

Appendix I

No Category Alternative

This alternative is based on the use of a simple predictive groundwater quality model (still in development) that could be used for approving fill projects. There are no categories – the standards are specific to the proposed beneficial use.

- **DISREGARD THE GROUNDWATER STANDARDS VALUES – THEY ARE PLACEHOLDERS FOR MODELLED VALUES YET TO BE CALCULATED.**
- There are lists of parameters to be tested for an Initial Certification and Recharacterization, but there are no standards listed,
- Geotechnical fill and construction uses are placed into one table; there is no difference in standards for confined, unconfined, or embankments,
- This alternative eliminates totals standards for byproduct materials not intended for exposed uses. The only applicable exposure pathway for uses other than unbonded surface course would be through groundwater (water leach test),
- A separate table of totals standards (Table 3B) is included for any generator that wishes to use their byproduct material as unbonded surface course (aggregate).

This alternative would allow for grouping uses by type rather than category:

- **NR 538.10(1) – Encapsulated and Contained Uses**
 - (a) Encapsulated uses
 - (b) Waste stabilization or solidification
 - (c) Supplemental fuels
 - (d) Daily cover
- **NR 538.10(2) – Geotechnical Fill**
 - (a) Building sub-base (confined)
 - (b) Paved lot sub-base (confined)
 - (c) Soil cover (unconfined)
 - (d) Feed and manure storage structures
 - (e) Transportation embankments
 - (f) Nonmetallic mine reclamation
- **NR 538.10(3) – Construction Uses**
 - (a) Paved roadway base course
 - (b) Utility trench backfill
 - (c) Tank abandonment
 - (d) Slabjacking
 - (e) Soil and pavement stabilization
 - (f) Flowable fill
 - (g) Bonded surface course
 - (h) Blasting grit
 - (i) Winter road abrasives
- **NR 538.10(4) – Unbonded surface course**
- **NR 538.10(5) – Soil or plant additive**

Table 1A
Initial Certification and Recertification
ASTM Water Leach Test

Parameter	Ferrous Foundry System Sand	Ferrous and Steel Slag	Coal Ash	FGD Gypsum	Other
Antimony	X	X	X	X	X
Arsenic	X	X	X	X	X
Barium		X	X		X
Beryllium	X	X	X		X
Boron		X	X	X	X
Cadmium	X	X	X		X
Chloride			X		X
Chromium, Total	X	X	X		X
Cobalt	X		X		X
Copper	X				X
Fluoride		X	X	X	X
Lead	X	X	X		X
Manganese				X	X
Mercury			X	X	X
Molybdenum		X	X		X
Nickel	X				X
Nitrite + Nitrate(as N)					X
Phenol	X				X
Selenium			X	X	X
Sulfate			X	X	X
Thallium		X	X	X	X
Vanadium		X			X
Zinc					X

Notes:

- Foundry sand parameters from Phase II Constituents of Concern per EPA Risk Assessment 530-R-14-003 (groundwater and ecological).
- Coal ash parameters from Appendix III and IV, 40 CFR 257 (CCR Rule) and Constituents of Concern for groundwater and surface water per EPA 530-R-14-001.
- Parameters for other categories based on historical data of values that exceeded the NR 140 groundwater quality standards.

Table 1B
Initial Certification and Recertification
Total Elemental Analysis

Parameter	Ferrous Foundry System Sand	Ferrous and Steel Slag	Coal Ash	FGD Gypsum	Other
Antimony	X	X	X	X	X
Arsenic	X	X	X	X	X
Barium		X	X		X
Beryllium	X		X	X	X
Boron		X	X		X
Cadmium	X	X	X		X
Chromium, (Hexavalent)	X	X	X	X	X
Lead	X		X		X
Mercury			X	X	X
Molybdenum		X	X		X
Nickel	X				X
Selenium			X	X	X
Thallium		X	X	X	X
Vanadium		X	X		X
Zinc					X
Benz(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene	X				X
Chrysene	X				X
Dibenzo(ah)anthracene	X				X
Indeno(123-cd)pyrene	X				X
1-methyl naphthalene	X				X
2-methylnaphthalene	X				X
Naphthalene	X				X
Pyrene	X				X

Notes:

