.

3828
3829 ~~(formerly Section 9(b)(iii)(C)(I)(viii))~~ (formerly Section 9(b)(iii)(C)(I)(viii)) Casing—~~The casing shall provide~~
3830 ~~structural stability to prevent casing collapse during installation as well as drill hole wall~~
3831 ~~integrity when installed, be of required size to convey liquid at a specified injection/recovery rate~~
3832 ~~and pressure, and~~ be of required size to convey liquid at a specified injection/recovery rate and
3833 pressure, shall be of required size to allow for sampling, and shall meet the following
3834 requirements:

3835
3836 ~~(formerly Section 9(b)(iii)(C)(I)(2.)(c.))~~ (formerly Section 9(b)(iii)(C)(I)(2.)(c.)) (A) High-strength carbon steel
3837 sheets or “well casing steel”: ~~Each sheet of material shall contain mill markings which that will~~
3838 identify the manufacturer and specify that the material is well casing steel ~~which that~~ complies
3839 with the chemical and physical properties published by the manufacturer.

3840
3841 ~~(formerly Section 9(b)(iii)(C)(I)(2.)(d.))~~ (formerly Section 9(b)(iii)(C)(I)(2.)(d.)) (B) Stainless steel casing shall
3842 meet the provisions of ASTM A409 ~~"Standard Specification for Welded Large Diameter~~
3843 ~~Austenitic Steel Pipe for Corrosive or High Temperature Service"~~.

3844
3845 ~~(formerly Section 9(b)(iii)(C)(I)(3.))~~ (formerly Section 9(b)(iii)(C)(I)(3.)) (C) ~~Nonferrous casing materials.~~
3846 ~~Nonferrous or plastic material may be used as a well casing. It must be resistant to the~~
3847 ~~corrosiveness of the water and to the stresses to which it will be subjected during installation,~~
3848 ~~grouting, and operation. The material shall be nontoxic. All joints shall be durable and~~
3849 ~~watertight.~~ Nonferrous casing material shall be nontoxic, shall have joints that are durable and
3850 watertight, and:

3851
3852 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(a.))~~ (formerly Section 9(b)(iii)(C)(I)(3.)(a.)) (I) ~~Thermoplastics. This~~
3853 material used for well casing shall meet the ~~requirements~~ specifications of ASTM F 480,
3854 ~~"Standard Specification for Thermoplastic Water Well Casing Pipe and Couplings made in~~
3855 ~~Standard Dimension Ratios (SDR)"~~.

Not plural

3856
3857
3858 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(b.))~~ (formerly Section 9(b)(iii)(C)(I)(3.)(b.)) (II) ~~Thermosets. This~~
3859 material used for well casing shall meet ~~the requirements of one~~ of the following specifications:

3860
3861 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(b.))~~ (formerly Section 9(b)(iii)(C)(I)(3.)(b.)) (1.) ASTM D2996
3862 ~~"Standard Specification for Filament Wound Reinforced Thermosetting Resin Pipe."~~;

3863
3864 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(b.))~~ (formerly Section 9(b)(iii)(C)(I)(3.)(b.)) (2.) ASTM D2997
3865 ~~"Standard Specification for Centrifugally Cast Reinforced Thermosetting Resin Pipe."~~;

3866
3867
3868 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(b.))~~ (formerly Section 9(b)(iii)(C)(I)(3.)(b.)) (3.) ASTM
3869 D3517 ~~"Standard Specification for Reinforced Plastic Mortar Pressure Pipe."~~ or

3870

3871 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(b.))~~(4.) AWWA
3872 C950, ~~"AWWA Standards for Glass Fiber Reinforced Thermosetting Resin Pressure Pipe."~~

3873
3874 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(c.))~~(II) Concrete pipe used
3875 for casing ~~should conform to~~ shall meet one of the following specifications

3876
3877 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(c.))~~(1.) ASTM C14
3878 ~~"Standard Specifications for Concrete Sewer, Storm Drain, and Culvert Pipe.";~~

3879
3880 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(c.))~~(2.) ASTM C76
3881 ~~"Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.";~~

3882
3883 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(c.))~~(3.) AWWA C300
3884 ~~"AWWA Standards for Reinforced Concrete Pressure Pipe, Steel Cylinder Type, for Water and~~
3885 ~~Other Liquids.";~~ or

3886
3887 ~~(formerly Section 9(b)(iii)(C)(I)(3.)(c.))~~(4.) AWWA C301
3888 ~~"AWWA Standards for Prestressed Concrete Pressure Pipe, Steel Cylinder Type, for Water and~~
3889 ~~Other Liquids.";~~

3890
3891 ~~(formerly Section 9(b)(iii)(C)(I)(4.))~~(D) ~~Casing diameter.~~ The
3892 well casing diameter (inside diameter) and associated pump diameter shall be a minimum of one
3893 size larger than the largest dimension/diameter of the pump or pumping structure meet AWWA
3894 A100 minimum requirements for standard well-casing sizes for wells. If a reduction in casing
3895 diameter is made, there shall be adequate overlap of the casing to prevent misalignment and to
3896 prevent the movement of unstable sediment into the well. ~~To prevent the migration of~~
3897 ~~mineralized, polluted, or otherwise inferior quality water, lead or neoprene packers shall be~~
3898 ~~installed to seal the annular space between casings.~~

3899
3900 (x) Packers and screens for public water supply wells shall meet the following
3901 requirements:

3902
3903 ~~(formerly Section 9(b)(iii)(C)(I)(4.))~~(A) ~~To prevent the migration of~~
3904 ~~mineralized, polluted, or otherwise inferior quality water, lead or neoprene packers shall be~~
3905 ~~installed to seal the annular space between casings.~~ Neoprene packers shall be installed to seal
3906 the annular space between casings to prevent the migration of mineralized, polluted, or otherwise
3907 inferior quality water.

3908
3909 ~~(formerly Section 9(b)(iii)(C)(III)(3.))~~(B) ~~For a nonhomogeneous~~
3910 ~~aquifer having a uniformity coefficient less than 3.0 and an effective grain size less than 0.01~~
3911 ~~inches, an artificial filter or screen shall be used.~~ An artificial filter or screen shall be used for
3912 nonhomogeneous aquifers that have a uniformity coefficient less than 3.0 and an effective grain
3913 size less than 0.01 inches.

3914
3915 (ix) The minimum grout thickness for public water supply wells shall be
3916 determined in accordance with AWWA Standard A100, part 4.7.8.3.



3917
3918
3919
3920
3921
3922
3923
3924
3925
3926
3927
3928
3929
3930
3931
3932
3933
3934
3935
3936
3937
3938
3939
3940
3941
3942
3943
3944
3945
3946
3947
3948
3949
3950
3951
3952
3953
3954
3955
3956
3957
3958
3959
3960
3961

(x) Well seals shall meet the following requirements:

(A) The annular space shall be sealed to protect against contamination or pollution by the entrance of surface or shallow subsurface waters; and

(B) Annular seals shall be installed to provide protection for the casing against corrosion, to ensure the structural integrity of the casing, and to stabilize the upper formation.

if employed, (xi) The concrete floor or apron of an upper terminal well construction for a public water supply well shall slope away from the casing at a slope of one inch per foot.

(xii) Well pumps shall be located at a point above the top of the well screen.

~~(formerly Section 9(b)(iii)(D)(II))~~ (xxiii) Submersible pumps. Where a submersible pump is used, ~~the top of the casing shall be effectively sealed against the entrance of water under all conditions of vibration or movement of conductors or cables. The electrical cable shall be firmly attached to the rise pipe at 20 foot (6.1 m) intervals or less, and the pump shall be located at a point above the top of the well screen~~ a check valve (foot valve) shall be located in the tubing string above the pump in addition to the check valve located above ground to prevent negative pressures on the discharge piping.

~~(formerly Section 9(b)(iii)(C)(IV))~~ (xxiv) Pitless well units. A pitless adaptor or well house shall be used where needed to protect the water system from freezing.

~~(formerly Section 9(b)(iii)(C)(IV))~~ (xxv) A frost pit may be used only in conjunction with a properly protected pitless adaptor.

~~(formerly Section 9(b)(iii)(C)(vi))~~ (xxvi) Water level management. ~~Every wWells with diameters that are greater than 4 four inches (10 cm) in diameter shall be equipped with an access port that will allow for the measurement of the depth to the water surface; or in the case of a flowing artesian well, with a pressure gauge that will indicate pressure. A an air line used for water level measurements or, shall be provided on all wells greater than 4 inches (10 cm) in diameter. Installation of water level measuring equipment shall be made using corrosion-resistant materials attached firmly to the drop pipe or pump column and in such a manner as to prevent entrance of foreign materials.~~ in the case of a flowing artesian well, with a pressure gauge that will indicate pressure.

~~(formerly Section 9(b)(iii)(C)(VII))~~ (xxvii) Discharge measuring device. ~~Every Each well shall be piped so that have a device capable of measuring the total well discharge can be placed in operation at the well for well testing. Every well field (or when only one well is present, every well) and shall have a device capable of measuring the total discharge from the field if there is more than one pump in operation.~~



3962 ~~(formerly Section 9(b)(iii)(C)(IX))(xxviii)~~ Well abandonment. Test wells and
3963 groundwater sources ~~which that~~ are ~~not in use shall be~~ sealed for plugging and abandonment in
3964 accordance with requirements of Water Quality Rules Chapter 26, ~~Water Quality Rules and~~
3965 ~~Regulations~~ Section 11 shall be sealed by filling with neat cement grout. The filling materials
3966 shall be applied to the well hole through a pipe, or tremie.

3967
3968 (f) Facilities that include spring development shall meet the following requirements:

3969
3970 (i) Spring collection systems shall be constructed to collect spring water
3971 while preventing contamination of the source from the ground surface or other contaminant
3972 sources.

3973
3974 (A) Spring water collection systems shall be developed where spring
3975 water is a minimum of three feet below the ground surface.

3976
3977 (B) Seepage springs shall have a trench for the collection site that
3978 extends at least six inches into the impervious layer, but not entirely through the impervious
3979 layer. Concentrated springs shall be developed down to bedrock.

3980
3981 (I) A bed of clean and disinfected rock shall be installed at the
3982 collection site extending the width of the spring from which water is being collected.

3983
3984 (II) The collection site shall:

3985
3986 (1.) Be covered with 60 mil plastic sheeting or an
3987 equivalent puncture-proof and water-proof barrier; and

3988
3989 (2.) Be protected from damage during back-fill and re-
3990 grading of the site to the original surface elevation with protective fabric or sand.

3991
3992 (C) Collecting walls shall be:

3993
3994 (I) Constructed immediately downstream of the collection site;

3995 and

What does this mean?
Wall thickness?

3996
3997 (II) Made of concrete, with a minimum width of six inches, or
3998 plastic; and No plastic spec?

3999
4000 (D) The spring water collection pipe shall be installed in accordance
4001 with the USDA NRCS Part 631 National Engineering Handbook, Chapter 32, part
4002 631.3201(b)(iii) for delivery pipes.

4003
4004 (I) The size of the collection pipe shall be sufficient to convey
4005 the flow of the spring.

4006

4007 (II) Pipe material and appurtenances shall comply with
4008 allowable well construction material for water distribution in accordance with the standards
4009 listed in paragraph (c) of this Section.

4010
4011 (III) Appropriate bedding and cover material shall protect the
4012 pipe from damage and freezing.

4013
4014 (ii) The horizontal setback for spring development shall be no less than the
4015 setback distances in (b)(iv) of this section.

4016
4017 (iii) All potential sources of contamination shall be removed from the spring
4018 protection area.

4019
4020 (iv) The spring collection site shall include fencing or other protective features
4021 that are constructed and secured to exclude large animals and unauthorized persons from
4022 entering.

4023
4024 (A) Fencing shall be designed to withstand animals and snow loading.
4025 Other protective systems may be proposed.

4026
4027 (B) Fencing shall include an entry point to allow access by authorized
4028 persons for inspection and maintenance activities.

4029
4030 (v) The spring collection site shall include a diversion ditch that is constructed
4031 on the upstream side of the spring collection site to route surface water flows away from the
4032 collection area. The diversion ditch shall be located a minimum of 10 feet away from the
4033 collection wall.

4034
4035 (vi) The spring collection site shall be equipped to disinfect water prior to
4036 distribution and shall include sampling ports before and after the disinfection application point.

4037
4038 (vii) Spring boxes shall comply with the finished water storage requirements of
4039 Section 14 of this Chapter.

4040 **Section 12. ~~Pumping Facilities~~ Treatment.**

4041
4042
4043 ~~(moved to Section 14(g)(iv))(a) — Total dynamic head. The total dynamic head rating~~
4044 ~~of pumping units shall be based on pipe friction, pressure losses from piping entrances, exits,~~
4045 ~~appurtenances (bends, valves, etc.), and static head at the design flow.~~

4046
4047 ~~(b) — Location.~~

4048
4049 ~~(i) — The pumping station shall be elevated or protected to a minimum of 3 feet~~
4050 ~~above the 100-year flood elevation, or 3 feet above the highest recorded flood elevation,~~
4051 ~~whichever is higher.~~

4052

4053 (ii) ~~—The station shall be accessible to operating personnel at all times, and~~
4054 ~~during all weather.~~

4055 (iii) ~~—The site around the station shall be graded to lead surface drainage away~~
4056 ~~from the station.~~

4057 (iv) ~~—The station shall have security installed to prevent vandalism and entrance~~
4058 ~~by unauthorized persons or animals.~~

4059 (e) ~~—Pumping stations—raw and finished water.~~

4060 (i) ~~—They shall have outward opening doors.~~

4061 (ii) ~~—They shall have a floor elevation or a main level entry of at least 6 inches~~
4062 ~~above finished grade. All floors shall slope at least 2 1/2 inches in every 10 feet to a suitable~~
4063 ~~drain. Pumps shall have an outlet for drainage from pump glands without discharging onto the~~
4064 ~~floor.~~

4065 (iii) ~~—They shall have any underground structures waterproofed.~~

4066 (d) ~~—Wetwells. Finished water wetwells shall be covered. All vents shall be turned~~
4067 ~~down and screened. Finished water wetwells shall be located above the groundwater table and~~
4068 ~~the top of the walls from the wetwell shall be at least 18 inches above finished grade.~~

4069 (e) ~~—Equipment servicing. Pump stations shall be provided with craneways, hoist~~
4070 ~~beams, eyebolts, or other facilities for servicing or removing pumps, motors or other heavy~~
4071 ~~equipment. They shall be rated for not less than 50 percent more than the weight of the heaviest~~
4072 ~~single item to be lifted. Openings in floors and roofs shall be provided as needed for removal of~~
4073 ~~heavy or bulky equipment.~~

4074 (moved to Section 14(b))(f) ~~—Stairways and ladders. Stairways or ladders shall be~~
4075 ~~provided between all floors, and in pits or compartments which must be entered. They shall have~~
4076 ~~handrails on both sides, and treads of non-slip material. The Wyoming Occupational Health and~~
4077 ~~Safety Rules and Regulations shall be complied with.~~

4078 (moved to Section 14(c))(g) ~~—Heating. Provisions shall be made for heating to maintain a~~
4079 ~~minimum temperature of 40° F (4° C) if not typically occupied and 50° F (10° C) if occupied.~~

4080 (moved to Section 14(d))(h) ~~—Ventilation. All accessible pumping station areas shall be~~
4081 ~~ventilated. Ventilation may be continuous or intermittent. If intermittent, ventilation in areas~~
4082 ~~normally visited by operating personnel shall be started automatically at not greater than 30~~
4083 ~~minute intervals. Permanently installed drywell ventilation shall provide at least 6 air changes~~
4084 ~~per hour if continuous, and 12 air changes per hour if intermittent. Intermittent ventilating~~
4085 ~~equipment shall ensure starting upon entry of operating personnel. Wetwells shall be designed to~~
4086 ~~permit the use of portable blowers that will exhaust the space and continue to supply fresh air~~
4087 ~~during access periods.~~

4099
4100 ~~(moved to Section 14(e))(i)—Dehumidification. In below ground pumping stations, a~~
4101 ~~means for dehumidification shall be provided. The facilities shall be sized to maintain the~~
4102 ~~dewpoint at least 2 below the coldest anticipated temperature of water to be conveyed in the~~
4103 ~~pipes.~~

4104
4105 ~~(j)—Lighting. Lighting levels shall be sufficient to permit safe operation and~~
4106 ~~maintenance of all equipment within the pumping stations, but not less than 30 foot candles. All~~
4107 ~~areas shall be lit in such a manner that the failure of 1 lighting fixture or lamp will not cause the~~
4108 ~~area to be completely dark.~~

4109
4110 ~~(moved to Section 14(f))(k)—Sanitary and other conveniences. All pumping stations that~~
4111 ~~are manned for four or more hours per day shall be provided with potable water, lavatory and~~
4112 ~~toilet facilities. Wastes shall be discharged to the sanitary sewer or to an on-site waste treatment~~
4113 ~~system.~~

4114
4115 ~~(moved to Section 14(g))(l)—Pumps. At least two pumping units shall be provided. With~~
4116 ~~the largest pump out of service, the remaining pump or pumps shall be capable of providing the~~
4117 ~~maximum pumping rate of the system.~~

4118
4119 ~~(moved to Section 14(g)(ii))(m)—Suction lift. Pumps shall be selected so that the net~~
4120 ~~positive suction head required at maximum flow (NPSHR) is less than the net positive suction~~
4121 ~~head available (NPSHA) minus 4 feet (1.2 m) based on the hydraulic conditions and altitude of~~
4122 ~~the pumping station. If this condition is not met, then priming shall be provided.~~

4123
4124 ~~Priming water must not be of lesser sanitary quality than that of the water being pumped.~~
4125 ~~Vacuum priming may be used.~~

4126
4127 ~~When an air operated ejector is used, the screened intake shall draw clean air from a point~~
4128 ~~at least 10 feet above the ground or other source of possible contamination.~~

4129
4130 ~~(moved to Section 14(g)(iii))(n)—Surge control. Piping systems shall be designed to~~
4131 ~~withstand the maximum possible surge (water hammer) from the pumping station, or adequate~~
4132 ~~surge control provided to protect the piping. Pressure relief valves are not acceptable surge~~
4133 ~~control.~~

4134
4135 ~~(moved to Section 14(h))(o)—Booster pumps.~~

4136
4137 ~~(moved to Section 14(h)(i))(i)Booster pumps shall not produce a pressure less~~
4138 ~~than 5 psi in suction lines. Where the suction line has service connections, booster pump intake~~
4139 ~~pressure shall be at least 35 psi (138 kPa) when the pump is in normal operation and shall be~~
4140 ~~provided with a low pressure cutoff switch if the suction line pressure is a minimum of 20 psi (69~~
4141 ~~kPa).~~

4142

4143 ~~(moved to Section 14(h)(iii))(ii) — Automatic or remote control devices shall~~
4144 ~~have a range between the start and cutoff pressure which will prevent cycling of more than 1~~
4145 ~~start every 15 minutes.~~

4146
4147 ~~(moved to Section 14(h)(iv))(iii) — In-line booster pumps shall be accessible for~~
4148 ~~servicing and repairs. The access opening and vault shall be large enough to remove the pump.~~

4149
4150 ~~(moved to Section 14(h)(v))(iv) — Individual home booster pumps shall not be~~
4151 ~~allowed for any individual service from the public water supply main.~~

4152
4153 ~~(moved to Section 14(h)(vi))(p) — Automatic and remote-controlled stations.~~
4154 ~~Conditions that may affect continuous delivery of water shall be alarmed at an attended location.~~

4155
4156 ~~(q) — Appurtenances.~~

4157
4158 ~~(i) — Valves.~~

4159
4160 ~~(A) — All pumps except submersibles shall have a suction and discharge~~
4161 ~~valve to permit satisfactory operation, maintenance and repair of the equipment. Submersible~~
4162 ~~pumps shall have a check valve and discharge valve to permit satisfactory operation,~~
4163 ~~maintenance and repair of the equipment.~~

4164
4165 ~~(B) — If foot valves are necessary, they shall have a net valve area of at~~
4166 ~~least 2 1/2 times the area of the suction pipe and they shall be screened.~~

4167
4168 ~~(moved the Section 14(i)(i))(C) — Each pump shall have an individual~~
4169 ~~suction line or the lines shall be so manifolded that they will ensure similar hydraulic and~~
4170 ~~operating conditions.~~

4171
4172 ~~(D) — Check. All pumps shall be provided with a check valve located~~
4173 ~~between the pump and the discharge shutoff valve, except where arranged so that backflow is not~~
4174 ~~possible under normal operating conditions.~~

4175
4176 ~~(moved to Section 14(i)(i))(E) — Air release. Air release valves shall~~
4177 ~~be provided where the pipe crown is dropped in elevation.~~

4178
4179 ~~(ii) — Gauges. Each pump shall have a standard pressure gauge on its discharge~~
4180 ~~line. Each pump shall have a compound gauge on its suction line, except wet pit type pumps.~~

4181
4182 ~~(iii) — Water seals. Water seals shall not be supplied with water of a lesser~~
4183 ~~sanitary quality than that of the water being pumped. Where pumps are sealed with potable water~~
4184 ~~and are pumping water of lesser sanitary quality, the seal shall be supplied from a break tank~~
4185 ~~open to atmospheric pressure. The tank shall have an air gap of at least 6 inches (0.15 m) or 2~~
4186 ~~pipe diameters, whichever is greater, between the feeder line and the spill line of the tank.~~

4187



4188 (iv) ~~Controls. Pumps, their prime movers and accessories, shall be controlled~~
4189 ~~in such a manner that they will operate at rated capacity without overload. Provision shall be~~
4190 ~~made to prevent energizing the motor in the event of a backspin cycle. Electrical controls shall~~
4191 ~~be located above grade.~~

4192
4193 (a) 2018 TSS, parts 4.2.1(b) and 4.2.1(c), presedimentation for inlets and bypasses;
4194 4.2.2, coagulation; 4.2.4(b), sedimentation by inlet devices; 4.2.4(c), sedimentation by velocity;
4195 4.2.4(d), sedimentation by outlet devices; 4.3.4.2, 4.4.4.3 (a)(b)(d), 4.3.4.4 through 4.3.4.8 and
4196 4.3.4.9 (b)(e)(f), the design of slow sand filters; 4.3.1.1, pretreatment of rapid rate gravity
4197 filters; 4.3.1.4, structural details and hydraulics; 4.3.1.6 (a) thru (c), 4.3.1.6 (d)(1), 4.3.1.6 (d)(2),
4198 4.3.1.6 (d)(4) and 4.3.1.6 (e)(1), filter materials; 4.3.3.6, diatomaceous earth filtration pre-coat;
4199 4.3.3.7, diatomaceous earth body feed system; 4.3.3.8, diatomaceous earth filtration design;
4200 4.3.3.10(a)(1-4), diatomaceous earth appurtenances; 4.3.3.10(b)(6,) diatomaceous earth filtration
4201 monitoring; 4.4, disinfection; 4.4.4.3, automatic switch-over; 4.4.1 (a) and (b), contact time, CT,
4202 and point(s) of application; 4.4.4.7, cross-connection protection; 4.4.4.8 is herein incorporated by
4203 reference for pipe material; 4.4.5 through 4.4.5., chloramines; 4.4.6 through 4.4.6.9 and 4.4.6.11,
4204 ozone; 4.5.1, 4.5.1.1, and 4.5.1.3 through 4.5.1.9, softening; 4.5.2.1 through 4.5.2.5, 4.5.2.7
4205 through 4.5.2.11, 4.5.2.13 (a-f), 4.5.2.14, 4.5.2.15,4.5.2.18, 4.5.2.19 and 4.5.3, cation exchange
4206 process; 4.6 through 4.6.14 are herein incorporated by reference for anion exchange treatment;
4207 4.7 through 4.7.5.3, 4.7.5.4(b-f), and 4.7.5.5 through 4.7.11, aeration; 4.8 through 4.8.4, 4.8.6,
4208 and 4.8.7, iron and manganese control; 4.9.3, 4.9.5(c), and 4.9.6, carbon dioxide addition,
4209 phosphate system design, and pH/alkalinity adjustment; 4.10 through 4.10.4 and 4.10.8, taste and
4210 odor control; 4.11 through 4.11.3, membrane technologies for public water supplies; 9.3 and
4211 9.3(a)(1-2), precipitative softening sludge, 9.4.1, lagoons; and 9.5 through 9.5.3, “red water”
4212 waste, are herein incorporated by reference.

