DUKE COGEMA
STONE & WEBSTER

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

17 September 2004
DCS-NRC-000172
Response Required: *No*

SUBJECT: Docket Number 070-03098
Duke Cogema Stone and Webster
Mixed Oxide Fuel Fabrication Facility
Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 5
Responses to Request for Additional Information

Reference: Jennifer Davis (NRC) letter to Robert Ihde (DCS), Request for Additional Information on the Duke Cogema Stone & Webster Proposed Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 5, 17 August 2004

On 10 June 2004, Duke Cogema Stone & Webster, LLC (DCS) provided Revision 5 of *Mixed Oxide Fuel Fabrication Facility Environmental Report* to the Nuclear Regulatory Commission (NRC) as change pages to Revision 4. On 17 August 2004, NRC provided DCS with a Request for Additional Information regarding this most recent revision of *Mixed Oxide Fuel Fabrication Facility Environmental Report*. Enclosed are DCS' responses to that Request for Additional Information.

If you have any questions, please contact me at 980-373-3787 or Mary Birch at 704-382-1401.

Sincerely,

Richard L. Sweigart
Vice-President, Regulatory Affairs

Enclosure: DCS Responses to NRC Request for Additional Information for the DCS Mixed Oxide Fuel Fabrication Facility Environmental Report, Revision 5

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DCS RESPONSES TO NRC
REQUEST FOR ADDITIONAL INFORMATION
FOR THE DUKE COGEMA STONE & WEBSTER (DCS)
PROPOSED MIXED OXIDE FUEL FABRICATION FACILITY
ENVIRONMENTAL REPORT (ER), REVISION 5

1. Chapter 5, page 5-23; Chapter 3, page 3-17

Describe the new transfer lines between the Mixed Oxide Fuel Fabrication Facility (MFFF) and the Waste Solidification Building (WSB), and between the Pit Disassembly and Conversion Facility (PDCF) and the WSB for transfer of liquid low-level waste (LLW).

It is unclear from the referenced descriptions how the liquid LLW will be transferred to the WSB. The requested information is necessary to complete the Land Use section of the Final Environmental Impact Statement (FEIS).

Response: High alpha waste, stripped uranium waste, and liquid LLW are transferred from the MFFF to the WSB through separate double-walled stainless steel pipes. All three pipes are routed in the same trench. Because the LLW line from MFFF to WSB is routed in the trench already established for the high alpha and stripped uranium waste lines, construction impacts previously established for routing the high alpha waste and stripped uranium waste lines are assumed to be unchanged by this design change. Impacts previously attributed to routing the LLW line to the Effluent Treatment Facility are eliminated.

All of the trenches to route waste from PDCF to WSB are bounded by the area previously accounted as being impacted by PDCF and WSB construction.

2. Chapter 5, pages 5-13, 5-23; Appendix G, pages G-12, G-15

Provide effluent characteristics for the WSB, specifically:

a. Composition of the effluent,
b. Concentrations of the effluent constituents,
c. Discharge locations, and
d. Permit information relative to this discharge location.

Previous analyses for the MFFF assumed that liquid wastes would be treated at the Effluent Treatment Facility, however, the current ER indicates that all liquid discharges to the environment will come from the WSB. The requested information is necessary to complete the Water Quality section of the FEIS.

Response:

a & b. The LLW effluent from the Waste Solidification Building (WSB) is not expected to be significantly different from the LLW effluent currently discharged by the Effluent Treatment Facility (ETF). Effluent from the WSB will be directed to a Savannah River Site (SRS) outfall permitted under the National Pollutant

Discharge Elimination System (NPDES). Discharge limits for conventional pollutants are approved by the South Carolina Department of Health and Environmental Control (SCDHEC) on a case-by-case basis, in accordance with South Carolina Regulation 61.9. The discharge limits for the radiological components are regulated by the Department of Energy and are limited to the quantities established by the EPA as drinking water standards for radiological dose. The WSB design will ensure that all discharges are within the prescribed limits. The discharges will fall under requirements similar to the SRS ETF and would not result in additional impacts.

The water quality criteria as specified in South Carolina Regulation 61.9 for conventional and radiological pollutants is attached (Attachment 1).

c. The WSB baseline directs the effluent discharge to the Upper Three Runs Creek at the permitted outfall, H-16, currently utilized by the ETF, although other alternatives are under consideration. Regardless of discharge point, all discharges will be within the limits specified by the applicable NPDES permit.

d. SRS Permit Number SC0000175 Outfall H-16 governs discharges to the Upper Three Runs Creek outfall. The WSB has not, to date, submitted an application to the SCDHEC for the additional effluent from the WSB. SRS will submit the required permit application for SCDHEC approval as the design effort proceeds.

3. Provide the following information for emergency generators:

a. What are the gallons per year of fuel used?
b. What are the annual operating hours?
c. How many emergency generators are there?

The referenced table provides updated emissions from the MFFF, however additional information is necessary to verify air quality impacts in order to complete the Air Quality section of the FEIS.

Response:

a. The emergency generators consume 63,250 gallons per year of fuel (137.5 gallons/hours for 460 hours of annual operation).
b. The emergency generators operate for 460 hours annually combined (230 hours for each of the 2 emergency generators).
c. There are two (2) emergency generators.

4. Chapter 5, Table 5-7, page 5-81

Provide the following information for standby generators:

a. What are the gallons per year of fuel used?
b. What are the annual operating hours?

c. How many standby generators are there?

The referenced table provides updated emissions from the MFFF, however additional information is necessary to verify air quality impacts in order to complete the Air Quality section of the FEIS.

Response:

a. The standby generators consume 47,300 gallons per year of fuel (137.5 gallons/hours for 344 hours of annual operation).
b. The standby generators operate for 344 hours annually combined (86 hours for each of 4 standby generators).
c. Although there are currently two (2) standby generators in the design, the calculation assumed four (4) standby generators for bounding conditions.

5. Chapter 5, pg. 5-23 and 5-24; Appendix G, pg. G-6, Section G.1.3

Clarify transuranic (TRU) waste management operations taking place in each facility (i.e., MFFF, PDCF, WSB, or Savannah River Site (SRS) Waste Management (WM) facilities) for meeting the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria requirements.

