



**Certification Page**  
**Regular and Emergency Rules**  
 Revised May 2014

Emergency Rules *(After completing all of Sections 1 and 2, proceed to Section 5 below)*

Regular Rules

**1. General Information**

a. Agency/Board Name Department of Environmental Quality		
b. Agency/Board Address 122 W 25th St	c. City Cheyenne	d. Zip Code 82002
e. Name of Contact Person William Tillman	f. Contact Telephone Number 307-777-6941	
g. Contact Email Address william.tillman@wyo.gov	h. Adoption Date January 14, 2015	
i. Program Water Quality		

**2. Rule Type and Information:** For each chapter listed, indicate if the rule is New, Amended, or Repealed.

If "New," provide the Enrolled Act numbers and years enacted:

c. Provide the Chapter Number, Short Title, and Rule Type of Each Chapter being Created/Amended/Repealed  
*(Please use the Additional Rule Information form for more than 10 chapters, and attach it to this certification)*

Chapter Number: 11	Chapter Name: DESIGN AND CONSTRUCTION STANDARDS FOR SEWERAGE SYSTEMS, TREATMENT WORKS, DISPOSAL SYSTEMS OR OTHER FACILITIES CAPABLE OF CAUSING OR CONTRIBUTING TO POLLUTION, AND MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC WATER SUPPLY DISTRIBUTION SYSTEMS	<input type="checkbox"/> New <input checked="" type="checkbox"/> Amended <input type="checkbox"/> Repealed
Chapter Number: 21	Chapter Name: STANDARDS FOR THE REUSE OF TREATED WASTEWATER	<input type="checkbox"/> New <input type="checkbox"/> Amended <input checked="" type="checkbox"/> Repealed
Chapter Number:	Chapter Name:	<input type="checkbox"/> New <input type="checkbox"/> Amended <input type="checkbox"/> Repealed
Chapter Number:	Chapter Name:	<input type="checkbox"/> New <input type="checkbox"/> Amended <input type="checkbox"/> Repealed
Chapter Number:	Chapter Name:	<input type="checkbox"/> New <input type="checkbox"/> Amended <input type="checkbox"/> Repealed
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Chapter Number:	Chapter Name:	<input type="checkbox"/> New <input type="checkbox"/> Amended <input type="checkbox"/> Repealed
Chapter Number:	Chapter Name:	<input type="checkbox"/> New <input type="checkbox"/> Amended <input type="checkbox"/> Repealed
Chapter Number:	Chapter Name:	<input type="checkbox"/> New <input type="checkbox"/> Amended <input type="checkbox"/> Repealed

d.  The Statement of Reasons is attached to this certification.

e. If applicable, describe the emergency which requires promulgation of these rules without providing notice or an opportunity for a public hearing:

### 3. State Government Notice of Intended Rulemaking

a. Date on which the Notice of Intent containing all of the information required by W.S. 16-3-103(a) was filed with the Secretary of State: **November 13, 2014**

b. Date on which the Notice of Intent and proposed rules in strike and underscore format and a clean copy were provided to the Legislative Service Office: **November 13, 2014**

c. Date on which the Notice of Intent and proposed rules in strike and underscore format and a clean copy were provided to the Attorney General: **November 13, 2014**

### 4. Public Notice of Intended Rulemaking

a. Notice was mailed 45 days in advance to all persons who made a timely request for advance notice.  Yes  No  N/A

b. A public hearing was held on the proposed rules.  Yes  No

If "Yes:"	Date: <b>January 14, 2015</b>	Time: <b>2:15 pm</b>	City: <b>Cheyenne, WY</b>	Location: <b>Wyoming State Library</b>
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### 5. Final Filing of Rules

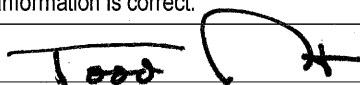
a. Date on which the Certification Page with original signatures and final rules were sent to the Attorney General's Office for the Governor's signature: **January 15, 2015**

b. Date on which final rules were sent to the Legislative Service Office: **January 15, 2015**

c. Date on which a PDF of the final rules was electronically sent to the Secretary of State: **January 15, 2015**

### 6. Agency/Board Certification

The undersigned certifies that the foregoing information is correct.

Signature of Authorized Individual (Blue ink as per Rules on Rules, Section 7)	
Printed Name of Signatory	<b>Todd Parfitt</b>
Signatory Title	<b>Director</b>
Date of Signature	<b>January 15, 2015</b>

### 7. Governor's Certification

I have reviewed these rules and determined that they:

1. Are within the scope of the statutory authority delegated to the adopting agency;
2. Appear to be within the scope of the legislative purpose of the statutory authority; and, if emergency rules,
3. Are necessary and that I concur in the finding that they are an emergency.

Therefore, I approve the same.

Governor's Signature	
Date of Signature	

**Attorney General:** 1. Statement of Reasons; 2. Original Certification Page; 3. Summary of Comments (regular rules); 4. Hard copy of rules: clean and strike/underscore; and 5. Memo to Governor documenting emergency (for emergency rules only).

**LSO:** 1. Statement of Reasons; 2. Copy of Certification Page; 3. Summary of Comments (regular rules); 4. Hard copy of rules: clean and strike/underscore; 5. Electronic copy of rules (PDFs) emailed to [Criss.Carlson@wyoleg.gov](mailto:Criss.Carlson@wyoleg.gov); clean and strike/underscore; and 6. Memo to Governor documenting emergency (for emergency rules only).

**SOS:** 1. PDF of clean copy of rules; and 2. Hard copy of Certification Page as delivered by the AG.

**BEFORE THE  
ENVIRONMENTAL QUALITY COUNCIL  
STATE OF WYOMING**

<b>IN THE MATTER OF REVISIONS TO</b>	)	
<b>WATER QUALITY RULES AND</b>	)	<b>STATEMENT OF</b>
<b>REGULATIONS; CHAPTER 11</b>	)	<b>PRINCIPAL REASONS</b>
<b>DESIGN AND CONSTRUCTION STANDARDS</b>	)	<b>FOR ADOPTION</b>
<b>FOR SEWERAGE SYSTEMS TREATMENT</b>	)	
<b>WORKS, DISPOSAL SYSTEMS OR OTHER</b>	)	
<b>FACILITIES CAPABLE OF CAUSING OR</b>	)	
<b>CONTRIBUTING TO POLLUTION AND</b>	)	
<b>MOBILE HOME PARK AND CAMPGROUND</b>	)	
<b>SEWERAGE AND PUBLIC WATER SUPPLY</b>	)	
<b>DISTRIBUTION SYSTEMS;AND CHAPTER 21</b>	)	
<b>REUSE OF TREATED WATER</b>	)	

**INTRODUCTION**

The Environmental Quality Council, pursuant to the authority vested in it by the Wyoming Statutes 35-11-112 (a)(i) has adopted revisions to the following chapters and sections of the Wyoming Water Quality Rules and Regulations: Chapter 11 Design and Construction Standards For Sewerage Systems Treatment Works, Disposal Systems or Other Facilities Capable of Causing or Contributing to Pollution and Mobile Home Park and Campground Sewerage and Public Water Supply Distribution Systems; and Chapter 21, Reuse of Treated Water.

Section 35-11-302 (a) of the Environmental Quality Act (the Act) states that the administrator, after receiving public comment and after consultation with the advisory board, shall recommend to the director rules, regulations, standards and permit systems to promote the purposes of this Act. Such rules, regulations, standards and permit systems shall prescribe:

(iii) Standards for the issuance of permits for construction, installation, modification or operation of any public water supply and sewerage system, subdivision water supply, treatment works, disposal system or other facility, capable of causing or contributing to pollution.

(vi) In recommending any standards, rules, regulations, or permits, the administrator and advisory board shall consider all the facts and circumstances bearing upon the reasonableness of the pollution involved including:

- (A) The character and degree of injury to or interference with the health and well being of the people, animals, wildlife, aquatic life and plant life affected;
- (B) The social and economic value of the source of pollution;
- (C) The priority of location in the area involved;
- (D) The technical practicability and economic reasonableness of reducing or eliminating the source of pollution; and
- (E) The effect upon the environment.

**SUMMARY OF PROPOSED REVISIONS TO CHAPTER 11**

Two parts, Part E and Part H, were revised in Chapter 11, Design and Construction Standards for Sewerage Systems, Treatment Works, Disposal Systems or Other Facilities Capable of Causing or Contributing to Pollution and Mobile Home Park and Campground Sewerage and Public Water Supply Distribution Systems.

## *Part E*

Part E was renamed from “Waste and Wastewater Land Application Facilities” to “Standards for the Application of Biosolids and the Reuse of Treated Non-Domestic Wastewater.” The part was renamed to more specifically describe the standards contained and also to properly differentiate between the non-domestic wastewater standards in Part E and the domestic wastewater standards in Part H.

**Section 48.** The passage was added: “The permitting of biosolids facilities or the land application of biosolids is regulated by the U.S. Environmental Protection Agency (EPA) under the Code of Federal Regulations at 40 CFR Part 503. In cases where EPA does not issue a permit under 40 CFR Part 503, the Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD) will issue a permit. The WQD will require applicants to comply with the requirements of 40 CFR § 503.12, § 503.13, and § 503.14. The permit applications and permits may be reviewed and processed according to Chapter 3 of the Water Quality Rules and Regulations.” This passage was added to ensure that Water Quality Division has a mechanism in place for those rare occasions when EPA elects to not issue a permit for biosolids.

EPA is shifting towards administering the biosolids program through general permitting instead of individual permits. While the Water Quality Division does not anticipate a specific situation where an applicant would not be eligible for the EPA general permit and the EPA decides not to review the individual application, the added language to Section 48 is protective of the right of Wyoming to ensure that biosolids land applications are conducted properly, within the scope of 40 CFR § 503.12, § 503.13, and § 503.14.

**Section 49.** Several definitions located in Section 49 were duplicated in Part H or in Chapter 11, Part A. The following definitions were removed because of duplication elsewhere: “Land application/treatment,” “Rapid infiltration system,” “Slow rate land application system,” “Sludge,” and “Soil.”

The definitions for “Direct consumption” or “direct food chain crops” and “indirect food chain crops” were removed because they are redundant to “direct human consumption food crops” and “indirect human consumption crop” in Part H, Section 73.

The definition for “biosolids,” previously contained in Chapter 15, was added to Part E as it had previously not been defined in Chapter 11. Chapter 15 has been proposed to be repealed in another rulemaking action.

**Section 52.** Section 52, Disinfection and Pathogen Control has been removed because the requirements were duplicated in Part H. This section is now reserved.

**Section 53.** Section 53, Buffer Zone has been removed because the requirements were duplicated in Part H. This section is now reserved.

**Section 54.** Section 54, Land Application of Municipal Sewage Sludge and Septic Tank Pumpings has been removed because the passage is redundant to the revised language in Section 48. This section is now reserved.

**Section 55.** Section 55, Irrigation Water Quality was edited to correct a number of typos.

The phrasing in subparagraph (c)(i) of “Direct consumption crops” was changed to “Direct human consumption food crops” to be consistent with terminology in Part H.

## *Part H*

Part H, Standards for the Reuse of Treated Domestic Wastewater, was created and the contents formerly located in Chapter 21, Standards for the Reuse of Treated Wastewater were relocated to Part H.

**Section 71.** The purpose of the regulation, formerly located in the introductory paragraph to Section 1 of Chapter 21, was stricken because the language is unnecessary.

**Section 73.** The definition of “Land application” was stricken as it was duplicated elsewhere in the chapter.

The remaining revisions to the chapter are in the form of cross reference corrections.

**SUMMARY OF PROPOSED REVISIONS TO CHAPTER 21**

Chapter 21, Standards for the Reuse of Treated Wastewater was relocated to Chapter 11, Design and Construction Standards for Sewerage Systems, Treatment Works, Disposal Systems or Other Facilities Capable of Causing or Contributing to Pollution and Mobile Home Park and Campground Sewerage and Public Water Supply Distribution Systems, Part H, which is a newly created part within Chapter 11. Chapter 21 is now reserved.

The Council finds that these regulations are reasonable and necessary to accomplish the policy and purpose of the Act, as stated in W.S. 35-11-102, and that they have been promulgated in accordance with rulemaking provisions of the Wyoming Administrative Procedures Act.

Dated this 14<sup>th</sup> day of January, 2015.

Dr. Dawn Bagley  
Hearing Examiner – *Printed Name*  
Wyoming Environmental Quality Council

Paul M. Bagley  
Hearing Examiner – *Signed Name*  
Wyoming Environmental Quality Council

**Response to Comments for Water Quality Division Rulemakings Before the Environmental Quality Council (EQC) on January 14, 2015**

The Wyoming Department of Environmental Quality Water Quality Division's proposed rulemaking involves revising Wyoming Water Quality Rules and Regulations Chapter 11, Design and Construction Standards for Sewerage Systems, Treatment Works, Disposal Systems or Other Facilities Capable of Causing or Contributing To Pollution and Mobile Home Park and Campground Sewerage and Public Water Supply Distribution Systems; and Chapter 21, Standards for the Reuse of Treated Wastewater.

No written comments were received during the 45 day public comment period

CHAPTER 11

DESIGN AND CONSTRUCTION STANDARDS FOR  
SEWERAGE SYSTEMS, TREATMENT WORKS, DISPOSAL SYSTEMS OR  
OTHER FACILITIES CAPABLE OF CAUSING OR CONTRIBUTING TO POLLUTION  
AND MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC WATER  
SUPPLY DISTRIBUTION SYSTEMS

**Table of Contents**

**PART A: INTRODUCTION AND GENERAL REQUIREMENTS**

Section 1. Authority. .... 1

Section 2. Purpose. .... 1

Section 3. Intent. .... 1

Section 4. Definitions. .... 1

Section 5. Facilities and Systems Not Specifically Covered by These Standards. .... 4

Section 6. Engineering Design Report. .... 4

Section 7. Plans and Specifications Content. .... 6

**PART B: MUNICIPAL AND DOMESTIC SEWERAGE SYSTEMS, TREATMENT  
WORKS, AND DISPOSAL SYSTEMS**

Section 8. General. .... 9

Section 9. Design of Sewers. .... 9

Section 10. Pumping stations. .... 14

Section 11. General Treatment Plant Considerations. .... 19

Section 12. Pretreatment. .... 22

Section 13. Primary Treatment. .... 26

Section 14. Activated Sludge. .... 28

Section 15. Attached Growth Systems. .... 33

Section 16. Combination systems. ....	35
Section 17. Secondary settling. ....	35
Section 18. Lagoons. ....	38
Section 19. Tertiary treatment systems. ....	41
Section 20. Sludge Handling, Treatment and Disposal. ....	45
Section 21. Disinfection. ....	51
Section 22. Effluent Structures. ....	54
Section 23. Laboratory requirements. ....	54
Section 24. Operation and Maintenance Manuals. ....	56
 <b>PART C: COMMERCIAL/INDUSTRIAL WASTE AND WASTEWATER FACILITIES</b>	
Section 25. General. ....	59
Section 26. Discharge to Public Sewerage System. ....	59
Section 27. Domestic Wastes from Commercial/Industrial Facilities. ....	59
Section 28. Biological Treatment Ponds. ....	59
Section 29. Feedlots. ....	63
Section 30. Non-biological Treatment Ponds. ....	66
Section 31. Sedimentation Control Facilities. ....	70
 <b>PART D: SEPTIC TANK AND/OR SOIL ABSORPTION SYSTEMS AND OTHER SMALL WASTEWATER SYSTEMS</b>	
Section 32. Reserved. ....	72
Section 33. Reserved. ....	72
Section 34. Reserved. ....	72



Section 35. Reserved. ....	72
Section 36. Reserved. ....	72
Section 37. Reserved. ....	72
Section 38. Reserved. ....	72
Section 39. Reserved. ....	72
Section 40. Reserved. ....	72
Section 41. Reserved. ....	72
Section 42. Reserved. ....	72
Section 43. Reserved. ....	72
Section 44. Reserved. ....	72
Section 45. Reserved. ....	72
Section 46. Reserved. ....	72
Section 47. Reserved. ....	72
 <b>PART E: STANDARDS FOR THE APPLICATION OF BIOSOLIDS AND THE REUSE OF TREATED NON-DOMESTIC WASTEWATER</b>	
Section 48. General. ....	73
Section 49. Definitions Specific to Part E. ....	73
Section 50. Site Requirements. ....	73
Section 51. Pretreatment Water Quality Requirement. ....	75
Section 52. Reserved. ....	75
Section 53. Reserved. ....	75
Section 54. Reserved. ....	75

Section 55. Irrigation Water Quality. .... 75

Section 56. Effluent Quality. .... 77

**PART F: MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC  
WATER SUPPLY DISTRIBUTION SYSTEMS**

Section 57. General. .... 81

Section 58. Sewage System Standards. .... 81

Section 59. Potable Water Supply Standards. .... 82

**PART G: WELL CONSTRUCTION**

Section 60. Reserved. .... 84

Section 61. Reserved. .... 84

Section 62. Reserved. .... 84

Section 63. Reserved. .... 84

Section 64. Reserved. .... 84

Section 65. Reserved. .... 84

Section 66. Reserved. .... 84

Section 67. Reserved. .... 84

Section 68. Reserved. .... 84

Section 69. Reserved. .... 84

Section 70. Reserved. .... 84

**PART H: STANDARDS FOR THE REUSE OF TREATED DOMESTIC WASTEWATER**

Section 71. Authority and Purpose. .... 85

Section 72. Applicability. .... 85

Section 73. Definitions Specific to Part H. .... 86

Section 74. Compliance with Other Laws and Regulations. .... 88

Section 75. Compliance Period. .... 88

Section 76. Permits, Enforceability and Applications. .... 89

Section 77. Exclusions. .... 90

Section 78. General Management Practices. .... 90

Section 79. Site Isolation Requirements. .... 91

Section 80. Minimum Level of Wastewater Treatment. .... 92

Section 81. Treatment Reliability. .... 92

Section 82. Authorized Reuse. .... 92

Section 83. Monitoring. .... 93

Section 84. Noncompliance Actions, Reporting and Monitoring Requirements. .... 94

Section 85. Record Keeping. .... 94

Section 86. Reporting. .... 95

Section 87. Operation and Maintenance Manual. .... 95

1                                   **PART A: INTRODUCTION AND GENERAL REQUIREMENTS**  
2

3                   **Section 1. Authority.**  
4

5                   These standards are promulgated pursuant to W. S. 35-11-101 through 3511-1207.  
6 Specifically, W. S. 35-11-302 requires the administrator to establish standards for the issuance of  
7 permits for construction, installation, or modification of any public water supply and sewerage  
8 system, treatment works, disposal system or other facility capable of causing or contributing to  
9 pollution.  
10

11                   **Section 2. Purpose.**  
12

13                   The purpose of these standards is to:

14  
15                   (a)       Ensure that the design and construction of sewerage systems, treatment works,  
16 disposal systems and other facilities capable of causing or contributing to pollution meet the  
17 purpose of the Environmental Quality Act.  
18

19                   (b)       Prevent, reduce and eliminate pollution and enhance the waters of the State of  
20 Wyoming by ensuring design and construction of systems and facilities are capable of the  
21 required treatment and/or disposal and continued operation to protect the health, safety and  
22 welfare of the environment and its inhabitants.  
23

24                   These standards pertain only to permits required pursuant to Chapter III and IX,  
25 Wyoming Water Quality Rules and Regulations.  
26

27                   **Section 3. Intent.**  
28

29                   The design and construction standards included in these regulations are directed toward  
30 conventional wastewater and waste systems. These standards impose limiting values of design for  
31 which a construction, installation or modification permit application and plans and specifications  
32 can be evaluated by the Division.  
33

34                   The terms “shall” and “must” are used when practice is sufficiently standardized to  
35 permit specific delineation of requirements or when safeguarding public health or protection of  
36 water quality justifies such definite action. Other terms, such as “should”, “recommend”, and  
37 “preferred” indicate desirable procedures or methods which allow deviations provided the  
38 purpose of these regulations can be accomplished.  
39

40                   The applicant shall use the date referenced copy of other standards referred to in these  
41 regulations. Where no date is listed for the referenced standards, the standards used shall be those  
42 in effect when these regulations become effective.  
43

44                   **Section 4. Definitions.**  
45

46                   The following definitions supplement those contained in W. S. 35-11-103 of the  
47 Wyoming Environmental Quality Act.  
48

- 49 (a) **“Affected land”** means the area of land from which overburden is removed, or  
50 upon which overburden, development waste rock or refuse is deposited, or both, access roads,  
51 haul roads, mineral stockpiles, mill tailings, impoundment basins, and all other lands whose  
52 natural state has been or will be disturbed as a result of the operations.  
53
- 54 (b) **“Campground”** means a parcel or tract of land under the control of a person at  
55 which sites are offered for the use of the public or members of an organization either free of  
56 charge or for a fee, for the establishment of temporary living quarters for two or more recreational  
57 units.  
58
- 59 (c) **“Commercial/industrial waste and wastewater facilities”** means any facility  
60 not defined as a municipal or single family residence facility.  
61
- 62 (d) **“Construction”** shall encompass the materials used, installation procedures and  
63 tolerances, and testing and disinfection requirements.  
64
- 65 (e) **“Feedlot”** means the concentrated confinement of animals or poultry in pens or  
66 houses for meat, milk, or egg production or the stabling of animals or poultry for a period of 45  
67 days or more in a 12 month period when forage or crops are not grown in the area of  
68 confinement.  
69
- 70 (f) **“Hazardous substance”** means any matter of any description including  
71 petroleum related products and radioactive material (substance) which, when discharged into any  
72 waters of the state, presents an imminent and substantial hazard to public health or welfare. This  
73 definition includes all materials (substances) so designated by the U. S. Environmental Protection  
74 Agency in the Federal Register for March 13, 1978 (Part III), Water Programs, Hazardous  
75 Substances.  
76
- 77 (g) **“Land application/treatment”** means the application of wastes or wastewater to  
78 the land at a predetermined rate for the purpose of disposal or treatment by any or all of the  
79 following processes: degradation, plant uptake, assimilation or accumulation in the soil profile  
80 from filtration.  
81
- 82 (h) **“Maximum daily demand”** means the largest daily water use rate which would  
83 occur during the calendar year.  
84
- 85 (i) **“Maximum hourly or peak hourly demand”** means the largest water use rate  
86 which would occur during any one hour during the year. The maximum hourly demand may or  
87 may not occur during the maximum daily demand period.  
88
- 89 (j) **“Mobile home park”** means a parcel or tract of land under the control of a  
90 person upon which two (2) or more mobile homes are located on a continual or seasonal  
91 nonrecreational basis, regardless of whether a charge is made therefore.  
92
- 93 (k) **“Off-channel”** means the interception of a drainage way which collects runoff  
94 only from disturbed areas.  
95
- 96 (l) **“On-channel”** means the interception of a drainage way which collects runoff  
97 from both disturbed and undisturbed areas.

- 98 (m) **“Permanent pool level”** means the elevation in a sedimentation pond or  
99 sediment control structure below which the water will not be discharged by an outlet structure or  
100 by pumping.  
101
- 102 (n) **“Pond/lagoon”** means a manmade or natural basin which is intended for  
103 containment, treatment or disposal of wastes or wastewater.  
104
- 105 (o) **“Rapid infiltration system”** means a land treatment system in which treatment  
106 is accomplished by the movement of large quantities of wastewater through a coarse or highly  
107 permeable soil profile.  
108
- 109 (p) **“Recreational unit”** means a tent or vehicular type structure, primarily designed  
110 as temporary living quarters for recreational, camping, or travel use, which either has its own  
111 motive power or is mounted on or drawn by a self-powered vehicle. A tent means a collapsible  
112 shelter of canvas or other fabric stretched and sustained by a rigid structure(s) and used for  
113 camping outdoors.  
114
- 115 (q) **“Seasonal high groundwater table”** is the highest elevation reached by the  
116 groundwater during the wet season of the year (usually spring or early summer).  
117
- 118 (r) **“Sedimentation control facility”** means a pond or structure designed to capture  
119 runoff from disturbed areas for the purpose of treating water for sediment and suspended solids  
120 removal.  
121
- 122 (s) **“Slow rate land application system”** means an irrigation system in which  
123 wastewater treatment is achieved due to vegetative uptake and percolation of wastewater through  
124 the soil profile by low application rates.  
125
- 126 (t) **“Sludge”** is the accumulation of solids settled from wastewater in a septic tank,  
127 aerobic unit, clarifier, or equivalent.  
128
- 129 (u) **“Soil”** means all unconsolidated material overlaying bedrock.  
130
- 131 (v) **“Toxic characteristics (or wastes)”** means those characteristics (or wastes)  
132 which are due to the presence of: substances or combinations of substances including disease  
133 causing agents which, after discharge and upon exposure, ingestions, inhalation or assimilation  
134 into any environmentally significant organism, either directly from the environment or indirectly  
135 by ingestion through food chains, may cause death, disease, behavioral abnormalities, cancer,  
136 genetic malfunctions, physiological malfunctions (including malfunctions in reproduction) or  
137 physical deformation in such organisms or their offspring. This definition shall include all  
138 substances designated as toxic or hazardous by the U.S. Environmental Protection Agency in the  
139 Federal Register for December 24, 1975, (Part IV), Water Programs, National Interim Primary  
140 Drinking Water Regulations; Federal Register for May 19, 1980, (Section 261), Hazardous Waste  
141 Management System: Identification and Listing of Hazardous Waste; and the Federal Register  
142 for July 16, 1982, Part V, National Oil and Hazardous Substances Contingency Plan.  
143  
144  
145  
146

147 **Section 5. Facilities and Systems Not Specifically Covered by These Standards.**  
148

149 This section is provided to encourage new technology and equipment and provide a  
150 process for evaluating and permitting designs which deviate from these regulations. The proposed  
151 construction of facilities and processes not in compliance with these regulations will be permitted  
152 provided that the facility, when constructed, can operate meeting the purpose of these regulations.  
153

154 (a) Each application for a permit to construct a facility under this section shall be  
155 evaluated on a case-by-case basis using the best available technology. The following information  
156 should be included with the application:  
157

158 (i) Data obtained from a full scale, comparable installation which demonstrates  
159 the acceptability of the design and/or,  
160

161 (ii) Data obtained from a pilot plant operated under the design condition for  
162 a sufficient length of time to demonstrate the acceptability of the design and/or,  
163

164 (iii) Data obtained from a theoretical evaluation of the design which  
165 demonstrates a reasonable probability of the facility meeting the design objectives; and  
166

167 (iv) An evaluation of the flexibility of making corrective changes to the  
168 constructed facility in the event it does not function as planned.  
169

170 (b) If an applicant wishes to construct a pilot plant to provide the data necessary to  
171 show the design will meet the purpose of the act, a permit to construct must be obtained.  
172

173 **Section 6. Engineering Design Report.**  
174

175 (a) Scope and purpose. An engineering design report which describes existing  
176 conditions, problems, and the proposed solution is required for each project.  
177

178 (b) Sewerage systems. The engineering design report shall include:  
179

180 (i) A description of the service area including scaled vicinity plan map(s) of  
181 the project with regard to adjacent and proposed development, elevations, and topographic  
182 features.  
183

184 (ii) Current and projected average, maximum day and peak flows for the  
185 design of the project, per capita design flows, extraneous flows, and industrial and/or commercial  
186 waste flows.  
187

188 (iii) Downstream impact on existing sewers, lift stations and treatment  
189 facilities. This information shall include existing population, waste loads, existing flows and  
190 capacity of downstream facilities.  
191

192 (iv) A letter of acceptance from the municipality, sewer district, or owner of  
193 any affected downstream sewerage, treatment or disposal facilities.  
194

- 195 (c) Treatment works and disposal systems. The engineering design report shall  
196 include:  
197  
198 (i) A description of the facility site and location, including scaled site plan  
199 and:  
200 (A) Present and projected facility property.  
201  
202 (B) Flood protection indicating predicted elevation of 25- and 100-  
203 year flood stages.  
204  
205 (C) Present and proposed access.  
206  
207 (D) Distances from current habitation.  
208  
209 (E) Prevailing wind direction.  
210  
211 (F) Fencing and/or security.  
212  
213 (G) Topographic features and contours with indicated datum.  
214  
215 (H) Soil and subsurface geological characteristics. Location of soil  
216 borings, rock elevations and groundwater elevations shall be indicated. Provide a soils  
217 investigation report of the proposed site.  
218  
219 (ii) A detailed description of the service area for the project including scaled  
220 plan showing land use and boundaries.  
221  
222 (iii) A detailed description of the disposal technique for effluent and solids.  
223 For lagoons, indicate whether the discharge is continuous, seasonal, or nondischarging.  
224  
225 (iv) Effluent water quality considerations for design of the facility shall be  
226 described to include:  
227  
228 (A) Surface discharge. An application shall be submitted to the  
229 Water Quality Division for a National Pollution Discharge Elimination System Permit.  
230  
231 (B) Groundwater protection. Pursuant to Chapter VIII of the Water  
232 Quality rules.  
233  
234 (v) Design conditions shall be described to include:  
235  
236 (A) Proposed effluent standards.  
237  
238 (B) Design population.  
239  
240 (C) Existing and projected flows and flow variations.  
241  
242 (D) Shock loads, with cause and frequency.  
243



- 244 (E) Existing and projected wastewater characteristics including
- 245 BOD, suspended solids, and pH.
- 246
- 247 (F) Existing and projected flow, loads and characteristics of
- 248 industrial wastes and toxic Materials.
- 249
- 250 (G) Existing or proposed quantity and frequency of septage
- 251 discharges.
- 252
- 253 (H) Climate conditions at existing or proposed treatment facility site.
- 254
- 255 (I) Existing or proposed water supply.
- 256
- 257 (J) Theory of operation.
- 258
- 259 (K) Odor control features.
- 260
- 261 (L) Complete description of existing facilities.
- 262
- 263 (vi) Specific requirements of any pertinent approved Water Quality
- 264 Management Plan shall be included.
- 265

266 **Section 7. Plans and Specifications Content.**

267 (a) All plans for sewerage works shall have a suitable title showing the following:

- 269 (i) Name of owner and location of project.
- 270
- 271 (ii) North arrow and drawing scale.
- 272
- 273 (iii) Name and seal or signature of the engineer.
- 274
- 275

276 Datum used shall be indicated. Plans shall contain a site plan of the proposed project with

277 topography and boundaries of the project.

278

279 (b) Sewers. Plans for interceptor sewers, outfall sewers, new collector systems, force

280 mains, sewer extensions, or any combination shall include:

281 (i) A detailed plan view at a legible scale of each sewer line showing all

282 existing and proposed streets, adjacent structures, physical features, existing and proposed

283 locations of utilities and a North arrow. The location and size of all sewer lines, manholes,

284 cleanouts, and other appurtenances shall be indicated. Pertinent elevations shall be indicated on

285 all appurtenances.

286

287 (ii) Profiles of all sewer lines shall be shown on the same sheet as the plan

288 view at legible horizontal and vertical scales, with a profile of existing and finished surfaces,

289 elevations of the sewer inverts at all manholes, and the slope of the sewer inverts at all manholes,

290 pipe size and material, and the slope of the sewer line. The location of all special features such as

291 inverted siphons, concrete encasements, casing pipes, elevated sewers, etc., shall be shown.

292

293  
294 (iii) Special detail drawings, scaled and dimensioned to show the following:  
295  
296 (A) Details of all sewer appurtenances such as manholes, cleanouts,  
297 inverted siphons, elevated sewers, encasements, casing pipes, force main thrust blocks, outfall  
298 structures, etc.  
299  
300 (B) The approximate bottom of the stream, the approximate  
301 elevation of the low and high-water levels, and other topographic features at all locations where  
302 the project is at streams or lakes.  
303  
304 (C) Cross section drawing of the sewer's bedding.  
305  
306 (D) Additional features not otherwise covered by specifications.  
307  
308 (iv) Location of waterlines within 30 feet (9m) horizontally shall be shown  
309 on the plan. Water lines that intersect sewers shall be shown on the profile drawings. Public  
310 and/or private water wells within 30 feet (9m) of sewer lines shall be indicated on the plans.  
311  
312 (c) Pumping stations, treatment works and disposal systems. Plans shall be submitted  
313 showing the relation of the proposed project to the remainder of the system. Layouts and detail  
314 plans shall show the following:  
315  
316 (i) Site location and layout including topographic and physical features,  
317 proposed arrangement of pumping or treatment units, existing facilities, existing and proposed  
318 piping arrangements, access drive, power supply, fencing, embankments, outfall sewer, outfall  
319 structure, and receiving stream with direction of flow.  
320  
321 (ii) Schematic flow diagram(s) and hydraulic profile(s)  
322 for treatment works wastewater, sludge and effluent flows.  
323  
324 (iii) Plan and section view(s) of the wetwell and drywell of the pumping  
325 station with specific construction details, features and pertinent elevations.  
326  
327 (iv) Plan and section view(s) of each treatment facility process unit with  
328 specific construction details, features and pertinent elevations. Details of each unit should  
329 include, but are not limited to, inlet and outlet devices, baffles, valves, arrangement of automatic  
330 control devices, aeration equipment, motors, sludge scrapers, sludge disposal, electrical devices  
331 or other mechanical devices.  
332  
333 (d) Specifications. Technical specifications shall accompany the plans for new  
334 sewers, pump stations, treatment works, disposal systems, or additions/modifications to existing  
335 systems or facilities. Where plans are for extensions to sewer systems, the specifications may be  
336 omitted, provided it is stated that the work is to be constructed under specifications authorized by  
337 the Water Quality Division office. Specifications on file must conform to these regulations.  
338  
339 The specifications accompanying construction drawings shall include:  
340  
341 (i) Identification of construction materials.

- 342  
343 (ii) The type, size, strength, operating characteristics, rating or requirements  
344 for all mechanical and electrical equipment, including machinery, valves, piping, electrical  
345 apparatus, wiring and meters; laboratory fixtures and equipment; operating tools; special  
346 appurtenances; and chemicals where applicable.  
347  
348 (iii) Construction and installation procedure for materials and equipment.  
349  
350 (iv) Requirements and tests of materials and equipment to meet design  
351 standards.  
352  
353 (v) Performance tests for operation of completed works and component  
354 units.

355 **PART B: MUNICIPAL AND DOMESTIC SEWERAGE SYSTEMS, TREATMENT**  
356 **WORKS, AND DISPOSAL SYSTEMS**

357  
358 **Section 8. General.**  
359

360 This part contains the minimum standards for the design and construction of sewerage  
361 systems, treatment works, and disposal systems for domestic and municipal wastewater. Soil  
362 absorption and land application systems are contained in other parts. All facilities shall comply  
363 with the purpose of this chapter.  
364

365 **Section 9. Design of Sewers.**  
366

367 (a) Separate sewers. Separate sewers shall be provided for collection of stormwater  
368 and wastewater. Roof, areaway, drive or foundation drains shall not be connected to sanitary  
369 sewers.  
370

371 (b) Pipe materials.  
372

373 (i) Wastewater characteristics. Pipe materials shall resist acid and alkaline  
374 solutions, organic solvents, and other wastewater constituents and environmental conditions  
375 encountered.  
376

377 (ii) Pipe loadings. Pipe materials shall be chosen and the pipeline shall be  
378 designed to withstand all trench and superimposed surface live loads with a minimum factor of  
379 safety. Rigid pipes shall have a minimum factor of safety of 1.5, and flexible pipes shall have a  
380 minimum factor of safety of 1.25.  
381

382 (iii) Soil characteristics. Pipe materials shall be chosen to resist corrosion due  
383 to aggressive soil characteristics by the soil it contacts. Iron or steel pipe shall be protected from  
384 corrosion with polyethylene encasement or cathodic protection.  
385

386 (iv) Joints. Pipe joints shall be flexible, durable and designed to minimize  
387 infiltration/exfiltration and exclude roots.  
388

389 (v) Performance tests. Piping shall be subjected to leakage tests. Leakage  
390 tests shall be infiltration, exfiltration, or air tests.  
391

392 (A) Infiltration. Maximum of 200 gallons per inch diameter per mile  
393 per day (1200 liters/cm/km/day) with a minimum of two feet (0.6 m) of head over the top of the  
394 pipe.  
395

396 (B) Exfiltration. Maximum of 200 gallons per inch diameter per mile  
397 per day (1200 liters/cm/km/day) with a minimum of two feet (0.6 m) of head over the top of the  
398 pipe.  
399

400 (C) Air. Air tests shall conform to ASTM C-828-80. (D) Deflection.  
401 Maximum five percent deflection after flexible pipe is backfilled for 30 days. A mandrel of 95  
402 percent of pipe diameter shall be used. No mechanical pulling of mandrel is permitted.

- 403 (vi) Approved pipe material specifications. Type of commercial pipe  
 404 approved for gravity sanitary systems include:  
 405  
 406 (A) Extra strength and standard strength vitrified clay pipe: ASTM  
 407 C700-78a.  
 408  
 409 (B) PVC sewer pipe and fittings: ASTM D3034-80, SDR35, ASTM  
 410 F679-81, or ASTM F794-83.  
 411  
 412 (C) ABS composite sewer pipe: ASTM D2680-80.  
 413  
 414 (D) Reinforced plastic mortar pipe: ASTM D3262-81.  
 415  
 416 (E) Asbestos cement nonpressure sewer pipe: ASTM C428-80.  
 417  
 418 (F) Reinforced concrete sewer pipe: ASTM C76-82.  
 419  
 420 (G) Concrete Sewer Pipe: ASTM C-14.  
 421  
 422 (H) Ductile iron sewer pipe: ASTM A746-77.  
 423

424 Types of commercial pipe approved for pressure sanitary sewer systems  
 425 include:

- 426  
 427 (I) PVC water pipe: ASTM D2241-80, or AWWA C900.  
 428  
 429 (J) Asbestos cement pressure pipe: AWWA C400-80.  
 430  
 431 (K) Ductile iron pipe: AWWA C151-81.  
 432  
 433 (L) Glass Fiber-Reinforced Thermo-setting-Resin Pressure Pipe:  
 434 AWWA C950-81.  
 435

436 (c) Collection piping design, construction and testing. A sewage collection line is  
 437 any conduit that carries wastewater that originates from two or more separate buildings or from a  
 438 single building that generates more than 2,000 gpd (7.6 m<sup>3</sup>/d) of average daily flow.  
 439

440 (i) Gravity system.

441  
 442 (A) Depth. Sewers shall be located to protect them from freezing and  
 443 frost heave as prudently possible.  
 444

445 (B) Size. Sewers to be aligned straight shall be eight inch (20.3 cm)  
 446 diameter or larger except six inch (15.2 cm) sewers may be used in cul-de-sacs, or other dead end  
 447 locations where the sewer cannot be extended in the future. Eighteen-inch (45.7 cm) or larger  
 448 sewers may be laid on curves. Lines shall be sized for 200 percent of maximum daily flow or  
 449 more. In the absence of data deriving maximum daily flow, the chart on Figure 1-1 shall be used  
 450 to determine maximum daily flow.  
 451

452 (C) Slope. Sewers shall be laid with uniform slope between  
 453 manholes. Minimum slopes shall be:  
 454  
 455

Sewer Size Inch (cm)	Minimum Slope in Feet Per 100 Feet (m/100 m)
6 (15.2)	0.60
8 (20.3)	0.40
10 (25.4)	0.28
12 (30.5)	0.22
14 (35.6)	0.17
15 (38.1)	0.15
16 (40.6)	0.14
18 (45.7)	0.12
20 (50.8)	0.11
21 (53.3)	0.10
24 (61.0)	0.08
27 (68.6)	0.067
30 (76.2)	0.058
33 (83.8)	0.051
36 (91.4)	0.046

456  
 457  
 458 Maximum slopes without the use of concrete anchors shall be 20 percent. The following  
 459 spacing of concrete anchors shall apply to slopes greater than 20 percent:  
 460

Slopes (percent)	Concrete Anchor
20-35	36 ft (11 m)
35-50	24 ft (7.3 m)
More than 50	16 ft (4.9 m)

461  
 462 (D) Velocity. Minimum velocities shall be 2 fps (0.6 mps) when  
 463 flowing full. Velocities greater than 10 fps (3.0 mps) require special design considerations.  
 464

465 (E) Increasing size. All sewer pipe size changes shall be at  
 466 manholes. Pipe size shall not be decreased in the direction of flow. The energy gradient line  
 467 should be maintained when a smaller sewer joins a larger one.  
 468

469 (F) Excavation, bedding installation, backfill.  
 470

471 (I) Excavation. Trench width from the trench bottom to a  
 472 point one foot above the top of the pipe shall be no less than the outside diameter of the pipe plus  
 473 8 inches (20.3 cm) but not more than 24 inches (61 cm) plus the pipe O.D. The trench bottom  
 474 shall be excavated for the pipe bell. All rock shall be removed within six inches (15.2 cm) of  
 475 pipe. The trench shall be dewatered for all work.  
 476

477 (II) Bedding. Bedding shall be designed in accordance with:  
 478

479 (1.) Rigid pipe. Types A, B, C (Water Pollution  
480 Control Federation Manual of Practice No. 9) or ASTM C12-81.  
481  
482 (2.) Flexible pipe. Types I, II, III, ASTM D2321-74.  
483  
484 (III) Backfill. Backfill shall be performed without disturbing  
485 pipe alignment. Backfill shall not contain debris, frozen material, unstable material, or large  
486 clods. Stones greater than three inches (7.6 cm) in diameter shall not be placed within two feet  
487 (0.6 m) of pipe. Compaction shall be to a density equal to or greater than the surrounding soil.  
488  
489 (ii) Force mains and pressure sewers.  
490  
491 (A) Depth. Force mains shall be located to protect them from  
492 freezing and frost heave.  
493  
494 (B) Size. Force mains shall be four inches (10 cm) diameter or  
495 greater. Pressure sewer collection system piping shall be one inch (2.4 cm) minimum.  
496  
497 (C) Velocity. Minimum velocity shall be 2.5 fps (0.76 mps).  
498  
499 (D) Air release. Air release facilities shall be provided at the high  
500 point in the piping whenever the pipe crown elevation falls below the pipe invert elevation.  
501 Access to air release manholes shall not be in traffic-ways.  
502  
503 (E) Cleanouts. Cleanouts shall be provided at 400 foot (122 m)  
504 maximum spacing in pressure piping four-inch diameter or less.  
505  
506 (F) Pressure sewer systems. Pressure sewer collection systems shall  
507 be preceded by grinder pumps or septic tanks.  
508  
509 (G) Pressure sewer collection system pumps. Pumps shall be  
510 provided with isolation and check valves. If a septic tank is not provided before the pump, a  
511 grinder pump shall be required. Pump holding sumps shall not be steel, iron, or coated metal. The  
512 sump chamber shall be 50 gallon (189 liters) volume, minimum.  
513  
514 (iii) Service connections. A service connection is any conduit that carries  
515 wastewater that is not defined as a sewage collection line. Service connections shall conform to  
516 the requirements for sewage collection lines (Section 9(c)(i) and (ii)) with the following  
517 modifications:  
518 (A) Size: minimum size shall be four inches (10.2 cm).  
519  
520 (B) Slope: minimum slope shall be two feet/100 feet (2 m/100 m).  
521  
522 (C) Flow: flow shall be determined from a fixture unit count and the  
523 sewage size based on flowing full.  
524  
525 (D) Connections: all service connections to sewage collection lines  
526 shall be made with a wye or tee for new construction and a tapping saddle for connection to  
527 existing collection lines.

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534

(d) Manholes and cleanouts.

(i) Location. Manholes shall be located at all changes in pipe size, vertical or horizontal alignment, pipe intersections, and the end of lines. Maximum spacing for various line sizes are as follows:

Line Size (In)	(cm)	Maximum M.H.	Spacing
15 or less	(38 or less)	400 ft	122 m
16 - 30	(40.6 - 76)	500 ft	152 m
31 or more	(76 or more)	600 ft	183 m

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Terminal sewer cleanouts may be provided at the end of sewer lines if they are not more than 150 feet (45 m) from the nearest downstream manhole. The cleanout shall be constructed using 45 degree bends to the upturned pipe coming to the surface of the ground. The diameter of the cleanout shall be the same as the pipe size. Lampholes shall not be used.

541  
542

(ii) Size. Minimum manhole interior size is four feet (1.2 m).

543  
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545

(iii) Drop manhole. Drop manholes must be constructed where the change in elevation between two lines is greater than 24 inches (0.6 m). Concrete encasement shall be provided around the drop pipe.

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550

(iv) Invert. Manhole inverts shall be constructed to conform to the shape of the sewer. The bench shall drain to the invert. Connections to the manhole shall be watertight and allow differential settlement between the manhole and pipe. Minimum fillet height shall be one half of the pipe diameter.

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(v) Cover. The manhole cover shall be suitable to withstand all loads, including impact loading without deformation, slip or rattle. The manhole cover shall be watertight in areas subject to flooding and a bolt-down type in areas subject to unauthorized dumping or vandals.

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(vi) Steps. Access to manholes shall be with portable ladders, or with cast iron manhole steps spaced at 16 inches (40.6 cm) maximum.

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(vii) Materials. Manholes shall be constructed watertight and durable using cast-in-place concrete, or precast concrete with gasketed joints. Where precast concrete bases are used, the first 12 inches (30 cm) of wall will be monolithically cast with the base.

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566

(viii) Access. A 22 inch (56 cm) minimum diameter clear opening shall be provided on all manholes. All manholes shall be located to be accessible by motorized equipment for maintenance.

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568  
569

(e) Special structures.

570  
571

(i) Inverted siphons. Inverted siphons shall have a minimum of two six-inch (15.2 cm) barrels. The inlet and outlet shall be arranged to cause only one pipe to be used during



572 normal flows. The minimum velocity shall be 3 fps (1 mps) at average flow, and occur at least  
573 daily. The siphon shall be designed for flushing and maintenance.

574

575 (ii) Aerial crossings. Aerial crossings shall be designed to prevent freezing,  
576 leaking, settlement, lateral movement, and damage from expansion/contraction. It shall be located  
577 with proper vertical clearances for highway vehicles and the 100 year flood.

578

579 (iii) Stream crossings. Stream crossings shall be within  
580 10° of the perpendicular direction of the stream. Pipe shall have a minimum cover of one foot in  
581 rock, and three feet under other surfaces. The crossing shall be made with an inverted siphon or  
582 without a grade change. Pipe materials shall be steel, cast iron, or ductile iron pipe.

583

584 (f) Potable water supply protection.

585

586 (i) Cross connections. There shall be no cross connections between sewer  
587 lines and potable water lines.

588

589 (ii) Horizontal and vertical separation from water mains. Minimum  
590 horizontal separation shall be ten feet (3 m) where the water main is less than 1.5 feet (0.46 m)  
591 above the elevation of the sewer. Minimum vertical separation shall be 1.5 feet (0.46 m) at  
592 crossing. Joints in sewers at crossing shall be located at least ten feet (3 m) from water mains. The  
593 upper line of a crossing shall be specially supported. Where vertical and/or horizontal clearances  
594 cannot be maintained, the sewer shall be placed in a separate conduit pipe.

595

596 **Section 10. Pumping stations.**

597

598 (a) Design conditions.

599

600 (i) Total dynamic head. The total dynamic head rating of pumping units  
601 shall be based on pipe friction, pressure losses from piping entrances, exits, appurtenances  
602 (bends, valves, etc.), and static head at the rated flow.

603

604 (ii) Grit. Where no grit removal is provided ahead of the pumping station,  
605 equipment and piping design shall minimize the deleterious effects of grit in the sewage.

606

607 (iii) Screening. Screens or comminutors shall be provided ahead of pumps  
608 where the average daily flow is in excess of 1.0 mgd (3,784 m<sup>3</sup>/d) to prevent solids larger than 2  
609 ½ inches (6.4 cm) from entering the pump.

610

611 (iv) Minimum pump opening. Except for grinder pumps, raw sewage pumps  
612 shall be capable of passing spheres of at least three inches (7.6 cm) in diameter. Pump suction and  
613 discharge piping in all sewage and sludge services shall be no smaller than four inches in  
614 diameter (10 cm).

615

616 (v) Pump cycle time. Intermittently operated pumps shall be designed to  
617 start no more often than once every ten minutes at the minimum operating interval.

618

619 (vi) Removal of equipment. Pumping stations shall be designed to permit  
620 removal of all items of equipment including pumps, valves, electrical and control equipment.  
621 Equipment located in wetwells shall be removable without entering the wetwell.  
622

623 (vii) Surge control. Piping systems shall be designed to withstand the  
624 maximum possible surge (water hammer) from the pumping station, or adequate surge control  
625 provided to protect the piping. Pressure relief valves are not acceptable surge control.  
626

627 (viii) Net positive suction head. Pumps shall be selected so that the net positive  
628 suction head required at maximum flow (NPSHR) is less than the NPSH available minus four feet  
629 (1.2 m) based on the hydraulic conditions and altitude of the pumping station.  
630

631 (ix) Uplift. The pumping station chambers shall resist hydrostatic uplift  
632 pressures. Siting requirements.  
633

634 (b) Siting requirements.

635

636 (i) Access. Pumping stations shall be located so that they are readily  
637 accessible to operating and maintenance personnel at all times of day or night, and under all  
638 weather conditions. Pumping stations shall be located off of traffic ways.  
639

640 (ii) Flood protection. Pumping stations shall be designed so there is no  
641 equipment or structural damage in the 100 year flood, and so the pumping station's operation is  
642 uninterrupted by the 25 year flood.  
643

644 (iii) Security. The pumping station shall be designed to discourage  
645 unauthorized entry.  
646

647 (c) Pumping station types.

648

649 (i) Dry wells.

650

651 (A) Access. Pumping station dry wells and equipment rooms shall be  
652 accessible for equipment inspection, operation and maintenance. Ladder and stair dimensions,  
653 locations of landings, and structural design shall comply with the Wyoming OHSA (1982).  
654 Equipment shall be removable from pumping stations without making structural changes to the  
655 station.  
656

657 (B) Separation from wetwell. Dry wells and equipment rooms shall  
658 be completely separated from wetwells with no hatches, untrapped drains, or other connecting  
659 accessways.  
660

661 (C) Dewatering. Dry pits and below-grade equipment rooms shall be  
662 provided with sump pumps sized to remove infiltration of water during normal seepage and  
663 leakage.  
664

665 (ii) Wetwell design. Wetwells shall be designed to prevent vortexing and  
666 unstable pump operation. Pumps shall be located below the minimum water level, except suction  
667 lift pumps. Suction intakes shall be bell-mouthed. Provisions shall be made for isolating,

668 bypassing and/or dewatering portions of the wetwell for maintenance. Hopper walls of wetwells  
669 shall be sloped at no less than 1.75 vertical to 1 horizontal.

670

671 (iii) Submersible pumping stations. Submersible pumping stations shall be  
672 designed specifically for totally submerged operation and so that pumps may be readily removed  
673 from the wetwell without dewatering the wetwell or disconnecting piping in the wetwell.

674 Submersible pumps shall have an adequate means of indicating motor seal failure. Electrical  
675 equipment shall be suitable for Class 1, Division 1, Groups C and D hazardous environments, as  
676 defined in the National Electrical Code (1982).

677

678 (iv) Suction lift. Pumping stations utilizing suction lift pumps shall have  
679 adequate priming means to prime the pumps quickly and shall be designed for priming the pumps  
680 when the water level in the wetwell is one foot (0.3 m) below the lead pump starting elevation in  
681 the suction wetwell, and for maintaining prime when the wetwell level is one foot (0.3 m) below  
682 the lead pump stopping level. Valving shall not be located in the wetwell.

683

684 (v) Pneumatic ejectors. Pneumatic ejectors shall be limited to design flows  
685 equivalent to 25 residential connections. One standby compressor shall be provided.

686

687 (vi) Grinder pumps. Grinder pumps shall be limited to design flows  
688 equivalent to 25 residential connections.

689

690 (d) Piping and valves.

691

692 (i) Suction.

693

694 (A) Suction intake. Suctions shall be located so the pump is below  
695 the minimum water level. Suction intakes shall be bell-mouthed. Suction intakes shall be located  
696 against the far wall from the wetwell inlet.

697

698 (ii) Piping.

699

700 (A) Size. Sewage and sludge piping shall be no smaller than four  
701 inches (10.2 cm) diameter, except as required for metering, or where grinder pumps are provided.

702

703 (B) Velocity. Piping and pumping systems shall be designed to  
704 maintain a minimum velocity of 2.5 fps (0.76 mps), and a maximum velocity of 5 fps (1.52 mps)  
705 for suction piping.

706

707 (C) Design pressure. Piping shall be designed for the maximum  
708 operating pressure and for the maximum value of any surges (water hammer) which may occur,  
709 taking into account any surge protection provided.

710

711 (D) Restraints. Piping shall be blocked and otherwise restrained to  
712 prevent damaging movement under the maximum anticipated pressure (including test pressure).

713

714 (E) Cleanouts. Cleanouts shall be provided in pump suction.

715

716 (iii) Valves. Valves shall not be located in wetwells.

717 (A) Shutoff. Except on submersible pumps and suction lift pumps, a  
718 shutoff valve shall be provided on the suction of all pumps. A shutoff valve shall be provided on  
719 the discharge of all pumps, regardless of type or service.

720

721 (B) Check. All pumps shall be provided with a check valve located  
722 between the pump and the discharge shutoff valve, except where arranged so that backflow is not  
723 possible under normal operating conditions.

724

725 (C) Air release. Air release valves shall be provided at the high  
726 points in piping whenever the pipe crown elevation falls below the pipe invert elevation. On  
727 sewage lines, air or air and vacuum release valves shall be specifically designed for sewage  
728 service.

729

730 (e) Reliability.

731

732 (i) Multiple units. Every pumping station shall have not less than two  
733 pumping units. The number of units and their size shall be sufficient to permit pumping the  
734 maximum design flow with the largest pumping unit out of service.

735

736 (ii) One of the following shall be provided:

737

738 (A) Alternative power source. Where the pumping station serves  
739 more than 50 residential units, alternative power shall be provided. Alternative power shall be  
740 permanently installed or portable engine generator sets, permanently installed or portable engine  
741 driven pumps or a separate, independent utility source provided. Where manual starting is  
742 required, sufficient storage shall be provided to allow notifying the operator and performing  
743 whatever tasks are necessary to get the pumping station in service. Where permanently installed  
744 engine driven equipment is provided, sufficient fuel shall be provided for at least eight hours  
745 operation under the maximum flow condition. Where more than one pumping station is affected  
746 by a power outage and portable equipment is planned for alternative power source, sufficient  
747 portable equipment shall be provided to provide alternative power to all pumping stations under  
748 maximum flow conditions.

749

750 (B) Generators. Generators shall be sized to permit starting the  
751 largest pump in the pumping station with all other pumps except one running. If the generator is  
752 not capable of starting all pumps simultaneously, suitable controls shall be provided to stagger the  
753 pump starts to remain within the capabilities of the equipment. Generators shall be diesel-fired,  
754 natural gas-fired or bottled gas-fired. The use of gasoline or digester gas-fired generators for  
755 permanently installed standby service is unacceptable. Gasoline-fired portable generators are  
756 accept able.

757

758 (C) Engine driving pumps. Engine driven pumps shall be sized for  
759 maximum design flow. Diesel, natural gas and bottled gas are acceptable fuels for portable  
760 engines only. Digester gas is unacceptable for standby fuel. Quick connecting couplings shall be  
761 provided for portable engine driven pumps.

762

763 (D) Storage. Wastewater storage may be provided in the form of  
764 underground storage or surface ponds or tanks in lieu of alternative power supplies. Storage shall

765 be sized for the maximum anticipated power outage, but not less than 24 hours at average design  
766 flow. Storage shall be water tight and arranged to drain back to the pumping station wetwell.

767

768 (f) Electrical.

769

770 (i) Equipment location. All electrical equipment, including motors, motor  
771 starters and controls shall be located so as to be undamaged by the 100 year flood.

772

773 (ii) Controls. Controls shall include a separate start/stop device for each  
774 pump or for each pumping position in the control sequence. Controls shall be arranged so that the  
775 failure of any one control system component will affect only the operation of one pumping unit.  
776 Manual override shall be provided for normal pump operating control.

777

778 (iii) Code requirements. All electrical work shall comply with the National  
779 Electrical Code as adopted and amended by the Wyoming Department of Fire Prevention and  
780 Electrical Safety. Electrical equipment in enclosed wetwells which may be subject to explosive  
781 concentration of hazardous gases or flammable fluids, including all raw sewage wetwells, shall  
782 comply with the NEC requirements for Class 1, Division 1, Groups C and D areas.

783

784 (iv) Alarms. An alarm system shall be provided for each pumping station. As  
785 a minimum, alarms shall include high wetwell level and high water level in the dry well. For  
786 pumping stations having a capacity of 0.5 mgd (1890 m<sup>3</sup>/d) or more, the alarm shall be  
787 telemetered to a facility that is manned 24 hours a day. For pumping stations having a capacity of  
788 0.5 mgd (1890 m<sup>3</sup>/d) or less, an audio and visual alarm shall be provided in a conspicuous  
789 location.

790

791 (g) Safety.

792

793 (i) Ventilation. All accessible pumping station areas shall be ventilated.  
794 Ventilation may be continuous or intermittent. If intermittent, ventilation in areas normally visited  
795 by operating personnel shall be started automatically at not greater than 30 minute intervals.  
796 Permanently installed dry well ventilation shall provide at least six air changes per hour if  
797 continuous, and 12 air changes per hour if intermittent. Permanently installed wetwell ventilation  
798 shall provide 12 complete air changes per hour if continuous, and 30 complete air changes per  
799 hour if intermittent. Wetwell ventilation shall be positive pressure, forcing air into the wetwell  
800 rather than exhaustion from it. All ventilation equipment shall be of a non-sparking design.  
801 Intermittent ventilating equipment shall insure starting upon entry of operating personnel.  
802 Wetwells may be ventilated by gravity means if normal access by operating personnel is  
803 unnecessary. Wetwells that are accessed infrequently shall be designed to permit the use of  
804 portable blowers that will exhaust the space and continue to supply fresh air during access  
805 periods.

806

807 (ii) Hoists. Where required for removing equipment, hoists shall be rated for  
808 not less than 50 percent more than the weight of the heaviest single item to be lifted by the hoist.

809

810 (iii) Lighting. Lighting levels shall be sufficient to permit safe operation and  
811 maintenance of all equipment within the pumping station, but not less than 30 foot-candles. All  
812 areas shall be lit in such a manner that the failure of one lighting fixture or lamp will not cause the  
813 area to be completely dark.

- 814 (iv) Equipment guards. Provide shields to protect from rotating or moving  
815 machinery.  
816  
817 (v) Warning signs. Provide warning signs for nonpotable water, electrical  
818 hazards, chemical hazards, or other unsafe features. Warning signs shall be permanently attached  
819 to the structure or appropriate equipment.  
820  
821 (vi) Safety. Comply with the Wyoming Occupational Health and Safety  
822 Rules and Regulations.  
823

824 **Section 11. General Treatment Plant Considerations.**  
825

- 826 (a) Surface water protection. Discharges to surface waters shall meet or exceed  
827 quality limitations in the National Pollution Discharge Elimination System Permit. Plant  
828 configurations and piping shall be arranged to avoid the bypassing of process units that could  
829 result in inadequately treated sewage reaching the receiving surface water.  
830  
831 (b) Groundwater protection. Seepage and/or discharge to groundwater shall comply  
832 with Chapter VIII of the Water Quality Regulations. Plan configurations and piping shall be  
833 arranged to avoid the bypassing of process units that could result in inadequately treated sewage  
834 reaching the groundwater.  
835  
836 (c) Siting requirements.  
837  
838 (i) Isolation. Treatment facilities shall be located to minimize public and  
839 private nuisances and health hazards on inhabited areas or residential areas. Where treatment  
840 plant siting does potentially affect inhabited areas, appropriate measures to minimize nuisances or  
841 hazards shall be incorporated in the design.  
842  
843 (ii) Flood protection. All treatment process structures, mechanical  
844 equipment, and electrical equipment shall be protected from the 100 year flood. The treatment  
845 facilities shall remain fully operational and accessible during the 25 year flood.  
846  
847 (d) Hydraulic and treatment reliability.  
848  
849 (i) Alternative power source. All treatment plants shall have an alternative  
850 source of power to provide reliable pumping and disinfection of sewage if required. The  
851 alternative source of power shall be sized to provide the capability to pump design maximum day  
852 flow rates through the treatment process and to disinfect the sewage if necessary. Acceptable  
853 alternative power sources include:  
854  
855 (A) A diesel, natural gas, or propane fueled engine generator.  
856  
857 (B) A second independent electrical supply.  
858  
859 (C) Storage of sewage and subsequent treatment  
860  
861 (ii) Bypass treatment units. Complete by-passing of treatment units is  
862 prohibited. Provide means to bypass any duplicate process unit or single unit where adequate

863 downstream process capability is provided. Sewage shall be treated in parallel singular units and/or  
864 subsequent processes.

865  
866 (iii) Multiple units. For average design flows greater than 100,000 gpd (378  
867 m<sup>3</sup>/d), more than one unit of each unit process shall be provided. For average design flows of  
868 less than 100,000 gpd (378 m<sup>3</sup>/d), one unit of each unit process may be provided if electrical or  
869 mechanical equipment or diffusers can be removed while the unit is in operation, or if the unit can  
870 be compartmentalized to permit access. There shall be no provision to bypass the entire plant nor  
871 shall bypass provisions be made that will allow inadequately treated sewage to reach the ground  
872 or surface waters.

873  
874 Where more than one parallel unit is provided, positive means of dividing the flow  
875 proportionally between units shall be included (such as splitter weirs or valves and meters).

876  
877 (iv) Multiple equipment. Mechanical process equipment shall be provided in  
878 multiple units. All pumping functions shall include sufficient pumping capacity that the peak  
879 flow can be pumped with the largest single unit not in service. Blowers and mechanical aerators  
880 for process aeration shall include sufficient capacity that the maximum day design capacity can be  
881 delivered with the largest single unit not in service. Other equipment shall have standby units  
882 where their function is critical to the treatment process.

883  
884 (e) Electrical.

885  
886 (i) Equipment location. Service transformers and other critical electrical  
887 equipment shall be located above the 100 year flood and above grade. Transformers shall be  
888 located in a manner that they are remote from or protected by substantial barriers from traffic.  
889 Motor controls shall be located in superstructures and in rooms that do not contain sewage,  
890 chemical processes, or corrosive atmospheres.

891  
892 (ii) Code requirements. All electrical work shall comply with the National  
893 Electrical Code as enacted and amended by the Wyoming Department of Fire Prevention and  
894 Electrical Safety. Areas in which the occurrence of explosive concentrations of hazardous gases or  
895 flammable fluids can occur Class 1, groups C and D, Division 1 locations shall be designed for  
896 hazardous locations in accordance with the National Electrical Code.

897  
898 (f) Structural.

899  
900 (i) Construction materials. Construction materials shall be selected,  
901 apportioned, and/or protected to provide water tightness, corrosion protection, and resistance to  
902 weather variations.