Would it take less room to just add the text of each section?

4213
4214 ~~(formerly Section 10(a))(b) Design capacity.~~ The designed capacity of the water
4215 treatment or water production system shall be ~~designed~~ for the maximum daily demand at the
4216 design year.

4217
4218 ~~(formerly Section 10(b))(i)~~ Presedimentation- shall be required for R_{raw}
4219 waters ~~which~~ that have episodes of turbidity in excess of 1,000 TU for a period of one week or
4220 longer ~~shall be presettled~~.

4221
4222 ~~(formerly Section 10(b)(i))(ii)~~ ~~Detention time.~~ Basins without mechanical
4223 sludge collection equipment shall have a minimum detention time of three days. Basins with
4224 mechanical sludge collection equipment shall have a minimum detention time of three hours.

4225
4226 ~~(formerly Section 10(b)(iv))(iii)~~ ~~Bottom slope.~~ Basins shall have a bottom
4227 slope to drain of ¼ inch per foot ~~(20 mm/m)~~ without mechanical sludge collection equipment and
4228 2 two inches per foot ~~(16 cm/m)~~ with mechanical sludge collection equipment.

4229
4230 ~~(formerly Section 10(b)(iii))(iv)~~ ~~Drains.~~ Basins shall have a minimum of one,
4231 ~~8-inch (20 cm)~~ eight-inch drain line to completely dewater the facility.
4232

4233 ~~(formerly Section 10(e))(c)~~ Rapid mix. Rapid dispersal of chemicals throughout the
4234 water shall be accomplished by mechanical mixers, jet mixers, static mixers, or hydraulic jump.

4235
4236 ~~(formerly Section 10(e)(i))(i)~~ Mixing intensity. For mechanical mixers, the
4237 minimum Gt (velocity gradient (sec-1) x t (sec)) provided at maximum daily flow shall be
4238 27,000.

4239
4240 ~~(formerly Section 10(e)(ii))(ii)~~ Mixing time. The detention time in a flash
4241 mixing chamber shall not exceed 30 seconds at maximum daily flow conditions.

4242
4243 ~~(formerly Section 10(e)(iii))(iii)~~ Drain. The basin shall have a drain.

4244
4245 ~~(formerly Section 10(d))(d)~~ Flocculation shall comply with the following
4246 requirements: ~~The low velocity agitation of chemically treated water shall be accomplished by~~
4247 ~~mechanical flocculators.~~

4248
4249 ~~(formerly Section 10(d))(i)~~ Mechanical flocculators shall be used for ~~The low velocity~~
4250 ~~agitation of chemically treated water shall be accomplished by mechanical flocculators.~~

4251
4252 ~~(formerly Section 10(d)(i))(ii)~~ Detention time. ~~A~~ The minimum detention
4253 time of 10 minutes ~~detention time~~ shall be provided.

4254
4255 ~~(formerly Section 10(d)(iii))(iii)~~ Drains. ~~Flocculation b~~Basins shall have a
4256 minimum of one drain line to dewater the facility.

4257
4258 ~~(formerly Section 10(d)(ii))(iv)~~ Mixing intensity. The velocity gradient (G
4259 value) ~~imposed~~ shall be adjustable ~~by providing~~ through the use of variable speed drives, ~~or shall~~
4260 ~~be designed to~~ The velocity gradient for single basin systems shall be 30 sec-1, ~~if a single basin~~
4261 ~~is provided,~~ 20 sec-1 in the final basin of a two stage system, and 10 sec-1 in the final basin of a
4262 three stage system. ~~For a single speed drive system, the tip speed of the mixer shall not exceed 3~~
4263 ~~feet per second (0.91 m/sec). Variable speed drives shall provide tip speeds of 0.5 to 3.0 feet per~~
4264 ~~second (0.15-0.91 m/sec).~~

4265
4266 ~~(formerly Section 10(d)(ii))(v)~~ For a single speed drive system, ~~t~~The tip
4267 speed for a single speed drive system of the mixer shall not exceed 3 feet per second ~~(0.91~~
4268 ~~m/sec) (ft/sec).~~ Variable speed drives shall provide tip speeds ~~of~~ between 0.5 ~~to~~ and 3.0 ~~feet per~~
4269 ~~second (0.15-0.91 m/sec) ft/sec.~~

4270
4271 ~~(formerly Section 10(d)(iv))(vi)~~ Piping. The velocity of flocculated water
4272 through pipes or conduits to settling basins shall not be less than 0.5 ft/sec or greater than 1.5 ~~feet~~
4273 ~~per second (0.15-0.46 m/sec) ft/sec.~~

4274
4275 ~~(formerly Section 10(e))(e)~~ Sedimentation basins shall comply with the following
4276 requirements:

4277



4278 ~~(formerly Section 10(e)(i))(i) Diameter.~~ The maximum diameter in circular basins
4279 shall be 80 feet.

4280
4281 ~~(formerly Section 10(e)(iv))(ii) Side water depth.~~ The minimum basin side
4282 water depth shall be 8 eight feet ~~(2.43 m)~~ if mechanical sludge collection equipment is provided
4283 or ~~basins or~~ basin sludge hopper segments are less than 100 square feet ~~(9.3 m)~~ in surface area
4284 and 15 feet ~~(4.6 m)~~ if basins are manually cleaned. ~~Mechanical sludge collection equipment~~
4285 ~~includes mechanically driven drives that use scrapers or differential water level to collect the~~
4286 ~~sludge.~~

4287
4288 ~~(formerly Section 10(e)(v))(iii) Freeboard.~~ The outer walls of the settling
4289 basins shall extend at least 12 inches ~~(30.5 cm)~~ above the surrounding ground and provide at
4290 least 12 inches ~~(30.5 cm)~~ of freeboard to the water surface. Where the basin walls are less than 4
4291 four feet ~~(1.22 m)~~ above the surrounding ground, a fence or other debris barrier shall be provided
4292 on the wall.

4293
4294 ~~(formerly Section 10(e)(xi))(iv) Drainage.~~ Basin bottoms shall slope toward
4295 the drain at not less than 1 one inch per foot ~~(8 cm/m)~~ where mechanical sludge collection
4296 equipment is provided and $\frac{1}{4}$ inch per foot ~~(2 cm/m)~~ where no mechanical sludge collection
4297 equipment is provided.

4298
4299 ~~(formerly Section 10(e)(ii))(v) Overflow rate.~~ The basin overflow rate shall
4300 not exceed 1,000 gpd/ft² ~~(41 m³/m²d)~~ at design conditions.

4301
4302 ~~(formerly Section 10(e)(viii))(vi) Sludge collection.~~ Mechanical sludge
4303 collection shall be provided ~~if~~ settleable organics are present in the water or if ~~there is a history~~
4304 ~~of organically related taste and odor problems, mechanical sludge collection shall be provided if~~
4305 the source water exceeds secondary maximum contaminant levels identified at 40 CFR 143.3.

4306
4307 ~~(formerly Section 10(e)(ix))(vii) Sludge removal.~~ ~~Sludge removal design~~
4308 ~~shall provide that sludge p~~Pipes for removing sludge shall ~~be~~ not be less than 6 six inches ~~(15.2~~
4309 ~~cm)~~ in diameter and arranged to facilitate cleaning. Valves on ~~the~~ sludge lines shall be located
4310 outside the tank.

4311
4312 ~~(formerly Section 10(f))(f) Facilities with S~~softening sedimentation – or clarification:
4313 ~~Conventional sedimentation – clarification as described above shall be provided in softening~~
4314 ~~operations, except for softening~~ softened a groundwater supply sources of constant quality.
4315 ~~Where a groundwater supply is softened, the requirements may be modified as follows~~shall meet
4316 the following requirements:

4317
4318 ~~(formerly Section 10(f)(i))(i) Overflow rate.~~ The basin overflow rate ~~at the design~~
4319 ~~flow~~ shall not exceed ~~2,100~~ 21,000 gpd/ft² ~~(86 m³/m²d).~~ at the design flow; and

4320
4321 ~~(formerly Section 10(f)(ii))(ii) Sludge.~~ Mechanical sludge removal shall be
4322 provided and shall be designed to handle a load of 40 lbs/foot ft ~~(60 kg/m)~~ of collector ~~scraper~~
4323 scraper arm length.

Spelling

4324
4325 ~~(formerly Section 10(g))(g)~~ Solids contact units. These treatment Solids contact units
4326 are acceptable for combined softening and clarification of well water where water quality
4327 characteristics are not variable and the flow rates are uniform and consistent. ~~The Solids contact~~
4328 units shall ~~be designed to meet the criteria detailed previously~~ meet the requirements of
4329 paragraphs (c) and (e) of this Section, and may be considered under the following circumstances:
4330

4331 ~~(formerly Section 10(g)(i))(i)~~ Such Solids contact units may be considered for use
4332 as clarifiers without softening when they are designed ~~to meet the criteria detailed in the~~ as
4333 conventional sedimentation ~~clarification units; and~~
4334

4335 ~~(formerly Section 10(g)(ii))(ii)~~ These Solids contact units may ~~also~~ be used
4336 for other treatment ~~purposes; processes~~ such as rapid mixing; or flocculation, etc., when the
4337 individual components of the ~~solids contact~~ units are designed ~~in accordance with the design~~
4338 ~~criteria~~ for that individual specific treatment process ~~as described above.~~
4339

4340 ~~(formerly Section 10(h))(h)~~ Settling tube clarifiers. Shallow depth sedimentation
4341 ~~devices or tube clarifier systems of the essentially horizontal or steeply inclined types~~ Tube
4342 clarifiers that are horizontal or steeply inclined may be used when designed as follows:
4343

4344 ~~(formerly Section 10(h)(iv))(i)~~ Loading rates. The maximum ~~over~~flow rate
4345 shall be less than 2.0 ~~gpm/sq ft (62.7 m³/m²·d)~~ gpm/ft² based on the surface area of the basin
4346 covered by the tubes.
4347

4348 ~~(formerly Section 10(h)(iii))(ii)~~ Tube placement. ~~The T~~tops of the tubes
4349 shall be more than 12 inches ~~(0.3 m)~~ from the underside of the launder and more than 18 inches
4350 ~~(0.46 m)~~ from the water surface. ~~(formerly Section 10(h)(v))~~ The spacing between of the effluent
4351 launders shall not exceed be more than three times the distance from the water surface to the top
4352 of the tube modules.
4353

4354 ~~(formerly Section 10(h)(i))(iii)~~ Sludge removal. Sludge shall be removed
4355 using 45-degree or steeper hoppers bottoms, ~~or~~ mechanical devices that move the sludge to
4356 hoppers, or devices that remove settled sludge from the basin floor using differential hydraulic
4357 level.
4358

4359 ~~(formerly Section 10(h)(ii))(iv)~~ Tube cleaning. A method of tube cleaning
4360 shall be provided. This may include a provisions for ~~obtaining~~ a rapid reduction in clarifier water
4361 surface elevation, a water jet spray system, or an air scour system. ~~Where~~ If cleaning is
4362 automatic, controls shall ~~be provided to~~ cease clarifier operation during tube cleaning and a 20-
4363 minute rest period.
4364

4365 ~~(formerly Section 10(i))(i)~~ Filtration ~~systems shall comply with the following~~
4366 requirements:
4367

4368 ~~(formerly Section 10(i)(i))(i)~~ Pressure granular media filters. Vertical or
4369 horizontal pressure filters shall not be used ~~for on filtration of~~ surface waters. Pressure filters
4370 may be used for groundwater filtration, including iron and manganese removal.

4371
4372 ~~(formerly Section 10(i)(ii)(A))(A)~~ Slow rate sand filters. ~~These types of~~
4373 ~~filters~~ may be used when maximum ~~raw water~~ turbidity is less than 50 turbidity units (TUs) and
4374 the turbidity present is not ~~attributable to~~ caused by colloidal clay. ~~Maximum color shall not~~
4375 ~~exceed 30 units.~~

4376
4377 ~~(formerly Section 10(i)(ii)(A))(B)~~ Maximum color shall not exceed 30
4378 units.

4379
4380 ~~(formerly Section 10(i)(ii)(B)(III))(ii)~~ Washwater troughs shall comply
4381 with the following requirements. ~~Washwater troughs shall be constructed to provide for not more~~
4382 ~~than 6 feet (1.8 m) clear distance between troughs. The troughs shall not cover more than 25~~
4383 ~~percent of filter area.:~~

4384
4385 ~~(formerly Section 10(i)(ii)(B)(III))(A)~~ The Washwater troughs shall
4386 not cover more than 25 percent of the filter area.

4387
4388 ~~(formerly Section 10(i)(ii)(B)(III)(1.))~~(B) The Minimum clearance
4389 distance between the bottom of the trough and the top of unexpanded media shall be 12 inches
4390 ~~(30.5 cm).~~

4391
4392 ~~(formerly Section 10(i)(ii)(B)(III)(2.))~~(C) The Minimum distance
4393 between the weir of the trough and the unexpanded media shall be 30 inches ~~(0.76 m).~~

4394
4395 ~~(formerly Section 10(i)(ii)(B)(III))(D)~~ Washwater troughs shall be
4396 ~~constructed to provide for not~~ There shall be no more than 6 six feet ~~(1.8 m)~~ clear distance
4397 between troughs.

4398
4399 ~~(formerly Section 10(i)(ii)(B)(III)(3))~~(E) The trough and ~~washwater~~
4400 ~~waste wastewater~~ line shall be sized ~~to carry for~~ a filter backwash rate of 20 gpm/ft² ~~(1181~~
4401 ~~m³/m²-d)~~ plus a surface wash rate of 2.0 gpm/ft² ~~(118 m³/m²-d).~~

4402
4403 ~~(formerly Section 10(i)(ii)(B)(IV)(1.))~~(F) The backwash system
4404 shall be sized to provide a minimum backwash flow rate flowrate of 20 gpm/ft² ~~(1181 m³/m²-d).~~
4405 ~~Washwater storage shall be designed to provide two 20-minute washes in rapid succession.~~
4406 ~~Where multiple units are not required and only one filter compartment is present, backwash~~
4407 ~~storage capabilities may be reduced to provide one 20-minute backwash. Where pumps are used~~
4408 ~~to provide backwash to the filter or to supply water to a washwater tank, the washwater pumps~~
4409 ~~shall be in duplicate. or a rate necessary to provide a 50 percent expansion of the filter bed.~~

4410
4411 ~~(formerly Section 10(i)(ii)(B)(IV)(1.))~~(G) The system and Washwater
4412 wash water storage shall be designed to provide two, 20-minute washes in rapid succession.

4413

4414 ~~(formerly Section 10(i)(ii)(B)(IV)(1.))~~(I) Where multiple units
4415 are not required and only one filter compartment is present, backwash storage capabilities may
4416 be reduced to provide one 20-minute backwash. If only one filter is provided, the backwash
4417 system needs to provide only one 20-minute backwash.

4418
4419 ~~(formerly Section 10(i)(ii)(B)(IV)(1.))~~(II) Where If pumps are
4420 used to provide convey backwash water to the filter(s) or to supply water to a the washwater
4421 wash water tank, ~~the washwater~~ two identical pumps shall be ~~in duplicate~~ provided.

4422
4423 ~~(formerly Section 10(i)(ii)(B)(IV)(2.))~~(H) The backwash and surface
4424 wash washwater supply Washwater shall be filtered and disinfected.

4425
4426 ~~(formerly Section 10(i)(ii)(B)(IV)(3.))~~(I) The Washwater washwater
4427 rate shall be controlled ~~by a separate valve, manual or automatic,~~ on the main washwater wash
4428 water line. ~~Washwater~~ The flow rate flowrate shall be metered and indicated.

4429
4430 ~~(formerly Section 10(i)(ii)(B)(IV)(4.))~~(J) Air-assisted backwash
4431 systems may be used when the design precludes disturbing the gravel support.

4432
4433 ~~(formerly Section 10(i)(ii)(B)(IV)(5.))~~(K) A surface wash system shall
4434 be provided. The system shall be capable of supplying 0.5 gpm/ft² (~~29.5 m³/m²-d~~) for a system
4435 with rotating arms and 2.0 gpm/ft² (~~118 m³/m²-d~~) with for fixed nozzles, at a minimum pressure
4436 of fifty (50) psi (~~344 kPa~~). The surface wash ~~shall use filtered and disinfected water or air and~~
4437 ~~filtered disinfected water~~ can be air-assisted. ~~The supply system shall be provided with adequate~~
4438 ~~backflow prevention.~~

4439
4440 ~~(formerly Section 10(i)(ii)(B)(IV)(5.))~~(L) The Both backwash and
4441 surface wash supply systems shall be provided with adequate backflow prevention.

4442
4443 ~~(formerly Section 10(i)(ii)(B)(V)(3.))~~(iii) Anthracite for sSingle media beds:
4444 shall use either ~~C~~clean crushed anthracite or a ~~combination of~~ sand and anthracite ~~may be used~~
4445 mixture. ~~Such~~ The media shall have an effective size ~~from of~~ 0.45 mm ~~to~~ 0.55 mm, and a
4446 uniformity coefficient not greater than 1.65.

4447
4448 ~~(formerly Section 10(i)(ii)(B)(V)(4.))~~(A) Gravel. When gravel is used
4449 as a supporting media, ~~gravel it~~ shall consist of coarse aggregate in which ~~a high proportion of~~
4450 ~~the particles are~~ most of it is rounded round and ~~tend toward a generally spherical or~~
4451 ~~equidimensional~~ of similar size and shape. ~~It shall possess sufficient strength and hardness to~~
4452 ~~resist degradation during handling and use, be substantially free of harmful materials, and exceed~~
4453 ~~the minimum density requirement. The gravel shall meet the requirements of AWWA B100.~~

4454
4455 ~~(formerly Section 10(i)(ii)(B)(V)(4.))~~(B) ~~It~~ Gravel as supporting media
4456 shall ~~possess~~ have sufficient strength and hardness to resist degradation during handling and use,
4457 ~~be substantially~~ free of harmful materials, ~~and exceed the minimum density requirements~~.

4458

4459 ~~(formerly Section 10(i)(ii)(B)(V)(4.))(C)~~ The gravel shall ~~meet also~~
4460 comply with the requirements of AWWA B100 specifications.

4461
4462 ~~(formerly Section 10(i)(ii)(B)(V)(6.))(iv)~~ Dual media: ~~C~~ coal sand
4463 filters shall consist of a coarse layer of coal ~~layer~~ not less than 15 inches deep above a layer of
4464 fine sand not less than eight inches deep on a torpedo sand or garnet layer of support not less
4465 than three inches on gravel support. ~~The media shall consist of not less than 8 inches (20 cm) of~~
4466 ~~sand and 15 inches (0.38 m) of coal on a torpedo sand or garnet layer support of not less than 3~~
4467 ~~inches (7.8 cm) on the gravel support.~~

4468
4469 ~~(formerly Section 10(i)(ii)(B)(VI))(v)~~ Filter bottoms: ~~Acceptable filter~~
4470 ~~bottoms~~ and strainer systems shall be limited to pipe, perforated pipe laterals, tile block, and
4471 perforated tile block. Perforated plate bottoms or plastic nozzles shall not be used.

4472
4473 ~~(formerly Section 10(i)(ii)(B)(VII))(vi)~~ ~~Appurtenances.~~ Every filter shall
4474 have: inlet and effluent sampling taps; indicating loss of head gauge; indicating effluent
4475 turbidimeter; a waste drain for draining the filter compartment to waste; and a filter rate flow
4476 meter. Every filter shall provide polymer feed facilities including polymer mixing and storage
4477 tank and at least one feed pump for each filter compartment. On plants having a capacity in
4478 excess of 0.5 MGD, recorders shall be provided on the turbidimeters.

4479
4480 ~~(formerly Section 10(i)(ii)(B)(VII))(A)~~ i ~~Influent and effluent~~
4481 sampling taps;

4482
4483 ~~(formerly Section 10(i)(ii)(B)(VII))(B)~~ A ~~indicating loss of head~~ loss
4484 gauge;

4485
4486 ~~(formerly Section 10(i)(ii)(B)(VII))(C)~~ An ~~indicating effluent~~
4487 turbidimeter;

4488
4489 ~~(formerly Section 10(i)(ii)(B)(VII))(D)~~ a ~~A~~ waste drain for draining
4490 the filter ~~compartment~~ component to waste; and

4491
4492 ~~(formerly Section 10(i)(ii)(B)(VII))(E)~~ a ~~A~~ filter rate ~~flow meter~~
4493 flow meter;

4494
4495 ~~(formerly Section 10(i)(ii)(B)(VII))(F)~~ Every filter shall provide
4496 p ~~Polymer feed facilities including polymer mixing, and storage tank and at least one feed pump~~
4497 for each filter compartment.; and

4498
4499 ~~(formerly Section 10(i)(ii)(B)(VII))(G)~~ On plants having a capacity
4500 in excess of 0.5 MGD, r ~~Recorders shall be provided on the turbidimeters~~ if the facility has a
4501 capacity in excess of 0.5 MGD.