Pages 5-23 and 5-24 of ER, Rev. 5 suggest that solid TRU waste generated at MFFF will go to the existing SRS WM infrastructure (same as Rev. 4). However, Section G.1.3 states that MFFF solid TRU will go to the WSB before going directly to WIPP. An accurate description of waste management activities is necessary to complete the Waste Management section of the FEIS.

Response: The Mixed Oxide Fuel Fabrication Facility (MFFF) and the Pit Disassembly and Conversion Facility (PDCF) will transfer all TRU waste generated to the WSB. The WSB will certify that the waste meets the WIPP waste acceptance criteria, load the waste into shipping containers and arrange for shipment to WIPP. This arrangement avoids the installation and costs of redundant certification/shipping facilities. The individual facility will be responsible for packaging its waste, documenting physical/chemical properties and assaying the contents. The individual facility (MFFF and PDCF) will also be responsible for resolving issues related to wastes that do not meet Waste Acceptance Criteria.

6. Chapter 5, pg. 5-23 and 5-24; Appendix G, pg. G-6, Section G.1.3

Clarify LLW management operations taking place in each facility (i.e., MFFF, PDCF, WSB, or SRS WM facilities).

a. At what facility or facilities will the waste be processed to meet the Waste Acceptance Criteria of the disposal facility?

b. What role, if any, will the SRS WM facilities play in the treatment, storage and disposal of the solid LLW generated at MFFF, PDCF, and WSB?

c. Will the disposal facility at SRS be available for MFFF/WSB waste?

Waste management operations occurring in each facility is unclear. An accurate description of waste management activities is necessary to complete the Waste Management section of the FEIS.

Response:

a & b. Low Level Waste (LLW) generated by MFFF, PDCF, and the WSB will be stored temporarily on the WSB site, prior to shipment to an approved on-site or off-site LLW disposal facility. The WSB will also transport the LLW solidified by the WSB cementation process to an approved on-site or off-site LLW disposal facility. Each facility will be responsible for ensuring that its respective waste is in compliance with the acceptance criteria of the receiving disposal site.

c. The SRS LLW disposal facility is anticipated to be available for wastes generated by this program. However, as stated in section G.1.1, the LLW form will be sent to a DOE approved disposal site. As required by the National Environmental Policy Act (NEPA), evaluation of impacts will either be in place through a previous analysis or will be developed as necessary for the designated location prior to shipment. The most convenient/cost-effective approved location would be used. It is also possible that more than one LLW disposal site may be used to receive waste during the duration of the mission. The approved LLW disposal facility presently is the SRS E-Area disposal facility.

7. Chapter 5, pg. 5-16; Appendix G, pg.-16

Verify the number of workers in the MFFF, WSB, and PDCF.

The additional operations at the WSB, and potentially in the MFFF and PDCF, related to waste management changes in Revision 5 of the ER, could possibly increase staffing levels. This information is necessary to complete the Socioeconomics section of the FEIS.

Response: The labor estimates specified in Revision 5 remain the most accurate estimates developed. The changes identified in Revision 5 are not anticipated to increase the required number of personnel. The WSB will be operated essentially as a batch process, and is not currently envisioned to operate 24 hours a day. Consequently, should operational requirements dictate, the facility would operate for more hours during the week rather than employ additional workers on a full-time basis.

8. Chapter 5 and Appendix G; Waste Volumes

a. Explain why different facility operational periods are used to estimate cumulative radioactive waste volumes. It appears that DCS has assumed that the MFFF will operate 10 years, while the WSB will operate 13 years.

For example, the total volume of LLW produced by the MFFF of 16,668 m^3 appears to be a sum of (1) 10 years of generating 176 m^3/year solid LLW, (2) 13 years of generating 316 m^3/year of solidified stripped uranium waste, and (3) 10 years of generating 1080 m^3/year liquid LLW. Also, the total volume of TRU waste produced by the MFFF of 4,250 m^3 appears to be a sum of (1) 10 years of generating 234 m^3/year solid TRU waste plus (2) 13 years of generating 147 m^3/year of solidified high alpha activity waste.

b. Resolve the discrepancy between the volume of the PDCF laboratory liquid stream cited in the first paragraph of Section G.1.2.1 as 11,000 gallons per year and the value cited in the last paragraph of the same section as 12,800 gallons per year.

c. Confirm that the value of the stripped uranium waste volume that appears in section G.1.2.2 (46,000 gallons per year) should now be 44,000 gallons per year, as stated in Table 3.3.

d. Explain the discrepancy between the maximum projected annual water consumption by the MFFF cited in Table 3.1 (2,438,410 gallons per year), and the maximum projected liquid waste generation by the MFFF as the sum of the (1) annual volume of liquid nonhazardous waste cited in Table 5.12 (8,800,000 gallons per year) plus (2) the total aqueous liquid waste volume shown in Table 3.3 (339,000 gallons per year).

There are several discrepancies in waste management volumes presented in Revision 5 of the ER. An accurate description of waste management volumes is necessary to complete the Waste Management section of the FEIS.

Response:

a. The facility operational periods outlined in the Environmental Report reflect the current anticipated operations. The environmental impacts for the MFFF are based on processing a finite quantity of plutonium-bearing materials (35 metric tons). Whether this occurs over 10 years (baseline) or longer has no significant impact to the environment, as the amount of material to be processed remains the same. However, the WSB must be operational to support not only the MFFF and PDCF operational mission, but also to receive streams during cleanout, decontamination, and decommissioning (D&D) of the two primary facilities, and will also generate waste for disposal during D&D of the WSB itself. Therefore, the WSB will be producing waste for disposal well past the mission life of MFFF and PDCF and will be packaging, scheduling and shipping waste forms for a period of time following MFFF and PDCF cessation of operations. In addition, it is anticipated that the concentrations of chemical constituents will be significantly lower during D&D activities, as WSB operational schedules will likely be dictated by tank capacity when handling more dilute streams from MFFF and PDCF.