903  
904 (ii) Coatings. Coatings used to protect structures, equipment and piping shall  
905 be suitable for atmospheres containing hydrogen sulfide and volatile organics. Surfaces exposed  
906 in chemical areas shall be protected from chemical attack. Concrete surfaces in confined spaces  
907 containing sewage shall be protected. Paints containing lead or mercury shall not be used.

908  
909 (iii) Geological conditions. Structural design shall consider the seismic zone,  
910 groundwater and soil support. Soils investigations shall be made, or adequate previous soils  
911 investigations shall be available to develop structural design.

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(g) Safety. The Wyoming Occupational Health and Safety Rules and Regulations shall be complied with. The following items shall also be provided:

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

(ii) Handrails. In addition to all Wyoming OSHA requirements, barriers around treatment basins shall be provided.

(iii) Warning Signs. Provide warning signs for nonpotable water, electrical hazards, chemical hazards, or other unsafe features. Warning signs shall be permanently attached to the structure or appropriate equipment.

(iv) Equipment guards. Provide shields to protect from rotating or moving machinery.

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

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

(h) Instrumentation.

(i) Location. A flow measuring device shall be provided for the plant effluent unless it is a mechanical plant where an influent flow measuring device will be acceptable.

(ii) Type. For plants having an average design flow of 50,000 gpd (189 m<sup>3</sup>/d) or more, the flow measuring device shall provide recording of instantaneous flow rate, enable calculation of average daily flow rate and have provisions for calibration and correction.

(iii) Controls. Automatic controls shall be designed to permit manual override.

(iv) Alarms. Conditions that may affect discharge quality or personnel or public safety shall be alarmed at an attended location.

(i) Sampling. Access shall be provided to sample untreated wastewater ahead of the treatment facilities prior to adding any process return flows, and sampling of the effluent after all treatment process units, but before discharge to the receiving stream. An automatic sampler that composites samples in proportion to the flow rate on the effluent shall be provided if required by the NPDES permit.

(j) Ventilation. All enclosed spaces shall be provided with forced ventilation, excepting pumping station wetwells, scum pits, anaerobic process units, and man-holes. In areas



961 where there are open sewage channels, wet pits exposed to the room or process units without gas  
962 tight enclosures, ventilation shall be provided to maintain a higher pressure in the room than  
963 atmospheric and shall provide 12 air changes per hour. In equipment rooms, ventilation shall be  
964 provided to limit the temperature rise in the room to less than 15° F (8° C) above ambient, but not  
965 less than six air changes per hour. Rooms housing chlorine storage and/or feeders shall have  
966 provisions for exhausting the room contents in two minutes and continuous ventilation to provide  
967 12 air changes per hour.

968  
969 (k) Dewatering of treatment units. All treatment units, channels, housing screens, or  
970 other embedded equipment, and wetwells shall be provided with drains or sumps that facilitate  
971 draining the unit for access and maintenance. Drainage shall be to upstream process units. Basin  
972 slabs shall be designed to successfully resist the hydrostatic uplift pressure or relief valves shall  
973 be provided.

974  
975 (l) Cold weather protection. All equipment including pumps, bar screens, grit  
976 washers, electrical equipment and other equipment not required to be in or on open basins (such  
977 as clarifier drives and surface aerators) shall be housed in heated, lighted, and ventilated  
978 structures. Structure entrances shall be above grade. Piping shall be buried below frost level,  
979 placed in heated structures, or provided with heat and insulated. Walkways shall be located away  
980 from areas of spray and/or ice buildup.

981  
982 (m) Chemical storage. All chemical storage shall be housed or buried. Areas  
983 designated for storage of specific chemicals shall be separated from areas designated for other  
984 reactive chemicals. Liquid storage containers shall be isolated from other portions of the structure  
985 by a curb that will contain and/or drain ruptured tank contents. Concrete floors, walls and curbs in  
986 chemical storage and feed areas shall be coated to protect the concrete from aggressive chemicals.  
987 Floors in polymer feed and storage areas shall be provided with nonslip surfaces. Rooms for  
988 chlorine storage and feed equipment shall be gas tight and be provided with entry from outdoors.  
989 All toxic chemical storage areas shall be provided with lighting and ventilation that are switched  
990 from outside the room, and windows to permit viewing the room from outside.

991  
992 (n) Design capacities.

993  
994 (i) Flow. In the absence of flow measurement information, the design  
995 average daily flow shall be based on a per capita daily flow rate of 100 gallons (378 liters).  
996 Allowances shall be made for return flows from digesters, sludge thickeners and the like, and the  
997 infiltration and wet weather inflow into older sewer systems. Significant industrial waste flows  
998 shall be added to the per capita flow rate.

999  
1000 (ii) Organic loads. In the absence of wastewater strength data, domestic  
1001 waste treatment design shall be based on a per capita daily BOD and suspended solids  
1002 contribution of 0.22 lb (0.10 kg) and 0.25 lb (0.11 kg), respectively. The influence of sidestream  
1003 return flows and significantly strong industrial wastes shall be considered and included in the  
1004 design where applicable.

1005  
1006 **Section 12. Pretreatment.**

1007  
1008 (a) Flow equalization.

1009

1010 (i) Storage requirements. Where mechanical plants experience large diurnal  
1011 variations in flow rate which will cause mechanical, hydraulic, or biological process upsets, flow  
1012 equalization shall be provided.  
1013

1014 (ii) Location. Pretreatment facilities, such as bar screens, comminutors and  
1015 grit chambers, and where possible, primary clarifiers should be located ahead of the equalization  
1016 basin.  
1017

1018 (iii) Drainage and cleaning. Provisions shall be made to isolate, drain and  
1019 clean the basin(s).  
1020

1021 (iv) Aeration and mixing. Aeration shall be sufficient to maintain a minimum  
1022 of 2.0 mg/L of dissolved oxygen in the basin at all times. Air supply rates shall be a minimum of  
1023 10 cfm/ 1,000 cubic feet (10 m<sup>3</sup>/min/1000 m<sup>3</sup>) of volume for primary treated wastewater and 20  
1024 cfm/1,000 cubic feet (20 m<sup>3</sup>/min/1000 m<sup>3</sup>) of volume for raw or screened waste water.  
1025

1026 (v) Controls. Controls shall be provided to control the flow rate from the  
1027 flow equalization basin. Flow measurement devices shall be provided.  
1028

1029 (b) Screens.  
1030

1031 (i) Location. Coarse screens shall be the first unit in the treatment process.  
1032 Screens shall be housed. The housing shall be heated and ventilated. Access shall be separated  
1033 from other enclosed spaces. Housing shall be designed for hazardous location (National Electrical  
1034 Code, Class 1, Groups C and D, Division 1 locations).  
1035

1036 (ii) Capacity. The screen capacity shall be capable of handling the maximum  
1037 anticipated peak hourly flow including inflow and infiltration.  
1038

1039 (iii) Types.  
1040

1041 (A) Mechanically cleaned. Bar screens shall be mechanically cleaned  
1042 if the removal of the daily accumulation of screenings results in surging of the flow. Manually  
1043 cleaned screens shall be provided in parallel channels to permit removal of the mechanically  
1044 cleaned screen from service. Bars shall be between 45° and 90° measured from the horizontal.  
1045

1046 (B) Manually cleaned. Manually cleaned bar screens shall be used  
1047 for bypass of a mechanically cleaned screen or for treatment installations having an average  
1048 design capacity of less than 100,000 gpd (378 m<sup>3</sup>/day). Bars shall be between 30° to 45° from the  
1049 vertical.  
1050

1051 (iv) Bar spacing. Clear spacing on mechanically cleaned bar screens shall  
1052 range from ½ inch to 1 ¾ inches (1.27 cm to 4.45 cm). Manually cleaned screens shall have a  
1053 range from one to 1 ¾ inches (2.54 cm to 4.45 cm) clear spacing. Coarse screens may have  
1054 spacing greater than 1 ¾ inches (4.45 cm).  
1055

1056 (v) Velocities. Maximum approach velocity at average flows for a  
1057 mechanically cleaned screen shall be 3.0 fps (0.91 mps). Maximum velocity for a manually  
1058 cleaned bar screen shall be 1.5 fps (0.46 mps). Minimum velocities shall be 1.25 fps (0.38 mps).

1059  
1060 (vi) Channel. Channels shall be designed to eliminate deposition and permit  
1061 draining. The channel shall contain a rock trap ahead of mechanically cleaned screens. Multiple  
1062 channels shall be designed to allow uniform and equal flow to the screens. Slide gates shall be  
1063 provided to permit isolating sections of channel containing screens.  
1064  
1065 (vii) Controls. Cleaning operation shall be controlled by one or several of the  
1066 following methods.  
1067  
1068 (A) Timers. A timer to start the cleaning operation, and a device to  
1069 stop the cleaning operation after one cycle.  
1070  
1071 (B) Differential head. Cleaning device starts and stops on differential  
1072 head across screen.  
1073  
1074 (C) High level switch. Cleaning device starts on high level and runs  
1075 for predetermined length of time.  
1076  
1077 All screens shall have manual override capability. All controls shall be suitable for use in  
1078 hazardous location (National Electrical Code, Class 1, Groups C and D, Division 1 locations).  
1079  
1080 (viii) Handling. Screenings receptacles shall be designed to contain a  
1081 minimum of one day's screenings. Manually cleaned bar screens shall include an easily  
1082 accessible and safe working platform. All handling areas should be well drained.  
1083  
1084 (ix) Disposal. Screenings shall be disposed of in a manner approved by the  
1085 Department of Environmental Quality, Solid Waste Management section. Grinding of screenings  
1086 and return to the wastewater flow is not acceptable.  
1087  
1088 (c) Comminutors.  
1089  
1090 (i) Location. When used, comminutors shall be located downstream of a  
1091 coarse screen. Where grit removal is provided, comminutors shall be located downstream.  
1092  
1093 (ii) Capacity. Comminution or screening capacity shall be adequate with the  
1094 largest comminutor out of service.  
1095  
1096 (iii) Number of units. Wherever comminutors are used, a bypass, manually  
1097 cleaned bar screen shall be installed.  
1098  
1099 (iv) Channel. Provide stop plates or similar devices to permit isolating a  
1100 comminutor for maintenance. Provide drainage and washdown facilities. Where grit removal is  
1101 not provided upstream, provide a gravel trap upstream of each comminutor.  
1102  
1103 (v) Bypass. An emergency bypass with a manually cleaned bar screen shall  
1104 be provided. All flow exceeding the operating capacity of the comminutor(s) shall be  
1105 automatically directed to the emergency bypass.  
1106

1107 (vi) Controls. The comminutor shall run continuously. All electrical controls  
1108 shall be NEC Class 1, Groups C and D, Division 1 rated.  
1109  
1110 (d) Grit removal and disposal.  
1111  
1112 (i) Where required. Grit removal shall be provided either by providing for  
1113 its accumulation in other process units or by removal in a specially designed basin. Where  
1114 accumulation is provided in other process units, duplicate units shall be provided to permit  
1115 removal of grit.  
1116  
1117 (ii) Location. Grit removal shall be placed after bar screens or racks, but  
1118 before comminutors and other treatment units. Where grit removal facilities can be located at  
1119 grade, they shall be upstream of raw sewage pumping stations. Grit basins may be located  
1120 outdoors with proper precautions against freezing, but all grit conveying, washing and handling  
1121 facilities shall be located indoors.  
1122  
1123 (iii) Capacity. Grit removal devices shall be designed to effectively remove  
1124 grit at the peak instantaneous flow rate. The grit handling capacity shall be a minimum of 15  
1125 cubic feet per million gallons (1.12 m<sup>3</sup>/10,000 m<sup>3</sup>).  
1126  
1127 (iv) Number of units. A minimum of one mechanically cleaned unit and a  
1128 bypass pipe or channel shall be provided for plants serving separate sewers. Five hundred  
1129 thousand gallons per day (500,000 gpd) (1891.5 m<sup>3</sup>/d) plants or smaller may have a manually  
1130 cleaned unit and bypass. Plants larger than 1.0 mgd (3784 m<sup>3</sup>/d), shall have two mechanically  
1131 cleaned units with capability to isolate each one.  
1132  
1133 (v) Type.  
1134  
1135 (A) Aerated.  
1136  
1137 (I) Air requirements. Air supply must be controllable and  
1138 capable of varying from 10 to 40 cfm/1,000 cubic feet (10 to 40 m<sup>3</sup>/m/1,000 m<sup>3</sup>) of basin. Air  
1139 diffusers shall be located above the tank bottom and positioned for adequate mixing.  
1140  
1141 (II) Equipment requirements. The tank shall be sized for a  
1142 three minute retention time at peak flows. Grit shall be collected to a hopper for removal by 60 or  
1143 greater sloped sides or mechanical equipment. The inlet and outlet shall be designed to avoid  
1144 shortcircuiting. Air diffusers shall be removable without taking the basin out of service.  
1145  
1146 (B) Gravity chamber. Horizontal channel grit basins shall have an  
1147 outlet control weir and specially shaped channel to maintain velocities from 0.8 to 1.3 fps (0.24 to  
1148 0.4 m/s) over the anticipated range of flows. Square basins shall be designed for an overflow rate  
1149 of 30,000 gpd/sq ft (1220 m<sup>3</sup>/m<sup>2</sup>/d) at the peak instantaneous flow rate.  
1150  
1151 (vi) Method of grit removal. Grit removal facilities located in pits six feet  
1152 (1.8 m) or deeper and for plants larger than 500,000 gpd (1891.5 m<sup>3</sup>/d) shall be provided with  
1153 mechanical equipment for moving grit to ground level.  
1154

1155 Plants having an average design capacity less than 100,000 gpd (378 m<sup>3</sup>/d) may be  
1156 provided with manually cleaned grit basins.

1157  
1158 (vii) Drains. Each unit in the grit facility shall be capable of being dewatered.

1159  
1160 (viii) Grit disposal. Grit disposal methods shall be approved by the Department  
1161 of Environmental Quality, Solid Waste Management Office.

1162  
1163 **Section 13. Primary Treatment.**

1164  
1165 (a) Sedimentation.

1166  
1167 (i) Number of basins. For plants having an average design capacity greater  
1168 than 100,000 gpd (378.4 m<sup>3</sup>/d) and where primary settling is provided, multiple units capable of  
1169 independent operation shall be provided.

1170  
1171 (ii) Design parameters.

1172  
1173 (A) Performance. Unless full-scale data is available, primary settling  
1174 shall be assumed to remove one third of the influent BOD and 55 percent of the influent  
1175 suspended solids. It is unacceptable to return waste activated sludge to the primary clarifier.

1176  
1177 (B) Water depth. The minimum side water depth shall be seven feet  
1178 (2.1 m).

1179  
1180 (C) Surface overflow rates. Surface overflow rates shall not exceed  
1181 1,000 gpd/sq ft (41 m<sup>3</sup>/m<sup>2</sup>d) of surface area at the average design flow nor 1,500 gpd/sq ft (61  
1182 m<sup>3</sup>/m<sup>2</sup>d) of surface area at the maximum day flow rate. Maximum day flow is the highest flow  
1183 over a 24 hour period that is projected to occur during the design year.

1184  
1185 (D) Weir loading rates. Circular basins (or basins with center inlets)  
1186 shall be provided with a full periphery weir. Rectangular basins shall be provided with end weirs  
1187 that provide less than 80,000 gpd/ft (9,920 m<sup>3</sup>/m d) weir hydraulic loading at peak instantaneous  
1188 flow rates.

1189  
1190 (iii) Clarifier inlet and outlet.

1191  
1192 (A) General. Clarifier inlet structures shall be designed to achieve the  
1193 following:

1194  
1195 (I) Dissipate the inlet kinetic energy.

1196  
1197 (II) Distribute the flow evenly into the tank.

1198  
1199 (III) Prevent short circuiting.

1200  
1201 Inlet channels or piping shall be designed for minimum velocities of one fps (0.3 mps).  
1202 Where minimum velocities are less, mixing, flushing or other means of resuspending solids shall  
1203 be provided.

1204 Circular basins shall be provided with symmetrical baffling to distribute flow equally in  
1205 all radial directions.

1206  
1207 Rectangular basins shall be provided with inlet parts uniformly distributed along the  
1208 entire end of the basin and shall be provided with baffles.

1209  
1210 (B) Weirs. Weir plates shall be adjustable for leveling and sealed  
1211 against the effluent channel.

1212  
1213 (C) Baffles. Provide scum baffles at the water surface to intercept all  
1214 floating materials and scum prior to the weir. Baffles should extend three inches (7.6 cm) above  
1215 the weir plate elevation and eight inches (20.3 cm) below the water surface.

1216  
1217 (D) Clarifier effluent channel.

1218  
1219 (I) Size. The effluent channel shall be sized to prevent weir  
1220 submergence at the peak hourly flow.

1221  
1222 (E) Freeboard. The outer walls of sedimentation tanks shall extend at  
1223 least six inches (0.15 m) above the surrounding ground and shall provide at least 12 inches (0.3  
1224 m) of freeboard to the water surface. Where basin walls do not extend four feet (1.2 m) above the  
1225 surrounding ground, a fence or suitable barrier to prevent debris from entering the basin shall be  
1226 provided.

1227  
1228 (F) Basin equipment and access. Provide walkways and accessways  
1229 to collector drive units, effluent launders and manual skimmer. Handrail shall be provided.

1230  
1231 (b) Fine screens.

1232  
1233 (i) Number of units. A minimum of two units shall be provided. Multiple  
1234 units shall be capable of independent operation. With the largest unit out of service, the remaining  
1235 units shall be capable of passing the peak flow rate.

1236  
1237 (ii) Flow distribution. Positive means of flow distribution shall be provided  
1238 ahead of the screens to ensure even loading and hydraulic flows.

1239  
1240 (iii) Design parameters.

1241  
1242 (A) Performance. In the absence of pilot plant data, the removal  
1243 efficiency of fine screens shall be assumed to be zero percent removal of BOD<sub>5</sub> and 15 percent  
1244 removal of suspended solids.

1245  
1246 (B) Preliminary treatment requirement. Prior to the fine screens,  
1247 removal of large debris shall be provided by coarse screens. Comminution shall not be provided  
1248 ahead of screens.

1249  
1250 (iv) Screenings storage and disposal. Screens with openings of 0.10 inch (2.5  
1251 mm) or more shall be disposed of directly to landfill in accordance with the requirements of the  
1252 Department of Environmental Quality, Solid Waste Management Office. Screens with openings

1253 less than 0.10 inch (2.5 mm) shall discharge the screenings (primary sludge) to sludge handling  
1254 system for organic stabilization.

1255  
1256 (v) Cleaning and maintenance. Provide facilities to permit regular cleaning  
1257 of screens with a high pressure, hot water or steam system.

1258  
1259 (vi) Controls. For rotating screens, each screen or series of screens shall be  
1260 provided with an overflow. An alarm shall be provided when overflowing.

1261  
1262 (c) Sludge handling.

1263  
1264 (i) Sludge removal. Mechanical sludge collection equipment is required for  
1265 all primary settling basins. The sludge collection rake arms or flights and the drive assembly shall  
1266 be designed to withstand the maximum anticipated loads and move sludge to the hopper.

1267  
1268 (ii) Scum removal. Provide scum collection and removal facilities for all  
1269 primary settling basins. Scum shall be removed from the liquid process and not returned.

1270  
1271 (iii) Sludge hopper. The minimum side slope of the hopper shall be 1.7  
1272 vertical to 1.0 horizontal. Hopper bottoms shall have a maximum dimension of two feet (0.61 m).  
1273 The sludge removal pipe shall be flush with the hopper bottom, and have a minimum diameter of  
1274 six inches (15.2 cm).

1275  
1276 (iv) Scum box. The scum box shall be located outside and immediately  
1277 adjacent to the scum collection point (beaching plate). The beaching plate shall be located on the  
1278 opposite side of the basin from the prevailing wind. Provide for mixing the contents of the scum  
1279 box, such as a mechanical mixer or air diffusion. Provide access and wash water for washing the  
1280 scum box.

1281  
1282 (v) Controls.

1283  
1284 (A) Primary settling sludge facilities. Primary sludge and scum shall  
1285 be removed using positive displacement pumps. Each basin shall have a separately activated and  
1286 controlled pump. (The standby pumps may be shared by more than one basin.) Pumps shall be on  
1287 timers and the pumps should be designed to initiate sludge removal two or more times per hour.

1288  
1289 Include devices on the primary sludge piping for sampling the primary sludge flow.

1290  
1291 (B) Primary screen sludge facilities. Where sludge pumping is  
1292 provided, include a means to shut off the pump when insufficient material is being supplied to the  
1293 pump suction. The controls for the pump shall be designed to match the pumping rate to quantity  
1294 of sludge. Where conveyors are used, they shall run continuously and alarm when off.

1295  
1296 **Section 14. Activated Sludge.**

1297  
1298 (a) Pretreatment. Where primary clarification is not provided, screening of the raw  
1299 sewage to remove debris larger than 3/4 inch (1.9 cm) shall be provided. The screened material  
1300 shall not be returned to the plant process. Where primary clarifiers are not provided, cleanouts,  
1301 grinders, or other similar provisions shall be made in the return sludge piping.

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(b) Loading rates. Activated sludge systems shall be designed to accommodate peak day loadings at the design year. Permissible loadings are presented in the following table. Where raw sewage BOD5 is less than 200 mg/L, detention times may be reduced.

(i) Conventional, including complete mix, plug flow, step aeration

		<u>Average Day</u>
<u>Detention (*) hrs,</u>	Following primary clarifiers	6 minimum
	Without primary clarifiers	9 minimum
<u>Organic Loading:</u>	lb/1,000 cu ft/day (kg/1000 m <sup>3</sup> d)	35 maximum (560)
<u>MLSS, mg/L</u>		1,000 - 3,000

(ii) Contact stabilization.

<u>Detention (*) hrs,</u>		
Contact Zone		0.5 - 3
Sludge Stabilization Zone		6 minimum
		<u>Average Day</u>
<u>Organic Loading (**)</u>	lb/1,000 cu ft/day (kg/1000 m <sup>3</sup> d)	50 (800)
<u>MLSS, mg/L</u>		
Contact Zone		1,000 - 3,000
Sludge Stabilization Zone		5,000 - 10,000

(iii) Extended aeration, including oxidation ditch.

<u>Detention (*) hrs,</u>		16 minimum
<u>Organic Loading,</u>	lb/1,000 cu ft/day (kg/1000 m <sup>3</sup> d)	15 maximum (240)
<u>MLSS, mg/L</u>		1,000 - 3,000

(\*) Based on average day raw sewage flow rate exclusive of recirculation flow.

(\*\*) Based on contact zone and sludge stabilization zone combined.

(c) Number of basins. For all design average flows in excess of 0.1 mgd (378 m<sup>3</sup>/d), two or more aeration basins shall be provided. For flows less than 0.1 mgd (378 m<sup>3</sup>/d), one aeration basin may be provided if the aeration devices can be readily removed while the basin is in operation.



1351 (d) Configuration. The basin configuration shall promote mixing, transfer of oxygen,  
1352 and minimize stagnant zones.

1353  
1354 (e) Freeboard. The walls of the aeration shall extend above the normal water surface  
1355 to provide a minimum freeboard as follows:

	Minimum Freeboard (*)	
	inches	cm
1359 Diffused air	18	45.7
1360 Surface aeration	48	121.9
1361 Submerged turbine	18	45.7
1362 Brush aeration, less than 10 feet from aeration device	48	121.9
1363 Brush aeration, 10 feet or more from aeration device	18	45.7
1364 Surface aeration, where aeration 1365 is 30 or more feet from basin wall	36	91.40

1366  
1367 (\*) Vertical walls. For sloped walls, the runup effect shall be considered.

1368  
1369 (f) Inlet and outlet conditions. Inlets may be submerged and shall be baffled or  
1370 directed away from the outlet to minimize shortcircuiting. Outlets shall be of the overflow type to  
1371 discourage buildup of foam and floatables on the aeration basins. Pipe and channels shall provide  
1372 a minimum velocity of 0.5 fps (0.15 m/s).

1373  
1374 (g) Aeration requirements.

1375  
1376 (i) Carbonaceous BOD<sub>5</sub>. When it can be shown that nitrification will not  
1377 occur in the activated sludge process, the aeration devices may be sized to meet only the  
1378 carbonaceous oxygen demand. The oxygen provided by the aeration device shall be selected to be  
1379 adequate for the projected maximum day loading. In the absence of other data, an oxygen  
1380 requirement of two times the average design day BOD<sub>5</sub> to the aeration basin shall be used.

1381  
1382 (ii) Nitrification. Where nitrification is required to meet the effluent  
1383 requirements or where the process cannot be operated to prevent nitrification, the aeration  
1384 requirements will be selected to provide oxygen for both carbonaceous BOD<sub>5</sub> and nitrification on  
1385 the projected maximum day loading. In the absence of other data, an oxygen requirement of two  
1386 times the average design day BOD<sub>5</sub> plus 7.5 times the average day ammonia nitrogen to the  
1387 aeration basin shall be used.

1388  
1389 (iii) Minimum dissolved oxygen. Oxygen supply shall be selected to transfer  
1390 the design quantity during the maximum day loading while maintaining an aeration basin  
1391 dissolved oxygen of 2.0 mg/L. The oxygen supply shall be designed for the specific site  
1392 considering all factors that affect oxygen transfer efficiency.

1393  
1394 (h) Mechanical aeration. Mechanical surface aerators shall be designed to maintain  
1395 all organics in suspension, enhance the oxygen transfer capability of the unit, and minimize mist  
1396 and spray that escape the basin. Drive units shall be protected from freezing mist and spray.

1397  
1398 (i) Diffused aeration.

1399

1400 (i) Diffuser requirements. The number and location of diffusers shall be  
1401 selected to distribute the design air quantity for efficient aeration and mixing. Diffusers in a basin  
1402 shall be grouped on control valves to permit varying the air supply to different parts of the basin.  
1403 Oxygen transfer efficiencies used for design purposes shall be conservatively selected, based on  
1404 experimentally determined transfer rates of generically similar diffusers. The effect of  
1405 transferring oxygen to wastewater, in lieu of water, and the effect of altitude shall be considered.  
1406 The aeration basin mid-depth shall be used to determine the oxygen saturation concentration.  
1407 Differential head loss to individual diffuser inlets shall not be more than 0.2 psi (14 gm/cm<sup>2</sup>).  
1408

1409 (ii) Blower requirements. Blowers shall be sized to provide the air  
1410 requirements for the aeration basins and other plant uses of low pressure air. The inlet air to the  
1411 blowers shall be filtered or otherwise conditioned to effectively remove dust and other particulate  
1412 material. Removal of particulate material for fine bubble diffusers shall be designed for 95  
1413 percent of 0.3 micron. Filters designed for blowers shall be easily replaceable. Blower intakes  
1414 shall be located to avoid clogging from drifting snow. Blowers shall be housed. The housing shall  
1415 be ventilated to prevent more than a 15° F (8° C) temperature rise with all blowers operating,  
1416 excepting the standby blower. The housing, blowers, and blower piping shall be arranged to  
1417 permit removal of individual blowers while all other blowers are operating. Noise attenuating  
1418 materials shall be used in the building interior. Blower systems shall be designed to permit  
1419 varying the volume of air delivered. Blower motors shall be of a size to operate the blower  
1420 throughout the range of ambient air temperatures experienced at the plant site.  
1421

1422 (j) Sludge recirculation and waste.  
1423

1424 (i) Rates. Sludge recirculation from the secondary settling basin to the  
1425 aeration basin shall be variable within 25 to 100 percent of the average design flow. Sludge  
1426 wasting from the activated sludge process may be from the mixed liquor or the return sludge.  
1427 Sludge wasting shall be variable to enable wasting ½ of the total system solids in one day to zero  
1428 wasting.  
1429

1430 (k) Equipment requirements.  
1431

1432 (i) Return sludge. Return sludge pumping shall be variable. The return  
1433 sludge rate from each secondary settling unit and the rate to each aeration basin shall be  
1434 controllable. Pumps shall be housed in heated, ventilated space. The pump floor shall be sloped  
1435 and drained. Valves shall permit isolating each pump. Pumps and piping shall be arranged to  
1436 allow ready removal of each pump. Check valves shall be provided where backflow through the  
1437 pump could occur. Check valves shall be located in the horizontal.  
1438

1439 Pump suction and discharge shall be three inches (7.6 cm) minimum. Sludge piping shall  
1440 be four inches (10.2 cm) or larger. Cleanouts and couplings shall be provided in sludge piping to  
1441 enable cleaning the pipe or to remove pumping equipment. All pipe high points shall be provided  
1442 with air releases. All sludge piping shall be metallic material. Should air lift pumps be used, the  
1443 units shall be designed with a minimum of 80 percent static submergence.  
1444

1445 (ii) Waste sludge. If separate waste sludge pumps are provided, the rate shall  
1446 be controlled by timers or variable speed devices. Pumping units shall be housed in heated,  
1447 ventilated space, with sloped and drained floors. Pump suction and discharge piping shall be three  
1448 inches (7.6 cm) minimum. Sludge piping shall be four inches (10.2 cm) or larger, except short,

1449 easily removable sections that may be required to maintain velocities above one fps (0.3 mps), or  
1450 for use in conjunction with meters.

1451

1452 (l) Metering.

1453

1454 (i) Return sludge. For treatment plants having an average day design  
1455 capacity greater than 100,000 gpd (378 m<sup>3</sup>/d) the return sludge flow rate from each secondary  
1456 settling unit and to each aeration basin shall be metered to indicate flow rate. Return sludge  
1457 metering devices shall be suitable for liquids carrying grease and solids, and shall be accurate to  
1458 within ±5 percent of the actual flow rate. Meters shall be readily field calibrated by plant  
1459 personnel. Meters shall be arranged to avoid trapping air.

1460

1461 (ii) Waste sludge. For treatment plants having an average day design  
1462 capacity greater than 100,000 gpd (378 m<sup>3</sup>/d), waste sludge flows shall be metered to indicate and  
1463 totalize. Waste sludge meters shall meet the requirements described for return sludge meters.

1464

1465 (iii) Air flow. Low pressure air used for basin aeration and other plant uses  
1466 shall be metered. Separate meters shall be used to indicate the flow rate to each aeration basin and  
1467 to the ancillary uses made of the low pressure air. Indicators shall be located near the device used  
1468 to control the air flow rate. Pressure gages shall be provided immediately downstream from each  
1469 blower and immediately upstream of each aeration basin.

1470

1471 (m) Controls. Facilities for control shall be provided for:

1472

1473 (i) Control of flow split between parallel process units.

1474

1475 (ii) Control of return sludge flow rate to each aeration basin.

1476

1477 (iii) Control of waste sludge quantity.

1478

1479 (iv) Control of air flow rate to each aeration basin.

1480

1481 (v) Control of air distribution to different zones in aeration basin.

1482

1483 (vi) Control of energy imparted with mechanical aeration. Facilities for  
1484 control shall include a meter or device to measure rate and a device to change the rate such as a  
1485 valve or adjustable weir.

1486

1487 (n) Prefabricated treatment units. Prefabricated activated sludge units shall conform  
1488 to the applicable requirements described.

1489

1490 (o) Ancillary facilities. Adequate nonpotable washdown water shall be provided  
1491 around the aeration basins sludge pumping area and secondary settling basins. Sampling ports,  
1492 pipes or other access shall be provided on aeration basin inlets, return sludge piping, waste sludge  
1493 piping and secondary settling basins. Hoisting or other means of equipment removal shall be  
1494 provided. All subgrade floors shall be drained.

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**Section 15. Attached Growth Systems.**

(a) Pretreatment and primary treatment requirements. Attached growth systems shall be preceded by primary settling or fine screening. If fine screening is provided, the screen size shall have 0.06 inch (1.5 mm) or smaller openings.

(b) Trickling filters.

(i) Loading rates. Applied organic loading rates on trickling filters, where not used in series with activated sludge, shall be limited to:

	<u>Applied Liquid Rate</u>		<u>BOD Loading*</u>	
	<u>to Surface of Filter</u>			
	(gpm/sf)	(lpm/m)	(lb/1000ft <sup>3</sup> /d)	(kg/1000 m <sup>3</sup> /d)
Rock Media	0.1	4.07	10	160
	0.2	8.15	12	192
	0.3	12.22	16	256
Plastic or Redwood Media			20	320

\*For more than a one-stage trickling filter, the volume of all stages shall be used.

(ii) Recirculation. Recirculated flow to stationary media attached growth systems shall be provided. Recirculated flow shall be sufficient to provide the following minimum wetting rates:

Media	Minimum Wetting Rate	
	(gpm/sf)	(lpm/m <sup>2</sup> )
Rock	0.1	4.07
Plastic or redwood	0.75	30.5

(iii) Media. Media may be rock or specially manufactured material made of redwood or plastic. Rocks shall be durable and free from thin, elongated, flat pieces and should have the following size distribution:

Passing 6-inch (15.2 cm) screen	100% by weight
Retained on 4-inch (10.2 cm) screen	95 - 100% by weight

Fabricated media shall be resistant to ultraviolet degradation, disintegration, erosion, aging, all common acids, alkalies, organic compounds, fungus and biological attack. Media shall be capable of supporting a man's weight.

(iv) Flow distribution. Wastewater shall be applied to stationary media by a rotary distributor or a fixed nozzle distribution system that provides uniform distribution. Flow distribution between multiple units of stationary or rotating media systems shall be by weirs, meters and valves, or other positive flow split device.

1545 (v) Depth of media. Rock trickling filters depth shall be between 5 to 10 feet  
1546 (1.52 to 3.04 m), and manufactured media filter depth shall be between 10 to 30 feet (3.05 to 9.15  
1547 m).

1548 (vi) Underdrain system. The underdrainage system shall cover the entire floor  
1549 of the filter. Inlet openings into the underdrains shall have an unsubmerged gross combined area  
1550 equal to at least 15 percent of the surface area of the filter. Underdrains shall have a minimum  
1551 slope of one percent.

1552  
1553 Effluent channels shall be designed to maintain minimum velocity of two feet per second  
1554 (0.61 mps). Drains, channels and pipe shall be designed to have maximum depth flow of 50  
1555 percent.

1556  
1557 (vii) Flushing. Provide valves and structurally capable walls to permit  
1558 flooding rock media filters. Access shall be provided around the periphery of the underdrain  
1559 system to allow flushing the underdrains.

1560  
1561 (viii) Freeboard. The clearance between rotating distributor and the media  
1562 shall be at least 18 inches (0.46 m). The surrounding wall shall extend 2.5 feet (0.76 m) above the  
1563 distributor.

1564  
1565 (ix) Ventilation. All trickling filters shall be provided with ventilation  
1566 openings to the underdrain. Ventilation openings will be provided with dampers or other  
1567 adjustable devices to permit adjusting the ventilation rate opening. Ventilation openings shall be a  
1568 minimum of eight square feet (0.74 m<sup>2</sup>) per 1,000 lb (454 kg) BOD<sub>5</sub>/day.

1569  
1570 Forced ventilation providing 4,000 cfm (113 m<sup>3</sup>/min) per 1,000 lb (454 kg) BOD<sub>5</sub>/day  
1571 shall be provided for covered filters.

1572  
1573 (c) Rotating biological contactors (RBC).

1574  
1575 (i) Loading rates. The organic loading rate on the first stage of an RBC shall  
1576 be limited to 140 lb BOD<sub>5</sub>/1,000 cu ft (2240 kg/1,000 m<sup>3</sup>) of media per day. The organic loading  
1577 rate on all stages of an RBC shall be limited to 45 lb/1,000 cu ft (720 kg/1,000 m<sup>3</sup>) of media for  
1578 media having a specific surface area of 35 sq ft per cu ft (114.8 sq m/m<sup>3</sup>). When more than ½ of  
1579 the media has a specific surface area of 50 sq ft per cu ft (164 sq m/m<sup>3</sup>), the organic loading may  
1580 be increased to 50 lb/ 1,000 cu ft (800 kg/1,000 m<sup>3</sup>).

1581  
1582 (ii) Number of stages. Rotating biological contactors shall be designed with  
1583 a minimum of three stages in series. Baffles shall be provided between stages.

1584  
1585 (iii) Velocities. The rotational speed of the contactors shall be designed to  
1586 maintain at least two mg/L of dissolved oxygen in each stage at designed loading rates. Drive  
1587 units shall provide a rotational speed of one rpm or more.

1588  
1589 (iv) Draining. Provide drains from each contactor basin.

1590  
1591 (v) Media materials. Media materials shall be special manufactured material  
1592 suitable and durable for the rotating biological contactor process. Media shall be resistant to  
1593 disintegration, ultraviolet degradation, erosion, aging, all common acids, alkalies, organic com

1594 pounds, fungus, and biological attack. Media shafts shall be designed for unbalanced loads and  
1595 cycle fatigue.

1596  
1597 (vi) Housing. The housing for the RBC'S shall be designed with openings or  
1598 access to allow removal and replacement of entire shafts.

1599  
1600 **Section 16. Combination systems.**

1601  
1602 When more than one type of biological treatment process is used in series, the removal  
1603 through each biological unit shall be calculated as if it were acting alone. No symbiotic effect will  
1604 be included in the design calculation.

1605  
1606 Pretreatment requirements for combinations of biological systems will be the same as for  
1607 attached growth systems. Final settling and sludge handling will be the same as for activated  
1608 sludge systems.

1609  
1610 **Section 17. Secondary settling.**

1611  
1612 (a) Secondary settling. Secondary settling is required after suspended growth and  
1613 attached growth biological processes such as activated sludge, trickling filters and RBC's.

1614  
1615 (b) Configuration. The largest dimension (either diameter or length) of a clarifier  
1616 shall be 80 feet (24.4 m). Corner sweeps on circular equipment are not acceptable.

1617  
1618 (c) Flow distribution. Positive flow splitting shall be provided ahead of multiple  
1619 sedimentation basins to ensure proportional hydraulic flows and solid loadings to each basin.  
1620 Flow splitting shall be achieved using positive means such as weirs or valves and meters.

1621  
1622 (d) Clarifier inlet and outlet structures.

1623  
1624 (i) Clarifier inlet structures shall be designed to dissipate the:

1625  
1626 (A) Inlet kinetic energy.

1627  
1628 (B) Distribute the flow evenly into the basin.

1629  
1630 (C) Minimize hydraulic turbulence.

1631  
1632 (D) Prevent short circuiting.

1633  
1634 Inlet devices that promote flocculation are encouraged.

1635  
1636 The inlet structure for rectangular tanks shall be the full width of the basin, for peripheral  
1637 feed clarifiers it shall be the entire periphery, and for center feed basins it shall be at least  
1638 20 percent of the tank diameter. Baffled scum relief ports shall be provided between the inlet  
1639 structure and the clarifier.

1640

1641 (ii) Inlet conveyance pipe or channels shall be designed to maintain a  
 1642 minimum velocity of 0.5 fps (0.15 mps) at the design flow. Where channels provide less velocity,  
 1643 provide mixing, flushing, or other means of resuspending solids.

1644  
 1645 (iii) Clarifier outlet systems shall be designed to minimize vertical velocities  
 1646 and reduce the effect of density currents at the effluent weir. Weir level shall be adjustable.

1647  
 1648 (e) Freeboard. The outer walls of settling tanks shall extend at least six inches (0.15  
 1649 m) above the surrounding ground and provide at least 12 inches (0.3 m) of free board to the water  
 1650 surface. Where settling basin walls are less than four feet (1.22 m) above the surrounding ground,  
 1651 a fence or other debris barrier shall be provided on the wall.

1652  
 1653 (f) Design parameters.

1654  
 1655 (i) Surface overflow rates.

1656  
 1657 (A) Activated sludge. Settling basins following an activated sludge  
 1658 process shall be designed to both thicken the sludge and clarify the liquid flow entering the tanks.  
 1659 The overflow rate shall not exceed:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1661 Activated Sludge	600	24.4	1,200	8.8
1662 Separate				
1663 Nitrification	400	16.3	800	32.5

1664  
 1665  
 1666  
 1667 (B) Attached growth biological reactors. Overflow rates for settling  
 1668 basins following attached growth processes shall not exceed:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1670 Trickle Filters				
1671 and RBC's	800	32.5	1,200	48.8

1672  
 1673  
 1674  
 1675 (ii) Solids loadings. Solids loadings for settling basins following an activated  
 1676 sludge process shall not exceed:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1678 All Activated				
1679 Sludge Processes	28	136.7	50	244.1
1680 Separate				
1681 Nitrification	25	122.1	40	195.3

1682  
 1683  
 1684  
 1685 (iii) Side water depth. Settling basins shall be deep enough to provide  
 1686 adequate distance between the sludge blanket and the effluent weirs to avoid disturbance of  
 1687 settled sludge.

1688

1689 The volume of the settling basin shall provide a minimum detention time of two hours at  
 1690 peak hourly flow rate. The peak hourly flow is the projected maximum flow over a one hour  
 1691 period during the design year. Peak hourly flow shall include all recycle flows entering clarifier.  
 1692

1693 (iv) Weir overflow rates and placement. Weir loading rates shall not exceed the  
 1694 following values:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1697 Launder and weir at 1698 outer wall	12,000	149	20,000	248
1699 Launder and weir at 1700 3/4 point of radius or less	18,000	223	36,000	446

1702  
 1703 Where double weirs or serpentine type weirs are used, the weir length shall be computed  
 1704 as the length of the centerline of the launder.  
 1705

1706 (g) Baffles. Baffles shall be located at the water surface and in such a position as to  
 1707 intercept all floating materials (scum) prior to the weirs. Baffles shall extend three inches (7.6  
 1708 cm) above the weir level and 12 inches (0.3 m) below the water surface. In circular basins, the  
 1709 baffle shall be a minimum of six inches (0.15 m) inside the weir plate. In rectangular basins, the  
 1710 baffle shall extend across the width of the basin and upstream of the effluent weirs.  
 1711

1712 (h) Basin and equipment access. Walkways and access ways shall be provided to  
 1713 drive units, effluent launders, and manual scum devices.  
 1714

1715 (i) Sludge removal. Sludge collection and withdrawal equipment shall  
 1716 provide complete and continuous removal of settled sludge. Rapid sludge removal pipes shall  
 1717 return sludge to a well at the surface that enables visual observation of flow. Mechanical rakes  
 1718 shall move sludge to a hopper at the floor. The tip speed for circular mechanisms shall not exceed  
 1719 8 fpm (2.4 m/min) and straight line flight speed shall not exceed 1 fpm (0.3 m/min).  
 1720

1721 The return sludge removal pipes shall be at least four inches (10.2 cm) in diameter. The  
 1722 hydraulic differential between the clarifier water level and the return sludge level shall be  
 1723 sufficient to maintain a three fps (0.9 mps) velocity in each rapid return sludge withdrawal pipe.  
 1724 Each sludge withdrawal pipe shall be accessible for rodding or backflushing when the settling  
 1725 basin is in operation.  
 1726

1727 (ii) Scum removal. Provide effective baffling and scum collection and  
 1728 removal facilities for all secondary settling basins. Equipment shall include a mechanical, positive  
 1729 scum skimmer.  
 1730

1731 (iii) Sludge hopper. The minimum side slope of the hopper shall be 1.7  
 1732 vertical to 1.0 horizontal. Hopper bottoms shall have a maximum dimension of two feet (0.61 m).  
 1733 The sludge removal pipe should be flush with hopper bottom, and have a minimum diameter of  
 1734 six inches (0.15 m).  
 1735

1736 (iv) Scum box. Locate scum box outside settling tank and adjacent to the  
 1737 scum collection point. Provide method for mixing contents of scum box, such as air jets or



1738 surface wetting using waste sludge. Provide access and washwater for washing the scum box. The  
1739 scum box shall be located on the side of the tank opposite the prevailing wind direction.

1740  
1741

1742 **Section 18. Lagoons.**

1743

1744 (a) Design requirements.(ii) Wastewater loading rates.

1745

1746 (i) Location. Wastewater lagoons shall be located more than 500 feet (152  
1747 m) from existing habitations.

1748

1749 (A) Facultative. The primary cells of a facultative (non-aerated) pond  
1750 system shall be limited to a maximum BOD application of 40 lb/acre/day (44.8 kg/ha/d) at  
1751 average design loading conditions.

1752

1753 (B) Aerated. Aerated lagoons shall be designed for an organic  
1754 loading of less than 10 lb BOD /day/1,000 cu ft (160 kg/1,000 m<sup>3</sup>/d) for completely mixed  
1755 systems, and less than two lb BOD<sub>5</sub>/day/1,000 cu ft (32 kg/1,000 m<sup>3</sup>/d) for aerated non-  
1756 completely mixed systems. Aeration equipment shall be sized to maintain a minimum dissolved  
1757 oxygen of two mg/L. Completely mixed systems are mixed to provide 1/4 hp/1000 cu ft  
1758 mechanical mixing or 10 cfm/1000 cu ft of air mixing.

1759

1760 (C) Nonsurface water discharging ponds. Nonsurface water  
1761 discharging ponds shall be designed on the basis of a water balance that considers evaporation  
1762 and seepage. Water balance calculations shall be submitted with the plans and specifications. The  
1763 BOD<sub>5</sub> loading for non discharging ponds shall not exceed 14 lb/acre/day (15.7 kg/ha/d) based on  
1764 the average annual BOD<sub>5</sub>.

1765

1766 (iii) Detention. Facultative lagoons shall be designed for a minimum detention  
1767 time of 180 days.

1768

1769 The detention time in aerated lagoons shall be at least one and one half days for  
1770 completely mixed primary cells, and seven days for non-completely mixed primary cells.  
1771 Secondary cells shall increase the overall detention time to 30 days.

1772

1773 (iv) Storage. Nonsurface water discharging lagoons shall be designed to  
1774 provide sufficient storage to retain all wastewater and rainfall during the wettest year of record  
1775 during a ten year period of record. Seepage shall be controlled to maintain a minimum water  
1776 depth of two feet (0.6 m) in the primary cell during the driest occurring year of a ten year period.

1777

1778 (v) Inlet.

1779

1780 (A) Location. The inlet pipe to the primary cell of a facultative  
1781 lagoon shall be at least 30 feet (9.2 m) from any bank. It shall terminate at a point away from the  
1782 outlet by a distance of at least equal to or greater than 2/3 of the longest lagoon dimension. In  
1783 aerated systems, the influent line shall be located in the mixing zone of the aeration equipment.

1784

1785 (C) Apron. Provide a concrete apron at the inlet pipe termination  
1786 with minimum dimensions of four feet by four feet (1.2 m by 1.2 m).

1787  
1788 (D) Influent manhole. An influent man-hole shall be provided prior  
1789 to the lagoons. The influent pipe in the influent manhole shall be at least six inches (0.15 m)  
1790 above the normal operating water level of the primary lagoons.  
1791  
1792 (E) Flow distribution. Flow distribution for multiple primary cells  
1793 shall be provided to effectively split hydraulic and solids proportionately.  
1794  
1795 (vi) Inlet and outlet structures.  
1796  
1797 (A) Location. Inlet and outlet structures shall be easily accessible by  
1798 plant operators and located to minimize short circuiting within the cell. A level control structure  
1799 shall be provided at the outlet of each cell.  
1800  
1801 (B) Level control. Provide controls to permit varying water levels  
1802 between two feet and six feet (0.6 m to 1.8 m). Provide baffling at the outlet to prevent scum  
1803 overflow. Multiple draw offs in the final cell shall be provided. At least one shall be located at the  
1804 two foot (0.6 m) level.  
1805  
1806 (vii) Interconnecting piping.  
1807  
1808 (A) Location. Piping between lagoon cells shall connect to the  
1809 preceding cell outlet control structure and discharge into the subsequent cell. The pipe shall  
1810 discharge at least ten feet (3.05 m) from the toe of the slope on the lagoon bottom and shall  
1811 terminate on the concrete apron that is at least four feet by four feet (1.2 m by 1.2 m).  
1812  
1813 (B) Elevation. The piping shall discharge at the floor of the lagoon.  
1814  
1815 (C) Material. Interconnecting piping shall be any acceptable pipe  
1816 designed to resist low pressures and adequately protected from corrosion.  
1817  
1818 (b) Number of lagoons cells. A lagoon system with a total area greater than one acre  
1819 (0.4 ha) shall have at least three cells in series. Smaller systems and nondischarge pond systems  
1820 shall have at least two cells. The maximum size cell shall be 20 acres (8 ha).  
1821  
1822 (c) Lagoon configuration.  
1823  
1824 (i) Shape. Rectangular cells shall have a maximum length to width ratio of  
1825 5:1. No sharp corners nor dead-end coves are permitted.  
1826  
1827 (ii) Water depth. Facultative ponds shall be designed to have water depths of  
1828 not less than two feet, nor more than six feet (0.61 m to 1.8 m). Aerated lagoons shall be designed  
1829 to have water depths of not less than four feet nor more than 15 feet (1.2 m to  
1830 4.6 m).  
1831  
1832 (iii) Removal of lagoon cells from operation. Bypass piping for primary  
1833 lagoon cells and aerated lagoon cells shall be provided.  
1834

1835 (iv) Lagoon freeboard. A minimum freeboard of two feet (0.6 m) shall be  
1836 provided. Greater freeboard shall be provided for wave runup, where required.

1837  
1838 (d) Construction requirements.

1839  
1840 (i) Dike.

1841  
1842 (A) Material. Dikes and embankments shall be of relatively  
1843 impervious and stable material, and compacted to at least 95 percent of maximum density (ASTM  
1844 D698-78). Embankment fill shall be free from organic material, rock larger than six inches (15.2  
1845 cm) and construction debris. The area where the embankment is to be constructed shall be  
1846 stripped of vegetation and roots.

1847  
1848 (B) Top width. Dikes and embankments shall be constructed with  
1849 minimum top width of eight feet (2.4 m).

1850  
1851 (C) Slopes. Interior slopes shall be from three to four horizontal to  
1852 one vertical, and shall be stable under varying water level conditions. Interior slopes that are  
1853 surfaced with concrete paving or riprap may be constructed at slopes of two or more horizontal to  
1854 one vertical. Exterior slopes shall be three or more horizontal to one vertical and shall prevent the  
1855 entrance of surface water to the lagoon.

1856  
1857 (ii) Seeding. Exterior slopes and interior slopes that are not riprapped shall  
1858 be seeded with dryland grasses, unless another equivalent method for soil erosion control is  
1859 provided.

1860  
1861 (iii) Erosion control. Interior embankments except cells smaller than one acre  
1862 shall be protected from wave action with riprap, paving, or other erosion resistant material, unless  
1863 it is demonstrated that the ponds are sheltered from wind or where wind velocity is low and  
1864 erosion will not occur.

1865  
1866 (e) Lagoon sealing.

1867  
1868 (i) Lagoon sealing. The seepage through the pond bottom and side walls  
1869 shall not cause a violation of the groundwater standards as described in Chapter VIII (Quality  
1870 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
1871 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
1872 site conditions will not insure the protection of the groundwater for which it is classified.

1873  
1874 If the applicant cannot document that the facility poses no threat to groundwater and  
1875 elects not to perform a subsurface study in accordance with Chapter III, Section 15 (a) and (b),  
1876 then the groundwater shall be protected from contamination by the wastewater with a liner  
1877 equivalent to three feet (1 m) of soil having a permeability of 10<sup>-7</sup>cm/sec or less. When an  
1878 applicant performs a subsurface study, the requirements for the liner shall be determined based on  
1879 the results of the study and the groundwater protection required. In no instance shall the  
1880 maximum seepage rate exceed 1/8 inch per day (3.2 mm/day) in the primary pond(s).

1881  
1882 Following construction of the lagoons, but prior to startup, a testing program shall be  
1883 conducted to demonstrate the effectiveness of the sealing program. Should the testing program

1884 show the lagoon seal to be less effective than the above requirements, the seal shall be modified  
1885 and retested until it succeeds.

1886  
1887 (ii) Synthetic liners.

1888  
1889 (A) Material. Synthetic liners shall be essentially impervious. The  
1890 minimum lining thickness shall be 30 mils. The liner material shall be resistant to organic  
1891 materials typical of sewage. The liner shall be resistant to sunlight or shall be covered with 12  
1892 inches (30.5 cm) or more of soil at all locations including the lagoon bottom and side slopes.

1893  
1894 (B) Liner stabilization. Where the seasonal high groundwater is  
1895 above the bottom of the lagoon, the liner shall be stabilized to prevent it from rising.

1896  
1897 (C) Appurtenances. A leak detection system and/or air release  
1898 mechanism may be required.

1899  
1900 (f) Aerated systems.

1901  
1902 (i) Air requirements. Aerated ponds shall be designed to maintain 2 mg/L of  
1903 dissolved oxygen or more throughout the pond contents.

1904  
1905 (ii) Equipment requirements.

1906  
1907 (A) Number. Surface aerators shall be provided at intervals of 200  
1908 feet (61 m) or less. The lagoon shall be protected from erosion from the aeration equipment. At  
1909 least two surface aerators or brush aerators shall be provided. With the largest unit out, the  
1910 remaining units shall be capable of transferring the average day oxygen demand. Each diffused  
1911 aeration system shall be provided with at least two blowers. With the largest blower out of  
1912 service, the remainder shall be capable of supplying the design air flow rate.

1913  
1914 (B) Removal. All equipment shall be accessible and removable from  
1915 the edge of the lagoons. Provisions for dewatering shall be made for removal or repair of  
1916 diffusers.

1917  
1918 **Section 19. Tertiary treatment systems.**

1919  
1920 (a) Phosphorus removal.

1921  
1922 (i) Equipment requirements.

1923  
1924 (A) Flash mixing. Chemical addition points shall be at points of high  
1925 turbulence, such as Parshall flumes, hydraulic jumps, or separate mixing basins.

1926  
1927 (B) Flocculation. Inlet and outlet design shall prevent short circuiting  
1928 and turbulent destruction of floc. Minimum detention time shall be 20 minutes at the average  
1929 design flow rate.

1930  
1931 The velocity of flocculated water to settling basins shall be 0.5 to 1.5 fps (0.15 to 0.46  
1932 mps). Changes in direction shall be with long radius elbows or curved channels.

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(C) Chemical feed equipment. Storage shall be provided for at least 14 days of chemical supply. Liquid chemical storage tanks shall have a liquid level indicator, an overflow, and a receiving basin capable of holding 110 percent of the stored volume, or a drain capable of receiving accidental spills or overflows. Liquid chemical storage shall be provided with heat.

(b) Ammonia nitrogen reduction.

(i) Activated sludge. Ammonia nitrogen removal by activated sludge processes shall be designed with sludge retention time of at least 15 days and shall provide at least 16 hours of hydraulic detention time. Aeration requirements are described in Section 15.

(ii) Attached growth. Rock media trickling filters shall not be used for ammonia reduction. Fabricated media trickling filters used for ammonia shall be designed using a BOD loading of less than 14 lb/1000 cu ft (224 kg/1,000 m<sup>3</sup>) of media. Rotating biological contactors used for ammonia reduction shall be designed with hydraulic loadings less than 1.0 gpd/sq ft (40.7 L/m<sup>2</sup>/d) of media surface area. At least four stages shall be provided for ammonia nitrogen removal.

(iii) Lagoons. The design of facultative lagoons for ammonia removal shall provide a minimum detention of 180 days. Aerated lagoon systems may be designed for 160 days.

(c) Solids reduction.

(i) Filtration.

(A) Filtration rate. The maximum hydraulic loading for 24 inch (61 cm) or deeper media is 5 gpm/sq ft (292.5 m<sup>3</sup>/m<sup>2</sup>/d) of filter area. Filtration rates for shallower media shall be limited to 3gpm/sq ft (175 m<sup>3</sup>/m<sup>2</sup>d).

(B) Backwash requirements. Provide a minimum backwash rate of 20 gpm per square foot (1170 m<sup>3</sup>/m<sup>2</sup>/d) of filter bed for 24 inch (61 cm) or deeper media and 12 gpm/square foot (702 m<sup>3</sup>/m<sup>2</sup>/d) for shallower media; supply shall be filtered water. A rate of flow regulator on the main backwash line shall be provided. The total backwash water storage capacity shall be adequate for 20 minutes of continuous backwash.

Air scour or surface wash facilities are required. All surface wash devices shall be provided with a minimum flow rate of 0.5 gpm per sq ft (29.3 m<sup>3</sup>/m<sup>2</sup>d) water pressures of 50 psi (3.52 kg/cm<sup>2</sup>) or greater and use filtered water.

(C) Backwash waste handling and treatment. Waste filter backwash shall be collected in a surge tank and recycled to the treatment plant at a rate not to exceed ten percent of the average plant design flow rate. Waste backwash water may be returned to any point upstream of the biological treatment units.

1980 (D) Number of units. At least two units shall be provided. With one  
1981 filter out of service, the remaining filters shall be capable of passing the maximum day design  
1982 flow rate.

1983  
1984 (E) Controls. Controls should be provided to remove a filter from  
1985 service, backwash the filter, and return it to service. Where the control is automatic, there shall  
1986 also be a means of manually overriding the operating equipment, including each valve essential to  
1987 filter operation.

1988  
1989 In addition, the following shall be provided:

1990  
1991 (I) Sampling tap on filter influent and  
1992 effluent.

1993 (II) Indicating and recording loss of head gauge.

1994  
1995 (III) Flow rate indicating and control.

1996  
1997 (IV) Means for feeding polymer as a filter aid at a controlled  
1998 rate to filter influent water when chemically coagulated effluent is being filtered.

1999  
2000 (ii) Microscreens.

2001  
2002 (A) Pilot testing. Pilot plant testing on the fluid to be screened or  
2003 data from other similar applications to demonstrate the suitability of the proposed filter fabric,  
2004 fabric life, proposed loading rates, and other design criteria shall be provided.

2005  
2006 (B) Loading rates. Flow equalization facilities shall be included in  
2007 the design to moderate influent quality and flow variations.

2008  
2009 The screening rate shall be selected to be compatible with available pilot plant test results  
2010 and selected screen aperture, but shall not exceed 1.5 gpm/sq ft (87.8 m<sup>3</sup>/m<sup>2</sup>/d) for lagoon effluent  
2011 or 5 gpm/sq ft (292.5 m<sup>3</sup>/m<sup>2</sup>/d) for activated sludge or attached growth effluents based on the  
2012 maximum hydraulic flow rate applied to the units. The screening rate shall not exceed 0.75 lb/sq  
2013 ft/day (3.7 kg/ m<sup>2</sup>/day). The effective screen area shall be considered the submerged screen  
2014 surface area less the area of screen blocked by structural supports and fasteners.

2015  
2016 (C) Backwash requirements. The backwash water shall be at least  
2017 eight gpm/ linear foot (9 Lpm/m) of screen length at 60 psi (4.2 kg/cm<sup>2</sup> ), obtained from  
2018 microscreened effluent.

2019  
2020 (D) Controls. Each microscreen unit shall be provided with  
2021 automatic drum speed controls with provisions for manual override.

2022  
2023 (d) Rapid infiltration.

2024  
2025 (i) Wastewater preapplication requirements. Rapid infiltration shall be  
2026 preceded by settling or fine screening having 0.6 inch (1.5 mm) or smaller openings.

2027  
2028 (ii) Hydraulic loading rates.

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(A) Permeability. Hydraulic capacity of the rapid infiltration site shall be based upon soil permeability, basin infiltration tests, or cylinder infiltrometer tests. Design loading rates based on these tests shall be as follows:

Field Measurement	Annual Loading Rate
Basin infiltration test	10% of minimum measure rate
Cylinder infiltrometer	2% of minimum measured rate
Permeability	5% of conductivity of most restricting soil layer

(B) Precipitation. The total hydraulic load to the rapid infiltration basins includes precipitation. The one in ten year precipitation event should be used as the basis for design.

(C) Cold weather conditions. The design must recognize that drying rates, oxidation rates, nitrification and denitrification rates all decrease in cold weather. Cold weather loading rates shall be used to determined land requirements or cold weather storage shall be used. Provisions should be made to mow and disc basin surfaces in the fall to prevent ice from freezing the vegetation near the soil surface. Snow fences can be used to keep snow cover on the rapid infiltration basins to insulate the applied wastewater and soil.

(iii) Land requirements.

(A) Storage. A minimum of 14 days of storage shall be provided. Where applied sewage will be less than 4° C, 160 days of effluent storage shall be provided.

(B) Location. Rapid infiltration basins shall be located more than 500 feet (152 m) from existing habitation.

(iv) Basin size. Individual basin size shall not be greater than five acres (2.0 ha). Basin sizing should be based upon a maximum water depth of 12 inches (30.5 cm) in the rapid infiltration basins.

(v) Subsurface drainage. The capillary fringe above the groundwater mound shall not be closer than two feet (0.6 m) to the bottom of the infiltration basin. The distance to groundwater shall be at least five feet (1.5 m) below the soil surface within two days following wastewater application.

(vi) Groundwater monitoring. Refer to Chapter III, Section 15, of the regulations.

(e) Intermittent sand filters.

(i) Wastewater preapplications treatment requirements. Intermittent sand filters shall be preceded by settling or fine screens having 0.06 inch (1.5 mm) or smaller openings.

2074 (ii) Hydraulic loading rates. The maximum application rates shall be limited  
2075 to:

2076  
2077  
2078  
2079

	Maximum Application Rate	
Source	gallons/acre/day	(m <sup>3</sup> /ha/d)
2081 Primary Effluent	130,000	(200)
2082 Secondary Effluent	400,000	(611)
2083 Lagoon Effluent	300,000	(458)

2084

2085 (iii) Media. The minimum sand depth shall be 24 inches (0.6 m). The sand  
2086 must be free of cementing materials and clay or loam. The sand should have an effective size of  
2087 not less than 0.2 mm and not greater than 0.5 mm, and a uniformity coefficient of less than 5.  
2088

2089

2090 Clean graded gravel shall be placed around the under drains and to a depth of at least 12  
2091 inches (0.3 m) over the top of the underdrains.

2092

2093 (iv) Underdrains. All intermittent sand filters shall be provided with  
2094 underdrains. Underdrains shall be at least four inches (10.2 cm) in diameter. The under-drain pipe  
2095 shall have a minimum slope of 5 feet per 1,000 feet (5 m/1,000 m).

2096

2097 The groundwater shall be at least two feet (0.6 m) below the bottom of the underdrain pipe.

2098

2099 (v) Number of units. Three or more filters shall be provided.

2100

2101 (vi) Dosing.

2102

2103

2104 (A) In each dosage of an intermittent filter, the hydraulic capacity  
2105 shall permit covering the bed to a depth of two inches (5 cm), within 20 minutes or less.

2106

2107 **Section 20. Sludge Handling, Treatment and Disposal.**

2108

2109 (a) Pumping.

2110

2111 (i) Design requirements. Sludge pumps shall be provided with a positive  
2112 suction pressure at the pump impeller, rotor or plunger at dynamic conditions. Discharge pressure  
2113 shall include static pressure difference and system friction losses based on the higher viscosity of  
2114 the sludge than water.

2115

2116 (ii) Piping and valves.

2117

2118 (A) Minimum size. Sludge piping and valves shall at least four  
2119 inches (10.2 cm) in diameter for pressure piping and six inches (15.2 cm) in diameter for gravity  
2120 pipe. Pump suction and discharge shall not be less than three inches (6.6 cm) in diameter.