4502
4503 ~~(formerly Section 10(i)(ii)(B)(VIII))(vii)~~ Filter rate control. Filter rate control
4504 shall be such that the filter is not surged. The f ~~Filter rate of flow shall not change~~ at a rate greater

4505 more than 0.3 gpm/ft² (~~17.7 m³/m²·d~~) per minute. A ~~F~~filters that stops and restarts during a
4506 cycle shall have a filter-to-waste system installed. Declining flow rate filters shall not be used
4507 unless the flow rate for each filter is controlled to a rates less than allowed in ~~10 (i)(ii)(B)~~
4508 paragraph (j)(iii) of this Section and there are four ~~or~~ more individual filters.

4509
4510 ~~(formerly Section 10(i)(ii)(B)(IX))(viii)~~ A filter to waste cycle shall be
4511 provided after the filter backwash operation. The filter to waste cycle shall be at least 10 minutes.

4512
4513 ~~(formerly Section 10(i)(ii)(B)(V)(5.))(ix)~~ Multi-media: ~~F~~filter beds of this type
4514 shall contain a depth of fine media made up of anthracite ~~coal~~ (specific gravity 1.5), ~~specific~~
4515 ~~gravity 1.5~~; silica sand (specific gravity 2.6), ~~specific gravity 2.6~~; and garnet sand or ilemite
4516 (specific gravity 4.2-4.5), ~~specific gravity 4.2—4.5~~. ~~(formerly Section 10(i)(ii)(B)(V)(5.)(a.))~~ The
4517 b~~Bed~~ depths and distribution ~~of the media~~ shall be determined by the water quality.

4518
4519 ~~(formerly Section 10(i)(ii)(B)(V)(5.)(a.))(A)~~ Bed depths and
4520 ~~distribution shall be determined by the water quality but~~ There shall not be less than 10 inches
4521 (~~0.25 m~~) of fine sand and 24 inches (~~0.61 m~~) of ~~coal~~ anthracite. The relative size of the ~~particles~~
4522 media shall be such that hydraulic grading of the material during backwash will result in a ~~filter~~
4523 ~~bed with~~ pore space ~~graded that~~ progressively goes from coarse to fine in the direction of
4524 ~~filtration (down) flow~~.

4525
4526 ~~(formerly Section 10(i)(ii)(B)(V)(5.)(b.))~~ (B) The multi-media shall
4527 be supported on two layers of special high-density gravel placed above the conventional silica
4528 gravel supporting bed. The special gravel shall have a specific gravity not less than 4.2. The
4529 bottom layer shall consist of particles passing ~~No. U.S. Standard~~ 5 mesh sieves and retained ~~on~~
4530 in No. U.S. Standard 12 ~~U.S.~~ mesh sieves and shall be 1 ½ inches (~~3.8 cm~~) thick. The top layer
4531 shall consist of particles passing ~~No. U.S. Standard~~ 12 mesh sieves and retained on U.S. Standard
4532 ~~No. 20 U.S.~~ mesh sieves; and shall be 1 ½ inches (~~3.8 cm~~) thick.

4533
4534 ~~(formerly Section 10(j))(x)~~ Diatomaceous earth filtration shall comply with the
4535 following requirements: ~~These types of filters may be used as the filtration process to remove~~
4536 ~~turbidity from surface waters where turbidities entering the filters do not exceed 25 TU and~~
4537 ~~where total raw water coliforms do not exceed 100 organisms/100 ml. These filters may be used~~
4538 ~~where the raw water quality exceeds the above limits when flocculation and sedimentation are~~
4539 ~~used preceding the filters. Diatomaceous earth filters may also be used for removal of iron from~~
4540 ~~groundwaters.~~

4541
4542 ~~(formerly Section 10(j))(A)~~ These types of Diatomaceous earth filters
4543 may be used:

4544
4545 ~~(formerly Section 10(j))(I)~~ filters may be used as the filtration
4546 ~~process~~ to remove turbidity from surface waters where turbidities entering the filters do not
4547 exceed 25 TU and where total raw water coliforms do not exceed 100 organisms/100 ml.

4548



4549 ~~(formerly Section 10(j))(II)~~ These filters may be used wWhere
4550 the raw water quality exceeds the ~~above~~ previously mentioned limits when flocculation and
4551 sedimentation are used preceding the filters.

4552
4553 ~~(formerly Section 10(j))(III)~~ Diatomaceous earth filters may also
4554 be used for removal of To remove iron from groundwaters.

4555
4556 ~~(formerly Section 10(j)(i))(B)~~ Types of filters. The diatomaceous earth filtration
4557 units shall be of the Ppressure or vacuum ~~diatomaceous earth filtration units will be considered~~
4558 for approval type.

4559
4560 ~~(formerly Section 10(j)(i))(C)~~ Precoat. A precoating system shall be
4561 provided.

Add a section addressing
cartridge filtration.

4562
4563 ~~(formerly Section 10(k))(j)~~ Disinfection equipment shall comply with the following
4564 requirements.: Chlorine, chlorine dioxide, ozone or other disinfectant as approved by the
4565 administrator may be used for disinfection. Where the primary disinfectant is ozone, chlorination
4566 equipment shall be provided to enable maintaining a residual disinfectant throughout the
4567 distribution system. Automatic proportioning of disinfectant feed to flow rate is required where
4568 the plant flow control is automatic.

4569
4570 ~~(formerly Section 10(k)(i))(i)~~ Chlorination equipment shall comply with the
4571 following requirements:-

4572
4573 ~~(formerly Section 10(k)(i)(A))(A)~~ Type. Solution feed gas chlorinators
4574 or hypochlorite feeders of the positive displacement type Positive displacement pumps shall be
4575 provided for solution feed gas chlorinators or hypochlorite feeders.

4576
4577 ~~(formerly Section 10(k)(i)(E))(B)~~ Diffuser. The chlorine solution
4578 ~~injection injector~~/diffuser shall provide a rapid and thorough mix with all the water being treated.
4579 If the application point is to a pipeline discharging to a clearwell, the chlorine shall be added to
4580 the center of the pipe at least 10 pipe diameters upstream of the discharge into the clearwell.

misspelled

4581
4582 ~~(formerly Section 10(k)(i)(F))(C)~~ Injector/Eductor. For gas feed
4583 chlorinators, the injector/~~eductor~~ educator shall be selected based on solution ~~water~~ pressure,
4584 injector ~~waterflow rate~~ water flowrate, feed point backpressure, and chlorine solution line length
4585 and size. The maximum feed point backpressure shall not exceed 110 psi (~~759 kPa~~). Where
4586 backpressure exceeds 110 psi (~~750 kPa~~), a chlorine solution pump shall be used. Gauges shall be
4587 provided for chlorine solution pressure, feed water pressure and chlorine gas pressure, or
4588 vacuum.

4589
4590 ~~(formerly Section 10(k)(i)(C))(D)~~ Standby equipment. Standby
4591 equipment of sufficient capacity shall be available ~~to replace~~ with the largest chlorinator unit out
4592 of service, except for a well ~~water~~ system providing no treatment other than disinfection.

4593



4594 ~~(formerly Section 10(k)(ii))(ii)~~ Points of application and contact time shall
4595 comply with the following requirements:

4596
4597 (A) Filtration types shall comply with the contact time and minimum chlorine
4598 residuals required in Table 3 of this Section. Contact times assume a baffling factor of 0.1 unless
4599 documentation justifying the use of a higher baffling factor is provided. Contact time
4600 requirements are based on worst-case operating conditions of water temperature of 32.9 degrees
4601 Fahrenheit and pH of 9.

4602 Table 12-1?

Provide the flexibility for the designer to calculate project specific, requ'd CT.

4603 Table 3. Required Contact Time and Residual by Filtration Type

| <u>Filtration Type</u> | <u>Required Contact Time (minutes), 0.4 mg/L minimum chlorine residual</u> | <u>Required Contact Time (minutes), 1.0 mg/L minimum chlorine residual</u> |
|--|--|--|
| <u>Conventional Filtration</u> | <u>162.5</u> | <u>73</u> |
| <u>Direct Filtration, Bag or Cartridge Filtration, Slow Sand Filtration, Diatomaceous Earth Filtration</u> | <u>325</u> | <u>146</u> |
| <u>Membrane Filtration (MF or UF)</u> | <u>30</u> | <u>12</u> |

4604
4605
4606 (B) When chlorine is applied to a groundwater source to maintain a
4607 residual, no contact time is required.

4608
4609 (k) Disinfection via ultraviolet light shall comply with the following requirements:

4610
4611 (i) Proposed designs for ultraviolet light shall include the following
4612 information in the ultraviolet reactor influent water quality analysis:

4613
4614 (A) Influent temperature (degrees Fahrenheit)

4615
4616 (B) UV Transmittance (UVT) at 254 nm

4617
4618 (C) Total Hardness (mg/L as CaCO₃)

4619
4620 (D) pH

4621
4622 (E) Alkalinity (mg/L as CaCO₃)

4623
4624 (F) Total Iron (mg/L) Influent < 0.3mg/L

4625
4626 (G) Calcium (mg/L)

4627
4628 (H) Total Manganese (mg/L) Influent <0.03 mg/L

4629
4630
4631
4632
4633
4634
4635
4636
4637
4638
4639
4640
4641
4642
4643
4644
4645
4646
4647
4648
4649
4650
4651
4652
4653
4654
4655
4656
4657
4658
4659
4660
4661
4662
4663
4664
4665
4666
4667
4668
4669
4670
4671
4672
4673
4674

(ii) Proposed designs for ultraviolet disinfection systems shall include the following information:

- (A) The maximum, average, and minimum flowrates;
- (B) A matrix that identifies paired flow and ultraviolet treatment values;
- (C) A description of the organisms targeted for inactivation;
- (D) Log Inactivation requirements
- (E) Operating approach (UV intensity vs. Calculated dose)
- (F) Maximum and minimum operating pressures
- (G) Maximum pressure at the UV reactor
- (H) UV system redundancy
- (I) Lamp cleaning strategy
- (J) Mercury trap for broken UV lamps
- (K) Maximum headloss through the UV reactor
- (L) The UV reactor(s) shall be hydrostatically tested to 1.5 times the rated operating pressure.
- (M) The UV reactor(s) shall be designed to ensure that plant personnel can change lamps and the UV intensity meter without draining the reactor; and
- (N) The units shall meet NSF/ANSI Standard 55 or NSF/ANSI/CAN Standard 61.

(iii) Ultraviolet treatment systems shall be designed to comply with the following dose requirements:

- (A) The UV disinfection system shall deliver the Reduced Equivalent Dose (RED) at the end of lamp life, with fouled sleeves.
- (B) The RED shall incorporate a Combined Age and Fouling Factor (CAF), calculated as
CAF = EOLL x FF.

EOLL is the ratio of the lamp output at the end of life relative to the new lamp output

FF is the fouling factor.

(C) The EOLL shall be 75 percent of the new lamp output.

(D) The FF shall be:

(I) 0.5 for UV systems with no sleeve wiping system;

(II) 0.75 for UV systems with mechanical wiping only; or

(III) 0.95 for UV systems with a combined online chemical and mechanical cleaning.

(E) The RED shall be delivered under maximum flow and design (UVT) condition, with the larger UV unit out of service.

(iv) Ultraviolet disinfection shall comply with the following validation requirements:

(A) The applicant shall submit the manufacturer's bioassay validation report for the proposed UV reactor with the permit application.

(B) The bioassay testing and results shall demonstrate validation by an independent third party in full compliance with the U.S. EPA's Ultraviolet Disinfection Guidance Manual.

(C) The owner and engineer shall submit a certification to the Administrator if validation requirements are adjusted and identify each of the equipment and system modifications required to ensure that the appropriate dosage is provided for the inactivation requirements.

(D) Bioassay testing shall evaluate reactor performance over the range of:

(I) Flowrates (maximum, average, and minimum);

(II) UVT from 70 percent to 98 percent (measured at 254 nm, 1 cm path length); and

(III) RED at maximum flowrate and design UVT conditions.

(E) The bioassay testing shall incorporate the range of design and operating conditions described in paragraph (o)(i) of this Section for UV Light.

4721 (F) Extrapolations to flowrates, UV transmittance values or UV doses
4722 outside the range actually tested, are not permitted.

4723
4724 (G) Bioassay testing shall also verify that the headloss generated by the
4725 proposed reactor is less than or equal to the specified limits.

4726
4727 (v) Ultraviolet disinfection hydraulics shall comply with the following
4728 requirements:

4729
4730 (A) The inlet and outlet piping configuration to the UV reactor shall
4731 result in a UV dose delivery that is equal to or greater than the dose delivered when the UV
4732 reactor was validated.

4733
4734 (B) If the UV reactor validation is performed off-site, the applicant
4735 shall refer to the validation report to determine the validated inlet and outlet conditions that apply
4736 to the site-specific requirements.

4737
4738 (C) Ultraviolet hydraulic piping shall comply with at least one of the
4739 following requirements:

4740
4741 (I) The piping configuration shall consist of a minimum of 10
4742 pipe diameters of straight pipe upstream and five pipe diameters of straight pipe downstream of
4743 the UV reactors. Additional pipe diameters above the minimum may be required in accordance
4744 with the manufacturer's guidelines for electromagnetic or other flowmeter installation.

4745
4746 (II) The inlet and outlet piping configurations shall be identical
4747 to those constructed for the UV reactor validation; or

4748
4749 (III) If on-site validation or custom off-site validation is
4750 planned, the inlet and outlet piping hydraulics must be designed according to the manufacturer
4751 recommendations and to accommodate any site-specific constraints.

4752
4753 (vi) Ultraviolet control and measurement instrumentation for each reactor shall
4754 comply with the following requirements:

4755
4756 (A) Each reactor shall be capable of measuring UV intensity and lamp
4757 status (on/off);

4758
4759 (B) Each reactor shall be capable of measuring or calculating the UV
4760 transmittance;

4761
4762 (C) Piping for each UV reactor shall be sized and configured in
4763 accordance with the validated operating conditions and maintain equal headloss through each
4764 reactor over the range of validated flowrates. Each UV reactor shall not be by-passed;

4765

4766 (D) Each UV reactor train shall have a dedicated flow meter to confirm
4767 the validated operating conditions;

4768
4769 (E) UV lamps in the UV reactor shall be submerged at all times during
4770 operation; and

4771
4772 (F) The specific configuration of the UV reactor(s) within a facility
4773 will dictate the use of air release, air/vacuum or combination air valves to prevent air pockets and
4774 negative pressure conditions. The design shall verify that the UV manufacturer was consulted to
4775 determine any equipment-specific air release and pressure control valve requirements.

4776
4777 (G) Each UV reactor shall have the piping configured so that it can be
4778 isolated and removed from service while the other UV reactor(s) remain in service.

4779
4780 (H) A booster pump shall be used if the head loss constraints indicate
4781 that a pump is necessary. The UV reactor shall be sized accordingly.

4782
4783 (vii) The applicant shall describe the dose monitoring strategy and the
4784 operational approach for the UV reactor that complies with the approaches described in EPA's
4785 Ultraviolet Disinfection Guideline Manual, part 3.5.2.

4786
4787 (viii) The cleaning system for each UV reactor shall comply with the following
4788 requirements:

4789 (A) Each UV reactor shall be equipped with an automatic online
4791 mechanical lamp sleeve cleaning system. The addition of chemical cleaning to the mechanical
4792 system is optional.

4793
4794 (B) The UV sensor shall include mechanical cleaning capabilities with
4795 an automatically initiated and controlled cleaning cycle.

4796
4797 (C) The UV reactor(s) shall be fully operational and shall provide
4798 validated dose requirements during system cleaning.

4799
4800 (ix) The minimum spare parts kept at a facility shall include the following:

4801
4802 (A) 20 percent of the UV Lamps;

4803
4804 (B) Five percent of the lamp sleeves; and

4805
4806 (C) One UV intensity sensor.

4807
4808 ~~(formerly Section 10(e))~~ (1) Facilities that propose disinfection via Fluoridation and
4809 defluoridation shall comply with the following requirements:-;

4810

4811 ~~(formerly Section 10(o)(i))(i)~~ Fluoride ~~compound~~ storage designs shall
4812 demonstrate; ~~Storage tanks shall be covered; all storage shall be inside a building. Storage tanks~~
4813 ~~for hydrofluosilic acid shall be vented to the atmosphere at a point outside the building.~~

4814 _____ ~~(formerly Section 10(o)(i))(A)~~ Fluoride ~~S~~storage tanks shall be
4815 covered;

4816 _____ ~~(formerly Section 10(o)(i))(B)~~ All other storage shall be inside a
4817 building; and

4818 _____ ~~(formerly Section 10(o)(i))(C)~~ Storage tanks for of hydrofluosilic
4819 acid shall be vented to the atmosphere at a point outside the building.

4820 _____ ~~(formerly Section 10(o)(ii))(ii)~~ Chemical feed equipment. Fluoride feed
4821 equipment shall meet the following requirements:-

4822 _____ ~~(formerly Section 10(o)(ii))(A)~~ (A) There shall be Sscales or ~~loss of~~
4823 weight loss recorders ~~shall be provided~~ for dry chemical feeds. The Ffeeders shall be accurate to
4824 within five percent of any desired feed rate.

4825 _____ ~~(formerly Section 10(o)(ii))(B)~~ (B) The point of application of
4826 hydrofluosilic acid, if into a horizontal pipe, shall be in the lower half of the pipe. Fluoride
4827 compounds s shall not be added before lime soda ~~softening~~ or ion exchange softening.

4828 _____ ~~(formerly Section 10(o)(ii))(C)~~ (C) A fluoride solution shall be applied
4829 by a positive displacement pump ~~having a stroke rate not less than 20 nor more than 95 strokes~~
4830 ~~per minute. Fluoride solutions shall not be injected to a point of negative pressure.~~

4831 _____ ~~(formerly Section 10(o)(ii))(D)~~ (D) Fluoride The solutions shall not be
4832 injected ~~to~~ into a point of negative pressure.

4833 _____ ~~(formerly Section 10(o)(ii))(E)~~ (E) All fluoride feed lines and dilution
4834 water lines shall be isolated from the potable water supplies by either an air gap above the
4835 solution tank or a reduced pressure ~~principal principle~~ backflow ~~preventor~~ preventer.

4836 _____ ~~(formerly Section 10(o)(ii))(F)~~ (F) Water used for sodium flouride
4837 ~~dissolution~~ solution shall have a hardness not exceeding ~~50 mg/L~~ 45 mg/L. ~~Softening shall be~~
4838 ~~provided for the solution water where hardness exceeds 45 mg/L.~~

4839 _____ ~~(formerly Section 10(o)(ii))(F)~~ (G) Flow meters for treated water flow
4840 ~~rate~~ and fluoride solution water shall be provided.

4841 _____ ~~(formerly Section 10(o)(iv)(A))(iii)~~ Provisions shall be made to allow the
4842 transfer of dry fluoride compounds from shipping containers to storage bins or hoppers ~~in such a~~
4843 ~~way as to that~~ minimize the quantity of fluoride dust ~~which that may enters~~ the room ~~in which~~
4844 where the equipment is installed. ~~The enclosure shall be provided with an exhaust fan and dust~~



4857 ~~filter which places the hopper under a negative pressure. Air exhausted from fluoride handling~~
4858 ~~equipment shall discharge through a dust filter to the outside atmosphere of the building. The~~
4859 ~~discharge shall not be fresh air intake.~~

4860
4861 ~~(formerly Section 10(o)(iv)(A))(A) The enclosure~~ The transfer system
4862 shall be ~~provided~~ equipped with an exhaust fan and dust filter ~~which~~ that places the hopper or
4863 storage bin under negative pressure.

4864
4865 ~~(formerly Section 10(o)(iv)(A))(B)~~ Air exhausted from fluoride handling
4866 equipment shall discharge through a dust filter to the atmosphere outside the building. The
4867 discharge shall not be ~~located near a building~~ within 50 feet of a fresh air intake for the building;
4868

4869 ~~(formerly Section 10(o)(iv)(B))(C)~~ A floor drain shall be provided for
4870 cleaning equipment and maintenance.

4871
4872 (iv) The following methods are acceptable for fluoride removal:

4873
4874 ~~(formerly Section 10(o)(vi)(A))(A)~~ Activated alumina may be ~~employed~~
4875 used in open gravity filters ~~tanks~~ or pressure filter tanks. ~~The minimum media depth shall be 5~~
4876 ~~feet. The units shall not be loaded at a rate exceeding 4 gallons per minute per square foot (236~~
4877 ~~m³/m²-d). The activated alumina media shall be in mesh sizes ranging from 28 to 48.~~
4878 ~~Regeneration facilities shall be provided to regenerate the media. These shall include both weak~~
4879 ~~caustic and weak acid systems.~~

4880
4881 ~~(formerly Section 10(o)(vi)(A))(B)~~ The minimum media depth shall be ~~5~~
4882 five feet.

4883
4884 ~~(formerly Section 10(o)(vi)(A))(C)~~ The ~~units shall not be loaded~~ loading
4885 ~~at a rate exceeding~~ shall not exceed 4 gallons per minute per square foot gpm/ft² (236 m³/m²-d).
4886

4887 ~~(formerly Section 10(o)(vi)(A))(D)~~ The mesh size for the ~~activated~~
4888 alumina media shall be ~~in mesh sizes ranging from~~ between #28 to and #48.

4889
4890 ~~(formerly Section 10(o)(vi)(A))(E)~~ Media Regeneration facilities shall
4891 be provided ~~to regenerate the media. These~~ and shall include both weak caustic and weak acid
4892 systems.

4893
4894 ~~(formerly Section 10(o)(vi)(B))(F)~~ Bone char filtration or lime softening
4895 with magnesium addition.

4896
4897 (v) Water that is unstable due either to natural causes or to subsequent
4898 treatment shall be stabilized.

4899
4900 (vi) Facilities shall have the capability of feeding both acid and alkalinity.