   A description of how the waste values in Table 5-15c were derived is provided in Attachment 2.

b. As stated in the first paragraph of G.1.2.1, the anticipated volume of the PDCF Laboratory Liquid is nominally 11,000 gallons per year, received in 12 batches. Each batch will then be followed with an approximately 150 gallon flush, such that the total volume received by the WSB will be 11,000 + (12)(150) = 12,800 gallons per year.

c. The 44,000 gallons presented in Table 3-3 represents the most recent MFFF design projection for the stripped uranium waste. In order to allow the WSB design to proceed, reasonable bounding estimates for waste volumes are consistently used throughout Appendix G. Safety analyses, tank sizing, pumping capacity, etc. are based on these bounding values. This approach allows the MFFF and PDCF designs the flexibility to evolve as necessary without impacting the WSB design, as long as the WSB design remains bounding. In addition, the volume of the stripped uranium stream is expected to fluctuate during the MFFF mission, depending on the specific feed stock to be processed. In all cases, however, the volume would remain less than the 46,000 gallons which is the basis for assessing impacts to the environment, as well as to personnel and public safety.

d. The difference is attributed to a projected 6.7 million gallons per year condensate removed by the Service Air Compressor and External HVAC system. This amount does not appear in the annual water consumed. This amount is considered a conservative estimate for impact evaluation.

9. Appendix G, Environmental Impacts of Construction and Operation of the Waste Solidification Building

Provide construction and operating cost data for the WSB, specifically:

a. Total construction cost (including design, construction and procurement, construction and project management costs).

b. Distribution of cost over the construction schedule.

c. Annual operating cost (including operating, repair and maintenance, programmatic and utility costs).

The additional operations at the WSB related to waste management changes in Revision 5 of the ER indicate the potential for changes in cost. This information is necessary to complete the Cost/Benefit section of the FEIS.

Response: The project costs reported in ER Table 6-1 and discussed in ER Section 6.1.2, derived from "Disposition of Surplus Defense Plutonium at Savannah River Site," dated February 15, 2002 remain unchanged. The WSB is included in the Congressional Line Item funding for the overall PDCF project.

Attachment 1. Water Quality Numeric Criteria for the Protection of Aquatic Life and Human Health

This appendix contains three charts (priority pollutants, nonpriority pollutants, and organoleptic effects) of numeric criteria for the protection of human health and aquatic life. The appendix also contains three attachments which address hardness conversions and application of ammonia criteria. Footnotes specific to each chart follow the chart. General footnotes pertaining to all are at the end of the charts prior to the attachments. Please refer to the text of the regulation for other general information and specifications in applying these numeric criteria.

PRIORITY TOXIC POLLUTANTS

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
1	Antimony	7440360					14 B, ee	4300 B, ee	6 ee	57FR60848 SDWA
2	Arsenic	7440382	340 A, D, K	150 A, D, K	69 A, D, Y	36 A, D, Y	0.018 C, R	0.14 C, R	50 C	65FR31681 57FR60848 SDWA
3	Beryllium	7440417					J, ee	J, ee	4 ee	65FR31681 SDWA
4	Cadmium	7440439	0.95 D, E, K	0.83 D, E, K	43 D, Y	9.3 D, Y	J, ee	J, ee	5 ee	65FR31681 SDWA
5a	Chromium III	16065831	580 D, E, K	28 D, E, K			J, ee	J, ee	100 Total ee	EPA820/B-96-001 65FR31681 SDWA
5b	Chromium VI	18540299	16 D, K	11 D, K	1,100 D, Y	50 D, Y	J, ee	J, ee	100 Total ee	65FR31681 SDWA
6	Copper	7440508	3.8	2.9	5.8	3.7	1,300			65FR31681

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
			D, E, K, Z	D, E, K, Z	D, Z, cc	D, Z, cc	T, ee			
7	Lead	7439921	14 D, E, Y	0.54 D, E, Y	220 D, Y	8.5 D, Y				65FR31681
8	Mercury	7439976	1.6 D, K, dd	0.91 D, K, dd	2.1 D, bb, dd	1.1 D, bb, dd	0.050 B, ee	0.051 B, ee	2ee	65FR31681 SDWA
9	Nickel	7440020	150 D, E, K	16 D, E, K	75 D, Y	8.3 D, Y	610 B, ee	4, 600 B, ee		65FR31681
10	Selenium	7782492	L, Q, S	5.0 S	300 D, Y, aa	71 D, Y, aa	170 Z, ee	11, 000 ee	50 ee	65FR31681 IRIS 09/01/91 SDWA
11	Silver	7440224	0.37 D, E, G		2.3 D, G					65FR31681
12	Thallium	7440280					1.7 B, ee	6.3 B, ee	2 ee	57FR60848 SDWA
13	Zinc	7440666	37 D, E, K	37 D, E, K	95 D, Y	86 D, Y	9,100 T, ee	69,000 T, ee		65FR31681 IRIS 10/01/92
14	Cyanide	57125	22 K, P	5.2 K, P	1 P, Y	1 P, Y	700 B, ee	220,000 B, H, ee	200 ee	EPA820/B-96-001 57FR60848 SDWA
15	Asbestos	1332214							7 million fibers/L I, ee	57FR60848
16	2, 3, 7, 8-TCDD (Dioxin)	1746016						0.12 ppq C	3.0E!8 C	State Standard SDWA

Priority Pollutant		CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
17	Acrolein	107028					320 ee	780 ee		57FR60848
18	Acrylonitrile	107131					0.059 B, C	0.66 B, C		57FR60848
19	Benzene	71432					1.2 B, C	71 B, C	5 C	65FR31681 SDWA
20	Bromoform	75252					4.3 B, C	360 B, C	100 Total THMs C	65FR31681 SDWA
21	Carbon Tetrachloride	56235					0.25 B, C	4.4 B, C	5 C	57FR60848 SDWA
22	Chlorobenzene	108907					680 B	21,000 B, H	100	57FR60848 SDWA
23	Chlorodibromomethane	124481					0.41 B, C	34 B, C	100 Total THMs C	65FR31681 SDWA
24	Chloroform	67663					5.7 B, C	470 B, C	100 Total THMs C	65FR31681 SDWA
25	Dichlorobromomethane	75274					0.56 B, C	46 B, C	100 Total THMs C	65FR31681 SDWA
26	1, 2-Dichloroethane	107062					0.38 B, C	99 B, C	5 C	57FR60848 SDWA
27	1, 1-Dichloroethylene	75354					0.057 B, C	3.2 B, C	7 C	57FR60848 SDWA
28	1, 2-Dichloropropane	78875					0.52	39	5	65FR31681