2121



2122 (B) Minimum velocity. For sludge pipes larger than four inches  
 2123 (10.2 cm) in diameter, the minimum velocity shall be one fps (0.3 m/sec).

2124  
 2125 (b) Thickening.

2126  
 2127 (i) Types.

2128  
 2129 (A) Gravity. Gravity thickening shall only be used for primary  
 2130 sludge, digested primary sludge, lime sludge, or combinations of lime sludge, trickling filter  
 2131 humus and primary sludge.

2132  
 2133 (B) Dissolved air flotation. Dissolved air flotation shall only be used  
 2134 for combination of primary and biological sludges, waste biological sludges, and aluminum and  
 2135 iron salt sludges.

2136  
 2137 (ii) Design parameters.

2138  
 2139 (A) Influent solids concentration. The design for influent solids  
 2140 concentrations to gravity or flotation thickeners shall be 5,000 mg/L or less, except tertiary lime  
 2141 sludge.

2142  
 2143 (B) Operating schedule. Sludge thickening facilities shall have the  
 2144 capacity to treat the maximum amount of solids produced. Where intermittent operation is  
 2145 provided, sludge holding tanks ahead of and after the thickening process shall be provided.

2146  
 2147 (C) Solids loading. Solids loadings (solids applied to the thickener)  
 2148 on thickening devices shall be limited to the following maximum values.

2149

Sludge Type	Solids Loading			
	lb/sq ft/day		kg/m <sup>2</sup> /d	
	Gravity	Dissolved Air Flotation	Gravity	Dissolved Air Flotation
Primary	24	NA	117.2	
Digested primary	20	NA	97.6	
Waste activated, without polymer	NA	12		58.6
Waste activated, with polymer	NA	48		234.3
Primary and trickling filter	15	--	73.2	
Anaerobically digested primary and activated	NA	NA		
Primary and lime	20	NA	97.6	
Tertiary lime	60	NA	292.9	
Alum	NA	12		58.6

2150 \*NA - Not allowed.  
 2151

2152 (D) Hydraulic loading. Gravity thickeners shall be designed for 400-  
2153 800 gpd/ sq ft (16.3 m<sup>3</sup>/m<sup>2</sup>/d to 32.5 m<sup>3</sup>/m<sup>2</sup>/d) of surface area.

2154  
2155 (iii) Number of units. Unless sludge storage capacity for three days is  
2156 provided, there shall be at least two units of equal capacity provided for sludge thickening.  
2157

2158 (iv) Controls. Controls for gravity and flotation sludge thickening operations  
2159 shall include provision for influent flow rate control. Centrifuge thickening shall include  
2160 adjustable manual controls for differential scroll speed, pool depth, and influent flow rate. Where  
2161 chemical conditioning is required, chemical dosage rate shall have adjustable manual controls.  
2162

2163 (v) Side stream waste characteristics. The flow, organic load, and solids load  
2164 in the thickener return flow to the plant shall be included in the plant design loadings.  
2165

2166 (vi) Odor control. Provisions shall be made for the continuous chlorination of  
2167 gravity thickener influent. Any thickening installation for anaerobically digested sludge shall  
2168 make provisions for enclosing zones where the sludge or decant is exposed to atmosphere,  
2169 exhausting the zone at an adequate rate to prevent escape of gas, and treating the exhaust air for  
2170 removal of odor causing agents.

2171  
2172 (c) Aerobic digestion.

2173  
2174 (i) Solids retention time. Solids shall be retained in the aerobic digester for  
2175 30 days for primary sludge and 20 days for waste sludge from conventional activated sludge  
2176 systems. Waste activated sludge from extended aeration systems shall be retained for a minimum  
2177 of 10 days.

2178 (ii) Mixing and aeration requirements. Aeration requirements shall  
2179 include the oxygen requirements for BOD stabilization, nitrification of ammonia nitrogen in the  
2180 sludge, and nitrification of organic nitrogen in raw sewage solids and biological solids. A  
2181 minimum dissolved oxygen of 2 mg/l shall be maintained. Minimum aeration requirements shall  
2182 be:  
2183  
2184

Sludge	CFM/1,000 lb solids/day	m <sup>3</sup> /min/1,000 kg/d
Extended Aeration	300	18.7
Conventional Activated Sludge	800	50.0
Primary Sludge	2,100	131.0

2185  
2186 The aerobic digester aeration shall be provided with nonclog diffused aeration.  
2187 Mechanical surface aerators shall not be allowed. Aeration provisions shall be a minimum of 30  
2188 cfm/1,000 cu ft (30 m<sup>3</sup>/min/1,000 m<sup>3</sup>) of volume.  
2189

2190 (iii) Number of digesters. Where aerobic digesters are used, two or more  
2191 shall be provided for treatment plants having an average design capacity of 100,000 gpd or more.  
2192 Multiple aerobic digesters shall be arranged to permit either parallel or series operation.  
2193

2194 (iv) Supernatant removal and disposal. Supernatant shall be returned prior to  
2195 the influent of the biological treatment process.

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(d) Anaerobic digestion.

(i) Sludge characteristics. The minimum sludge concentration for feed to anaerobic digesters is four percent.

(ii) Number of digesters. Two or more digesters shall be provided for treatment plants having an average design capacity of 100,000 gpd (378.4 m<sup>3</sup>/d) or more.

(iii) Design requirements.

(A) Temperature. Primary anaerobic digesters shall be heated to provide a minimum temperature of 95°F (35°C). Controls shall maintain the digester temperature within ±5°F (±2° C).

(B) Mixing equipment. Digester mixing shall, as a minimum, provide control of scum accumulation at the gas/liquid interface. Mixing that is designed for increasing the effectiveness of the digester and thereby reducing detention time shall mix the entire tank contents. Mixing devices and their application rate that will be considered to provide high rate digestion are:

<u>Volume</u>	<u>Per 1,000 cf</u>	<u>Per 1,000 m<sup>3</sup></u>
Slow speed turbine mixers	0.25 hp	6.7 kw
Draft tube mechanical mixers	0.40 hp	14.1 kw
External pumps and jet nozzles	500 gpm	66.7 m <sup>3</sup> /m
Gas mixing applied at bottom of digester	10 cfm	10 m <sup>3</sup> /m

Less mixing may be provided; however, longer solids retention times than described below shall be required.

(C) Solids retention time. The minimum solids retention time for heated, primary digesters are:

<u>Unmixed</u>	<u>Completely mixed</u>
30 days	10 days

Solids retention time shall be the same as liquid retention time in the primary digester where waste activated sludge is anaerobically digested.

(D) Volatile solids loading. As an alternative design basis to solids retention time, heated primary digesters may be designed for the following maximum volatile solids loading:

Unmixed  
0.1 lb/ft<sup>3</sup>/day (1.6 kg/m<sup>3</sup>/d)

Completely mixed  
0.3 lb ft<sup>3</sup>/day (4.8 kg/m<sup>3</sup>/d)

2245 (iv) Sludge piping.  
2246  
2247 (A) Inlet. Except in completely mixed digesters, multiple inlets shall  
2248 be provided. The piping shall provide the opportunity to heat undigested sludge prior to entering  
2249 the digester.  
2250  
2251 (B) Sludge withdrawal. Except in completely mixed digesters,  
2252 multiple withdrawal pipes shall be provided. One or more withdrawal pipes shall be from the  
2253 digester floor.  
2254  
2255 (C) Supernatant withdrawal. The design basis for facilities using  
2256 digesters for waste activated sludge shall assume no supernatant withdrawal. Piping for  
2257 supernatant withdrawal may be provided. A minimum of three supernatant withdrawal levels  
2258 shall be provided otherwise.  
2259  
2260 (v) Gas system. All portions of the gas system, including the space above the  
2261 tank liquor, storage facilities, and piping shall be designed to be under greater than atmospheric  
2262 pressure at all times.  
2263  
2264 (A) Piping. Gas piping shall be 2.5 inches (6.4 cm) diameter or  
2265 greater. Piping from the digester shall be provided with a flame trap. Piping shall slope to  
2266 condensate traps. Float controlled condensate traps are not permitted.  
2267  
2268 (B) Safety equipment. All necessary safety equipment shall be  
2269 included. Pressure and vacuum relief valves, flame traps and other safety equipment shall be  
2270 provided. Gas safety equipment and gas compressors shall be housed in a separate room with an  
2271 exterior entrance.  
2272  
2273 (C) Metering. A gas meter with bypass shall be provided for  
2274 measurement of total gas production.  
2275  
2276 (vi) Heating equipment. Sludge and digester contents shall be heated with an  
2277 external heat exchanger. Where sludge is heated using digester gas, an auxiliary fuel supply shall  
2278 be provided. Boilers using digester gas shall be designed to minimize corrosion and to facilitate  
2279 burner replacement. All digester gas that is not beneficially used shall be incinerated in a waste  
2280 gas burner.  
2281  
2282 (vii) Access. The roof of the digester and the top sidewall shall be provided  
2283 with sealed access hatches.  
2284  
2285 (viii) Sampling. One and one-half inches (3.8 cm) or larger sampling ports  
2286 shall be provided for inlet sludge, effluent sludge, supernatant and digester contents.  
2287  
2288 (ix) Supernatant disposal. Supernatant from secondary digesters or from  
2289 subsequent thickening or dewatering facilities for digested sludge shall be treated independently  
2290 or returned immediately preceding the biological process. Supernatant shall not be returned to the  
2291 primary clarifier.  
2292  
2293

2294 (e) Dewatering.  
2295  
2296 (i) Mechanical dewatering. Where provided, mechanical dewatering  
2297 facilities shall include storage tanks for liquid sludge and shall provide for reliable use.  
2298  
2299 (ii) Drying beds.  
2300  
2301 (A) Gravity. Drying beds may be strictly evaporation or evaporation  
2302 - percolation. Evaporation - percolation beds shall be provided with graded gravel and sand beds  
2303 over perforated underdrain pipe. Evaporation beds shall be designed for the application of 1.5 feet  
2304 (0.46 m) of sludge per year. Evaporation - percolation beds shall be designed for the application  
2305 of four feet (1.2 m) of sludge per year. Storage of sludge in the beds or in separate basins shall  
2306 provide 180 days of capacity. Percolate shall be returned to the plant ahead of the biological  
2307 treatment process.  
2308  
2309 (B) Vacuum. The bed area for vacuum assisted open drying beds  
2310 shall be based on the application of no more than 40 feet ( 12.2 m) of liquid per year. If the beds  
2311 are housed, the bed area shall be based on the application of 80 feet (24.4 m) per year. Where  
2312 beds are not housed, sludge storage shall be provided for 180 days of capacity. Polymer  
2313 conditioning, chemical feed, chemical storage and facilities for mixing the polymer with the  
2314 sludge shall be provided. Vacuum pumps, sump pumps, chemical feed equipment and motor  
2315 control equipment shall be housed.  
2316  
2317 (iii) Filtrate disposal. Filtrate, centrate or underdrain liquid shall be returned  
2318 to a point upstream of the biological treatment process. Centrate or filtrate shall not be returned  
2319 upstream of the primary clarifier.  
2320  
2321 (f) Disposal.  
2322  
2323 (i) Degree of stabilization.  
2324  
2325 (A) Land application. Sludges shall be stabilized. Sludges that are to  
2326 be used on public lands that are accessed by the public (parks, golf courses, cemeteries) or  
2327 sludges that are to be made available to the public shall be composted or stabilized and stored for  
2328 a period of at least one year. Sludges that are to be incorporated into the land shall be stabilized.  
2329  
2330 "Stabilized sludge" shall have reduced organic content and reduced pathogenic content.  
2331 Stabilized sludge shall have less than 60 lb of BOD<sub>5</sub> per 1,000 lb (60 kg/1,000 kg) of dry weight  
2332 sludge solids.  
2333  
2334 (B) Landfill. Sludge processed for incorporation into a landfill shall  
2335 be (1) a solid or semisolid material that will not release water upon standing, and (2) has been  
2336 subjected to anaerobic or aerobic digestion, or chemically treated with lime to a pH of 12.0 or  
2337 chemically treated with chlorine to a free chlorine residual. Waiver of this requirement must be  
2338 obtained from the Solid Waste Management Section of the Department of Environmental Quality.  
2339  
2340 (ii) Storage. Sludge storage shall be provided in lined earthen lagoons or  
2341 structural tanks. The lagoon lining shall be designed to protect the groundwater pursuant to the  
2342 requirements of Chapter VIII of the Water Quality Divisions rules and regulations. Sludge storage

2343 volume shall be sufficiently large to provide for independent operation of the sludge dewatering  
2344 or disposal facilities from preceding liquid or sludge processes.

2345

2346 **Section 21. Disinfection.**

2347

2348 (a) Chlorination/dechlorination.

2349

2350 (i) Chlorination. The disinfection capacity shall be sized to provide the  
2351 coliform concentrations required by the discharge permit. Feeders shall be sized to provide the  
2352 minimum dosage at the minimum flow rate and to the maximum dosage at the maximum flow  
2353 rate.

2354

2355 (ii) Dechlorination. Dechlorination feeders shall be sized for the final  
2356 effluent dechlorination dosage required by the discharge permit requirements.

2357

2358 (iii) Chlorination.

2359

2360 (A) Number of units. Feeders shall be able to supply, at all times, the  
2361 necessary amounts of chemical at an accurate rate ( $\pm 3\%$ ) throughout the range of feed. The  
2362 number of units shall provide capacity for effluent disinfection with the largest unit out of service  
2363 and a separate feeder or feeders for ancillary uses, such as prechlorination or intermediate process  
2364 control chlorination. The number of feeders shall be selected to permit feeding chemicals over the  
2365 range of required dosage while only varying a single feeder over a 10:1 range.

2366

2367 (B) Chemical storage. Chlorine shall be stored in a heated, ventilated  
2368 space. Space shall provide at least 30 days of chemical supply, convenient and efficient handling,  
2369 and dry conditions. Cylinders or other containers of chlorine gas should be isolated from  
2370 operating areas and restrained in position to prevent upset.

2371

2372 (C) Piping. Piping systems carrying gaseous or liquid chlorine shall  
2373 be schedule 80 black steel pipe with forged steel fittings. Bushings shall not be used. Vacuum  
2374 piping for gaseous chlorine may be polyethylene tubing.

2375

2376 Gas piping between the chlorine pressure reducing valve of the chlorinator and the  
2377 ejector shall be PVC or polyethylene. Piping for aqueous solutions of chlorine beyond the ejector  
2378 shall be PVC, fiberglass, or steel pipe lined with PVC or saran.

2379

2380 (D) Maximum withdrawal. The maximum withdrawal rate of  
2381 gaseous chlorine shall be limited to 40 lbs/day (18.1 kg/day) for 100 or 150 lb (45.4 or 68.0 kg)  
2382 cylinders and 400 lbs/day (181 kg/day) for 2,000 lb (907 kg) cylinders, unless chlorine  
2383 evaporators are used.

2384

2385 (iv) Dechlorination.

2386

2387 (A) Number of units. Dechlorination equipment shall be provided to  
2388 permit feeding the design dosage with the largest unit out of service. Feeders shall be sized for a  
2389 10:1 feed range.

2390

2391 (B) Chemical storage. Chemical storage shall be in a heated,  
2392 ventilated room, separate from chlorine cylinder storage. Provisions for heating the storage area  
2393 or the SO cylinders shall be provided. Where used, bin storage shall be provided with desiccated  
2394 vents.

2395  
2396 (C) Piping. Piping for liquid or gaseous SO shall be schedule 80  
2397 black steel pipe with forged steel fittings. Bushings shall not be used. Piping for aqueous  
2398 solutions of dechlorination chemicals shall be PVC, fiber glass, or steel pipe lined with PVC or  
2399 saran. All valves for liquid and gaseous sulfur dioxide shall be as approved by the Chlorine  
2400 Institute. Valves for aqueous solution of dechlorination chemicals shall be PVC or saran lined.

2401  
2402 (D) Maximum withdrawal.

2403  
2404 (I) The maximum withdrawal rate for sulfur dioxide from  
2405 2,000 lb (907 kg) cylinders shall be 200 lb (90.7 kg) per day, unless sulfur dioxide evaporators  
2406 are used.

2407  
2408 (v) Makeup water. Water used for dissolving dry chemicals, diluting liquid  
2409 chemicals or operating chlorine or SO injectors shall be chlorinated and strained for filtered (65  
2410 mesh) final effluent or potable water. Where potable water is used, backflow prevention shall be  
2411 achieved by (a) a 6 inch (15.2 cm) air gap between the potable water supply pipe and the  
2412 maximum water level of a receiving tank; or (b) an approved reduced pressure zone backflow  
2413 preventer.

2414  
2415 (vi) Mixing requirements. The feed point for chlorination or dechlorination  
2416 chemical shall be at a location of high turbulence. At points of critical flow, specially designed  
2417 static tube mixers or artificial mixing are required.

2418  
2419 (vii) Contact basins.

2420  
2421 (A) Detention time. The chlorine contact period shall provide a  
2422 minimum of 15 minutes contact time at the peak hour design flow. The contact period shall be  
2423 from the point of chemical injection into the flow to the outfall point or dechlorination feed point.

2424  
2425 (B) Baffling. Baffling of the chlorine contact basin shall provide a  
2426 length-to-width ratio of 5:1 or greater.

2427  
2428 (viii) Controls. The minimum control for chlorination - dechlorination  
2429 facilities shall include manual variation of feed rate and a portable chlorine residual monitor.

2430  
2431 (b) Ozonation.

2432  
2433 (i) Applied dosage rates. Ozonation system for disinfection shall provide a  
2434 range of chemical feed as follows:

2435  
2436 Secondary effluents 5-15 mg/L  
2437 Advanced treatment effluents 5-10 mg/L  
2438

2439 (ii) Piping. Injection equipment and piping in contact with ozonated air and  
2440 air water emulsions shall be of stainless steel, Teflon or other material resistant to ozone. Valves  
2441 carrying ozonized air shall be made of metal coated with ozone-resistant materials.  
2442

2443 (iii) Mixing requirements. Ozone shall be fed to a contact tank along the  
2444 length of the tank. The ozone contact tank shall be at least 15 feet (4.6 m) deep and provided with  
2445 vertical serpentine baffles. Fine bubble diffusers shall be used in areas where the flow is  
2446 downward.

2447 (iv) Detention time. The minimum contact time for ozone is 15 minutes at  
2448 peak hourly flow. Ozone contact basins shall be covered and provided with means to collect and  
2449 destroy unreacted ozone. The contact basin shall be designed to facilitate maintenance and  
2450 cleaning without reducing the effectiveness of the ozonation process.  
2451

2452 (c) Housing.  
2453

2454 (i) Access. Where housing is specially designed for equipment, structures,  
2455 rooms and areas containing chemical feed equipment used in disinfection, convenient access  
2456 should be provided. Access to chemical feed rooms shall only be from the outside. Doors shall be  
2457 provided with panic hardware, and open from the inside to the outside.  
2458

2459 (ii) Heating and ventilation. Chemical feed rooms and chemical storage  
2460 rooms shall be heated and ventilated. Ventilation shall exhaust continuously from near the floor  
2461 to an outside area that will not contaminate an air inlet to any building. The exhaust shall be  
2462 screened and turned downward. Continuous ventilation shall provide a complete air change six  
2463 times per hour. Emergency exhaust ventilation shall provide a complete room air change 30 times  
2464 per hour. The control for the emergency ventilation fan shall be on the outside of the room.  
2465

2466 (iii) Visual inspection. A clear glass, gas-tight window shall be installed in an  
2467 exterior door or interior wall of the disinfection chemical feed room.  
2468

2469 (iv) Isolation. Chemical feed and storage rooms shall be gas-tight.  
2470 Ventilation, plumbing and access shall be separated from other building parts. When ton  
2471 cylinders are used for chlorine or sulfur dioxide storage, storage and feed rooms will be separate.  
2472 Where powdered or granular chemicals are used, they will be stored in separate rooms from the  
2473 feed room. Switches for fans and lights shall be outside the room at the entrance. Vents from  
2474 feeders and storage shall discharge to the outside atmosphere above grade. Pipes and feed lines  
2475 through interior walls shall be gas-tight.  
2476

2477 (d) Safety.  
2478

2479 (i) Leak detectors. A bottle of ammonium hydroxide shall be available for  
2480 chlorine leak detection. For plants that store 1,000 lbs (454 kg) or more of chlorine, continuously  
2481 monitoring leak detectors shall be provided that sound an alarm in the event of an escape of gas.  
2482

2483 (ii) Repair kits. Repair kits approved by the Chlorine Institute shall be  
2484 provided for plants using ton containers or tank cars.  
2485

2486 (iii) Personnel equipment. Protective clothing, rubber gloves, and U.S.  
2487 Bureau of Mines approved industrial canister gas masks shall be provided for each operator who



2488 will handle or prepare chemical solutions/mixtures. A respiratory protection program shall be  
2489 available for all employees.

2490  
2491 (iv) Emergency breathing apparatus. Industrial size canister gas masks of the  
2492 type designed for chlorine gas and approved by U.S. Bureau of Mines shall be available at all  
2493 installations where chlorine gas is handled. Pressure-demand, self-contained breathing apparatus  
2494 shall be provided for repairing leaks to chlorine systems. A respiratory protection program shall  
2495 be available for all employees.

2496  
2497 (v) Instruction manuals. Instruction manuals for all elements of the  
2498 disinfectant storage, preparation and application system shall be provided. These instruction  
2499 manuals shall describe each component of the system, and provide a complete discussion of the  
2500 operation and maintenance requirements.

2501  
2502 **Section 22. Effluent Structures.**

2503  
2504 (a) Location. The location of the effluent discharge shall be at least three miles from  
2505 public water supply intakes.

2506  
2507 (b) Protection from hazards. The outfall sewer shall be constructed and protected  
2508 against the effects of floodwater, ice, debris, or other hazards as to insure its structural stability  
2509 and freedom from stoppage. A manhole should be provided at the shore- end of all gravity sewers  
2510 extending into the receiving waters.

2511  
2512 **Section 23. Laboratory requirements.**

2513  
2514 (a) Test procedures. Test procedures for analysis of monitoring samples shall  
2515 conform to regulations published pursuant to Section 304(g) of the Federal Water Pollution  
2516 Control Act (33 U.S.C. 466 et. seq.).

2517  
2518 (b) Testing requirements. All treatment plants shall have capability to perform or  
2519 contract for the self-monitoring analytical work required by discharge permits or ground water  
2520 monitoring requirements. All plants shall in addition be capable of performing or contract out the  
2521 analytical work required to assure good management and control of plant operation and  
2522 performance. Plants operating under requirements of an industrial pretreatment program must  
2523 have the capability of performing or must contract out the necessary testing to maintain the  
2524 program as approved by the reviewing agency.

2525  
2526 (c) Minimum requirements.

2527  
2528 (i) Location and space. The laboratory shall be located away from vibrating  
2529 machinery or equipment which might have adverse effects on the performance of laboratory  
2530 instruments or the analyst and shall be designed to prevent adverse effects from vibration.

2531  
2532 A minimum of 400 square feet (37.2 m<sup>2</sup>) of floor space shall be provided for the  
2533 laboratory where an analysis program for a fulltime laboratory chemist is proposed. If more than  
2534 two persons will be working in the laboratory, 100 square feet (9.3 m<sup>2</sup>) of additional space shall  
2535 be provided for each additional person.

2536

2537 (ii) Materials.  
2538  
2539 (A) Walls. Provide a durable, impervious surface that is easily  
2540 cleaned.  
2541  
2542 (B) Doors. Two exit doors or openings shall be located to permit a  
2543 straight egress from the laboratory; one exit shall be directly to outside of the building. Panic  
2544 hardware shall be used. Interior doors shall have glass windows.  
2545  
2546 (C) Cabinets and bench tops. Cabinet and storage space shall be  
2547 provided for dust-free storage of instruments and glassware.  
2548  
2549 Bench top height shall be 36 inches (0.91 m). Tops should be field joined into a  
2550 continuous surface with acid, alkali, and solvent-resistant cements.  
2551  
2552 (D) Hoods. Fume hoods shall be provided where reflux or heating of  
2553 toxic or hazardous materials is required.  
2554  
2555 (I) Fume hoods.  
2556  
2557 (1.) Location. A hood shall not be situated near a  
2558 doorway, unless a secondary means of egress is provided.  
2559  
2560 (2.) Fixtures. All switches, electrical outlets, and  
2561 utility and baffle adjustment handles shall be located outside the hood. Light fixtures shall be  
2562 explosion proof.  
2563  
2564 (3.) Exhaust. Twenty-four hour continuous exhaust  
2565 capability shall be provided. Exhaust fans shall be explosion proof.  
2566  
2567 (v) Sinks. The laboratory shall have a minimum of two sinks per 400 ft (37.2  
2568 m) (not including cup sinks). Sinks shall be double-well with drainboards and shall be made of  
2569 epoxy resin or plastic. All water fixtures shall be provided with reduced pressure zone backflow  
2570 preventers. Traps constructed of glass, plastic, or lead and accessibility for cleaning shall be  
2571 provided.  
2572  
2573 (vi) Ventilation and lighting. Laboratories shall be separately air conditioned,  
2574 with external air supply for 100 percent makeup volume. Separate exhaust ventilation shall be  
2575 provided. Ventilation outlet locations shall be remote from ventilation inlets.  
2576 Lighting shall provide 100 foot-candles at the bench top.  
2577  
2578 (vii) Gas and vacuum. If gas is required in the laboratory, natural gas shall be  
2579 supplied. Digester gas shall not be used.  
2580  
2581 (viii) Water still. Distilled water shall conform to the Standard Methods for  
2582 the Examination of Water and Wastewater, 15th Edition.  
2583  
2584 (ix) Emergency shower and eye wash. All laboratories shall be equipped with  
2585 an emergency eye wash and shower.

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(d) Portable testing equipment. Portable testing equipment shall be provided where necessary for operational control testing or industrial waste testing. Portable testing may be used for testing as necessary, provided the testing procedure meets the requirements of Section 304(g) of the Federal Water Pollution Control Act, if the results are to be used for permit reporting. Non-EPA certified procedures may be used for operational control or gross data generation.

**Section 24. Operation and Maintenance Manuals.**

(a) Where required. Plant operation and maintenance manuals are required for each new or modified treatment or pumping facility. The manuals shall provide the following information as a minimum:

- (i) Introduction.
- (ii) Description of facilities and unit processes through the plant from influent structures through effluent structures.
- (iii) Plant control system.
- (iv) Utilities and systems.
- (v) Emergency operation and response.
- (vi) Permit requirements and other regulatory requirements.
- (vii) Staffing needs.
- (viii) Index to manufacturer's manuals.

(b) When required. Draft operation and maintenance manuals shall be submitted to the Department of Environmental Quality at 50 percent completion of construction. Approval of the final operation and maintenance manuals is required prior to plant startup.

(c) Description and facilities. The description of facilities and unit processes shall include the size, capacity, model number (where applicable) and intended loading rate.

- (i) Each unit. The manual shall describe each unit, including the function, the controls, the lubrication and maintenance schedule, as well as the following:
  - (A) Startup operations.
  - (B) Routine operations.
  - (C) Abnormal operations.
  - (D) Emergency or power outage operations.
  - (E) Bypass procedures.

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(F) Safety.

(ii) Flow diagrams. The manual shall provide flow diagrams of the entire process, as well as individual unit processes. The flow diagrams shall show the flow options under the various operational conditions listed above.

(d) Operating parameters. The O&M manual shall provide the design criteria for each unit process. The data shall include the number, type, capacity, sizes, etc., and other information, as applicable.

(e) Troubleshooting guide. Each equipment maintenance manual shall include a section on troubleshooting. These manuals are to be indexed in the plant O&M manual. The troubleshooting guide shall include a telephone number for factory troubleshooting assistance.

(f) Emergency procedures. The plant O&M manual shall detail emergency operations procedures for possible foreseeable emergencies, including power outage, equipment failure, development of unsafe conditions, oil and hazardous substances discharge into the plant, and other emergency conditions. The details shall include valve positions, flow control settings, and other information to insure continued operation of the facility at maximum possible efficiency.

The manual shall also detail emergency notification procedures to be followed to protect health and safety under various emergency conditions.

(g) Safety. The manual shall provide general information of safety in and around the plant and its components. Each unit process discussion shall include applicable safety procedures and precautions. For unit processes or operations having extreme hazards (i.e., chlorine, closed tanks, etc.) the discussion shall detail appropriate protection, rescue procedures, and necessary safety equipment.

(h) Compliance submittals. The O&M manual shall summarize the monitoring and the reporting requirements of the discharge permit. These requirements will be modified from time-to-time, and should, therefore, be placed in an appendix to the O&M manual.

(i) Maintenance manuals. Maintenance manuals shall be required for each piece of equipment. These manuals must meet the requirements of the engineer and contractor for installation and startup of equipment. The information included in the manufacturers' manuals shall not be included in the O&M manual.

(i) General content of manuals.

(A) Neatly typewritten table of contents for each volume, arranged in a systematic order.

(B) Product data.

(C) Drawings.

- 2684  
2685 particular installation.  
2686  
2687 (D) Written text as required to supplement product data for the  
2688  
2689 (E) Copy of each warranty, bond and service contract issued.  
2690  
2691 (ii) Manuals for equipment and systems.  
2692 (A) Description of unit and component parts.  
2693 (B) Operating procedures.  
2694 (C) Maintenance procedures and schedules.  
2695 (D) Service and lubrication schedule.  
2696 (E) Sequence of control operation.  
2697 (F) Parts list.  
2698 (G) Recommended spare parts.  
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**PART C: COMMERCIAL/INDUSTRIAL WASTE AND WASTEWATER FACILITIES**

**Section 25. General.**

This part contains the minimum standards for the design and construction of commercial/ industrial wastewater facilities. The applicant shall demonstrate to the administrator that any discharge or seepage from the wastewater facility will not cause a violation of the surface and/ or groundwaters of the state in accordance with Chapter I, “Quality Standards for Wyoming Surface Waters” and Chapter VIII, “Quality Standards for Wyoming Groundwaters.” Due to the wide variety of wastes, wastewater and site conditions, the latest available scientific information shall be used to demonstrate that violations will not occur.

**Section 26. Discharge to Public Sewerage System.**

The discharge of commercial/industrial wastewater to a public sewerage system shall be allowed provided a letter of verification from the public sewerage system manager is submitted to the Department of Environmental Quality stating that the municipal system is capable of handling the added organic and/or hydraulic loads. The applicant shall demonstrate (1) that the wastewater will not adversely impact the treatment works and/or discharge or (2) that pretreatment of the wastewater shall be provided to eliminate the adverse impacts. The design and construction of any pretreatment device shall reduce the pollutants to the limits imposed by the public sewerage system manager.

**Section 27. Domestic Wastes from Commercial/Industrial Facilities.**

Commercial/industrial facilities which generate waste that is entirely domestic waste shall be designed in compliance with Part B of Chapter 11 or Chapter 25. When the commercial/industrial facility generates a combined domestic and commercial/industrial waste, the facility may be designed in compliance with Chapter 25 or Part B of this chapter provided the applicant can demonstrate that the commercial/ industrial waste will not interfere or adversely impact the treatment works or the discharge.

**Section 28. Biological Treatment Ponds.**

This section includes the standards for ponds that accept commercial/ industrial waste and wastewater that is primarily organic and utilizes biological organisms for treatment and do not meet the requirements of Section 27. The presence of toxic wastes, hazardous substances, and/or petroleum products shall not interfere or adversely impact the treatment process or disposal system.

(a) Location.

(i) Extraneous surface water and groundwater shall be excluded from entering the wastewater pond or entering the wastewater flow into the pond.

(ii) Ponds shall not be located within the ordinary high water mark of perennial rivers, streams, or creeks; nor in the bottoms of rivers, streams, creeks, draws, coulees, or other natural drainages into which natural runoff may flow and/or enter.

2754  
2755 (iii) Ponds shall be protected from structural damage during the 100-year  
2756 flood event.  
2757  
2758 (b) Basis of design.  
2759  
2760 (i) Aerobic, facultative, and anaerobic ponds shall be designed based on the  
2761 type, strength characteristics, and anticipated flow rates of the wastewater. Loading rates shall be  
2762 determined on a case-by-case basis using the best available technology, reference, and/or pilot  
2763 studies. The affect of any toxic wastes, hazardous substances, and/or petroleum products on the  
2764 wastewater treatment works and disposal system shall be evaluated. All anaerobic ponds shall be  
2765 followed by an aerobic process if the system discharges to surface waters of the state.  
2766  
2767 When seepage is considered part of the design, the potential effect of groundwater  
2768 mounding on the seepage rate shall be evaluated.  
2769  
2770 (ii) In addition to the above, all nonsurface water discharging ponds shall be  
2771 designed on the basis of a water balance that considers net evaporation and seepage. They shall  
2772 be designed to provide sufficient storage for retention of all wastewater and rainfall during the  
2773 wettest occurring year of a ten-year period. Seepage shall be controlled to maintain a minimum  
2774 water depth of two feet in the primary cell during the driest occurring year of a ten-year period.  
2775  
2776 (c) Pond layout.  
2777  
2778 (i) Discharging treatment systems and ponds that require liners to protect  
2779 groundwater shall consist of a minimum of two cells. The largest cell shall not contain more than  
2780 55 percent of the total waste volume at the design capacity.  
2781  
2782 (ii) Inlet structures shall be submerged and located to properly distribute the  
2783 wastewater flow throughout the pond(s) and shall prevent short circuiting. Influent wastewater  
2784 shall not erode or disturb the liner, seal, or dike. Submerged multiple inlets are recommended.  
2785 The pipe shall discharge at least ten feet from the toe of the slope.  
2786  
2787 (iii) Outlet structures from discharging treatment systems shall be capable of  
2788 multilevel drawoff and have an overflow device. Outlet structures shall prevent short circuiting,  
2789 prevent floating debris from discharging, and keep outlet velocities at a minimum so as not to  
2790 erode or disturb the receiving channel. Erosion control material shall be designed based on flow  
2791 velocities and quantities. Ice formation shall neither stop the overflow nor damage the outlet  
2792 structure.  
2793  
2794 (iv) All pipe protruding through a dike or embankment shall have adequate  
2795 seepage controls. Capabilities shall exist to drain the ponds for maintenance purposes. By-pass  
2796 piping for each individual pond cell shall be provided.  
2797  
2798 (v) A manhole or vented cleanout wye shall be installed prior to the entrance  
2799 of the influent pipe into the primary pond(s) and shall be located as close to the dike as  
2800 topography permits. The influent pipe invert should be at least six inches above the maximum  
2801 operating level of the pond.  
2802

2803 (vi) The maximum water depth shall be six feet in the primary cell(s) of non-  
2804 aerated aerobic or facultative systems. The maximum water depth shall be 15 feet in aerated cells.  
2805 The maximum water depth for subsequent cells or other types of ponds shall be determined on a  
2806 case-by-case basis.

2807  
2808 The minimum water depth shall be three feet in the primary cell(s) and two feet in  
2809 subsequent cell(s). Cells designed for high-rate infiltration may be allowed to be dry periodically  
2810 provided that the applicant can demonstrate that vegetation will be controlled and a regular  
2811 maintenance program is provided.

2812  
2813 (vii) Free board shall be provided to protect embankments and dikes from  
2814 overtopping from wave action, and shall be a minimum of three feet above the high water level.  
2815 For ponds less than two acres, two feet of freeboard may be acceptable.

2816  
2817 (d) Pond construction.

2818  
2819 (i) Soils used in constructing the pond bottom and dike cores (not including  
2820 the liner) shall be relatively incompressible, have a low permeability, and be free from organic  
2821 material or trash. The soil shall be compacted at a water content that will insure structural  
2822 stability, minimize hydraulic seepage, and minimize settling. The soil shall provide an adequate  
2823 foundation for the liner, if used.

2824  
2825 (ii) On ponds that are not specified to receive an artificial liner, no rocks  
2826 larger than six inches in length shall be permitted in any of the designated embankment.

2827  
2828 On ponds that are specified to be lined with an artificial liner, rocks larger than six inches  
2829 in length shall not be placed within five feet of the interior slope of any pond embankment.  
2830 Material containing by volume less than 25 percent of rock larger than six inches and less than 12  
2831 inches in length may be placed in the remainder of the embankment.

2832  
2833 (iii) Outer dike slopes shall not be steeper than one vertical to two horizontal.  
2834 Flatter slopes may be required to maintain slope stability. Outer dike slopes shall prevent surface  
2835 runoff from entering the ponds.

2836  
2837 Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical  
2838 to three horizontal. Flatter inner slopes may be allowed where vegetation due to the shallower  
2839 slopes will not interfere with treatment or the dike's integrity. Interior slopes surfaced with  
2840 concrete paving or riprap may be constructed at slopes of one vertical to two horizontal.

2841  
2842 (iv) The minimum top dike width shall be eight feet to permit access of  
2843 maintenance vehicles. Top dikes wider than eight feet shall be required when necessary to assure  
2844 structural stability.

2845  
2846 (v) The pond bottom shall be sufficiently flat to insure a minimum water  
2847 depth as required in Section 28 (c)(vi).

2848  
2849 (e) Dike protection.

2850



2851 (i) Interior embankments shall be protected from wave action with riprap,  
2852 paving, or other erosion resistant material. The following conditions may be exempted from the  
2853 riprap requirements:

2854

2855 (A) Ponds of one surface acre or less;

2856

2857 (B) Ponds with an artificial liner;

2858

2859 (C) Embankments cut into natural slopes when a soil liner is not  
2860 provided; or

2861

2862 (D) Ponds which are sheltered from wind or where winds are slow  
2863 enough that significant erosion will not occur.

2864

2865 (ii) Exterior of dikes, top of dikes, and all interior dike surfaces where riprap  
2866 or a seal is not provided shall be covered with topsoil and seeded with suitable dryland grasses to  
2867 prevent erosion. A uniform coarse graded gravel may be substituted for the vegetation  
2868 requirement.

2869

2870 (f) Liners.

2871

2872 (i) Seepage limits. The seepage through the pond bottom and side walls  
2873 shall not cause a violation of the groundwater standards as described in Chapter VIII (Quality  
2874 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
2875 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
2876 site conditions will not insure the protection of the groundwater for which it is classified.

2877

2878 If the applicant cannot document that the facility poses no threat to groundwater and  
2879 elects not to perform a subsurface study in accordance with Chapter III, Section 15(a) and (b),  
2880 then the groundwater shall be protected from contamination by the wastewater with a liner  
2881 equivalent to three feet of soil having a permeability of  $10^{-7}$  cm/sec or less. When an applicant  
2882 performs a subsurface study, the requirement for the liner shall be determined based on the results  
2883 of the study and the groundwater protection required. In no instance shall the maximum seepage  
2884 rate exceed 1/8 inch per day in the primary pond(s).

2885

2886 (ii) Soil and bentonite liners. The specifications for a soil or bentonite liner  
2887 shall be based upon the results of a preliminary testing program and shall contain at a minimum  
2888 the type of material, optimum and acceptable range in water content, acceptable range for  
2889 compaction, and maximum allowable particle size.

2890

2891 Soil or bentonite liners used to protect groundwater quality shall meet the following  
2892 criteria: Written certification that the soil liner was constructed in accordance with specifications  
2893 shall be provided by a Wyoming registered professional engineer or an independent soils  
2894 laboratory. Tests for water content and density shall be taken during application of each lift.  
2895 Additionally, either permeability testing of undisturbed core samples from the in-place seal, or  
2896 detailed tests such as particle size distribution and Atterburg limits confirming that the soil used  
2897 in the liner construction was the same soil initially tested, shall be provided. In all cases, at least  
2898 one test shall be provided per acre per lift, except for core sampling of the in-place liner, where  
2899 one core of the completed liner shall be tested per acre.

2900  
2901 (iii) Synthetic liners. The thickness requirements for synthetic liners shall be  
2902 determined on a case-by-case basis but shall not be less than 30 mil. The type of liner shall be  
2903 compatible with the wastewater characteristics. The synthetic liner shall have a permeability  
2904 equivalent to that required in Section 28(f)(i).  
2905

2906 Synthetic liners shall be anchored to prevent movement, slippage, and flotation. The  
2907 synthetic liner shall be protected from degradation by ultraviolet light, ice damage and settling of  
2908 underdrain trenches. An air venting system may be required beneath the synthetic liner to expel  
2909 gases trapped during installation, produced by decomposing organic material, or produced by a  
2910 fluctuating water table.

2911  
2912 (iv) Uniformity. The pond bottom shall be smooth with a maximum tolerance  
2913 of  $\pm 6$  inches.  
2914

2915 (v) Prefilling. All ponds shall be prefilled to the two foot level to protect  
2916 the liner, to prevent weed growth, to encourage rapid startup of the biological process and  
2917 discourage odor, to reduce freeze up problems for late fall startups, to confirm the seal's integrity  
2918 and to maintain the water of the seal at or above optimum conditions. The raw wastewater shall  
2919 not be used for prefilling purposes except for anaerobic ponds.  
2920

2921 (vi) Exfiltration evaluation. All ponds designated with a maximum  
2922 exfiltration rate shall be tested for exfiltration. A maximum exfiltration rate not in excess of the  
2923 design rate shall be deemed acceptable. If the exfiltration rate is deemed excessive, the seal shall  
2924 be repaired and the test procedure repeated. This procedure shall be repeated until the maximum  
2925 exfiltration rate criteria is met. Results of all testing shall be submitted to DEQ.  
2926

2927 (g) Miscellaneous. A permanent flow measuring device shall be installed at the  
2928 outfall of discharging pond sites and shall measure the effluent under all climatic conditions. The  
2929 accuracy of the flow measuring device must be within ten percent of the actual flow. Ponds with a  
2930 maximum daily discharge of less than 50,000 gallons per day may be exempted from installing a  
2931 permanent flow measuring device.  
2932

2933 **Section 29. Feedlots.**  
2934

2935 This section includes the standards for wastewater retention systems for feedlot runoff.  
2936 The basic concept of retention systems is to intercept and collect runoff and wastes from the  
2937 animal feeding area until it can be disposed of via land application. Although retention systems  
2938 are usually the most economical method of treatment, other systems will be evaluated on a case-  
2939 by-case basis.  
2940

2941 (a) Location.  
2942

2943 (i) Groundwater shall be excluded from entering the wastewater pond or the  
2944 wastewater flow into the pond.  
2945

2946 (ii) Ponds shall not be located within the ordinary highwater mark of  
2947 perennial rivers, streams, or creeks. Ponds not containing hazardous or toxic wastes may be  
2948 located within the ordinary high water mark of intermittent rivers, streams, creeks, draws,

2949 coulees, or other natural drainages provided a by-pass ditch is installed capable of passing the 24  
2950 hour - 100 year precipitation event.

2951

2952 (iii) The wastewater retention system shall be as near to the animal feeding  
2953 operation as possible to keep construction to a minimum. The retention ponds shall be located  
2954 outside the pen area for safety and maintenance purposes. Sufficient space must be left between  
2955 streams or drainage areas to allow construction of the necessary collection ditches and retention  
2956 ponds.

2957

2958 (b) Basis of design. All livestock confinement areas, alleyways, etc., shall be graded  
2959 to prevent accumulation of surface waters and to drain all contaminated water to the retention  
2960 system. Collection ditches shall be provided when necessary to intercept contaminated water. The  
2961 wastewater retention system shall be designed to contain the 25 year, 24 hour precipitation event.  
2962 Wastewater in the retention pond shall be removed and disposed of as soon as possible after a  
2963 precipitation event. The applicant shall demonstrate that equipment is available for removing the  
2964 wastewater.

2965

2966 (i) Diversion ditches. The animal feeding area shall be protected with  
2967 diversion ditches that will direct uncontaminated runoff from areas above and adjacent to the site  
2968 away from the ponds and shall be capable of diverting the 25-year, 24 hour precipitation event.

2969

2970 (ii) Collection ditches. Collection ditches shall be constructed around the  
2971 feeding area to intercept the contaminated runoff and transport it to the settling and/or retention  
2972 pond. The depth shall be adequate to handle the design flow and shall have a bottom slope  
2973 sufficient to produce a velocity of not less than two feet per second. Side slopes shall not be  
2974 steeper than eight horizontal to one vertical.

2975

2976 (iii) Settling pond. A settling pond ahead of the retention pond is  
2977 recommended to accumulate the solids in the waste flow and to simplify their removal and final  
2978 disposal. The surface area shall be sized to reduce the flow velocity below one foot per second to  
2979 allow settling of solids. The pond shall be between three to six feet deep to allow sufficient  
2980 capacity for holding the solids and yet allow easy removal of the solids. The outlet structure shall  
2981 minimize the overflow of solids into the retention pond.

2982

2983 (iv) Retention pond. The retention pond shall be capable of containing all  
2984 runoff from the feeding area for the design storm until the contaminated runoff can be disposed.  
2985 If a settling pond is not provided before the retention pond, the design volume shall be increased  
2986 by 10 percent to accommodate collection of solids.

2987

2988 (c) Retention pond layout.

2989

2990 (i) The shape and depth shall facilitate ease of cleaning and maintenance. A  
2991 minimum freeboard of 1.5 feet shall be required above the high water level of the spillway.

2992

2993 (ii) Spillways shall be provided on all retention ponds to pass flows in excess  
2994 of the 25 year, 24 hour precipitation event. The spillway shall be placed above the design high  
2995 water level.

2996

2997 (d) Retention pond construction. The retention pond construction shall meet the  
2998 following requirements:

2999  
3000 (i) Soils used in constructing the pond bottom and dike cores (not including  
3001 the liner) shall be relatively incompressible, have a low permeability, and be free from organic  
3002 material or trash. The soil shall be compacted at a water content that will insure structural  
3003 stability, minimize hydraulic seepage, and minimize settling. The soil shall provide an adequate  
3004 foundation for the liner, if used.

3005  
3006 (ii) On ponds that are not specified to receive an artificial liner, no rocks  
3007 larger than six inches in length shall be permitted in any of the designated embankments.

3008  
3009 On ponds that are specified to be lined with an artificial liner, rocks larger than six inches  
3010 in length shall not be placed within five feet surface of the interior slope of any pond  
3011 embankment. Material containing by volume less than 25 percent of rock larger than six inches  
3012 and less than 12 inches in length may be placed in the remainder of the embankment.

3013  
3014 (iii) Outer dike slopes shall not be steeper than one vertical to two horizontal.  
3015 Flatter slopes may be required to maintain slope stability.

3016  
3017 Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical  
3018 to three horizontal. Flatter inner slopes may be allowed where vegetation due to the shallower  
3019 slopes will not interfere with treatment or the dike's integrity. Interior slopes surfaced with  
3020 concrete paving or riprap may be constructed at slopes of one vertical to two horizontal.

3021  
3022 (iv) The minimum top dike width shall be eight feet to permit access of  
3023 maintenance vehicles. Top dikes wider than eight feet shall be required when necessary to assure  
3024 structural stability.

3025  
3026 (v) The pond bottom may be sloped to facilitate pumping but shall not  
3027 exceed a 0.5 percent slope.

3028  
3029 (e) Liners.

3030  
3031 (i) Seepage limits. The seepage through the pond bottom and side walls  
3032 shall not cause a violation of the groundwater standards as described in Chapter VIII (Quality  
3033 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
3034 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
3035 site conditions will not insure the protection of the groundwater for which it is classified.

3036  
3037 If the applicant cannot document that the facility poses no threat to groundwater and  
3038 elects not to perform a subsurface study in accordance with Chapter III, Section 15(a) and (b),  
3039 then the groundwater shall be protected from contamination by the wastewater with a liner  
3040 equivalent to three feet of soil having a permeability of  $10^{-7}$  cm/sec or less. When an applicant  
3041 performs a subsurface study, the requirement for the liner shall be determined based on the results  
3042 of the study and the groundwater protection required. In no instance shall the maximum seepage  
3043 rate exceed 1/8 inch per day in the primary pond(s).

3044

3045 (ii) Soil and bentonite liners. The specifications for a soil or bentonite liner  
3046 shall be based upon the results of a preliminary testing program and shall contain at a minimum  
3047 the type of material, optimum and acceptable range in water content, acceptable range for  
3048 compaction, and maximum allowable particle size.

3049  
3050 Soil or bentonite liners used to protect groundwater quality shall meet the following  
3051 criteria: Written certification that the soil liner was constructed in accordance with specifications  
3052 shall be provided by a Wyoming registered professional engineer or an independent soils  
3053 laboratory. Tests for water content and density shall be taken during application of each lift.  
3054 Additionally, either permeability testing of undisturbed core samples from the in-place seal, or  
3055 detailed tests such as particle size distribution and Atterburg limits confirming that the soil used  
3056 in the liner construction was the same soil initially tested, shall be provided. In all cases, at least  
3057 one test shall be provided per acre per lift, except for core sampling of the in-place liner, where  
3058 one core of the completed liner shall be tested per acre.

3059  
3060 (iii) Synthetic liners. The thickness requirements for synthetic liners shall be  
3061 determined on a case-by-case basis but shall not be less than 30 mils. The type of liner shall be  
3062 compatible with the wastewater characteristics. The synthetic liner shall have a permeability  
3063 equivalent to that of Section 29(e)(i).

3064  
3065 Synthetic liners shall be anchored to prevent movement, slippage, and flotation. The  
3066 synthetic liner shall be protected from degradation by ultraviolet light, ice damage and settling of  
3067 underdrain trenches. An air venting system may be required beneath the synthetic liner to expel  
3068 gases trapped during installation, produced by decomposing organic material, or produced by a  
3069 fluctuating water table.

3070  
3071 (iv) Exfiltration evaluation. All ponds designated with a maximum  
3072 exfiltration rate shall be tested for exfiltration. A maximum exfiltration rate not in excess of the  
3073 design rate shall be deemed acceptable. If the exfiltration rate is deemed excessive, the seal shall  
3074 be repaired, and the test procedure repeated. This procedure shall be repeated until the maximum  
3075 exfiltration rate criteria is met. Results of all testing shall be submitted to the Department of  
3076 Environmental Quality.

3077  
3078 **Section 30. Non-biological Treatment Ponds.**

3079  
3080 This section includes the standards for non-biological treatment ponds or ponds that  
3081 accept commercial/industrial waste or wastewater that is primarily non-biological in nature and  
3082 does not utilize biological organisms for treatment. Radio logical affects considered by the  
3083 Nuclear Regulatory Commission (NRC) from non-surface discharging treatment works within a  
3084 NRC licensed permit boundary are exempt from this section.

3085  
3086 (a) Location.

3087  
3088 (i) Extraneous surface water and groundwater shall be excluded from  
3089 entering the wastewater pond or entering the wastewater flow into the pond.

3090  
3091 (ii) Ponds shall not be located within the ordinary high water mark of  
3092 perennial rivers, streams, or creeks. Ponds not containing hazardous or toxic wastes may be  
3093 located within the ordinary high water mark of intermit tent rivers, streams, creeks, draws,

3094 coulees, or other natural drainages provided a by-pass ditch is installed capable of passing the 24  
3095 hour - 100 year precipitation event. All other ponds shall be protected from structural damage  
3096 during the 100-year flood event.

3097

3098 (b) Basis of design.

3099

3100 (i) Ponds shall be designed based on the type of wastewater, the wastewater  
3101 strength characteristics, and the anticipated flow rates. Loading rates shall be determined on a  
3102 case-by-case basis using the best available technology, reference, and/or pilot studies. The affect  
3103 of any toxic wastes, hazardous substances, and/or petroleum products on the wastewater  
3104 treatment process and disposal system shall be evaluated.

3105

3106 Where seepage is considered part of the design, the potential effect of groundwater  
3107 mounding on the seepage rate must be evaluated.

3108

3109 (ii) In addition to the above, non-surface water discharging ponds shall be  
3110 designed on the basis of a water balance that considers net evaporation and seepage. Non-  
3111 discharging ponds shall be designed to provide sufficient storage to retain all wastewater and  
3112 rainfall during the wettest occurring year of a ten year period.

3113

3114 (c) Pond layout.

3115

3116 (i) Discharging treatment systems and ponds that require liners to protect  
3117 groundwater shall consist of a minimum of two cells. The largest cell shall not contain more than  
3118 55 percent of the total waste volume at the design capacity.

3119

3120 (ii) Inlet and intracell structures for discharging treatment systems shall  
3121 prevent short circuiting, and shall not erode or disturb the liner, seal or dike.

3122

3123 (iii) Outlet structures from a discharging treatment system shall have an  
3124 overflow device, prevent short circuiting, prevent floating debris from discharging, and keep  
3125 outlet velocities to a minimum so as not to erode or disturb the receiving channel. Erosion control  
3126 material shall be designed based on flow velocities and quantities. Ice formation shall neither stop  
3127 the overflow nor damage the outlet structure.

3128

3129 (iv) All pipe protruding through a dike or embankment shall have adequate  
3130 seepage controls. Capabilities shall exist to drain the ponds for maintenance purposes.

3131

3132 (v) A manhole or vented cleanout wye shall be installed prior to the entrance  
3133 of the influent pipe into the primary pond(s) and shall be located as close to the dike as  
3134 topography permits. The influent pipe invert should be at least six inches above the maximum  
3135 operating level of the pond.

3136

3137 (vi) The maximum and minimum water depth shall be determined on a case-  
3138 by-case basis. However, the design engineer must demonstrate that ponds with less than two feet  
3139 water depth will not have vegetation problems.

3140

3141 (vii) Free board shall be provided to protect embankments and dikes from  
3142 overtopping from wave action, and shall be a minimum of three feet above the high water level.  
3143 For ponds less than two acres, two feet of freeboard may be acceptable.

3144  
3145 (d) Pond construction.

3146  
3147 (i) Soils used in constructing the pond bottom and dike cores (not including  
3148 the liner) shall be relatively incompressible, have a low permeability, and be free from organic  
3149 material or trash. The soil shall be compacted at a water content that will insure structural  
3150 stability, minimize hydraulic seepage, and minimize settling. The soil shall provide an adequate  
3151 foundation for the liner, if used.

3152  
3153 (ii) On ponds that are not specified to receive an artificial liner, no rocks  
3154 larger than six inches in length shall be permitted in any of the designated embankment.

3155  
3156 On ponds that are specified to be lined with an artificial liner, rocks larger than six inches  
3157 in length shall not be placed within five feet of the interior slope surface of any pond  
3158 embankment. Material containing by volume less than 25 percent of rock larger than six inches  
3159 and less than 12 inches in length may be placed in the remainder of the embankment.

3160  
3161 (iii) Outer dike slopes shall not be steeper than one vertical to two horizontal.  
3162 Flatter slopes may be required to maintain slope stability. Outer dike slopes shall prevent surface  
3163 runoff from entering the ponds.

3164  
3165 Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical  
3166 to three horizontal. Flatter inner slopes may be allowed where vegetation due to the shallower  
3167 slopes will not interfere with treatment or the dike's integrity. Interior slopes surfaced with  
3168 concrete paving or riprap may be constructed at slopes of one vertical to two horizontal.

3169  
3170 (iv) The minimum top dike width shall be eight feet to permit access of  
3171 maintenance vehicles. Top dikes wider than eight feet shall be required when necessary to assure  
3172 structural stability.

3173  
3174 (e) Dike protection.

3175  
3176 (i) Interior embankments shall be protected from wave action with riprap,  
3177 paving, or other erosion resistant material. The following conditions may be exempted from the  
3178 riprap requirements:

3179  
3180 (A) Ponds of one surface acre or less:

3181  
3182 (B) Ponds with an artificial liner;

3183  
3184 (C) Embankments cut into natural slopes where a soil liner is not  
3185 provided; or

3186  
3187 (D) Ponds which are sheltered from wind or where winds are slow  
3188 enough that significant erosion will not occur.

3189

3190 (ii) Exterior of dikes, top of dikes, and all interior dike surfaces where riprap  
3191 or a seal is not provided shall be covered with topsoil and seeded with suitable dryland grasses to  
3192 prevent erosion. A uniform coarse graded gravel may be substituted for the vegetation  
3193 requirement.

3194  
3195 (f) Liners.

3196  
3197 (i) Seepage limits. The seepage through the pond bottom and side walls  
3198 shall not cause, a violation of the groundwater standards as described in Chapter VIII (Quality  
3199 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
3200 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
3201 site conditions will not insure the protection of the groundwater for which it is classified.  
3202

3203 If the applicant cannot document that the facility poses no threat to groundwater and  
3204 elects not to perform a subsurface study in accordance with Chapter III, Section 15(a) and (b),  
3205 then the groundwater shall be protected from contamination by the wastewater with a liner  
3206 equivalent to three feet of soil having a permeability of  $10^{-7}$  cm/sec or less. When an applicant  
3207 performs a subsurface study, the requirement for the liner shall be determined based on the results  
3208 of the study and the groundwater protection required. In no instance shall the maximum seepage  
3209 rate exceed 1/8 inch per day in the primary pond(s).  
3210

3211 (ii) Soil and bentonite liners. The specifications for a soil or bentonite liner  
3212 shall be based upon the results of a preliminary testing program and shall contain at a minimum  
3213 the type of material, optimum and acceptable range in water content, acceptable range for  
3214 compaction, and maximum allowable particle size.  
3215

3216 Soil or bentonite liners used to protect groundwater quality shall meet the following  
3217 criteria. Written certification that the soil liner was constructed in accordance with specifications  
3218 shall be provided by a Wyoming registered professional engineer or an independent soils  
3219 laboratory. Tests for water content and density shall be taken during application of each lift.  
3220 Additionally, either permeability testing of undisturbed core samples from the in-place seal, or  
3221 detailed tests such as particle size distribution and Atterburg limits confirming that the soil used  
3222 in the liner construction was the same soil initially tested, shall be provided. In all cases, at least  
3223 one test shall be provided per acre per lift, except for core sampling of the in-place liner, where  
3224 one core of the completed liner shall be tested per acre.  
3225

3226 (iii) Synthetic liners. The thickness requirements for synthetic liners shall be  
3227 determined on a case-by-case basis but shall not be less than 30 mils. The type of liner shall be  
3228 compatible with the wastewater characteristics. The synthetic liner shall have a permeability  
3229 equivalent to that of Section 30(f)(i).  
3230

3231 Synthetic liners shall be anchored to prevent movement, slippage, and flotation. The  
3232 synthetic liner shall be protected from degradation by ultraviolet light, ice damage and settling of  
3233 underdrain trenches. An air venting system may be required beneath the synthetic liner to expel  
3234 gases trapped during installation, produced by decomposing organic material, or produced by a  
3235 fluctuating water table.  
3236

3237 (iv) Prefilling. For soil or bentonite liners, a method of maintaining the seal  
3238 at or above optimum moisture conditions is required.



3239  
3240 (v) Exfiltration evaluation. All ponds designated with a maximum  
3241 exfiltration rate shall be tested for exfiltration. A maximum exfiltration rate not in excess of the  
3242 design rate shall be deemed acceptable. If the exfiltration rate is deemed excessive, the seal shall  
3243 be repaired and the test procedure repeated. This procedure shall be repeated until the maximum  
3244 exfiltration rate criteria is met. Results of all testing shall be submitted to the Department of  
3245 Environmental Quality.

3246  
3247 (g) Miscellaneous. A permanent flow measuring device shall be installed at the  
3248 outfall of discharging pond sites and shall measure the effluent under all climatic conditions. The  
3249 accuracy of the flow measuring device must be within ten percent of the actual flow. Ponds with a  
3250 maximum daily discharge of less than 50,000 gallons per day may be exempted from installing a  
3251 permanent flow measuring device.

3252  
3253 **Section 31. Sedimentation Control Facilities.**

3254  
3255 This section includes the standards for sedimentation control facilities. Those  
3256 sedimentation control facilities that are regulated under Water Quality Rules and Regulations,  
3257 Chapter X, "Performance/Design Standards for Surface Coal Mining Runoff Control Facilities"  
3258 are exempted from this section.

3259  
3260 (a) Location. The sedimentation control facilities shall be as near to the affected  
3261 lands as possible to keep construction and containment volumes to a minimum. Sedimentation  
3262 control facilities shall be located off-channel when possible. Runoff from unaffected lands should  
3263 be by-passed around the containment area. All affected lands must drain to a sedimentation  
3264 control facility.

3265  
3266 (b) Basis of design. Sedimentation control facilities shall control all runoff from  
3267 areas which drain into the facility from a 10-year 24-hour precipitation event in addition to the  
3268 estimated sediment storage volume for one year be always available. The pond shall be drained  
3269 down to the permanent pool level as soon as the effluent meets the discharge parameters. The  
3270 applicant shall demonstrate that equipment or outlet structures are available for draining the pond.

3271  
3272 (c) Layout.

3273  
3274 (i) Inlet ditches or structures shall not erode or disturb the pond bottom.

3275  
3276 (ii) Outlet structures, if used, shall have an overflow device, prevent short-  
3277 circuiting, prevent floating debris from discharging and shall not erode or disturb the dike. All  
3278 pipe protruding through a dike shall have adequate seepage control. The point of discharge into a  
3279 channel shall be protected against erosion and erosion control devices shall be designed based on  
3280 flow velocities.

3281  
3282 (iii) Spillways. Sedimentation control facilities that individually contain more  
3283 than 2.0 acre-feet of runoff or that individually have more than 2.0 acres of surface area or that  
3284 are located on-channel shall have a spillway to by-pass precipitation events in excess of the  
3285 design event. Spillways shall safely pass the 25 year flood event except when the impoundment  
3286 height is greater than twenty feet or capacity exceeds twenty acre-feet; in which case the spillway  
3287 shall safely pass the 100-year flood event.

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(iv) By-pass ditches. If by-pass ditches are provided to transport runoff from unaffected lands, they shall be designed to pass the runoff from a 25 year precipitation event.

(v) Freeboard. Freeboard shall be provided to protect embankments and dikes from overtopping from wave action and shall be a minimum of one foot above the high water level. For ponds less than two acres, one-half foot of freeboard may be acceptable.

(d) Construction.

(i) Soils used in constructing the pond bottom and dike cores shall be relatively incompressible, have a low permeability, and be free from organic material or trash. The soil shall be compacted at a water content that will insure structural stability, minimize hydraulic seepage, and minimize settling.

Rocks larger than six inches in length shall not be placed within five feet of the interior slope surface of any pond embankment. Material containing by volume less than 25 percent of rock larger than six inches and less than 12 inch in length dimension may be placed in the remainder of the embankment.

(ii) Outer dike slopes shall not be steeper than one vertical to two horizontal. Flatter slopes may be required to maintain slope stability. Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical to three horizontal.

(iii) The minimum top dike width shall be sufficient to provide structural stability.

(iv) Riprap or other acceptable erosion control shall be installed on the inner dike slopes at all anticipated levels of water. Dikes cut into existing ground shall be exempted from riprap requirements. Ponds that have less than 2.0 acres of surface area shall also be exempted.

**PART D: SEPTIC TANK AND/OR SOIL ABSORPTION SYSTEMS AND OTHER  
SMALL WASTEWATER SYSTEMS**

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**Section 32. Reserved.**

**Section 33. Reserved.**

**Section 34. Reserved.**

**Section 35. Reserved.**

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**Section 44. Reserved.**

**Section 45. Reserved.**

**Section 46. Reserved.**

**Section 47. Reserved.**

3355 **PART E: STANDARDS FOR THE APPLICATION OF BIOSOLIDS AND THE REUSE**  
3356 **OF TREATED NON-DOMESTIC WASTEWATER**

3357  
3358 **Section 48. General.**  
3359

3360 This part contains the minimum standards for the design and construction of waste and  
3361 wastewater land application facilities.