4901

4902 ~~(formerly Section 10(q)(iv))(vii) — Alkali feed.~~ Unstable water created by ion
4903 exchange softening shall be stabilized by an alkali feed. ~~An alkali feeder shall be provided for all~~
4904 ~~ion-exchange water softening plants.~~

4905
4906 ~~(formerly Section 10(q)(v))(viii) Control.~~ Laboratory equipment shall be
4907 provided ~~for to determining~~ determine the effectiveness of stabilization treatment. This shall
4908 include testing equipment for hardness, calcium, alkalinity, pH, and magnesium, at as-a
4909 minimum.

4910
4911 ~~(formerly Section 10(q))(m) Taste and odor control equipment.~~ ~~Provision shall be made~~
4912 ~~for the control of taste and odor at all surface water treatment plants.~~ shall comply with the
4913 following requirements:

4914
4915 ~~(formerly Section 10(q)(v))(i) Granular activated carbon adsorption units.~~
4916 Open or closed, granular activated carbon contacting absorption units may be used to absorb
4917 organics for taste and odor control, ~~by adsorption of organics~~ subject to the following
4918 requirements: ~~The loading rate shall not exceed 10 gpm/ft² (236 m³/m²·d). The minimum~~
4919 ~~empty bed contact time shall be 20 minutes. Provisions shall be made for moving carbon to and~~
4920 ~~from the contactors.~~

4921
4922 ~~(formerly Section 10(q)(v))(A)~~ The loading rate shall not exceed 10
4923 gpm/ft² ~~(236 m³/m²·d).~~

4924
4925 ~~(formerly Section 10(q)(v))(B)~~ The minimum empty bed contact
4926 time shall be 20 minutes.

4927
4928 ~~(formerly Section 10(s)(i))(C) Adsorption of organics on granular~~
4929 ~~activated carbon. Water to be treated may be contacted with granular activated carbon.~~ The pH
4930 of the water shall be less than 9.0 with a turbidity of less than 2 TU when using packed beds.
4931 ~~The turbidity of the applied water shall be less than 2 TU when packed beds are used.~~

4932
4933 ~~(formerly Section 10(q)(v))(D)~~ There shall be Pprovisions shall be
4934 ~~made~~ for moving carbon to and from the contactors.

4935
4936 ~~(formerly Section 10(s)(iii)(A))(E) If an upflow countercurrent~~
4937 ~~contactors is used, it may be either packed or expanded. A single unit is acceptable. If a~~
4938 ~~downflow contactor is used, two or more beds in parallel are required.~~ Contactors may be
4939 upflow or downflow design. A single unit is acceptable for countercurrent upflow designs.
4940 Downflow designs shall have two or more parallel units.

4941
4942 ~~(formerly Section 10(s)(iii)(B))(F) Contactors may shall be designed as~~
4943 open gravity ~~units~~, or pressure beds. ~~They may be constructed of concrete, steel, or fiberglass~~
4944 ~~reinforced plastic. Steel vessels shall be protected against corrosion by coaltar epoxy coating,~~
4945 ~~rubber or glass lining, or other means.~~ Pressure contactors shall have an air-vacuum relief valve
4946 fitted with a stainless-steel screen to prevent plugging.

4947



4948 ~~(formerly Section 10(s)(iii)(B))(G)~~ They may be constructed The
4949 contactor materials of construction shall be concrete, steel, or fiberglass reinforced plastic. Steel
4950 vessels shall be protected against corrosion ~~by coaltar epoxy coating, rubber or glass lining, or~~
4951 ~~other means.~~ Inlet and outlet screens shall be made of stainless steel or other suitable materials.

4952
4953 ~~(formerly Section 10(s)(iii)(C))(H)~~ All carbon beds or columns There
4954 shall be ~~equipped with~~ provisions for flow reversal and bed expansion. ~~Combination downflow~~
4955 ~~filter contactors shall have b~~ Backwashing facilities to shall provide up to 50 percent bed
4956 expansion and ~~shall~~ meet the ~~same~~ backwash criteria as rapid filters.

4957
4958 ~~(formerly Section 10(q)(vii))(iii)~~ Ozone. If ozone is used for taste and odor
4959 control, there shall be at least Thirty 30 minutes of contact time ~~must be provided~~ to complete ~~the~~
4960 all chemical reactions ~~involved~~. The ~~facilities shall be capable of an~~ minimum applied feed rate
4961 of ozone feed rate of shall be 15 mg/L minimum.

4962
4963 ~~(formerly Section 10(r))(n)~~ Microscreening. Microscreens shall comply with the
4964 following requirements: ~~A microscreen will be allowed as a mechanical supplement to treatment.~~
4965 ~~The microscreening shall be capable of removing suspended matter from the water by straining.~~
4966 ~~It may be used to reduce nuisance organisms and organic loadings. It shall not be used in place~~
4967 ~~of filtration or coagulation.~~

4968
4969 ~~(formerly Section 10(r))(i)~~ A microscreen will shall be allowed as a mechanical
4970 supplement to treatment but it shall not be used in place of filtration or coagulation;

4971
4972 ~~(formerly Section 10(r))(ii)~~ The microscreening screen shall be capable of
4973 removing suspended matter from the water by straining;

4974
4975 ~~(formerly Section 10(r)(i))(iii)~~ Screens shall be made of a corrosion-
4976 resistant material, ~~plastic or stainless steel;~~

4977
4978 ~~(formerly Section 10(r)(ii))(iv)~~ Bypass piping shall around the unit shall be strike shall
4979 provided ~~around the unit;~~

4980
4981 ~~(formerly Section 10(r)(iii))(v)~~ There shall be pProtection against back
4982 siphonage ~~shall be provided~~ when potable water is used for washing the screen; and

4983
4984 ~~(formerly Section 10(r)(iv))(vi)~~ Washwaters Wash water shall be wasted and
4985 not recycled to the microscreen.

4986
4987 (o) Membrane technologies shall comply with the following requirements:

4988
4989 (i) Proposed membrane treatment processes shall comply with the
4990 requirements of Section 6 of this Chapter. Protocols for pilot plant testing shall incorporate
4991 guidance or procedures from the Membrane Filtration Guidance Manual, Chapter 6.

Who publishes this manual and where do you get it?

4993 (ii) All proposed membrane filters shall demonstrate third-party validation for
4994 the removal of giardia or cryptosporidium. Removal efficiency shall be determined through
4995 challenge testing as outlined in the Membrane Filtration Guidance Manual and one of the
4996 following:

4997
4998 (iii) Membranes that are used as final compliance filters of a multiple
4999 treatment barrier approach shall meet the requirements of 40 CFR Part 141; or

5000
5001 (iv) All surface water or groundwater under direct influence (GWUDI)
5002 systems using membrane technology shall demonstrate minimum disinfection that meets 4.0-Log
5003 virus inactivation.

5004
5005 (p) Bag and cartridge filters shall comply with the following requirements:

5006
5007 (i) Facilities that propose bag or cartridge filters shall comply with the
5008 procedures identified in Section 6 of this Chapter.

5009
5010 (A) Filter performance will be based on cryptosporidium oocyst
5011 removal;

5012
5013 (B) The filter shall demonstrate at least a 2-log removal of particle size
5014 1 micron and above;

5015
5016 (C) Removal efficiency shall be determined through challenge testing
5017 as outlined in Membrane Filtration Guidance Manual, Chapter 3; and

5018
5019 (D) The performance demonstration shall be specific to the
5020 corresponding housing and type or model of filter. Any other combination of housing and filter
5021 that could be used for treatment shall also demonstrate filter efficiency.

5022
5023 (ii) Applicants shall include documentation that the proposed bag or cartridge
5024 filter has received third-party validation for the removal of giardia and cryptosporidium.

5025
5026 (iii) Filter and housing specifications shall include a description of the
5027 materials of construction, surface area per filter, the minimum and maximum operating pressure,
5028 and shall be evaluated under NSF/ANSI 53.

5029
5030 (iv) System components such as housing, bags, cartridges, gaskets, and O-
5031 rings shall comply with NSF/ANSI/CAN 61 for leaching of contaminants.

5032
5033 (v) A means for monitoring the performance of the filter shall be provided and
5034 shall include at a minimum flow meters and valves, pressure gauges, and sample taps.

5035
5036 (vi) The proposed design shall specify chemical compatibility limitations.

5037
5038 (vii) A minimum of two filter housings shall be provided.



5039
5040 (A) Bag or cartridge filters that are used as final compliance filters of a
5041 multiple treatment barrier approach shall meet the requirements of 40 CFR Part 141.
5042

5043 (viii) All surface water or GWUDI systems using bag or cartridge filter
5044 technology shall provide at minimum disinfection that meets 4.0-Log virus inactivation and 0.5-
5045 Log Giardia inactivation.
5046

5047 (q) Pre-engineered water treatment plants shall comply with the following
5048 requirements:
5049

5050 (i) Pre-engineered water treatment plants shall be permitted on a case-by-case
5051 basis for specific process applications and flow rates. Multiple units may be installed in parallel
5052 to accommodate flow rates.
5053

5054 (ii) Pre-engineered water treatment plant equipment shall be designed in
5055 accordance with NSF/ANSI/CAN 61 and NSF/ANSI/CAN 372.
5056

5057 (iv) Pre-engineered water treatment plants shall comply with the procedures in
5058 Section 6 of this Chapter to obtain data that demonstrates the treatment effectiveness of the
5059 treatment for the source water and the proposed application.
5060

5061 (v) Each component and process of the pre-engineered water treatment plant
5062 shall demonstrate compliance with the applicable design criteria of the respective treatment
5063 processes of this Chapter.
5064

5065 (r) Wastes shall be handled and disposed of as follows:
5066

5067 ~~(formerly Section 10(u)(i))~~ (i) Sanitary and laboratory wastes. The sanitary
5068 and laboratory wastes from water treatment plants, pumping stations, ~~ete. or simple well systems,~~
5069 shall not be recycled to any part of the water plant. Waste from these facilities ~~must~~ shall be
5070 discharged directly ~~to~~ into a sanitary sewer system ~~when feasible, or to an on-site waste~~
5071 ~~treatment facility permitted by the Wyoming Department of Environmental Quality. Waste from~~
5072 ~~these facilities be discharged directly a sanitary sewer when feasible or a permitted, on-site~~
5073 disposal system.

and/or is applicable

5074 ~~(formerly Section 10(u)(ii))~~ (ii) Brine waste. ~~The waste~~ from ion exchange
5075 plants, demineralization plants, ~~ete., and other similar facilities~~ may not be recycled to the water
5076 plant. Where discharging to a sanitary sewer, a holding tank shall be provided to prevent the
5077 overloading of the sewer and ~~or~~ interference with the waste treatment processes. ~~The effect of~~
5078 ~~brine discharge to sewage lagoons may depend on the rate of evaporation from the lagoons.~~
5079 Where disposal to an off-site waste treatment system is proposed, ~~it must be demonstrated that~~
5080 the sewer and ~~the~~ treatment facility shall have the required capacity and dilution capability. ~~The~~
5081 ~~impact on any treatment system discharge shall be evaluated.~~
5082
5083



5084 ~~(formerly Section 10(u)(iii)(A))(iii)~~ The design of sludge lagoons
5085 shall ~~provide also include:~~ for location above the 100-year flood or adequately protected from the
5086 100-year flood. There shall be means of diverting surface water runoff so that it does not flow
5087 into the lagoons. Minimum free-board of 3 feet (0.66 m) shall be present. An adjustable
5088 decanting device for recycling the overflow shall be present. There shall be an accessible effluent
5089 sampling point.

5090
5091 (A) ~~for~~ The location of the lagoon shall be protected from ~~above~~ the
5092 100-year flood ~~or adequately protected from the 100-year flood.~~

5093
5094 (B) ~~There shall be~~ A means of diverting surface water runoff so that it
5095 does not flow into the lagoons.

5096
5097 (C) ~~Minimum free-board~~ The freeboard shall be a minimum of 3 three
5098 feet ~~(0.66 m) shall be present.~~

5099
5100 (D) ~~An adjustable decanting device for recycling the overflow shall be~~
5101 ~~present.~~

5102
5103 (E) ~~There shall be a~~ An accessible effluent sampling point.

5104
5105 ~~(formerly Section 10(u)(iii)(B))(iv)~~ Land application of liquid lime softening
5106 sludge; ~~shall comply with Part E of Chapter 11 of the Water Quality Rules and Regulations.~~

may be employed

5107
5108 ~~(formerly Section 10(u)(iii)(C))(v)~~ Disposal at a suitable landfill; ~~shall be~~
5109 ~~authorized by the Solid Waste Management Program of the Department of Environmental~~
5110 ~~Quality.~~

5111
5112 ~~(formerly Section 10(u)(iii)(D))(vi)~~ Mechanical dewatering of sludge may be
5113 ~~employed~~ used.

5114
5115 ~~(formerly Section 10(u)(iii)(E))(vii)~~ Recalcination of sludge may be ~~employed~~
5116 used.

5117
5118 ~~(formerly Section 10(u)(iii)(F))(viii)~~ Lime sludge drying beds shall not be ~~used~~
5119 allowed.

5120
5121 ~~(formerly Section 10(u)(iv))(s)~~ Acceptable methods of treatment and disposal of
5122 Alum sludge. ~~are as follows:~~

5123
5124 ~~(formerly Section 10(u)(iv)(A))(i)~~ Lagooning Lagoons may be used as a
5125 storage and interim disposal ~~method for alum sludge.~~ Lagoons used for storage shall have a ~~The~~
5126 volume of ~~alum sludge storage lagoons shall be~~ at least 100,000 gallons ~~(378.5 m³)~~ per ~~for every~~
5127 1,000,000 gpd ~~(3,785 m³/d)~~ of facility water treatment plant treating capacity.
5128

5129 ~~(formerly Section 10(u)(iv)(B))(ii) Discharge of alum sludge to sanitary sewers~~
5130 ~~may be used only when the sewage system has the capability to adequately handle the flow and~~
5131 ~~sludge. Alum sludge may be discharged to the sanitary sewer only when the system is capable of~~
5132 ~~handling the waste and with the approval of the owner of the sewer system.~~

5133
5134 ~~(formerly Section 10(u)(iv)(C))(iii) Mechanical dewatering of sludge may be~~
5135 ~~employed used.~~

5136
5137 ~~(formerly Section 10(u)(iv)(D))(iv) Alum sludge drying beds may be used.~~

5138
5139 ~~(formerly Section 10(u)(iv)(E))(v) Alum sludge may be acid-treated and~~
5140 ~~recovered.~~

5141
5142 ~~(formerly Section 10(u)(iv)(F))(vi) Disposal at a suitable landfill shall be~~
5143 ~~authorized by the Solid Waste Management Program of the Department of Environmental~~
5144 ~~Quality.~~

5145
5146 **Section 13. ~~Finished Water Storage~~ Chemical Application.**

5147
5148 ~~(moved to Section 15(b))(a) General. Steel finished water storage structures shall be~~
5149 ~~provided using the requirements of the AWWA D100 or AWWA D103. All tank design and~~
5150 ~~foundation design shall be performed by a registered professional engineer and the plans or~~
5151 ~~contractor furnished information shall so designate the registered engineer providing the design.~~
5152 ~~Materials other than steel may be used for water storage tanks.~~

5153
5154 ~~(i) Sizing. Storage facilities shall have the capacity to meet domestic~~
5155 ~~demands, and where required, fire protection storage.~~

5156
5157 ~~(A) Water systems serving less than 50,000 gallons (189 m³) on the~~
5158 ~~design average daily demand shall provide clearwell and system storage capacity equal to the~~
5159 ~~average daily demand.~~

5160
5161 ~~(B) Water systems serving from 50,000 to 500,000 gallons (189-1,892~~
5162 ~~m³) on the design average daily demand shall provide clearwell and system storage capacity~~
5163 ~~equal to the average daily demand plus fire storage, based on recommendations established by~~
5164 ~~the State Fire Marshall or local fire agency.~~

5165
5166 ~~(C) Water systems serving in excess of 500,000 gallons (1,892 m³) on~~
5167 ~~the design average daily demand shall provide clearwell and system storage capacity equal to 25~~
5168 ~~percent of the design maximum daily demand, plus added fire storage based on~~
5169 ~~recommendations established by the State Fire Marshall or local fire agency.~~

5170
5171 ~~(moved to Section 15(c)(iv))(D) Storage need not be provided in a~~
5172 ~~well supply system where a minimum of two wells are provided and the maximum hour demand~~
5173 ~~or fire demand, whichever is greater, can be supplied with the largest well out of service.~~
5174

5175 ~~(ii) Location of ground level reservoirs.~~

5176
5177 ~~(A) The bottom of reservoirs and standpipes shall be above or~~
5178 ~~protected from the 100-year flood or highest flood of record, whichever is greater.~~

5179
5180 ~~(B) When the bottom is below normal ground surface, it shall be~~
5181 ~~placed above the groundwater table. Sewers, drains, standing water, and similar sources of~~
5182 ~~possible contamination must be kept at least 50 feet (15.2 m) from the reservoir. Watermain pipe,~~
5183 ~~pressure tested in place to 50 psi (345 kPa) without leakage, may be used for gravity sewers at~~
5184 ~~distances greater than 20 feet (6.1 m) and less than 50 feet (15.2 m).~~

5185
5186 ~~(C) The top of the reservoir walls shall not be less than 18 inches (0.46~~
5187 ~~m) above normal ground surface. Clearwells constructed under filters are exempted from this~~
5188 ~~requirement when the total design gives the same protection.~~

5189
5190 ~~(iii) Protection. All finished water storage structures shall have suitable~~
5191 ~~watertight roofs which exclude birds, animals, insects, and excessive dust.~~

5192
5193 ~~(iv) Protection from trespassers. Security type fencing, locks on access~~
5194 ~~manholes, and other precautions shall be provided to prevent trespassing, vandalism, and~~
5195 ~~sabotage at above ground storage facilities. Below ground level storage facilities may be exempt~~
5196 ~~from the fencing requirements.~~

5197
5198 ~~(v) Drains. No drain on a water storage structure may have a direct connection~~
5199 ~~to a sewer or storm drain. Water storage structures drained to sewer or storm drains shall be~~
5200 ~~drained through piping which allows an air gap such that the drain pipe is at least three pipe~~
5201 ~~diameters above the ground level at the drain point to the sanitary or storm drain.~~

5202
5203 ~~(vi) Overflow. All water storage structures shall be provided with an overflow~~
5204 ~~which is brought down to an elevation between 12 and 24 inches (0.3-0.61 m) above the ground~~
5205 ~~surface, and discharges over a drainage inlet structure or a splash plate. No overflow may be~~
5206 ~~connected directly to a sewer or a storm drain. All overflow pipes shall be located so that any~~
5207 ~~discharge is visible.~~

5208
5209 ~~(A) When an internal overflow pipe is used on elevated tanks, it shall~~
5210 ~~be located in the access tube. For vertical drops on other types of storage facilities, the overflow~~
5211 ~~pipe shall be located on the outside of the structure.~~

5212
5213 ~~(moved to Section 15(h(i))(B) The overflow of a ground level~~
5214 ~~structure shall open downward and be screened with noncorrodible screen installed within the~~
5215 ~~pipe at a location least susceptible to damage by vandalism.~~

5216
5217 ~~(C) The overflow pipe shall be of sufficient diameter to permit wasting~~
5218 ~~of water in excess of the filling rate.~~

5219

5220 ~~(vii) — Access. Finished water storage structures shall be designed with access to~~
5221 ~~the interior for cleaning and maintenance. Manholes above the waterline shall be framed at least~~
5222 ~~4 inches (0.1 m) above the surface of the roof at the opening; on ground level structures,~~
5223 ~~manholes should be elevated a minimum of 24 inches (0.61 m) above the top. The manholes~~
5224 ~~shall be fitted with a solid watertight cover which overlaps the framed opening and extends down~~
5225 ~~around the frame at least 2 inches (5 cm). The cover shall be hinged at 1 side and shall have a~~
5226 ~~locking device. The man hold shall have a minimum inside opening diameter of 24 inches.~~

5227
5228 ~~(moved to Section 15(k))(viii) — Vents. Finished water storage structures~~
5229 ~~shall be vented. Overflows shall not be considered as vents. Open construction between the~~
5230 ~~sidewall and roof is not permissible. Vents shall prevent the entrance of surface water and~~
5231 ~~rainwater, and shall exclude birds and animals.~~

5232
5233 ~~(moved to Section 15(k)(i))(A) — For elevated tanks and standpipes, 24~~
5234 ~~mesh noncorrodible screen may be used.~~

5235
5236 ~~(B) — For ground level structures, the vents shall terminate in an inverted~~
5237 ~~U construction with the opening a minimum of 24 inches (0.61 m) above the roof and covered~~
5238 ~~with 24 mesh noncorrodible screen installed within the pipe at a location least susceptible to~~
5239 ~~vandalism.~~

5240
5241 ~~(ix) — Roof and sidewall. The roof and sidewalls of all structures shall be~~
5242 ~~watertight with no openings except properly constructed vents, manholes, overflows, risers,~~
5243 ~~drains, pump mountings, control ports, or piping for inflow and outflow.~~

5244
5245 ~~(x) — Painting and/or cathodic protection. Protection shall be given to metal~~
5246 ~~surfaces by paints or other protective coatings, by cathodic protective devices, or by both.~~
5247 ~~Materials and procedures shall conform to AWWA Standard D102. Paint systems, after proper~~
5248 ~~curing, shall not transfer any substance to the water which will be toxic or cause tastes or odors.~~
5249 ~~Paints containing lead or mercury shall not be used. All paints and other protective coatings shall~~
5250 ~~be compatible.~~

5251
5252 ~~(xi) — Disinfection. Finished water storage structures shall be specified to be~~
5253 ~~disinfected in accordance with AWWA Standard D105. Sampling shall be specified.~~

5254
5255 ~~(b) — Plant storage.~~

5256
5257 ~~(i) — Washwater tanks. Washwater tanks shall be sized, in conjunction with~~
5258 ~~available pump units and finished water storage, to provide the backwash water required by~~
5259 ~~Section 10 (i). The storage and pumping shall be sized so that a minimum of two filters may be~~
5260 ~~backwashed in rapid succession.~~

5261
5262 ~~(moved to Section 15(o))(ii) — Clearwell. Clearwell storage shall be sized, in~~
5263 ~~conjunction with distribution system storage, to relieve the filters from having to follow~~
5264 ~~fluctuations in water use. Where water is pumped from clearwater storage to the system, an~~
5265 ~~overflow shall be provided.~~

5266
5267 (iii) ~~Adjacent compartments. Finished water must be separated from~~
5268 ~~unfinished water in adjacent compartments by double walls.~~

5269
5270 (moved to Section 15(o)(iii))(iv) ~~Basins and wetwells. Receiving basins and~~
5271 ~~pump wetwells for finished water shall be designed as finished water storage structures.~~

5272
5273 (e) ~~Hydropneumatic tanks. Hydropneumatic (pressure) tanks may be used as the only~~
5274 ~~storage facility when the system serves less than 50 homes. When servicing more than 50 homes,~~
5275 ~~ground or elevated storage designed in accordance with Section 13(a) should be provided.~~
5276 ~~Pressure tank storage is not to be considered for fire protection purposes. Pressure tanks shall~~
5277 ~~meet ASME code requirements or local laws and regulations for the construction and installation~~
5278 ~~of unfired pressure vessels.~~

5279
5280 (i) ~~Location. The tank shall be located above normal ground surface and be~~
5281 ~~completely housed.~~

5282
5283 (ii) ~~Sizing. The capacity of the wells and pumps in a hydropneumatic system~~
5284 ~~shall be at least 10 times the average daily consumption rate. The gross volume of the~~
5285 ~~hydropneumatic tank, in gallons, shall be at least 10 times the capacity of the largest pump, rated~~
5286 ~~in gallons per minute. For example, a 250 gpm (1,364 m³/d) pump should have a 2,500 gallon~~
5287 ~~(9.46 m³) pressure tank.~~

5288
5289 (iii) ~~Piping. The tank shall be plumbed with bypass piping.~~

5290
5291 (iv) ~~Appurtenances. Each tank shall have an access manhole, a drain, and~~
5292 ~~control equipment consisting of pressure gauge, water tight glass, automatic or manual air~~
5293 ~~blowoff, means for adding air, and pressure operated startstop controls for the pumps.~~

5294
5295 (a) 2018 TSS, parts 5.0.2(f), backflow or back siphonage prevention; 5.0.3, chemical
5296 application general equipment design; 5.1.2(a-d), control of chemicals fed; 5.1.3, dry chemical
5297 feeders; 5.1.4, positive displacement solution feed pumps; 5.1.5, siphon control for liquid
5298 chemical feeders; 5.1.6, cross-connection control; 5.1.8, in-plant water supply; 5.1.9(a)(1-3),
5299 5.1.9(b) and (d), storage of chemicals; 5.1.10, bulk liquid storage tanks; 5.1.11 is herein
5300 incorporated by reference for day tanks; 5.1.12, feed lines; 5.1.13 for handling; 5.1.14, housing;
5301 5.3.2, respiratory protection for operators; 5.3.3, leak detection systems; 5.4.1 (d)(1-5), 5.4.1
5302 (d)(7-10), 5.4.1 (f) and (h), are herein incorporated by reference for the design of chlorine feed
5303 and storage areas; 5.4.2, design of acid and caustic systems; 5.4.3, design of sodium chlorite
5304 systems; and 5.4.4, design of sodium hypochlorite systems, are herein incorporated by reference.