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
							B, C	B, C	C	SDWA
29	1, 3-Dichloropropene	542756					10 B, ee	1,700 B, ee		57FR60848
30	Ethylbenzene	100414					3,100 B, ee	29,000 B, ee	700 ee	65FR31681 SDWA
31	Methyl Bromide	74839					48 B, ee	4000 B, ee		65FR31681
32	Methylene Chloride	75092					4.7 B, C	1600 B, C	5 C	65FR31681 SDWA
33	1, 1, 2, 2-Tetrachloroethane	79345					0.17 B, C	11 B, C		57FR60848
34	Tetrachloroethylene	127184					0.8 C	8.85 C	5 C	57FR60848 SDWA
35	Toluene	108883					6,800 B, ee	200,000 B, ee	1000 ee	65FR31681 SDWA
36	1, 2-Trans-Dichloroethylene	156605					700 B, ee	140,000 B, ee	100 ee	65FR31681 SDWA
37	1, 1, 1-Trichloroethane	71556					J, ee	J, ee	200 ee	65FR31681 SDWA
38	1, 1, 2-Trichloroethane	79005					0.60 B, C	42 B, C	5 C	57FR60848 SDWA
39	Trichloroethylene	79016					2.7	81	5	57FR60848

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
							C	C	C	SDWA
40	Vinyl Chloride	75014					2.0 C	525 C	2 C	57FR60848 SDWA
41	2-Chlorophenol	95578					120 B, T, ee	400 B, T, ee		65FR31681
42	2, 4-Dichlorophenol	120832					93 B, T, ee	790 B, T, ee		57FR60848
43	2, 4-Dimethylphenol	105679					540 B, T, ee	2,300 B, T, ee		65FR31681
44	2-Methyl- 4, 6-Dinitrophenol	534521					13.4 ee	765 ee		57FR60848
45	2, 4-Dinitrophenol	51285					70 B, ee	14,000 B, ee		57FR60848
46	3-Methyl- 4-Chlorophenol	59507					T, ee	T, ee		Gold Book
47	Pentachlorophenol	87865	19 F, K	15 F, K	13 Y	7.9 Y	0.28 B, C	8.2 B, C, H	1 C	65FR31681 SDWA
48	Phenol	108952					21,000 B, T, ee	4,600,000 B, H, U, ee		65FR31681 57FR60848
49	2, 4, 6-Trichlorophenol	88062					2.1 B, C, T	6.5 B, C		65FR31681
50	Acenaphthene	83329					1,200	2,700		65FR31681

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
							B, T, ee	B, U, ee		
51	Anthracene	120127					9,600 B, ee	110,000 B, ee		65FR31681
52	Benzidine	92875					0.00012 B, C	0.00054 B, C		57FR60848
53	Benzo (a) Anthracene	56553					0.0044 B, C	0.049 B, C		65FR31681
54	Benzo (a) Pyrene	50328					0.0044 B, C	0.049 B, C	0.2 C	65FR31681 SDWA
55	Benzo (b) Fluoranthene	205992					0.0044 B, C	0.049 B, C		65FR31681
56	Benzo (k) Fluoranthene	207089					0.0044 B, C	0.049 B, C		65FR31681
57	Bis 2-Chloroethyl Ether	111444					0.031 B, C	1.4 B, C		57FR60848
58	Bis 2-Chloroisopropyl Ether	39638329					1,400 B, ee	170,000 B, ee		65FR31681 57FR60848
59	Bis 2-EthylhexylPhthalate (DEHP)	117817	V	V	V	V	1.8 B, C	5.9 B, C	6 C	57FR60848 SDWA
60	2-Chloronaphthalene	91587					1,700 B	4,300 B		65FR31681

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
61	Chrysene	218019					0.0044 B, C	0.049 B, C		65FR31681
62	Dibenzo (a, h) Anthracene	53703					0.0044 B, C	0.049 B, C		65FR31681
63	1, 2-Dichlorobenzene	95501					2,700 B, ee	17,000 B, ee	600 ee	65FR31681 SDWA
64	1, 3-Dichlorobenzene	541731					400 ee	2,600 ee		65FR31681
65	1, 4-Dichlorobenzene	106467					400 ee	2600 ee	75 ee	65FR31681 SDWA
66	3, 3'-Dichlorobenzidine	91941					0.04 B, C	0.077 B, C		57FR60848
67	2, 4-Dinitrotoluene	121142					0.11 C	9.1 C		57FR60848
68	1, 2-Diphenylhydrazine	122667					0.040 B, C	0.54 B, C		57FR60848
69	Fluoranthene	206440					300 B, ee	370 B, ee		65FR31681
70	Fluorene	86737					1,300 B, ee	14,000 B, ee		65FR31681
71	Hexachlorobenzene	118741					0.00075 B, C	0.00077 B, C	1 C	65FR31681 SDWA

Priority Pollutant		CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
72	Hexachlorobutadiene	87683					0.44 B, C	50 B, C		57FR60848
73	Hexachlorocyclo-pentadiene	77474					240 B, T, ee	17,000 B, H, U, ee	50 ee	57FR60848 SDWA
74	Hexachloroethane	67721					1.9 B, C	8.9 B, C		57FR60848
75	Ideno 1, 2, 3 - (cd) Pyrene	193395					0.0044 B, C	0.049 B, C		65FR31681
76	Isophorone	78591					36 B, C	2,600 B, C		IRIS 11/01/97
77	Nitrobenzene	98953					17 B, ee	1,900 B, H, U, ee		57FR60848
78	N-Nitrosodimethylamine	62759					0.00069 B, C	8.1 B, C		57FR60848
79	N-Nitrosodi-n-Propylamine	621647					0.005 B, C	B, C		65FR31681
80	N-Nitrosodiphenylamine	86306					5.0 B, C	B, C		57FR60848
81	Pyrene	129000					960 B, ee	11,000 B, ee		65FR31681
82	1, 2, 4-Trichlorobenzene	120821					260 ee	940 ee	70 ee	IRIS 11/01/96 SDWA