Table 2
Geotechnical Fill and Construction Standards
ASTM Water Leach Test

Standard (mg/L)	Parameter	Ferrous Foundry System Sand	Ferrous and Steel Slag	Coal Ash	Other
0.006	Antimony	X	X	X	X
0.01	Arsenic	X	X	X	X
2.0	Barium		X	X	X
0.004	Beryllium	X	X	X	X
1.0	Boron		X	X	X
0.005	Cadmium	X	X	X	X
1250	Chloride			X	X
0.10	Chromium, Total	X	X	X	X
0.04	Cobalt	X		X	X
1.30	Copper	X			X
4.0	Fluoride		X	X	X
0.015	Lead	X	X	X	X
0.30	Manganese				X
0.002	Mercury			X	X
0.04	Molybdenum		X	X	X
0.1	Nickel	X			X
10	Nitrite + Nitrate(as N)				X
2.0	Phenol	X			X
0.05	Selenium			X	X
1250	Sulfate			X	X
0.002	Thallium		X	X	X
0.15	Vanadium		X		X
25	Zinc				X

Notes:

Standards will change subject to modelling results (values listed are NR 140 enforcement standards)

Table 3A
Unbonded Surface Course Standards
ASTM Water Leach Test

Standard (mg/L)	Parameter	Ferrous Foundry System Sand	Ferrous and Steel Slag	Coal Ash	Other
0.006	Antimony	X	X	X	X
0.01	Arsenic	X	X	X	X
2.0	Barium		X	X	X
0.004	Beryllium	X	X	X	X
1.0	Boron		X	X	X
0.005	Cadmium	X	X	X	X
1250	Chloride			X	X
0.10	Chromium, Total	X	X	X	X
0.04	Cobalt	X		X	X
1.30	Copper	X			X
4.0	Fluoride		X	X	X
1.5	Iron				X
0.015	Lead	X	X	X	X
0.30	Manganese				X
0.002	Mercury			X	X
0.04	Molybdenum		X	X	X
0.1	Nickel	X			X
10	Nitrite + Nitrate(as N)				X
2.0	Phenol	X			X
0.05	Selenium			X	X
1250	Sulfate				X
0.002	Thallium		X	X	X
0.03	Vanadium		X		X
25	Zinc				X

Notes:

Standards will change subject to modelling results (values listed are NR 140 enforcement standards)

Table 3B
Unbonded Surface Course Standards
Total Elemental Analysis

Standard (mg/kg)	Parameter	Ferrous Foundry System Sand	Ferrous and Steel Slag	Coal Ash	Other
97.3	Antimony	X	X	X	X
8	Arsenic	X	X	X	X
8600	Barium		X	X	X
122	Beryllium	X		X	X
43600	Boron		X	X	X
104	Cadmium	X	X	X	X
1.9	Chromium, (Hexavalent)	X	X	X	X
9730	Copper				X
52	Lead	X	X	X	X
13.7	Mercury			X	X
1220	Molybdenum		X	X	X
264	Nickel	X			X
1210	Selenium			X	X
2.4	Thallium		X	X	X
773	Vanadium		X	X	X
73000	Zinc				X
19.9	Benz(a)anthracene	X			X
2.0	Benzo(a)pyrene	X			X
20	Benzo(b)fluoranthene	X			X
200	Benzo(k)fluoranthene	X			X
2000	Chrysene	X			X
2	Dibenz(a,h)anthracene	X			X
20	Indeno(123-cd)pyrene	X			X
75.8	1-methyl naphthalene	X			X
628	2-methylnaphthalene	X			X
25.1	Naphthalene	X			X
4710	Pyrene	X			X

Notes:

Standards based on Dept. of Health modelling results.

Table 4
FGD Byproduct for Soil or Plant Additive Standards
Total Elemental Analysis

Parameter	Standard (mg/kg)
Antimony	1.5
Arsenic	13.1
Barium	1000
Beryllium	2.5
Boron	200
Cadmium	1.0
Chromium (Total)	100
Copper	95
Lead	30
Manganese	1500
Mercury	2.5
Molybdenum	10
Nickel	100
Selenium	50
Thallium	1.0
Vanadium	136
Zinc	125

Note: Values are derived from the NRCS Conservation Practice Standard Code 333, June, 2015