5305
5306 (formerly Section 11(b))(b) Chemical application Facility designs shall comply with
5307 the following requirements:

5308
5309 (formerly Section 11(b)(i))(i) Number of feeders. A separate feeder shall be
5310 provided used for each chemical applied.

5311

5312 ~~(formerly Section 11(b)(viii)(D))(ii) All~~ Chemical storage tanks shall be
5313 constructed of materials which that are resistant to the chemicals which they store stored. The
5314 tank shall ~~not lose its maintain~~ structural integrity ~~through chemical action or be subject to~~
5315 ~~corrosion while in use.~~

5316 **Section 14. ~~Distribution Systems~~ Pumping Facilities.**

5317 ~~(a) — Materials.~~

5318 ~~(moved to Section 16(b))(i) — Types of commercial pipe approved for water~~
5319 ~~systems include:~~

5320 ~~(moved to Section 16(b)(i))(A) — PVC water pipe: ASTM D2241, less~~
5321 ~~than 4" diameter (10 cm); AWWA C900: 4" (10 cm) and larger diameter.~~

5322 ~~(B) — Asbestos cement pressure pipe: AWWA C400.~~

5323 ~~(moved to Section 16(b)(ii))(C) Ductile iron pipe: AWWA C151.~~

5324 ~~(moved to Section 16(b)(iii))(D) — Glass fiber reinforced~~
5325 ~~thermosetting resin pressure pipe: AWWA C950.~~

5326 ~~(moved to Section 16(b)(iv))(E) — Polyethylene: AWWA C901.~~

5327 ~~(F) — Polybutylene: AWWA C902.~~

5328 ~~(ii) — Used materials. Watermains and valves which have been used previously~~
5329 ~~for conveying potable water may be reused provided they are in good working order and can~~
5330 ~~meet these standards. No other used materials may be employed.~~

5331 ~~(moved to Section 16(c)(iii) — Joints. Packing and jointing materials used in the~~
5332 ~~joints of pipe shall be flexible and durable. Flanged piping shall not be used for buried service~~
5333 ~~except for connections to valves; push-on or mechanical joints shall be used.~~

5334 ~~(iv) — Service connections. Service connections shall mean and include any~~
5335 ~~water line or pipe connected to a distribution supply main or pipe for the purpose of conveying~~
5336 ~~water to a building or dwelling. All service connections shall be constructed in conformance with~~
5337 ~~the Uniform Plumbing Code.~~

5338 ~~(moved to Section 16(d))(b) — Watermain design.~~

5339 ~~(i) — Pressure. All watermains, including those not designed to provide fire~~
5340 ~~protection, shall be sized after a hydraulic analysis based on flow demands and pressure~~
5341 ~~requirements. The system shall be designed to maintain a minimum pressure of 20 psi (138 kPa)~~
5342 ~~at ground level at all points in the distribution system under all conditions of flow. The normal~~
5343 ~~working pressure in the distribution system shall be not less than 35 psi (276 kPa).~~

5358
5359 (ii) ~~—Diameter. The minimum size of a watermain for providing fire protection~~
5360 ~~and serving fire hydrants shall be 6 inches (0.15 m) diameter when service is provided from 2~~
5361 ~~directions, or where the maximum length of 6 inches pipe serving the hydrant from 1 direction~~
5362 ~~does not exceed 250 feet, or 8 inches (0.2 m) where service is provided from 1 direction only.~~
5363 ~~Larger size mains shall be provided as necessary to allow the withdrawal of the required fire~~
5364 ~~flow while maintaining the minimum residual pressure of 20 psi (138 kPa).~~

5365
5366 ~~(moved to Section 16(d)(i))(iii) —Fire protection. When fire protection is to be~~
5367 ~~provided, system design shall be such that fire flows can be served.~~

5368
5369 ~~(iv) —Small mains. Any main smaller than 6 inches (0.15 m) shall be justified by~~
5370 ~~hydraulic analysis and future water use.~~

5371
5372 ~~(v) —Hydrants. Only watermains designed to carry fire flows shall have fire~~
5373 ~~hydrants connected to them.~~

5374
5375 ~~(vi) —Deadends. Deadends shall be minimized by looping.~~

5376
5377 ~~(vii) —Flushing. Where deadend mains occur they shall be provided with a~~
5378 ~~flushing hydrant or blowoff for flushing purposes. Flushing devices shall be sized to provide~~
5379 ~~flows which will give a velocity of 2.5 feet per second minimum in the watermain being flushed.~~
5380 ~~No flushing device shall be directly connected to any sewer.~~

5381
5382 ~~(e) —Valves. Valves shall be provided on watermains so that inconvenience and~~
5383 ~~sanitary hazards will be minimized during repairs. Valves shall be located at not more than 500~~
5384 ~~foot (152 m) intervals in commercial districts and at not more than 1 block or 800 foot (244 m)~~
5385 ~~intervals in other districts.~~

5386
5387 ~~(moved to Section 16(e))(d) —Hydrants.~~

5388
5389 ~~(moved to Section 16(e)(i))(i) Hydrant leads. The hydrant lead shall be a~~
5390 ~~minimum of 6 inches (0.15 m) in diameter. Valves shall be installed in all hydrant leads.~~

5391
5392 ~~(moved to Section 16(e)(iii))(ii) —Protection from freezing. Provisions shall be~~
5393 ~~made to protect fire hydrant leads and barrels from freezing. The use of hydrant weep holes is~~
5394 ~~not allowed when groundwater levels are above the gravel drain area. In these cases it will be~~
5395 ~~necessary to pump the hydrant dry or use other means of dewatering.~~

5396
5397 ~~(moved to Section 16(e)(v))(iii) —Drainage. Hydrant drains shall not be~~
5398 ~~connected to or located within 10 feet (3.05 m) of sanitary sewers or storm drains.~~

5399
5400 ~~(e) —Air relief valves; Valve, meter and blowoff chambers.~~

5401
5402 ~~(moved to Section 16(f))(i) —Air relief valves. In all transmission lines and in~~
5403 ~~distribution lines 16 inches and larger at high points (where the water pipe crown elevation falls~~

5404 below the pipe invert elevation), provisions shall be made for air relief. Fire hydrants or active
5405 service taps may be substituted for air relief valves on 6 and 8 inch lines. Manholes or chambers
5406 for automatic air relief valves shall be designed to prevent submerging the valve with
5407 groundwater or surface water.

5408
5409 (ii) — Chamber drainage. Chambers, pits or man holes containing valves,
5410 blowoffs, meters, or other such appurtenances to a distribution system, shall not be connected
5411 directly to any storm drain or sanitary sewer, nor shall blowoffs or air relief valves be connected
5412 directly to any sewer. Such chambers or pits shall be drained to the surface of the ground where
5413 they are not subject to flooding by surface water or to absorption pits underground. Where
5414 drainage cannot be provided, a sump for a permanent or portable pump shall be provided.

5415
5416 (moved to Section 16(g))(formerly Section 14)(f) — Excavation, bedding, installation,
5417 backfill.

5418
5419 (moved to Section 16(g)(i))(i) Excavation. The trench bottom shall be excavated
5420 for the pipe bell. All rock shall be removed within 6 inches (15.2 cm) of the pipe. The trench
5421 shall be dewatered for all work.

5422
5423 (moved to Section 16(h))(ii) — Bedding. Bedding shall be designed in accordance
5424 with ASTM C12 — types A, B, C — for rigid pipe and ASTM D2321 — types I, II, III — for flexible
5425 pipe.

5426
5427 (iii) — Installation. The pipe shall be joined to assure a watertight fitting. Ductile
5428 iron pipe shall be installed in accordance with AWWA 600 and PVC piping shall be installed in
5429 accordance with AWWA manual M23.

5430
5431 (moved to Section 16(j))(iv) — Backfill. Backfill shall be performed without
5432 disturbing pipe alignment. Backfill shall not contain debris, frozen material, unstable material, or
5433 large clods. Stones greater than 3 inches (7.6 cm) in diameter shall not be placed within 2 feet
5434 (0.6 m) of pipe. Compaction shall be to a density equal to or greater than the surrounding soil.

5435
5436 (v) — Cover. All watermains shall be located to protect them from freezing and
5437 frost heave.

5438
5439 (vi) — Blocking. All tees, bends, plugs, and hydrants shall be provided with
5440 reaction blocking, tie rods, or joints designed to prevent movement.

5441
5442 (vii) — Pressure and leakage testing. All types of installed pipe shall be specified
5443 to be pressure tested and leakage tested in accordance with AWWA Standard C600.

5444
5445 (viii) — Disinfection. All new, cleaned, repaired, or reused watermains shall be
5446 specified to be disinfected in accordance with AWWA Standard C601. Specifications shall
5447 include detailed procedures for the adequate flushing, disinfection, and microbiological testing of
5448 all watermains.

5449

5450 ~~(moved to Section 16(k))(g) Separation of watermains, sanitary sewers and storm~~
5451 ~~sewers.~~

5452
5453 ~~(moved to Section 16(k)(i))(i) Horizontal and vertical separation from sewer lines.~~
5454 ~~Minimum horizontal separation shall be 10 feet (3 m) where the invert of the watermain is less~~
5455 ~~than 1.5 feet (0.46 m) above the crown of the sewer line. Minimum vertical separation shall be~~
5456 ~~1.5 feet (0.46 m) at crossings. Joints in sewers at crossings shall be located at least 10 feet (3 m)~~
5457 ~~from water mains. The upper line of a crossing shall be specially supported. Where vertical~~
5458 ~~and/or horizontal clearances cannot be maintained, the sewer or water line shall be placed in a~~
5459 ~~separate conduit pipe.~~

5460
5461 ~~(formerly Section 14)(g)(ii) Sewer manholes. No water pipe shall pass through~~
5462 ~~or come in contact with any part of a sewer manhole.~~

5463
5464 ~~(h) Surface water crossings.~~

5465
5466 ~~(i) Above water crossings. The pipe shall be adequately supported and~~
5467 ~~anchored, protected from damage and freezing, and accessible for repair or replacement.~~

5468
5469 ~~(ii) Underwater crossings. A minimum cover of 2 feet (0.61 m) shall be~~
5470 ~~provided over the pipe. When crossing water courses which are greater than 15 feet (4.6 m) in~~
5471 ~~width, the following shall be provided:~~

5472
5473 ~~(A) The pipe shall be of special construction, having flexible watertight~~
5474 ~~joints.~~

5475
5476 ~~(B) Valves shall be provided at both ends of water crossings so that the~~
5477 ~~section can be isolated for testing or repair; the valves shall be easily accessible and not subject~~
5478 ~~to flooding; and the valve closest to the supply source shall be located in a manhole.~~

5479
5480 ~~(moved to Section 16(l))(i) Cross connections.~~

5481
5482 ~~(moved to Section 16(l))(i)(i) Cross connections. There shall be no water service~~
5483 ~~connection installed or maintained between a public water supply and any water user whereby~~
5484 ~~unsafe water or contamination may backflow into the public water supply.~~

5485
5486 ~~(moved to Section 16(l)(i)(A))(A) Applicability. In order to protect all~~
5487 ~~public water supplies from the possibility of the introduction of contamination due to cross~~
5488 ~~connections, the water supplier shall require backflow prevention devices for each water service~~
5489 ~~connection in accordance with Table 1 which appears at the end of this section, with the~~
5490 ~~exception of (B)(I) residential water service connections and (B)(II) domestic non-residential~~
5491 ~~water service connections. The water supplier shall take appropriate actions which may include~~
5492 ~~immediate disconnection for any water user that fails to maintain a properly installed backflow~~
5493 ~~prevention device or comply with other measures as identified in Section 14 (i) of these~~
5494 ~~regulations.~~

5495

5496 ~~(moved to Section 16(1)(i)(A)(I))(I) — Any high hazard non-~~
5497 ~~residential connection to any public water supply shall be protected by the appropriate backflow~~
5498 ~~prevention device.~~

5499
5500 ~~(II) — Any service connection made to facilities constructed under~~
5501 ~~a permit to construct issued after adoption of this regulation, Section 14 (i), shall be in full~~
5502 ~~compliance with this section. This requirement applies to all service connections made or~~
5503 ~~initially activated after the adoption of this regulation.~~

5504
5505 ~~(moved to Section 16(1)(i)(A)(II))(II) — Water suppliers shall~~
5506 ~~establish record keeping and management procedures to ensure that requirements of this~~
5507 ~~regulation for installation and maintenance of backflow prevention devices are being met.~~

5508
5509 ~~(moved to Section 16(1)(i)(B))(B) — The method of backflow control,~~
5510 ~~selected from Table 1, shall be determined based upon the degree of hazard of the cross~~
5511 ~~connection and the cause of the potential backflow. Hazards shall be classified as high hazard or~~
5512 ~~low hazard. The potential cause of the backflow shall be identified as being back-siphonage or~~
5513 ~~back-pressure.~~

5514
5515 ~~(moved to Section 16(1)(i)(B)(I))(I) — Residential water service~~
5516 ~~connections shall be considered to be low hazard back-siphonage connections, unless determined~~
5517 ~~otherwise by a hazard classification.~~

5518
5519 ~~(moved to Section 16(1)(i)(B)(II))(II) — Domestic non-residential~~
5520 ~~water service connections shall be considered to be low hazard back-pressure connections, unless~~
5521 ~~determined otherwise by a hazard classification conducted by the water supplier. Examples~~
5522 ~~include schools without laboratories, churches, office buildings, warehouses, motels, etc.~~

5523
5524 ~~(moved to Section 16(1)(i)(B)(III))(III) — Any water user's~~
5525 ~~system with an auxiliary source of supply shall be considered to be a high hazard, back-pressure~~
5526 ~~cross-connection. A reduced pressure principle backflow device shall be installed at the water~~
5527 ~~service connection to any water user's system with an auxiliary source of supply.~~

5528
5529 ~~(moved to Section 16(1)(i)(B)(IV))(IV) — All water loading~~
5530 ~~stations shall be considered high hazard connections. A device, assembly, or method consistent~~
5531 ~~with Table 1 shall be provided.~~

5532
5533 ~~(moved to Section 16(1)(i)(B)(V))(V) — Non-domestic commercial or~~
5534 ~~industrial water service connections shall be considered to be high hazard back-pressure~~
5535 ~~connections, unless determined otherwise by a hazard classification. Examples include~~
5536 ~~restaurants, refineries, chemical mixing facilities, sewage treatment plants, mortuaries,~~
5537 ~~laboratories, laundries, dry cleaners, irrigation systems, facilities producing or utilizing~~
5538 ~~hazardous substances, etc. For some of these service connections, a hazard classification may~~
5539 ~~result in a determination of a back-siphonage or low hazard classification. The backflow~~
5540 ~~prevention device required shall be appropriate to the hazard classification. Where potential high~~
5541 ~~hazards exist within the non-residential water user's system, even though such high hazards may~~

5542 ~~be isolated at the point of use, an approved backflow prevention device shall be installed and~~
5543 ~~maintained at the water service connection.~~

5544
5545 ~~(moved to Section 16(1)(i)(C))(C) — Determination of the hazard~~
5546 ~~classification of a water service connection is the responsibility of the water supplier. The water~~
5547 ~~supplier may require the water user to furnish a hazard classification survey to be used to~~
5548 ~~determine the hazard classification.~~

5549
5550 ~~(moved to 5(e))(D) — Hazard classifications shall be conducted by hazard~~
5551 ~~classification surveyors that are certified by the USC Foundation for Cross-Connection Control~~
5552 ~~and Hydraulic Research, the American Association of Sanitary Engineers (ASSE), or by another~~
5553 ~~state certification program approved by the administrator, or by a water distribution system~~
5554 ~~operator also certified as a backflow device tester employed by the public water supplier for the~~
5555 ~~service where the survey is being conducted.~~

5556
5557 ~~(moved to Section 16(1)(i)(E))(E) — All backflow prevention devices~~
5558 ~~must be in-line serviceable (repairable), in-line testable except for devices meeting ASSE~~
5559 ~~Standard #1024, and installed in accordance with manufacturer instructions and applicable~~
5560 ~~plumbing codes.~~

5561
5562 ~~(moved to Section 16(1)(i)(F))(F) — All backflow prevention devices~~
5563 ~~must have a certification by an approved third party certification agency. Approved certification~~
5564 ~~agencies are:~~

5565
5566 ~~(moved to Section 16(1)(i)(F)(I))(I) — American Society of Sanitary~~
5567 ~~Engineers (ASSE),~~

5568
5569 ~~(moved to Section 16(1)(i)(F)(II))(II) — International Association of~~
5570 ~~Plumbing/Mechanical officials (IAPMO), and~~

5571
5572 ~~(moved to Section 16(1)(i)(F)(III))(III) — Foundation for Cross-~~
5573 ~~Connection Control and Hydraulic Research, University Of Southern California~~
5574 ~~(USC_FCCCHR).~~

5575
5576 ~~(moved to Section 16(1)(i)(G))(G) — Backflow prevention devices at~~
5577 ~~water service connections shall be inspected and certified by a certified backflow assembly tester~~
5578 ~~at the time of installation. Certification of the assembly tester shall be by one of the following:~~

5579
5580 ~~(moved to Section 16(1)(i)(G)(I))(I) — The American Society~~
5581 ~~Sanitary Engineers (ASSE),~~

5582
5583 ~~(moved to Section 16(1)(i)(G)(II))(II) — American Backflow~~
5584 ~~Prevention Association (ABPA),~~

5585
5586 ~~(III) — A state certification program approved by the~~
5587 ~~administrator.~~

5588
5589
5590
5591
5592
5593
5594
5595
5596
5597
5598
5599
5600
5601
5602
5603
5604
5605
5606
5607
5608
5609

~~(moved to Section 16(1)(i)(H))(H) — Backflow prevention devices installed at high hazard non-residential cross-connections shall be inspected and tested on an annual basis by a certified backflow assembly tester.~~

~~(moved to Section 16(1)(i)(I))(I) — The administrator may conduct inspections of backflow prevention devices. If any device is found to be defective or functioning improperly, it must be immediately repaired or replaced. Failure to make necessary repairs to a backflow prevention device will be cause for the water service connection to be terminated.~~

~~(moved to Section 16(1)(i)(J))(J) — All public water suppliers shall report any high hazard backflow incident within seven (7) days to the Wyoming Department of Environmental Quality, Water Quality Division. The backflow incident shall be reported on a form provided by the administrator.~~

~~(moved to Section 16(1)(ii))(ii) — Recycling water. Neither steam condensate nor cooling water from engine jackets or other heat exchange devices shall be returned to the public water supply after it has passed through the water service connection.~~

~~(moved to Section 16(1)(ii))(ii) TABLE 1
Backflow Prevention Devices, Assemblies and Methods~~

| Device, Assembly or Method | Degree of Hazard | | | | Notes |
|--|--------------------|-------------------|--------------------|-------------------|--|
| | Low Hazard | | High Hazard | | |
| | Back- Siphonage | Back- Pressure | Back- Siphonage | Back- Pressure | |
| Airgap | X | | X | | See Note 1 |
| Atmospheric Vacuum Breaker | X | | X | | Not allowed under continuous pressure |
| Spill-proof Pressure-type Vacuum | X | | X | | |
| Double Check Valve Backflow Preventer | X | X | | | |
| Pressure Vacuum Breaker | X | | X | | |
| Reduced Pressure Principle Backflow | X | X | X | X | See Note 2 |

| | | | | | |
|------------|---|--|--|--|------------------------------------|
| Dual Check | X | | | | Restricted to residential services |
|------------|---|--|--|--|------------------------------------|

5610
5611
5612
5613
5614
5615
5616
5617
5618
5619
5620
5621
5622
5623
5624
5625
5626
5627
5628
5629
5630
5631
5632
5633
5634
5635
5636
5637
5638
5639
5640
5641
5642
5643
5644
5645
5646
5647
5648
5649
5650
5651
5652

~~———— Note 1 Minimum Airgap for Water Distribution. For spouts with an effective opening diameter of one-half inch or less, the minimum airgap when the discharge is not affected by side walls shall be one inch. The minimum airgap when the discharge is affected by sidewalls shall be one and one-half inches. For effective openings greater than one-half inch, the minimum airgap shall be two times the effective opening diameter when the discharge is not affected by side walls. The minimum airgap when the discharge is affected by sidewalls shall be three times the effective opening diameter.~~

~~———— Note 2 Extreme Hazards. In the case of any water user's system where, in the opinion of the water supplier or the administrator, an undue health threat is posed because of the presence of extremely toxic substances or potential back pressures in excess of the design working pressure of the device, the water supplier may require an air gap at the water service connection to protect the public water system.~~

(a) 2018 TSS, parts 6.1, pumping facility location; parts 6.2(b-e), the general design of the pump station; 6.2.1, suction wells; 6.2.2(a-b), equipment servicing; 6.3.2, pump priming; 6.6.1, valves; 6.6.3, gauges and meters; 6.6.4, water seals; 6.6.5, controls, and 6.6.6, standby power, are herein incorporated by reference.