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
83	Aldrin	309002	3.0 G		1.3 G		0.00013 B, C	0.00014 B, C		65FR31681
84	alpha-BHC	319846					0.0039 B, C	0.013 B, C		65FR31681
85	beta-BHC	319857					0.014 B, C	0.046 B, C		65FR31681
86	gamma-BHC (Lindane)	58899	0.95 K		0.16 G		0.019 C	0.063 C	0.2 C	65FR31681 SDWA
87	Chlordane	57749	2.4 G	0.0043 G, X	0.09 G	0.004 G, X	0.0021 B, C	0.0022 B, C	2 C	65FR31681 IRIS02/07/98 SDWA
88	4, 4'-DDT	50293	1.1 G	0.001 G, X	0.13 G	0.001 G, X	0.00059 B, C	B, C		65FR31681
89	4, 4'-DDE	72559					0.00059 B, C	0.00059 B, C		65FR31681
90	4, 4'-DDD	72548					0.00083 B, C	0.00084 B, C		65FR31681
91	Dieldrin	60571	0.24 K	0.056 K, N	0.71 G	0.0019 G, X	0.00014 B, C	0.00014 B, C		65FR31681
92	alpha-Endosulfan	959988	0.22 W	0.056 G, W	0.034 G, W	0.0087 G, W	110 B, ee	240 B, ee		65FR31681
93	beta-Endosulfan	33213659	0.22 G, W	0.056 G, W	0.034 G, W	0.0087 G, W	110 B, ee	240 B, ee		65FR31681

	Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/ Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
94	Endosulfan Sulfate	1031078					110 B, ee	240 B, ee		65FR31681
95	Endrin	72208	0.086 K	0.036 K, N	0.037 G	0.0023 G, X	0.76 B, ee	0.81 B, H, ee	2 ee	65FR31681 SDWA
96	Endrin Aldehyde	7421934					0.76 B, ee	0.81 B, H, ee		65FR31681
97	Heptachlor	76448	0.52 G	0.0038	0.053 G	0.0036 G, X	0.00021 B, C	0.00021 B, C	0.4 C	65FR31681 SDWA
98	Heptachlor Epoxide	1024573	0.52 G, V	0.0038 G, U, X	0.053 G, V	0.0036 G, U, X	0.00010 B, C	0.00011 B, C	0.2 C	65FR31681 SDWA
99	Polychlorinated Biphenyls PCBs:	--		0.014 M, X		0.03 M, X	0.00017 B, C, O	0.00017 B, C, O	0.5 C	65FR31681 63FR16182 SDWA
100	Toxaphene	8001352	0.73	0.0002 X	0.21	0.0002 X	0.00073 B, C	0.00075 B, C	3 C	65FR31681 SDWA

Footnotes:

A This water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EPA 440/5-84-033, January 1985), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.

B This criterion has been revised to reflect The Environmental Protection Agency=s q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in +each case.

C This criterion is based on carcinogenicity of 10^{-6} risk. As prescribed in Section E of this regulation, application of this criterion for permit effluent limitations requires the use annual average flow or comparable tidal condition as determined by the Department

D Freshwater and saltwater criteria for metals are expressed in terms of total recoverable metals. As allowed in Section E of this regulation, these criteria may be expressed as dissolved metal for the purposes of deriving permit effluent limitations. The dissolved metal water quality criteria value may be calculated by using these 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. (Conversion Factors for saltwater CCCs are not currently available. Conversion factors derived for

saltwater CMCs have been used for both saltwater CMCs and CCCs). See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria, ≅ October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center, USEPA, 401 M St., SW, mail code RC4100, Washington, DC 20460; and 40CFR∋131.36(b)(1). Conversion Factors can be found in Attachment 1 - Conversion Factors for Dissolved Metals.

E The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 25 mg/L as expressed as $CaCO_3$. Criteria values for other hardness may be calculated from the following: CMC (dissolved) = $\exp\{m_A [\ln(\text{hArdness})] + b_A\}$ (CF), or CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ (CF) and the parameters specified in Attachment 2 - Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent.

F Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC = exp(1.005(pH)-4.869); CCC = exp(1.005(pH)-5.134). Values displayed in table correspond to a pH of 7.8.

G This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a ACMC≅ derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

H No criterion for protection of human health from consumption of aquatic organisms excluding water was presented in the 1980 criteria document or in the *1986 Quality Criteria for Water.* Nevertheless, sufficient information was presented in the 1980 document to allow the calculation of a criterion, even though the results of such a calculation were not shown in the document.

I This criterion for asbestos is the Maximum Contaminant Level (MCL) developed under the Safe Drinking Water Act (SDWA) and the National Primary Drinking Water Regulation (NPDWR).

J EPA has not calculated a 304(a) human health criterion for this contaminant. The criterion is the Maximum Contaminant Level developed under the Safe Drinking Water Act (SDWA) and the National Primary Drinking Water Regulation (NPDWR).

K This criterion is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, (EPA-820-B-96-001, September 1996). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the difference between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. None of the decisions concerning the derivation of this criterion were affected by any considerations that are specific to the Great Lakes.

L This appendix contains aquatic life criteria for selenium that are the same as those published in the CTR, with the exception of removal of the acute criterion based on EPA=s June 2, 2000 revocation of the value.

M PCBs are a class of chemicals which include aroclors, 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825 and 12674112 respectively. The aquatic life criteria apply to this set of PCBs.

N The derivation of the CCC for this pollutant did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.

O This criterion applies to total PCBs, i.e., the sum of all congener or all isomer analyses.

P This water quality criterion is expressed as Φg free cyanide (as CN)/L.

Q This value was announced (61FR58444-58449, November 14, 1996) as a proposed GLI 303 (c) aquatic life criterion.

R This water quality criterion refers to the inorganic form only.

S This water quality criterion is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor of 0.922 that was used in the GLI to convert this to a value that is expressed in terms of dissolved metal.

T The organoleptic effect criterion is more stringent than the value for priority toxic pollutants.

U This value was derived from data for heptachlor and the criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.

V There is a full set of aquatic life toxicity data that show that DEHP is not toxic to aquatic organisms at or below its solubility limit.

W This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

X This CCC is based on the Final Residue value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the EPA no longer uses the Final Residue value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

Y This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA 440/5-84-032), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5-84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene, (EPA 440/5-86-006), Zinc (EPA 440/5-87- 003).

Z When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

aa The selenium criteria document (EPA 440/5-87-006, September 1987) provides that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 Φg/L in salt water because the saltwater CCC does not take into account uptake via the food chain.

bb This water quality criterion was derived on page 43 of the mercury criteria document (EPA 440/5-84-026, January 1985). The saltwater CCC of 0.025 ug/L given on page 23 of the criteria

document is based on the Final Residue value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the EPA no longer uses the Final Residue value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

cc This water quality criterion was derived in *Ambient Water Quality Criteria Saltwater Copper Addendum* (Draft, April 14, 1995) and was promulgated in the Interim Final National Toxics Rule (60FR22228-222237, May 4, 1995).

dd This water quality criterion was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury and methylmercury bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived.

ee This criterion is a noncarcinogen. As prescribed in Section E of this regulation, application of this criterion for determining permit effluent limitations requires the use of 7Q10 or 30Q5 (if provided by the applicant), or comparable tidal condition as determined by the Department.