3362  
3363 The permitting of biosolids facilities or the land application of biosolids is regulated by  
3364 the U.S. Environmental Protection Agency (EPA) under the Code of Federal Regulations at 40  
3365 CFR Part 503. In cases where the EPA does not issue a permit under 40 CFR 503, the Wyoming  
3366 Department of Environmental Quality, Water Quality Division (WDEQ/WQD) will issue a  
3367 permit. The WQD will require applicants to comply with the requirements of 40 CFR § 503.12, §  
3368 503.13, and § 503.14. The permit applications and permits will be reviewed and processed  
3369 according to Chapter 3 of the Water Quality Rules and Regulations.  
3370

3371 **Section 49. Definitions Specific to Part E.**  
3372

3373 (a) **“Overland flow land application system”** is a system in which treatment is  
3374 accomplished by the application of wastewater to a sloping, largely impermeable site. Treatment  
3375 mechanisms include filtration, sedimentation, microbial oxidation, and crop uptake. Typical  
3376 application rates range from 0.0392-0.3136 yd<sup>3</sup>/yd/hr.  
3377

3378 (b) **“Primary treatment level”** (as related to pathogenic organism reduction) is that  
3379 level of fecal coliform reduction (a minimum of 25 percent reduction) achievable by primary  
3380 sedimentation in single cell discharging lagoons operated within the limits described in Part B,  
3381 Section 13(c).  
3382

3383 (c) **“Biosolids”** are solid, semi-solid, or liquid residue generated during the treatment  
3384 of domestic sewage in a treatment works. Biosolids include, but are not limited to, domestic  
3385 septage; scum or solids removed in primary, secondary, or advanced wastewater treatment  
3386 processes; and a material derived from biosolids. Biosolids do not include ash generated during  
3387 the firing of biosolids in a biosolids incinerator or grit and screenings generated during  
3388 preliminary treatment of domestic sewage in a treatment works.  
3389

3390 **Section 50. Site Requirements.**  
3391

3392 (a) The method for determining the size of a particular land site for accomplishing  
3393 the treatment level necessary to comply with an NPDES permit or to maintain a groundwater  
3394 aquifer within its present class shall be based on the number of acres (hectares) required to reduce  
3395 the waste constituent identified as requiring the largest land area, based on soil assimilative  
3396 capacity. The ratio used for this determination is expressed as:  
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3404 Required Land Treatment Area = G/C

3405

3406 Where:

3407

3408 G = generation rate = the yearly amount of the controlling constituent to be  
3409 applied for land treatment. G is listed in kilograms per year (kg/yr) or  
3410 pounds per year (lbs/yr).

3411

3412

3413 C = plant-soil assimilative capacity = the yearly amount of the controlling  
3414 constituent which can be assimilated by plant uptake, soil adsorption and  
3415 accumulation, transformation or degradation, and allow survival and  
3416 maintenance of indigenous or crop plant species. C is listed in kilograms  
3417 per hectare per year (kg/ha/yr) or pounds per acre per year (lbs/ac/yr).

3418

3419 Wastewater constituents or categories of constituents from which the land-limiting factor  
3420 will be selected are generally grouped as:

3421

3422

3423 Organics

Nitrogen

3424 Phosphorus

Heavy metals

3425 Salts, acids and bases

Water

3426 Oil and grease

3427

3428 (b) Slope. Slow rate irrigation systems (generally less than 4.0 inches/wk application  
3429 rate) will not be developed on slopes greater than 15 percent unless the site is terraced, gated pipe  
3430 is placed on the contour, or vegetation, application rate and soil infiltration rate are such that  
3431 runoff and erosion would not result.

3432

3433 Overland flow systems will not be developed on sites having less than two percent or  
3434 greater than eight percent slope.

3435

3436 (c) Soil profile. The minimum depth of unsaturated soil strata on which a land  
3437 treatment system may be developed is five feet for a slow rate system and ten feet for a rapid  
3438 infiltration system, unless underdrains or pumped recovery wells are employed for lowering the  
3439 water table. The applicant should refer to Part A, Section 5 for innovative technology permit  
3440 requirements.

3441

3442 (d) Runoff and erosion. All land treatment sites will be protected from upslope  
3443 runoff by diversion ditches capable of intercepting the overland flow from a 10-year 24-hour  
3444 storm event, unless it is otherwise demonstrated that a storm of this size will not have an impact  
3445 on the site. A runoff collection ditch is required at the base of overland flow slopes or on sloping  
3446 irrigation sites where site conditions are such that over application of wastewater and/or seasonal  
3447 precipitation events may threaten to pollute surface waters of the state. Provisions for storage,  
3448 return and reapplication are required where a runoff collection ditch is required.

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**Section 51. Pretreatment Water Quality Requirement.**

Pretreatment of wastewater shall provide sufficient organic and inorganic solids reduction, maintaining the estimated infiltration rate of the soil surface.

**Section 52. Reserved.**

**Section 53. Reserved.**

**Section 54. Reserved.**

**Section 55. Irrigation Water Quality.**

(a) The surface infiltration rate and hydraulic conductivity of the soil profile shall be approximated by the appropriate tests and used in determining an average annual application rate.

(b) Indigenous or crop plant species shall be capable of survival and maintenance under the conditions of increased soil moisture, salinity, and alkalinity, the classes of which will be determined by use of Figure 1, Tables 1-3 and a soil textural analysis. Waste and wastewater analyses required for this evaluation include electrical conductivity (EC in umhos/cm @ 25°C), sodium (Na<sup>+</sup>), calcium (Ca<sup>2+</sup>), magnesium (Mg<sup>2+</sup>), bicarbonate (HCO<sup>3-</sup>), chloride (Cl<sup>-</sup>), sulfate (SO<sub>4</sub><sup>2-</sup>), Boron (B) and Selenium (Se), and calculation of the Sodium Adsorption Ratio (SAR) by use of the formula:

$$SAR = \frac{Na^+}{\sqrt{\frac{([Ca^{2+}] + [Mg^{2+}])}{2}}}$$

(c) Numerical water quality criteria for special situations.

(i) For continuous and unrestricted irrigation of direct human consumption food crops or of parks, playgrounds, highway rest areas and rights-of-way (R.O.W.s), or domestic, commercial and industrial grounds with treated municipal wastewater effluent, the following quality criteria shall not be exceeded:

pH	4.5 - 9.0 s.u.
BOD	10.0 mg/L Daytime
BOD	30 mg/L Dusk-Dawn
TSS	5.0 mg/L Daytime
TSS	100 mg/L Dusk-Dawn
Fecal Coliforms	200/100 mL (positive disinfection)
TDS	480.0 mg/L
Electrical Conduivity, (EC)	750 micromhos/cm@25°C
Sodium Adsorption Ratio (SAR)	10
Chlorides (Cl <sup>-</sup> )	213 mg/L

Sulfates (SO <sub>4</sub> <sup>2-</sup> )	192 mg/L
Bicarbonates (HO <sub>3</sub> <sup>-</sup> )	Not greater than 50 percent of the total anion concentration in meq/L
Aluminum (Al)	5.0 mg/L
Arsenic (As)	1.0 mg/L
Beryllium (Be)	0.1 mg/L
Boron (B)	0.6 mg/L
Cadmium (Cd)	0.01 mg/L
Cobalt (Co)	0.5 mg/L
Chromium (Cr)	0.1 mg/L
Copper (Cu)	0.2 mg/L
Iron (Fe)	5.0 mg/L
Lead (Pb)	5.0 mg/L
Lithium (Li)	0.1 mg/L
Manganese (Mn)	10.0 mg/L
Nickel (Ni)	0.2 mg/L
Selenium (Se)	0.1 mg/L
Vanadium (V)	0.1 mg/L
Zinc (Zn)	2.0 mg/L

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(ii) For disposal of limited volumes of industrial wastewater and sludge of less than 10 percent solids, the following criteria shall not be exceeded:

pH	4.5 - 9.0 s.u.
Electrical Conductivity (EC)	3,250 micromhos/cm @25°C
Total Dissolved Solids	2,100 mg/L
Sodium Adsorption Ratio (SAR)	26
Potassium	In combination with sodium, will not produce an SAR greater than 26
Chlorides (Cl <sup>-</sup> )	1,500 mg/L
Sulfates (SO <sub>4</sub> <sup>2-</sup> )	960 mg/L
Bicarbonates (HCO <sub>3</sub> <sup>-</sup> )	Not greater than 50 percent of the total anion concentration, meq/L
Arsenic (as H <sub>3</sub> AsO <sub>4</sub> , Arsenious Acid)	0.1 mg/L
Boron (as H <sub>3</sub> BO <sub>3</sub> , Boric Acid)	2.0 mg/L
Chromium (Cr)	1.0 mg/L
Copper (Cu)	1.0 mg/L
Nickel (Ni)	0.2 mg/L
Selenium (Se)	0.2 mg/L
Zinc (Zn)	2.0 mg/L

Oil and grease

20,000 lbs/ac when  
soil incorporated  
(surface 6 inches)  
2,000 lbs/ac  
when surface applied

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(iii) All other continuous disposal land application systems will be approved on a site specific, case by case basis by use of the applicable standards and guidelines.

**Section 56. Effluent Quality.**

(a) Surface water protection. Discharge from a land treatment system to a surface water body will be regulated by the NPDES permit process.

(b) Groundwater protection. Percolation water from land treatment of waste or wastewater shall not degrade groundwater quality to the point at which it is no longer suitable for its current or potential use as described in Chapter VIII of the Wyoming Water Quality Regulations.



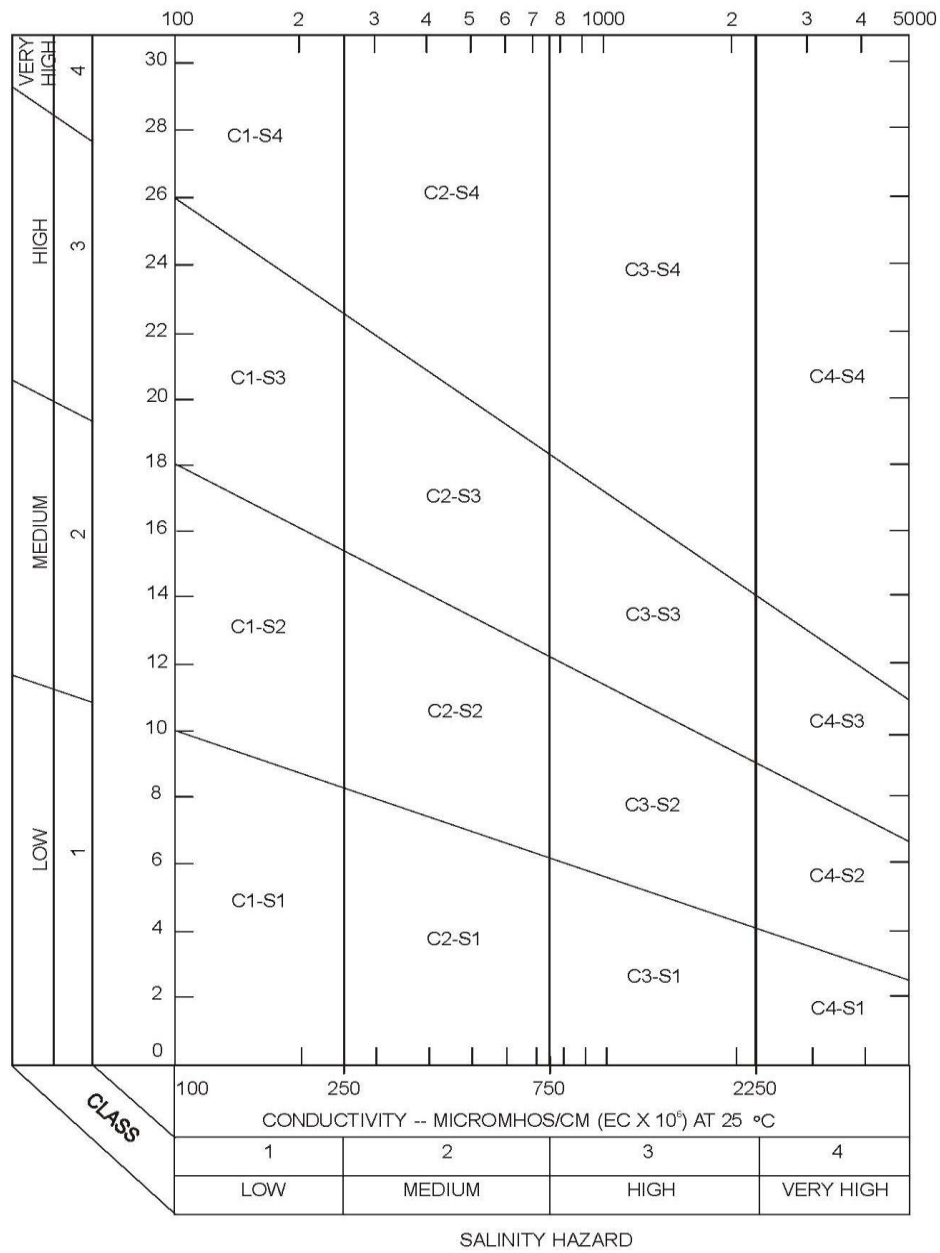


Figure I - Diagram for the classification of irrigation waters

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## IRRIGATION WATER QUALITY

### Permissibility Classes for Salinity

Class C1, low salinity: --

Good water with little or no likelihood of salt accumulation under the leaching provided by average irrigation practices, except where sub-surface drainage is inadequate.

Class C2, medium salinity: --

Can be used if a moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most cases without special practices for salinity control.

Class C3, high salinity: --

Cannot be used on soils with restricted drainage. With adequate drainage, considerable excess water must be applied to each irrigation; irrigations must be made more frequently, and plants with a good salt tolerance should be selected.

Class C4, very high salinity: --

Not usable under ordinary conditions. On very light and permeable soils with excellent drainage, water may be usable with a large amount of excess leaching water, frequent irrigations, and very salt-tolerant crops.

### Permissibility Classes for Alkalinity

Class S1, low sodium: --

Good for almost all soils and all Wyoming crops.

Class S2, medium sodium: --

Can cause alkali problems on heavy clayey soils, with low leaching, unless gypsum (or equivalent soil amendments) are present or added to the soils.

Class S3, high sodium: --

May create harmful levels of exchangeable sodium in all soils and will require special management--good drainage, high leaching, and organic matter additions. Soils containing natural gypsum may not develop alkali troubles. Chemical amendments may be necessary, but are not feasible with waters of very high salinity.

Class S4, very high sodium: --

Generally unsuited for irrigation. Special conditions of low salinity water, favorable gypsum content of soils, tolerant crops, and special management may permit use of these waters.

These water classes are based on recommendations of the United States Regional Salinity Laboratory and numerous state agricultural experiment stations.

TABLE 1 - Boron Class Limits

Class	Limits -- parts per million			Description
	Sensitive crops	Semi-tolerant crops	Tolerant crops	
1	Below 0.33	Below 0.67	Below 1.00	Very low. No effect on crops.
2	0.33 to 0.67	0.67 to 1.33	1.00 to 2.00	Low. Very slight effect on crops.
3	0.67 to 1.00	1.33 to 2.00	2.00 to 3.00	Moderate. Significant yield depression.
4	1.00 to 1.25	2.00 to 2.50	3.00 to 3.75	High. Large yield depression anticipated.
5	Over 1.25	Over 2.50	Over 3.75	Very high. Non-usable.

TABLE II - Selenium Class Limits

Class	Limits -- parts per million	Description
1	0.00 to 0.10	Low. No plant toxicity anticipated.
2	0.11 to 0.20	Medium. Usable -- possible long-term accumulation under particular conditions and should be watched
3	0.21 to 0.50	High. Doubtful -- probably toxic accumulation in plants except under especially favorable conditions
4	Over 0.50	Very High. Non-usable under any conditions.

TABLE III.

CHLORIDE AND SULFIDE LIMITS FOR THREE CLASSES OF IRRIGATION WATERS

Class		Chlorides		Sulfates	
		meq/L	mg/L	meq/L	mg/L
I-	Excellent to good; or suitable for most plants under most conditions	less than 2-5.5	71.1 - 195.5	4 - 10	192 - 480
II-	Good to injurious; harmful to some under certain conditions of soil, climate and practices	2 -16	71.1 - 568.0	4 - 20	192 - 960
III-	Injurious to unsatisfactory; unsuitable under most conditions	6 -16	213 - 568	12 - 20	576 - 960

3551 **PART F: MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC**  
3552 **WATER SUPPLY DISTRIBUTION SYSTEMS**

3553  
3554 **Section 57. General.**

3555  
3556 This part contains the minimum standards for the design and construction of mobile  
3557 home park and/or campground wastewater facilities and public water supply systems.  
3558

3559 **Section 58. Sewage System Standards.**

3560  
3561 (a) If sewerage system services are to be provided by a second person, a letter of  
3562 verification from the system manager stating that they are capable of handling added organic  
3563 and/or hydraulic loads shall be provided by the owner/operator of the system.  
3564

3565 (b) A mobile home park or campground sewerage system, treatment works and  
3566 disposal system shall comply with Part A, B, C, and/or D of Chapter XI except as follows:  
3567

3568 (i) Mobile home park sewerage systems, treatment works and disposal  
3569 systems shall be designed on the basis of not less than 350 gallons per site per day. Camp ground  
3570 sewerage systems, treatment works and disposal systems shall be designed on the basis of not less  
3571 than 100 gallons per site per day for all sewered sites or 75 gallons per site per day for all  
3572 unsewered sites.  
3573

3574 (ii) Sanitary sewers shall not be smaller than six inches in diameter. They  
3575 shall be installed at a slope equal to or greater than 0.6 feet per 100 feet.  
3576

3577 (iii) Not more than two mobile homes or campground sites shall be served  
3578 by a sanitary sewer service connection pipe of a least four inches in diameter, provided the main  
3579 branch of the service pipe is served by a cleanout and provided it is not longer than 50 feet. It  
3580 shall be installed at a minimum slope of 1/4 inch per foot. The riser portion of the service  
3581 connection pipe shall be constructed of cast iron or schedule 40 plastic pipe. The riser shall be  
3582 terminated at least four inches above finished grade and shall not be located closer than five feet  
3583 from a potable water service riser. The service connection pipe shall connect to the sewerage  
3584 system at a maximum 45 degree bend in the direction of sewage flow.  
3585

3586 (iv) Not more than one mobile home shall be served by a sanitary sewer  
3587 service riser pipe. The riser shall be located so as to minimize the length of pipe required to  
3588 connect the mobile home drain. The riser pipe shall be capped or plugged when not in use.  
3589

3590 (v) The connection of the mobile home drain to the riser pipe shall be sealed.  
3591

3592 (vi) If sewer service is provided to sites in a campground, the sanitary sewer  
3593 service connection pipe shall comply with subsections (iii) and (iv) above.  
3594

3595 (vii) Service connection pipes for campgrounds shall be trapped below the  
3596 frost line.  
3597  
3598  
3599

3600 **Section 59. Potable Water Supply Standards.**

3601  
3602 (a) The potable water distribution system serving any building, mobile home lot,  
3603 campground site or other appurtenance within a mobile home park or campground which is  
3604 connected to a public water supply shall be considered an extension or modification of the public  
3605 supply.

3606  
3607 (b) If water is to be obtained from a public water supply, a letter of verification shall  
3608 be provided from the public water supply system manager stating that the required flow can be  
3609 supplied at a minimum pressure of 20 pounds per square inch under all conditions of flow  
3610 throughout the proposed distribution system. A normal working pressure of 35 pounds per square  
3611 inch shall be maintained in the distribution system.

3612  
3613 (c) The public water supply serving mobile home sites, buildings and other facilities  
3614 within a mobile home park shall be designed, constructed or installed and protected in accordance  
3615 with Chapter XII of the Water Quality Rules and Regulations, except as follows:

3616 (i) The water supply source shall be capable of supplying the peak water  
3617 demand to a mobile home park distribution system according to the following table:  
3618

3619

Homes	Gallons per Minute
25	65
50	105
75	145
100	180
150	235
200	285
each additional mobile home over 200	1 gpm

3620 (ii) If fire protection is provided, the flow required shall be in addition to the  
3621 requirements of subsection (i) above.  
3622

3623 (iii) Each mobile home shall be provided with a potable water service  
3624 connection pipe. It shall be 3/4 inch nominal pipe size or larger. The riser portion of the pipe shall  
3625 be constructed of type K copper or steel pipe from a point below the frost line to the point of  
3626 connection to the mobile home piping. The riser shall terminate at least four inches above  
3627 finished grade and shall be protected from damage. The service connection pipe shall be provided  
3628 with a curb stop below frost penetration. A stop and waste valve with a weep hole below grade  
3629 shall not be used.  
3630

3631 (iv) The distribution system shall be of sufficient size to supply the required  
3632 volume of water at a minimum pressure of 20 pounds per square inch under all conditions of  
3633 demand. A working pressure of 35 pounds per square inch shall be maintained under average day  
3634 demand conditions. The distribution system mains shall not be smaller than 1 1/2 inches in  
3635 diameter. If fire protection is provided, the distribution system shall meet the requirements of  
3636 Chapter XII of the Water Quality Rules and Regulations.  
3637  
3638

3639 (v) If the potable water is pumped to the distribution system from wells or  
3640 storage facilities, the pumps shall be capable of meeting the maximum day demand with the  
3641 largest pumping unit out of service.

3642  
3643 (vi) Water storage facilities shall be provided when the potable water source  
3644 cannot meet the peak demand.

3645  
3646 (d) The public water supply serving campground sites, buildings and/or other  
3647 facilities within a campground shall be designed, constructed and protected in accordance with  
3648 Chapter XII of the Water Quality Rules and Regulations except as follows:

3649  
3650 (i) The public water supply source shall be capable of supplying water to a  
3651 campground distribution system at a rate of 0.5 gpm/site.

3652  
3653 (ii) Below ground stop and waste valves with weep holes below ground shall  
3654 not be permitted.

3655  
3656 (iii) A minimum pressure of 20 pounds per square inch shall be maintained  
3657 throughout the distribution system under all conditions of flow. A working pressure of 35 pounds  
3658 per square inch shall be maintained under average day demand conditions.

3659  
3660 (iv) The distribution piping shall not be smaller than one inch in diameter.  
3661 Service pipes shall not be smaller than 1/2 inch in diameter.

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**PART G: WELL CONSTRUCTION**

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**Section 60. Reserved.**

**Section 61. Reserved.**

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**Section 70. Reserved.**

3689 **PART H: STANDARDS FOR THE REUSE OF TREATED DOMESTIC WASTEWATER**  
3690

3691 **Section 71. Authority and Purpose.**  
3692

3693 (a) These regulations establish standards that address the primary health concerns  
3694 associated with the reuse of treated wastewater. The regulations establish criteria to address the  
3695 risk of pathogen exposure and infectious disease risks associated with various specified uses of  
3696 treated wastewater. The regulations establish standards for the following:

- 3697
- 3698 (i) The level of wastewater treatment required;
  - 3699 (ii) Treatment reliability requirements;
  - 3700 (iii) Upper limits for water quality parameters;
  - 3701 (iv) Site access restrictions; and
  - 3702 (v) Management practices.
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3708 (b) In addition, the standards in this part include the parameters to be monitored,  
3709 frequency of monitoring, record keeping and reporting requirements when treated wastewater is  
3710 reused.

3711 (c) These regulations establish the degree of control required for wastewater reuse  
3712 through site access limitations, management practices and crop restrictions that will be  
3713 commensurate with the level of treatment provided, reliability of the treatment process, quality of  
3714 the wastewater and the intended use. As the quality of the wastewater and the reliability of the  
3715 treatment process increases, the regulatory controls are reduced to a level consistent with  
3716 protecting public health and the environment.  
3717

3718 (d) Pathogen reduction and public health impacts related to infectious disease agents  
3719 are the major concerns associated with the reuse of treated wastewater. Chemical and toxic  
3720 pollutants in treated domestic sewage are generally not a concern and are not targeted for state  
3721 regulation in this chapter. There are additional constituents, such as total dissolved solids, that  
3722 should be considered as part of an overall irrigation management program but are not regulated  
3723 by this chapter.  
3724

3725 **Section 72. Applicability.**  
3726

3727 (a) These regulations apply to any person who prepares or applies treated waste-  
3728 water from domestic sewage.  
3729

3730 (b) These regulations are not applicable if the primary intent is to provide treatment  
3731 and/or disposal of a wastewater. Treatment and disposal are regulated under appropriate sections  
3732 of Chapter 11, Wyoming Water Quality Rules and Regulations.  
3733

3734 (c) If the reuse of treated wastewater involves the construction of facilities for the  
3735 disinfection, delivery, storage or land application, a construction permit is required in accordance  
3736 with the provisions of Chapters 3 and 11, Wyoming Water Quality Rules and Regulations. Such  
3737



3738 a permit constitutes approval to reuse the treated wastewater. This permit is not an operational  
3739 permit and does not require periodic renewal. If there are no structural facilities requiring a  
3740 construction permit, the reuse of wastewater will be authorized by a land application permit  
3741 issued in accordance with these regulations. The land application permit is not an operational  
3742 permit and does not require periodic renewal.

3743  
3744 (d) These regulations are not applicable to the discharge of a treated wastewater  
3745 which is subject to a discharge permit issued pursuant to Chapter 2, Wyoming Water Quality  
3746 Rules and Regulations.

3747  
3748 (e) These regulations are not applicable to treated wastewater reused at reclamation  
3749 sites regulated by the Land Quality Division under Article 4 of the Wyoming Environmental  
3750 Quality Act.

3751  
3752 (f) These regulations are not applicable to treated wastewater reused for irrigation of  
3753 grass, shrubs and trees at the treatment works.

3754  
3755 (g) These regulations are not applicable to the disposal of gray water.

3756  
3757 (h) These regulations are not applicable to groundwater recharge projects which are  
3758 regulated by the Underground Injection Control Program of the Department of Environmental  
3759 Quality, Water Quality Division.

3760  
3761 **Section 73. Definitions Specific to Part H.**

3762  
3763 The following definitions supplement those definitions contained in Section 35-11-103 of  
3764 the Wyoming Environmental Quality Act.

3765  
3766 (a) **“Agricultural land”** is land on which a food crop, a feed crop, or a fiber crop is  
3767 grown. This includes range land and land used as pasture.

3768  
3769 (b) **“Agronomic rate”** is the wastewater application rate designed to: (1) provide  
3770 the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation  
3771 grown on the land; and (2) minimize the amount of nitrogen in the treated wastewater that passes  
3772 below the root zone of the crop or vegetation grown on the land to the groundwater.

3773  
3774 (c) **“Class A wastewater”** is treated wastewater which has received advanced  
3775 treatment and/or secondary treatment and a level of disinfection so that the maximum number of  
3776 fecal coliform organisms is 2.2/100 mL or less.

3777  
3778 (d) **“Class B wastewater”** is treated wastewater which has received the equivalent  
3779 of secondary treatment and a level of disinfection so that the maximum fecal coliform level is  
3780 greater than 2.2/100 mL but less than 200/100 mL.

3781  
3782 (e) **“Class C wastewater”** is treated wastewater which has received the equivalent  
3783 of primary treatment and a level of disinfection so that the maximum fecal coliform level is  
3784 200/100 mL or greater but less than 1000/100 mL.

3785

3786 (f) **“Contaminate a groundwater aquifer”** means to introduce a substance that  
3787 causes the maximum contaminant level for water quality parameters specified in Chapter 8,  
3788 Wyoming Water Quality Rules and Regulations to be exceeded or that causes the existing  
3789 concentration of pollutants in groundwater to increase when the existing concentration of the  
3790 parameters in the groundwater exceeds the maximum contaminant level specified in Chapter 8,  
3791 Wyoming Water Quality Rules and Regulations.  
3792

3793 (g) **“Direct human consumption food crops”** are crops consumed directly by  
3794 humans. These include, but are not limited to fruits, vegetables and grains grown for human  
3795 consumption.  
3796

3797 (h) **“Domestic sewage”** is waste and wastewater that is primarily from human or  
3798 household operations that is discharged to or otherwise enters a treatment works.  
3799

3800 (i) **“Forest”** is a tract of land thick with trees and underbrush.  
3801

3802 (j) **“Groundwater”** is subsurface water that fills available openings in rock or soil  
3803 material such that they may be considered water saturated under hydrostatic pressure.  
3804

3805 (k) **“Indirect human consumption crop”** are crops utilized by grazing animals and  
3806 are thereby one step removed from human consumption.  
3807

3808 (l) **“Land with a high potential for public exposure”** is land that the public uses  
3809 frequently and there are no restrictions or limitations on public access during irrigation periods.  
3810 This includes, but is not limited to public parks, ball fields, cemeteries, plant nurseries, turf farms,  
3811 golf courses and a reclamation site located in a populated area (e.g., a construction site located in  
3812 a city).  
3813

3814 (m) **“Land with moderate potential for public exposure”** is land that is accessible  
3815 to the public but access is limited during irrigation periods. This would include the facilities in  
3816 (n) where signing and fencing is provided to restrict access.  
3817

3818 (n) **“Land with a low potential for public exposure”** is land that the public uses  
3819 infrequently. This includes, but is not limited to agricultural land, forest, and a reclamation site  
3820 located in an unpopulated area (e.g., a strip mine located in a rural area).  
3821

3822 (o) **“Municipal wastewater”** means the discharge from a publicly owned or con-  
3823 trolled treatment system receiving primarily domestic wastewater or a combination of domestic,  
3824 commercial and industrial wastewater that is normally treated in a primary, secondary or  
3825 advanced wastewater treatment process.  
3826

3827 (p) **“Pathogenic organisms”** are disease-causing organisms. These include, but are  
3828 not limited to certain bacteria, protozoa, viruses, and viable helminth ova.  
3829

3830 (q) **“Pasture”** is land on which animals feed directly on feed crops such as legumes,  
3831 grasses, grain stubble, or stover.  
3832

3833 (r) **“Permitting authority”** is the Department of Environmental Quality, Water  
3834 Quality Division.

3835  
3836  
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(s) **“Pollutant”** is an organic substance, an inorganic substance, a combination of organic and inorganic substances, or a pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could, on the basis of information available to the permitting authority, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in either organisms or offspring of the organisms.

(t) **“Pollutant limit”** is a numerical value that describes the amount of a pollutant allowed per unit amount of wastewater (e.g., milligrams per liter).

(u) **“Range land”** is open land used for grazing by livestock and/or wildlife on which the natural potential plant community is dominated by grasses, grasslike plants, forbs and shrubs.

(v) **“Reclamation site”** is drastically disturbed land that is reclaimed using wastewater. This includes, but is not limited to, strip mines and construction sites.

(w) **“Runoff”** is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off of the land surface.

(x) **“Treated wastewater”** is domestic sewage discharged from a treatment works after completion of the treatment process.

(y) **“Treatment works”** is either a publicly or privately owned device or system used to treat either domestic sewage or a combination of domestic sewage and commercial or industrial waste of a liquid nature.

#### **Section 74. Compliance with Other Laws and Regulations.**

Nothing in these regulations or the permits issued pursuant to these regulations shall be construed to relieve the recipient of a permit of the need to comply with any other law, rule or regulation. It is the duty of the permittee to comply with all applicable federal, state and local laws or regulations in the exercise of activities authorized pursuant to these regulations.

Specifically, the permittee is responsible for complying with the water right requirements of the Wyoming State Engineers Office.

#### **Section 75. Compliance Period.**

(a) Compliance with the standards in these regulations shall be achieved as expeditiously as practicable, but in no case later than one year after final adoption. When compliance with the standards requires construction of new or modified treatment facilities, compliance with the standards shall be achieved as expeditiously as practicable, but in no case later than two years after final adoption.

(b) Water reuse facilities operating under authority granted by the Department of Environmental Quality are required to notify the department of the nature and requirements of the

3884 existing authorization. Existing authorized facilities are not required to comply with the  
3885 requirements of these regulations unless the administrator determines it is necessary to revise the  
3886 existing authorization in order to protect public health and the environment. Existing facilities  
3887 are required to comply with the monitoring and reporting requirements of Sections 83, 84, 85 and  
3888 86.

3889

3890 **Section 76. Permits, Enforceability and Applications.**

3891

3892 (a) The requirements in these regulations may be implemented through:

3893

3894 (i) A land application permit issued by the Department of Environmental  
3895 Quality, Water Quality Division in accordance with these regulations;

3896

3897 (ii) A construction and operation permit issued by the Department of  
3898 Environmental Quality, Water Quality Division in accordance with Chapters 11 and 31, Wyoming  
3899 Water Quality Rules and Regulation; or

3900

3901 (iii) A general statewide operation permit issued by the Water Quality  
3902 Division, Department of Environmental Quality for the Land Application of Treated Waste-  
3903 water.

3904

3905 (b) No person shall prepare or use treated wastewater except in accordance with the  
3906 requirements of these regulations.

3907

3908 (c) Applications for permits shall be submitted to the Department of Environmental  
3909 Quality, Water Quality Division in accordance with the requirements of Chapter 3, Wyoming  
3910 Water Quality Rules and Regulations. The application materials submitted shall be adequate to  
3911 demonstrate compliance with all requirements of this part. It shall be the responsibility of the  
3912 applicant to demonstrate that the proposed reuse of treated wastewater will not endanger public  
3913 health or the environment.

3914

3915 (d) The person who prepares treated wastewater and makes it available to another  
3916 person for reuse shall provide, as part of the application required by Section 76 (c), a  
3917 demonstration that all of the requirements of this chapter will be met. This will include access  
3918 restrictions, management practices, record keeping and reporting requirements which may be the  
3919 responsibility of another person who will apply the treated wastewater. This demonstration may  
3920 be in the form of either a written agreement with the applier specifying his or her responsibilities  
3921 or a separate permit application from the applier. If the method selected is an agreement, the  
3922 agreement must cover appropriate access restrictions, management practices, record keeping and  
3923 reporting requirements of this chapter. If the method selected is a separate permit for the applier  
3924 the permit application by the applier must address the same requirements.

3925

3926 (e) Any person who prepares treated wastewater outside of the state to be applied  
3927 within the state must either obtain a permit to land apply in accordance with this chapter or  
3928 provide the wastewater to a person who has a permit.

3929

3930 (f) Any person who prepares treated wastewater outside of the State of Wyoming  
3931 that is to be applied to land within the State of Wyoming and opts not to obtain a permit shall  
3932 provide written notice, prior to the initial application of treated wastewater to the reuse site by the

3933 applicator, to the Department of Environmental Quality, Water Quality Division. The notification  
3934 shall include the following:

3935  
3936 (i) The location, by either street address or latitude and longitude, of each  
3937 reuse site;

3938  
3939 (ii) The approximate time period the treated wastewater will be applied to  
3940 the site;

3941  
3942 (iii) The name, address, telephone number, and National Pollutant Discharge  
3943 Elimination System permit number (if appropriate) for the person who prepares the treated  
3944 wastewater;

3945  
3946 (iv) The name, address, telephone number of the person who will reuse the  
3947 treated wastewater; and

3948  
3949 (v) Documentation that the requirements of this regulation have been met.  
3950

3951 **Section 77. Exclusions.**

3952  
3953 (a) Treatment processes. These regulations do not establish requirements for  
3954 processes used to treat wastewater.

3955  
3956 (b) Selection of a reuse practice. This chapter does not require the selection of a  
3957 reuse practice. The determination of the manner in which treated wastewater is to be reused is a  
3958 local determination.

3959  
3960 **Section 78. General Management Practices.**

3961  
3962 (a) Treated wastewater shall be applied for the purpose of beneficial reuse and shall  
3963 not exceed the irrigation need or demand of the vegetation at the site. Winter irrigation is  
3964 considered to be beneficial reuse.

3965  
3966 (b) Treated wastewater shall not be applied to agricultural land, forest, a public  
3967 contact site, or a reclamation site at an application rate that is greater than the agronomic rate for  
3968 the vegetation at the site.

3969  
3970 (c) Treated wastewater shall not be applied in a manner that will contaminate a  
3971 groundwater aquifer.

3972  
3973 (d) Treated wastewater will be applied in a manner and time that will not cause any  
3974 surface runoff to leave the application site and enter surface waters of the state.

3975  
3976 (e) Direct human consumption food crops shall not be harvested for 30 days after  
3977 application of treated wastewater.

3978  
3979 (f) Animals shall not be allowed to graze on the land for 30 days after application of  
3980 Class C treated wastewater.

3981

3982 (g) Fencing and signing shall be provided at sites where Class B treated wastewater  
3983 is proposed for reuse on land with a moderate potential for public exposure.

3984  
3985 (h) Signing shall be provided at sites where Class B or Class C treated wastewater is  
3986 proposed for reuse on land with a low potential for public exposure in order to protect the health  
3987 and safety of workers.

3988  
3989 **Section 79. Site Isolation Requirements.**

3990  
3991 No person shall reuse treated wastewater on an application site except in accordance with  
3992 the restrictions specified below.

3993  
3994 (a) Isolation of spray irrigation systems.

3995  
3996 (i) Wind drift shall not leave the application site.

3997  
3998 (ii) If Class A or Class B wastewater is reused for irrigation, a 30 foot buffer  
3999 zone is required between the reuse site and adjacent property lines. Public right-of-ways may be  
4000 utilized to meet this requirement for a buffer zone.

4001  
4002 (iii) If Class C wastewater is reused for irrigation a 100 foot buffer zone is  
4003 required between the reuse site and adjacent property lines and any public right-of-way.

4004  
4005 (iv) A 30 foot separation distance is required between reuse sites and all  
4006 surface waters.

4007  
4008 (v) A 100 foot separation distance is required between reuse sites and all  
4009 potable water supply wells.

4010  
4011 (vi) Surface runoff shall not leave the application site.

4012  
4013 (b) Isolation distances between reuse sites irrigated by flood irrigation systems.

4014  
4015 (i) Surface runoff shall not leave the application site.

4016  
4017 (ii) If Class A or Class B wastewater is reused for irrigation, a 30 foot buffer  
4018 zone is required between the reuse site and adjacent property lines. Public right-of-ways may be  
4019 utilized to meet this requirement for a buffer zone.

4020  
4021 (iii) If Class C wastewater is reused for irrigation, a 30 foot buffer zone is  
4022 required between the reuse site and adjacent property lines and any public right-of-way.

4023  
4024 (iv) A 30 foot separation distance is required between reuse sites and all  
4025 surface waters.

4026  
4027 (v) A 100 foot separation distance is required between reuse sites and all  
4028 potable water supply wells.

4029

4030 (c) Drip irrigation systems. The buffer zone requirements of Section 79(a)(ii) and  
4031 79(b)(ii) for Class A and B wastewaters may be met by the use of drip irrigation systems.

4032

4033 **Section 80. Minimum Level of Wastewater Treatment.**

4034

4035 Treated wastewater must receive the equivalent of primary treatment and a maximum  
4036 fecal coliform value of less than 1000/100 ml in order to be reused in accordance with these  
4037 regulations.

4038

4039 **Section 81. Treatment Reliability.**

4040

4041 (a) The ability of the treatment process to deliver the class of treated wastewater  
4042 required for a particular use will be considered by the permitting authority when approving or  
4043 denying wastewater reuse in accordance with Section 76. The criteria for evaluating treatment  
4044 reliability may include the following as appropriate:

4045

4046 (i) Multiple units and equipment;

4047

4048 (ii) Alternative power sources;

4049

4050 (iii) Alarm systems and instrumentation;

4051

4052 (iv) Operator certification and stand-by capability;

4053

4054 (v) Bypass and dewatering capability;

4055

4056 (vi) Frequency of sampling;

4057

4058 (vii) Hydraulic and organic loading design capabilities; and

4059

4060 (viii) Emergency storage.

4061

4062 (b) Where treatment reliability cannot be provided by existing facilities, the reuse  
4063 may be approved based upon the preparer's ability to dispose of the treated wastewater in an  
4064 acceptable alternative manner or to reuse the treated wastewater for a less restrictive authorized  
4065 reuse as indicated in Section 82.

4066

4067 **Section 82. Authorized Reuse.**

4068

4069 (a) Class A wastewater may be used for the following purposes:

4070

4071 (i) Irrigation of land with a high potential for public exposure;

4072

4073 (ii) Irrigation of land with a moderate potential for public exposure;

4074

4075 (iii) Irrigation of land with a low potential for public exposure;

4076

4077 (iv) Irrigation of direct human consumption food crops; and

4078

- 4079 (v) Irrigation of indirect human consumption food crops.  
4080  
4081 (b) Class B wastewater may be used for the following purposes:  
4082  
4083 (i) Irrigation of land with a moderate potential for public exposure;  
4084  
4085 (ii) Irrigation of land with a low potential for public exposure;  
4086  
4087 (iii) Irrigation of direct human consumption food crops; and  
4088  
4089 (iv) Irrigation of indirect human consumption food crops.  
4090  
4091 (c) Class C wastewater may be used for the following purposes:  
4092  
4093 (i) Irrigation of land with a low potential for public exposure; and  
4094  
4095 (ii) Irrigation of indirect human consumption food crops.  
4096

4097 **Section 83. Monitoring.**  
4098

4099 (a) Sampling. Representative samples of the treated wastewater that is to be reused  
4100 shall be collected and analyzed by the person who prepares the wastewater.  
4101

4102 (b) Methods. Waste constituents shall be analyzed in accordance with 40 CFR Part  
4103 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants.  
4104

4105 (c) Parameters. The treated wastewater shall be analyzed for the following:  
4106

4107 (i) Fecal coliform;

4108 (ii) Nitrate as N;

4109 (iii) Ammonia as N;

4110 (iv) pH;

4111 (v) Parameters identified in 40 CFR Part 122, Appendix D, Table III, when  
4112 required by the NPDES permit; and  
4113  
4114

4115 (vi) Other parameters identified in the permit.  
4116  
4117

4118 (d) Frequency for monitoring for these pollutants shall be:  
4119

4120 (i) For lagoon systems, once per month or the frequency specified in the  
4121 NPDES discharge permit whichever is more frequent;  
4122

4123 (ii) For mechanical plants, once per week or the monitoring frequency  
4124 specified in the NPDES discharge permit whichever is more frequent; and  
4125  
4126  
4127



4128 (iii) For monitoring of parameters identified in Section 83 (c) (v), shall be  
4129 conducted at the frequency specified in the NPDES discharge permit.

4130 **Section 84. Noncompliance Actions, Reporting and Monitoring Requirements.**

4131  
4132  
4133 In the event that the monitoring program identified in Section 83 indicates  
4134 noncompliance with the fecal coliform levels associated with the class of wastewater and the  
4135 appropriate authorized reuse identified in Section 82, the responsible party shall take the  
4136 following actions.

4137  
4138 (a) Discontinue the reuse of treated wastewater immediately. The responsible party  
4139 may discharge in compliance with the requirements of an NPDES permit or convert to any  
4140 authorized reuse which is consistent with the quality of the treated wastewater.

4141  
4142 (b) Report the noncompliance to the permitting authority as soon as possible, but no  
4143 later than the next working day.

4144  
4145 (c) Initiate monitoring of the parameter in noncompliance on a daily or more  
4146 frequent basis in order to adequately demonstrate that the treated wastewater can reliably meet the  
4147 reuse criteria.

4148  
4149 (d) Report the results on the noncompliance monitoring to the permitting authority.  
4150 Upon adequate demonstration by the responsible party that the reuse criteria can be reliably met,  
4151 the permitting authority may grant verbal and written authorization to re-institute the discontinued  
4152 reuse.

4153  
4154 (e) The responsible party shall provide a written report within 15 days of the  
4155 resolution of the event which will contain the following:

- 4156 (i) A description of the noncompliance and its cause;  
4157  
4158 (ii) The period of the noncompliance, including dates and times;  
4159  
4160 (iii) All monitoring data related to the noncompliance and the return to  
4161 compliance; and  
4162  
4163 (iv) Steps taken or planned to reduce, eliminate or prevent reoccurrence of  
4164 the noncompliance.  
4165  
4166  
4167

4168 **Section 85. Record Keeping.**

4169  
4170 (a) A person who prepares treated wastewater shall develop the following  
4171 information and shall retain the information for five (5) years.

4172  
4173 (i) The concentration of each applicable pollutant listed in Section 83 (c) in  
4174 the treated wastewater at the frequency specified in Section 83 (d).  
4175

- 4176 (ii) A description of how the minimum level of treatment requirements in  
4177 Section 80 are met.  
4178  
4179 (iii) A description of how the treatment reliability requirements in Section 81  
4180 are met.  
4181  
4182 (iv) The following certification statement: "I certify, under penalty of law,  
4183 that the level of treatment requirements in Section 80 of Chapter 11, Wyoming Water Quality  
4184 Rules and Regulations, the treatment reliability requirements in Section 81 and the water quality  
4185 parameters have been met. This determination has been made under my direction and  
4186 supervision. I am aware that there are significant penalties for false certification."  
4187
- 4188 (b) A person who prepares treated wastewater shall obtain the following information  
4189 from any person who reuses the treated wastewater and shall retain the information for five years.  
4190
- 4191 (i) The location, by either street address or latitude and longitude, of each  
4192 site on which treated wastewater is applied.  
4193
- 4194 (ii) The number of acres on each site on which treated wastewater is applied.  
4195
- 4196 (iii) The date and time treated wastewater is applied to each site.  
4197
- 4198 (iv) The cumulative amount of treated wastewater applied to each site.  
4199
- 4200 (v) The following certification statement: "I certify, under penalty of law,  
4201 that the general management practices in Section 78 of Chapter 11, Wyoming Water Quality  
4202 Rules and Regulations, and the site isolation requirements in Section 79 have been met. This  
4203 determination has been made under my direction and supervision. I am aware that there are  
4204 significant penalties for false certification."  
4205

4206 **Section 86. Reporting.**

- 4207
- 4208 (a) A person preparing treated wastewater shall submit the information in Section 85  
4209 (a) and (b) to the permitting authority on an annual basis.  
4210
- 4211 (b) A person who reuses treated wastewater shall submit the information in Section  
4212 85 (b) to the person who prepares the treated wastewater on an annual basis if he or she is  
4213 operating under an agreement with the applicer. If the application is regulated by a permit, the  
4214 information shall be submitted to the permitting authority.  
4215

4216

4217 **Section 87. Operation and Maintenance Manual.**

- 4218
- 4219 (a) Any person responsible for the application of treated wastewater shall provide an  
4220 operation and maintenance manual as part of the agreement or permit application required by  
4221 Section 75 (d).  
4222
- 4223 (b) The operation and maintenance manual shall include the following:  
4224

- 4225 (i) Description of the facilities;
- 4226
- 4227 (ii) Description of the application system;
- 4228
- 4229 (iii) Procedures for emergency operation and spill events;
- 4230
- 4231 (iv) Procedures for meeting permit and regulatory requirements;
- 4232
- 4233 (v) Maintenance and operation requirements for any mechanical equipment;
- 4234 and
- 4235 (vi) Description of how the monitoring, record keeping and reporting
- 4236 requirements of this chapter will be met.
- 4237
- 4238
- 4239
- 4240
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- 4242 15-0052 gjt

CHAPTER 11

DESIGN AND CONSTRUCTION STANDARDS FOR  
SEWERAGE SYSTEMS, TREATMENT WORKS, DISPOSAL SYSTEMS OR  
OTHER FACILITIES CAPABLE OF CAUSING OR CONTRIBUTING TO POLLUTION  
AND MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC WATER  
SUPPLY DISTRIBUTION SYSTEMS

**Table of Contents**

**PART A: INTRODUCTION AND GENERAL REQUIREMENTS**

Section 1. Authority. .... 1

Section 2. Purpose. .... 1

Section 3. Intent. .... 1

Section 4. Definitions. .... 1

Section 5. Facilities and Systems Not Specifically Covered by These Standards. 4

Section 6. Engineering Design Report. 4

Section 7. Plans and Specifications Content. 6

**PART B: MUNICIPAL AND DOMESTIC SEWERAGE SYSTEMS, TREATMENT  
WORKS, AND DISPOSAL SYSTEMS**

Section 8. General. .... 9

Section 9. Design of Sewers. .... 9

Section 10. Pumping stations. .... 14

Section 11. General Treatment Plant Considerations. .... 19

Section 12. Pretreatment. .... 22

Section 13. Primary Treatment. .... 26

Section 14. Activated Sludge. .... 28

Section 15. Attached Growth Systems. .... 33

Section 16. Combination systems. .... 35

Section 17. Secondary settling. .... 35

Section 18. Lagoons. .... 38

Section 19. Tertiary treatment systems. .... 41

Section 20. Sludge Handling, Treatment and Disposal. .... 45

Section 21. Disinfection. .... 51

Section 22. Effluent Structures. .... 54

Section 23. Laboratory requirements. .... 54

Section 24. Operation and Maintenance Manuals. .... 56

**PART C: COMMERCIAL/INDUSTRIAL WASTE AND WASTEWATER FACILITIES**

Section 25. General. .... 59

Section 26. Discharge to Public Sewerage System. .... 59

Section 27. Domestic Wastes from Commercial/Industrial Facilities. .... 59

Section 28. Biological Treatment Ponds. .... 59

Section 29. Feedlots. .... 63

Section 30. Non-biological Treatment Ponds. .... 66

Section 31. Sedimentation Control Facilities. .... 70

**PART D: SEPTIC TANK AND/OR SOIL ABSORPTION SYSTEMS AND OTHER  
SMALL WASTEWATER SYSTEMS**

Section 32. Reserved. .... 72

Section 33. Reserved. .... 72

Section 34. Reserved. .... 72

Section 35. Reserved. .... 72

Section 36. Reserved. .... 72

Section 37. Reserved. .... 72

Section 38. Reserved. .... 72

Section 39. Reserved. .... 72

Section 40. Reserved. .... 72

Section 41. Reserved. .... 72

Section 42. Reserved. .... 72

Section 43. Reserved. .... 72

Section 44. Reserved. .... 72

Section 45. Reserved. .... 72

Section 46. Reserved. .... 72

Section 47. Reserved. .... 72

**PART E: WASTE AND WASTEWATER**  
**LAND APPLICATION FACILITIES STANDARDS FOR THE APPLICATION OF**  
**BIOSOLIDS AND THE REUSE OF TREATED NON-DOMESTIC WASTEWATER**

Section 48. General. .... 73

Section 49. Definitions Specific to Part E. .... 73

Section 50. Site Requirements. .... 74

Section 51. Pretreatment Water Quality Requirement. .... 75

Section 52. ~~Disinfection and Pathogen Control.~~ Reserved. .... 75

Section 53. ~~Buffer Zone.~~ Reserved. .... 75

Section 54. ~~Land Application of Municipal Sewage Sludge and Septic Tank Pumpings Reserved.~~ ..... 75

Section 55. Irrigation Water Quality. .... 79

Section 56. Effluent Quality. .... 81

**PART F: MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC WATER SUPPLY DISTRIBUTION SYSTEMS**

Section 57. General. .... 82

Section 58. Sewage System Standards. .... 82

Section 59. Potable Water Supply Standards. .... 83

**PART G: WELL CONSTRUCTION**

Section 60. Reserved. .... 85

Section 61. Reserved. .... 85

Section 62. Reserved. .... 85

Section 63. Reserved. .... 85

Section 64. Reserved. .... 85

Section 65. Reserved. .... 85

Section 66. Reserved. .... 85

Section 67. Reserved. .... 85

Section 68. Reserved. .... 85

Section 69. Reserved. .... 85

Section 70. Reserved. .... 85

**(formerly Chapter 21) PART H: STANDARDS FOR THE REUSE OF TREATED DOMESTIC WASTEWATER**

(formerly Chapter 21, Section 1) Section 71. Authority and Purpose. .... 86

(formerly Chapter 21, Section 2)Section 72. Applicability. .... 87

(formerly Chapter 21, Section 3) Section 73. Definitions Specific to Part H. .... 87

(formerly Chapter 21, Section 4)Section 74. Compliance with Other Laws and Regulations. 90

(formerly Chapter 21, Section 5) Section 75. Compliance Period. .... 90

(formerly Chapter 21, Section 6)Section 76. Permits, Enforceability and Applications. .... 90

(formerly Chapter 21, Section 7)Section 77. Exclusions. .... 92

(formerly Chapter 21, Section 8)Section 78. General Management Practices. .... 92

(formerly Chapter 21, Section 9) Section 79. Site Isolation Requirements. .... 92

(formerly Chapter 21, Section 10) Section 80. Minimum Level of Wastewater Treatment. ... 94

(formerly Chapter 21, Section 11) Section 81. Treatment Reliability. .... 94

(formerly Chapter 21, Section 12) Section 82. Authorized Reuse. .... 94

(formerly Chapter 21, Section 13) Section 83. Monitoring. .... 95

(formerly Chapter 21, Section 14) Section 84. Noncompliance Actions, Reporting and  
Monitoring Requirements. .... 96

(formerly Chapter 21, Section 15) Section 85. Record Keeping. .... 97

(formerly Chapter 21, Section 16) Section 86. Reporting. .... 98

(formerly Chapter 21, Section 17) Section 87. Operation and Maintenance Manual. .... 98





49 (a) **“Affected land”** means the area of land from which overburden is removed, or  
50 upon which overburden, development waste rock or refuse is deposited, or both, access roads,  
51 haul roads, mineral stockpiles, mill tailings, impoundment basins, and all other lands whose  
52 natural state has been or will be disturbed as a result of the operations.

53  
54 (b) **“Campground”** means a parcel or tract of land under the control of a person at  
55 which sites are offered for the use of the public or members of an organization either free of  
56 charge or for a fee, for the establishment of temporary living quarters for two or more recreational  
57 units.

58  
59 (c) **“Commercial/industrial waste and wastewater facilities”** means any facility  
60 not defined as a municipal or single family residence facility.

61  
62 (d) **“Construction”** shall encompass the materials used, installation procedures and  
63 tolerances, and testing and disinfection requirements.

64  
65 (e) **“Feedlot”** means the concentrated confinement of animals or poultry in pens or  
66 houses for meat, milk, or egg production or the stabling of animals or poultry for a period of 45  
67 days or more in a 12 month period when forage or crops are not grown in the area of  
68 confinement.

69  
70 (f) **“Hazardous substance”** means any matter of any description including  
71 petroleum related products and radioactive material (substance) which, when discharged into any  
72 waters of the state, presents an imminent and substantial hazard to public health or welfare. This  
73 definition includes all materials (substances) so designated by the U. S. Environmental Protection  
74 Agency in the Federal Register for March 13, 1978 (Part III), Water Programs, Hazardous  
75 Substances.

76  
77 (g) **“Land application/treatment”** means the application of wastes or wastewater to  
78 the land at a predetermined rate for the purpose of disposal or treatment by any or all of the  
79 following processes: degradation, plant uptake, assimilation or accumulation in the soil profile  
80 from filtration.

81 (h) **“Maximum daily demand”** means the largest daily water use rate which would  
82 occur during the calendar year.

83  
84 (i) **“Maximum hourly or peak hourly demand”** means the largest water use rate  
85 which would occur during any one hour during the year. The maximum hourly demand may or  
86 may not occur during the maximum daily demand period.

87  
88 (j) **“Mobile home park”** means a parcel or tract of land under the control of a  
89 person upon which two (2) or more mobile homes are located on a continual or seasonal  
90 nonrecreational basis, regardless of whether a charge is made therefore.

91  
92 (k) **“Off-channel”** means the interception of a drainage way which collects runoff  
93 only from disturbed areas.

94  
95 (l) **“On-channel”** means the interception of a drainage way which collects runoff  
96 from both disturbed and undisturbed areas.

97

98 (m) **“Permanent pool level”** means the elevation in a sedimentation pond or  
99 sediment control structure below which the water will not be discharged by an outlet structure or  
100 by pumping.

101

102 (n) **“Pond/lagoon”** means a manmade or natural basin which is intended for  
103 containment, treatment or disposal of wastes or wastewater.

104

105 (o) **“Rapid infiltration system”** means a land treatment system in which treatment  
106 is accomplished by the movement of large quantities of wastewater through a coarse or highly  
107 permeable soil profile.

108

109 (p) **“Recreational unit”** means a tent or vehicular type structure, primarily designed  
110 as temporary living quarters for recreational, camping, or travel use, which either has its own  
111 motive power or is mounted on or drawn by a self-powered vehicle. A tent means a collapsible  
112 shelter of canvas or other fabric stretched and sustained by a rigid structure(s) and used for  
113 camping outdoors.

114

115 (q) **“Seasonal high groundwater table”** is the highest elevation reached by the  
116 groundwater during the wet season of the year (usually spring or early summer).

117

118 (r) **“Sedimentation control facility”** means a pond or structure designed to capture  
119 runoff from disturbed areas for the purpose of treating water for sediment and suspended solids  
120 removal.

121

122 (s) **“Slow rate land application system”** means an irrigation system in which  
123 wastewater treatment is achieved due to vegetative uptake and percolation of wastewater through  
124 the soil profile by low application rates.

125

126 (t) **“Sludge”** is the accumulation of solids settled from wastewater in a septic tank,  
127 aerobic unit, clarifier, or equivalent.

128

129 (u) **“Soil”** means all unconsolidated material overlaying bedrock.

130

131 (v) **“Toxic characteristics (or wastes)”** means those characteristics (or wastes)  
132 which are due to the presence of: substances or combinations of substances including disease  
133 causing agents which, after discharge and upon exposure, ingestions, inhalation or assimilation  
134 into any environmentally significant organism, either directly from the environment or indirectly  
135 by ingestion through food chains, may cause death, disease, behavioral abnormalities, cancer,  
136 genetic malfunctions, physiological malfunctions (including malfunctions in reproduction) or  
137 physical deformation in such organisms or their offspring. This definition shall include all  
138 substances designated as toxic or hazardous by the U.S. Environmental Protection Agency in the  
139 Federal Register for December 24, 1975, (Part IV), Water Programs, National Interim Primary  
140 Drinking Water Regulations; Federal Register for May 19, 1980, (Section 261), Hazardous Waste  
141 Management System: Identification and Listing of Hazardous Waste; and the Federal Register  
142 for July 16, 1982, Part V, National Oil and Hazardous Substances Contingency Plan.

143

144

145

146

147 **Section 5. Facilities and Systems Not Specifically Covered by These Standards.**

148

149 This section is provided to encourage new technology and equipment and provide a  
150 process for evaluating and permitting designs which deviate from these regulations. The proposed  
151 construction of facilities and processes not in compliance with these regulations will be permitted  
152 provided that the facility, when constructed, can operate meeting the purpose of these regulations.  
153

154

155 (a) Each application for a permit to construct a facility under this section shall be  
156 evaluated on a case-by-case basis using the best available technology. The following information  
157 should be included with the application:

158

159 (i) Data obtained from a full scale, comparable installation which demonstrates  
160 the acceptability of the design and/or,

161

162 (ii) Data obtained from a pilot plant operated under the design condition for  
163 a sufficient length of time to demonstrate the acceptability of the design and/or,

164

165 (iii) Data obtained from a theoretical evaluation of the design which  
166 demonstrates a reasonable probability of the facility meeting the design objectives; and

167

168 (iv) An evaluation of the flexibility of making corrective changes to the  
169 constructed facility in the event it does not function as planned.

170

171 (b) If an applicant wishes to construct a pilot plant to provide the data necessary to  
172 show the design will meet the purpose of the act, a permit to construct must be obtained.

173

174 **Section 6. Engineering Design Report.**

175

176 (a) Scope and purpose. An engineering design report which describes existing  
177 conditions, problems, and the proposed solution is required for each project.

178

179 (b) Sewerage systems. The engineering design report shall include:

180

181 (i) A description of the service area including scaled vicinity plan map(s) of  
182 the project with regard to adjacent and proposed development, elevations, and topographic  
183 features.

184

185 (ii) Current and projected average, maximum day and peak flows for the  
186 design of the project, per capita design flows, extraneous flows, and industrial and/or commercial  
187 waste flows.

188

189 (iii) Downstream impact on existing sewers, lift stations and treatment  
190 facilities. This information shall include existing population, waste loads, existing flows and  
191 capacity of downstream facilities.

192

193 (iv) A letter of acceptance from the municipality, sewer district, or owner of  
194 any affected downstream sewerage, treatment or disposal facilities.

- 195 (c) Treatment works and disposal systems. The engineering design report shall  
196 include:  
197  
198 (i) A description of the facility site and location, including scaled site plan  
199 and:  
200 (A) Present and projected facility property.  
201  
202 (B) Flood protection indicating predicted elevation of 25- and 100-  
203 year flood stages.  
204  
205 (C) Present and proposed access.  
206  
207 (D) Distances from current habitation.  
208  
209 (E) Prevailing wind direction.  
210  
211 (F) Fencing and/or security.  
212  
213 (G) Topographic features and contours with indicated datum.  
214  
215 (H) Soil and subsurface geological characteristics. Location of soil  
216 borings, rock elevations and groundwater elevations shall be indicated. Provide a soils  
217 investigation report of the proposed site.  
218  
219 (ii) A detailed description of the service area for the project including scaled  
220 plan showing land use and boundaries.  
221  
222 (iii) A detailed description of the disposal technique for effluent and solids.  
223 For lagoons, indicate whether the discharge is continuous, seasonal, or nondischarging.  
224  
225 (iv) Effluent water quality considerations for design of the facility shall be  
226 described to include:  
227  
228 (A) Surface discharge. An application shall be submitted to the  
229 Water Quality Division for a National Pollution Discharge Elimination System Permit.  
230  
231 (B) Groundwater protection. Pursuant to Chapter VIII of the Water  
232 Quality rules.  
233  
234 (v) Design conditions shall be described to include:  
235  
236 (A) Proposed effluent standards.  
237  
238 (B) Design population.  
239  
240 (C) Existing and projected flows and flow variations.  
241  
242 (D) Shock loads, with cause and frequency.  
243

- 244 (E) Existing and projected wastewater characteristics including
- 245 BOD, suspended solids, and pH.
- 246
- 247 (F) Existing and projected flow, loads and characteristics of
- 248 industrial wastes and toxic Materials.
- 249
- 250 (G) Existing or proposed quantity and frequency of septage
- 251 discharges.
- 252
- 253 (H) Climate conditions at existing or proposed treatment facility site.
- 254
- 255 (I) Existing or proposed water supply.
- 256
- 257 (J) Theory of operation.
- 258
- 259 (K) Odor control features.
- 260
- 261 (L) Complete description of existing facilities.
- 262
- 263 (vi) Specific requirements of any pertinent approved Water Quality
- 264 Management Plan shall be included.
- 265

266 **Section 7. Plans and Specifications Content.**

- 267
- 268 (a) All plans for sewerage works shall have a suitable title showing the following:
- 269
- 270 (i) Name of owner and location of project.
- 271
- 272 (ii) North arrow and drawing scale.
- 273
- 274 (iii) Name and seal or signature of the engineer.
- 275

276 Datum used shall be indicated. Plans shall contain a site plan of the proposed project with

277 topography and boundaries of the project.