~~(formerly Section 12(f))(b) Stairways and/ ladders. Stairways or ladders shall be provided between all floors, and in pits or compartments which that must be entered. They shall have handrails on both sides, and treads of non-slip material. The Wyoming Occupational Health and Safety Rules and Regulations shall be complied with.~~

~~(formerly Section 12(g))(c) Heating. Provisions Pumping facilities shall be made for heating heated to maintain a minimum temperature of 40° F degrees Fahrenheit (4° C) if not typically unoccupied and 50° F degrees Fahrenheit (10° C) if normally occupied.~~

~~(formerly Section 12(h))(d) Pumping station Vventilation. designs shall demonstrate that: All accessible pumping station areas shall be ventilated. Ventilation may be continuous or intermittent. If intermittent, ventilation in areas normally visited by operating personnel shall be started automatically at not greater than 30 minute intervals. Permanently installed drywell ventilation shall provide at least 6 air changes per hour if continuous, and 12 air changes per hour if intermittent. Intermittent ventilating equipment shall ensure starting upon entry of operating personnel. Wetwells shall be designed to permit the use of portable blowers that will exhaust the space and continue to supply fresh air during access periods.~~

(formerly Section 12(h))(i) All accessible areas of the pumping station that are accessible areas shall be ventilated.

(formerly Section 12(h))(ii) Ventilation may be continuous or intermittent.

5653 ~~(formerly Section 12(h))(iii)~~ Permanently installed dDrywell ventilation shall
5654 provide: at least 6 air changes per hour if continuous, and 12 air changes per hour if intermittent.

5655
5656 ~~(formerly Section 12(h))(A)~~ aAt least 6 air changes per hour if
5657 continuous; ~~and 12 air changes per hour if intermittent.~~

5658
5659 ~~(formerly Section 12(h))(B)~~ At least 30 air changes per hour iif
5660 intermittent; with an automatic start upon operator entry into the area. ventilation in areas
5661 normally visited by operating personnel shall be started automatically at not greater than 30
5662 minute intervals. Intermittent ventilating equipment shall ensure starting upon entry of operating
5663 personnel.

5664
5665 ~~(formerly Section 12(h))(iv)~~ Wetwells s ventilation shall provide 12 continuous air
5666 changes per hour or 60 intermittent air changes per hour and be designed to permit the use of
5667 portable blowers that will exhaust the space and ~~continue to~~ supply fresh air during the access
5668 periods.

5669
5670 ~~(formerly Section 12(i))(c)~~ Dehumidification: equipment shall be provided in below
5671 ground pumping stations; ~~a means for dehumidification shall be provided.~~ The facilities
5672 equipment shall be sized to maintain ~~the a~~ dewpoint at least 2 degrees Fahrenheit below the
5673 coldest anticipated temperature of the water to be conveyed in the pipes.

5674
5675 ~~(formerly Section 12(k))(f)~~ Sanitary and other conveniences. All pumping
5676 stations that are manned ~~for~~ four or more hours per day shall be provided with potable water,
5677 lavatory, and toilet facilities. The Wwastes shall be discharged to the sanitary sewer or ~~to~~ an on-
5678 site waste treatment system.

5679
5680 (g) Pumps. design shall comply with the following requirements: At least two
5681 pumping units shall be provided. With the largest pump out of service, the remaining pump or
5682 pumps shall be capable of providing the maximum pumping rate of the system.

5683
5684 ~~(formerly Section 12(l))(i)~~ (i) At least two pumping units pumps shall be
5685 provided. With the largest pump out of service, the remaining pump or pumps shall be capable of
5686 providing the maximum pumping ~~rate~~ capacity of the system.

5687
5688 ~~(formerly Section 12(m))(ii)~~ Suction lift. Pumps shall be selected ~~so~~ such that the
5689 net positive suction head required ~~at maximum flow~~ (NPSHR) is less than the net positive
5690 suction head available (NPSHA) minus four (4) feet (1.2 m) based on ~~the~~ hydraulic conditions
5691 and the altitude of the pumping station installation. If this condition ~~is not met~~ cannot be
5692 satisfied, then a means of priming shall be provided.

5693
5694 ~~(iii)(formerly Section 12(n))~~ Surge control. Piping systems shall be designed to
5695 withstand the maximum possible surge (water hammer) from the pumping station, or adequate
5696 surge control provided to protect the piping. Pressure relief valves are not acceptable as surge
5697 control.

5698

5699 ~~(formerly Section 12(a))(iv) Total dynamic head.~~ The calculated total dynamic
5700 head ~~rating of~~ for pumping units shall be based on pipe friction, pressure losses from pipng pipe
5701 entrances, exits, appurtenances (~~bends, valves, etc.~~ such as valves and bends), and static head at
5702 the design flow.

5703
5704 ~~(formerly Section 12(o))(h)~~ Booster pumps shall comply with the following
5705 requirements:
5706

5707 ~~(formerly Section 12(o)(i))(i)~~ Booster pumps shall not produce a pressure less
5708 than 5 psi in suction lines. Where If the suction line has service connections, booster pump intake
5709 the pressure shall be at least 35 psi (138 kPa) when the pump is in during normal operation and
5710 shall be provided with have a low-pressure cutoff switch if the suction line pressure is a
5711 minimum of to maintain at least 20 psi (69 kPa).
5712

5713 (ii) For booster pumps used for fire suppression, no person shall install or
5714 maintain a water service connection to any premises where a fire pump has been installed on the
5715 service line to or within such premises unless the pump is equipped with one of the following:
5716

5717 (A) A low suction throttling valve or pilot-operated valve installed in
5718 the discharge piping that maintains positive pressure in the suction piping while monitoring
5719 pressure in the suction piping through a sensing line. The valve shall throttle the discharge of the
5720 pump when necessary so that suction pressure will not be reduced below 20 psi gauge when the
5721 pump is operating; or
5722

5723 (B) A variable-speed suction limiting control that is used to maintain a
5724 minimum positive suction pressure at the pump inlet by reducing the pump driver speed while
5725 monitoring pressure in the suction piping through a sensing line. The limiting control shall be set
5726 so that the suction pressure will not be reduced below 20 psi gauge while the pump is operating.
5727

5728 ~~(formerly Section 12(o)(ii))(iii)~~ Automatic or remote controlled devices
5729 pumps shall have a range between the start and cutoff pressure which that will prevent the pump
5730 from cycling of more than + one start every 15 minutes.
5731

5732 ~~(formerly Section 12(o)(iii))(iv)~~ In-line booster pumps shall be accessible for
5733 servicing and repairs maintenance. The There shall be access openings, as needed, and vault
5734 shall be large enough to to allow the remove removal of the pump.
5735

5736 ~~(formerly Section 12(o))(v)~~ Individual home booster pumps shall not be allowed
5737 for any individual service from the public water supply main.
5738

5739 ~~(formerly Section 12(p))(vi) Automatic and remote controlled stations.~~
5740 Conditions that may affect continuous delivery of water shall be alarmed at an attended location.
5741 Un-manned or remotely controlled pump stations shall have an alarm at an operator attended
5742 location for any conditions that may affect the continuous delivery of water.
5743

5744 (i) Pumping facility valves shall comply with the following requirements:

5745
5746 ~~(formerly Section 12(e)(i))(E)(i)~~ **Air release.** Air release valves shall be
5747 provided where the pipe crown is dropped in elevation.
5748

5749 ~~(formerly Section 12(e)(i))(C)(ii)~~ Each pump shall have an individual suction
5750 line or the lines shall ~~be so~~ manifolded such that they will ensure similar hydraulic and operating
5751 conditions.
5752

5753 **Section 15. Laboratory Requirements Finished Water Storage.**
5754

5755 ~~(moved to Section 17(a))(a) — Test procedures. Test procedures for analysis of monitoring~~
5756 ~~samples shall conform to the 15th Edition of Standard Methods for the Examination of Water~~
5757 ~~and Wastewater.~~
5758

5759 ~~(moved to Section 17(b))(b) — Testing requirements. All treatment plants shall have the~~
5760 ~~capability to perform or contract for the self-monitoring analytical work required by the Safe~~
5761 ~~Drinking Water Act and/or state regulation. All plants shall, in addition, be capable of~~
5762 ~~performing or contracting the analytical work required to assure good management and control~~
5763 ~~of plant operation and performance.~~
5764

5765 ~~(moved to Section 17(c))(c) — Minimum requirements.~~
5766

5767 ~~(moved to Section 17(c)(i))(i) Location and space. The laboratory shall be located~~
5768 ~~away from vibrating machinery or equipment which might have adverse effects on the~~
5769 ~~performance of laboratory instruments or the analyst and shall be designed to prevent adverse~~
5770 ~~effects from vibration.~~
5771

5772 ~~(i) — Where a full-time chemist is proposed to work in the laboratory, a minimum of~~
5773 ~~400 square feet (37.2 m²) of floor space shall be provided in the laboratory. If more than two~~
5774 ~~persons will be working in the laboratory, 100 square feet (9.3 m²) of additional space shall be~~
5775 ~~provided for each additional person.~~
5776

5777 ~~(moved to Section 17(c)(ii))(ii) — Materials. Walls shall have an easily~~
5778 ~~cleaned, durable and impervious surface. Two exit doors or openings shall be located to permit a~~
5779 ~~straight exit from the laboratory; one exit shall be directly to the outside of the building. Panic~~
5780 ~~hardware shall be used. Interior doors shall have glass windows.~~
5781

5782 ~~(moved to Section 17(c)(iii))(iii) — Cabinets and bench tops. Cabinet and~~
5783 ~~storage space shall be provided for dust-free storage of instruments and glassware.~~
5784

5785 ~~(moved to Section 17(c)(iii))(iii) Bench top height shall be 30 inches (0.91 m). Tops~~
5786 ~~should be field joined into a continuous surface with acid, alkali, and solvent resistant cements.~~
5787

5788 ~~(moved to Section 17(c)(iv))(iv) — Hoods. Fume hoods shall be provided where~~
5789 ~~reflux or heating of toxic or hazardous materials is required. A hood shall not be situated near a~~
5790 ~~doorway, unless a secondary means of exit is provided. All switches, electrical outlets, and utility~~



5791 and baffle adjustment handles shall be located outside the hood. Light fixtures shall be
5792 explosion proof. Twenty four hour continuous exhaust capability shall be provided. Exhaust fans
5793 shall be explosion proof.

5794
5795 (moved to Section 17(c)(v))(v) ~~— Sinks. The laboratory shall have a minimum~~
5796 ~~of 2 sinks per 400 ft² (37.2 m²) (not including cup sinks). Sinks shall be double well with~~
5797 ~~drainboards and shall be made of epoxy resin or plastic. All water fixtures shall be provided with~~
5798 ~~reduced pressure zone backflow preventers. Traps constructed of glass, plastic, or lead and~~
5799 ~~accessible for cleaning shall be provided.~~

5800
5801 (vi) ~~— Ventilation and lighting. Laboratories shall be separately heated and~~
5802 ~~cooled, with external air supply for 100 percent makeup volume. Separate exhaust ventilation~~
5803 ~~shall be provided. Ventilation outlet locations shall be remote from ventilation inlets.~~

5804
5805 (vi) ~~— Lighting shall provide 100 foot candles at the bench top.~~

5806
5807 (vii) ~~— Gas. If gas is required in the laboratory, natural gas shall be supplied.~~

5808
5809 (moved to Section 17(c)(vi)) (viii) ~~— Water still. Distilled water shall conform to~~
5810 ~~the quality specified by Standard Methods for the Examination of Water and Wastewater, 15th~~
5811 ~~Edition.~~

5812
5813 (ix) ~~— Emergency shower and eye wash. All laboratories shall be equipped with~~
5814 ~~an emergency eye wash and shower that is located within the laboratory.~~

5815
5816 (moved to Section 17(d))(d) ~~— Portable testing equipment. Portable testing equipment~~
5817 ~~shall be provided where necessary for operational control testing.~~

5818
5819 (a) 2018 TSS, parts 7.01, sizing; 7.0.2, finished water storage structures; 7.0.3,
5820 contamination protection for storage structures; 7.0.4, security for storage structures; 7.0.5, drain
5821 design for storage structures; 7.0.7, overflow design for storage structures; 7.0.8, finished water
5822 storage access; 7.0.9, vents; 7.0.10, roof and sidewall design; 7.0.17, painting and cathodic
5823 protection; 7.0.18, disinfection; 7.1.1, filter washwater tanks; and 7.2 through 7.2.4,
5824 hydropneumatic tank systems, are herein incorporated by reference.

5825
5826 (formerly Section 13(a))(b) General. Steel finished water storage structures shall be
5827 provided using the requirements of the AWWA D100 or AWWA D103. All tank design and
5828 foundation design shall be performed by a registered professional engineer and the plans or
5829 contractor furnished information shall so designate the registered engineer providing the design.
5830 Materials other than steel may be used for water storage tanks. Finished water storage structures
5831 shall comply with the following requirements:

5832
5833 (formerly Section 13(a))(i) Steel finished water storage structures shall be
5834 provided using the requirements of the AWWA D100 or AWWA D103. Water storage structures
5835 shall comply with the following standards for storage tanks, standpipes, ground storage
5836 reservoirs that are described in AWWA M42, clearwells, and elevated storage:



- 5837
- 5838 (A) AWWA D100;
- 5839
- 5840 (B) AWWA D102;
- 5841
- 5842 (C) AWWA D103;
- 5843
- 5844 (D) AWWA D104;
- 5845
- 5846 (E) AWWA D106;
- 5847
- 5848 (F) AWWA D107;
- 5849
- 5850 (G) AWWA D108;
- 5851
- 5852 (H) AWWA D110;
- 5853
- 5854 (I) AWWA D115;
- 5855
- 5856 (J) AWWA D120;
- 5857
- 5858 (K) AWWA D121;
- 5859

5860 ~~(formerly Section 13(a))~~(ii) All tank design and foundation design shall be
 5861 performed by a Wyoming registered professional engineer. ~~and t~~The plans or contractor-
 5862 furnished information shall ~~so designate the registered engineer providing the design be signed~~
 5863 and sealed by a Wyoming registered professional engineer.

5864

5865 (iii) All new or modified water storage tanks shall have the inlet and outlet
 5866 connections separated from each other as much as is practical.

5867

5868 (c) Storage facility designs shall demonstrate:

5869

5870 (ii) The average daily demand will require a daily fill of 20 percent of the total
 5871 storage volume for surface water sources and 10 percent for groundwater sources. The minimum
 5872 inlet velocity shall be 10 ft/sec.

5873

5874 (iii) For designs that demonstrate the storage tank has a small daily demand
 5875 and a high fire water storage requirement, ~~or the storage tank water age of 100 percent filled in a~~
 5876 24 hour period will have an average of greater than two days, the design shall demonstrate that a
 5877 a volume equal to at least 20 percent of the tank volume will be delivered to the storage tank
 5878 each time pumping is initiated.

What does this mean? State more clearly.

5879

5880 ~~(formerly Section 13(a)(i)(D))~~(iv) ~~Storage need not be provided in a well~~
 5881 ~~supply system where~~ For designs with well systems that provide a minimum of two wells are
 5882 ~~provided and that can supply either~~ the maximum hourly demand or the fire demand, whichever

5883 is greater, ~~can be supplied with the largest well out of service~~ storage is not required. These
5884 systems shall demonstrate that they will provide alternative power for the finished water pumps.

5885
5886 (d) Storage structure design shall eliminate short-circuiting.

5887
5888 (e) A mixing system shall be considered to address disinfection by-product
5889 formation, stratification, stagnation, freezing, and other water age issues.

5890
5891 (f) Overflow and drain lines shall be protected with a mechanical device such as a
5892 sealed flapper valve or duckbill valve, or #24 mesh non-corrodible screen.

5893
5894 (g) Overflow lines protected with a mechanical device shall install a #4 mesh non-
5895 corrodible screen or finer to prevent the entrance of birds or rodents.

5896
5897 (h) If overflow lines are protected with #24 mesh non-corrodible screen, the design
5898 shall demonstrate prevention of screen clogging that would lead to structural storage tank
5899 damage.

5900
5901 ~~(formerly Section 13(a)(vi)(B))(i)~~ The screen shall be installed within ~~T~~the
5902 overflow line of a ground level structure shall open downward and be screened with
5903 noncorrodible screen installed within the pipe at a location that is not least susceptible to damage
5904 by vandalism and that allows for the overflow line to be operational during an overflow event.

5905
5906 (ii) The screen with the smallest openings shall be accesible for replacement
5907 and shall be the outermost screen.

5908
5909 (i) Overflow designs shall demonstrate the provisions that will be included to prevent
5910 mechanical devices from freezing shut.

5911
5912 (j) Overflow lines shall not be considered as vents.

5913
5914 ~~(formerly Section 13(a)(viii))(k)~~ Vents. Finished water storage structures shall be
5915 vented. Overflows shall not be considered as vents. Open construction between the sidewall and
5916 roof is not permissible. Vents shall prevent the entrance of be designed to protect the tank from
5917 contaminants including but not limited to surface water, and rainwater, stormwater runoff,
5918 insects, rodents, and shall exclude birds and animals.

5919
5920 ~~(formerly Section 13(a)(viii)(A))(i)~~ For elevated tanks and standpipes, All
5921 openings shall be protected with #24 mesh noncorrodible non-corrodible screen may be used or a
5922 combination of #24 mesh and coarser mesh non-corrodible screen.

5923
5924 (ii) The design shall demonstrate consideration of site conditions, freezing,
5925 frosting, and provide justification including precautions for snow depth.

5926
5927 (A) The design shall demonstrate consideration of frost free or frost
5928 proof vents; and

5929
5930 (B) The design shall demonstrate consideration of a pressure/vacuum,
5931 frost-proof release vents that will need to protect openings with #24 mesh non-corrodible screen.

5932
5933 (l) Vent openings shall be at least 24 inches above the nearest horizontal surface.

5934
5935 (m) Elevated tanks shall be designed to remove snow via tank geometry to prevent
5936 snow build up clogging vents.

5937
5938 (n) Vent designs shall include calculations that verify the required volume of flow is
5939 achievable through the proposed vent pipe and screen combination.

5940
5941 (o) Finished water plant water storage shall comply with the following requirements:

5942
5943 ~~(formerly Section 13(b)(ii))(i) Clearwell.~~ Clearwell storage shall be sized,
5944 in conjunction with distribution system storage, to relieve the filters ~~from~~ of having to follow
5945 fluctuations in water use. Where water is pumped from ~~clearwater~~ clearwell storage to the
5946 system, an overflow shall be provided.

5947
5948 (ii) If unfinished water is stored in compartments adjacent to finished water,
5949 the unfinished and finished water shall be separated by double walls.

5950
5951 ~~(formerly Section 13(b)(iv))(iii) Basins and wetwells.~~ Receiving basins and
5952 ~~pump~~ wetwells ~~for finished water~~ shall be designed as finished water storage structures and shall
5953 comply with the requirements of this Section.