NON PRIORITY POLLUTANTS

	Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
							For Consumption of:			
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
1	Alachlor	--							2 M	SDWA
2	Ammonia	7664417	CRITERIA ARE pH AND TEMPERATURE DEPENDENT - SEE DOCUMENT FOR DETAILS C							EPA822-R99-014 EPA440/5-88-004
3	Aesthetic Qualities	--	NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							Gold Book
4	Atrazine	--							3 M	SDWA
5	Bacteria	--	FOR PRIMARY CONTACT RECREATION AND SHELLFISH USES -- SEE TEXT							Gold Book
6	Barium	7440393					1000 A, L		2000 L	Gold Book
7	Carbofuran	1563662							40 L	SDWA
8	Chlorine	7782505	19 L	11 L	13 L	7.5 L				Gold Book
9	Chlorophenoxy Herbicide 2, 4, 5, -TP	93721					10 A, L		50 L	Gold Book SDWA
10	Chlorophenoxy Herbicide 2, 4-D	94757					100 A, L		70 L	Gold Book SDWA

	Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	For Consumption of: Organism Only (Φg/L)	MCL (Φg/L)	
11	Chlorophyll *a*	--	NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							State Standard
12	Chloropyrifos	2921882	0.083 F, L	0.041 F, L	0.011 F, L	0.0056 F, L				Gold Book
13	Color	--	NARRATIVE STATEMENT - SEE TEXT							State Standard
14	Dalapon	75990							200 L	SDWA
15	Demeton	8065483		0.1 E, L		0.1 E, L				Gold Book
16	1, 2-Dibromo-3-chloropropane (DBCP)	96128							0.2 M	SDWA
17	Di(2-ethylhexyl) adipate	103231							400 L	SDWA
18	Dinoseb	88857							7 L	SDWA
19	Dinitrophenols	25550587					70 L	14, 000 L		Gold Book
20	Diquat	85007							20 L	SDWA
21	Endothall	145733							100 L	SDWA
22	Ether, Bis Chloromethyl	542881					0.00013 D, L	0.00078 D, L		IRIS 01/01/91

	Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	For Consumption of: Organism Only (Φg/L)	MCL (Φg/L)	
23	Ether, Cis-1, 2-dichloroethylene	156592							70 L	SDWA
24	Ethylene dibromide	--							0.05 M	SDWA
25	Fluoride	7681494							4000 L	SDWA
26	Glyphosate	1071836							700 L	SDWA
27	Guthion	86500		0.01 E, L		0.01 E, L				Gold Book
28	Hexachlorocyclo-hexane-Technical	319868					0.0123 L	0.0414 L		Gold Book
29	Iron	7439896		1000 E, L			300 A, L			Gold Book
30	Malathion	121755		0.1 E, G, L		0.1 E, G, L				Gold Book
31	Manganese	7439965					50 A, L	100 A, L		Gold Book
32	Methoxychlor	72435		0.03 E, G, L		0.03 E, G, L	100 A, L		40 L	Gold Book SDWA
33	Mirex	2385855		0.001 E, G, L		0.001 E, G, L				Gold Book
									10, 000	

	Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	For Consumption of: Organism Only (Φg/L)	MCL (Φg/L)	
34	Nitrates	14797558							L	SDWA
35	Nitrites	14797650							1000 L	SDWA
36	Nitrogen, Total	--	NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							State Standard
37	Nitrosamines	--					0.0008 L	1.24 L		Gold Book
38	Nitrosodibutylamine, N	924163						0.0064 A, L		Gold Book
39	Nitrosodiethylamine, N	55185						0.0008 A, L		Gold Book
40	Nitrosopyrrolidine, N	930552						0.016 L		Gold Book
41	Oil and Grease	--	NARRATIVE STATEMENT - SEE TEXT							Gold Book
42	Oxamyl	23135220							200 L	SDWA
43	Oxygen, Dissolved	7782447	WARMWATER, COLDWATER, AND EXCEPTIONS FOR NATURAL CONDITIONS - SEE TEXT K							Gold Book State Standard
44	Parathion	56382	0.065 H, L	0.013 H, L						Gold Book
45	Pentachlorobenzene	608935					3.5 E	4.1 E		IRIS 03/01/88
46	pH	--	SEE TEXT							Gold Book

	Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	For Consumption of: Organism Only (Φg/L)	MCL (Φg/L)	
			I							State Standard
47	Phosphorus, Total		NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							State Standard
48	Picloram	1918021							500 L	SDWA
49	Salinity	--	NARRATIVE STATEMENT - SEE TEXT							Gold Book
50	Simazine	122349							4 L	SDWA
51	Solids Suspended and Turbidity	--	NARRATIVE STATEMENT AND NUMERIC CRITERIA - SEE TEXT							Gold Book State Standard
52	Styrene	100425							100 L	SDWA
53	Sulfide-Hydrogen Sulfide	7783064		2.0 E, G, L		2.0 E, G, L				Gold Book
54	Tainting Substances	--	NARRATIVE STATEMENT - SEE TEXT							Gold Book
55	Temperature	--	SPECIES DEPENDENT CRITERIA - SEE TEXT J							Red Book
56	1, 2, 4, 5-Tetrachlorobenzene	95943					2.3 E	2.9 E		IRIS03/01/91
57	Tributyltin (TBT)	688733	0.46 L	0.063 L	0.38 L	0.001 L				62FR42554
									70	

	Non Priority Pollutant	CAS Number	Freshwater Aquatic Life		Saltwater Aquatic Life		Human Health			FR Cite/Source
			CMC (Φg/L)	CCC (Φg/L)	CMC (Φg/L)	CCC (Φg/L)	For Consumption of: Water & Organism (Φg/L)	Organism Only (Φg/L)	MCL (Φg/L)	
58	1, 2, 4-Trichlorobenzene	120821							L	SDWA
59	2, 4, 5-Trichlorophenol	95954					2, 600 B, D			IRIS 03/01/88
60	Xylenes, Total	--							10, 000 L	SDWA
61	Beta particles and photon emitters	--							4 Millirems/yr	SDWA
62	Gross alpha particle activity	--							15 picocuries per liter (pCi/l)	SDWA
63	Radium 226 and Radium 228 (combined)	--							5 pCi/l	SDWA

Footnotes:

A This human health criterion is the same as originally published in the Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value is now published in the Gold Book.