278

279 (b) Sewers. Plans for interceptor sewers, outfall sewers, new collector systems, force

280 mains, sewer extensions, or any combination shall include:

281

- 282 (i) A detailed plan view at a legible scale of each sewer line showing all
- 283 existing and proposed streets, adjacent structures, physical features, existing and proposed
- 284 locations of utilities and a North arrow. The location and size of all sewer lines, manholes,
- 285 cleanouts, and other appurtenances shall be indicated. Pertinent elevations shall be indicated on
- 286 all appurtenances.
- 287

- 288 (ii) Profiles of all sewer lines shall be shown on the same sheet as the plan
- 289 view at legible horizontal and vertical scales, with a profile of existing and finished surfaces,
- 290 elevations of the sewer inverts at all manholes, and the slope of the sewer inverts at all manholes,
- 291 pipe size and material, and the slope of the sewer line. The location of all special features such as
- 292 inverted siphons, concrete encasements, casing pipes, elevated sewers, etc., shall be shown.

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(iii) Special detail drawings, scaled and dimensioned to show the following:

(A) Details of all sewer appurtenances such as manholes, cleanouts, inverted siphons, elevated sewers, encasements, casing pipes, force main thrust blocks, outfall structures, etc.

(B) The approximate bottom of the stream, the approximate elevation of the low and high-water levels, and other topographic features at all locations where the project is at streams or lakes.

(C) Cross section drawing of the sewer's bedding.

(D) Additional features not otherwise covered by specifications.

(iv) Location of waterlines within 30 feet (9m) horizontally shall be shown on the plan. Water lines that intersect sewers shall be shown on the profile drawings. Public and/or private water wells within 30 feet (9m) of sewer lines shall be indicated on the plans.

(c) Pumping stations, treatment works and disposal systems. 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:

(i) Site location and layout including topographic and physical features, proposed arrangement of pumping or treatment units, existing facilities, existing and proposed piping arrangements, access drive, power supply, fencing, embankments, outfall sewer, outfall structure, and receiving stream with direction of flow.

(ii) Schematic flow diagram(s) and hydraulic profile(s) for treatment works wastewater, sludge and effluent flows.

(iii) Plan and section view(s) of the wetwell and drywell of the pumping station with specific construction details, features and pertinent elevations.

(iv) Plan and section view(s) of each treatment facility process unit with specific construction details, features and pertinent elevations. Details of each unit should include, but are not limited to, inlet and outlet devices, baffles, valves, arrangement of automatic control devices, aeration equipment, motors, sludge scrapers, sludge disposal, electrical devices or other mechanical devices.

(d) Specifications. Technical specifications shall accompany the plans for new sewers, pump stations, treatment works, disposal systems, or additions/modifications to existing systems or facilities. Where plans are for extensions to sewer systems, the specifications may be omitted, provided it is stated that the work is to be constructed under specifications authorized by the Water Quality Division office. Specifications on file must conform to these regulations.

The specifications accompanying construction drawings shall include:

(i) Identification of construction materials.

- 342  
343                   (ii)     The type, size, strength, operating characteristics, rating or requirements  
344 for all mechanical and electrical equipment, including machinery, valves, piping, electrical  
345 apparatus, wiring and meters; laboratory fixtures and equipment; operating tools; special  
346 appurtenances; and chemicals where applicable.  
347  
348                   (iii)    Construction and installation procedure for materials and equipment.  
349  
350                   (iv)    Requirements and tests of materials and equipment to meet design  
351 standards.  
352  
353                   (v)    Performance tests for operation of completed works and component  
354 units.



**PART B: MUNICIPAL AND DOMESTIC SEWERAGE SYSTEMS, TREATMENT  
WORKS, AND DISPOSAL SYSTEMS**

**Section 8. General.**

This part contains the minimum standards for the design and construction of sewerage systems, treatment works, and disposal systems for domestic and municipal wastewater. Soil absorption and land application systems are contained in other parts. All facilities shall comply with the purpose of this chapter.

**Section 9. Design of Sewers.**

(a) Separate sewers. Separate sewers shall be provided for collection of stormwater and wastewater. Roof, areaway, drive or foundation drains shall not be connected to sanitary sewers.

(b) Pipe materials.

(i) Wastewater characteristics. Pipe materials shall resist acid and alkaline solutions, organic solvents, and other wastewater constituents and environmental conditions encountered.

(ii) Pipe loadings. Pipe materials shall be chosen and the pipeline shall be designed to withstand all trench and superimposed surface live loads with a minimum factor of safety. Rigid pipes shall have a minimum factor of safety of 1.5, and flexible pipes shall have a minimum factor of safety of 1.25.

(iii) Soil characteristics. Pipe materials shall be chosen to resist corrosion due to aggressive soil characteristics by the soil it contacts. Iron or steel pipe shall be protected from corrosion with polyethylene encasement or cathodic protection.

(iv) Joints. Pipe joints shall be flexible, durable and designed to minimize infiltration/exfiltration and exclude roots.

(v) Performance tests. Piping shall be subjected to leakage tests. Leakage tests shall be infiltration, exfiltration, or air tests.

(A) Infiltration. Maximum of 200 gallons per inch diameter per mile per day (1200 liters/cm/km/day) with a minimum of two feet (0.6 m) of head over the top of the pipe.

(B) Exfiltration. Maximum of 200 gallons per inch diameter per mile per day (1200 liters/cm/km/day) with a minimum of two feet (0.6 m) of head over the top of the pipe.

(C) Air. Air tests shall conform to ASTM C-828-80. (D) Deflection. Maximum five percent deflection after flexible pipe is backfilled for 30 days. A mandrel of 95 percent of pipe diameter shall be used. No mechanical pulling of mandrel is permitted.

403 (vi) Approved pipe material specifications. Type of commercial pipe  
404 approved for gravity sanitary systems include:

- 405  
406 (A) Extra strength and standard strength vitrified clay pipe: ASTM  
407 C700-78a.  
408  
409 (B) PVC sewer pipe and fittings: ASTM D3034-80, SDR35, ASTM  
410 F679-81, or ASTM F794-83.  
411  
412 (C) ABS composite sewer pipe: ASTM D2680-80.  
413  
414 (D) Reinforced plastic mortar pipe: ASTM D3262-81.  
415  
416 (E) Asbestos cement nonpressure sewer pipe: ASTM C428-80.  
417  
418 (F) Reinforced concrete sewer pipe: ASTM C76-82.  
419  
420 (G) Concrete Sewer Pipe: ASTM C-14.  
421  
422 (H) Ductile iron sewer pipe: ASTM A746-77.

423  
424 Types of commercial pipe approved for pressure sanitary sewer systems  
425 include:

- 426  
427 (I) PVC water pipe: ASTM D2241-80, or AWWA C900.  
428  
429 (J) Asbestos cement pressure pipe: AWWA C400-80.  
430  
431 (K) Ductile iron pipe: AWWA C151-81.  
432  
433 (L) Glass Fiber-Reinforced Thermo-setting-Resin Pressure Pipe:  
434 AWWA C950-81.  
435

436 (c) Collection piping design, construction and testing. A sewage collection line is  
437 any conduit that carries wastewater that originates from two or more separate buildings or from a  
438 single building that generates more than 2,000 gpd (7.6 m<sup>3</sup>/d) of average daily flow.

439  
440 (i) Gravity system.

441  
442 (A) Depth. Sewers shall be located to protect them from freezing and  
443 frost heave as prudently possible.

444  
445 (B) Size. Sewers to be aligned straight shall be eight inch (20.3 cm)  
446 diameter or larger except six inch (15.2 cm) sewers may be used in cul-de-sacs, or other dead end  
447 locations where the sewer cannot be extended in the future. Eighteen-inch (45.7 cm) or larger  
448 sewers may be laid on curves. Lines shall be sized for 200 percent of maximum daily flow or  
449 more. In the absence of data deriving maximum daily flow, the chart on Figure 1-1 shall be used  
450 to determine maximum daily flow.  
451

452 (C) Slope. Sewers shall be laid with uniform slope between  
 453 manholes. Minimum slopes shall be:  
 454  
 455

Sewer Size Inch (cm)	Minimum Slope in Feet Per 100 Feet (m/100 m)
6 (15.2)	0.60
8 (20.3)	0.40
10 (25.4)	0.28
12 (30.5)	0.22
14 (35.6)	0.17
15 (38.1)	0.15
16 (40.6)	0.14
18 (45.7)	0.12
20 (50.8)	0.11
21 (53.3)	0.10
24 (61.0)	0.08
27 (68.6)	0.067
30 (76.2)	0.058
33 (83.8)	0.051
36 (91.4)	0.046

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 457  
 458 Maximum slopes without the use of concrete anchors shall be 20 percent. The following  
 459 spacing of concrete anchors shall apply to slopes greater than 20 percent:  
 460

Slopes (percent)	Concrete Anchor
20-35	36 ft (11 m)
35-50	24 ft (7.3 m)
More than 50	16 ft (4.9 m)

461  
 462 (D) Velocity. Minimum velocities shall be 2 fps (0.6 mps) when  
 463 flowing full. Velocities greater than 10 fps (3.0 mps) require special design considerations.  
 464

465 (E) Increasing size. All sewer pipe size changes shall be at  
 466 manholes. Pipe size shall not be decreased in the direction of flow. The energy gradient line  
 467 should be maintained when a smaller sewer joins a larger one.  
 468

469 (F) Excavation, bedding installation, backfill.  
 470

471 (I) Excavation. Trench width from the trench bottom to a  
 472 point one foot above the top of the pipe shall be no less than the outside diameter of the pipe plus  
 473 8 inches (20.3 cm) but not more than 24 inches (61 cm) plus the pipe O.D. The trench bottom  
 474 shall be excavated for the pipe bell. All rock shall be removed within six inches (15.2 cm) of  
 475 pipe. The trench shall be dewatered for all work.  
 476

477 (II) Bedding. Bedding shall be designed in accordance with:  
 478

- 479 (1.) Rigid pipe. Types A, B, C (Water Pollution  
480 Control Federation Manual of Practice No. 9) or ASTM C12-81.  
481
- 482 (2.) Flexible pipe. Types I, II, III, ASTM D2321-74.  
483
- 484 (III) Backfill. Backfill shall be performed without disturbing  
485 pipe alignment. Backfill shall not contain debris, frozen material, unstable material, or large  
486 clods. Stones greater than three inches (7.6 cm) in diameter shall not be placed within two feet  
487 (0.6 m) of pipe. Compaction shall be to a density equal to or greater than the surrounding soil.  
488
- 489 (ii) Force mains and pressure sewers.
- 490
- 491 (A) Depth. Force mains shall be located to protect them from  
492 freezing and frost heave.  
493
- 494 (B) Size. Force mains shall be four inches (10 cm) diameter or  
495 greater. Pressure sewer collection system piping shall be one inch (2.4 cm) minimum.  
496
- 497 (C) Velocity. Minimum velocity shall be 2.5 fps (0.76 mps).  
498
- 499 (D) Air release. Air release facilities shall be provided at the high  
500 point in the piping whenever the pipe crown elevation falls below the pipe invert elevation.  
501 Access to air release manholes shall not be in traffic-ways.  
502
- 503 (E) Cleanouts. Cleanouts shall be provided at 400 foot (122 m)  
504 maximum spacing in pressure piping four-inch diameter or less.  
505
- 506 (F) Pressure sewer systems. Pressure sewer collection systems shall  
507 be preceded by grinder pumps or septic tanks.  
508
- 509 (G) Pressure sewer collection system pumps. Pumps shall be  
510 provided with isolation and check valves. If a septic tank is not provided before the pump, a  
511 grinder pump shall be required. Pump holding sumps shall not be steel, iron, or coated metal. The  
512 sump chamber shall be 50 gallon (189 liters) volume, minimum.  
513
- 514 (iii) Service connections. A service connection is any conduit that carries  
515 wastewater that is not defined as a sewage collection line. Service connections shall conform to  
516 the requirements for sewage collection lines (Section 9(c)(i) and (ii)) with the following  
517 modifications:
- 518 (A) Size: minimum size shall be four inches (10.2 cm).  
519
- 520 (B) Slope: minimum slope shall be two feet/100 feet (2 m/100 m).  
521
- 522 (C) Flow: flow shall be determined from a fixture unit count and the  
523 sewage size based on flowing full.  
524
- 525 (D) Connections: all service connections to sewage collection lines  
526 shall be made with a wye or tee for new construction and a tapping saddle for connection to  
527 existing collection lines.

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(d) Manholes and cleanouts.

(i) Location. Manholes shall be located at all changes in pipe size, vertical or horizontal alignment, pipe intersections, and the end of lines. Maximum spacing for various line sizes are as follows:

Line Size (In)	(cm)	Maximum M.H.	Spacing
15 or less	(38 or less)	400 ft	122 m
16 - 30	(40.6 - 76)	500 ft	152 m
31 or more	(76 or more)	600 ft	183 m

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Terminal sewer cleanouts may be provided at the end of sewer lines if they are not more than 150 feet (45 m) from the nearest downstream manhole. The cleanout shall be constructed using 45 degree bends to the upturned pipe coming to the surface of the ground. The diameter of the cleanout shall be the same as the pipe size. Lampholes shall not be used.

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(ii) Size. Minimum manhole interior size is four feet (1.2 m).

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(iii) Drop manhole. Drop manholes must be constructed where the change in elevation between two lines is greater than 24 inches (0.6 m). Concrete encasement shall be provided around the drop pipe.

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(iv) Invert. Manhole inverts shall be constructed to conform to the shape of the sewer. The bench shall drain to the invert. Connections to the manhole shall be watertight and allow differential settlement between the manhole and pipe. Minimum fillet height shall be one half of the pipe diameter.

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(v) Cover. The manhole cover shall be suitable to withstand all loads, including impact loading without deformation, slip or rattle. The manhole cover shall be watertight in areas subject to flooding and a bolt-down type in areas subject to unauthorized dumping or vandals.

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(vi) Steps. Access to manholes shall be with portable ladders, or with cast iron manhole steps spaced at 16 inches (40.6 cm) maximum.

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(vii) Materials. Manholes shall be constructed watertight and durable using cast-in-place concrete, or precast concrete with gasketed joints. Where precast concrete bases are used, the first 12 inches (30 cm) of wall will be monolithically cast with the base.

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566

(viii) Access. A 22 inch (56 cm) minimum diameter clear opening shall be provided on all manholes. All manholes shall be located to be accessible by motorized equipment for maintenance.

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569

(e) Special structures.

570  
571

(i) Inverted siphons. Inverted siphons shall have a minimum of two six-inch (15.2 cm) barrels. The inlet and outlet shall be arranged to cause only one pipe to be used during

572 normal flows. The minimum velocity shall be 3 fps (1 mps) at average flow, and occur at least  
573 daily. The siphon shall be designed for flushing and maintenance.

574

575 (ii) Aerial crossings. Aerial crossings shall be designed to prevent freezing,  
576 leaking, settlement, lateral movement, and damage from expansion/contraction. It shall be located  
577 with proper vertical clearances for highway vehicles and the 100 year flood.

578

579 (iii) Stream crossings. Stream crossings shall be within  
580 10° of the perpendicular direction of the stream. Pipe shall have a minimum cover of one foot in  
581 rock, and three feet under other surfaces. The crossing shall be made with an inverted siphon or  
582 without a grade change. Pipe materials shall be steel, cast iron, or ductile iron pipe.

583

584 (f) Potable water supply protection.

585

586 (i) Cross connections. There shall be no cross connections between sewer  
587 lines and potable water lines.

588

589 (ii) Horizontal and vertical separation from water mains. Minimum  
590 horizontal separation shall be ten feet (3 m) where the water main is less than 1.5 feet (0.46 m)  
591 above the elevation of the sewer. Minimum vertical separation shall be 1.5 feet (0.46 m) at  
592 crossing. Joints in sewers at crossing shall be located at least ten feet (3 m) from water mains. The  
593 upper line of a crossing shall be specially supported. Where vertical and/or horizontal clearances  
594 cannot be maintained, the sewer shall be placed in a separate conduit pipe.

595

596 **Section 10. Pumping stations.**

597

598 (a) Design conditions.

599

600 (i) Total dynamic head. The total dynamic head rating of pumping units  
601 shall be based on pipe friction, pressure losses from piping entrances, exits, appurtenances  
602 (bends, valves, etc.), and static head at the rated flow.

603

604 (ii) Grit. Where no grit removal is provided ahead of the pumping station,  
605 equipment and piping design shall minimize the deleterious effects of grit in the sewage.

606

607 (iii) Screening. Screens or comminutors shall be provided ahead of pumps  
608 where the average daily flow is in excess of 1.0 mgd (3,784 m<sup>3</sup>/d) to prevent solids larger than 2  
609 ½ inches (6.4 cm) from entering the pump.

610

611 (iv) Minimum pump opening. Except for grinder pumps, raw sewage pumps  
612 shall be capable of passing spheres of at least three inches (7.6 cm) in diameter. Pump suction and  
613 discharge piping in all sewage and sludge services shall be no smaller than four inches in  
614 diameter (10 cm).

615

616 (v) Pump cycle time. Intermittently operated pumps shall be designed to  
617 start no more often than once every ten minutes at the minimum operating interval.

618

619 (vi) Removal of equipment. Pumping stations shall be designed to permit  
620 removal of all items of equipment including pumps, valves, electrical and control equipment.  
621 Equipment located in wetwells shall be removable without entering the wetwell.  
622

623 (vii) Surge control. Piping systems shall be designed to withstand the  
624 maximum possible surge (water hammer) from the pumping station, or adequate surge control  
625 provided to protect the piping. Pressure relief valves are not acceptable surge control.  
626

627 (viii) Net positive suction head. Pumps shall be selected so that the net positive  
628 suction head required at maximum flow (NPSHR) is less than the NPSH available minus four feet  
629 (1.2 m) based on the hydraulic conditions and altitude of the pumping station.  
630

631 (ix) Uplift. The pumping station chambers shall resist hydrostatic uplift  
632 pressures. Siting requirements.  
633

634 (b) Siting requirements.  
635

636 (i) Access. Pumping stations shall be located so that they are readily  
637 accessible to operating and maintenance personnel at all times of day or night, and under all  
638 weather conditions. Pumping stations shall be located off of traffic ways.  
639

640 (ii) Flood protection. Pumping stations shall be designed so there is no  
641 equipment or structural damage in the 100 year flood, and so the pumping station's operation is  
642 uninterrupted by the 25 year flood.  
643

644 (iii) Security. The pumping station shall be designed to discourage  
645 unauthorized entry.  
646

647 (c) Pumping station types.  
648

649 (i) Dry wells.  
650

651 (A) Access. Pumping station dry wells and equipment rooms shall be  
652 accessible for equipment inspection, operation and maintenance. Ladder and stair dimensions,  
653 locations of landings, and structural design shall comply with the Wyoming OHSA (1982).  
654 Equipment shall be removable from pumping stations without making structural changes to the  
655 station.  
656

657 (B) Separation from wetwell. Dry wells and equipment rooms shall  
658 be completely separated from wetwells with no hatches, untrapped drains, or other connecting  
659 accessways.  
660

661 (C) Dewatering. Dry pits and below-grade equipment rooms shall be  
662 provided with sump pumps sized to remove infiltration of water during normal seepage and  
663 leakage.  
664

665 (ii) Wetwell design. Wetwells shall be designed to prevent vortexing and  
666 unstable pump operation. Pumps shall be located below the minimum water level, except suction  
667 lift pumps. Suction intakes shall be bell-mouthed. Provisions shall be made for isolating,

668 bypassing and/or dewatering portions of the wetwell for maintenance. Hopper walls of wetwells  
669 shall be sloped at no less than 1.75 vertical to 1 horizontal.

670

671 (iii) Submersible pumping stations. Submersible pumping stations shall be  
672 designed specifically for totally submerged operation and so that pumps may be readily removed  
673 from the wetwell without dewatering the wetwell or disconnecting piping in the wetwell.

674 Submersible pumps shall have an adequate means of indicating motor seal failure. Electrical  
675 equipment shall be suitable for Class 1, Division 1, Groups C and D hazardous environments, as  
676 defined in the National Electrical Code (1982).

677

678 (iv) Suction lift. Pumping stations utilizing suction lift pumps shall have  
679 adequate priming means to prime the pumps quickly and shall be designed for priming the pumps  
680 when the water level in the wetwell is one foot (0.3 m) below the lead pump starting elevation in  
681 the suction wetwell, and for maintaining prime when the wetwell level is one foot (0.3 m) below  
682 the lead pump stopping level. Valving shall not be located in the wetwell.

683

684 (v) Pneumatic ejectors. Pneumatic ejectors shall be limited to design flows  
685 equivalent to 25 residential connections. One standby compressor shall be provided.

686

687 (vi) Grinder pumps. Grinder pumps shall be limited to design flows  
688 equivalent to 25 residential connections.

689

690 (d) Piping and valves.

691

692 (i) Suction.

693

694 (A) Suction intake. Suctions shall be located so the pump is below  
695 the minimum water level. Suction intakes shall be bell-mouthed. Suction intakes shall be located  
696 against the far wall from the wetwell inlet.

697

698 (ii) Piping.

699

700 (A) Size. Sewage and sludge piping shall be no smaller than four  
701 inches (10.2 cm) diameter, except as required for metering, or where grinder pumps are provided.

702

703 (B) Velocity. Piping and pumping systems shall be designed to  
704 maintain a minimum velocity of 2.5 fps (0.76 mps), and a maximum velocity of 5 fps (1.52 mps)  
705 for suction piping.

706

707 (C) Design pressure. Piping shall be designed for the maximum  
708 operating pressure and for the maximum value of any surges (water hammer) which may occur,  
709 taking into account any surge protection provided.

710

711 (D) Restraints. Piping shall be blocked and otherwise restrained to  
712 prevent damaging movement under the maximum anticipated pressure (including test pressure).

713

714 (E) Cleanouts. Cleanouts shall be provided in pump suction.

715

716 (iii) Valves. Valves shall not be located in wetwells.



717 (A) Shutoff. Except on submersible pumps and suction lift pumps, a  
718 shutoff valve shall be provided on the suction of all pumps. A shutoff valve shall be provided on  
719 the discharge of all pumps, regardless of type or service.

720

721 (B) Check. All pumps shall be provided with a check valve located  
722 between the pump and the discharge shutoff valve, except where arranged so that backflow is not  
723 possible under normal operating conditions.

724

725 (C) Air release. Air release valves shall be provided at the high  
726 points in piping whenever the pipe crown elevation falls below the pipe invert elevation. On  
727 sewage lines, air or air and vacuum release valves shall be specifically designed for sewage  
728 service.

729

730 (e) Reliability.

731

732 (i) Multiple units. Every pumping station shall have not less than two  
733 pumping units. The number of units and their size shall be sufficient to permit pumping the  
734 maximum design flow with the largest pumping unit out of service.

735

736 (ii) One of the following shall be provided:

737

738 (A) Alternative power source. Where the pumping station serves  
739 more than 50 residential units, alternative power shall be provided. Alternative power shall be  
740 permanently installed or portable engine generator sets, permanently installed or portable engine  
741 driven pumps or a separate, independent utility source provided. Where manual starting is  
742 required, sufficient storage shall be provided to allow notifying the operator and performing  
743 whatever tasks are necessary to get the pumping station in service. Where permanently installed  
744 engine driven equipment is provided, sufficient fuel shall be provided for at least eight hours  
745 operation under the maximum flow condition. Where more than one pumping station is affected  
746 by a power outage and portable equipment is planned for alternative power source, sufficient  
747 portable equipment shall be provided to provide alternative power to all pumping stations under  
748 maximum flow conditions.

749

750 (B) Generators. Generators shall be sized to permit starting the  
751 largest pump in the pumping station with all other pumps except one running. If the generator is  
752 not capable of starting all pumps simultaneously, suitable controls shall be provided to stagger the  
753 pump starts to remain within the capabilities of the equipment. Generators shall be diesel-fired,  
754 natural gas-fired or bottled gas-fired. The use of gasoline or digester gas-fired generators for  
755 permanently installed standby service is unacceptable. Gasoline-fired portable generators are  
756 accept able.

757

758 (C) Engine driving pumps. Engine driven pumps shall be sized for  
759 maximum design flow. Diesel, natural gas and bottled gas are acceptable fuels for portable  
760 engines only. Digester gas is unacceptable for standby fuel. Quick connecting couplings shall be  
761 provided for portable engine driven pumps.

762

763 (D) Storage. Wastewater storage may be provided in the form of  
764 underground storage or surface ponds or tanks in lieu of alternative power supplies. Storage shall

765 be sized for the maximum anticipated power outage, but not less than 24 hours at average design  
766 flow. Storage shall be water tight and arranged to drain back to the pumping station wetwell.

767

768 (f) Electrical.

769

770 (i) Equipment location. All electrical equipment, including motors, motor  
771 starters and controls shall be located so as to be undamaged by the 100 year flood.

772

773 (ii) Controls. Controls shall include a separate start/stop device for each  
774 pump or for each pumping position in the control sequence. Controls shall be arranged so that the  
775 failure of any one control system component will affect only the operation of one pumping unit.  
776 Manual override shall be provided for normal pump operating control.

777

778 (iii) Code requirements. All electrical work shall comply with the National  
779 Electrical Code as adopted and amended by the Wyoming Department of Fire Prevention and  
780 Electrical Safety. Electrical equipment in enclosed wetwells which may be subject to explosive  
781 concentration of hazardous gases or flammable fluids, including all raw sewage wetwells, shall  
782 comply with the NEC requirements for Class 1, Division 1, Groups C and D areas.

783

784 (iv) Alarms. An alarm system shall be provided for each pumping station. As  
785 a minimum, alarms shall include high wetwell level and high water level in the dry well. For  
786 pumping stations having a capacity of 0.5 mgd (1890 m<sup>3</sup>/d) or more, the alarm shall be  
787 telemetered to a facility that is manned 24 hours a day. For pumping stations having a capacity of  
788 0.5 mgd (1890 m<sup>3</sup>/d) or less, an audio and visual alarm shall be provided in a conspicuous  
789 location.

790

791 (g) Safety.

792

793 (i) Ventilation. All accessible pumping station areas shall be ventilated.  
794 Ventilation may be continuous or intermittent. If intermittent, ventilation in areas normally visited  
795 by operating personnel shall be started automatically at not greater than 30 minute intervals.  
796 Permanently installed dry well ventilation shall provide at least six air changes per hour if  
797 continuous, and 12 air changes per hour if intermittent. Permanently installed wetwell ventilation  
798 shall provide 12 complete air changes per hour if continuous, and 30 complete air changes per  
799 hour if intermittent. Wetwell ventilation shall be positive pressure, forcing air into the wetwell  
800 rather than exhaustion from it. All ventilation equipment shall be of a non-sparking design.  
801 Intermittent ventilating equipment shall insure starting upon entry of operating personnel.  
802 Wetwells may be ventilated by gravity means if normal access by operating personnel is  
803 unnecessary. Wetwells that are accessed infrequently shall be designed to permit the use of  
804 portable blowers that will exhaust the space and continue to supply fresh air during access  
805 periods.

806

807 (ii) Hoists. Where required for removing equipment, hoists shall be rated for  
808 not less than 50 percent more than the weight of the heaviest single item to be lifted by the hoist.

809

810 (iii) Lighting. Lighting levels shall be sufficient to permit safe operation and  
811 maintenance of all equipment within the pumping station, but not less than 30 foot-candles. All  
812 areas shall be lit in such a manner that the failure of one lighting fixture or lamp will not cause the  
813 area to be completely dark.

814 (iv) Equipment guards. Provide shields to protect from rotating or moving  
815 machinery.

816  
817 (v) Warning signs. Provide warning signs for nonpotable water, electrical  
818 hazards, chemical hazards, or other unsafe features. Warning signs shall be permanently attached  
819 to the structure or appropriate equipment.

820  
821 (vi) Safety. Comply with the Wyoming Occupational Health and Safety  
822 Rules and Regulations.

823

824 **Section 11. General Treatment Plant Considerations.**

825

826 (a) Surface water protection. Discharges to surface waters shall meet or exceed  
827 quality limitations in the National Pollution Discharge Elimination System Permit. Plant  
828 configurations and piping shall be arranged to avoid the bypassing of process units that could  
829 result in inadequately treated sewage reaching the receiving surface water.

830

831 (b) Groundwater protection. Seepage and/or discharge to groundwater shall comply  
832 with Chapter VIII of the Water Quality Regulations. Plan configurations and piping shall be  
833 arranged to avoid the bypassing of process units that could result in inadequately treated sewage  
834 reaching the groundwater.

835

836 (c) Siting requirements.

837

838 (i) Isolation. Treatment facilities shall be located to minimize public and  
839 private nuisances and health hazards on inhabited areas or residential areas. Where treatment  
840 plant siting does potentially affect inhabited areas, appropriate measures to minimize nuisances or  
841 hazards shall be incorporated in the design.

842

843 (ii) Flood protection. All treatment process structures, mechanical  
844 equipment, and electrical equipment shall be protected from the 100 year flood. The treatment  
845 facilities shall remain fully operational and accessible during the 25 year flood.

846

847 (d) Hydraulic and treatment reliability.

848

849 (i) Alternative power source. All treatment plants shall have an alternative  
850 source of power to provide reliable pumping and disinfection of sewage if required. The  
851 alternative source of power shall be sized to provide the capability to pump design maximum day  
852 flow rates through the treatment process and to disinfect the sewage if necessary. Acceptable  
853 alternative power sources include:

854

855 (A) A diesel, natural gas, or propane fueled engine generator.

856

857 (B) A second independent electrical supply.

858

859 (C) Storage of sewage and subsequent treatment

860

861 (ii) Bypass treatment units. Complete by-passing of treatment units is  
862 prohibited. Provide means to bypass any duplicate process unit or single unit where adequate

863 downstream process capability is provided. Sewage shall be treated in parallel singular units and/or  
864 subsequent processes.

865

866 (iii) Multiple units. For average design flows greater than 100,000 gpd (378  
867 m<sup>3</sup>/d), more than one unit of each unit process shall be provided. For average design flows of  
868 less than 100,000 gpd (378 m<sup>3</sup>/d), one unit of each unit process may be provided if electrical or  
869 mechanical equipment or diffusers can be removed while the unit is in operation, or if the unit can  
870 be compartmentalized to permit access. There shall be no provision to bypass the entire plant nor  
871 shall bypass provisions be made that will allow inadequately treated sewage to reach the ground  
872 or surface waters.

873

874 Where more than one parallel unit is provided, positive means of dividing the flow  
875 proportionally between units shall be included (such as splitter weirs or valves and meters).

876

877 (iv) Multiple equipment. Mechanical process equipment shall be provided in  
878 multiple units. All pumping functions shall include sufficient pumping capacity that the peak  
879 flow can be pumped with the largest single unit not in service. Blowers and mechanical aerators  
880 for process aeration shall include sufficient capacity that the maximum day design capacity can be  
881 delivered with the largest single unit not in service. Other equipment shall have standby units  
882 where their function is critical to the treatment process.

883

884 (e) Electrical.

885

886 (i) Equipment location. Service transformers and other critical electrical  
887 equipment shall be located above the 100 year flood and above grade. Transformers shall be  
888 located in a manner that they are remote from or protected by substantial barriers from traffic.  
889 Motor controls shall be located in superstructures and in rooms that do not contain sewage,  
890 chemical processes, or corrosive atmospheres.

891

892 (ii) Code requirements. All electrical work shall comply with the National  
893 Electrical Code as enacted and amended by the Wyoming Department of Fire Prevention and  
894 Electrical Safety. Areas in which the occurrence of explosive concentrations of hazardous gases or  
895 flammable fluids can occur Class 1, groups C and D, Division 1 locations shall be designed for  
896 hazardous locations in accordance with the National Electrical Code.

897

898 (f) Structural.

899

900 (i) Construction materials. Construction materials shall be selected,  
901 apportioned, and/or protected to provide water tightness, corrosion protection, and resistance to  
902 weather variations.

903

904 (ii) Coatings. Coatings used to protect structures, equipment and piping shall  
905 be suitable for atmospheres containing hydrogen sulfide and volatile organics. Surfaces exposed  
906 in chemical areas shall be protected from chemical attack. Concrete surfaces in confined spaces  
907 containing sewage shall be protected. Paints containing lead or mercury shall not be used.

908

909 (iii) Geological conditions. Structural design shall consider the seismic zone,  
910 groundwater and soil support. Soils investigations shall be made, or adequate previous soils  
911 investigations shall be available to develop structural design.

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(g) Safety. The Wyoming Occupational Health and Safety Rules and Regulations shall be complied with. The following items shall also be provided:

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

(ii) Handrails. In addition to all Wyoming OSHA requirements, barriers around treatment basins shall be provided.

(iii) Warning Signs. Provide warning signs for nonpotable water, electrical hazards, chemical hazards, or other unsafe features. Warning signs shall be permanently attached to the structure or appropriate equipment.

(iv) Equipment guards. Provide shields to protect from rotating or moving machinery.

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

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

(h) Instrumentation.

(i) Location. A flow measuring device shall be provided for the plant effluent unless it is a mechanical plant where an influent flow measuring device will be acceptable.

(ii) Type. For plants having an average design flow of 50,000 gpd (189 m<sup>3</sup>/d) or more, the flow measuring device shall provide recording of instantaneous flow rate, enable calculation of average daily flow rate and have provisions for calibration and correction.

(iii) Controls. Automatic controls shall be designed to permit manual override.

(iv) Alarms. Conditions that may affect discharge quality or personnel or public safety shall be alarmed at an attended location.

(i) Sampling. Access shall be provided to sample untreated wastewater ahead of the treatment facilities prior to adding any process return flows, and sampling of the effluent after all treatment process units, but before discharge to the receiving stream. An automatic sampler that composites samples in proportion to the flow rate on the effluent shall be provided if required by the NPDES permit.

(j) Ventilation. All enclosed spaces shall be provided with forced ventilation, excepting pumping station wetwells, scum pits, anaerobic process units, and man-holes. In areas

961 where there are open sewage channels, wet pits exposed to the room or process units without gas  
962 tight enclosures, ventilation shall be provided to maintain a higher pressure in the room than  
963 atmospheric and shall provide 12 air changes per hour. In equipment rooms, ventilation shall be  
964 provided to limit the temperature rise in the room to less than 15° F (8° C) above ambient, but not  
965 less than six air changes per hour. Rooms housing chlorine storage and/or feeders shall have  
966 provisions for exhausting the room contents in two minutes and continuous ventilation to provide  
967 12 air changes per hour.

968  
969 (k) Dewatering of treatment units. All treatment units, channels, housing screens, or  
970 other embedded equipment, and wetwells shall be provided with drains or sumps that facilitate  
971 draining the unit for access and maintenance. Drainage shall be to upstream process units. Basin  
972 slabs shall be designed to successfully resist the hydrostatic uplift pressure or relief valves shall  
973 be provided.

974  
975 (l) Cold weather protection. All equipment including pumps, bar screens, grit  
976 washers, electrical equipment and other equipment not required to be in or on open basins (such  
977 as clarifier drives and surface aerators) shall be housed in heated, lighted, and ventilated  
978 structures. Structure entrances shall be above grade. Piping shall be buried below frost level,  
979 placed in heated structures, or provided with heat and insulated. Walkways shall be located away  
980 from areas of spray and/or ice buildup.

981  
982 (m) Chemical storage. All chemical storage shall be housed or buried. Areas  
983 designated for storage of specific chemicals shall be separated from areas designated for other  
984 reactive chemicals. Liquid storage containers shall be isolated from other portions of the structure  
985 by a curb that will contain and/or drain ruptured tank contents. Concrete floors, walls and curbs in  
986 chemical storage and feed areas shall be coated to protect the concrete from aggressive chemicals.  
987 Floors in polymer feed and storage areas shall be provided with nonslip surfaces. Rooms for  
988 chlorine storage and feed equipment shall be gas tight and be provided with entry from outdoors.  
989 All toxic chemical storage areas shall be provided with lighting and ventilation that are switched  
990 from outside the room, and windows to permit viewing the room from outside.

991  
992 (n) Design capacities.

993  
994 (i) Flow. In the absence of flow measurement information, the design  
995 average daily flow shall be based on a per capita daily flow rate of 100 gallons (378 liters).  
996 Allowances shall be made for return flows from digesters, sludge thickeners and the like, and the  
997 infiltration and wet weather inflow into older sewer systems. Significant industrial waste flows  
998 shall be added to the per capita flow rate.

999  
1000 (ii) Organic loads. In the absence of wastewater strength data, domestic  
1001 waste treatment design shall be based on a per capita daily BOD and suspended solids  
1002 contribution of 0.22 lb (0.10 kg) and 0.25 lb (0.11 kg), respectively. The influence of sidestream  
1003 return flows and significantly strong industrial wastes shall be considered and included in the  
1004 design where applicable.

1005  
1006 **Section 12. Pretreatment.**

1007  
1008 (a) Flow equalization.

1009

- 1010 (i) Storage requirements. Where mechanical plants experience large diurnal  
1011 variations in flow rate which will cause mechanical, hydraulic, or biological process upsets, flow  
1012 equalization shall be provided.  
1013
- 1014 (ii) Location. Pretreatment facilities, such as bar screens, comminutors and  
1015 grit chambers, and where possible, primary clarifiers should be located ahead of the equalization  
1016 basin.  
1017
- 1018 (iii) Drainage and cleaning. Provisions shall be made to isolate, drain and  
1019 clean the basin(s).  
1020
- 1021 (iv) Aeration and mixing. Aeration shall be sufficient to maintain a minimum  
1022 of 2.0 mg/L of dissolved oxygen in the basin at all times. Air supply rates shall be a minimum of  
1023 10 cfm/ 1,000 cubic feet (10 m<sup>3</sup>/min/1000 m<sup>3</sup>) of volume for primary treated wastewater and 20  
1024 cfm/1,000 cubic feet (20 m<sup>3</sup>/min/1000 m<sup>3</sup>) of volume for raw or screened waste water.  
1025
- 1026 (v) Controls. Controls shall be provided to control the flow rate from the  
1027 flow equalization basin. Flow measurement devices shall be provided.  
1028
- 1029 (b) Screens.  
1030
- 1031 (i) Location. Coarse screens shall be the first unit in the treatment process.  
1032 Screens shall be housed. The housing shall be heated and ventilated. Access shall be separated  
1033 from other enclosed spaces. Housing shall be designed for hazardous location (National Electrical  
1034 Code, Class 1, Groups C and D, Division 1 locations).  
1035
- 1036 (ii) Capacity. The screen capacity shall be capable of handling the maximum  
1037 anticipated peak hourly flow including inflow and infiltration.  
1038
- 1039 (iii) Types.  
1040
- 1041 (A) Mechanically cleaned. Bar screens shall be mechanically cleaned  
1042 if the removal of the daily accumulation of screenings results in surging of the flow. Manually  
1043 cleaned screens shall be provided in parallel channels to permit removal of the mechanically  
1044 cleaned screen from service. Bars shall be between 45° and 90° measured from the horizontal.  
1045
- 1046 (B) Manually cleaned. Manually cleaned bar screens shall be used  
1047 for bypass of a mechanically cleaned screen or for treatment installations having an average  
1048 design capacity of less than 100,000 gpd (378 m<sup>3</sup>/day). Bars shall be between 30° to 45° from the  
1049 vertical.  
1050
- 1051 (iv) Bar spacing. Clear spacing on mechanically cleaned bar screens shall  
1052 range from ½ inch to 1 ¾ inches (1.27 cm to 4.45 cm). Manually cleaned screens shall have a  
1053 range from one to 1 ¾ inches (2.54 cm to 4.45 cm) clear spacing. Coarse screens may have  
1054 spacing greater than 1 ¾ inches (4.45 cm).  
1055
- 1056 (v) Velocities. Maximum approach velocity at average flows for a  
1057 mechanically cleaned screen shall be 3.0 fps (0.91 mps). Maximum velocity for a manually  
1058 cleaned bar screen shall be 1.5 fps (0.46 mps). Minimum velocities shall be 1.25 fps (0.38 mps).

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(vi) Channel. Channels shall be designed to eliminate deposition and permit draining. The channel shall contain a rock trap ahead of mechanically cleaned screens. Multiple channels shall be designed to allow uniform and equal flow to the screens. Slide gates shall be provided to permit isolating sections of channel containing screens.

(vii) Controls. Cleaning operation shall be controlled by one or several of the following methods.

(A) Timers. A timer to start the cleaning operation, and a device to stop the cleaning operation after one cycle.

(B) Differential head. Cleaning device starts and stops on differential head across screen.

(C) High level switch. Cleaning device starts on high level and runs for predetermined length of time.

All screens shall have manual override capability. All controls shall be suitable for use in hazardous location (National Electrical Code, Class 1, Groups C and D, Division 1 locations).

(viii) Handling. Screenings receptacles shall be designed to contain a minimum of one day's screenings. Manually cleaned bar screens shall include an easily accessible and safe working platform. All handling areas should be well drained.

(ix) Disposal. Screenings shall be disposed of in a manner approved by the Department of Environmental Quality, Solid Waste Management section. Grinding of screenings and return to the wastewater flow is not acceptable.

(c) Comminutors.

(i) Location. When used, comminutors shall be located downstream of a coarse screen. Where grit removal is provided, comminutors shall be located downstream.

(ii) Capacity. Comminution or screening capacity shall be adequate with the largest comminutor out of service.

(iii) Number of units. Wherever comminutors are used, a bypass, manually cleaned bar screen shall be installed.

(iv) Channel. Provide stop plates or similar devices to permit isolating a comminutor for maintenance. Provide drainage and washdown facilities. Where grit removal is not provided upstream, provide a gravel trap upstream of each comminutor.

(v) Bypass. An emergency bypass with a manually cleaned bar screen shall be provided. All flow exceeding the operating capacity of the comminutor(s) shall be automatically directed to the emergency bypass.



1107 (vi) Controls. The comminutor shall run continuously. All electrical controls  
1108 shall be NEC Class 1, Groups C and D, Division 1 rated.

1109  
1110 (d) Grit removal and disposal.

1111  
1112 (i) Where required. Grit removal shall be provided either by providing for  
1113 its accumulation in other process units or by removal in a specially designed basin. Where  
1114 accumulation is provided in other process units, duplicate units shall be provided to permit  
1115 removal of grit.

1116  
1117 (ii) Location. Grit removal shall be placed after bar screens or racks, but  
1118 before comminutors and other treatment units. Where grit removal facilities can be located at  
1119 grade, they shall be upstream of raw sewage pumping stations. Grit basins may be located  
1120 outdoors with proper precautions against freezing, but all grit conveying, washing and handling  
1121 facilities shall be located indoors.

1122  
1123 (iii) Capacity. Grit removal devices shall be designed to effectively remove  
1124 grit at the peak instantaneous flow rate. The grit handling capacity shall be a minimum of 15  
1125 cubic feet per million gallons (1.12 m<sup>3</sup>/10,000 m<sup>3</sup>).

1126  
1127 (iv) Number of units. A minimum of one mechanically cleaned unit and a  
1128 bypass pipe or channel shall be provided for plants serving separate sewers. Five hundred  
1129 thousand gallons per day (500,000 gpd) (1891.5 m<sup>3</sup>/d) plants or smaller may have a manually  
1130 cleaned unit and bypass. Plants larger than 1.0 mgd (3784 m<sup>3</sup>/d), shall have two mechanically  
1131 cleaned units with capability to isolate each one.

1132  
1133 (v) Type.

1134  
1135 (A) Aerated.

1136  
1137 (I) Air requirements. Air supply must be controllable and  
1138 capable of varying from 10 to 40 cfm/1,000 cubic feet (10 to 40 m<sup>3</sup>/m/1,000 m<sup>3</sup>) of basin. Air  
1139 diffusers shall be located above the tank bottom and positioned for adequate mixing.

1140  
1141 (II) Equipment requirements. The tank shall be sized for a  
1142 three minute retention time at peak flows. Grit shall be collected to a hopper for removal by 60 or  
1143 greater sloped sides or mechanical equipment. The inlet and outlet shall be designed to avoid  
1144 shortcircuiting. Air diffusers shall be removable without taking the basin out of service.

1145  
1146 (B) Gravity chamber. Horizontal channel grit basins shall have an  
1147 outlet control weir and specially shaped channel to maintain velocities from 0.8 to 1.3 fps (0.24 to  
1148 0.4 m/s) over the anticipated range of flows. Square basins shall be designed for an overflow rate  
1149 of 30,000 gpd/sq ft (1220 m<sup>3</sup>/m<sup>2</sup>/d) at the peak instantaneous flow rate.

1150  
1151 (vi) Method of grit removal. Grit removal facilities located in pits six feet  
1152 (1.8 m) or deeper and for plants larger than 500,000 gpd (1891.5 m<sup>3</sup>/d) shall be provided with  
1153 mechanical equipment for moving grit to ground level.

1154

1155 Plants having an average design capacity less than 100,000 gpd (378 m<sup>3</sup>/d) may be  
1156 provided with manually cleaned grit basins.

1157  
1158 (vii) Drains. Each unit in the grit facility shall be capable of being dewatered.

1159  
1160 (viii) Grit disposal. Grit disposal methods shall be approved by the Department  
1161 of Environmental Quality, Solid Waste Management Office.

1162  
1163 **Section 13. Primary Treatment.**

1164  
1165 (a) Sedimentation.

1166  
1167 (i) Number of basins. For plants having an average design capacity greater  
1168 than 100,000 gpd (378.4 m<sup>3</sup>/d) and where primary settling is provided, multiple units capable of  
1169 independent operation shall be provided.

1170  
1171 (ii) Design parameters.

1172  
1173 (A) Performance. Unless full-scale data is available, primary settling  
1174 shall be assumed to remove one third of the influent BOD and 55 percent of the influent  
1175 suspended solids. It is unacceptable to return waste activated sludge to the primary clarifier.

1176  
1177 (B) Water depth. The minimum side water depth shall be seven feet  
1178 (2.1 m).

1179  
1180 (C) Surface overflow rates. Surface overflow rates shall not exceed  
1181 1,000 gpd/sq ft (41 m<sup>3</sup>/m<sup>2</sup>d) of surface area at the average design flow nor 1,500 gpd/sq ft (61  
1182 m<sup>3</sup>/m<sup>2</sup>d) of surface area at the maximum day flow rate. Maximum day flow is the highest flow  
1183 over a 24 hour period that is projected to occur during the design year.

1184  
1185 (D) Weir loading rates. Circular basins (or basins with center inlets)  
1186 shall be provided with a full periphery weir. Rectangular basins shall be provided with end weirs  
1187 that provide less than 80,000 gpd/ft (9,920 m<sup>3</sup>/m d) weir hydraulic loading at peak instantaneous  
1188 flow rates.

1189  
1190 (iii) Clarifier inlet and outlet.

1191  
1192 (A) General. Clarifier inlet structures shall be designed to achieve the  
1193 following:

1194  
1195 (I) Dissipate the inlet kinetic energy.

1196  
1197 (II) Distribute the flow evenly into the tank.

1198  
1199 (III) Prevent short circuiting.

1200  
1201 Inlet channels or piping shall be designed for minimum velocities of one fps (0.3 mps).  
1202 Where minimum velocities are less, mixing, flushing or other means of resuspending solids shall  
1203 be provided.

1204 Circular basins shall be provided with symmetrical baffling to distribute flow equally in  
1205 all radial directions.

1206  
1207 Rectangular basins shall be provided with inlet parts uniformly distributed along the  
1208 entire end of the basin and shall be provided with baffles.

1209  
1210 (B) Weirs. Weir plates shall be adjustable for leveling and sealed  
1211 against the effluent channel.

1212  
1213 (C) Baffles. Provide scum baffles at the water surface to intercept all  
1214 floating materials and scum prior to the weir. Baffles should extend three inches (7.6 cm) above  
1215 the weir plate elevation and eight inches (20.3 cm) below the water surface.

1216  
1217 (D) Clarifier effluent channel.

1218  
1219 (I) Size. The effluent channel shall be sized to prevent weir  
1220 submergence at the peak hourly flow.

1221  
1222 (E) Freeboard. The outer walls of sedimentation tanks shall extend at  
1223 least six inches (0.15 m) above the surrounding ground and shall provide at least 12 inches (0.3  
1224 m) of freeboard to the water surface. Where basin walls do not extend four feet (1.2 m) above the  
1225 surrounding ground, a fence or suitable barrier to prevent debris from entering the basin shall be  
1226 provided.

1227  
1228 (F) Basin equipment and access. Provide walkways and accessways  
1229 to collector drive units, effluent launders and manual skimmer. Handrail shall be provided.

1230  
1231 (b) Fine screens.

1232  
1233 (i) Number of units. A minimum of two units shall be provided. Multiple  
1234 units shall be capable of independent operation. With the largest unit out of service, the remaining  
1235 units shall be capable of passing the peak flow rate.

1236  
1237 (ii) Flow distribution. Positive means of flow distribution shall be provided  
1238 ahead of the screens to ensure even loading and hydraulic flows.

1239  
1240 (iii) Design parameters.

1241  
1242 (A) Performance. In the absence of pilot plant data, the removal  
1243 efficiency of fine screens shall be assumed to be zero percent removal of BOD<sub>5</sub> and 15 percent  
1244 removal of suspended solids.

1245  
1246 (B) Preliminary treatment requirement. Prior to the fine screens,  
1247 removal of large debris shall be provided by coarse screens. Comminution shall not be provided  
1248 ahead of screens.

1249  
1250 (iv) Screenings storage and disposal. Screens with openings of 0.10 inch (2.5  
1251 mm) or more shall be disposed of directly to landfill in accordance with the requirements of the  
1252 Department of Environmental Quality, Solid Waste Management Office. Screens with openings

1253 less than 0.10 inch (2.5 mm) shall discharge the screenings (primary sludge) to sludge handling  
1254 system for organic stabilization.

1255  
1256 (v) Cleaning and maintenance. Provide facilities to permit regular cleaning  
1257 of screens with a high pressure, hot water or steam system.

1258  
1259 (vi) Controls. For rotating screens, each screen or series of screens shall be  
1260 provided with an overflow. An alarm shall be provided when overflowing.

1261  
1262 (c) Sludge handling.

1263  
1264 (i) Sludge removal. Mechanical sludge collection equipment is required for  
1265 all primary settling basins. The sludge collection rake arms or flights and the drive assembly shall  
1266 be designed to withstand the maximum anticipated loads and move sludge to the hopper.

1267  
1268 (ii) Scum removal. Provide scum collection and removal facilities for all  
1269 primary settling basins. Scum shall be removed from the liquid process and not returned.

1270  
1271 (iii) Sludge hopper. The minimum side slope of the hopper shall be 1.7  
1272 vertical to 1.0 horizontal. Hopper bottoms shall have a maximum dimension of two feet (0.61 m).  
1273 The sludge removal pipe shall be flush with the hopper bottom, and have a minimum diameter of  
1274 six inches (15.2 cm).

1275  
1276 (iv) Scum box. The scum box shall be located outside and immediately  
1277 adjacent to the scum collection point (beaching plate). The beaching plate shall be located on the  
1278 opposite side of the basin from the prevailing wind. Provide for mixing the contents of the scum  
1279 box, such as a mechanical mixer or air diffusion. Provide access and wash water for washing the  
1280 scum box.

1281  
1282 (v) Controls.

1283  
1284 (A) Primary settling sludge facilities. Primary sludge and scum shall  
1285 be removed using positive displacement pumps. Each basin shall have a separately activated and  
1286 controlled pump. (The standby pumps may be shared by more than one basin.) Pumps shall be on  
1287 timers and the pumps should be designed to initiate sludge removal two or more times per hour.

1288  
1289 Include devices on the primary sludge piping for sampling the primary sludge flow.

1290  
1291 (B) Primary screen sludge facilities. Where sludge pumping is  
1292 provided, include a means to shut off the pump when insufficient material is being supplied to the  
1293 pump suction. The controls for the pump shall be designed to match the pumping rate to quantity  
1294 of sludge. Where conveyors are used, they shall run continuously and alarm when off.

1295  
1296 **Section 14. Activated Sludge.**

1297  
1298 (a) Pretreatment. Where primary clarification is not provided, screening of the raw  
1299 sewage to remove debris larger than 3/4 inch (1.9 cm) shall be provided. The screened material  
1300 shall not be returned to the plant process. Where primary clarifiers are not provided, cleanouts,  
1301 grinders, or other similar provisions shall be made in the return sludge piping.

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(b) Loading rates. Activated sludge systems shall be designed to accommodate peak day loadings at the design year. Permissible loadings are presented in the following table. Where raw sewage BOD5 is less than 200 mg/L, detention times may be reduced.

(i) Conventional, including complete mix, plug flow, step aeration

		<u>Average Day</u>
<u>Detention (*) hrs,</u>	Following primary clarifiers	6 minimum
	Without primary clarifiers	9 minimum
<u>Organic Loading:</u>	lb/1,000 cu ft/day (kg/1000 m <sup>3</sup> d)	35 maximum (560)
<u>MLSS, mg/L</u>		1,000 - 3,000

(ii) Contact stabilization.

<u>Detention (*) hrs,</u>		
Contact Zone		0.5 - 3
Sludge Stabilization Zone		6 minimum
		<u>Average Day</u>
<u>Organic Loading (**)</u>	lb/1,000 cu ft/day (kg/1000 m <sup>3</sup> d)	50 (800)
<u>MLSS, mg/L</u>		
Contact Zone		1,000 - 3,000
Sludge Stabilization Zone		5,000 - 10,000

(iii) Extended aeration, including oxidation ditch.

<u>Detention (*) hrs,</u>		16 minimum
<u>Organic Loading,</u>	lb/1,000 cu ft/day (kg/1000 m <sup>3</sup> d)	15 maximum (240)
<u>MLSS, mg/L</u>		1,000 - 3,000

(\*) Based on average day raw sewage flow rate exclusive of recirculation flow.

(\*\*) Based on contact zone and sludge stabilization zone combined.

(c) Number of basins. For all design average flows in excess of 0.1 mgd (378 m<sup>3</sup>/d), two or more aeration basins shall be provided. For flows less than 0.1 mgd (378 m<sup>3</sup>/d), one aeration basin may be provided if the aeration devices can be readily removed while the basin is in operation.

1351 (d) Configuration. The basin configuration shall promote mixing, transfer of oxygen,  
 1352 and minimize stagnant zones.

1353  
 1354 (e) Freeboard. The walls of the aeration shall extend above the normal water surface  
 1355 to provide a minimum freeboard as follows:

		Minimum Freeboard (*)	
		inches	cm
1359	Diffused air	18	45.7
1360	Surface aeration	48	121.9
1361	Submerged turbine	18	45.7
1362	Brush aeration, less than 10 feet from aeration device	48	121.9
1363	Brush aeration, 10 feet or more from aeration device	18	45.7
1364	Surface aeration, where aeration	36	91.40
1365	is 30 or more feet from basin wall		

1366  
 1367 (\*) Vertical walls. For sloped walls, the runup effect shall be considered.

1368  
 1369 (f) Inlet and outlet conditions. Inlets may be submerged and shall be baffled or  
 1370 directed away from the outlet to minimize shortcircuiting. Outlets shall be of the overflow type to  
 1371 discourage buildup of foam and floatables on the aeration basins. Pipe and channels shall provide  
 1372 a minimum velocity of 0.5 fps (0.15 m/s).

1373  
 1374 (g) Aeration requirements.

1375  
 1376 (i) Carbonaceous BOD<sub>5</sub>. When it can be shown that nitrification will not  
 1377 occur in the activated sludge process, the aeration devices may be sized to meet only the  
 1378 carbonaceous oxygen demand. The oxygen provided by the aeration device shall be selected to be  
 1379 adequate for the projected maximum day loading. In the absence of other data, an oxygen  
 1380 requirement of two times the average design day BOD<sub>5</sub> to the aeration basin shall be used.

1381  
 1382 (ii) Nitrification. Where nitrification is required to meet the effluent  
 1383 requirements or where the process cannot be operated to prevent nitrification, the aeration  
 1384 requirements will be selected to provide oxygen for both carbonaceous BOD<sub>5</sub> and nitrification on  
 1385 the projected maximum day loading. In the absence of other data, an oxygen requirement of two  
 1386 times the average design day BOD<sub>5</sub> plus 7.5 times the average day ammonia nitrogen to the  
 1387 aeration basin shall be used.

1388  
 1389 (iii) Minimum dissolved oxygen. Oxygen supply shall be selected to transfer  
 1390 the design quantity during the maximum day loading while maintaining an aeration basin  
 1391 dissolved oxygen of 2.0 mg/L. The oxygen supply shall be designed for the specific site  
 1392 considering all factors that affect oxygen transfer efficiency.

1393  
 1394 (h) Mechanical aeration. Mechanical surface aerators shall be designed to maintain  
 1395 all organics in suspension, enhance the oxygen transfer capability of the unit, and minimize mist  
 1396 and spray that escape the basin. Drive units shall be protected from freezing mist and spray.

1397  
 1398 (i) Diffused aeration.

1399

1400 (i) Diffuser requirements. The number and location of diffusers shall be  
1401 selected to distribute the design air quantity for efficient aeration and mixing. Diffusers in a basin  
1402 shall be grouped on control valves to permit varying the air supply to different parts of the basin.  
1403 Oxygen transfer efficiencies used for design purposes shall be conservatively selected, based on  
1404 experimentally determined transfer rates of generically similar diffusers. The effect of  
1405 transferring oxygen to wastewater, in lieu of water, and the effect of altitude shall be considered.  
1406 The aeration basin mid-depth shall be used to determine the oxygen saturation concentration.  
1407 Differential head loss to individual diffuser inlets shall not be more than 0.2 psi (14 gm/cm<sup>2</sup>).  
1408

1409 (ii) Blower requirements. Blowers shall be sized to provide the air  
1410 requirements for the aeration basins and other plant uses of low pressure air. The inlet air to the  
1411 blowers shall be filtered or otherwise conditioned to effectively remove dust and other particulate  
1412 material. Removal of particulate material for fine bubble diffusers shall be designed for 95  
1413 percent of 0.3 micron. Filters designed for blowers shall be easily replaceable. Blower intakes  
1414 shall be located to avoid clogging from drifting snow. Blowers shall be housed. The housing shall  
1415 be ventilated to prevent more than a 15° F (8° C) temperature rise with all blowers operating,  
1416 excepting the standby blower. The housing, blowers, and blower piping shall be arranged to  
1417 permit removal of individual blowers while all other blowers are operating. Noise attenuating  
1418 materials shall be used in the building interior. Blower systems shall be designed to permit  
1419 varying the volume of air delivered. Blower motors shall be of a size to operate the blower  
1420 throughout the range of ambient air temperatures experienced at the plant site.  
1421

1422 (j) Sludge recirculation and waste.  
1423

1424 (i) Rates. Sludge recirculation from the secondary settling basin to the  
1425 aeration basin shall be variable within 25 to 100 percent of the average design flow. Sludge  
1426 wasting from the activated sludge process may be from the mixed liquor or the return sludge.  
1427 Sludge wasting shall be variable to enable wasting ½ of the total system solids in one day to zero  
1428 wasting.  
1429

1430 (k) Equipment requirements.  
1431

1432 (i) Return sludge. Return sludge pumping shall be variable. The return  
1433 sludge rate from each secondary settling unit and the rate to each aeration basin shall be  
1434 controllable. Pumps shall be housed in heated, ventilated space. The pump floor shall be sloped  
1435 and drained. Valves shall permit isolating each pump. Pumps and piping shall be arranged to  
1436 allow ready removal of each pump. Check valves shall be provided where backflow through the  
1437 pump could occur. Check valves shall be located in the horizontal.  
1438

1439 Pump suction and discharge shall be three inches (7.6 cm) minimum. Sludge piping shall  
1440 be four inches (10.2 cm) or larger. Cleanouts and couplings shall be provided in sludge piping to  
1441 enable cleaning the pipe or to remove pumping equipment. All pipe high points shall be provided  
1442 with air releases. All sludge piping shall be metallic material. Should air lift pumps be used, the  
1443 units shall be designed with a minimum of 80 percent static submergence.  
1444

1445 (ii) Waste sludge. If separate waste sludge pumps are provided, the rate shall  
1446 be controlled by timers or variable speed devices. Pumping units shall be housed in heated,  
1447 ventilated space, with sloped and drained floors. Pump suction and discharge piping shall be three  
1448 inches (7.6 cm) minimum. Sludge piping shall be four inches (10.2 cm) or larger, except short,

1449 easily removable sections that may be required to maintain velocities above one fps (0.3 mps), or  
1450 for use in conjunction with meters.

1451

1452 (l) Metering.

1453

1454 (i) Return sludge. For treatment plants having an average day design  
1455 capacity greater than 100,000 gpd (378 m<sup>3</sup>/d) the return sludge flow rate from each secondary  
1456 settling unit and to each aeration basin shall be metered to indicate flow rate. Return sludge  
1457 metering devices shall be suitable for liquids carrying grease and solids, and shall be accurate to  
1458 within ±5 percent of the actual flow rate. Meters shall be readily field calibrated by plant  
1459 personnel. Meters shall be arranged to avoid trapping air.

1460

1461 (ii) Waste sludge. For treatment plants having an average day design  
1462 capacity greater than 100,000 gpd (378 m<sup>3</sup>/d), waste sludge flows shall be metered to indicate and  
1463 totalize. Waste sludge meters shall meet the requirements described for return sludge meters.

1464

1465 (iii) Air flow. Low pressure air used for basin aeration and other plant uses  
1466 shall be metered. Separate meters shall be used to indicate the flow rate to each aeration basin and  
1467 to the ancillary uses made of the low pressure air. Indicators shall be located near the device used  
1468 to control the air flow rate. Pressure gages shall be provided immediately downstream from each  
1469 blower and immediately upstream of each aeration basin.

1470

1471 (m) Controls. Facilities for control shall be provided for:

1472

1473 (i) Control of flow split between parallel process units.

1474

1475 (ii) Control of return sludge flow rate to each aeration basin.

1476

1477 (iii) Control of waste sludge quantity.

1478

1479 (iv) Control of air flow rate to each aeration basin.

1480

1481 (v) Control of air distribution to different zones in aeration basin.

1482

1483 (vi) Control of energy imparted with mechanical aeration. Facilities for  
1484 control shall include a meter or device to measure rate and a device to change the rate such as a  
1485 valve or adjustable weir.

1486

1487 (n) Prefabricated treatment units. Prefabricated activated sludge units shall conform  
1488 to the applicable requirements described.

1489

1490 (o) Ancillary facilities. Adequate nonpotable washdown water shall be provided  
1491 around the aeration basins sludge pumping area and secondary settling basins. Sampling ports,  
1492 pipes or other access shall be provided on aeration basin inlets, return sludge piping, waste sludge  
1493 piping and secondary settling basins. Hoisting or other means of equipment removal shall be  
1494 provided. All subgrade floors shall be drained.

1495

1496

1497



1498 **Section 15. Attached Growth Systems.**

1499

1500 (a) Pretreatment and primary treatment requirements. Attached growth systems shall  
 1501 be preceded by primary settling or fine screening. If fine screening is provided, the screen size  
 1502 shall have 0.06 inch (1.5 mm) or smaller openings.