5954
5955 **Section 16. ~~Operation and Maintenance Manuals~~ Distribution Systems.**

5956
5957 ~~(moved to Section 18(a))(a) Where required. Plant operation and maintenance manuals~~
5958 ~~are required for each new or modified treatment or pumping facility. The manuals shall provide~~
5959 ~~the following information as a minimum:~~

5960
5961 ~~(moved to Section 18(a)(i))(i) Introduction.~~

5962
5963 ~~(moved to Section 18(a)(ii))(ii) Description of facilities and unit processes~~
5964 ~~within the plant from influent structures through effluent structures.~~

5965
5966 ~~(moved to Section 18(a)(iii))(iii) Plant control system.~~

5967
5968 ~~(moved to Section 18(a)(iv))(iv) Utilities and systems.~~

5969
5970 ~~(moved to Section 18(a)(v))(v) Emergency operation and response.~~

5971
5972 ~~(moved to Section 18(a)(vi))(vi) Permit requirements and other regulatory~~
5973 ~~requirements.~~

5974

5975 ~~(moved to Section 18(a)(vii))(vii) — Staffing needs.~~

5976

5977 ~~(moved to Section 18(a)(ix))(viii) — Index to manufacturer's manuals.~~

5978

5979 ~~(moved to Section 18(b))(b) — When required, Acceptance of the final operation and~~
5980 ~~maintenance manuals is required prior to plant startup.~~

5981

5982 ~~(c) — Description of facilities. The description of facilities and unit processes shall~~
5983 ~~include the size, capacity, model number (where applicable) and intended loading rate.~~

5984

5985 ~~(moved to Section 18(c)(i) — Each unit. The manual shall describe each unit,~~
5986 ~~including the function, the controls, the lubrication and maintenance schedule. The manual shall~~
5987 ~~also include start-up operations; routine operations; abnormal operations; emergency or power~~
5988 ~~outage operations; bypass procedures; and safety.~~

5989

5990 ~~(ii) — Flow diagrams. The manual shall provide flow diagrams of the entire~~
5991 ~~process, as well as individual unit processes. The flow diagrams shall show the flow options~~
5992 ~~under the various operational conditions listed above.~~

5993

5994 ~~(d) — Operating parameters. The O & M manual shall provide the design criteria for~~
5995 ~~each unit process. The data shall include the number, type, capacity, sizes, etc., and other~~
5996 ~~information, as applicable.~~

5997

5998 ~~(moved to Section 18(c)(iii))(e) — Troubleshooting guide. Each equipment~~
5999 ~~maintenance manual shall include a section on troubleshooting. These manuals are to be indexed~~
6000 ~~in the plant O & M manual. The troubleshooting guide shall include typical operation problems~~
6001 ~~and solutions. The guide shall include a telephone number for factory troubleshooting assistance.~~

6002

6003 ~~(f) — Emergency procedures. The plant O & M manual shall detail emergency~~
6004 ~~operations procedures for possible foreseeable emergencies, including power outage, equipment~~
6005 ~~failure, development of unsafe conditions, and other emergency conditions. The details shall~~
6006 ~~include valve positions, flow control settings, and other information to ensure continued~~
6007 ~~operation of the facility at maximum possible efficiency.~~

6008

6009 ~~The manual shall also detail emergency notification procedures to be followed to protect~~
6010 ~~health and safety under various emergency conditions.~~

6011

6012 ~~(g) — Safety. The manual shall provide general information on safety in and around the~~
6013 ~~plant and its components. Each unit process discussion shall include applicable safety procedures~~
6014 ~~and precautions. For unit processes or operations having extreme hazards (such as chlorine,~~
6015 ~~closed tanks, etc.), the discussion shall detail appropriate protection, rescue procedures, and~~
6016 ~~necessary safety equipment.~~

6017

6018 ~~(moved to Section 18(c)(iv))(h) — Maintenance manuals. Maintenance manuals shall~~
6019 ~~be required for each piece of equipment. These manuals must meet the requirements of the~~



6020 engineer and contractor for installation and startup of equipment. ~~The information included in the~~
6021 ~~manufacturer's manuals shall not be included in the O & M manual.~~

6022
6023 ~~The manual shall have a neatly typewritten table of contents for each volume arranged in~~
6024 ~~a systematic order. The general contents shall include product data; drawings; written text as~~
6025 ~~required to supplement product data for the particular installation; and a copy of each warranty,~~
6026 ~~bond and service contract issued.~~

6027
6028 ~~The manuals for equipment and systems shall include a description of unit and~~
6029 ~~component parts; operating procedures; maintenance procedures and schedules; service and~~
6030 ~~lubrication schedule; sequence of control operation; a parts list; and a recommended spare parts~~
6031 ~~list.~~

6032
6033 (a) 2018 TSS, parts 8.2, system design; 8.3, valves; 8.6, valve, meter and blow-off
6034 chambers; 8.7.3, cover; 8.7.4, blocking; 8.7.6, pressure and leakage testing; 8.7.7, disinfection;
6035 8.8.6, sewer manholes, inlets, and structures; 8.9.1, above-water crossings; 8.9.2, underwater
6036 crossings, are herein incorporated by reference.

6037
6038 ~~(formerly Section 14(a)(i))(b) Types~~ Distribution systems shall be constructed of
6039 commercial pipe approved for water systems include that conform to the following standards:
6040 conforms

6041 ~~(formerly Section 14(a)(i)(A))(i)~~ PVC water pipe: ASTM D2241, less
6042 than 4" diameter (10 cm); AWWA C900: 4" (10 cm) and larger diameter.

6043
6044 ~~(formerly Section 14(a)(i)(A))(A)~~ ASTM D2241, ~~l~~ess than 4" four
6045 inches diameter (10 cm), ASTM D 2241; or

6046
6047 ~~(formerly Section 14(a)(i)(A))(B)~~ AWWA C900: 4" (10 cm) Four
6048 inches and larger diameter, AWWA C900.

6049
6050 ~~(formerly Section 14(a)(i)(C))(ii)~~ Ductile iron pipe; AWWA C151;

6051
6052 ~~(formerly Section 14(a)(i)(D))(iii)~~ Glass fiber ~~reinforced thermosetting resin~~
6053 pressure pipe; Fiberglass pressure pipe, AWWA C950; or

6054
6055 ~~(formerly Section 14(a)(i)(E))(iv)~~ Polyethelyene Polyethylene pipe; AWWA
6056 C901;
6057 Add polyethylene large diameter, AWWA C906

6058 ~~(formerly Section 14(a)(iii))(c)~~ Joints. Packing and jointing materials used in the
6059 joints of pipe shall be flexible and durable. Flanged piping shall ~~not be used for buried service~~
6060 except for connections to valves; ~~push-on or mechanical joints shall be used~~ only be allowed for
6061 connection to valves.

6062
6063 ~~(formerly Section 14(b))(d)~~ Watermains ~~design~~ shall meet the following design
6064 requirements;
6065



6066 ~~(formerly Section 14(b)(iii))(i)~~ ~~Fire protection.~~ When fire protection is ~~to be~~
6067 provided, the system design shall be ~~such that~~ designed to also serve fire flows ~~can be served~~.

6068
6069 ~~(formerly Section 14(b)(v))(ii)~~ ~~Hydrants.~~ Only ~~watermains~~ mains designed
6070 ~~to carry for~~ fire flows shall have ~~fire~~ hydrants connected to them.

6071
6072 _____ ~~(formerly Section 14(d))(e)~~ ~~Hydrants shall:~~

6073
6074 ~~(formerly Section 14(d)(i))(i)~~ ~~Hydrant leads.~~ The Have hydrant leads ~~shall be~~ a
6075 minimum of 6 six inches (0.15 m) in diameter. ~~Valves shall be installed in all hydrant leads.~~

6076
6077 ~~(formerly Section 14(d)(i))(ii)~~ _____ ~~Have v~~Valves ~~shall be~~ installed. in all
6078 hydrant leads. ~~Keep this clause.~~

6079
6080 ~~(formerly Section 14(d)(ii))(iii)~~ _____ ~~Be~~ Protection-protected from freezing; at
6081 hydrant leads and barrels. ~~Provisions shall be made to protect fire hydrant leads and barrels from~~
6082 ~~freezing. The use of hydrant weep holes is not allowed when groundwater levels are above the~~
6083 ~~gravel drain area. In these cases it will be necessary to pump the hydrant dry or use other means~~
6084 ~~of dewatering.~~

6085
6086 ~~(formerly Section 14(d)(ii))(iv)~~ _____ ~~The use of hydrant weep holes is not~~
6087 ~~allowed when groundwater levels are above the gravel drain area. In these cases it will be~~
6088 ~~necessary to pump the hydrant dry or use other means of dewatering.~~ Where groundwater levels
6089 are above the gravel drain area, hydrants shall be pumped dry or otherwise dewatered and
6090 hydrant weep holes shall not be used; and

6091
6092 ~~(formerly Section 14(d)(iii))(v)~~ _____ ~~Drainage.~~ Hydrant Have drains ~~shall not be~~
6093 that are not connected to or located within 10 feet (3.05 m) of a sanitary sewers or storm drains.

6094
6095 ~~(formerly Section 14(e)(i))(f)~~ ~~Air relief valves.~~ In all transmission ~~lines~~ and ~~in~~
6096 distribution lines 16 inches and larger at high points ~~(where the water pipe crown elevation falls~~
6097 ~~below the pipe invert elevation), provisions~~ hydrants ~~shall be made~~ have provisions for air relief.
6098 ~~Fire hydrants or active service taps may be substituted for air relief valves on 6- and 8- inch lines.~~
6099 ~~Manholes or chambers for automatic air relief valves shall be designed to prevent submerging~~
6100 ~~the valve with groundwater or surface water.~~

6101
6102 ~~(formerly Section 14(e)(i))(i)~~ Fire hydrants or active service taps may be
6103 substituted for air relief valves on 6- and 8-inch lines.

6104
6105 ~~(formerly Section 14(e)(i))(ii)~~ _____ Manholes or chambers for automatic air
6106 relief valves shall be designed to prevent submerging the valve with groundwater or surface
6107 water.

6108
6109 ~~(formerly Section 14(f))(g)~~ ~~Excavation, bedding, installation, backfill.~~ Where
6110 excavation is performed for distribution systems:

6111

Keep the old wording. FH are not the only means of air relief and this instance calls for auto air relief. This revision totally misses intent.



6112 ~~(formerly Section 14)(f)(i)(i) Excavation.~~ The trench bottom shall be excavated
6113 for the pipe bell ~~bell of the pipe.~~ All rock shall be removed within ~~6 inches (15.2 cm)~~ of the pipe.
6114 The trench shall be dewatered for all work.

6116 ~~(formerly Section 14)(f)(i)(ii)~~ All rock shall be removed within ~~6~~ six inches ~~(15.2~~
6117 ~~cm)~~ of the pipe.

6119 ~~(formerly Section 14)(f)(i)(iii)~~ The trench shall be dewatered for all work.
6120 Add "involving pipe that is jointed in the trench".

6121 ~~(formerly Section 14)(f)(ii)(h)~~ Bedding. ~~Distribution system B~~ bedding for rigid
6122 pipe shall be designed in accordance with ASTM C12 ~~types Classes~~ A, B, or C ~~for rigid pipe,~~
6123 and Flexible pipe bedding shall be designed in accordance with ASTM D2321 ~~types Class~~ I, II,
6124 or III ~~for flexible pipe.~~

6126 (i) Distribution system pipe shall be joined to ensure a watertight fitting and installed
6127 in accordance with the following standards, as applicable:

6129 (A) For ductile iron pipe, AWWA C600;

6131 (B) For PVC pipe, AWWA M23;

6133 (C) For HDPE pipe, AWWA M55.

6135 ~~(formerly Section 14)(f)(iv)(j)~~ Backfill. ~~Backfill for distribution systems shall:~~
6136 ~~be performed without disturbing pipe alignment. Backfill shall not contain debris, frozen~~
6137 ~~material, unstable material, or large clods. Stones greater than 3 inches (7.6 cm) in diameter shall~~
6138 ~~not be placed within 2 feet (0.6 m) of pipe. Compaction shall be to a density equal to or greater~~
6139 ~~than the surrounding soil.~~

6141 ~~(formerly Section 14)(f)(iv)(A)~~ B ~~be performed without disturbing pipe~~
6142 ~~alignment.;~~

6144 ~~(formerly Section 14)(f)(iv)(B)~~ Backfill shall n ~~ot contain debris, frozen~~
6145 ~~material, unstable material, or large clods.;~~

6147 ~~(formerly Section 14)(f)(iv)(C)~~ Not ~~place rocks or S~~ stones greater than 3
6148 three inches ~~(7.6 cm)~~ in diameter ~~shall not be placed~~ within 2 ~~two~~ feet ~~(0.6 m)~~ of pipe ~~;~~ and
6149 include placement of

6150 ~~(formerly Section 14)(f)(iv)(D)~~ Compaction shall be ~~Be compacted~~ to a
6151 density equal to or greater than the surrounding soil.

6153 ~~(formerly Section 14)(g)(k)~~ Distribution systems shall meet the following requirements
6154 for S ~~eparation of water mains, from~~ sanitary ~~sewers~~ and storm sewers ~~;~~

6156 ~~(formerly Section 14)(g)(i)(i)~~ Horizontal and vertical separation from sewer lines.
6157 The M ~~inimum~~ horizontal separation from sewer lines shall be 10 feet ~~(3 m)~~ where the invert of



6158 the watermain is less than 1.5 feet ~~(0.46 m)~~ above the crown of the sewer line. ~~Minimum~~
6159 ~~vertical separation shall be 1.5 feet (0.46 m) at crossings. Joints in sewers at crossings shall be~~
6160 ~~located at least 10 feet (3 m) from water mains. The upper line of a crossing shall be specially~~
6161 ~~supported. Where vertical and/or horizontal clearances cannot be maintained, the sewer or water~~
6162 ~~line shall be placed in a separate conduit pipe.~~

6163
6164 ~~(formerly Section 14(g)(i))(ii)~~ (ii) The ~~M~~minimum vertical separation shall be
6165 1.5 feet ~~(0.46 m)~~ at crossings.;

6166
6167 ~~(formerly Section 14(g)(i))(iii)~~ (iii) Joints in ~~sewers~~ sewer lines at crossings
6168 shall be located at least 10 feet ~~(3 m)~~ from water mains.;

6169
6170 ~~(formerly Section 14(g)(i))(iv)~~ (iv) The upper line of a crossing shall be
6171 specially supported. ~~;~~ and

6172
6173 ~~(formerly Section 14(g)(i))(v)~~ (v) Where the minimum vertical ~~and/or~~ horizontal
6174 ~~clearances~~ separation distances required by this Section cannot be ~~maintained met~~, the sewer or
6175 water line shall be placed in a separate conduit pipe.

Not the only acceptable method, per DEQ policy. Also list sewer installed w/pressure-rated pipe and flow-fill.

6176
6177 (vi) Flow-fill for pipelines shall comply with the following:

6178
6179 (A) Cement-treated fill, non-shrink backfill, low density concrete
6180 backfill, or structural backfill may be used as flow-fill when the material has a 28-day
6181 compressive strength of 30-60 psi.

6182
6183 (B) The pipe to be encased shall be laid on a four to six inch of bed of
6184 washed gravel that has been widened, with the walls of the trench benched away from the center-
6185 line of the trench, so the pipe is uniformly supported over the length or supported on blocks no
6186 further than 10 feet apart.

6187
6188 (C) The flow-fill and washed gravel or blocks shall rest on an
6189 undisturbed trench bottom.

6190
6191 (D) The pipe shall not move laterally or float during placement of the
6192 flow-fill. The line and grade of the pipe shall be maintained.

6193
6194 (E) The flow-fill shall extend from trench sidewall to trench sidewall
6195 and extend at least two inches above the top of the pipe.

6196
6197 (vii) Flow-fill for pipe crossings shall comply with the following:

6198
6199 (A) To the extent possible, there shall be no joints or taps within nine
6200 feet of the crossing.

6201
6202 (B) The flow-fill shall extend from undisturbed earth at the bottom of
6203 the lower pipe to at least two inches above the top of the upper pipe.



6204
6205 (C) The block of flow-fill shall be wide enough to ensure the structural
6206 integrity of the installation.

6207 shall be vertically
6208 (D) Pipes that cross one another ~~may be~~ separated by a minimum of
6209 two inches when encased in flow-fill.

6210 Cross-connection prevention
6211 ~~(formerly Section 14(i))(l)~~ Cross-connections shall comply with the following
6212 requirements:

6213
6214 ~~(formerly Section 14(i)(i))(i) Cross-connections.~~ There shall be no water service
6215 connection installed or maintained between a public water supply and any water user whereby
6216 unsafe water or contamination may backflow into the public water supply.

6217
6218 ~~(formerly Section 14(i)(i)(A))(A) Applicability.~~ In order to protect all
6219 public water supplies from the possibility of the introduction of contamination due to cross -
6220 connections, the water supplier shall require backflow prevention devices for each water service
6221 connection in accordance with ~~Table 1 which appears at the end of this section~~ Table 4 of this
6222 Section, with the exception of (B)(I) residential water service connections and (B)(II) domestic
6223 non-residential water service connections. The water supplier shall take appropriate actions
6224 ~~which that~~ which that may include immediate disconnection for any water user that fails to maintain a
6225 properly installed backflow prevention device or comply with other measures as identified in
6226 ~~Section 14 (i) of these regulations~~ this Section.

Rethink table labels, as
Section # - 1, 2, etc.

6227
6228 ~~(formerly Section 14(i)(i)(A)(I))(I)~~ Any high hazard non-
6229 residential connection to any public water supply shall be protected by the ~~appropriate~~ backflow
6230 prevention device required by Table 1. → 16-1 (or 4, if the current convention is kept)

6231
6232 ~~(formerly Section 14(i)(i)(A)(III))(II)~~ Water suppliers shall
6233 establish record keeping and management procedures to ensure that requirements of this
6234 regulation for installation and maintenance of backflow prevention devices are being met.

6235
6236 ~~(formerly Section 14(i)(i)(B))(B)~~ The method of backflow control,
6237 selected from Table 1, shall be determined based upon the degree of hazard of the cross-
6238 connection and the cause of the potential backflow. Hazards shall be classified as high hazard or
6239 low hazard. The potential cause of the backflow shall be identified as being back-siphonage or
6240 back-pressure.

6241
6242 ~~(formerly Section 14(i)(i)(B)(I))(I)~~ Residential water service
6243 connections shall be considered to be low hazard back-siphonage connections; unless determined
6244 otherwise by a ~~h~~Hazard ~~e~~Classification.

6245
6246 ~~(formerly Section 14(i)(i)(B)(II))(II)~~ Domestic non-residential
6247 water service connections (such as schools without laboratories, churches, office buildings,
6248 warehouses, and motels) shall be considered to be low hazard back-pressure connections; unless



6249 determined otherwise by a hHazard eClassification conducted by the water supplier. ~~Examples~~
6250 ~~include schools without laboratories, churches, office buildings, warehouses, motels, etc.~~

6251
6252 ~~(formerly Section 14(i)(i)(B)(III))~~(III) Any water user's
6253 system with an auxiliary source of supply shall be considered to be a high hazard, back-pressure
6254 cross-connection. A reduced pressure principle backflow device shall be installed at the water
6255 service connection to any water user's system with an auxiliary source of supply.

6256
6257 ~~(formerly Section 14(i)(i)(B)(IV))~~(IV) All water loading
6258 stations shall be considered high hazard connections. A device, assembly, or method consistent
6259 with Table 1 shall be provided.

16-1 (or 4)

6260
6261
6262 ~~(formerly Section 14(i)(i)(B)(V))~~(V) Non-domestic commercial or
6263 industrial water service connections (such as restaurants, refineries, chemical mixing facilities,
6264 sewage treatment plants, mortuaries, laboratories, laundries, dry cleaners, irrigation systems, and
6265 facilities producing or utilizing hazardous substances) shall be considered to be high hazard
6266 back-pressure connections, unless determined otherwise by a hHazard eClassification. ~~Examples~~
6267 ~~include restaurants, refineries, chemical mixing facilities, sewage treatment plants, mortuaries,~~
6268 ~~laboratories, laundries, dry cleaners, irrigation systems, facilities producing or utilizing~~
6269 ~~hazardous substances, etc.~~ For some of these service connections, a hHazard eClassification may
6270 result in a determination of a back-siphonage or low hazard classification. The backflow
6271 prevention device required shall be appropriate to the degree of hazard established by the
6272 hHazard eClassification. Where potential high hazards exist within the non-residential water
6273 user's system, even though such high hazards may be isolated at the point of use, an approved
6274 backflow prevention device shall be installed and maintained at the water service connection.

6275
6276 ~~(formerly Section 14(i)(i)(C)(C))~~ — Determination of the hazard
6277 classification of a water service connection is the responsibility of the water supplier. The water
6278 supplier may require the water user to furnish a hHazard eClassification sSurvey to be used to
6279 determine the hHazard eClassification.

6280
6281 Hazard (D) Hazard Classification Surveys ~~that have been~~ conducted by
6282 Hazardous Classification Surveyors that have been certified by another state certification
6283 program shall include the following information for Administrator approval:

6284
6285 (I) Documentation that indicates the Hazard (typical) Hazardous Classification
6286 Surveyor has received certification from the regulatory agency that issued the current
6287 certification that states the name of the Hazardous Classification Surveyor, the status of their
6288 certification, the date originally issued, the expiration date, and the classification for which the
6289 Hazardous Classification Surveyor is certified; and

6290
6291 (II) Any disciplinary action imposed against the applicant; if
6292 any.
6293

6294 ~~(formerly Section 14(i)(i)(E))~~(E) All backflow prevention devices
6295 ~~must shall~~ be in-line serviceable (repairable), in-line testable except for devices meeting ASSE
6296 ~~Standard #1024~~, and installed in accordance with manufacturer instructions and applicable
6297 plumbing codes.

6298
6299 ~~(formerly Section 14(i)(i)(F))~~(F) All backflow prevention devices
6300 must have a certification by an approved third party certification agency. Approved certification
6301 agencies are:

6302 ~~(formerly Section 14(i)(i)(F)(I))~~(I) American Society of Sanitary
6303 Engineers (ASSE),

6304
6305 ~~(formerly Section 14(i)(i)(F)(II))~~(II) International Association of
6306 Plumbing/Mechanical officials (IAPMO); and

6307
6308 ~~(formerly Section 14(i)(i)(F)(III))~~(III) Foundation for Cross-
6309 Connection Control and Hydraulic Research, University Of Southern California (USC-
6310 FCCCHR).

6311
6312 ~~(formerly Section 14(i)(i)(G))~~(G) Backflow prevention devices at
6313 water service connections shall be inspected and certified by a certified backflow assembly tester
6314 at the time of installation. Certification of the assembly tester shall be by one of the following:

6315
6316 ~~(formerly Section 14(i)(i)(G)(I))~~(I) The American Society of
6317 Sanitary Engineers (ASSE); ~~or~~

6318
6319 ~~(formerly Section 14(i)(i)(G)(II))~~(II) American Backflow
6320 Prevention Association (ABPA);

6321
6322 ~~(formerly Section 14(i)(i)(H))~~(H) Backflow prevention devices
6323 installed at high hazard non-residential-cross connections shall be inspected and tested on an
6324 annual basis by a certified backflow assembly tester.

6325
6326 ~~(formerly Section 14(i)(i)(I))~~(I) ~~The administrator may conduct~~
6327 ~~inspections of backflow prevention devices.~~ If any device is found to be defective or functioning
6328 improperly, it ~~must shall~~ be immediately repaired or replaced. Failure to make necessary repairs
6329 to a backflow prevention device will be cause for the water service connection to be terminated.

6330
6331 ~~(formerly Section 14(i)(i)(J))~~(J) All public water suppliers shall
6332 report any high hazard backflow incident within seven ~~(7)~~ days to the ~~Wyoming Department of~~
6333 ~~Environmental Quality, Water Quality~~ Division. The backflow incident shall be reported on a
6334 form provided by the ~~a~~AAdministrator.

6335
6336 ~~(formerly Section 14(i)(ii)(i))~~(ii) ~~Recycling water.~~ Neither steam condensate
6337 nor cooling water from engine jackets or other heat exchange devices shall be returned to the
6338 public water supply after it has passed through the water service connection.