B The organoleptic effect criterion is more stringent than the value presented in the non priority pollutants table.

C According to the procedures described in the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, except possibly where a very sensitive species is important at a site, freshwater aquatic life should be protected if both conditions specified in Attachment 3 - Calculation of Freshwater Ammonia Criterion are satisfied.

D This criterion has been revised to reflect The Environmental Protection Agency=s q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) used to derive the original criterion was retained in each case.

E The derivation of this value is presented in the Red Book (EPA 440/9-76-023, July, 1976).

F This value is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in the following criteria document: Chloropyrifos (EPA 440/5-86-005).

G This CCC is based on the Final Residue Value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60 FR 15393-15399, March 23, 1995), the EPA no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

H This value is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water* (EPA-820-B-96-001). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the differences between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. No decision concerning this criterion was affected by any considerations that are specific to the Great Lakes.

I South Carolina has established some site-specific standards for pH. These site-specific standards are listed in S.C. Regulation 61-69, Classified Waters.

J U.S. EPA, 1976, Quality Criteria for Water 1976.

K South Carolina has established numeric criteria in Section G for waters of the State based on the protection of warmwater and coldwater species. For the exception to be used for waters of the State that do not meet the numeric criteria established for the waterbody due to natural conditions, South Carolina has specified the allowable deficit in Section D.4. and used the following document as a source. U.S. EPA, 1986, Ambient Water Quality Criteria for Dissolved Oxygen, EPA 440/5-86-003, National Technical Information Service, Springfield, VA. South Carolina has established some site-specific standards for DO. These site-specific standards are listed in S.C. Regulation 61-69, Classified Waters.

L This criterion is a noncarcinogen. As prescribed in Section E of this regulation, application of this criterion for determining permit effluent limitations requires the use of 7Q10 or 30Q5 (if provided by the applicant), or comparable tidal condition as determined by the Department

M This criterion is based on an added carcinogenicity risk. As prescribed in Section E of this regulation, application of this criterion for permit effluent limitations requires the use annual average flow or comparable tidal condition as determined by the Department.

ORGANOLEPTIC EFFECTS

	Pollutant	CAS Number	Organoleptic Effect Criteria (Φg/L)	FR Cite/Source
1	Acenaphthene	83329	20	Gold Book
2	Monochlorobenzene	108907	20	Gold Book
3	3-Chlorophenol	--	0.1	Gold Book
4	4-Chlorophenol	106489	0.1	Gold Book
5	2, 3-Dichlorophenol	--	0.04	Gold Book
6	2, 5-Dichlorophenol	--	0.5	Gold Book
7	2, 6-Dichlorophenol	--	0.2	Gold Book
8	3, 4-Dichlorophenol	--	0.3	Gold Book
9	2, 4, 5-Trichlorophenol	95954	1	Gold Book
10	2, 4, 6-Trichloropehnol	88062	2	Gold Book
11	2, 3, 4, 6-Tetrachlorophenol	--	1	Gold Book
12	2-Methyl-4-Chlorophenol	--	1800	Gold Book
13	3-Methyl-4-Chlorophenol	59507	3000	Gold Book
14	3-Methyl-6-Chlorophenol	--	20	Gold Book
15	2-Chlorophenol	95578	0.1	Gold Book
16	Copper	7440508	1000	Gold Book
17	2, 4-Dichlorophenol	120832	0.3	Gold Book

	Pollutant	CAS Number	Organoleptic Effect Criteria (Φg/L)	FR Cite/Source
18	2, 4-Dimethylphenol	105679	400	Gold Book
19	Hexachlorocyclopentadiene	77474	1	Gold Book
20	Nitrobenzene	98953	30	Gold Book
21	Pentachlorophenol	87865	30	Gold Book
22	Phenol	108952	300	Gold Book
23	Zinc	7440666	5000	45 FR79341

Footnote:

1. These criteria are based on organoleptic (taste and odor) effects. Because of variations in chemical nomenclature systems, this listing of pollutants does not duplicate the listing in Appendix A of 40 CFR Part 423. Also listed are the chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

WATER QUALITY CRITERIA ADDITIONAL NOTES

1. **Criteria Maximum Concentration and Criterion Continuous Concentration**
   The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The CMC and CCC are just two of the six parts of a aquatic life criterion; the other four parts are the acute averaging period, chronic averaging period, acute frequency of allowed exceedence, and chronic frequency of allowed exceedence.

2. **Criteria for Priority Pollutants, Non Priority Pollutants and Organoleptic Effects**
   This appendix lists all priority toxic pollutants and some non priority toxic pollutants, and both human health effect and organoleptic effect criteria issued pursuant to CWA ∋304(a), the SDWA, and the NPDWR. Blank spaces indicate that EPA has no CWA ∋304(a) criteria recommendations. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A of 40 CFR Part 423.

3. **Human Health Risk**
   The human health criteria for the priority and non priority pollutants are based on carcinogenicity of 10^{-6} risk.

4. **Water Quality Criteria published pursuant to Section 304(a) or Section 303(c) of the CWA**
   Many of the values in the appendix were published in the California Toxics Rule. Although such values were published pursuant to Section 303(c) of the CWA, they represent the EPA=s most recent calculation of water quality criteria.

5. **Calculation of Dissolved Metals Criteria**
   The 304(a) criteria for metals are shown as total recoverable metals. As allowed in Section E of this regulation, these criteria may be expressed as dissolved metals. Dissolved metals criteria may be calculated in one of two ways (please refer to Attachments). For freshwater metals criteria that are hardness-dependent, the dissolved metal criteria may be calculated using a hardness of 25 mg/l as expressedas $CaCO_3$. Saltwater and freshwater metals= criteria that are not hardness-dependent are calculated by multiplying the total recoverable criteria before rounding by the appropriate conversion factors. The final metals= criteria in the table are rounded to two significant figures. Information regarding the calculation of hardness dependent conversion factors are included in the footnotes.

6. **Chemical Abstract Services Number**
   The Chemical Abstract Services number (CAS) for each pollutant is provided (where available).