1503

1504 (b) Trickling filters.

1505

1506 (i) Loading rates. Applied organic loading rates on trickling filters, where  
 1507 not used in series with activated sludge, shall be limited to:

1508

	<u>Applied Liquid Rate</u>		<u>BOD Loading*</u>	
	<u>to Surface of Filter</u>			
	(gpm/sf)	(lpm/m)	(lb/1000ft <sup>3</sup> /d)	(kg/1000 m <sup>3</sup> /d)
1511 Rock Media	0.1	4.07	10	160
1512	0.2	8.15	12	192
1513	0.3	12.22	16	256
1514 Plastic or				
1515 Redwood Media			20	320

1516

1517 \*For more than a one-stage trickling filter, the volume of all stages shall be used.

1518

1519 (ii) Recirculation. Recirculated flow to stationary media attached growth  
 1520 systems shall be provided. Recirculated flow shall be sufficient to provide the following  
 1521 minimum wetting rates:

1522

Media	Minimum Wetting Rate	
	(gpm/sf)	(lpm/m <sup>2</sup> )
1524 Rock	0.1	4.07
1525 Plastic or redwood	0.75	30.5

1526

1527 (iii) Media. Media may be rock or specially manufactured material made of  
 1528 redwood or plastic. Rocks shall be durable and free from thin, elongated, flat pieces and should  
 1529 have the following size distribution:

1530

1531 Passing 6-inch (15.2 cm) screen	100% by weight
1532 Retained on 4-inch (10.2 cm) screen	95 - 100% by weight

1533

1534 Fabricated media shall be resistant to ultraviolet degradation, disintegration, erosion,  
 1535 aging, all common acids, alkalies, organic compounds, fungus and biological attack. Media shall  
 1536 be capable of supporting a man's weight.

1537

1538 (iv) Flow distribution. Wastewater shall be applied to stationary media by a  
 1539 rotary distributor or a fixed nozzle distribution system that provides uniform distribution. Flow  
 1540 distribution between multiple units of stationary or rotating media systems shall be by weirs,  
 1541 meters and valves, or other positive flow split device.

1542

1543

1544

1545 (v) Depth of media. Rock trickling filters depth shall be between 5 to 10 feet  
1546 (1.52 to 3.04 m), and manufactured media filter depth shall be between 10 to 30 feet (3.05 to 9.15  
1547 m).

1548 (vi) Underdrain system. The underdrainage system shall cover the entire floor  
1549 of the filter. Inlet openings into the underdrains shall have an unsubmerged gross combined area  
1550 equal to at least 15 percent of the surface area of the filter. Underdrains shall have a minimum  
1551 slope of one percent.

1552  
1553 Effluent channels shall be designed to maintain minimum velocity of two feet per second  
1554 (0.61 mps). Drains, channels and pipe shall be designed to have maximum depth flow of 50  
1555 percent.

1556  
1557 (vii) Flushing. Provide valves and structurally capable walls to permit  
1558 flooding rock media filters. Access shall be provided around the periphery of the underdrain  
1559 system to allow flushing the underdrains.

1560  
1561 (viii) Freeboard. The clearance between rotating distributor and the media  
1562 shall be at least 18 inches (0.46 m). The surrounding wall shall extend 2.5 feet (0.76 m) above the  
1563 distributor.

1564  
1565 (ix) Ventilation. All trickling filters shall be provided with ventilation  
1566 openings to the underdrain. Ventilation openings will be provided with dampers or other  
1567 adjustable devices to permit adjusting the ventilation rate opening. Ventilation openings shall be a  
1568 minimum of eight square feet (0.74 m<sup>2</sup>) per 1,000 lb (454 kg) BOD<sub>5</sub>/day.

1569  
1570 Forced ventilation providing 4,000 cfm (113 m<sup>3</sup>/min) per 1,000 lb (454 kg) BOD<sub>5</sub>/day  
1571 shall be provided for covered filters.

1572  
1573 (c) Rotating biological contactors (RBC).

1574  
1575 (i) Loading rates. The organic loading rate on the first stage of an RBC shall  
1576 be limited to 140 lb BOD<sub>5</sub>/1,000 cu ft (2240 kg/1,000 m<sup>3</sup>) of media per day. The organic loading  
1577 rate on all stages of an RBC shall be limited to 45 lb/1,000 cu ft (720 kg/1,000 m<sup>3</sup>) of media for  
1578 media having a specific surface area of 35 sq ft per cu ft (114.8 sq m/m<sup>3</sup>). When more than ½ of  
1579 the media has a specific surface area of 50 sq ft per cu ft (164 sq m/m<sup>3</sup>), the organic loading may  
1580 be increased to 50 lb/ 1,000 cu ft (800 kg/1,000 m<sup>3</sup>).

1581  
1582 (ii) Number of stages. Rotating biological contactors shall be designed with  
1583 a minimum of three stages in series. Baffles shall be provided between stages.

1584  
1585 (iii) Velocities. The rotational speed of the contactors shall be designed to  
1586 maintain at least two mg/L of dissolved oxygen in each stage at designed loading rates. Drive  
1587 units shall provide a rotational speed of one rpm or more.

1588  
1589 (iv) Draining. Provide drains from each contactor basin.

1590  
1591 (v) Media materials. Media materials shall be special manufactured material  
1592 suitable and durable for the rotating biological contactor process. Media shall be resistant to  
1593 disintegration, ultraviolet degradation, erosion, aging, all common acids, alkalies, organic com

1594 pounds, fungus, and biological attack. Media shafts shall be designed for unbalanced loads and  
1595 cycle fatigue.

1596  
1597 (vi) Housing. The housing for the RBC'S shall be designed with openings or  
1598 access to allow removal and replacement of entire shafts.

1599  
1600 **Section 16. Combination systems.**  
1601

1602 When more than one type of biological treatment process is used in series, the removal  
1603 through each biological unit shall be calculated as if it were acting alone. No symbiotic effect will  
1604 be included in the design calculation.

1605  
1606 Pretreatment requirements for combinations of biological systems will be the same as for  
1607 attached growth systems. Final settling and sludge handling will be the same as for activated  
1608 sludge systems.

1609  
1610 **Section 17. Secondary settling.**  
1611

1612 (a) Secondary settling. Secondary settling is required after suspended growth and  
1613 attached growth biological processes such as activated sludge, trickling filters and RBC's.

1614  
1615 (b) Configuration. The largest dimension (either diameter or length) of a clarifier  
1616 shall be 80 feet (24.4 m). Corner sweeps on circular equipment are not acceptable.

1617  
1618 (c) Flow distribution. Positive flow splitting shall be provided ahead of multiple  
1619 sedimentation basins to ensure proportional hydraulic flows and solid loadings to each basin.  
1620 Flow splitting shall be achieved using positive means such as weirs or valves and meters.

1621  
1622 (d) Clarifier inlet and outlet structures.

1623  
1624 (i) Clarifier inlet structures shall be designed to dissipate the:

1625  
1626 (A) Inlet kinetic energy.

1627  
1628 (B) Distribute the flow evenly into the basin.

1629  
1630 (C) Minimize hydraulic turbulence.

1631  
1632 (D) Prevent short circuiting.

1633  
1634 Inlet devices that promote flocculation are encouraged.

1635  
1636 The inlet structure for rectangular tanks shall be the full width of the basin, for peripheral  
1637 feed clarifiers it shall be the entire periphery, and for center feed basins it shall be at least  
1638 20 percent of the tank diameter. Baffled scum relief ports shall be provided between the inlet  
1639 structure and the clarifier.

1640

1641 (ii) Inlet conveyance pipe or channels shall be designed to maintain a  
 1642 minimum velocity of 0.5 fps (0.15 mps) at the design flow. Where channels provide less velocity,  
 1643 provide mixing, flushing, or other means of resuspending solids.

1644  
 1645 (iii) Clarifier outlet systems shall be designed to minimize vertical velocities  
 1646 and reduce the effect of density currents at the effluent weir. Weir level shall be adjustable.

1647  
 1648 (e) Freeboard. The outer walls of settling tanks shall extend at least six inches (0.15  
 1649 m) above the surrounding ground and provide at least 12 inches (0.3 m) of free board to the water  
 1650 surface. Where settling basin walls are less than four feet (1.22 m) above the surrounding ground,  
 1651 a fence or other debris barrier shall be provided on the wall.

1652  
 1653 (f) Design parameters.

1654  
 1655 (i) Surface overflow rates.

1656  
 1657 (A) Activated sludge. Settling basins following an activated sludge  
 1658 process shall be designed to both thicken the sludge and clarify the liquid flow entering the tanks.  
 1659 The overflow rate shall not exceed:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1661 Activated Sludge	600	24.4	1,200	8.8
1662 Separate				
1663 Nitrification	400	16.3	800	32.5

1664  
 1665  
 1666  
 1667 (B) Attached growth biological reactors. Overflow rates for settling  
 1668 basins following attached growth processes shall not exceed:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1670 Trickle Filters				
1671 and RBC's	800	32.5	1,200	48.8

1672  
 1673  
 1674  
 1675 (ii) Solids loadings. Solids loadings for settling basins following an activated  
 1676 sludge process shall not exceed:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1678 All Activated				
1679 Sludge Processes	28	136.7	50	244.1
1680 Separate				
1681 Nitrification	25	122.1	40	195.3

1682  
 1683  
 1684  
 1685 (iii) Side water depth. Settling basins shall be deep enough to provide  
 1686 adequate distance between the sludge blanket and the effluent weirs to avoid disturbance of  
 1687 settled sludge.

1688

1689 The volume of the settling basin shall provide a minimum detention time of two hours at  
 1690 peak hourly flow rate. The peak hourly flow is the projected maximum flow over a one hour  
 1691 period during the design year. Peak hourly flow shall include all recycle flows entering clarifier.  
 1692

1693 (iv) Weir overflow rates and placement. Weir loading rates shall not exceed the  
 1694 following values:

	<u>Design Flow</u>		<u>Peak Hourly Flow</u>	
	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d	gpd/ft <sup>2</sup>	m <sup>3</sup> /m <sup>2</sup> /d
1697 Launder and weir at 1698 outer wall	12,000	149	20,000	248
1699 Launder and weir at 1700 3/4 point of radius or less	18,000	223	36,000	446

1703 Where double weirs or serpentine type weirs are used, the weir length shall be computed  
 1704 as the length of the centerline of the launder.  
 1705

1706 (g) Baffles. Baffles shall be located at the water surface and in such a position as to  
 1707 intercept all floating materials (scum) prior to the weirs. Baffles shall extend three inches (7.6  
 1708 cm) above the weir level and 12 inches (0.3 m) below the water surface. In circular basins, the  
 1709 baffle shall be a minimum of six inches (0.15 m) inside the weir plate. In rectangular basins, the  
 1710 baffle shall extend across the width of the basin and upstream of the effluent weirs.  
 1711

1712 (h) Basin and equipment access. Walkways and access ways shall be provided to  
 1713 drive units, effluent launders, and manual scum devices.  
 1714

1715 (i) Sludge removal. Sludge collection and withdrawal equipment shall  
 1716 provide complete and continuous removal of settled sludge. Rapid sludge removal pipes shall  
 1717 return sludge to a well at the surface that enables visual observation of flow. Mechanical rakes  
 1718 shall move sludge to a hopper at the floor. The tip speed for circular mechanisms shall not exceed  
 1719 8 fpm (2.4 m/min) and straight line flight speed shall not exceed 1 fpm (0.3 m/min).  
 1720

1721 The return sludge removal pipes shall be at least four inches (10.2 cm) in diameter. The  
 1722 hydraulic differential between the clarifier water level and the return sludge level shall be  
 1723 sufficient to maintain a three fps (0.9 mps) velocity in each rapid return sludge withdrawal pipe.  
 1724 Each sludge withdrawal pipe shall be accessible for rodding or backflushing when the settling  
 1725 basin is in operation.  
 1726

1727 (ii) Scum removal. Provide effective baffling and scum collection and  
 1728 removal facilities for all secondary settling basins. Equipment shall include a mechanical, positive  
 1729 scum skimmer.  
 1730

1731 (iii) Sludge hopper. The minimum side slope of the hopper shall be 1.7  
 1732 vertical to 1.0 horizontal. Hopper bottoms shall have a maximum dimension of two feet (0.61 m).  
 1733 The sludge removal pipe should be flush with hopper bottom, and have a minimum diameter of  
 1734 six inches (0.15 m).  
 1735

1736 (iv) Scum box. Locate scum box outside settling tank and adjacent to the  
 1737 scum collection point. Provide method for mixing contents of scum box, such as air jets or

1738 surface wetting using waste sludge. Provide access and washwater for washing the scum box. The  
1739 scum box shall be located on the side of the tank opposite the prevailing wind direction.

1740  
1741

1742 **Section 18. Lagoons.**

1743  
1744

(a) Design requirements.(ii) Wastewater loading rates.

1745  
1746

(i) Location. Wastewater lagoons shall be located more than 500 feet (152  
1747 m) from existing habitations.

1748  
1749

(A) Facultative. The primary cells of a facultative (non-aerated) pond  
1750 system shall be limited to a maximum BOD application of 40 lb/acre/day (44.8 kg/ha/d) at  
1751 average design loading conditions.

1752  
1753

(B) Aerated. Aerated lagoons shall be designed for an organic  
1754 loading of less than 10 lb BOD /day/1,000 cu ft (160 kg/1,000 m<sup>3</sup>/d) for completely mixed  
1755 systems, and less than two lb BOD<sub>5</sub>/day/1,000 cu ft (32 kg/1,000 m<sup>3</sup>/d) for aerated non-  
1756 completely mixed systems. Aeration equipment shall be sized to maintain a minimum dissolved  
1757 oxygen of two mg/L. Completely mixed systems are mixed to provide 1/4 hp/1000 cu ft  
1758 mechanical mixing or 10 cfm/1000 cu ft of air mixing.

1759  
1760

(C) Nonsurface water discharging ponds. Nonsurface water  
1761 discharging ponds shall be designed on the basis of a water balance that considers evaporation  
1762 and seepage. Water balance calculations shall be submitted with the plans and specifications. The  
1763 BOD<sub>5</sub> loading for non discharging ponds shall not exceed 14 lb/acre/day (15.7 kg/ha/d) based on  
1764 the average annual BOD<sub>5</sub>.

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1766

(iii) Detention. Facultative lagoons shall be designed for a minimum detention  
1767 time of 180 days.

1768  
1769

The detention time in aerated lagoons shall be at least one and one half days for  
1770 completely mixed primary cells, and seven days for non-completely mixed primary cells.  
1771 Secondary cells shall increase the overall detention time to 30 days.

1772  
1773

(iv) Storage. Nonsurface water discharging lagoons shall be designed to  
1774 provide sufficient storage to retain all wastewater and rainfall during the wettest year of record  
1775 during a ten year period of record. Seepage shall be controlled to maintain a minimum water  
1776 depth of two feet (0.6 m) in the primary cell during the driest occurring year of a ten year period.

1777  
1778

(v) Inlet.

1779  
1780

(A) Location. The inlet pipe to the primary cell of a facultative  
1781 lagoon shall be at least 30 feet (9.2 m) from any bank. It shall terminate at a point away from the  
1782 outlet by a distance of at least equal to or greater than 2/3 of the longest lagoon dimension. In  
1783 aerated systems, the influent line shall be located in the mixing zone of the aeration equipment.

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1785

(C) Apron. Provide a concrete apron at the inlet pipe termination  
1786 with minimum dimensions of four feet by four feet (1.2 m by 1.2 m).

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(D) Influent manhole. An influent man-hole shall be provided prior to the lagoons. The influent pipe in the influent manhole shall be at least six inches (0.15 m) above the normal operating water level of the primary lagoons.

(E) Flow distribution. Flow distribution for multiple primary cells shall be provided to effectively split hydraulic and solids proportionately.

(vi) Inlet and outlet structures.

(A) Location. Inlet and outlet structures shall be easily accessible by plant operators and located to minimize short circuiting within the cell. A level control structure shall be provided at the outlet of each cell.

(B) Level control. Provide controls to permit varying water levels between two feet and six feet (0.6 m to 1.8 m). Provide baffling at the outlet to prevent scum overflow. Multiple draw offs in the final cell shall be provided. At least one shall be located at the two foot (0.6 m) level.

(vii) Interconnecting piping.

(A) Location. Piping between lagoon cells shall connect to the preceding cell outlet control structure and discharge into the subsequent cell. The pipe shall discharge at least ten feet (3.05 m) from the toe of the slope on the lagoon bottom and shall terminate on the concrete apron that is at least four feet by four feet (1.2 m by 1.2 m).

(B) Elevation. The piping shall discharge at the floor of the lagoon.

(C) Material. Interconnecting piping shall be any acceptable pipe designed to resist low pressures and adequately protected from corrosion.

(b) Number of lagoons cells. A lagoon system with a total area greater than one acre (0.4 ha) shall have at least three cells in series. Smaller systems and nondischarge pond systems shall have at least two cells. The maximum size cell shall be 20 acres (8 ha).

(c) Lagoon configuration.

(i) Shape. Rectangular cells shall have a maximum length to width ratio of 5:1. No sharp corners nor dead-end coves are permitted.

(ii) Water depth. Facultative ponds shall be designed to have water depths of not less than two feet, nor more than six feet (0.61 m to 1.8 m). Aerated lagoons shall be designed to have water depths of not less than four feet nor more than 15 feet (1.2 m to 4.6 m).

(iii) Removal of lagoon cells from operation. Bypass piping for primary lagoon cells and aerated lagoon cells shall be provided.

1835 (iv) Lagoon freeboard. A minimum freeboard of two feet (0.6 m) shall be  
1836 provided. Greater freeboard shall be provided for wave runup, where required.

1837  
1838 (d) Construction requirements.

1839  
1840 (i) Dike.

1841  
1842 (A) Material. Dikes and embankments shall be of relatively  
1843 impervious and stable material, and compacted to at least 95 percent of maximum density (ASTM  
1844 D698-78). Embankment fill shall be free from organic material, rock larger than six inches (15.2  
1845 cm) and construction debris. The area where the embankment is to be constructed shall be  
1846 stripped of vegetation and roots.

1847  
1848 (B) Top width. Dikes and embankments shall be constructed with  
1849 minimum top width of eight feet (2.4 m).

1850  
1851 (C) Slopes. Interior slopes shall be from three to four horizontal to  
1852 one vertical, and shall be stable under varying water level conditions. Interior slopes that are  
1853 surfaced with concrete paving or riprap may be constructed at slopes of two or more horizontal to  
1854 one vertical. Exterior slopes shall be three or more horizontal to one vertical and shall prevent the  
1855 entrance of surface water to the lagoon.

1856  
1857 (ii) Seeding. Exterior slopes and interior slopes that are not riprapped shall  
1858 be seeded with dryland grasses, unless another equivalent method for soil erosion control is  
1859 provided.

1860  
1861 (iii) Erosion control. Interior embankments except cells smaller than one acre  
1862 shall be protected from wave action with riprap, paving, or other erosion resistant material, unless  
1863 it is demonstrated that the ponds are sheltered from wind or where wind velocity is low and  
1864 erosion will not occur.

1865  
1866 (e) Lagoon sealing.

1867  
1868 (i) Lagoon sealing. The seepage through the pond bottom and side walls  
1869 shall not cause a violation of the groundwater standards as described in Chapter VIII (Quality  
1870 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
1871 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
1872 site conditions will not insure the protection of the groundwater for which it is classified.

1873  
1874 If the applicant cannot document that the facility poses no threat to groundwater and  
1875 elects not to perform a subsurface study in accordance with Chapter III, Section 15 (a) and (b),  
1876 then the groundwater shall be protected from contamination by the wastewater with a liner  
1877 equivalent to three feet (1 m) of soil having a permeability of 10<sup>-7</sup>cm/sec or less. When an  
1878 applicant performs a subsurface study, the requirements for the liner shall be determined based on  
1879 the results of the study and the groundwater protection required. In no instance shall the  
1880 maximum seepage rate exceed 1/8 inch per day (3.2 mm/day) in the primary pond(s).

1881  
1882 Following construction of the lagoons, but prior to startup, a testing program shall be  
1883 conducted to demonstrate the effectiveness of the sealing program. Should the testing program



1884 show the lagoon seal to be less effective than the above requirements, the seal shall be modified  
1885 and retested until it succeeds.

1886  
1887 (ii) Synthetic liners.

1888  
1889 (A) Material. Synthetic liners shall be essentially impervious. The  
1890 minimum lining thickness shall be 30 mils. The liner material shall be resistant to organic  
1891 materials typical of sewage. The liner shall be resistant to sunlight or shall be covered with 12  
1892 inches (30.5 cm) or more of soil at all locations including the lagoon bottom and side slopes.

1893  
1894 (B) Liner stabilization. Where the seasonal high groundwater is  
1895 above the bottom of the lagoon, the liner shall be stabilized to prevent it from rising.

1896  
1897 (C) Appurtenances. A leak detection system and/or air release  
1898 mechanism may be required.

1899  
1900 (f) Aerated systems.

1901  
1902 (i) Air requirements. Aerated ponds shall be designed to maintain 2 mg/L of  
1903 dissolved oxygen or more throughout the pond contents.

1904  
1905 (ii) Equipment requirements.

1906  
1907 (A) Number. Surface aerators shall be provided at intervals of 200  
1908 feet (61 m) or less. The lagoon shall be protected from erosion from the aeration equipment. At  
1909 least two surface aerators or brush aerators shall be provided. With the largest unit out, the  
1910 remaining units shall be capable of transferring the average day oxygen demand. Each diffused  
1911 aeration system shall be provided with at least two blowers. With the largest blower out of  
1912 service, the remainder shall be capable of supplying the design air flow rate.

1913  
1914 (B) Removal. All equipment shall be accessible and removable from  
1915 the edge of the lagoons. Provisions for dewatering shall be made for removal or repair of  
1916 diffusers.

1917  
1918 **Section 19. Tertiary treatment systems.**

1919  
1920 (a) Phosphorus removal.

1921  
1922 (i) Equipment requirements.

1923  
1924 (A) Flash mixing. Chemical addition points shall be at points of high  
1925 turbulence, such as Parshall flumes, hydraulic jumps, or separate mixing basins.

1926  
1927 (B) Flocculation. Inlet and outlet design shall prevent short circuiting  
1928 and turbulent destruction of floc. Minimum detention time shall be 20 minutes at the average  
1929 design flow rate.

1930  
1931 The velocity of flocculated water to settling basins shall be 0.5 to 1.5 fps (0.15 to 0.46  
1932 mps). Changes in direction shall be with long radius elbows or curved channels.

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(C) Chemical feed equipment. Storage shall be provided for at least 14 days of chemical supply. Liquid chemical storage tanks shall have a liquid level indicator, an overflow, and a receiving basin capable of holding 110 percent of the stored volume, or a drain capable of receiving accidental spills or overflows. Liquid chemical storage shall be provided with heat.

(b) Ammonia nitrogen reduction.

(i) Activated sludge. Ammonia nitrogen removal by activated sludge processes shall be designed with sludge retention time of at least 15 days and shall provide at least 16 hours of hydraulic detention time. Aeration requirements are described in Section 15.

(ii) Attached growth. Rock media trickling filters shall not be used for ammonia reduction. Fabricated media trickling filters used for ammonia shall be designed using a BOD loading of less than 14 lb/1000 cu ft (224 kg/1,000 m<sup>3</sup>) of media. Rotating biological contactors used for ammonia reduction shall be designed with hydraulic loadings less than 1.0 gpd/sq ft (40.7 L/m<sup>2</sup>/d) of media surface area. At least four stages shall be provided for ammonia nitrogen removal.

(iii) Lagoons. The design of facultative lagoons for ammonia removal shall provide a minimum detention of 180 days. Aerated lagoon systems may be designed for 160 days.

(c) Solids reduction.

(i) Filtration.

(A) Filtration rate. The maximum hydraulic loading for 24 inch (61 cm) or deeper media is 5 gpm/sq ft (292.5 m<sup>3</sup>/m<sup>2</sup>/d) of filter area. Filtration rates for shallower media shall be limited to 3gpm/sq ft (175 m<sup>3</sup>/m<sup>2</sup>d).

(B) Backwash requirements. Provide a minimum backwash rate of 20 gpm per square foot (1170 m<sup>3</sup>/m<sup>2</sup>/d) of filter bed for 24 inch (61 cm) or deeper media and 12 gpm/square foot (702 m<sup>3</sup>/m<sup>2</sup>/d) for shallower media; supply shall be filtered water. A rate of flow regulator on the main backwash line shall be provided. The total backwash water storage capacity shall be adequate for 20 minutes of continuous backwash.

Air scour or surface wash facilities are required. All surface wash devices shall be provided with a minimum flow rate of 0.5 gpm per sq ft (29.3 m<sup>3</sup>/m<sup>2</sup>d) water pressures of 50 psi (3.52 kg/cm<sup>2</sup>) or greater and use filtered water.

(C) Backwash waste handling and treatment. Waste filter backwash shall be collected in a surge tank and recycled to the treatment plant at a rate not to exceed ten percent of the average plant design flow rate. Waste backwash water may be returned to any point upstream of the biological treatment units.

1980 (D) Number of units. At least two units shall be provided. With one  
1981 filter out of service, the remaining filters shall be capable of passing the maximum day design  
1982 flow rate.

1983  
1984 (E) Controls. Controls should be provided to remove a filter from  
1985 service, backwash the filter, and return it to service. Where the control is automatic, there shall  
1986 also be a means of manually overriding the operating equipment, including each valve essential to  
1987 filter operation.

1988  
1989 In addition, the following shall be provided:

1990  
1991 (I) Sampling tap on filter influent and  
1992 effluent.

1993 (II) Indicating and recording loss of head gauge.

1994  
1995 (III) Flow rate indicating and control.

1996  
1997 (IV) Means for feeding polymer as a filter aid at a controlled  
1998 rate to filter influent water when chemically coagulated effluent is being filtered.

1999  
2000 (ii) Microscreens.

2001  
2002 (A) Pilot testing. Pilot plant testing on the fluid to be screened or  
2003 data from other similar applications to demonstrate the suitability of the proposed filter fabric,  
2004 fabric life, proposed loading rates, and other design criteria shall be provided.

2005  
2006 (B) Loading rates. Flow equalization facilities shall be included in  
2007 the design to moderate influent quality and flow variations.

2008  
2009 The screening rate shall be selected to be compatible with available pilot plant test results  
2010 and selected screen aperture, but shall not exceed 1.5 gpm/sq ft (87.8 m<sup>3</sup>/m<sup>2</sup>/d) for lagoon effluent  
2011 or 5 gpm/sq ft (292.5 m<sup>3</sup>/m<sup>2</sup>/d) for activated sludge or attached growth effluents based on the  
2012 maximum hydraulic flow rate applied to the units. The screening rate shall not exceed 0.75 lb/sq  
2013 ft/day (3.7 kg/ m<sup>2</sup>/day). The effective screen area shall be considered the submerged screen  
2014 surface area less the area of screen blocked by structural supports and fasteners.

2015  
2016 (C) Backwash requirements. The backwash water shall be at least  
2017 eight gpm/ linear foot (9 Lpm/m) of screen length at 60 psi (4.2 kg/cm<sup>2</sup> ), obtained from  
2018 microscreened effluent.

2019  
2020 (D) Controls. Each microscreen unit shall be provided with  
2021 automatic drum speed controls with provisions for manual override.

2022  
2023 (d) Rapid infiltration.

2024  
2025 (i) Wastewater preapplication requirements. Rapid infiltration shall be  
2026 preceded by settling or fine screening having 0.6 inch (1.5 mm) or smaller openings.

2027  
2028 (ii) Hydraulic loading rates.

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(A) Permeability. Hydraulic capacity of the rapid infiltration site shall be based upon soil permeability, basin infiltration tests, or cylinder infiltrometer tests. Design loading rates based on these tests shall be as follows:

Field Measurement	Annual Loading Rate
Basin infiltration test	10% of minimum measure rate
Cylinder infiltrometer	2% of minimum measured rate
Permeability	5% of conductivity of most restricting soil layer

(B) Precipitation. The total hydraulic load to the rapid infiltration basins includes precipitation. The one in ten year precipitation event should be used as the basis for design.

(C) Cold weather conditions. The design must recognize that drying rates, oxidation rates, nitrification and denitrification rates all decrease in cold weather. Cold weather loading rates shall be used to determined land requirements or cold weather storage shall be used. Provisions should be made to mow and disc basin surfaces in the fall to prevent ice from freezing the vegetation near the soil surface. Snow fences can be used to keep snow cover on the rapid infiltration basins to insulate the applied wastewater and soil.

(iii) Land requirements.

(A) Storage. A minimum of 14 days of storage shall be provided. Where applied sewage will be less than 4° C, 160 days of effluent storage shall be provided.

(B) Location. Rapid infiltration basins shall be located more than 500 feet (152 m) from existing habitation.

(iv) Basin size. Individual basin size shall not be greater than five acres (2.0 ha). Basin sizing should be based upon a maximum water depth of 12 inches (30.5 cm) in the rapid infiltration basins.

(v) Subsurface drainage. The capillary fringe above the groundwater mound shall not be closer than two feet (0.6 m) to the bottom of the infiltration basin. The distance to groundwater shall be at least five feet (1.5 m) below the soil surface within two days following wastewater application.

(vi) Groundwater monitoring. Refer to Chapter III, Section 15, of the regulations.

(e) Intermittent sand filters.

(i) Wastewater preapplications treatment requirements. Intermittent sand filters shall be preceded by settling or fine screens having 0.06 inch (1.5 mm) or smaller openings.

2074 (ii) Hydraulic loading rates. The maximum application rates shall be limited  
2075 to:

2076  
2077  
2078  
2079

2080	Source	Maximum Application Rate	
		gallons/acre/day	(m <sup>3</sup> /ha/d)
2081	Primary Effluent	130,000	(200)
2082	Secondary Effluent	400,000	(611)
2083	Lagoon Effluent	300,000	(458)

2084  
2085  
2086 (iii) Media. The minimum sand depth shall be 24 inches (0.6 m). The sand  
2087 must be free of cementing materials and clay or loam. The sand should have an effective size of  
2088 not less than 0.2 mm and not greater than 0.5 mm, and a uniformity coefficient of less than 5.

2089  
2090 Clean graded gravel shall be placed around the under drains and to a depth of at least 12  
2091 inches (0.3 m) over the top of the underdrains.

2092  
2093 (iv) Underdrains. All intermittent sand filters shall be provided with  
2094 underdrains. Underdrains shall be at least four inches (10.2 cm) in diameter. The under-drain pipe  
2095 shall have a minimum slope of 5 feet per 1,000 feet (5 m/1,000 m).

2096  
2097 The groundwater shall be at least two feet (0.6 m) below the bottom of the underdrain pipe.

2098  
2099 (v) Number of units. Three or more filters shall be provided.

2100  
2101 (vi) Dosing.

2102  
2103  
2104 (A) In each dosage of an intermittent filter, the hydraulic capacity  
2105 shall permit covering the bed to a depth of two inches (5 cm), within 20 minutes or less.

2106  
2107 **Section 20. Sludge Handling, Treatment and Disposal.**

2108  
2109 (a) Pumping.

2110  
2111 (i) Design requirements. Sludge pumps shall be provided with a positive  
2112 suction pressure at the pump impeller, rotor or plunger at dynamic conditions. Discharge pressure  
2113 shall include static pressure difference and system friction losses based on the higher viscosity of  
2114 the sludge than water.

2115  
2116 (ii) Piping and valves.

2117  
2118 (A) Minimum size. Sludge piping and valves shall at least four  
2119 inches (10.2 cm) in diameter for pressure piping and six inches (15.2 cm) in diameter for gravity  
2120 pipe. Pump suction and discharge shall not be less than three inches (6.6 cm) in diameter.

2121

2122 (B) Minimum velocity. For sludge pipes larger than four inches  
 2123 (10.2 cm) in diameter, the minimum velocity shall be one fps (0.3 m/sec).

2124  
 2125 (b) Thickening.

2126  
 2127 (i) Types.

2128  
 2129 (A) Gravity. Gravity thickening shall only be used for primary  
 2130 sludge, digested primary sludge, lime sludge, or combinations of lime sludge, trickling filter  
 2131 humus and primary sludge.

2132  
 2133 (B) Dissolved air flotation. Dissolved air flotation shall only be used  
 2134 for combination of primary and biological sludges, waste biological sludges, and aluminum and  
 2135 iron salt sludges.

2136  
 2137 (ii) Design parameters.

2138  
 2139 (A) Influent solids concentration. The design for influent solids  
 2140 concentrations to gravity or flotation thickeners shall be 5,000 mg/L or less, except tertiary lime  
 2141 sludge.

2142  
 2143 (B) Operating schedule. Sludge thickening facilities shall have the  
 2144 capacity to treat the maximum amount of solids produced. Where intermittent operation is  
 2145 provided, sludge holding tanks ahead of and after the thickening process shall be provided.

2146  
 2147 (C) Solids loading. Solids loadings (solids applied to the thickener)  
 2148 on thickening devices shall be limited to the following maximum values.

Sludge Type	Solids Loading			
	lb/sq ft/day		kg/m <sup>2</sup> /d	
	Gravity	Dissolved Air Flotation	Gravity	Dissolved Air Flotation
Primary	24	NA	117.2	
Digested primary	20	NA	97.6	
Waste activated, without polymer	NA	12		58.6
Waste activated, with polymer		48		234.3
Primary and trickling filter	15	--	73.2	
Anaerobically digested primary and activated	NA	NA		
Primary and lime	20	NA	97.6	
Tertiary lime	60	NA	292.9	
Alum	NA	12		58.6

2150 \*NA - Not allowed.  
 2151

2152 (D) Hydraulic loading. Gravity thickeners shall be designed for 400-  
 2153 800 gpd/ sq ft (16.3 m<sup>3</sup>/m<sup>2</sup>/d to 32.5 m<sup>3</sup>/m<sup>2</sup>/d) of surface area.

2154  
 2155 (iii) Number of units. Unless sludge storage capacity for three days is  
 2156 provided, there shall be at least two units of equal capacity provided for sludge thickening.  
 2157

2158 (iv) Controls. Controls for gravity and flotation sludge thickening operations  
 2159 shall include provision for influent flow rate control. Centrifuge thickening shall include  
 2160 adjustable manual controls for differential scroll speed, pool depth, and influent flow rate. Where  
 2161 chemical conditioning is required, chemical dosage rate shall have adjustable manual controls.  
 2162

2163 (v) Side stream waste characteristics. The flow, organic load, and solids load  
 2164 in the thickener return flow to the plant shall be included in the plant design loadings.  
 2165

2166 (vi) Odor control. Provisions shall be made for the continuous chlorination of  
 2167 gravity thickener influent. Any thickening installation for anaerobically digested sludge shall  
 2168 make provisions for enclosing zones where the sludge or decant is exposed to atmosphere,  
 2169 exhausting the zone at an adequate rate to prevent escape of gas, and treating the exhaust air for  
 2170 removal of odor causing agents.

2171  
 2172 (c) Aerobic digestion.

2173  
 2174 (i) Solids retention time. Solids shall be retained in the aerobic digester for  
 2175 30 days for primary sludge and 20 days for waste sludge from conventional activated sludge  
 2176 systems. Waste activated sludge from extended aeration systems shall be retained for a minimum  
 2177 of 10 days.

2178  
 2179 (ii) Mixing and aeration requirements. Aeration requirements shall  
 2180 include the oxygen requirements for BOD stabilization, nitrification of ammonia nitrogen in the  
 2181 sludge, and nitrification of organic nitrogen in raw sewage solids and biological solids. A  
 2182 minimum dissolved oxygen of 2 mg/l shall be maintained. Minimum aeration requirements shall  
 2183 be:  
 2184

Sludge	CFM/1,000 lb solids/day	m <sup>3</sup> /min/1,000 kg/d
Extended Aeration	300	18.7
Conventional Activated Sludge	800	50.0
Primary Sludge	2,100	131.0

2185  
 2186 The aerobic digester aeration shall be provided with nonclog diffused aeration.  
 2187 Mechanical surface aerators shall not be allowed. Aeration provisions shall be a minimum of 30  
 2188 cfm/1,000 cu ft (30 m<sup>3</sup>/min/1,000 m<sup>3</sup>) of volume.  
 2189

2190 (iii) Number of digesters. Where aerobic digesters are used, two or more  
 2191 shall be provided for treatment plants having an average design capacity of 100,000 gpd or more.  
 2192 Multiple aerobic digesters shall be arranged to permit either parallel or series operation.  
 2193

2194 (iv) Supernatant removal and disposal. Supernatant shall be returned prior to  
 2195 the influent of the biological treatment process.

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(d) Anaerobic digestion.

(i) Sludge characteristics. The minimum sludge concentration for feed to anaerobic digesters is four percent.

(ii) Number of digesters. Two or more digesters shall be provided for treatment plants having an average design capacity of 100,000 gpd (378.4 m<sup>3</sup>/d) or more.

(iii) Design requirements.

(A) Temperature. Primary anaerobic digesters shall be heated to provide a minimum temperature of 95°F (35°C). Controls shall maintain the digester temperature within ±5°F (±2° C).

(B) Mixing equipment. Digester mixing shall, as a minimum, provide control of scum accumulation at the gas/liquid interface. Mixing that is designed for increasing the effectiveness of the digester and thereby reducing detention time shall mix the entire tank contents. Mixing devices and their application rate that will be considered to provide high rate digestion are:

<u>Volume</u>	<u>Per 1,000 cf</u>	<u>Per 1,000 m<sup>3</sup></u>
Slow speed turbine mixers	0.25 hp	6.7 kw
Draft tube mechanical mixers	0.40 hp	14.1 kw
External pumps and jet nozzles	500 gpm	66.7 m <sup>3</sup> /m
Gas mixing applied at bottom of digester	10 cfm	10 m <sup>3</sup> /m

Less mixing may be provided; however, longer solids retention times than described below shall be required.

(C) Solids retention time. The minimum solids retention time for heated, primary digesters are:

<u>Unmixed</u>	<u>Completely mixed</u>
30 days	10 days

Solids retention time shall be the same as liquid retention time in the primary digester where waste activated sludge is anaerobically digested.

(D) Volatile solids loading. As an alternative design basis to solids retention time, heated primary digesters may be designed for the following maximum volatile solids loading:

<u>Unmixed</u>
0.1 lb/ft <sup>3</sup> /day (1.6 kg/m <sup>3</sup> /d)
<u>Completely mixed</u>
0.3 lb ft <sup>3</sup> /day (4.8 kg/m <sup>3</sup> /d)



- 2245 (iv) Sludge piping.  
2246  
2247 (A) Inlet. Except in completely mixed digesters, multiple inlets shall  
2248 be provided. The piping shall provide the opportunity to heat undigested sludge prior to entering  
2249 the digester.  
2250  
2251 (B) Sludge withdrawal. Except in completely mixed digesters,  
2252 multiple withdrawal pipes shall be provided. One or more withdrawal pipes shall be from the  
2253 digester floor.  
2254  
2255 (C) Supernatant withdrawal. The design basis for facilities using  
2256 digesters for waste activated sludge shall assume no supernatant withdrawal. Piping for  
2257 supernatant withdrawal may be provided. A minimum of three supernatant withdrawal levels  
2258 shall be provided otherwise.  
2259  
2260 (v) Gas system. All portions of the gas system, including the space above the  
2261 tank liquor, storage facilities, and piping shall be designed to be under greater than atmospheric  
2262 pressure at all times.  
2263  
2264 (A) Piping. Gas piping shall be 2.5 inches (6.4 cm) diameter or  
2265 greater. Piping from the digester shall be provided with a flame trap. Piping shall slope to  
2266 condensate traps. Float controlled condensate traps are not permitted.  
2267  
2268 (B) Safety equipment. All necessary safety equipment shall be  
2269 included. Pressure and vacuum relief valves, flame traps and other safety equipment shall be  
2270 provided. Gas safety equipment and gas compressors shall be housed in a separate room with an  
2271 exterior entrance.  
2272  
2273 (C) Metering. A gas meter with bypass shall be provided for  
2274 measurement of total gas production.  
2275  
2276 (vi) Heating equipment. Sludge and digester contents shall be heated with an  
2277 external heat exchanger. Where sludge is heated using digester gas, an auxiliary fuel supply shall  
2278 be provided. Boilers using digester gas shall be designed to minimize corrosion and to facilitate  
2279 burner replacement. All digester gas that is not beneficially used shall be incinerated in a waste  
2280 gas burner.  
2281  
2282 (vii) Access. The roof of the digester and the top sidewall shall be provided  
2283 with sealed access hatches.  
2284  
2285 (viii) Sampling. One and one-half inches (3.8 cm) or larger sampling ports  
2286 shall be provided for inlet sludge, effluent sludge, supernatant and digester contents.  
2287  
2288 (ix) Supernatant disposal. Supernatant from secondary digesters or from  
2289 subsequent thickening or dewatering facilities for digested sludge shall be treated independently  
2290 or returned immediately preceding the biological process. Supernatant shall not be returned to the  
2291 primary clarifier.  
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(e) Dewatering.

(i) Mechanical dewatering. Where provided, mechanical dewatering facilities shall include storage tanks for liquid sludge and shall provide for reliable use.

(ii) Drying beds.

(A) Gravity. Drying beds may be strictly evaporation or evaporation - percolation. Evaporation - percolation beds shall be provided with graded gravel and sand beds over perforated underdrain pipe. Evaporation beds shall be designed for the application of 1.5 feet (0.46 m) of sludge per year. Evaporation - percolation beds shall be designed for the application of four feet (1.2 m) of sludge per year. Storage of sludge in the beds or in separate basins shall provide 180 days of capacity. Percolate shall be returned to the plant ahead of the biological treatment process.

(B) Vacuum. The bed area for vacuum assisted open drying beds shall be based on the application of no more than 40 feet ( 12.2 m) of liquid per year. If the beds are housed, the bed area shall be based on the application of 80 feet (24.4 m) per year. Where beds are not housed, sludge storage shall be provided for 180 days of capacity. Polymer conditioning, chemical feed, chemical storage and facilities for mixing the polymer with the sludge shall be provided. Vacuum pumps, sump pumps, chemical feed equipment and motor control equipment shall be housed.

(iii) Filtrate disposal. Filtrate, centrate or underdrain liquid shall be returned to a point upstream of the biological treatment process. Centrate or filtrate shall not be returned upstream of the primary clarifier.

(f) Disposal.

(i) Degree of stabilization.

(A) Land application. Sludges shall be stabilized. Sludges that are to be used on public lands that are accessed by the public (parks, golf courses, cemeteries) or sludges that are to be made available to the public shall be composted or stabilized and stored for a period of at least one year. Sludges that are to be incorporated into the land shall be stabilized.

“Stabilized sludge” shall have reduced organic content and reduced pathogenic content. Stabilized sludge shall have less than 60 lb of BOD<sub>5</sub> per 1,000 lb (60 kg/1,000 kg) of dry weight sludge solids.

(B) Landfill. Sludge processed for incorporation into a landfill shall be (1) a solid or semisolid material that will not release water upon standing, and (2) has been subjected to anaerobic or aerobic digestion, or chemically treated with lime to a pH of 12.0 or chemically treated with chlorine to a free chlorine residual. Waiver of this requirement must be obtained from the Solid Waste Management Section of the Department of Environmental Quality.

(ii) Storage. Sludge storage shall be provided in lined earthen lagoons or structural tanks. The lagoon lining shall be designed to protect the groundwater pursuant to the requirements of Chapter VIII of the Water Quality Divisions rules and regulations. Sludge storage

2343 volume shall be sufficiently large to provide for independent operation of the sludge dewatering  
2344 or disposal facilities from preceding liquid or sludge processes.

2345

2346 **Section 21. Disinfection.**

2347

2348 (a) Chlorination/dechlorination.

2349

2350 (i) Chlorination. The disinfection capacity shall be sized to provide the  
2351 coliform concentrations required by the discharge permit. Feeders shall be sized to provide the  
2352 minimum dosage at the minimum flow rate and to the maximum dosage at the maximum flow  
2353 rate.

2354

2355 (ii) Dechlorination. Dechlorination feeders shall be sized for the final  
2356 effluent dechlorination dosage required by the discharge permit requirements.

2357

2358 (iii) Chlorination.

2359

2360 (A) Number of units. Feeders shall be able to supply, at all times, the  
2361 necessary amounts of chemical at an accurate rate ( $\pm 3\%$ ) throughout the range of feed. The  
2362 number of units shall provide capacity for effluent disinfection with the largest unit out of service  
2363 and a separate feeder or feeders for ancillary uses, such as prechlorination or intermediate process  
2364 control chlorination. The number of feeders shall be selected to permit feeding chemicals over the  
2365 range of required dosage while only varying a single feeder over a 10:1 range.

2366

2367 (B) Chemical storage. Chlorine shall be stored in a heated, ventilated  
2368 space. Space shall provide at least 30 days of chemical supply, convenient and efficient handling,  
2369 and dry conditions. Cylinders or other containers of chlorine gas should be isolated from  
2370 operating areas and restrained in position to prevent upset.

2371

2372 (C) Piping. Piping systems carrying gaseous or liquid chlorine shall  
2373 be schedule 80 black steel pipe with forged steel fittings. Bushings shall not be used. Vacuum  
2374 piping for gaseous chlorine may be polyethylene tubing.

2375

2376 Gas piping between the chlorine pressure reducing valve of the chlorinator and the  
2377 ejector shall be PVC or polyethylene. Piping for aqueous solutions of chlorine beyond the ejector  
2378 shall be PVC, fiberglass, or steel pipe lined with PVC or saran.

2379

2380 (D) Maximum withdrawal. The maximum withdrawal rate of  
2381 gaseous chlorine shall be limited to 40 lbs/day (18.1 kg/day) for 100 or 150 lb (45.4 or 68.0 kg)  
2382 cylinders and 400 lbs/day (181 kg/day) for 2,000 lb (907 kg) cylinders, unless chlorine  
2383 evaporators are used.

2384

2385 (iv) Dechlorination.

2386

2387 (A) Number of units. Dechlorination equipment shall be provided to  
2388 permit feeding the design dosage with the largest unit out of service. Feeders shall be sized for a  
2389 10:1 feed range.

2390

2391 (B) Chemical storage. Chemical storage shall be in a heated,  
2392 ventilated room, separate from chlorine cylinder storage. Provisions for heating the storage area  
2393 or the SO cylinders shall be provided. Where used, bin storage shall be provided with desiccated  
2394 vents.

2395  
2396 (C) Piping. Piping for liquid or gaseous SO shall be schedule 80  
2397 black steel pipe with forged steel fittings. Bushings shall not be used. Piping for aqueous  
2398 solutions of dechlorination chemicals shall be PVC, fiber glass, or steel pipe lined with PVC or  
2399 saran. All valves for liquid and gaseous sulfur dioxide shall be as approved by the Chlorine  
2400 Institute. Valves for aqueous solution of dechlorination chemicals shall be PVC or saran lined.

2401  
2402 (D) Maximum withdrawal.

2403  
2404 (I) The maximum withdrawal rate for sulfur dioxide from  
2405 2,000 lb (907 kg) cylinders shall be 200 lb (90.7 kg) per day, unless sulfur dioxide evaporators  
2406 are used.

2407  
2408 (v) Makeup water. Water used for dissolving dry chemicals, diluting liquid  
2409 chemicals or operating chlorine or SO injectors shall be chlorinated and strained for filtered (65  
2410 mesh) final effluent or potable water. Where potable water is used, backflow prevention shall be  
2411 achieved by (a) a 6 inch (15.2 cm) air gap between the potable water supply pipe and the  
2412 maximum water level of a receiving tank; or (b) an approved reduced pressure zone backflow  
2413 preventer.

2414  
2415 (vi) Mixing requirements. The feed point for chlorination or dechlorination  
2416 chemical shall be at a location of high turbulence. At points of critical flow, specially designed  
2417 static tube mixers or artificial mixing are required.

2418  
2419 (vii) Contact basins.

2420  
2421 (A) Detention time. The chlorine contact period shall provide a  
2422 minimum of 15 minutes contact time at the peak hour design flow. The contact period shall be  
2423 from the point of chemical injection into the flow to the outfall point or dechlorination feed point.

2424  
2425 (B) Baffling. Baffling of the chlorine contact basin shall provide a  
2426 length-to-width ratio of 5:1 or greater.

2427  
2428 (viii) Controls. The minimum control for chlorination - dechlorination  
2429 facilities shall include manual variation of feed rate and a portable chlorine residual monitor.

2430  
2431 (b) Ozonation.

2432  
2433 (i) Applied dosage rates. Ozonation system for disinfection shall provide a  
2434 range of chemical feed as follows:

2435  
2436 Secondary effluents 5-15 mg/L  
2437 Advanced treatment effluents 5-10 mg/L  
2438

2439 (ii) Piping. Injection equipment and piping in contact with ozonated air and  
2440 air water emulsions shall be of stainless steel, Teflon or other material resistant to ozone. Valves  
2441 carrying ozonized air shall be made of metal coated with ozone-resistant materials.  
2442

2443 (iii) Mixing requirements. Ozone shall be fed to a contact tank along the  
2444 length of the tank. The ozone contact tank shall be at least 15 feet (4.6 m) deep and provided with  
2445 vertical serpentine baffles. Fine bubble diffusers shall be used in areas where the flow is  
2446 downward.

2447 (iv) Detention time. The minimum contact time for ozone is 15 minutes at  
2448 peak hourly flow. Ozone contact basins shall be covered and provided with means to collect and  
2449 destroy unreacted ozone. The contact basin shall be designed to facilitate maintenance and  
2450 cleaning without reducing the effectiveness of the ozonation process.  
2451

2452 (c) Housing.  
2453

2454 (i) Access. Where housing is specially designed for equipment, structures,  
2455 rooms and areas containing chemical feed equipment used in disinfection, convenient access  
2456 should be provided. Access to chemical feed rooms shall only be from the outside. Doors shall be  
2457 provided with panic hardware, and open from the inside to the outside.  
2458

2459 (ii) Heating and ventilation. Chemical feed rooms and chemical storage  
2460 rooms shall be heated and ventilated. Ventilation shall exhaust continuously from near the floor  
2461 to an outside area that will not contaminate an air inlet to any building. The exhaust shall be  
2462 screened and turned downward. Continuous ventilation shall provide a complete air change six  
2463 times per hour. Emergency exhaust ventilation shall provide a complete room air change 30 times  
2464 per hour. The control for the emergency ventilation fan shall be on the outside of the room.  
2465

2466 (iii) Visual inspection. A clear glass, gas-tight window shall be installed in an  
2467 exterior door or interior wall of the disinfection chemical feed room.  
2468

2469 (iv) Isolation. Chemical feed and storage rooms shall be gas-tight.  
2470 Ventilation, plumbing and access shall be separated from other building parts. When ton  
2471 cylinders are used for chlorine or sulfur dioxide storage, storage and feed rooms will be separate.  
2472 Where powdered or granular chemicals are used, they will be stored in separate rooms from the  
2473 feed room. Switches for fans and lights shall be outside the room at the entrance. Vents from  
2474 feeders and storage shall discharge to the outside atmosphere above grade. Pipes and feed lines  
2475 through interior walls shall be gas-tight.  
2476

2477 (d) Safety.  
2478

2479 (i) Leak detectors. A bottle of ammonium hydroxide shall be available for  
2480 chlorine leak detection. For plants that store 1,000 lbs (454 kg) or more of chlorine, continuously  
2481 monitoring leak detectors shall be provided that sound an alarm in the event of an escape of gas.  
2482

2483 (ii) Repair kits. Repair kits approved by the Chlorine Institute shall be  
2484 provided for plants using ton containers or tank cars.  
2485

2486 (iii) Personnel equipment. Protective clothing, rubber gloves, and U.S.  
2487 Bureau of Mines approved industrial canister gas masks shall be provided for each operator who

2488 will handle or prepare chemical solutions/mixtures. A respiratory protection program shall be  
2489 available for all employees.

2490  
2491 (iv) Emergency breathing apparatus. Industrial size canister gas masks of the  
2492 type designed for chlorine gas and approved by U.S. Bureau of Mines shall be available at all  
2493 installations where chlorine gas is handled. Pressure-demand, self-contained breathing apparatus  
2494 shall be provided for repairing leaks to chlorine systems. A respiratory protection program shall  
2495 be available for all employees.

2496  
2497 (v) Instruction manuals. Instruction manuals for all elements of the  
2498 disinfectant storage, preparation and application system shall be provided. These instruction  
2499 manuals shall describe each component of the system, and provide a complete discussion of the  
2500 operation and maintenance requirements.

2501  
2502 **Section 22. Effluent Structures.**

2503  
2504 (a) Location. The location of the effluent discharge shall be at least three miles from  
2505 public water supply intakes.

2506  
2507 (b) Protection from hazards. The outfall sewer shall be constructed and protected  
2508 against the effects of floodwater, ice, debris, or other hazards as to insure its structural stability  
2509 and freedom from stoppage. A manhole should be provided at the shore- end of all gravity sewers  
2510 extending into the receiving waters.

2511  
2512 **Section 23. Laboratory requirements.**

2513  
2514 (a) Test procedures. Test procedures for analysis of monitoring samples shall  
2515 conform to regulations published pursuant to Section 304(g) of the Federal Water Pollution  
2516 Control Act (33 U.S.C. 466 et. seq.).

2517  
2518 (b) Testing requirements. All treatment plants shall have capability to perform or  
2519 contract for the self-monitoring analytical work required by discharge permits or ground water  
2520 monitoring requirements. All plants shall in addition be capable of performing or contract out the  
2521 analytical work required to assure good management and control of plant operation and  
2522 performance. Plants operating under requirements of an industrial pretreatment program must  
2523 have the capability of performing or must contract out the necessary testing to maintain the  
2524 program as approved by the reviewing agency.

2525  
2526 (c) Minimum requirements.

2527  
2528 (i) Location and space. The laboratory shall be located away from vibrating  
2529 machinery or equipment which might have adverse effects on the performance of laboratory  
2530 instruments or the analyst and shall be designed to prevent adverse effects from vibration.

2531  
2532 A minimum of 400 square feet (37.2 m<sup>2</sup>) of floor space shall be provided for the  
2533 laboratory where an analysis program for a fulltime laboratory chemist is proposed. If more than  
2534 two persons will be working in the laboratory, 100 square feet (9.3 m<sup>2</sup>) of additional space shall  
2535 be provided for each additional person.

2536

- 2537 (ii) Materials.  
2538  
2539 (A) Walls. Provide a durable, impervious surface that is easily  
2540 cleaned.  
2541  
2542 (B) Doors. Two exit doors or openings shall be located to permit a  
2543 straight egress from the laboratory; one exit shall be directly to outside of the building. Panic  
2544 hardware shall be used. Interior doors shall have glass windows.  
2545  
2546 (C) Cabinets and bench tops. Cabinet and storage space shall be  
2547 provided for dust-free storage of instruments and glassware.  
2548  
2549 Bench top height shall be 36 inches (0.91 m). Tops should be field joined into a  
2550 continuous surface with acid, alkali, and solvent-resistant cements.  
2551  
2552 (D) Hoods. Fume hoods shall be provided where reflux or heating of  
2553 toxic or hazardous materials is required.  
2554  
2555 (I) Fume hoods.  
2556  
2557 (1.) Location. A hood shall not be situated near a  
2558 doorway, unless a secondary means of egress is provided.  
2559  
2560 (2.) Fixtures. All switches, electrical outlets, and  
2561 utility and baffle adjustment handles shall be located outside the hood. Light fixtures shall be  
2562 explosion proof.  
2563  
2564 (3.) Exhaust. Twenty-four hour continuous exhaust  
2565 capability shall be provided. Exhaust fans shall be explosion proof.  
2566  
2567 (v) Sinks. The laboratory shall have a minimum of two sinks per 400 ft (37.2  
2568 m) (not including cup sinks). Sinks shall be double-well with drainboards and shall be made of  
2569 epoxy resin or plastic. All water fixtures shall be provided with reduced pressure zone backflow  
2570 preventers. Traps constructed of glass, plastic, or lead and accessibility for cleaning shall be  
2571 provided.  
2572  
2573 (vi) Ventilation and lighting. Laboratories shall be separately air conditioned,  
2574 with external air supply for 100 percent makeup volume. Separate exhaust ventilation shall be  
2575 provided. Ventilation outlet locations shall be remote from ventilation inlets.  
2576 Lighting shall provide 100 foot-candles at the bench top.  
2577  
2578 (vii) Gas and vacuum. If gas is required in the laboratory, natural gas shall be  
2579 supplied. Digester gas shall not be used.  
2580  
2581 (viii) Water still. Distilled water shall conform to the Standard Methods for  
2582 the Examination of Water and Wastewater, 15th Edition.  
2583  
2584 (ix) Emergency shower and eye wash. All laboratories shall be equipped with  
2585 an emergency eye wash and shower.

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(d) Portable testing equipment. Portable testing equipment shall be provided where necessary for operational control testing or industrial waste testing. Portable testing may be used for testing as necessary, provided the testing procedure meets the requirements of Section 304(g) of the Federal Water Pollution Control Act, if the results are to be used for permit reporting. Non-EPA certified procedures may be used for operational control or gross data generation.

**Section 24. Operation and Maintenance Manuals.**

(a) Where required. Plant operation and maintenance manuals are required for each new or modified treatment or pumping facility. The manuals shall provide the following information as a minimum:

- (i) Introduction.
- (ii) Description of facilities and unit processes through the plant from influent structures through effluent structures.
- (iii) Plant control system.
- (iv) Utilities and systems.
- (v) Emergency operation and response.
- (vi) Permit requirements and other regulatory requirements.
- (vii) Staffing needs.
- (viii) Index to manufacturer's manuals.

(b) When required. Draft operation and maintenance manuals shall be submitted to the Department of Environmental Quality at 50 percent completion of construction. Approval of the final operation and maintenance manuals is required prior to plant startup.

(c) Description and facilities. The description of facilities and unit processes shall include the size, capacity, model number (where applicable) and intended loading rate.

- (i) Each unit. The manual shall describe each unit, including the function, the controls, the lubrication and maintenance schedule, as well as the following:
  - (A) Startup operations.
  - (B) Routine operations.
  - (C) Abnormal operations.
  - (D) Emergency or power outage operations.
  - (E) Bypass procedures.



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(F) Safety.

(ii) Flow diagrams. The manual shall provide flow diagrams of the entire process, as well as individual unit processes. The flow diagrams shall show the flow options under the various operational conditions listed above.

(d) Operating parameters. The O&M manual shall provide the design criteria for each unit process. The data shall include the number, type, capacity, sizes, etc., and other information, as applicable.

(e) Troubleshooting guide. Each equipment maintenance manual shall include a section on troubleshooting. These manuals are to be indexed in the plant O&M manual. The troubleshooting guide shall include a telephone number for factory troubleshooting assistance.

(f) Emergency procedures. The plant O&M manual shall detail emergency operations procedures for possible foreseeable emergencies, including power outage, equipment failure, development of unsafe conditions, oil and hazardous substances discharge into the plant, and other emergency conditions. The details shall include valve positions, flow control settings, and other information to insure continued operation of the facility at maximum possible efficiency.

The manual shall also detail emergency notification procedures to be followed to protect health and safety under various emergency conditions.

(g) Safety. The manual shall provide general information of safety in and around the plant and its components. Each unit process discussion shall include applicable safety procedures and precautions. For unit processes or operations having extreme hazards (i.e., chlorine, closed tanks, etc.) the discussion shall detail appropriate protection, rescue procedures, and necessary safety equipment.

(h) Compliance submittals. The O&M manual shall summarize the monitoring and the reporting requirements of the discharge permit. These requirements will be modified from time-to-time, and should, therefore, be placed in an appendix to the O&M manual.

(i) Maintenance manuals. Maintenance manuals shall be required for each piece of equipment. These manuals must meet the requirements of the engineer and contractor for installation and startup of equipment. The information included in the manufacturers' manuals shall not be included in the O&M manual.

(i) General content of manuals.

(A) Neatly typewritten table of contents for each volume, arranged in a systematic order.

(B) Product data.

(C) Drawings.

- 2684  
2685 particular installation.  
2686  
2687 (D) Written text as required to supplement product data for the  
2688  
2689 (E) Copy of each warranty, bond and service contract issued.  
2690 (ii) Manuals for equipment and systems.  
2691 (A) Description of unit and component parts.  
2692  
2693 (B) Operating procedures.  
2694  
2695 (C) Maintenance procedures and schedules.  
2696  
2697 (D) Service and lubrication schedule.  
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2699 (E) Sequence of control operation.  
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2701 (F) Parts list.  
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2703 (G) Recommended spare parts.  
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**PART C: COMMERCIAL/INDUSTRIAL WASTE AND WASTEWATER FACILITIES**

**Section 25. General.**

This part contains the minimum standards for the design and construction of commercial/ industrial wastewater facilities. The applicant shall demonstrate to the administrator that any discharge or seepage from the wastewater facility will not cause a violation of the surface and/ or groundwaters of the state in accordance with Chapter I, “Quality Standards for Wyoming Surface Waters” and Chapter VIII, “Quality Standards for Wyoming Groundwaters.” Due to the wide variety of wastes, wastewater and site conditions, the latest available scientific information shall be used to demonstrate that violations will not occur.

**Section 26. Discharge to Public Sewerage System.**

The discharge of commercial/industrial wastewater to a public sewerage system shall be allowed provided a letter of verification from the public sewerage system manager is submitted to the Department of Environmental Quality stating that the municipal system is capable of handling the added organic and/or hydraulic loads. The applicant shall demonstrate (1) that the wastewater will not adversely impact the treatment works and/or discharge or (2) that pretreatment of the wastewater shall be provided to eliminate the adverse impacts. The design and construction of any pretreatment device shall reduce the pollutants to the limits imposed by the public sewerage system manager.

**Section 27. Domestic Wastes from Commercial/Industrial Facilities.**

Commercial/industrial facilities which generate waste that is entirely domestic waste shall be designed in compliance with Part B of Chapter 11 or Chapter 25. When the commercial/industrial facility generates a combined domestic and commercial/industrial waste, the facility may be designed in compliance with Chapter 25 or Part B of this chapter provided the applicant can demonstrate that the commercial/ industrial waste will not interfere or adversely impact the treatment works or the discharge.

**Section 28. Biological Treatment Ponds.**

This section includes the standards for ponds that accept commercial/ industrial waste and wastewater that is primarily organic and utilizes biological organisms for treatment and do not meet the requirements of Section 27. The presence of toxic wastes, hazardous substances, and/or petroleum products shall not interfere or adversely impact the treatment process or disposal system.

(a) Location.

(i) Extraneous surface water and groundwater shall be excluded from entering the wastewater pond or entering the wastewater flow into the pond.

(ii) Ponds shall not be located within the ordinary high water mark of perennial rivers, streams, or creeks; nor in the bottoms of rivers, streams, creeks, draws, coulees, or other natural drainages into which natural runoff may flow and/or enter.