6339



or 16-1

6340

~~TABLE 1~~ Table 4. Backflow Prevention Devices, Assemblies and Methods

| Device, Assembly or Method | Degree of Hazard | | | | Notes |
|--|--------------------|-------------------|--------------------|-------------------|--|
| | Low Hazard | | High Hazard | | |
| | Back- Siphonage | Back- Pressure | Back- Siphonage | Back- Pressure | |
| Airgap | X | | X | | See Note 1 |
| Atmospheric Vacuum Breaker | X | | X | | Not allowed under continuous pressure |
| Spill-proof Pressure-type Vacuum | X | | X | | |
| Double Check Valve Backflow Preventer | X | X | | | |
| Pressure Vacuum Breaker | X | | X | | |
| Reduced Pressure Principle Backflow | X | X | X | X | See Note 2 |
| Dual Check | X | | | | Restricted to residential services |

6341

6342

6343

6344

6345

6346

6347

6348

Note 1: Minimum Airgap for Water Distribution. For spouts with an effective opening diameter of ½ inch or less, the minimum airgap when the discharge is not affected by side walls shall be one inch. The minimum airgap when the discharge is affected by sidewalls shall be 1 ½ inches. For effective openings greater than ½ inch, the minimum airgap shall be two times the effective opening diameter when the discharge is not affected by sidewalls. The minimum airgap when the discharge is affected by sidewalls shall be three times the effective opening diameter.

6349

6350

6351

6352

6353

6354

Note 2: Extreme Hazards. In the case of any water user’s system where, in the opinion of the water supplier or the Administrator, an undue health threat is posed because of the presence of extremely toxic substances or potential back pressures in excess of the design working pressure of the device, the water supplier may require an airgap at the water service connection to protect the public water system. Then why isn't this instance checked in the Table?

6355

6356

6357

6358

6359

Section 17. Laboratory Requirements.

~~(formerly Section 15)(a)(a)~~ Test procedures. Test procedures for analysis of monitoring samples shall conform to the ~~15th Edition of Standard Methods for the Examination of Water and Wastewater~~ Standard Methods for the Examination of Water and Wastewater.

6360
6361 ~~(formerly Section 15(b))(b)~~ Testing requirements. All treatment plants shall
6362 have the capability to perform or contract for the self-monitoring analytical work required by the
6363 Safe Drinking Water Act, ~~and/or state regulation~~ 42 U.S.C. §300f et seq. All plants shall, in
6364 addition, be capable of performing or contracting the analytical work required to assure good
6365 management and control of plant operation and performance.

6366
6367 ~~(formerly Section 15(e))(c)~~ All laboratories used for the tests, analysis, and monitoring
6368 required by this Section shall meet the following ~~Minimum~~ requirements.:

6369
6370 ~~(formerly Section 15(e)(i))(i)~~ Location and space. The laboratory shall be located
6371 away from vibrating machinery or equipment ~~which that~~ might have adverse effects on the
6372 performance of laboratory instruments or the analyst and shall be designed to prevent adverse
6373 effects from vibration.

6374
6375 ~~(formerly Section 15)(e)(ii)(ii)~~ Materials. Walls shall have an easily
6376 cleaned, durable and impervious surface. ~~Two exit doors or openings shall be located to permit a~~
6377 ~~straight exit from the laboratory; one exit shall be directly to the outside of the building. Panic~~
6378 ~~hardware shall be used. Interior doors shall have glass windows.~~

6379
6380 ~~(formerly Section 15)(e)(iii)(iii)~~ Cabinets and bench tops. Cabinet and
6381 storage space shall be provided for dust-free storage of instruments and glassware. ~~(formerly~~
6382 ~~Section 15)(e)(iii)~~ Bench top height shall be 30 inches (0.91 m). Tops ~~Benchtops should shall~~ be
6383 field joined into a continuous surface with acid, alkali, and solvent-resistant cements.

6384
6385 ~~(formerly Section 15)(e)(iv))(iv)~~ Hoods. Fume hoods shall be provided where
6386 reflux or heating of toxic or hazardous materials is required. A hood shall not be situated near a
6387 doorway, unless a secondary means of exit is provided. All fume hood switches, electrical
6388 outlets, and utility and baffle adjustment handles shall be located outside the hood. Light fixtures
6389 shall be explosion-proof. ~~Twenty-four hour~~ 24-hour continuous exhaust capability shall be
6390 provided. Exhaust fans shall be explosion-proof.

6391
6392 ~~(formerly Section 15)(e)(v)(v)~~ Sinks. The laboratory shall have a minimum
6393 of ~~2~~ two sinks per 400 ~~ft² (37.2 m²)~~ square feet (not including cup sinks). Sinks shall be double
6394 well with drainboards and shall be made of epoxy resin or plastic. All water fixtures shall ~~be~~
6395 ~~provided with~~ have reduced pressure zone backflow preventers. Traps shall be constructed of
6396 glass, plastic, or lead and accessible for cleaning ~~shall be provided.~~

6397
6398 ~~(formerly Section 15)(e)(viii)(vi)~~ Water still. Distilled water shall conform to
6399 the quality specified by ~~Standard Methods for the Examination of Water and Wastewater, 15th~~
6400 ~~Edition~~ Standard Methods for the Examination of Water and Wastewater.

6401
6402 ~~(formerly Section 15)(d)(d)~~ Portable testing equipment. Portable testing equipment
6403 shall be provided where necessary for operational control testing.

6404

6405 **Section 18. Operation and Maintenance Manuals.**

6406
6407 ~~(formerly Section 16(a))(a) Where required. Plant operation and maintenance manuals~~
6408 ~~are required for each new or modified treatment or pumping facility.~~ Each new or modified
6409 treatment or pumping facility shall have an operation and maintenance manual (O & M Manual)
6410 located at the facility. The manuals shall provide the following information as a minimum:

6411
6412 ~~(formerly Section 16(a)(i))(i)~~ Introduction;

6413
6414 ~~(formerly Section 16(a)(ii))(ii)~~ Description of facilities and unit processes
6415 within the plant from influent structures through effluent structures;

6416
6417 (A) The size, capacity, model number (where applicable), and intended
6418 loading rate of facilities and unit processes;

6419
6420 (B) A description of each unit, including the function, the controls, the
6421 lubrication, and maintenance schedule;

6422
6423 (C) A description of start-up operations, routine operations, abnormal
6424 operations, emergency or power outage operations, bypass procedures, and safety;

6425
6426 (D) Flow diagrams of the entire process, as well as individual unit
6427 processes that show the flow options under the various operational conditions listed in paragraph
6428 (a)(ii) of this Section; and.

6429
6430 (E) The design criteria for each unit process, including the number,
6431 type, capacity, sizes, and other relevant information.

6432
6433 ~~(formerly Section 16(a)(iii))(iii)~~ Plant control system;

6434
6435 ~~(formerly Section 16(a)(iv))(iv)~~ Utilities and systems;

6436
6437 ~~(formerly Section 16(a)(v))(v)~~ Emergency ~~operation and response.~~
6438 procedures, including:

6439
6440 (A) Details of emergency operations procedures for possible
6441 foreseeable emergencies, such as power outage, equipment failure, development of unsafe
6442 conditions, and other emergency conditions;

6443
6444 (B) Emergency operations valve positions, flow control settings, and
6445 other information to ensure continued operation of the facility at maximum possible efficiency
6446 during emergencies; and

6447
6448 (C) Emergency notification procedures to be followed to protect health
6449 and safety under various emergency conditions.

6450

6451 ~~(formerly Section 16)(a)(vi)(vi)~~ Permit requirements and other regulatory
6452 requirements;

6453
6454 ~~(formerly Section 16)(a)(vii)(vii)~~ Staffing needs;

6455
6456 ~~(formerly Section 16)(a)(viii)(viii)~~ Index ~~to~~ of manufacturer's manuals;

6457
6458 (ix) Index of equipment maintenance manuals; and

6459
6460 (x) General information on safety in and around the plant and its components,
6461 including the following safety information:

6462
6463 (A) Each unit process discussion shall include applicable safety
6464 procedures and precautions; and

6465
6466 (B) For unit processes or operations having extreme hazards (such as
6467 chlorine and closed tanks), the discussion shall detail appropriate protection, rescue procedures,
6468 and necessary safety equipment.

6469
6470 ~~(formerly Section 16)(b)(b) When required. Acceptance of the final operation and~~
6471 ~~maintenance manuals~~ Administrator approval of the final O & M Manual is required prior to
6472 plant startup.

6473
6474 ~~(formerly Section 16)(e)(i)(c) Each unit. The~~ Public water supply facilities shall
6475 have an equipment maintenance manual located at the facility for each piece of equipment. Each
6476 equipment maintenance manual shall; ~~describe each unit, including the function, the controls, the~~
6477 ~~lubrication and maintenance schedule. The manual shall also include start-up operations; routine~~
6478 ~~operations; abnormal operations; emergency or power outage operations; bypass procedures; and~~
6479 ~~safety.~~

6480
6481 (i) Have a typewritten table of contents for each volume arranged in a
6482 systematic order;

6483
6484 (ii) Include the following general contents:

6485
6486 (A) Product data;

6487
6488 (B) Drawings;

6489
6490 (C) Written text as required to supplement product data for the
6491 particular installation;

6492
6493 (D) A copy of each warranty, bond, and service contract issued;

6494
6495 (E) A description of unit and component parts;

6496

- 6497 (F) Operating procedures;
6498
6499 (G) Maintenance procedures and schedules;
6500
6501 (H) Service and lubrication schedule;
6502
6503 (I) Sequence of control operation;
6504
6505 (J) A parts list; and
6506
6507 (K) A recommended spare parts list.
6508

6509 ~~(formerly Section 16(e))(iii) Troubleshooting guide. Each equipment~~
6510 ~~maintenance manual shall include a section on troubleshooting. that shall include: These~~
6511 ~~manuals are to be indexed in the plant O & M manual. The troubleshooting guide shall include~~
6512 ~~typical operation problems and solutions. The guide shall include a telephone number for factory~~
6513 ~~troubleshooting assistance.~~

6514
6515 ~~(formerly Section 16(e))(A) Typical operation problems and solutions;~~
6516 and

6517
6518 ~~(formerly Section 16(e))(B) a~~ A telephone number for factory
6519 troubleshooting assistance; and

6520
6521 ~~(formerly Section 16(h))(iv) Maintenance manuals. Maintenance manuals shall~~
6522 ~~be required for each piece of equipment. These manuals must m~~ Meet the requirements of the
6523 engineer and contractor for installation and startup of equipment. ~~The information included in the~~
6524 ~~manufacturer's manuals shall not be included in the O & M manual.~~

6525
6526 **Section 19. Incorporation by Reference.**

6527
6528 (a) The following codes, standards, rules, and regulations referenced in this Chapter
6529 are incorporated by reference:

6530
6531 (i) American National Standards Institute/National Sanitation Foundation
6532 Standard 53, Drinking Water Treatment Units - Health Effects (2019), referred to as “NSF/ANSI
6533 53;”

6534
6535 (ii) American National Standards Institute/National Sanitation Foundation
6536 Standard 55, Ultraviolet Microbiological Water Treatment Systems (2020), referred to as
6537 “NSF/ANSI 55;”

6538
6539 (iii) American National Standards Institute/National Sanitation Foundation
6540 Standard 61, Drinking Water System Components - Health Effects NSF/ANSI/CAN 61-
6541 2020/NSF/ANSI/CAN 600-2021, referred to as “NSF/ANSI/CAN 61-2020/NSF/ANSI/CAN
6542 600-2021;”



- 6543
- 6544 (iv) American National Standards Institute/National Sanitation Foundation
- 6545 Standard 372, Drinking Water System Components-Lead Content 372-20, referred to as
- 6546 “NSF/ANSI/CAN 372-20;”
- 6547
- 6548 (v) American Petroleum Institute Specification 5L, Line Pipe, Forty-Sixth
- 6549 Edition (2019), referred to as “API 5L;”
- 6550
- 6551 (vi) American Water Works Association Standard A100, Water Wells, A100-
- 6552 20, referred to as “AWWA A100-20;”
- 6553
- 6554 (vii) American Water Works Association Standard C200, Steel Water Pipe, 6
- 6555 In. (150 mm) and Larger, C200-17 (2017), referred to as “AWWA C200;”
- 6556
- 6557 (vii) American Water Works Association Standard C300, Reinforced Concrete
- 6558 Pressure Pipe, Steel-Cylinder Type, C300-11 (2011), referred to as “AWWA C300;”
- 6559
- 6560 (viii) American Water Works Association Standard C301, Prestressed Concrete
- 6561 Pressure Pipe, Steel-Cylinder Type, C301-14 (2014), referred to as “AWWA C301;”
- 6562
- 6563 (ix) American Water Works Association Standard C600, Installation of
- 6564 Ductile-Iron Mains and Their Appurtenances, C600-10 (2010), referred to as “AWWA C600;”
- 6565
- 6566 (x) American Water Works Association Standard C601, AWWA Standard for
- 6567 Disinfecting Water Mains, C601-81 (1981), referred to as “AWWA C601;”
- 6568
- 6569 (xi) American Water Works Association Standard C652, Disinfection of Water
- 6570 Storage Facilities, C652 (2011), referred to as “AWWA C652;”
- 6571
- 6572 (xii) American Water Works Association Standard C900, Polyvinyl Chloride
- 6573 (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm through 300 mm),
- 6574 for Water Transmission and Distribution, C900-07 (2007), referred to as “AWWA C900;”
- 6575
- 6576 (xiii) American Water Works Association Standard C901, Polyethylene (PE)
- 6577 Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service, C901-17
- 6578 (2017), referred to as “AWWA C901;”
- 6579 AWWA C906
- 6580 (xiv) American Water Works Association Standard C950, Fiberglass Pressure
- 6581 Pipe, C950-13 (2013), referred to as “AWWA C950;”
- 6582
- 6583 (xv) American Water Works Association Standard D100, Welded Carbon Steel
- 6584 Tanks for Water Storage, D100-11 (2011), referred to as “AWWA D100-11;”
- 6585
- 6586 (xvi) American Water Works Association Standard D102, Coating Steel Water-
- 6587 Storage Tanks, D102-17 (2017), referred to as “AWWA D102-21;”
- 6588

6589 (xvii) American Water Works Association Standard D103, Factory-Coated
6590 Bolted Carbon Steel Tanks for Water Storage, D103-19, referred to as “AWWA D103-19;”
6591

6592 (xviii) American Water Works Association Standard D104-17, Automatically
6593 Controlled, Impressed-Current Cathodic Protection for the Interior of Steel Water Storage,
6594 referred to as “AWWA D104-17;”
6595

6596 (xix) American Water Works Association Standard D106-20, Sacrificial anode
6597 Cathodic Protection Systems for the Interior Submerged Surfaces of Steel Water Storage Tanks,
6598 referred to as “AWWA D106-20;”
6599

6600 (xx) American Water Works Association Standard D107-16, Composite
6601 Elevated Tanks for Water Storage, referred to as “AWWA D107-16;”
6602

6603 (xxi) American Water Works Association Standard D108-19, Aluminum Dome
6604 Roofs for Water Storage Facilities, referred to as “AWWA D108-19;”
6605

6606 (xxii) American Water Works Association Standard D110-13 (R18), Wire- and
6607 Strand-Wound, Circular, Prestressed Concrete Water Tanks, referred to as “AWWA D110-13
6608 (R18);”
6609

6610 (xxiii) American Water Works Association Standard D115-20, Tendon-
6611 Prestressed Concrete Water Tanks, referred to as “AWWA D115-20;”
6612

6613 (xxiv) American Water Works Association Standard D120-19, Thermosetting
6614 Fiberglass-Reinforced Plastic Tanks, referred to as “AWWA D120-19;”
6615

6616 (xxv) American Water Works Association Standard D121-12, Bolted
6617 Aboveground Thermosetting Fiberglass Reinforced Plastic Panel-Type Tanks for Water Storage,
6618 referred to as “AWWA D121-12;”
6619

6620 (xxvi) American Water Works Association Standard M23-20, PVC Pipe –
6621 Design and Installation, Third Edition, M23, referred to as “AWWA M23-20;”
6622

6623 (xxvii) American Water Works Association Standard M55-20, PE Pipe-Design
6624 and Installation, Second Edition, M55, referred to as “M55-20;”
6625

6626 (xxviii) American Water Works Association Manual M42, Steel Water Storage
6627 Tanks, 2013, referred to as “AWWA M42;”
6628

6629 (xxix) American National Standards Institute ASSE Standard 1024, Dual Check
6630 Backflow Preventers, ASSE 1024-17 (2017), referred to as “ASSE 1024;”
6631

6632 (xxx) ASTM International Standard A53, Standard Specification for Pipe, Steel,
6633 Black and Hot-Dipped, Zinc-Coated, Welded and Seamless, A53M-18 (2018), referred to as
6634 “ASTM A53;”

6635
6636 (xxxvi) ASTM International Standard A134, Standard Specification for Pipe,
6637 Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over), A134M-18 (2018), referred to as
6638 “ASTM A134;”

6639
6640 (xxxvii) ASTM International Standard A135, Standard Specification for Electric-
6641 Resistance-Welded Steel Pipe, A135M-19 (2019), referred to as “ASTM A135;”

6642
6643 (xxxviii) ASTM International Standard ASTM A139 / A139M – 16, Standard
6644 Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over), (2016), referred to
6645 as “ASTM A139;”

6646
6647 (xxxix) ASTM International Standard A409, Standard Specification for Welded
6648 Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service, A409M-15
6649 (2015), referred to as “ASTM A409;”

6650
6651 (xl) ASTM International Standard C12, Standard Practice for Installing
6652 Vitrified Clay Pipe Lines, C12-17 (2017), referred to as “ASTM C12;”

6653
6654 (xli) ASTM International Standard C14, Standard Specification for
6655 Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe, C14-15a (2015), referred to as
6656 “ASTM C14;”

6657
6658 (xlii) ASTM International Standard C76, Standard Specification for Reinforced
6659 Concrete Culvert, Storm Drain, and Sewer Pipe, C76-19a (2019), referred to as “ASTM C76;”

6660
6661 (xliii) ASTM International Standard D2321, Standard Practice for
6662 Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow
6663 Applications, D2321-18 (2018), referred to as “ASTM D2321;”

6664
6665 (xliv) ASTM International Standard D2846, Standard Specification for
6666 Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems,
6667 ASTM D2846/D2846M-19A (2019), referred to as “ASTM D2846;”

6668
6669 (xlv) ASTM International Standard D2996, Standard Specification for
6670 Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe, D2996-17
6671 (2017), referred to as “ASTM D2996;”

6672
6673 (xlvi) ASTM International Standard D2997, Standard Specification for
6674 Centrifugally Cast “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe, D2997-15
6675 (2015), referred to as “ASTM D2997;”

6676
6677 (xlvii) ASTM International Standard D3517, Standard Specification for
6678 “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe, D3517-19 (2019),
6679 referred to as “ASTM D3517;”

6680

6681 (xlii) ASTM International Standard F480, Standard Specification for
6682 Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR),
6683 SCH 40 and SCH 80, F480-14 (2014), referred to as “ASTM F480;”
6684

6685 (xliii) ASTM International Standard F645, Standard Guide for Selection, Design,
6686 and Installation of Thermoplastic Water- Pressure Piping Systems, ASTM F645-18b, (2018),
6687 referred to as “ASTM F645;”
6688

6689 (xliv) ASTM International Standard F877, Standard Specification for
6690 Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems, ASTM F877-20,
6691 (2020), referred to as “ASTM F877;”
6692

6693 (xlv) ASTM International Standard F2389, Standard Specification for Pressure-
6694 rated Polypropylene (PP) Piping Systems, ASTM F2389-21, (2021), referred to as “ASTM
6695 F2389;”
6696

6697 (xlvi) ASTM International Standard F2806, Standard Specification for
6698 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Metric SDR-PR), ASTM F2806-20, (2020),
6699 referred to as “ASTM F2806;”
6700

6701 (xlvii) ASTM International Standard F2855, Standard Specification for
6702 Chlorinated Poly(Vinyl Chloride)/Aluminum/Chlorinated Poly(Vinyl Chloride) (CPVC-AL-
6703 CPVC) Composite Pressure Tubing ASTM F2855-19, (2019), referred to as “ASTM F2855;”
6704

6705 (xlviii) ASTM International Standard F2969, Standard Specification for
6706 Acrylonitrile-Butadiene-Styrene (ABS) IPS Dimensioned Pressure Pipe ASTM F2969-12(2020),
6707 (2020), referred to as “ASTM F2969;”
6708

6709 (xlix) Standard Methods for the Examination of Water and Wastewater,
6710 published by American Public Health Association, American Water Works Association, and
6711 Water Environment Federation, 23rd Edition (2018), referred to as “Standard Methods for the
6712 Examination of Water and Wastewater;” and
6713

6714 (l) Code of Federal Regulations 40 CFR Part 141, in effect as of July 1, 2011,
6715 available at: <http://www.ecfr.gov>.
6716

6717 (li) Code of Federal Regulations 40 CFR 143.3, in effect as of July 1, 2021;
6718 available at: <http://www.ecfr.gov>
6719

6720 (lii) Code of Federal Regulations 40 CFR 173.3(e), in effect as of November 7,
6721 2018, available at: <http://www.ecfr.gov>.
6722

6723 (liii) United States Department of Agriculture, Natural Resources Conservation
6724 Service, Part 631 National Engineering Handbook, Chapter 32 Well Design and Spring
6725 Development, Part 631.3201(b)(iii), in effect as of January 2010, available at
6726 <https://directives.sc.gov.usda.gov/OpenNonWebContent.aspx?content=26985.wba>

6727
6728 (liv) Recommended Standards for Water Works, published by Great Lakes
6729 Upper Mississippi River Board of State and Provincial Public Health and Environmental
6730 Managers, (2018), referred to as “2018 TSS.”

6731
6732 (lv) United States Environmental Protection Agency, Ultraviolet Disinfection
6733 Guidance Manual For The Final Long Term 2 Enhanced Surface Water Treatment Rule, 2006,
6734 referred to as “U.S. EPA’s Ultraviolet Disinfection Guidance Manual, ”available at
6735 <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=600006T3.txt>

6736
6737 (lvi) United States Environmental Protection Agency, Membrane Filtration
6738 Guidance Manual, 2005, referred to as “Membrane Filtration Guidance Manual , ”available at
6739 <https://nepis.epa.gov/Exe/ZyNET.exe/P1008S15.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2006+Thru+2010&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C06thru10%5CTxt%5C00000021%5CP1008S15.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL>

6748
6749 (b) For these codes, standards, rules, and regulations incorporated by reference:

6750
6751 (i) The Environmental Quality Council has determined that incorporation of
6752 the full text in these rules would be cumbersome or inefficient given the length or nature of the
6753 rules;

6754
6755 (ii) This Chapter does not incorporate later amendments or editions of
6756 incorporated codes, standards, rules, and regulations.

6757
6758 (iii) All incorporated codes, standards, rules, and regulations are available for
6759 public inspection at the Department’s Cheyenne office. Contact information for the Cheyenne
6760 office may be obtained at <http://deq.wyoming.gov> or from (307) 777-7937.