7. **Gold Book Reference**
   The Gold Book reference listed in the appendix refers to the May 1, 1986 EPA publication EPA 440/5-86-001.

8. **Federal Register Reference**
   The FR listed in the appendix refers to the appropriate *Federal Register* listing. and source refers to the origin of the value. Many of the numeric values contained in this appendix have been modified, revised, or altered and therefore, the source as listed may not be the same as it appears in this table. Also, South Carolina may have selected to use a different value or may have promulgated a different value in its previous iterations of this regulation, so differences from these sources should be expected.

9. **Maximum Contaminant Levels**
   The appendix includes Maximum Contaminant Levels (MCLs) developed under the Safe Drinking Water Act (SDWA) and the National Primary Drinking Water Regulation (NPDWR).

10. Organoleptic Effects

The appendix contains ∋304(a) criteria for pollutants with toxicity-based criteria as well as non-toxicity based criteria. The basis for the non-toxicity based criteria are organoleptic effects (e.g., taste and odor) which would make water and edible aquatic life unpalatable but not toxic to humans. The table includes criteria for organoleptic effects for 23 pollutants. Pollutants with organoleptic effect criteria more stringent than the criteria based on toxicity (e.g., included in both the priority and non-priority pollutant tables) are footnoted as such.

11. Category Criteria

In the 1980 criteria documents, certain water quality criteria were published for categories of pollutants rather than for individual pollutants within that category. Subsequently, in a series of separate actions, the EPA derived criteria for specific pollutants within a category. Therefore, in this appendix South Carolina is replacing criteria representing categories with individual pollutant criteria (e.g., 1, 3-dichlorobenzene, 1, 4-dichlorobenzene and 1, 2-dichlorobenzene).

12. Specific Chemical Calculations

A. Selenium

(1) Human Health

In the 1980 Selenium document, a criterion for the protection of human health from consumption of water and organisms was calculated based on a BCF of 6.0 l/kg and a maximum water-related contribution of 35 Φg Se/day. Subsequently, the EPA Office of Health and Environmental Assessment issued an errata notice (February 23, 1982), revising the BCF for selenium to 4.8 L/kg. In 1988, EPA issued an addendum (ECAO-CIN-668) revising the human health criteria for selenium. Later in the final National Toxic Rule (NTR, 57 FR 60848), EPA withdrew previously published selenium human health criteria, pending EPA review of new epidemiological data.

This appendix includes human health criteria for selenium, calculated using a BCF of 4.8 L/kg along with the current IRIS RfD of 0.005 mg/kg/day. South Carolina included these water quality criteria in the appendix because the data necessary for calculating a criteria in accordance with EPA=s 1980 human health methodology are available.

(2) Aquatic Life

This appendix contains aquatic life criteria for selenium that are the same as those published in the CTR, with the exception of removal of the acute criterion based on EPA=s June 2, 2000 revocation of the value.

B. 1, 2, 4-Trichlorobenzene and Zinc

Human health criteria for 1, 2, 4-trichlorobenzene and zinc have not been previously published. Sufficient information is now available for calculating water quality criteria for the protection of human health from the consumption of aquatic organisms and the consumption of aquatic organisms and water for both these compounds.

C. Chromium (III)

The aquatic life water quality criteria for chromium (III) included in the appendix are based on the values presented in the document titled: *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water.*

D. Ether, Bis (Chloromethyl), Pentachlorobenzene, Tetrachlorobenzene 1, 2, 4, 5-, Trichlorphenol

Human health criteria for these pollutants were last published in EPA=s *Quality Criteria for Water 1986* or AGold Book≡. Some of these criteria were calculated using Acceptable Daily Intake (ADIs) rather than RfDs. Updated q1*s and RfDs are now available in IRIS for ether, bis (chloromethyl), pentachlorobenzene, tetrachlorobenzene 1, 2, 4, 5-, and trichlorophenol, and were used to revise the water quality criteria for these compounds. The water quality criteria for ether, bis (chloromethyl) were revised using an updated q1*, while criteria for pentachlorobenzene, and tetrachlorobenzene 1, 2, 4, 5-, and trichlorophenol were derived using an

updated RfD value.

E. PCBs

In this appendix, South Carolina is publishing aquatic life and human health criteria based on total PCBs rather than individual arochlors. These criteria replace the previous criteria for the seven individual arochlors.

Attachment 2
Calculation of MFFF Wastes in ER Table 5-15c

Low-Level Waste

MFFF Stripped Uranium solidified (Table 5-12 & pg G-15) = 316 m^3/yr
MFFF Solid LLW (Table 5-12 & pg 5-24) = 176 m^3/yr
MFFF liquid LLW (Table 5-12 & pg 5-23) = 1,080 m^3/yr

Total MFFF LLW = 1,080 + 176 = 1,256 m^3/yr X 10 yr operation = 12,560 m^3
Total WSB LLW from SU = 316 m^3/yr X 13 yr operation = 4,108 m^3
Total LLW = 16,668 m^3

Note: WSB assumed stripped uranium waste solidified for 13 yrs to account for deactivation waste.

Hazardous/ Mixed Waste

MFFF Solvent Waste (Table 3-3) = 2,800 gallon/yr = 11 m^3/yr
11 m^3/yr X 10 yr operation = 110 m^3

Transuranic Waste

MFFF High Alpha Waste solidified (Table 5-12 & G-15) = 190 m^3/yr
MFFF Solid TRU Waste (Table 5-12 & pg 5-24) = 234 m^3/yr

Total WSB TRU Waste from high alpha = 147 m^3/yr X 13 yr operation = 1,911 m^3
Total MFFF Solid TRU Waste = 234 m^3/yr X 10 yrs operation = 2,340 m^3
Total TRU Waste = 2,340 + 1,911 = 4251 m^3

Note: WSB assumed high alpha waste solidified for 13 yrs to account for deactivation waste.

Non Hazardous Liquid Waste

MFFF Non-Hazardous Liquid Waste (Table 5-12) = 8,800,000 gal/yr = 33,300 m^3/yr
33,300 m^3/yr X 10 yr operation = 333,000 m^3

Non Hazardous Solid Waste

MFFF Non-Hazardous Solid Waste (Table 5-12) = 1,754 yd3/yr = 1,341 m3/yr
1,341 m^3/yr X 10 yr operations = 13,400 m^3