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2755 (iii) Ponds shall be protected from structural damage during the 100-year  
2756 flood event.  
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- 2758 (b) Basis of design.  
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- 2760 (i) Aerobic, facultative, and anaerobic ponds shall be designed based on the  
2761 type, strength characteristics, and anticipated flow rates of the wastewater. Loading rates shall be  
2762 determined on a case-by-case basis using the best available technology, reference, and/or pilot  
2763 studies. The affect of any toxic wastes, hazardous substances, and/or petroleum products on the  
2764 wastewater treatment works and disposal system shall be evaluated. All anaerobic ponds shall be  
2765 followed by an aerobic process if the system discharges to surface waters of the state.  
2766
- 2767 When seepage is considered part of the design, the potential effect of groundwater  
2768 mounding on the seepage rate shall be evaluated.  
2769
- 2770 (ii) In addition to the above, all nonsurface water discharging ponds shall be  
2771 designed on the basis of a water balance that considers net evaporation and seepage. They shall  
2772 be designed to provide sufficient storage for retention of all wastewater and rainfall during the  
2773 wettest occurring year of a ten-year period. Seepage shall be controlled to maintain a minimum  
2774 water depth of two feet in the primary cell during the driest occurring year of a ten-year period.  
2775
- 2776 (c) Pond layout.  
2777
- 2778 (i) Discharging treatment systems and ponds that require liners to protect  
2779 groundwater shall consist of a minimum of two cells. The largest cell shall not contain more than  
2780 55 percent of the total waste volume at the design capacity.  
2781
- 2782 (ii) Inlet structures shall be submerged and located to properly distribute the  
2783 wastewater flow throughout the pond(s) and shall prevent short circuiting. Influent wastewater  
2784 shall not erode or disturb the liner, seal, or dike. Submerged multiple inlets are recommended.  
2785 The pipe shall discharge at least ten feet from the toe of the slope.  
2786
- 2787 (iii) Outlet structures from discharging treatment systems shall be capable of  
2788 multilevel drawoff and have an overflow device. Outlet structures shall prevent short circuiting,  
2789 prevent floating debris from discharging, and keep outlet velocities at a minimum so as not to  
2790 erode or disturb the receiving channel. Erosion control material shall be designed based on flow  
2791 velocities and quantities. Ice formation shall neither stop the overflow nor damage the outlet  
2792 structure.  
2793
- 2794 (iv) All pipe protruding through a dike or embankment shall have adequate  
2795 seepage controls. Capabilities shall exist to drain the ponds for maintenance purposes. By-pass  
2796 piping for each individual pond cell shall be provided.  
2797
- 2798 (v) A manhole or vented cleanout wye shall be installed prior to the entrance  
2799 of the influent pipe into the primary pond(s) and shall be located as close to the dike as  
2800 topography permits. The influent pipe invert should be at least six inches above the maximum  
2801 operating level of the pond.  
2802

2803 (vi) The maximum water depth shall be six feet in the primary cell(s) of non-  
2804 aerated aerobic or facultative systems. The maximum water depth shall be 15 feet in aerated cells.  
2805 The maximum water depth for subsequent cells or other types of ponds shall be determined on a  
2806 case-by-case basis.

2807

2808 The minimum water depth shall be three feet in the primary cell(s) and two feet in  
2809 subsequent cell(s). Cells designed for high-rate infiltration may be allowed to be dry periodically  
2810 provided that the applicant can demonstrate that vegetation will be controlled and a regular  
2811 maintenance program is provided.

2812

2813 (vii) Free board shall be provided to protect embankments and dikes from  
2814 overtopping from wave action, and shall be a minimum of three feet above the high water level.  
2815 For ponds less than two acres, two feet of freeboard may be acceptable.

2816

2817 (d) Pond construction.

2818

2819 (i) Soils used in constructing the pond bottom and dike cores (not including  
2820 the liner) shall be relatively incompressible, have a low permeability, and be free from organic  
2821 material or trash. The soil shall be compacted at a water content that will insure structural  
2822 stability, minimize hydraulic seepage, and minimize settling. The soil shall provide an adequate  
2823 foundation for the liner, if used.

2824

2825 (ii) On ponds that are not specified to receive an artificial liner, no rocks  
2826 larger than six inches in length shall be permitted in any of the designated embankment.

2827

2828 On ponds that are specified to be lined with an artificial liner, rocks larger than six inches  
2829 in length shall not be placed within five feet of the interior slope of any pond embankment.  
2830 Material containing by volume less than 25 percent of rock larger than six inches and less than 12  
2831 inches in length may be placed in the remainder of the embankment.

2832

2833 (iii) Outer dike slopes shall not be steeper than one vertical to two horizontal.  
2834 Flatter slopes may be required to maintain slope stability. Outer dike slopes shall prevent surface  
2835 runoff from entering the ponds.

2836

2837 Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical  
2838 to three horizontal. Flatter inner slopes may be allowed where vegetation due to the shallower  
2839 slopes will not interfere with treatment or the dike's integrity. Interior slopes surfaced with  
2840 concrete paving or riprap may be constructed at slopes of one vertical to two horizontal.

2841

2842 (iv) The minimum top dike width shall be eight feet to permit access of  
2843 maintenance vehicles. Top dikes wider than eight feet shall be required when necessary to assure  
2844 structural stability.

2845

2846 (v) The pond bottom shall be sufficiently flat to insure a minimum water  
2847 depth as required in Section 28 (c)(vi).

2848

2849 (e) Dike protection.

2850

2851 (i) Interior embankments shall be protected from wave action with riprap,  
2852 paving, or other erosion resistant material. The following conditions may be exempted from the  
2853 riprap requirements:

2854

2855 (A) Ponds of one surface acre or less;

2856

2857 (B) Ponds with an artificial liner;

2858

2859 (C) Embankments cut into natural slopes when a soil liner is not  
2860 provided; or

2861

2862 (D) Ponds which are sheltered from wind or where winds are slow  
2863 enough that significant erosion will not occur.

2864

2865 (ii) Exterior of dikes, top of dikes, and all interior dike surfaces where riprap  
2866 or a seal is not provided shall be covered with topsoil and seeded with suitable dryland grasses to  
2867 prevent erosion. A uniform coarse graded gravel may be substituted for the vegetation  
2868 requirement.

2869

2870 (f) Liners.

2871

2872 (i) Seepage limits. The seepage through the pond bottom and side walls  
2873 shall not cause a violation of the groundwater standards as described in Chapter VIII (Quality  
2874 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
2875 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
2876 site conditions will not insure the protection of the groundwater for which it is classified.

2877

2878 If the applicant cannot document that the facility poses no threat to groundwater and  
2879 elects not to perform a subsurface study in accordance with Chapter III, Section 15(a) and (b),  
2880 then the groundwater shall be protected from contamination by the wastewater with a liner  
2881 equivalent to three feet of soil having a permeability of  $10^{-7}$  cm/sec or less. When an applicant  
2882 performs a subsurface study, the requirement for the liner shall be determined based on the results  
2883 of the study and the groundwater protection required. In no instance shall the maximum seepage  
2884 rate exceed 1/8 inch per day in the primary pond(s).

2885

2886 (ii) Soil and bentonite liners. The specifications for a soil or bentonite liner  
2887 shall be based upon the results of a preliminary testing program and shall contain at a minimum  
2888 the type of material, optimum and acceptable range in water content, acceptable range for  
2889 compaction, and maximum allowable particle size.

2890

2891 Soil or bentonite liners used to protect groundwater quality shall meet the following  
2892 criteria: Written certification that the soil liner was constructed in accordance with specifications  
2893 shall be provided by a Wyoming registered professional engineer or an independent soils  
2894 laboratory. Tests for water content and density shall be taken during application of each lift.  
2895 Additionally, either permeability testing of undisturbed core samples from the in-place seal, or  
2896 detailed tests such as particle size distribution and Atterburg limits confirming that the soil used  
2897 in the liner construction was the same soil initially tested, shall be provided. In all cases, at least  
2898 one test shall be provided per acre per lift, except for core sampling of the in-place liner, where  
2899 one core of the completed liner shall be tested per acre.

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(iii) Synthetic liners. The thickness requirements for synthetic liners shall be determined on a case-by-case basis but shall not be less than 30 mil. The type of liner shall be compatible with the wastewater characteristics. The synthetic liner shall have a permeability equivalent to that required in Section 28(f)(i).

Synthetic liners shall be anchored to prevent movement, slippage, and flotation. The synthetic liner shall be protected from degradation by ultraviolet light, ice damage and settling of underdrain trenches. An air venting system may be required beneath the synthetic liner to expel gases trapped during installation, produced by decomposing organic material, or produced by a fluctuating water table.

(iv) Uniformity. The pond bottom shall be smooth with a maximum tolerance of  $\pm 6$  inches.

(v) Prefilling. All ponds shall be prefilled to the two foot level to protect the liner, to prevent weed growth, to encourage rapid startup of the biological process and discourage odor, to reduce freeze up problems for late fall startups, to confirm the seal's integrity and to maintain the water of the seal at or above optimum conditions. The raw wastewater shall not be used for prefilling purposes except for anaerobic ponds.

(vi) Exfiltration evaluation. All ponds designated with a maximum exfiltration rate shall be tested for exfiltration. A maximum exfiltration rate not in excess of the design rate shall be deemed acceptable. If the exfiltration rate is deemed excessive, the seal shall be repaired and the test procedure repeated. This procedure shall be repeated until the maximum exfiltration rate criteria is met. Results of all testing shall be submitted to DEQ.

(g) Miscellaneous. A permanent flow measuring device shall be installed at the outfall of discharging pond sites and shall measure the effluent under all climatic conditions. The accuracy of the flow measuring device must be within ten percent of the actual flow. Ponds with a maximum daily discharge of less than 50,000 gallons per day may be exempted from installing a permanent flow measuring device.

**Section 29. Feedlots.**

This section includes the standards for wastewater retention systems for feedlot runoff. The basic concept of retention systems is to intercept and collect runoff and wastes from the animal feeding area until it can be disposed of via land application. Although retention systems are usually the most economical method of treatment, other systems will be evaluated on a case-by-case basis.

(a) Location.

(i) Groundwater shall be excluded from entering the wastewater pond or the wastewater flow into the pond.

(ii) Ponds shall not be located within the ordinary highwater mark of perennial rivers, streams, or creeks. Ponds not containing hazardous or toxic wastes may be located within the ordinary high water mark of intermittent rivers, streams, creeks, draws,

2949 coulees, or other natural drainages provided a by-pass ditch is installed capable of passing the 24  
2950 hour - 100 year precipitation event.

2951

2952 (iii) The wastewater retention system shall be as near to the animal feeding  
2953 operation as possible to keep construction to a minimum. The retention ponds shall be located  
2954 outside the pen area for safety and maintenance purposes. Sufficient space must be left between  
2955 streams or drainage areas to allow construction of the necessary collection ditches and retention  
2956 ponds.

2957

2958 (b) Basis of design. All livestock confinement areas, alleyways, etc., shall be graded  
2959 to prevent accumulation of surface waters and to drain all contaminated water to the retention  
2960 system. Collection ditches shall be provided when necessary to intercept contaminated water. The  
2961 wastewater retention system shall be designed to contain the 25 year, 24 hour precipitation event.  
2962 Wastewater in the retention pond shall be removed and disposed of as soon as possible after a  
2963 precipitation event. The applicant shall demonstrate that equipment is available for removing the  
2964 wastewater.

2965

2966 (i) Diversion ditches. The animal feeding area shall be protected with  
2967 diversion ditches that will direct uncontaminated runoff from areas above and adjacent to the site  
2968 away from the ponds and shall be capable of diverting the 25-year, 24 hour precipitation event.

2969

2970 (ii) Collection ditches. Collection ditches shall be constructed around the  
2971 feeding area to intercept the contaminated runoff and transport it to the settling and/or retention  
2972 pond. The depth shall be adequate to handle the design flow and shall have a bottom slope  
2973 sufficient to produce a velocity of not less than two feet per second. Side slopes shall not be  
2974 steeper than eight horizontal to one vertical.

2975

2976 (iii) Settling pond. A settling pond ahead of the retention pond is  
2977 recommended to accumulate the solids in the waste flow and to simplify their removal and final  
2978 disposal. The surface area shall be sized to reduce the flow velocity below one foot per second to  
2979 allow settling of solids. The pond shall be between three to six feet deep to allow sufficient  
2980 capacity for holding the solids and yet allow easy removal of the solids. The outlet structure shall  
2981 minimize the overflow of solids into the retention pond.

2982

2983 (iv) Retention pond. The retention pond shall be capable of containing all  
2984 runoff from the feeding area for the design storm until the contaminated runoff can be disposed.  
2985 If a settling pond is not provided before the retention pond, the design volume shall be increased  
2986 by 10 percent to accommodate collection of solids.

2987

2988 (c) Retention pond layout.

2989

2990 (i) The shape and depth shall facilitate ease of cleaning and maintenance. A  
2991 minimum freeboard of 1.5 feet shall be required above the high water level of the spillway.

2992

2993 (ii) Spillways shall be provided on all retention ponds to pass flows in excess  
2994 of the 25 year, 24 hour precipitation event. The spillway shall be placed above the design high  
2995 water level.

2996



2997 (d) Retention pond construction. The retention pond construction shall meet the  
2998 following requirements:  
2999

3000 (i) Soils used in constructing the pond bottom and dike cores (not including  
3001 the liner) shall be relatively incompressible, have a low permeability, and be free from organic  
3002 material or trash. The soil shall be compacted at a water content that will insure structural  
3003 stability, minimize hydraulic seepage, and minimize settling. The soil shall provide an adequate  
3004 foundation for the liner, if used.  
3005

3006 (ii) On ponds that are not specified to receive an artificial liner, no rocks  
3007 larger than six inches in length shall be permitted in any of the designated embankments.  
3008

3009 On ponds that are specified to be lined with an artificial liner, rocks larger than six inches  
3010 in length shall not be placed within five feet surface of the interior slope of any pond  
3011 embankment. Material containing by volume less than 25 percent of rock larger than six inches  
3012 and less than 12 inches in length may be placed in the remainder of the embankment.  
3013

3014 (iii) Outer dike slopes shall not be steeper than one vertical to two horizontal.  
3015 Flatter slopes may be required to maintain slope stability.  
3016

3017 Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical  
3018 to three horizontal. Flatter inner slopes may be allowed where vegetation due to the shallower  
3019 slopes will not interfere with treatment or the dike's integrity. Interior slopes surfaced with  
3020 concrete paving or riprap may be constructed at slopes of one vertical to two horizontal.  
3021

3022 (iv) The minimum top dike width shall be eight feet to permit access of  
3023 maintenance vehicles. Top dikes wider than eight feet shall be required when necessary to assure  
3024 structural stability.  
3025

3026 (v) The pond bottom may be sloped to facilitate pumping but shall not  
3027 exceed a 0.5 percent slope.  
3028

3029 (e) Liners.  
3030

3031 (i) Seepage limits. The seepage through the pond bottom and side walls  
3032 shall not cause a violation of the groundwater standards as described in Chapter VIII (Quality  
3033 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
3034 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
3035 site conditions will not insure the protection of the groundwater for which it is classified.  
3036

3037 If the applicant cannot document that the facility poses no threat to groundwater and  
3038 elects not to perform a subsurface study in accordance with Chapter III, Section 15(a) and (b),  
3039 then the groundwater shall be protected from contamination by the wastewater with a liner  
3040 equivalent to three feet of soil having a permeability of  $10^{-7}$  cm/sec or less. When an applicant  
3041 performs a subsurface study, the requirement for the liner shall be determined based on the results  
3042 of the study and the groundwater protection required. In no instance shall the maximum seepage  
3043 rate exceed 1/8 inch per day in the primary pond(s).  
3044

3045 (ii) Soil and bentonite liners. The specifications for a soil or bentonite liner  
3046 shall be based upon the results of a preliminary testing program and shall contain at a minimum  
3047 the type of material, optimum and acceptable range in water content, acceptable range for  
3048 compaction, and maximum allowable particle size.

3049  
3050 Soil or bentonite liners used to protect groundwater quality shall meet the following  
3051 criteria: Written certification that the soil liner was constructed in accordance with specifications  
3052 shall be provided by a Wyoming registered professional engineer or an independent soils  
3053 laboratory. Tests for water content and density shall be taken during application of each lift.  
3054 Additionally, either permeability testing of undisturbed core samples from the in-place seal, or  
3055 detailed tests such as particle size distribution and Atterburg limits confirming that the soil used  
3056 in the liner construction was the same soil initially tested, shall be provided. In all cases, at least  
3057 one test shall be provided per acre per lift, except for core sampling of the in-place liner, where  
3058 one core of the completed liner shall be tested per acre.

3059  
3060 (iii) Synthetic liners. The thickness requirements for synthetic liners shall be  
3061 determined on a case-by-case basis but shall not be less than 30 mils. The type of liner shall be  
3062 compatible with the wastewater characteristics. The synthetic liner shall have a permeability  
3063 equivalent to that of Section 29(e)(i).

3064  
3065 Synthetic liners shall be anchored to prevent movement, slippage, and flotation. The  
3066 synthetic liner shall be protected from degradation by ultraviolet light, ice damage and settling of  
3067 underdrain trenches. An air venting system may be required beneath the synthetic liner to expel  
3068 gases trapped during installation, produced by decomposing organic material, or produced by a  
3069 fluctuating water table.

3070  
3071 (iv) Exfiltration evaluation. All ponds designated with a maximum  
3072 exfiltration rate shall be tested for exfiltration. A maximum exfiltration rate not in excess of the  
3073 design rate shall be deemed acceptable. If the exfiltration rate is deemed excessive, the seal shall  
3074 be repaired, and the test procedure repeated. This procedure shall be repeated until the maximum  
3075 exfiltration rate criteria is met. Results of all testing shall be submitted to the Department of  
3076 Environmental Quality.

3077  
3078 **Section 30. Non-biological Treatment Ponds.**

3079  
3080 This section includes the standards for non-biological treatment ponds or ponds that  
3081 accept commercial/industrial waste or wastewater that is primarily non-biological in nature and  
3082 does not utilize biological organisms for treatment. Radio logical affects considered by the  
3083 Nuclear Regulatory Commission (NRC) from non-surface discharging treatment works within a  
3084 NRC licensed permit boundary are exempt from this section.

3085  
3086 (a) Location.

3087  
3088 (i) Extraneous surface water and groundwater shall be excluded from  
3089 entering the wastewater pond or entering the wastewater flow into the pond.

3090  
3091 (ii) Ponds shall not be located within the ordinary high water mark of  
3092 perennial rivers, streams, or creeks. Ponds not containing hazardous or toxic wastes may be  
3093 located within the ordinary high water mark of intermit tent rivers, streams, creeks, draws,

3094 coulees, or other natural drainages provided a by-pass ditch is installed capable of passing the 24  
3095 hour - 100 year precipitation event. All other ponds shall be protected from structural damage  
3096 during the 100-year flood event.

3097

3098 (b) Basis of design.

3099

3100 (i) Ponds shall be designed based on the type of wastewater, the wastewater  
3101 strength characteristics, and the anticipated flow rates. Loading rates shall be determined on a  
3102 case-by-case basis using the best available technology, reference, and/or pilot studies. The affect  
3103 of any toxic wastes, hazardous substances, and/or petroleum products on the wastewater  
3104 treatment process and disposal system shall be evaluated.

3105

3106 Where seepage is considered part of the design, the potential effect of groundwater  
3107 mounding on the seepage rate must be evaluated.

3108

3109 (ii) In addition to the above, non-surface water discharging ponds shall be  
3110 designed on the basis of a water balance that considers net evaporation and seepage. Non-  
3111 discharging ponds shall be designed to provide sufficient storage to retain all wastewater and  
3112 rainfall during the wettest occurring year of a ten year period.

3113

3114 (c) Pond layout.

3115

3116 (i) Discharging treatment systems and ponds that require liners to protect  
3117 groundwater shall consist of a minimum of two cells. The largest cell shall not contain more than  
3118 55 percent of the total waste volume at the design capacity.

3119

3120 (ii) Inlet and intracell structures for discharging treatment systems shall  
3121 prevent short circuiting, and shall not erode or disturb the liner, seal or dike.

3122

3123 (iii) Outlet structures from a discharging treatment system shall have an  
3124 overflow device, prevent short circuiting, prevent floating debris from discharging, and keep  
3125 outlet velocities to a minimum so as not to erode or disturb the receiving channel. Erosion control  
3126 material shall be designed based on flow velocities and quantities. Ice formation shall neither stop  
3127 the overflow nor damage the outlet structure.

3128

3129 (iv) All pipe protruding through a dike or embankment shall have adequate  
3130 seepage controls. Capabilities shall exist to drain the ponds for maintenance purposes.

3131

3132 (v) A manhole or vented cleanout wye shall be installed prior to the entrance  
3133 of the influent pipe into the primary pond(s) and shall be located as close to the dike as  
3134 topography permits. The influent pipe invert should be at least six inches above the maximum  
3135 operating level of the pond.

3136

3137 (vi) The maximum and minimum water depth shall be determined on a case-  
3138 by-case basis. However, the design engineer must demonstrate that ponds with less than two feet  
3139 water depth will not have vegetation problems.

3140

3141 (vii) Free board shall be provided to protect embankments and dikes from  
3142 overtopping from wave action, and shall be a minimum of three feet above the high water level.  
3143 For ponds less than two acres, two feet of freeboard may be acceptable.

3144

3145 (d) Pond construction.

3146

3147 (i) Soils used in constructing the pond bottom and dike cores (not including  
3148 the liner) shall be relatively incompressible, have a low permeability, and be free from organic  
3149 material or trash. The soil shall be compacted at a water content that will insure structural  
3150 stability, minimize hydraulic seepage, and minimize settling. The soil shall provide an adequate  
3151 foundation for the liner, if used.

3152

3153 (ii) On ponds that are not specified to receive an artificial liner, no rocks  
3154 larger than six inches in length shall be permitted in any of the designated embankment.

3155

3156 On ponds that are specified to be lined with an artificial liner, rocks larger than six inches  
3157 in length shall not be placed within five feet of the interior slope surface of any pond  
3158 embankment. Material containing by volume less than 25 percent of rock larger than six inches  
3159 and less than 12 inches in length may be placed in the remainder of the embankment.

3160

3161 (iii) Outer dike slopes shall not be steeper than one vertical to two horizontal.  
3162 Flatter slopes may be required to maintain slope stability. Outer dike slopes shall prevent surface  
3163 runoff from entering the ponds.

3164

3165 Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical  
3166 to three horizontal. Flatter inner slopes may be allowed where vegetation due to the shallower  
3167 slopes will not interfere with treatment or the dike's integrity. Interior slopes surfaced with  
3168 concrete paving or riprap may be constructed at slopes of one vertical to two horizontal.

3169

3170 (iv) The minimum top dike width shall be eight feet to permit access of  
3171 maintenance vehicles. Top dikes wider than eight feet shall be required when necessary to assure  
3172 structural stability.

3173

3174 (e) Dike protection.

3175

3176 (i) Interior embankments shall be protected from wave action with riprap,  
3177 paving, or other erosion resistant material. The following conditions may be exempted from the  
3178 riprap requirements:

3179

3180 (A) Ponds of one surface acre or less:

3181

3182 (B) Ponds with an artificial liner;

3183

3184 (C) Embankments cut into natural slopes where a soil liner is not  
3185 provided; or

3186

3187 (D) Ponds which are sheltered from wind or where winds are slow  
3188 enough that significant erosion will not occur.

3189

3190 (ii) Exterior of dikes, top of dikes, and all interior dike surfaces where riprap  
3191 or a seal is not provided shall be covered with topsoil and seeded with suitable dryland grasses to  
3192 prevent erosion. A uniform coarse graded gravel may be substituted for the vegetation  
3193 requirement.

3194

3195 (f) Liners.

3196

3197 (i) Seepage limits. The seepage through the pond bottom and side walls  
3198 shall not cause, a violation of the groundwater standards as described in Chapter VIII (Quality  
3199 Standards for Wyoming Groundwaters) of the Wyoming Department of Environmental Quality,  
3200 Water Quality Rules and Regulations. Liners shall be required if the wastewater characteristics or  
3201 site conditions will not insure the protection of the groundwater for which it is classified.  
3202

3203

3204 If the applicant cannot document that the facility poses no threat to groundwater and  
3205 elects not to perform a subsurface study in accordance with Chapter III, Section 15(a) and (b),  
3206 then the groundwater shall be protected from contamination by the wastewater with a liner  
3207 equivalent to three feet of soil having a permeability of  $10^{-7}$  cm/sec or less. When an applicant  
3208 performs a subsurface study, the requirement for the liner shall be determined based on the results  
3209 of the study and the groundwater protection required. In no instance shall the maximum seepage  
3210 rate exceed 1/8 inch per day in the primary pond(s).

3211

3212 (ii) Soil and bentonite liners. The specifications for a soil or bentonite liner  
3213 shall be based upon the results of a preliminary testing program and shall contain at a minimum  
3214 the type of material, optimum and acceptable range in water content, acceptable range for  
3215 compaction, and maximum allowable particle size.

3216

3217 Soil or bentonite liners used to protect groundwater quality shall meet the following  
3218 criteria. Written certification that the soil liner was constructed in accordance with specifications  
3219 shall be provided by a Wyoming registered professional engineer or an independent soils  
3220 laboratory. Tests for water content and density shall be taken during application of each lift.  
3221 Additionally, either permeability testing of undisturbed core samples from the in-place seal, or  
3222 detailed tests such as particle size distribution and Atterburg limits confirming that the soil used  
3223 in the liner construction was the same soil initially tested, shall be provided. In all cases, at least  
3224 one test shall be provided per acre per lift, except for core sampling of the in-place liner, where  
3225 one core of the completed liner shall be tested per acre.

3226

3227 (iii) Synthetic liners. The thickness requirements for synthetic liners shall be  
3228 determined on a case-by-case basis but shall not be less than 30 mils. The type of liner shall be  
3229 compatible with the wastewater characteristics. The synthetic liner shall have a permeability  
3230 equivalent to that of Section 30(f)(i).

3231

3232 Synthetic liners shall be anchored to prevent movement, slippage, and flotation. The  
3233 synthetic liner shall be protected from degradation by ultraviolet light, ice damage and settling of  
3234 underdrain trenches. An air venting system may be required beneath the synthetic liner to expel  
3235 gases trapped during installation, produced by decomposing organic material, or produced by a  
3236 fluctuating water table.

3237

3238 (iv) Prefilling. For soil or bentonite liners, a method of maintaining the seal  
at or above optimum moisture conditions is required.

3239  
3240 (v) Exfiltration evaluation. All ponds designated with a maximum  
3241 exfiltration rate shall be tested for exfiltration. A maximum exfiltration rate not in excess of the  
3242 design rate shall be deemed acceptable. If the exfiltration rate is deemed excessive, the seal shall  
3243 be repaired and the test procedure repeated. This procedure shall be repeated until the maximum  
3244 exfiltration rate criteria is met. Results of all testing shall be submitted to the Department of  
3245 Environmental Quality.

3246  
3247 (g) Miscellaneous. A permanent flow measuring device shall be installed at the  
3248 outfall of discharging pond sites and shall measure the effluent under all climatic conditions. The  
3249 accuracy of the flow measuring device must be within ten percent of the actual flow. Ponds with a  
3250 maximum daily discharge of less than 50,000 gallons per day may be exempted from installing a  
3251 permanent flow measuring device.

3252  
3253 **Section 31. Sedimentation Control Facilities.**

3254  
3255 This section includes the standards for sedimentation control facilities. Those  
3256 sedimentation control facilities that are regulated under Water Quality Rules and Regulations,  
3257 Chapter X, "Performance/Design Standards for Surface Coal Mining Runoff Control Facilities"  
3258 are exempted from this section.

3259  
3260 (a) Location. The sedimentation control facilities shall be as near to the affected  
3261 lands as possible to keep construction and containment volumes to a minimum. Sedimentation  
3262 control facilities shall be located off-channel when possible. Runoff from unaffected lands should  
3263 be by-passed around the containment area. All affected lands must drain to a sedimentation  
3264 control facility.

3265  
3266 (b) Basis of design. Sedimentation control facilities shall control all runoff from  
3267 areas which drain into the facility from a 10-year 24-hour precipitation event in addition to the  
3268 estimated sediment storage volume for one year be always available. The pond shall be drained  
3269 down to the permanent pool level as soon as the effluent meets the discharge parameters. The  
3270 applicant shall demonstrate that equipment or outlet structures are available for draining the pond.

3271  
3272 (c) Layout.

3273  
3274 (i) Inlet ditches or structures shall not erode or disturb the pond bottom.

3275  
3276 (ii) Outlet structures, if used, shall have an overflow device, prevent short-  
3277 circuiting, prevent floating debris from discharging and shall not erode or disturb the dike. All  
3278 pipe protruding through a dike shall have adequate seepage control. The point of discharge into a  
3279 channel shall be protected against erosion and erosion control devices shall be designed based on  
3280 flow velocities.

3281  
3282 (iii) Spillways. Sedimentation control facilities that individually contain more  
3283 than 2.0 acre-feet of runoff or that individually have more than 2.0 acres of surface area or that  
3284 are located on-channel shall have a spillway to by-pass precipitation events in excess of the  
3285 design event. Spillways shall safely pass the 25 year flood event except when the impoundment  
3286 height is greater than twenty feet or capacity exceeds twenty acre-feet; in which case the spillway  
3287 shall safely pass the 100-year flood event.

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(iv) By-pass ditches. If by-pass ditches are provided to transport runoff from unaffected lands, they shall be designed to pass the runoff from a 25 year precipitation event.

(v) Freeboard. Freeboard shall be provided to protect embankments and dikes from overtopping from wave action and shall be a minimum of one foot above the high water level. For ponds less than two acres, one-half foot of freeboard may be acceptable.

(d) Construction.

(i) Soils used in constructing the pond bottom and dike cores shall be relatively incompressible, have a low permeability, and be free from organic material or trash. The soil shall be compacted at a water content that will insure structural stability, minimize hydraulic seepage, and minimize settling.

Rocks larger than six inches in length shall not be placed within five feet of the interior slope surface of any pond embankment. Material containing by volume less than 25 percent of rock larger than six inches and less than 12 inch in length dimension may be placed in the remainder of the embankment.

(ii) Outer dike slopes shall not be steeper than one vertical to two horizontal. Flatter slopes may be required to maintain slope stability. Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical to three horizontal.

(iii) The minimum top dike width shall be sufficient to provide structural stability.

(iv) Riprap or other acceptable erosion control shall be installed on the inner dike slopes at all anticipated levels of water. Dikes cut into existing ground shall be exempted from riprap requirements. Ponds that have less than 2.0 acres of surface area shall also be exempted.

**PART D: SEPTIC TANK AND/OR SOIL ABSORPTION SYSTEMS AND OTHER  
SMALL WASTEWATER SYSTEMS**

~~NOW Chapter 25~~

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**Section 32. Reserved.**

**Section 33. Reserved.**

**Section 34. Reserved.**

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**Section 40. Reserved.**

**Section 41. Reserved.**

**Section 42. Reserved.**

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**Section 44. Reserved.**

**Section 45. Reserved.**

**Section 46. Reserved.**

**Section 47. Reserved.**



3356 **PART E: WASTE AND WASTEWATER**  
3357 **LAND APPLICATION FACILITIES STANDARDS FOR THE APPLICATION OF BIOSOLIDS**  
3358 **AND THE REUSE OF TREATED NON-DOMESTIC WASTEWATER**  
3359

3360 **Section 48. General.**

3361 This part contains the minimum standards for the design and construction of waste and  
3362 wastewater land application facilities.  
3363

3364 The permitting of biosolids facilities or the land application of biosolids is regulated by the U.S.  
3365 Environmental Protection Agency (EPA) under the Code of Federal Regulations at 40 CFR Part 503. In  
3366 cases where the EPA does not issue a permit under 40 CFR 503, the Wyoming Department of  
3367 Environmental Quality, Water Quality Division (WDEQ/WQD) will issue a permit. The WQD will  
3368 require applicants to comply with the requirements of 40 CFR §503.12, §503.13, and § 503.14. The permit  
3369 applications and permits will be reviewed and processed according to Chapter 3 of the Water Quality  
3370 Rules and Regulations.  
3371

3372 **Section 49. Definitions Specific to Part E.**

3373 (a) ~~“Direct consumption” or “direct food chain crops” means vegetable, grain or fruit crops~~  
3374 ~~grown for direct human consumption.~~ **“Overland flow land application system”** is a system in which  
3375 treatment is accomplished by the application of wastewater to a sloping, largely impermeable site.  
3376 Treatment mechanisms include filtration, sedimentation, microbial oxidation, and crop uptake. Typical  
3377 application rates range from 0.0392-0.3136 yd<sup>3</sup>/yd/hr.  
3378

3379 (b) ~~“Indirect food chain crops” means forage or grain crops utilized by grazing animals and~~  
3380 ~~thereby one step removed from human consumption.~~ **“Primary treatment level”** (as related to  
3381 pathogenic organism reduction) is that level of fecal coliform reduction (a minimum of 25 percent  
3382 reduction) achievable by primary sedimentation in single cell discharging lagoons operated within the  
3383 limits described in Part B, Section 13(c).  
3384

3385 (c) ~~“Land application/treatment” is the application of wastes or wastewater to the land at a~~  
3386 ~~predetermined rate for the purpose of renovation by any or all of the following processes: chemical and~~  
3387 ~~microbial degradation, plant uptake and assimilation, or soil adsorption and accumulation in the profile.~~  
3388 (formerly Chapter 15, 3(c)) “Biosolids” are solid, semi-solid, or liquid residue generated during the  
3389 treatment of domestic sewage in a treatment works. Biosolids include, but are not limited to, domestic  
3390 septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and  
3391 a material derived from biosolids. Biosolids do not include ash generated during the firing of biosolids in  
3392 a biosolids incinerator or grit and screenings generated during preliminary treatment of domestic sewage  
3393 in a treatment works.  
3394

3395 (f) ~~“Rapid infiltration system” is a land application system in which treatment is~~  
3396 ~~accomplished by the percolation of large quantities of wastewater through a sufficient depth of coarse or~~  
3397 ~~highly permeable soil profile. Treatment is accomplished by filtration, microbial oxidation (which may~~  
3398 ~~include nitrification denitrification), and soil adsorption. Application rates for these systems generally~~  
3399 ~~exceed four inches per week, and may exceed 100 inches per week on soils capable of transmitting a~~  
3400 ~~range of .30 to 20 inches of water per hour through the most restrictive layer.~~  
3401

3402 (g) ~~“Slow rate land application system” is an irrigation system in which wastewater treatment~~  
3403 ~~is achieved chiefly by microbial oxidation (nitrification – denitrification), plant uptake of nutrients and~~  
3404 ~~adsorption on soil and organic matter. Application rates for systems in this category range from 0.5-4~~  
3405

3407 ~~inches per week on soils capable of transmitting 0.06-6.0 inches of water per hour through the most~~  
3408 ~~restrictive layer.~~

3409  
3410 ~~(h) —“Sludge” means any mixture or suspension of liquid and solid wastes having a total~~  
3411 ~~suspended solids content greater than ten percent by weight.~~

3412  
3413 ~~(i) —“Soil” is the collection of natural bodies occupying parts of the earth’s surface that~~  
3414 ~~support plants and that have properties due to the integrated effect of climate and living matter acting~~  
3415 ~~upon parent material, as conditioned by relief, over periods of time.~~

3416  
3417 **Section 50. Site Requirements.**

3418  
3419 (a) The method for determining the size of a particular land site for accomplishing the  
3420 treatment level necessary to comply with an NPDES permit or to maintain a groundwater aquifer within  
3421 its present class shall be based on the number of acres (hectares) required to reduce the waste constituent  
3422 identified as requiring the largest land area, based on soil assimilative capacity. The ratio used for this  
3423 determination is expressed as:

3424  
3425 Required Land Treatment Area = G/C

3426  
3427 Where:

3428  
3429 G = generation rate = the yearly amount of the controlling constituent to be applied  
3430 for land treatment. G is listed in kilograms per year (kg/yr) or pounds per year  
3431 (lbs/yr).

3432  
3433  
3434 C = plant-soil assimilative capacity = the yearly amount of the controlling  
3435 constituent which can be assimilated by plant uptake, soil adsorption and  
3436 accumulation, transformation or degradation, and allow survival and maintenance  
3437 of indigenous or crop plant species. C is listed in kilograms per hectare per year  
3438 (kg/ha/yr) or pounds per acre per year (lbs/ac/yr).

3439  
3440 Wastewater constituents or categories of constituents from which the land-limiting factor will be  
3441 selected are generally grouped as:

3442  
3443

3444 Organics	Nitrogen
3445 Phosphorus	Heavy metals
3446 Salts, acids and bases	Water
3447 Oil and grease	

3448

3449 (b) Slope. Slow rate irrigation systems (generally less than 4.0 inches/wk application rate)  
3450 will not be developed on slopes greater than 15 percent unless the site is terraced, gated pipe is placed on  
3451 the contour, or vegetation, application rate and soil infiltration rate are such that runoff and erosion would  
3452 not result.

3453  
3454 Overland flow systems will not be developed on sites having less than two percent or greater than  
3455 eight percent slope.

3456  
3457 (c) Soil profile. The minimum depth of unsaturated soil strata on which a land treatment  
3458 system may be developed is five feet for a slow rate system and ten feet for a rapid infiltration system,

3459 unless underdrains or pumped recovery wells are employed for lowering the water table. The applicant  
3460 should refer to Part A, Section 5 for innovative technology permit requirements.

3461  
3462 (d) Runoff and erosion. All land treatment sites will be protected from upslope runoff by  
3463 diversion ditches capable of intercepting the overland flow from a 10-year 24-hour storm event, unless it  
3464 is otherwise demonstrated that a storm of this size will not have an impact on the site. A runoff collection  
3465 ditch is required at the base of overland flow slopes or on sloping irrigation sites where site conditions are  
3466 such that over application of wastewater and/or seasonal precipitation events may threaten to pollute  
3467 surface waters of the state. Provisions for storage, return and reapplication are required where a runoff  
3468 collection ditch is required.

3469  
3470 **Section 51. Pretreatment Water Quality Requirement.**

3471  
3472 Pretreatment of wastewater shall provide sufficient organic and inorganic solids  
3473 reduction, maintaining the estimated infiltration rate of the soil surface.

3474  
3475 **Section 52. ~~Disinfection and Pathogen Control.~~ Reserved.**

3476 ~~Waste water effluent containing pathogenic organisms to be sprayed on agricultural lands~~  
3477 ~~supporting indirect food chain crops must achieve fecal coliform limits of 1000 colonies/100 ml (30 day~~  
3478 ~~geometric mean) before spray irrigation.~~

3479  
3480 ~~Wastewater containing pathogenic organisms that is surface applied to agricultural lands supporting~~  
3481 ~~indirect food chain crops must achieve a fecal coliform reduction equivalent to the primary treatment~~  
3482 ~~level (see Section 2(e)).~~

3483  
3484  
3485 ~~Wastewater effluent containing pathogenic organisms that is to be used for surface or spray irrigation of~~  
3486 ~~direct human consumption crops or for irrigation of golf courses, highway rest areas and rights of way~~  
3487 ~~(R.O.W.s), parks, playgrounds or similar domestic, commercial and industrial zones must achieve fecal~~  
3488 ~~coliform limits of 200/100 ml by positive disinfection.~~

3489  
3490 **Section 53. ~~Buffer Zone.~~ Reserved.**

3491  
3492 ~~A buffer strip of varying width is required around all land treatment sites located within one fourth~~  
3493 ~~mile upwind of current residential, commercial or industrial development where wastewater containing~~  
3494 ~~pathogenic organisms or capable of producing odors is to be spray irrigated. A 100 foot buffer zone is~~  
3495 ~~required for the spray irrigation of secondary municipal effluent. A 150 foot buffer zone is required around~~  
3496 ~~sites sprayed with primary municipal effluent.~~

3497  
3498 ~~The minimum allowable buffer strip for spray irrigation of wastewaters not containing pathogenic~~  
3499 ~~organisms or odor producing substances is 30 feet.~~

3500  
3501 **Section 54. ~~Land Application of Municipal Sewage Sludge and Septic Tank~~**  
3502 **~~Pumpings.~~ Reserved.**

3503  
3504 ~~Before municipal sewage sludge and septic tank pumpings can be applied to soils,~~  
3505 ~~minimum public health criteria must be met with respect to reduction of pathogenic organisms, limitation~~  
3506 ~~of PCBs, and limitation of cadmium and other heavy metals.~~

3507  
3508 (a) ~~Reduction of pathogens. Sludges applied to a land surface or soil incorporated must undergo a~~  
3509 ~~Process to Significantly Reduce Pathogens(PSRP) before application.~~

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~~PSRPs may include, but not be limited to, any one of the following:~~

~~(i) Anaerobic digestion— with a solids retention time (SRT) of eight to ten days at 95° F (35°C).~~

~~(ii) Aerobic digestion— minimum volatile solids reduction of 40 percent by any combination of time and temperature in the digester resulting in 475 degree days stabilization. (A minimum digester liquid temperature is approximately 40°F (4.4°C) resulting in a maximum winter retention of 108 days).~~

~~(iii) Windrow Composting— maintenance of pile temperatures at 131°F (55°C) for two days or 140°F(60°C) for .5 days to achieve approximately a 15 log reduction of the f2 bacteriophage, as monitored at the coldest pile location.~~

~~(iv) Individual static or extended aerated pile composting— according to the design developed by researchers at Beltsville, Md. A standard for destruction of pathogens is the maintenance of pile temperatures at approximately 68°C (154°F) for 10 days followed by storage in a curing pile for 30 days.~~

~~(v) Lime stabilization— addition of sufficient quantities of lime to maintain the pH at 12 for two hours.~~

~~(vi) Chlorine oxidation— the required chlorine is dependent on the type of sludge and percent solids, as follows:~~

<u>Type of Sludge</u>	<u>percent SS</u>	<u>Chlorine Requirement lb/1000 gal</u>
Primary Sludge	4.0	17
Waste activated sludge with prior primary treatment	0.7	7
—no primary treatment	0.7	7
—from contact stabilization	0.7	7
Sludge from low and high rate trickling filters	1.0	10
Digester supernatant	0.3	2-10
Septage	1.2	6

3533 From: R.C. Neal of BIF  
3534 1 lb/1,000 gal = 0.12 kg/l

~~In addition, public access to the site must be restricted for 12 months and access by grazing animals restricted for one month. If crops for direct human consumption are grown within 18 months after the application, the sludge must not come into direct contact with the edible portion of the crop.~~

~~Septic tank pumpings that are to be land applied must undergo a PSRP unless public access to the site is restricted for 12 months and grazing animal access is restricted for one month.~~

~~Where sludge or septic tank pumpings do come into direct contact with the edible portion of a direct consumption crop, or where dried sludge (greater than 40 percent solids) is utilized on parks, golf courses,~~

3545 ~~highway R.O.W.s, or made available to the general public, the sludge or septage must undergo a Process to~~  
3546 ~~Further Reduce Pathogens (PFRP).~~

3547  
3548 ~~Disclaimer: Sludge or septage that has been subjected to a PFRP is considered to have an~~  
3549 ~~insignificant pathogenic organism content; such sludge is not, however, considered to be 100 percent~~  
3550 ~~pathogen free.~~

3551  
3552 ~~PFRPs may include, but not be limited to, any one of the following:~~

3553  
3554 ~~(i) Composting storage for three months following windrowing, pile composting, or~~  
3555 ~~any previously mentioned PSRP.~~

3556  
3557 ~~(ii) Heat drying use of a flash or rotary kiln drier.~~

3558  
3559 ~~(iii) Pasteurization at 158° F (70° C) for 30 minutes.~~

3560  
3561 ~~(iv) Lime conditioning of stabilized sludge to pH of 10.2-11.~~

3562  
3563 ~~(v) Gamma ray irradiation 400 krad or greater dosage with Ce-137 or Co-60 source~~  
3564 ~~for dried, composted sludge of approximately 80 percent solids.~~

3565  
3566 ~~(vi) Electron beam (beta irradiation) 400 krad dosage for liquid digested sludge.~~

3567  
3568 ~~(b) PCBs (Polychlorinated Biphenyls). Sludges containing greater than 10 mg/kg of PCBs that are~~  
3569 ~~land applied where a crop is grown for animal feed or pasture must be soil incorporated unless the annual~~  
3570 ~~application is less than 0.4 lbs/acre.~~

3571  
3572 ~~(c) Cadmium and other heavy metals.~~

3573  
3574 ~~(i) Sludges containing a significant quantity (greater than 2 mg/kg) of cadmium may be~~  
3575 ~~applied to land where direct human consumption crops are grown if the background soil pH is 6.5 or greater~~  
3576 ~~and the sludge pH is 6.2 or greater.~~

3577  
3578 ~~(ii) The maximum annual cadmium application rate to land where any direct human~~  
3579 ~~consumption crops are grown must not exceed 0.5 kg/ha (0.44 lbs/acre).~~

3580

3581 ~~(iii) In addition, maximum cumulative cadmium application to any given land site where~~  
 3582 ~~direct food chain crops are grown or capable of being grown shall not exceed 5 kg/ha (4.4 lb/ ac)~~  
 3583 ~~for a soil with cation exchange capacity less than 5 meq/100 g, 10 kg/ha (8.9 lbs/ac) for a soil with~~  
 3584 ~~a cation exchange capacity of 5-15 meq/100 g and 20 kg/ha (17.8 lbs/ac) when the cation exchange~~  
 3585 ~~capacity is greater than 15 meq/100 g. Maximum cumulative loadings of other metals based on soil~~  
 3586 ~~cation exchange capacity are as follows:~~

<u>Metal</u>	<u>Soil Cation Exchange Capacity</u> <u>(meq/100 gms)</u>		
	<u>≤5</u>	<u>5-10</u> <u>lbs/acre</u>	<u>&gt;15</u>
Lead	500	1000	2000
Zinc	250	500	1000
Copper	125	250	500
Nickel	50	100	200

3587  
 3588 ~~(iv) Where the background soil pH is less than 6.5 and is adjusted by amendment~~  
 3589 ~~(e.g. limestone) above that level, the following requirements must be met:~~

3590 ~~(A) Only indirect food chain crops (animal feed) may be grown, or~~

3591  
 3592 ~~(B) Soil pH must be maintained at 6.5 or greater when sludge is~~  
 3593 ~~applied or when the direct consumption crop is planted.~~

3594  
 3595 ~~(C) The metal application rates in Section 54 (c) (i) (iii) apply.~~

3596  
 3597 ~~(v) Where the background soil pH is less than 6.5 and no adjustment is~~  
 3598 ~~planned, the following requirements must be met:~~

3599  
 3600 ~~(A) Only indirect food chain crops (animal feed) may be grown.~~

3601 ~~(B) The annual cadmium application rate shall not exceed 0.5 kg/ha (0.44~~  
 3602 ~~lbs/acre)~~

3603  
 3604 ~~(C) The maximum cumulative cadmium application shall not exceed 5~~  
 3605 ~~kg/ha (4.4 lbs/ac).~~

3606  
 3607 ~~(D) Maximum cumulative applications of lead, zinc, copper and nickel~~  
 3608 ~~shall not exceed 500, 250, 125 and 50 lbs/acre respectively, regardless of the cation exchange~~  
 3609 ~~capacity of the soil.~~

3610  
 3611 ~~(d) Site limitations:~~

3612  
 3613 ~~(i) Sludge and septage must not be applied to sites with a slope greater than~~  
 3614 ~~five percent whether or not it is soil incorporated, unless the site is protected by a runoff collection~~  
 3615 ~~ditch, in which case the site slope must not exceed eight percent. Sludge or septage application to~~  
 3616

3617 ~~frozen or snow covered ground will require the installation of a runoff collection ditch on slopes~~  
3618 ~~greater than three percent.~~

3619  
3620 (ii) ~~Sludge application sites must be located a minimum distance of 300 feet~~  
3621 ~~from the definable high water line of all surface water bodies unless the sludge is subsurface~~  
3622 ~~injected, in which case the above distance is reduced to 50 feet.~~

3623  
3624 (iii) ~~Sludge application sites must be located a minimum distance of 300 feet from~~  
3625 ~~any public water supply wells, whether surface applied or subsurface injected.~~

3626  
3627 (iv) ~~Sludge application sites must be located a minimum distance of 1500 feet from~~  
3628 ~~residential developments, unless the sludge is subsurface injected, in which case the above distance~~  
3629 ~~reduces to 300 feet.~~

3630  
3631 (v) ~~Sludge application sites must be located a minimum distance of 300 feet~~  
3632 ~~from nonresidential developments or public road R.O.W.s, unless the sludge is subsurface injected,~~  
3633 ~~in which case the above distance reduces to 50 feet.~~

3634  
3635 **Section 55. Irrigation Water Quality.**

3636  
3637 (a) The surface infiltration rate and hydraulic conductivity of the soil profile shall be  
3638 approximated by the appropriate tests and used in determining an average annual application rate.  
3639

3640 (b) Indigenous or crop plant species shall be capable of survival and maintenance  
3641 under the conditions of increased soil moisture, salinity, and alkalinity, the classes of which will  
3642 be determined by use of Figure 1, Tables 1-3 and a soil textural analysis. Waste and wastewater  
3643 analyses required for this evaluation include electrical conductivity (EC in umhos/cm @ 25°C),  
3644 sodium (Na<sup>+</sup>), calcium ~~(Ca<sup>2+</sup>)~~ (Ca<sup>2+</sup>), magnesium ~~(Mg<sup>2+</sup>)~~ (Mg<sup>2+</sup>), bicarbonate (HCO<sup>3</sup>), chloride  
3645 (Cl<sup>-</sup>), sulfate (SO<sub>4</sub><sup>2-</sup>), Boron (B) and Selenium (Se), and calculation of the Sodium Adsorption  
3646 Ratio (SAR) by use of the formula:

3647  
3648  
3649 
$$SAR = \frac{Na^+}{\sqrt{\frac{([Ca^{2+}] + [Mg^{2+}])}{2}}}$$

3650  
3651 (c) Numerical water quality criteria for special situations.

3652  
3653 (i) For continuous and unrestricted irrigation of direct human consumption  
3654 food crops or of parks, playgrounds, highway rest areas and rights-of-way (R.O.W.s), or  
3655 domestic, commercial and industrial grounds with treated municipal wastewater effluent, the  
3656 following quality criteria shall not be exceeded:

3657

pH	4.5 - 9.0 s.u.
BOD	10+.0 <del>mg/l</del> <u>mg/L</u> Daytime
BOD	30 <del>mg/l</del> <u>mg/L</u> Dusk-Dawn
TSS	5.0 <del>mg/l</del> <u>mg/L</u> Daytime

TSS	100 <del>mg/l</del> <u>mg/L</u> Dusk-Dawn
Fecal Coliforms	200/100 <del>mg/l</del> <u>mg/L</u> (positive disinfection)
TDS	480.0 <del>mg/l</del> <u>mg/L</u>
Electrical Conductivity, (EC)	750 micromhos/cm@25°C
Sodium Adsorption Ratio (SAR)	10
Chlorides ( <del>Cl</del> ) ( <u>Cl</u> )	213 <del>mg/l</del> <u>mg/L</u>
Sulfates (SO <sub>4</sub> <sup>2-</sup> )	192 <del>mg/l</del> <u>mg/L</u>
Bicarbonates (HO <sub>3</sub> <sup>-</sup> )	Not greater than 50 percent of the total anion concentration in <del>meq/l</del> <u>meq/L</u>
Aluminum (Al)	5.0 <del>mg/l</del> <u>mg/L</u>
Arsenic (As)	1.0 <del>mg/l</del> <u>mg/L</u>
Beryllium (Be)	0.1 <del>mg/l</del> <u>mg/L</u>
Boron (B)	0.6 <del>mg/l</del> <u>mg/L</u>
Cadmium (Cd)	0.01 <del>mg/l</del> <u>mg/L</u>
Cobalt (Co)	0.5 <del>mg/l</del> <u>mg/L</u>
Chromium (Cr)	0.1 <del>mg/l</del> <u>mg/L</u>
Copper (Cu)	0.2 <del>mg/l</del> <u>mg/L</u>
Iron (Fe)	5.0 <del>mg/l</del> <u>mg/L</u>
Lead (Pb)	5.0 <del>mg/l</del> <u>mg/L</u>
Lithium (Li)	0.1 <del>mg/l</del> <u>mg/L</u>
Manganese (Mn)	10.0 <del>mg/l</del> <u>mg/L</u>
Nickel (Ni)	0.2 <del>mg/l</del> <u>mg/L</u>
Selenium (Se)	0.1 <del>mg/l</del> <u>mg/L</u>
Vanadium (V)	0.1 <del>mg/l</del> <u>mg/L</u>
Zinc (Zn)	2.0 <del>mg/l</del> <u>mg/L</u>

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(ii) For disposal of limited volumes of industrial wastewater and sludge of less than 10 percent solids, the following criteria shall not be exceeded:

pH	4.5 - 9.0 s.u.
Electrical Conductivity (EC)	3,250 micromhos/cm @25°C
Total Dissolved Solids	2,100 <del>mg/l</del> <u>mg/L</u>
Sodium Adsorption Ratio (SAR)	26
Potassium	In combination with sodium, will not produce an SAR greater than 26
Chlorides ( <del>Cl</del> ) ( <u>Cl</u> )	1,500 <del>mg/l</del> <u>mg/L</u>
Sulfates ( <del>SO42-</del> ) ( <u>SO4<sup>2-</sup></u> )	960 <del>mg/l</del> <u>mg/L</u>
Bicarbonates ( <del>HCO3-</del> ) ( <u>HO3<sup>-</sup></u> )	Not greater than 50 percent of the total anion concentration, meq/l <del>mg/l</del> <u>mg/L</u>



Arsenic (as <del>H3AsO4</del> <u>H3AsO4</u> , Arsenious Acid)	0.1 <del>mg/l</del> <u>mg/L</u>
Boron (as <del>H3BO3</del> <u>H3BO3</u> , Boric Acid)	2.0 <del>mg/l</del> <u>mg/L</u>
Chromium (Cr)	1.0 <del>mg/l</del> <u>mg/L</u>
Copper (Cu)	1.0 <del>mg/l</del> <u>mg/L</u>
Nickel (Ni)	0.2 <del>mg/l</del> <u>mg/L</u>
Selenium (Se)	0.2 <del>mg/l</del> <u>mg/L</u>
Zinc (Zn)	2.0 <del>mg/l</del> <u>mg/L</u>
	20,000 lbs/ac when soil incorporated (surface 6 inches)
Oil and grease	2,000 lbs/ac when surface applied

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(iii) All other continuous disposal land application systems will be approved on a site specific, case by case basis by use of the applicable standards and guidelines.

**Section 56. Effluent Quality.**

(a) Surface water protection. Discharge from a land treatment system to a surface water body will be regulated by the NPDES permit process.

(b) Groundwater protection. Percolation water from land treatment of waste or wastewater shall not degrade groundwater quality to the point at which it is no longer suitable for its current or potential use as described in Chapter VIII of the Wyoming Water Quality Regulations.

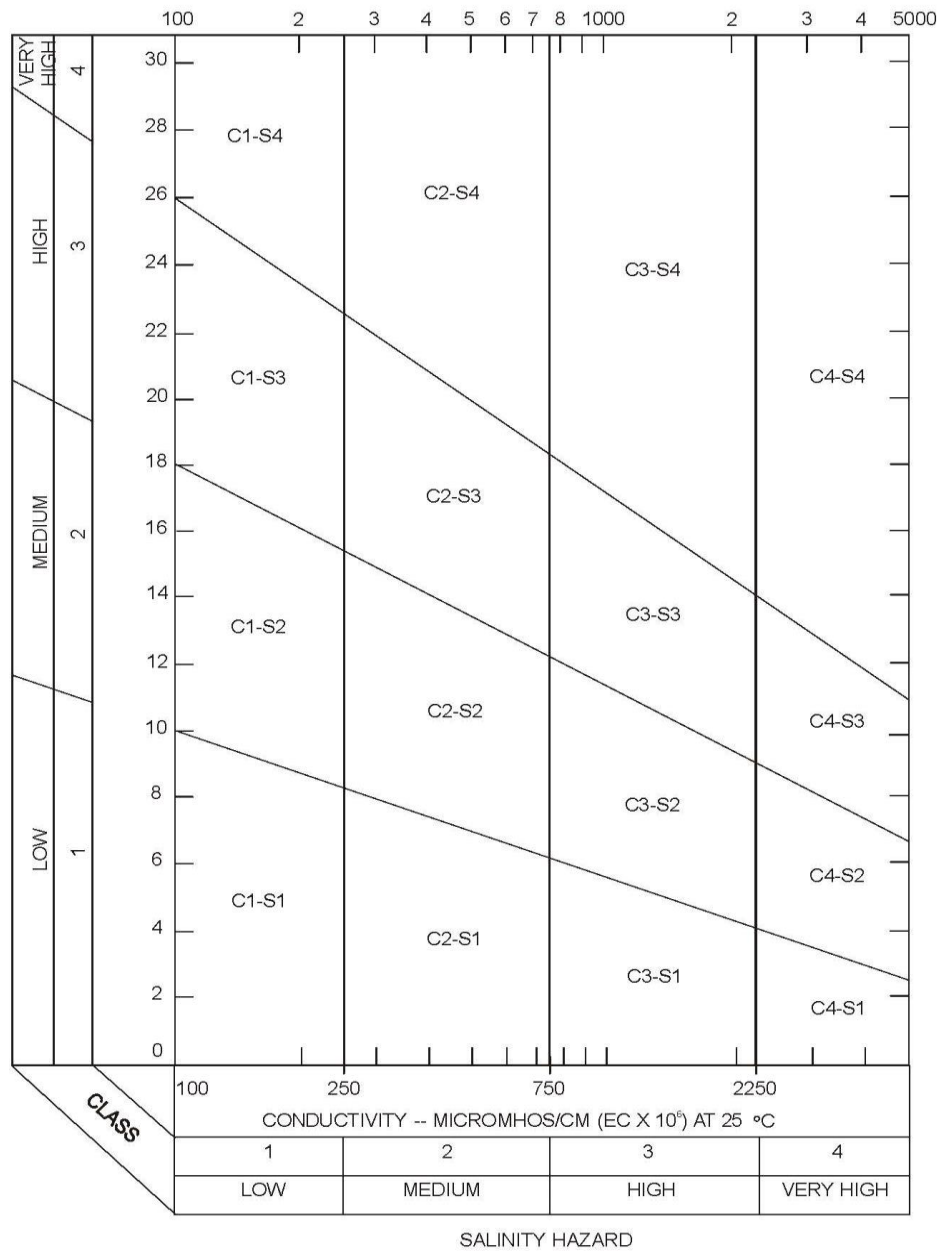


Figure I - Diagram for the classification of irrigation waters

## IRRIGATION WATER QUALITY

### Permissibility Classes for Salinity

3677  
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3680  
3681 Class C1, low salinity: --

3682 Good water with little or no likelihood of salt accumulation under the  
3683 leaching provided by average irrigation practices, except where sub-  
3684 surface drainage is inadequate.

3685 Class C2, medium salinity: --

3686 Can be used if a moderate amount of leaching occurs. Plants with  
3687 moderate salt tolerance can be grown in most cases without special  
3688 practices for salinity control.

3689 Class C3, high salinity: --

3690 Cannot be used on soils with restricted drainage. With adequate drainage,  
3691 considerable excess water must be applied to each irrigation; irrigations  
3692 must be made more frequently, and plants with a good salt tolerance  
3693 should be selected.

3694 Class C4, very high salinity: --

3695 Not usable under ordinary conditions. On very light and permeable soils  
3696 with excellent drainage, water may be usable with a large amount of excess  
3697 leaching water, frequent irrigations, and very salt-tolerant crops.

### Permissibility Classes for Alkalinity

3698  
3699  
3700  
3701 Class S1, low sodium: --

3702 Good for almost all soils and all Wyoming crops.

3703 Class S2, medium sodium: --

3704 Can cause alkali problems on heavy clayey soils, with low leaching, unless  
3705 gypsum (or equivalent soil amendments) are present or added to the soils.

3706 Class S3, high sodium: --

3707 May create harmful levels of exchangeable sodium in all soils and will  
3708 require special management--good drainage, high leaching, and organic  
3709 matter additions. Soils containing natural gypsum may not develop alkali  
3710 troubles. Chemical amendments may be necessary, but are not feasible  
3711 with waters of very high salinity.

3712 Class S4, very high sodium: --

3713 Generally unsuited for irrigation. Special conditions of low salinity water,  
3714 favorable gypsum content of soils, tolerant crops, and special management  
3715 may permit use of these waters.

3716  
3717 These water classes are based on recommendations of the United States Regional  
3718 Salinity Laboratory and numerous state agricultural experiment stations.

TABLE 1 - Boron Class Limits

Class	Limits -- parts per million			Description
	Sensitive crops	Semi-tolerant crops	Tolerant crops	
1	Below 0.33	Below 0.67	Below 1.00	Very low. No effect on crops.
2	0.33 to 0.67	0.67 to 1.33	1.00 to 2.00	Low. Very slight effect on crops.
3	0.67 to 1.00	1.33 to 2.00	2.00 to 3.00	Moderate. Significant yield depression.
4	1.00 to 1.25	2.00 to 2.50	3.00 to 3.75	High. Large yield depression anticipated.
5	Over 1.25	Over 2.50	Over 3.75	Very high. Non-usable.

TABLE II - Selenium Class Limits

Class	Limits -- parts per million	Description
1	0.00 to 0.10	Low. No plant toxicity anticipated.
2	0.11 to 0.20	Medium. Usable -- possible long-term accumulation under particular conditions and should be watched
3	0.21 to 0.50	High. Doubtful -- probably toxic accumulation in plants except under especially favorable conditions
4	Over 0.50	Very High. Non-usable under any conditions.

TABLE III. CHLORIDE AND SULFIDE LIMITS FOR THREE CLASSES OF IRRIGATION WATERS

Class		Chlorides		Sulfates	
		meq/l meq/L	mg/l mg/L	meq/l meq/L	mg/l mg/L
I-	Excellent to good; or suitable for most plants under most conditions	less than 2-5.5	71.1 - 195.5	4 - 10	192 - 480
II-	Good to injurious; harmful to some under certain conditions of soil, climate and practices	2 -16	71.1 - 568.0	4 - 20	192 - 960

III-	Injurious to unsatisfactory; unsuitable under most conditions	6 -16	213 - 568	12 - 20	576 - 960
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**PART F: MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC WATER SUPPLY DISTRIBUTION SYSTEMS**

**Section 57. General.**

This part contains the minimum standards for the design and construction of mobile home park and/or campground wastewater facilities and public water supply systems.

**Section 58. Sewage System Standards.**

(a) If sewerage system services are to be provided by a second person, a letter of verification from the system manager stating that they are capable of handling added organic and/or hydraulic loads shall be provided by the owner/operator of the system.

(b) A mobile home park or campground sewerage system, treatment works and disposal system shall comply with Part A, B, C, and/or D of Chapter XI except as follows:

(i) Mobile home park sewerage systems, treatment works and disposal systems shall be designed on the basis of not less than 350 gallons per site per day. Camp ground sewerage systems, treatment works and disposal systems shall be designed on the basis of not less than 100 gallons per site per day for all sewered sites or 75 gallons per site per day for all unsewered sites.

(ii) Sanitary sewers shall not be smaller than six inches in diameter. They shall be installed at a slope equal to or greater than 0.6 feet per 100 feet.

(iii) Not more than two mobile homes or campground sites shall be served by a sanitary sewer service connection pipe of a least four inches in diameter, provided the main branch of the service pipe is served by a cleanout and provided it is not longer than 50 feet. It shall be installed at a minimum slope of 1/4 inch per foot. The riser portion of the service connection pipe shall be constructed of cast iron or schedule 40 plastic pipe. The riser shall be terminated at least four inches above finished grade and shall not be located closer than five feet from a potable water service riser. The service connection pipe shall connect to the sewerage system at a maximum 45 degree bend in the direction of sewage flow.

(iv) Not more than one mobile home shall be served by a sanitary sewer service riser pipe. The riser shall be located so as to minimize the length of pipe required to connect the mobile home drain. The riser pipe shall be capped or plugged when not in use.

(v) The connection of the mobile home drain to the riser pipe shall be sealed.

(vi) If sewer service is provided to sites in a campground, the sanitary sewer service connection pipe shall comply with subsections (iii) and (iv) above.

(vii) Service connection pipes for campgrounds shall be trapped below the frost line.

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**Section 59. Potable Water Supply Standards.**

(a) The potable water distribution system serving any building, mobile home lot, campground site or other appurtenance within a mobile home park or campground which is connected to a public water supply shall be considered an extension or modification of the public supply.

(b) If water is to be obtained from a public water supply, a letter of verification shall be provided from the public water supply system manager stating that the required flow can be supplied at a minimum pressure of 20 pounds per square inch under all conditions of flow throughout the proposed distribution system. A normal working pressure of 35 pounds per square inch shall be maintained in the distribution system.

(c) The public water supply serving mobile home sites, buildings and other facilities within a mobile home park shall be designed, constructed or installed and protected in accordance with Chapter XII of the Water Quality Rules and Regulations, except as follows:

(i) The water supply source shall be capable of supplying the peak water demand to a mobile home park distribution system according to the following table:

Homes	Gallons per Minute
25	65
50	105
75	145
100	180
150	235
200	285
each additional mobile home over 200	1 gpm

(ii) If fire protection is provided, the flow required shall be in addition to the requirements of subsection (i) above.

(iii) Each mobile home shall be provided with a potable water service connection pipe. It shall be 3/4 inch nominal pipe size or larger. The riser portion of the pipe shall be constructed of type K copper or steel pipe from a point below the frost line to the point of connection to the mobile home piping. The riser shall terminate at least four inches above finished grade and shall be protected from damage. The service connection pipe shall be provided with a curb stop below frost penetration. A stop and waste valve with a weep hole below grade shall not be used.

(iv) The distribution system shall be of sufficient size to supply the required volume of water at a minimum pressure of 20 pounds per square inch under all conditions of demand. A working pressure of 35 pounds per square inch shall be maintained under average day demand conditions. The distribution system mains shall not be smaller than 1 1/2 inches in diameter. If fire protection is provided, the distribution system shall meet the requirements of Chapter XII of the Water Quality Rules and Regulations.

3807 (v) If the potable water is pumped to the distribution system from wells or  
3808 storage facilities, the pumps shall be capable of meeting the maximum day demand with the  
3809 largest pumping unit out of service.

3810

3811 (vi) Water storage facilities shall be provided when the potable water source  
3812 cannot meet the peak demand.

3813

3814 (d) The public water supply serving campground sites, buildings and/or other  
3815 facilities within a campground shall be designed, constructed and protected in accordance with  
3816 Chapter XII of the Water Quality Rules and Regulations except as follows:

3817

3818 (i) The public water supply source shall be capable of supplying water to a  
3819 campground distribution system at a rate of 0.5 gpm/site.

3820

3821 (ii) Below ground stop and waste valves with weep holes below ground shall  
3822 not be permitted.

3823

3824 (iii) A minimum pressure of 20 pounds per square inch shall be maintained  
3825 throughout the distribution system under all conditions of flow. A working pressure of 35 pounds  
3826 per square inch shall be maintained under average day demand conditions.

3827

3828 (iv) The distribution piping shall not be smaller than one inch in diameter.  
3829 Service pipes shall not be smaller than 1/2 inch in diameter.

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**PART G: WELL CONSTRUCTION**

~~NOW Chapter 26~~

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**Section 60. Reserved.**

**Section 61. Reserved.**

**Section 62. Reserved.**

**Section 63. Reserved.**

**Section 64. Reserved.**

**Section 65. Reserved.**

**Section 66. Reserved.**

**Section 67. Reserved.**

**Section 68. Reserved.**

**Section 69. Reserved.**

**Section 70. Reserved.**

3858 **(formerly Chapter 21) PART H: STANDARDS FOR THE REUSE OF TREATED**  
3859 **DOMESTIC WASTEWATER**

3860 **(formerly Chapter 21, Section 1) Section 71. Authority and Purpose.**

3861 ~~(formerly Chapter 21, Section 1.) It is the intent of these regulations to encourage and~~  
3862 ~~facilitate the productive and safe reuse of treated wastewater as a viable option in the~~  
3863 ~~management of the state's scarce water resources. The use of treated wastewater for non-~~  
3864 ~~potable purposes through "source substitution" or replacing potable water used for non-~~  
3865 ~~potable purposes is encouraged. This part contains the minimum standards for the reuse of~~  
3866 ~~treated wastewater as defined in these regulations. This chapter replaces and supersedes the~~  
3867 ~~portions of part E, Chapter 11, Wyoming Water Quality Rules and Regulations pertaining~~  
3868 ~~land application of treated wastewater.~~

3869 (formerly Chapter 21, Section 1(a)) (a) These regulations establish standards that  
3870 address the primary health concerns associated with the reuse of treated wastewater. The  
3871 regulations establish criteria to address the risk of pathogen exposure and infectious disease risks  
3872 associated with various specified uses of treated wastewater. The regulations establish standards  
3873 for the following:

3874 \_\_\_\_\_ (formerly Chapter 21, Section 1(a)(i)) (i) The level of wastewater treatment  
3875 required;

3876 \_\_\_\_\_ (formerly Chapter 21, Section 1(a)(ii)) (ii) Treatment reliability  
3877 requirements;

3878 \_\_\_\_\_ (formerly Chapter 21, Section 1(a)(iii)) (iii) Upper limits for water quality  
3879 parameters;

3880 \_\_\_\_\_ (formerly Chapter 21, Section 1(a)(iv)) (iv) Site access restrictions; and

3881 \_\_\_\_\_ (formerly Chapter 21, Section 1(a)(v)) (v) Management practices.

3882 (formerly Chapter 21, Section 1(b)) (b) In addition, the standards in this part include the  
3883 parameters to be monitored, frequency of monitoring, record keeping and reporting requirements  
3884 when treated wastewater is reused.

3885 \_\_\_\_\_ (formerly Chapter 21, Section 1(c)) (c) These regulations establish the degree of control  
3886 required for wastewater reuse through site access limitations, management practices and crop  
3887 restrictions that will be commensurate with the level of treatment provided, reliability of the  
3888 treatment process, quality of the wastewater and the intended use. As the quality of the  
3889 wastewater and the reliability of the treatment process increases, the regulatory controls are  
3890 reduced to a level consistent with protecting public health and the environment.

3891 \_\_\_\_\_ (formerly Chapter 21, Section 1(d)) (d) Pathogen reduction and public health impacts  
3892 related to infectious disease agents are the major concerns associated with the reuse of treated  
3893 wastewater. Chemical and toxic pollutants in treated domestic sewage are generally not a  
3894 concern and are not targeted for state regulation in this chapter. There are additional constituents,  
3895

3906 such as total dissolved solids, that should be considered as part of an overall irrigation  
3907 management program but are not regulated by this chapter.

3908  
3909 **(formerly Chapter 21, Section 2)Section 72. Applicability.**

3910  
3911 (formerly Chapter 21, Section 2(a)) (a) These regulations apply to any person who  
3912 prepares or applies treated waste-water from domestic sewage.

3913  
3914 (formerly Chapter 21, Section 2(b)) (b) These regulations are not applicable if the  
3915 primary intent is to provide treatment and/or disposal of a wastewater. Treatment and disposal  
3916 are regulated under appropriate sections of Chapter 11, Wyoming Water Quality Rules and  
3917 Regulations.

3918  
3919 (formerly Chapter 21, Section 2(c)) (c) If the reuse of treated wastewater involves the  
3920 construction of facilities for the disinfection, delivery, storage or land application, a construction  
3921 permit is required in accordance with the provisions of Chapters 3 and 11, Wyoming Water  
3922 Quality Rules and Regulations. Such a permit constitutes approval to reuse the treated  
3923 wastewater. This permit is not an operational permit and does not require periodic renewal. If  
3924 there are no structural facilities requiring a construction permit, the reuse of wastewater will be  
3925 authorized by a land application permit issued in accordance with these regulations. The land  
3926 application permit is not an operational permit and does not require periodic renewal.

3927  
3928 (formerly Chapter 21, Section 2(d)) (d) These regulations are not applicable to the  
3929 discharge of a treated wastewater which is subject to a discharge permit issued pursuant to  
3930 Chapter 2, Wyoming Water Quality Rules and Regulations.

3931  
3932 (formerly Chapter 21, Section 2(e)) (e) These regulations are not applicable to treated  
3933 wastewater reused at reclamation sites regulated by the Land Quality Division under Article 4 of  
3934 the Wyoming Environmental Quality Act.

3935  
3936 (formerly Chapter 21, Section 2(f)) (f) These regulations are not applicable to treated  
3937 wastewater reused for irrigation of grass, shrubs and trees at the treatment works.

3938  
3939 (formerly Chapter 21, Section 2(g)) (g) These regulations are not applicable to the  
3940 disposal of gray water.

3941  
3942 (formerly Chapter 21, Section 2(h)) (h) These regulations are not applicable to  
3943 groundwater recharge projects which are regulated by the Underground Injection Control  
3944 Program of the Department of Environmental Quality, Water Quality Division.

3945  
3946 **(formerly Chapter 21, Section 3) Section 73. Definitions Specific to Part H.**

3947  
3948 The following definitions supplement those definitions contained in Section 35-11-103 of  
3949 the Wyoming Environmental Quality Act.

3950  
3951 (formerly Chapter 21, Section 3(a)) (a) **“Agricultural land”** is land on which a food  
3952 crop, a feed crop, or a fiber crop is grown. This includes range land and land used as pasture.  
3953

3954 (formerly Chapter 21, Section 3(b)) (b) “Agronomic rate” is the wastewater application  
3955 rate designed to: (1) provide the amount of nitrogen needed by the food crop, feed crop, fiber  
3956 crop, cover crop, or vegetation grown on the land; and (2) minimize the amount of nitrogen in the  
3957 treated wastewater that passes below the root zone of the crop or vegetation grown on the land to  
3958 the ~~ground-water~~ groundwater.

3959  
3960 (formerly Chapter 21, Section 3(c)) (c) “Class A wastewater” is treated wastewater  
3961 which has received advanced treatment and/or secondary treatment and a level of disinfection so  
3962 that the maximum number of fecal coliform organisms is 2.2/100 mL or less.

3963  
3964 (formerly Chapter 21, Section 3(d)) (d) “Class B wastewater” is treated wastewater  
3965 which has received the equivalent of secondary treatment and a level of disinfection so that the  
3966 maximum fecal coliform level is greater than 2.2/100 mL but less than 200/100 mL.

3967  
3968 (formerly Chapter 21, Section 3(e)) (e) “Class C wastewater” is treated wastewater  
3969 which has received the equivalent of primary treatment and a level of disinfection so that the  
3970 maximum fecal coliform level is 200/100 mL or greater but less than 1000/100 mL.

3971  
3972 (formerly Chapter 21, Section 3(f)) (f) “Contaminate a groundwater aquifer” means  
3973 to introduce a substance that causes the maximum contaminant level for water quality parameters  
3974 specified in Chapter 8, Wyoming Water Quality Rules and Regulations to be exceeded or that  
3975 causes the existing concentration of pollutants in ~~ground-water~~ groundwater to increase when the  
3976 existing concentration of the parameters in the ~~ground-water~~ groundwater exceeds the maximum  
3977 contaminant level specified in Chapter 8, Wyoming Water Quality Rules and Regulations.

3978  
3979 (formerly Chapter 21, Section 3(g)) (g) “Direct human consumption food crops” are  
3980 crops consumed directly by humans. These include, but are not limited to fruits, vegetables and  
3981 grains grown for human consumption.

3982  
3983 (formerly Chapter 21, Section 3(h)) (h) “Domestic sewage” is waste and wastewater  
3984 that is primarily from human or household operations that is discharged to or otherwise enters a  
3985 treatment works.

3986  
3987 (formerly Chapter 21, Section 3(i)) (i) “Forest” is a tract of land thick with trees and  
3988 underbrush.

3989  
3990 (formerly Chapter 21, Section 3(j)) (j) ~~“Ground-water”~~ “Groundwater” is subsurface  
3991 water that fills available openings in rock or soil material such that they may be considered water  
3992 saturated under hydrostatic pressure.

3993  
3994 (formerly Chapter 21, Section 3(k)) (k) “Indirect human consumption crop” are crops  
3995 utilized by grazing animals and are thereby one step removed from human consumption.

3996  
3997 (formerly Chapter 21, Section 3(l)) (l) ~~“Land application” is the spraying or spreading~~  
3998 ~~of wastewater onto the land surface or the injection of wastewater below the land surface.~~

3999  
4000 (formerly Chapter 21, Section 3(m)) (l) “Land with a high potential for public  
4001 exposure” is land that the public uses frequently and there are no restrictions or limitations on  
4002 public access during irrigation periods. This includes, but is not limited to public parks, ball

4003 fields, cemeteries, plant nurseries, turf farms, golf courses and a reclamation site located in a  
4004 populated area (e.g., a construction site located in a city).

4005 \_\_\_\_\_  
4006 (formerly Chapter 21, Section 3(n)) (m) “**Land with moderate potential for public**  
4007 **exposure**” is land that is accessible to the public but access is limited during irrigation periods.  
4008 This would include the facilities in (n) where signing and fencing is provided to restrict access.

4009 \_\_\_\_\_  
4010 (formerly Chapter 21, Section 3(o)) (n) “**Land with a low potential for public**  
4011 **exposure**” is land that the public uses infrequently. This includes, but is not limited to  
4012 agricultural land, forest, and a reclamation site located in an unpopulated area (e.g., a strip mine  
4013 located in a rural area).

4014 \_\_\_\_\_  
4015 (formerly Chapter 21, Section 3(p)) (o) “**Municipal wastewater**” means the discharge  
4016 from a publicly owned or con-trolled treatment system receiving primarily domestic wastewater  
4017 or a combination of domestic, commercial and industrial wastewater that is normally treated in a  
4018 primary, secondary or advanced wastewater treatment process.

4019 \_\_\_\_\_  
4020 (formerly Chapter 21, Section 3(q)) (p) “**Pathogenic organisms**” are disease-causing  
4021 organisms. These include, but are not limited to certain bacteria, protozoa, viruses, and viable  
4022 helminth ova.

4023 \_\_\_\_\_  
4024 (formerly Chapter 21, Section 3(r)) (q) “**Pasture**” is land on which animals feed  
4025 directly on feed crops such as legumes, grasses, grain stubble, or stover.

4026 \_\_\_\_\_  
4027 (formerly Chapter 21, Section 3(s)) (r) “**Permitting authority**” is the Department of  
4028 Environmental Quality, Water Quality Division.

4029 \_\_\_\_\_  
4030 (formerly Chapter 21, Section 3(t)) (s) “**Pollutant**” is an organic substance, an  
4031 inorganic substance, a combination of organic and inorganic substances, or a pathogenic  
4032 organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an  
4033 organism either directly from the environment or indirectly by ingestion through the food chain,  
4034 could, on the basis of information available to the permitting authority, cause death, disease,  
4035 behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including  
4036 malfunctions in reproduction), or physical deformations in either organisms or offspring of the  
4037 organisms.

4038 \_\_\_\_\_  
4039 (formerly Chapter 21, Section 3(u)) (t) “**Pollutant limit**” is a numerical value that  
4040 describes the amount of a pollutant allowed per unit amount of wastewater (e.g., milligrams per  
4041 liter).

4042 \_\_\_\_\_  
4043 (formerly Chapter 21, Section 3(v)) (u) “**Range land**” is open land used for grazing by  
4044 livestock and/or wildlife on which the natural potential plant community is dominated by grasses,  
4045 grasslike plants, forbs and shrubs.

4046 \_\_\_\_\_  
4047 (formerly Chapter 21, Section 3(w)) (v) “**Reclamation site**” is drastically disturbed land  
4048 that is reclaimed using waste-water. This includes, but is not limited to, strip mines and  
4049 construction sites.

4050

4051 (formerly Chapter 21, Section 3(x)) (w) “Runoff” is rainwater, leachate, or other liquid  
4052 that drains overland on any part of a land surface and runs off of the land surface.

4053  
4054 (formerly Chapter 21, Section 3(y)) (x) “Treated wastewater” is domestic sewage  
4055 discharged from a treatment works after completion of the treatment process.

4056  
4057 (formerly Chapter 21, Section 3(z)) (y) “Treatment works” is either a publicly or  
4058 privately owned device or system used to treat either domestic sewage or a combination of  
4059 domestic sewage and commercial or industrial waste of a liquid nature.

4060  
4061 **(formerly Chapter 21, Section 4)Section 74. Compliance with Other Laws and**  
4062 **Regulations.**

4063  
4064 Nothing in these regulations or the permits issued pursuant to these regulations shall be  
4065 construed to relieve the recipient of a permit of the need to comply with any other law, rule or  
4066 regulation. It is the duty of the permittee to comply with all applicable federal, state and local  
4067 laws or regulations in the exercise of activities authorized pursuant to these regulations.

4068  
4069 Specifically, the permittee is responsible for complying with the water right requirements  
4070 of the Wyoming State Engineers Office.

4071  
4072 **(formerly Chapter 21, Section 5) Section 75. Compliance Period.**

4073  
4074 (formerly Chapter 21, Section 5(a)) (a) Compliance with the standards in these  
4075 regulations shall be achieved as expeditiously as practicable, but in no case later than one year  
4076 after final adoption. When compliance with the standards requires construction of new or  
4077 modified treatment facilities, compliance with the standards shall be achieved as expeditiously as  
4078 practicable, but in no case later than two years after final adoption.

4079  
4080 (formerly Chapter 21, Section 5(b)) (b) Water reuse facilities operating under authority  
4081 granted by the Department of Environmental Quality are required to notify the department of the  
4082 nature and requirements of the existing authorization. Existing authorized facilities are not  
4083 required to comply with the requirements of these regulations unless the administrator determines  
4084 it is necessary to revise the existing authorization in order to protect public health and the  
4085 environment. Existing facilities are required to comply with the monitoring and reporting  
4086 requirements of Sections ~~13~~-83, ~~14~~84, ~~15~~ 85 and ~~16~~-86.

4087  
4088 **(formerly Chapter 21, Section 6)Section 76. Permits, Enforceability and**  
4089 **Applications.**

4090  
4091 (formerly Chapter 21, Section 6(a)) (a) The requirements in these regulations may be  
4092 implemented through:

4093  
4094 (formerly Chapter 21, Section 6(a)(i)) (i)A land application permit issued by the  
4095 Department of Environmental Quality, Water Quality Division in accordance with these  
4096 regulations;

4097

4098 (formerly Chapter 21, Section 6(a)(ii)) (ii) A construction and operation  
4099 permit issued by the Department of Environmental Quality, Water Quality Division in accordance  
4100 with Chapters 11 and 3H, Wyoming Water Quality Rules and Regulation; or

4101  
4102 (formerly Chapter 21, Section 6(a)) (iii) A general statewide operation permit  
4103 issued by the Water Quality Division, Department of Environmental Quality for the Land  
4104 Application of Treated Wastewater.

4105  
4106 (formerly Chapter 21, Section 6(b)) (b) No person shall prepare or use treated  
4107 wastewater except in accordance with the requirements of these regulations.

4108  
4109 (formerly Chapter 21, Section 6(c)) (c) Applications for permits shall be submitted to  
4110 the Department of Environmental Quality, Water Quality Division in accordance with the  
4111 requirements of Chapter 3, Wyoming Water Quality Rules and Regulations. The application  
4112 materials submitted shall be adequate to demonstrate compliance with all requirements of this  
4113 part. It shall be the responsibility of the applicant to demonstrate that the proposed reuse of  
4114 treated wastewater will not endanger public health or the environment.

4115  
4116 (formerly Chapter 21, Section 3(a)) (d) The person who prepares treated wastewater and  
4117 makes it available to another person for reuse shall provide, as part of the application required by  
4118 Section 6 76 (c), a demonstration that all of the requirements of this chapter will be met. This  
4119 will include access restrictions, management practices, record keeping and reporting requirements  
4120 which may be the responsibility of another person who will apply the treated wastewater. This  
4121 demonstration may be in the form of either a written agreement with the applier specifying his or  
4122 her responsibilities or a separate permit application from the applier. If the method selected is an  
4123 agreement, the agreement must cover appropriate access restrictions, management practices,  
4124 record keeping and reporting requirements of this chapter. If the method selected is a separate  
4125 permit for the applier the permit application by the applier must address the same requirements.

4126  
4127 (formerly Chapter 21, Section 6(e)) (e) Any person who prepares treated wastewater  
4128 outside of the state to be applied within the state must either obtain a permit to land apply in  
4129 accordance with this chapter or provide the wastewater to a person who has a permit.

4130  
4131 (formerly Chapter 21, Section 6(f)) (f) Any person who prepares treated wastewater  
4132 outside of the State of Wyoming that is to be applied to land within the State of Wyoming and  
4133 opts not to obtain a permit shall provide written notice, prior to the initial application of treated  
4134 wastewater to the reuse site by the applier, to the Department of Environmental Quality, Water  
4135 Quality Division. The notification shall include the following:

4136  
4137 (formerly Chapter 21, Section 6(f)(i)) (i) The location, by either street address or  
4138 latitude and longitude, of each reuse site;

4139  
4140 (formerly Chapter 21, Section 6(f)(ii)) (ii) The approximate time period  
4141 the treated wastewater will be applied to the site;

4142  
4143 (formerly Chapter 21, Section 6(f)(iii)) (iii) The name, address, telephone  
4144 number, and National Pollutant Discharge Elimination System permit number (if appropriate) for  
4145 the person who prepares the treated wastewater;

4146



4147 (formerly Chapter 21, Section 6(f)(iv)) (iv) The name, address, telephone  
4148 number of the person who will reuse the treated wastewater; and

4149  
4150 (formerly Chapter 21, Section 6(f)(v)) (v) Documentation that the  
4151 requirements of this regulation have been met.

4152  
4153 **(formerly Chapter 21, Section 7) Section 77. Exclusions.**

4154  
4155 (formerly Chapter 21, Section 7(a)) (a) Treatment processes. These regulations do not  
4156 establish requirements for processes used to treat wastewater.

4157  
4158 (formerly Chapter 21, Section 7(b)) (b) Selection of a reuse practice. This chapter does  
4159 not require the selection of a reuse practice. The determination of the manner in which treated  
4160 wastewater is to be reused is a local determination.

4161  
4162 **(formerly Chapter 21, Section 8) Section 78. General Management Practices.**

4163  
4164 (formerly Chapter 21, Section 8(a)) (a) Treated wastewater shall be applied for the  
4165 purpose of beneficial reuse and shall not exceed the irrigation need or demand of the vegetation at  
4166 the site. Winter irrigation is considered to be beneficial reuse.

4167  
4168 (formerly Chapter 21, Section 8(b)) (b) Treated wastewater shall not be applied to  
4169 agricultural land, forest, a public contact site, or a reclamation site at an application rate that is  
4170 greater than the agronomic rate for the vegetation at the site.

4171  
4172 (formerly Chapter 21, Section 8(c)) (c) Treated wastewater shall not be applied in a  
4173 manner that will contaminate a groundwater aquifer.

4174  
4175 (formerly Chapter 21, Section 8(d)) (d) Treated wastewater will be applied in a manner  
4176 and time that will not cause any surface runoff to leave the application site and enter surface  
4177 waters of the state.

4178  
4179 (formerly Chapter 21, Section 8(e)) (e) Direct human consumption food crops shall not  
4180 be harvested for 30 days after application of treated wastewater.

4181  
4182 (formerly Chapter 21, Section 8(f)) (f) Animals shall not be allowed to graze on the  
4183 land for 30 days after application of Class C treated wastewater.

4184  
4185 (formerly Chapter 21, Section 8(g)) (g) Fencing and signing shall be provide at sites  
4186 where Class B treated wastewater is proposed for reuse on land with a moderate potential for  
4187 public exposure.

4188  
4189 (formerly Chapter 21, Section 8(h)) (h) Signing shall be ~~provide~~ provided at sites where  
4190 Class B or Class C treated wastewater is proposed for reuse on land with a low potential for  
4191 public exposure in order to protect the health and safety of workers.

4192  
4193 **(formerly Chapter 21, Section 9) Section 79. Site Isolation Requirements.**

4194



4195 (formerly Chapter 21, Section 9) No person shall reuse treated wastewater on an  
4196 application site except in accordance with the restrictions specified below.  
4197  
4198 (formerly Chapter 21, Section 9(a)) (a) Isolation of spray irrigation systems.  
4199  
4200 (formerly Chapter 21, Section 9(a)(i)) (i) Wind drift shall not leave the  
4201 application site.  
4202  
4203 (formerly Chapter 21, Section 9(a)(ii)) (ii) If Class A or Class B  
4204 wastewater is reused for irrigation, a 30 foot buffer zone is required between the reuse site and  
4205 adjacent property lines. Public right-of-ways may be utilized to meet this requirement for a buffer  
4206 zone.  
4207  
4208 (formerly Chapter 21, Section 9(a)(iii)) (iii) If Class C wastewater is reused  
4209 for irrigation a 100 foot buffer zone is required between the reuse site and adjacent property lines  
4210 and any public right-of-way.  
4211  
4212 (formerly Chapter 21, Section 9(a)(iv)) (iv) A 30 foot separation distance is  
4213 required between reuse sites and all surface waters.  
4214  
4215 (formerly Chapter 21, Section 9(a)(v)) (v) A 100 foot separation distance  
4216 is required between reuse sites and all potable water supply wells.  
4217  
4218 (formerly Chapter 21, Section 9(a)(vi)) (vi) Surface runoff shall not leave  
4219 the application site.  
4220  
4221 (formerly Chapter 21, Section 9(b)) (b) Isolation distances between reuse sites irrigated  
4222 by flood irrigation systems.  
4223  
4224 (formerly Chapter 21, Section 9(b)(i)) (i) Surface runoff shall not leave  
4225 the application site.  
4226  
4227 (formerly Chapter 21, Section 9(b)(ii)) (ii) If Class A or Class B  
4228 wastewater is reused for irrigation, a 30 foot buffer zone is required between the reuse site and  
4229 adjacent property lines. Public right-of-ways may be utilized to meet this requirement for a buffer  
4230 zone.  
4231  
4232 (formerly Chapter 21, Section 9(b)(iii)) (iii) If Class C wastewater is reused  
4233 for irrigation, a 30 foot buffer zone is required between the reuse site and adjacent property lines  
4234 and any public right-of-way.  
4235  
4236 (formerly Chapter 21, Section 9(b)(iv)) (iv) A 30 foot separation distance is  
4237 required between reuse sites and all surface waters.  
4238  
4239 (formerly Chapter 21, Section 9(b)(v)) (v) A 100 foot separation distance  
4240 is required between reuse sites and all potable water supply wells.  
4241

4242 (formerly Chapter 21, Section 9(c)) (c) Drip irrigation systems. The buffer zone  
4243 requirements of Section ~~9-79~~(a)(ii) and ~~9-79~~(b)(ii) for Class A and B wastewaters may be met by  
4244 the use of drip irrigation systems.

4245

4246 **(formerly Chapter 21, Section 10) Section 80. Minimum Level of Wastewater**  
4247 **Treatment.**

4248

4249 Treated wastewater must receive the equivalent of primary treatment and a maximum  
4250 fecal coliform value of less than 1000/100 ~~ml~~ mL in order to be reused in accordance with these  
4251 regulations.

4252

4253 **(formerly Chapter 21, Section 11) Section 81. Treatment Reliability.**

4254

4255 (formerly Chapter 21, Section 11(a)) (a) The ability of the treatment process to deliver  
4256 the class of treated wastewater required for a particular use will be considered by the permitting  
4257 authority when approving or denying wastewater reuse in accordance with Section ~~6-76~~. The  
4258 criteria for evaluating treatment reliability may include the following as appropriate:

4259

4260 (formerly Chapter 21, Section 11(a)(i)) (i) Multiple units and equipment;

4261

4262 (formerly Chapter 21, Section 11(a)(ii)) (ii) Alternative power sources;

4263

4264 (formerly Chapter 21, Section 11(a)(iii)) (iii) Alarm systems and  
4265 instrumentation;

4266

4267 (formerly Chapter 21, Section 11(a)(iv)) (iv) Operator certification and stand-  
4268 by capability;

4269

4270 (formerly Chapter 21, Section 11(a)(v)) (v) Bypass and dewatering  
4271 capability;

4272

4273 (formerly Chapter 21, Section 11(a)(vi)) (vi) Frequency of sampling;

4274

4275 (formerly Chapter 21, Section 11(a)(vii)) (vii) Hydraulic and organic loading  
4276 design capabilities; and

4277

4278 (formerly Chapter 21, Section 11(a)(viii)) (viii) Emergency storage.

4279

4280 (formerly Chapter 21, Section 11(b)) (b) Where treatment reliability cannot be provided  
4281 by existing facilities, the reuse may be approved based upon the preparer's ability to dispose of  
4282 the treated wastewater in an acceptable alternative manner or to reuse the treated wastewater for a  
4283 less restrictive authorized reuse as indicated in Section ~~12-82~~.

4284

4285 **(formerly Chapter 21, Section 12) Section 82. Authorized Reuse.**

4286

4287 (formerly Chapter 21, Section 12(a)) (a) Class A wastewater may be used for the  
4288 following purposes:

4289

4290 (formerly Chapter 21, Section 12(a)(i)) (i) Irrigation of land with a high  
4291 potential for public exposure;

4292  
4293 (formerly Chapter 21, Section 12(a)(ii)) (ii) Irrigation of land with a  
4294 moderate potential for public exposure;

4295  
4296 (formerly Chapter 21, Section 12(a)(iii)) (iii) Irrigation of land with a low  
4297 potential for public exposure;

4298  
4299 (formerly Chapter 21, Section 12(a)(iv)) (iv) Irrigation of direct human  
4300 consumption food crops; and

4301  
4302 (formerly Chapter 21, Section 12(a)(v)) (v) Irrigation of indirect human  
4303 consumption food crops.

4304  
4305 (formerly Chapter 21, Section 12(b)) (b) Class B wastewater may be used for the  
4306 following purposes:

4307  
4308 (formerly Chapter 21, Section 12(b)(i)) (i) Irrigation of land with a  
4309 moderate potential for public exposure;

4310  
4311 (formerly Chapter 21, Section 12(b)(ii)) (ii) Irrigation of land with a low  
4312 potential for public exposure;

4313  
4314 (formerly Chapter 21, Section 12(b)(iii)) (iii) Irrigation of direct human  
4315 consumption food crops; and

4316  
4317 (formerly Chapter 21, Section 12(b)(iv)) (iv) Irrigation of indirect human  
4318 consumption food crops.

4319  
4320 (formerly Chapter 21, Section 12(c)) (c) Class C wastewater may be used for the  
4321 following purposes:

4322  
4323 (formerly Chapter 21, Section 12(c)(i)) (i) Irrigation of land with a low  
4324 potential for public exposure; and

4325  
4326 (formerly Chapter 21, Section 12(c)(ii)) (ii) Irrigation of indirect human  
4327 consumption food crops.

4328  
4329 **(formerly Chapter 21, Section 13) Section 83. Monitoring.**

4330  
4331 (formerly Chapter 21, Section 13(a)) (a) Sampling. Representative samples of the treated  
4332 wastewater that is to be reused shall be collected and analyzed by the person who prepares the  
4333 wastewater.

4334  
4335 (formerly Chapter 21, Section 13(b)) (b) Methods. Waste constituents shall be analyzed  
4336 in accordance with 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of  
4337 Pollutants.

4338

4339 (formerly Chapter 21, Section 13(c)) (c) Parameters. The treated wastewater shall be  
4340 analyzed for the following:  
4341  
4342 (formerly Chapter 21, Section 13(c)(i)) (i) Fecal coliform;  
4343  
4344 (formerly Chapter 21, Section 13(c)(ii)) (ii) Nitrate as N;  
4345  
4346 (formerly Chapter 21, Section 13(c)(iii)) (iii) Ammonia as N;  
4347  
4348 (formerly Chapter 21, Section 13(c)(iv)) (iv) pH;  
4349  
4350 (formerly Chapter 21, Section 13(c)(v)) (v) Parameters identified in 40 CFR  
4351 Part 122, Appendix D, Table III, when required by the NPDES permit; and  
4352  
4353 (formerly Chapter 21, Section 13(c)(vi)) (vi) Other parameters identified in  
4354 the permit.  
4355  
4356 (formerly Chapter 21, Section 13(d)) (d) Frequency for monitoring for these pollutants  
4357 shall be:  
4358  
4359 (formerly Chapter 21, Section 13(d)(i)) (i) For lagoon systems, once per  
4360 month or the frequency specified in the NPDES discharge permit whichever is more frequent;  
4361  
4362 (formerly Chapter 21, Section 13(d)(ii)) (ii) For mechanical plants, once per  
4363 week or the monitoring frequency specified in the NPDES discharge permit whichever is more  
4364 frequent; and  
4365  
4366 (formerly Chapter 21, Section 13(d)(iii)) (iii) For monitoring of parameters  
4367 identified in Section ~~13~~83 (c) (v), shall be conducted at the frequency specified in the NPDES  
4368 discharge permit.  
4369  
4370 **(formerly Chapter 21, Section 14) Section 84. Noncompliance Actions, Reporting**  
4371 **and Monitoring Requirements.**  
4372  
4373 (formerly Chapter 21, Section 14) In the event that the monitoring program identified in  
4374 Section 83 indicates noncompliance with the fecal coliform levels associated with the class of  
4375 wastewater and the appropriate authorized reuse identified in Section ~~12~~ 82, the responsible party  
4376 shall take the following actions.  
4377  
4378 (formerly Chapter 21, Section 14(a)) (a) Discontinue the reuse of treated wastewater  
4379 immediately. The responsible party may discharge in compliance with the requirements of an  
4380 NPDES permit or convert to any authorized reuse which is consistent with the quality of the  
4381 treated wastewater.  
4382  
4383 (formerly Chapter 21, Section 14(b)) (b) Report the noncompliance to the permitting  
4384 authority as soon as possible, but no later than the next working day.  
4385

4386 (formerly Chapter 21, Section 14(c)) (c) Initiate monitoring of the parameter in  
4387 noncompliance on a daily or more frequent basis in order to adequately demonstrate that the  
4388 treated wastewater can reliably meet the reuse criteria.

4389  
4390 (formerly Chapter 21, Section 14(d)) (d) Report the results on the noncompliance  
4391 monitoring to the permitting authority. Upon adequate demonstration by the responsible party  
4392 that the reuse criteria can be reliably met, the permitting authority may grant verbal and written  
4393 authorization to re-institute the discontinued reuse.

4394  
4395 (formerly Chapter 21, Section 14(e)) (e) The responsible party shall provide a written  
4396 report within 15 days of the resolution of the event which will contain the following:

4397  
4398 (formerly Chapter 21, Section 14(e)(i)) (i) A description of the  
4399 noncompliance and its cause;

4400  
4401 (formerly Chapter 21, Section 14(e)(ii)) (ii) The period of the  
4402 noncompliance, including dates and times;

4403  
4404 (formerly Chapter 21, Section 14(e)(iii)) (iii) All monitoring data related to  
4405 the noncompliance and the return to compliance; and

4406  
4407 (formerly Chapter 21, Section 14(e)(iv)) (iv) Steps taken or planned to  
4408 reduce, eliminate or prevent reoccurrence of the noncompliance.

4409  
4410  
4411 **(formerly Chapter 21, Section 15) Section 85. Record Keeping.**

4412  
4413 (formerly Chapter 21, Section 15(a)) (a) A person who prepares treated wastewater shall  
4414 develop the following information and shall retain the information for five (5) years.

4415  
4416 (formerly Chapter 21, Section 15(a)(i)) (i) The concentration of each  
4417 applicable pollutant listed in Section ~~13~~83 (c) in the treated wastewater at the frequency specified  
4418 in Section ~~13~~83 (d).

4419  
4420 (formerly Chapter 21, Section 15(a)(ii)) (ii) A description of how the  
4421 minimum level of treatment requirements in Section ~~10~~ 80 are met.

4422  
4423 (formerly Chapter 21, Section 15(a)(iii)) (iii) A description of how the  
4424 treatment reliability requirements in Section ~~11~~81 are met.

4425  
4426 (formerly Chapter 21, Section 15(a)(iv)) (iv) The following certification  
4427 statement: "I certify, under penalty of law, that the level of treatment requirements in Section ~~10~~  
4428 80 of Chapter ~~21~~11, Wyoming Water Quality Rules and Regulations, the treatment reliability  
4429 requirements in Section 81 and the water quality parameters have been met. This determination  
4430 has been made under my direction and supervision. I am aware that there are significant penalties  
4431 for false certification."

4432

4433 (formerly Chapter 21, Section 15(b)) (b) A person who prepares treated wastewater shall  
4434 obtain the following information from any person who reuses the treated wastewater and shall  
4435 retain the information for five years.

4436  
4437 (formerly Chapter 21, Section 15(b)(i)) (i) The location, by either street address or  
4438 latitude and longitude, of each site on which treated wastewater is applied.

4439  
4440 (formerly Chapter 21, Section 15(b)(ii)) (ii) The number of acres on each  
4441 site on which treated wastewater is applied.

4442  
4443 (formerly Chapter 21, Section 15(b)(iii)) (iii) The date and time treated  
4444 wastewater is applied to each site.

4445  
4446 (formerly Chapter 21, Section 15(b)(iv)) (iv) The cumulative amount of  
4447 treated wastewater applied to each site.

4448  
4449 (formerly Chapter 21, Section 15(b)(v)) (v) The following certification  
4450 statement: "I certify, under penalty of law, that the general management practices in Section ~~8~~-78  
4451 of Chapter ~~21~~-11, Wyoming Water Quality Rules and Regulations, and the site isolation  
4452 requirements in Section ~~9~~-79 have been met. This determination has been made under my  
4453 direction and supervision. I am aware that there are significant penalties for false certification."

4454  
4455 **(formerly Chapter 21, Section 16) Section 86. Reporting.**

4456  
4457 (formerly Chapter 21, Section 16(a)) (a) A person preparing treated wastewater shall  
4458 submit the information in Section ~~15~~-85 (a) and (b) to the permitting authority on an annual  
4459 basis.

4460  
4461 (formerly Chapter 21, Section 16(b)) (b) A person who reuses treated wastewater  
4462 shall submit the information in Section ~~15~~-85 (b) to the person who prepares the treated  
4463 wastewater on an annual basis if he or she is operating under an agreement with the applier. If  
4464 the application is regulated by a permit, the information shall be submitted to the permitting  
4465 authority.

4466  
4467 **(formerly Chapter 21, Section 17) Section 87. Operation and Maintenance Manual.**

4468  
4469 (formerly Chapter 21, Section 17(a)) (a) Any person responsible for the application of  
4470 treated wastewater shall provide an operation and maintenance manual as part of the agreement or  
4471 permit application required by Section ~~15~~-75 (d).

4472  
4473 (formerly Chapter 21, Section 17(b)) (b) The operation and maintenance manual shall  
4474 include the following:

4475  
4476 (formerly Chapter 21, Section 17(b)(i)) (i) Description of the facilities;

4477  
4478 (formerly Chapter 21, Section 17(b)(ii)) (ii) Description of the application  
4479 system;

4480

4481 (formerly Chapter 21, Section 17(b)(iii)) (iii) Procedures for emergency  
4482 operation and spill events;

4483  
4484 (formerly Chapter 21, Section 17(b)(iv)) (iv) Procedures for meeting permit  
4485 and regulatory requirements;

4486  
4487 (formerly Chapter 21, Section 17(b)(v)) (v) Maintenance and operation  
4488 requirements for any mechanical equipment; and

4489  
4490 (formerly Chapter 21, Section 17(b)(vi)) (vi) Description of how the monitoring, record  
4491 keeping and reporting requirements of this chapter will be met.  
4492

**STANDARDS FOR THE REUSE OF TREATED WASTEWATER**

**CHAPTER 21**

**RESERVED**



# ~~STANDARDS FOR THE REUSE OF TREATED WASTEWATER~~

## ~~CHAPTER 21~~

~~Section 1.—**Authority and Purpose.**—It is the intent of these regulations to encourage and facilitate the productive and safe reuse of treated wastewater as a viable option in the management of the state's scarce water resources.—The use of treated wastewater for non-potable purposes through "source substitution" or replacing potable water used for non-potable purposes is encouraged.—This part contains the minimum standards for the reuse of treated wastewater as defined in these regulations.—This chapter replaces and supersedes the portions of part E, Chapter 11, Wyoming Water Quality Rules and Regulations pertaining land application of treated wastewater.~~

~~(a) —These regulations establish standards that address the primary health concerns associated with the reuse of treated wastewater. The regulations establish criteria to address the risk of pathogen exposure and infectious disease risks associated with various specified uses of treated wastewater. The regulations establish standards for the following:~~

- ~~(i) —The level of wastewater treatment required;~~
- ~~(ii) —Treatment reliability requirements;~~
- ~~(iii) —Upper limits for water quality parameters;~~
- ~~(iv) —Site access restrictions; and~~
- ~~(v) —Management practices.~~

~~(b) —In addition, the standards in this part include the parameters to be monitored, frequency of monitoring, record keeping and reporting requirements when treated wastewater is reused.~~

~~(c) —These regulations establish the degree of control required for wastewater reuse through site access limitations, management practices and crop restrictions that will be commensurate with the level of treatment provided, reliability of the treatment process, quality of the wastewater and the intended use.—As the quality of the wastewater and the reliability of the treatment process increases, the regulatory controls are reduced to a level consistent with protecting public health and the environment.~~

~~(d) —Pathogen reduction and public health impacts related to infectious disease agents are the major concerns associated with the reuse of treated wastewater.—Chemical and toxic pollutants in treated domestic sewage are generally not a concern and are not targeted for state regulation in this chapter.—There are additional constituents, such as total dissolved solids, that~~

~~should be considered as part of an overall irrigation management program but are not regulated by this chapter.~~

~~Section 2.—~~**Applicability.**

~~(a) — These regulations apply to any person who prepares or applies treated wastewater from domestic sewage.~~

~~(b) — These regulations are not applicable if the primary intent is to provide treatment and/or disposal of a wastewater. — Treatment and disposal are regulated under appropriate sections of Chapter 25, Wyoming Water Quality Rules and Regulations.~~

~~(c) — If the reuse of treated wastewater involves the construction of facilities for the disinfection, delivery, storage or land application, a construction permit is required in accordance with the provisions of Chapters 3 and 11, Wyoming Water Quality Rules and Regulations. Such a permit constitutes approval to reuse the treated wastewater. — This permit is not an operational permit and does not require periodic renewal. — If there are no structural facilities requiring a construction permit, the reuse of wastewater will be authorized by a land application permit issued in accordance with these regulations. The land application permit is not an operational permit and does not require periodic renewal.~~

~~(d) — These regulations are not applicable to the discharge of a treated wastewater which is subject to a discharge permit issued pursuant to Chapter 2, Wyoming Water Quality Rules and Regulations.~~

~~(e) — These regulations are not applicable to treated wastewater reused at reclamation sites regulated by the Land Quality Division under Article 4 of the Wyoming Environmental Quality Act.~~

~~(f) — These regulations are not applicable to treated wastewater reused for irrigation of grass, shrubs and trees at the treatment works.~~

~~(g) — These regulations are not applicable to the disposal of gray water.~~

~~(h) — These regulations are not applicable to groundwater recharge projects which are regulated by the Underground Injection Control Program of the Department of Environmental Quality, Water Quality Division.~~

~~Section 3.—~~**Definitions.**— The following definitions supplement those definitions contained in Section 35-11-103 of the Wyoming Environmental Quality Act.

~~(a) — “Agricultural land” is land on which a food crop, a feed crop, or a fiber crop is grown. — This includes range land and land used as pasture.~~

~~(b) — “Agronomic rate” is the wastewater application rate designed to: —(1) provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and (2) minimize the amount of nitrogen in the treated wastewater that passes below the root zone of the crop or vegetation grown on the land to the ground water.~~

~~(c) — “Class A wastewater” is treated wastewater which has received advanced treatment and/or secondary treatment and a level of disinfection so that the maximum number of fecal coliform organisms is —2.2/100 ml or less.~~

~~(d) — “Class B wastewater” is treated wastewater which has received the equivalent of secondary treatment and a level of disinfection so that the maximum fecal coliform level is greater than 2.2/100 ml but less than 200/100 ml.~~

~~(e) — “Class C wastewater” is treated wastewater which has received the equivalent of primary treatment and a level of disinfection so that the maximum fecal coliform level is 200/100 ml or greater but less than 1000/100 ml.~~

~~(f) — “Contaminate a groundwater aquifer” means to introduce a substance that causes the maximum contaminant level for water quality parameters specified in Chapter 8, Wyoming Water Quality Rules and Regulations to be exceeded or that causes the existing concentration of pollutants in ground water to increase when the existing concentration of the parameters in the ground water exceeds the maximum contaminant level specified in Chapter 8, Wyoming Water Quality Rules and Regulations.~~

~~(g) — “Direct human consumption food crops” are crops consumed directly by humans. These include, but are not limited to fruits, vegetables and grains grown for human consumption.~~

~~(h) — “Domestic sewage” is waste and wastewater that is primarily from human or household operations that is discharged to or otherwise enters a treatment works.~~

~~(i) — “Forest” is a tract of land thick with trees and underbrush.~~

~~(j) — “Ground water” is subsurface water that fills available openings in rock or soil material such that they may be considered water saturated under hydrostatic pressure.~~

~~(k) — “Indirect human consumption crop” are crops utilized by grazing animals and are thereby one step removed from human consumption.~~

~~(l) — “Land application” is the spraying or spreading of wastewater onto the land surface or the injection of wastewater below the land surface.~~

~~(m) — “Land with a high potential for public exposure” is land that the public uses frequently and there are no restrictions or limitations on public access during irrigation periods. This includes, but is not limited to public parks, ball fields, cemeteries, plant nurseries, turf farms, golf courses and a reclamation site located in a populated area (e.g., a construction site located in a city).~~

~~(n) — “Land with moderate potential for public exposure” is land that is accessible to the public but access is limited during irrigation periods. This would include the facilities in (n) where signing and fencing is provided to restrict access.~~

~~(o) — “Land with a low potential for public exposure” is land that the public uses infrequently. This includes, but is not limited to agricultural land, forest, and a reclamation site located in an unpopulated area (e.g., a strip mine located in a rural area).~~

~~(p) — “Municipal wastewater” means the discharge from a publicly owned or controlled treatment system receiving primarily domestic wastewater or a combination of domestic, commercial and industrial wastewater that is normally treated in a primary, secondary or advanced wastewater treatment process.~~

~~(q) — “Pathogenic organisms” are disease-causing organisms. These include, but are not limited to certain bacteria, protozoa, viruses, and viable helminth ova.~~

~~(r) — “Pasture” is land on which animals feed directly on feed crops such as legumes, grasses, grain stubble, or stover.~~

~~(s) — “Permitting authority” is the Department of Environmental Quality, Water Quality Division.~~

~~(t) — “Pollutant” is an organic substance, an inorganic substance, a combination of organic and inorganic substances, or a pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could, on the basis of information available to the permitting authority, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in either organisms or offspring of the organisms.~~

~~(u) — “Pollutant limit” is a numerical value that describes the amount of a pollutant allowed per unit amount of wastewater (e.g., milligrams per liter).~~

~~(v) — “Range land” is open land used for grazing by livestock and/or wildlife on which the natural potential plant community is dominated by grasses, grasslike plants, forbs and shrubs.~~

~~(w) — “Reclamation site” is drastically disturbed land that is reclaimed using waste water. This includes, but is not limited to, strip mines and construction sites.~~

~~(x) — “Runoff” is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off of the land surface.~~

~~(y) — “Treated wastewater” is domestic sewage discharged from a treatment works after completion of the treatment process.~~

~~(z) — “Treatment works” is either a publicly or privately owned device or system used to treat either domestic sewage or a combination of domestic sewage and commercial or industrial waste of a liquid nature.~~

~~Section 4. — **Compliance with Other Laws and Regulations.** — Nothing in these regulations or the permits issued pursuant to these regulations shall be construed to relieve the recipient of a permit of the need to comply with any other law, rule or regulation. It is the duty of the permittee to comply with all applicable federal, state and local laws or regulations in the exercise of activities authorized pursuant to these regulations. Specifically, the permittee is responsible for complying with the water right requirements of the Wyoming State Engineers Office.~~

~~Section 5. — **Compliance Period.**~~

~~(a) — Compliance with the standards in these regulations shall be achieved as expeditiously as practicable, but in no case later than one year after final adoption. When compliance with the standards requires construction of new or modified treatment facilities, compliance with the standards shall be achieved as expeditiously as practicable, but in no case later than two years after final adoption.~~

~~(b) — Water reuse facilities operating under authority granted by the Department of Environmental Quality are required to notify the department of the nature and requirements of the existing authorization. Existing authorized facilities are not required to comply with the requirements of these regulations unless the administrator determines it is necessary to revise the existing authorization in order to protect public health and the environment. Existing facilities are required to comply with the monitoring and reporting requirements of Sections 13, 14, 15 and 16.~~

~~Section 6. — Permits, Enforceability and Applications.~~

~~(a) — The requirements in these regulations may be implemented through:~~

~~(i) — A land application permit issued by the Department of Environmental Quality, Water Quality Division in accordance with these regulations;~~

~~(ii) — A construction and operation permit issued by the Department of Environmental Quality, Water Quality Division in accordance with Chapters 11 and 31, Wyoming Water Quality Rules and Regulation; or~~

~~(iii) — A general statewide operation permit issued by the Water Quality Division, Department of Environmental Quality for the Land Application of Treated Wastewater.~~

~~(b) — No person shall prepare or use treated wastewater except in accordance with the requirements of these regulations.~~

~~(c) — Applications for permits shall be submitted to the Department of Environmental Quality, Water Quality Division in accordance with the requirements of Chapter 3, Wyoming Water Quality Rules and Regulations. — The application materials submitted shall be adequate to demonstrate compliance with all requirements of this part. — It shall be the responsibility of the applicant to demonstrate that the proposed reuse of treated wastewater will not endanger public health or the environment.~~

~~(d) — The person who prepares treated wastewater and makes it available to another person for reuse shall provide, as part of the application required by Section 6 (c), a demonstration that all of the requirements of this chapter will be met. — This will include access restrictions, management practices, record keeping and reporting requirements which may be the responsibility of another person who will apply the treated wastewater. — This demonstration may be in the form of either a written agreement with the applier specifying his or her responsibilities or a separate permit application from the applier. — If the method selected is an agreement, the agreement must cover appropriate access restrictions, management practices, record keeping and reporting requirements of this chapter. — If the method selected is a separate permit for the applier the permit application by the applier must address the same requirements.~~

~~(e) — Any person who prepares treated wastewater outside of the state to be applied within the state must either obtain a permit to land apply in accordance with this chapter or provide the wastewater to a person who has a permit.~~

~~(f) — Any person who prepares treated wastewater outside of the State of Wyoming that is to be applied to land within the State of Wyoming and opts not to obtain a permit shall provide written notice, prior to the initial application of treated wastewater to the reuse site by the applier, to the Department of Environmental Quality, Water Quality Division. — The notification shall include the following:~~

- ~~(i) — The location, by either street address or latitude and longitude, of each reuse site;~~
- ~~(ii) — The approximate time period the treated wastewater will be applied to the site;~~
- ~~(iii) — The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) for the person who prepares the treated wastewater;~~
- ~~(iv) — The name, address, telephone number of the person who will reuse the treated wastewater; and~~
- ~~(v) — Documentation that the requirements of this regulation have been met.~~

~~Section 7. — Exclusions.~~

- ~~(a) — Treatment processes. — These regulations do not establish requirements for processes used to treat wastewater.~~
- ~~(b) — Selection of a reuse practice. — This chapter does not require the selection of a reuse practice. — The determination of the manner in which treated wastewater is to be reused is a local determination.~~

~~Section 8. — General Management Practices.~~

- ~~(a) — Treated wastewater shall be applied for the purpose of beneficial reuse and shall not exceed the irrigation need or demand of the vegetation at the site. — Winter irrigation is considered to be beneficial reuse.~~
- ~~(b) — Treated wastewater shall not be applied to agricultural land, forest, a public-contact site, or a reclamation site at a application rate that is greater than the agronomic rate for the vegetation at the site.~~
- ~~(c) — Treated wastewater shall not be applied in a manner that will contaminate a groundwater aquifer.~~
- ~~(d) — Treated wastewater will be applied in a manner and time that will not cause any surface runoff to leave the application site and enter surface waters of the state.~~
- ~~(e) — Direct human consumption food crops shall not be harvested for 30 days after application of treated wastewater.~~

~~(f) — Animals shall not be allowed to graze on the land for 30 days after application of Class C treated wastewater.~~

~~(g) — Fencing and signing shall be provide at sites where Class B treated wastewater is proposed for reuse on land with a moderate potential for public exposure.~~

~~(h) — Signing shall be provided at sites where Class B or Class C treated wastewater is proposed for reuse on land with a low potential for public exposure in order to protect the health and safety of workers.~~

~~Section 9. — **Site Isolation Requirements.** — No person shall reuse treated wastewater on an application site except in accordance with the restrictions specified below.~~

~~(a) — Isolation of spray irrigation systems.~~

~~(i) — Wind drift shall not leave the application site.~~

~~(ii) — If Class A or Class B wastewater is reused for irrigation, a 30 foot buffer zone is required between the reuse site and adjacent property lines. Public right-of ways may be utilized to meet this requirement for a buffer zone.~~

~~(iii) — If Class C wastewater is reused for irrigation a 100 foot buffer zone is required between the reuse site and adjacent property lines and any public right-of-way.~~

~~(iv) — A 30 foot separation distance is required between reuse sites and all surface waters.~~

~~(v) — A 100 foot separation distance is required between reuse sites and all potable water supply wells.~~

~~(vi) — Surface runoff shall not leave the application site.~~

~~(b) — Isolation distances between reuse sites irrigated by flood irrigation systems.~~

~~(i) — Surface runoff shall not leave the application site.~~

~~(ii) — If Class A or Class B wastewater is reused for irrigation, a 30 foot buffer zone is required between the reuse site and adjacent property lines. Public right-of ways may be utilized to meet this requirement for a buffer zone.~~

~~(iii) — If Class C wastewater is reused for irrigation, a 30 foot buffer zone is required between the reuse site and adjacent property lines and any public right-of-way.~~

~~(iv) — A 30 foot separation distance is required between reuse sites and all~~



surface waters.

~~(v) — A 100-foot separation distance is required between reuse sites and all-potable water supply wells.~~

~~(e) — Drip irrigation systems. — The buffer zone requirements of Section 9 (a) (ii) and 9 (b) (ii) for Class A and B wastewaters may be met by the use of drip irrigation systems.~~

~~Section 10. — **Minimum Level of Wastewater Treatment.** — Treated wastewater must receive the equivalent of primary treatment and a maximum fecal coliform value of less than 1000/100 ml in order to be reused in accordance with these regulations.~~

~~Section 11. — **Treatment Reliability.**~~

~~(a) — The ability of the treatment process to deliver the class of treated wastewater required for a particular use will be considered by the permitting authority when approving or denying wastewater reuse in accordance with Section 6. — The criteria for evaluating treatment reliability may include the following as appropriate:~~

~~(i) — Multiple units and equipment;~~

~~(ii) — Alternative power sources;~~

~~(iii) — Alarm systems and instrumentation;~~

~~(iv) — Operator certification and stand-by capability;~~

~~(v) — Bypass and dewatering capability;~~

~~(vi) — Frequency of sampling;~~

~~(vii) — Hydraulic and organic loading design capabilities; and~~

~~(viii) — Emergency storage.~~

~~(b) — Where treatment reliability cannot be provided by existing facilities, the reuse may be approved based upon the preparer's ability to dispose of the treated wastewater in an acceptable alternative manner or to reuse the treated wastewater for a less restrictive authorized reuse as indicated in Section 12.~~

~~Section 12. — **Authorized Reuse.**~~

~~(a) — Class A wastewater may be used for the following purposes:~~

- ~~(i) Irrigation of land with a high potential for public exposure;~~
  - ~~(ii) Irrigation of land with a moderate potential for public exposure;~~
  - ~~(iii) Irrigation of land with a low potential for public exposure;~~
  - ~~(iv) Irrigation of direct human consumption food crops; and~~
  - ~~(v) Irrigation of indirect human consumption food crops.~~
- ~~(b) Class B wastewater may be used for the following purposes:~~
- ~~(i) Irrigation of land with a moderate potential for public exposure;~~
  - ~~(ii) Irrigation of land with a low potential for public exposure;~~
  - ~~(iii) Irrigation of direct human consumption food crops; and~~
  - ~~(iv) Irrigation of indirect human consumption food crops.~~
- ~~(c) Class C wastewater may be used for the following purposes:~~
- ~~(i) Irrigation of land with a low potential for public exposure; and~~
  - ~~(ii) Irrigation of indirect human consumption food crops.~~

~~Section 13. **Monitoring.**~~

~~(a) Sampling. Representative samples of the treated wastewater that is to be reused shall be collected and analyzed by the person who prepares the wastewater.~~

~~(b) Methods. Waste constituents shall be analyzed in accordance with 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants.~~

- ~~(c) Parameters. The treated wastewater shall be analyzed for the following:~~
- ~~(i) Fecal coliform;~~
  - ~~(ii) Nitrate as N;~~
  - ~~(iii) Ammonia as N;~~
  - ~~(iv) pH;~~

~~(v) — Parameters identified in 40 CFR Part 122, Appendix D, Table III, when required by the NPDES permit; and~~

~~(vi) — Other parameters identified in the permit.~~

~~(d) — Frequency for monitoring for these pollutants shall be:~~

~~(i) — For lagoon systems, once per month or the frequency specified in the NPDES discharge permit whichever is more frequent;~~

~~(ii) — For mechanical plants, once per week or the monitoring frequency specified in the NPDES discharge permit whichever is more frequent; and~~

~~(iii) — For monitoring of parameters identified in Section 13 (c) (v), shall be conducted at the frequency specified in the NPDES discharge permit.~~

~~**Section 14. — Noncompliance Actions, Reporting and Monitoring Requirements.**  
In the event that the monitoring program identified in Section 13 indicates noncompliance with the fecal coliform levels associated with the class of wastewater and the appropriate authorized reuse identified in Section 12, the responsible party shall take the following actions:~~

~~(a) — Discontinue the reuse of treated wastewater immediately. — The responsible party may discharge in compliance with the requirements of an NPDES permit or convert to any authorized reuse which is consistent with the quality of the treated wastewater.~~

~~(b) — Report the noncompliance to the permitting authority as soon as possible, but no later than the next working day.~~

~~(c) — Initiate monitoring of the parameter in noncompliance on a daily or more frequent basis in order to adequately demonstrate that the treated wastewater can reliably meet the reuse criteria.~~

~~(d) — Report the results on the noncompliance monitoring to the permitting authority. Upon adequate demonstration by the responsible party that the reuse criteria can be reliably met, the permitting authority may grant verbal and written authorization to re-institute the discontinued reuse.~~

~~(e) — The responsible party shall provide a written report within 15 days of the resolution of the event which will contain the following:~~

~~(i) — A description of the noncompliance and its cause;~~

~~(ii) — The period of the noncompliance, including dates and times;~~

~~(iii) — All monitoring data related to the noncompliance and the return to~~

compliance; and

~~(iv) — Steps taken or planned to reduce, eliminate or prevent reoccurrence of the noncompliance.~~

~~Section 15. — **Record Keeping.**~~

~~(a) — A person who prepares treated wastewater shall develop the following information and shall retain the information for five (5) years.~~

~~(i) — The concentration of each applicable pollutant listed in Section 13 (c) in the treated wastewater at the frequency specified in Section 13 (d).~~

~~(ii) — A description of how the minimum level of treatment requirements in Section 10 are met.~~

~~(iii) — A description of how the treatment reliability requirements in Section 11 are met.~~

~~(iv) — The following certification statement: — "I certify, under penalty of law, that the level of treatment requirements in Section 10 of Chapter 21, Wyoming Water Quality Rules and Regulations, the treatment reliability requirements in Section 11 and the water quality parameters have been met. — This determination has been made under my direction and supervision. — I am aware that there are significant penalties for false certification."~~

~~(b) — A person who prepares treated wastewater shall obtain the following information from any person who reuses the treated wastewater and shall retain the information for five years.~~

~~(i) — The location, by either street address or latitude and longitude, of each site on which treated wastewater is applied.~~

~~(ii) — The number of acres on each site on which treated wastewater is applied.~~

~~(iii) — The date and time treated wastewater is applied to each site.~~

~~(iv) — The cumulative amount of treated wastewater applied to each site.~~

~~(v) — The following certification statement: — "I certify, under penalty of law, that the general management practices in Section 8 of Chapter 21, Wyoming Water Quality Rules and Regulations, and the site isolation requirements in Section 9 have been met. — This determination has been made under my direction and supervision. — I am aware that there are significant penalties for false certification."~~

~~Section 16.—Reporting.~~

~~(a) — A person preparing treated wastewater shall submit the information in Section 15 (a) and (b) to the permitting authority on an annual basis.~~

~~(b) — A person who reuses treated wastewater shall submit the information in Section 15 (b) to the person who prepares the treated wastewater on an annual basis if he or she is operating under an agreement with the applier. — If the application is regulated by a permit, the information shall be submitted to the permitting authority.~~

~~Section 17.—Operation and Maintenance Manual.~~

~~(a) — Any person responsible for the application of treated wastewater shall provide an operation and maintenance manual as part of the agreement or permit application required by Section 5 (d).~~

~~(b) — The operation and maintenance manual shall include the following:~~

~~(i) — Description of the facilities;~~

~~(ii) — Description of the application system;~~

~~(iii) — Procedures for emergency operation and spill events;~~

~~(iv) — Procedures for meeting permit and regulatory requirements;~~

~~(v) — Maintenance and operation requirements for any mechanical equipment;~~

and

~~(vi) — Description of how the monitoring, record keeping and reporting requirements of this chapter will be met.~~

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