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IRON CONCENTRATIONS AND ZONE J ECO SCREENING LEVELS CNC CHARLESTON SC
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ENSAFE

Iron Concentrations. Eco Screening Levels
CNC Charleston.



M e m o r a n d u m

January 25, 2001

To: Mihir Mehta, SCDHEC
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From: Todd Haverkost, P.G.

Re: Iron Concentrations at CNC and Zone J Eco Screening Levels

One of the topics of discussion that was introduced at the January CNC Project Team meeting was the lack of a site specific background concentration for iron in soil (it was not mentioned at the meeting but a background concentration for groundwater has not been established either) or a published risk based screening level for sediment. Background concentrations for iron were not calculated at CNC because, until recently, iron was identified as an essential nutrient in the risk assessments performed and not evaluated. Comments from Project Team members have indicated the practice of excluding iron solely on the basis that it is an essential nutrient is unacceptable and iron must now be evaluated. The inclusion of iron has presented a challenge in the preparation of the Zone J RFI Report/Work Plan currently underway. The purpose of this memo is to attempt to describe the challenge using soil as an example so that feedback can be obtained before preparing a document that will otherwise identify a tremendous number of data gaps associated with the presence of iron which is naturally ubiquitously abundant in the environment.

One of the initial steps in the Zone J process is attempting to determine if a "linkage" exists between what is found in soil at land based SWMUs and/or AOCs at CNC and what is detected in sediments of the adjacent water bodies (i.e. source identification). EnSafe is presently reviewing all of the RFI data for the land based SWMUs and AOCs at CNC to first determine if constituents are present in site soil above proposed screening criteria. The fundamental assumption being made is that if a constituent is not present in site media at a concentration above background or acceptable risk based criteria, it would not pose an unacceptable risk to

receptors in Zone J regardless of whether or not a complete migration pathway exists. In other words, the land based site would not be considered a source area for contaminants in Zone J. The screening criteria (in the order they are being applied) for determining whether a site might be considered a Zone J source due to constituents detected in soil is as follows:

Screening Criteria	Rationale For Use
• Zone Specific Background (inorganics and select PAHs only)	A site would not be considered a source area if constituents do not exceed background levels.
• USEPA Region IV SSVs	Constituents detected in soil at concentrations below SSVs would not pose a risk if the soil were transported to a water body where it would become sediment so the site would not be considered a source area.
– PRGs for Sediment, Oak Ridge National Laboratory	In the absence of a background value (applies to most organics) and/or a SSV (the list of constituents with SSVs is very abbreviated compared to the Appendix IX analyte list), the Preliminary Remediation Goals (PRGs) developed by ORNL are believed to be the next best technically defensible, published screening values available.
ESVs from Savannah River Site Database	Lacking a PRG, the ecological screening values prepared by DOE's Savannah River Laboratories compiled values from the USFWS, Dutch Ministry of the Environment, Canadian Council of Ministers of the Environment and literature, including ORNL publications.

A screening value for iron is not available from any of the 4 sources listed above. The only published screening value found for iron in soil is the ecological screening value (ESV) of 200 mg/kg that applies to terrestrial receptors (soil micro-organisms). The ESV is not directly applicable to the site linkage screening process since the focus is on constituents that could end up in the surface water body and pose a threat to aquatic receptors. In the absence of a screening value, iron is included by default in a list of soil constituents detected that are considered a preliminary list of chemicals of potential concern (COPC) which can be refined later. This is similar to what occurs during Steps 1 and 2 of the ERA. In the absence of an agreed upon screening level for iron, every site at CNC would be identified as a Zone J source based on the presence of iron. Attached are three tables which provide some basic data pertaining to the detection of iron in grid based soil samples (from which the background data set was derived for other inorganics), site soil samples, and sediment. Adopting background values for iron in soil for each of the zones is one obvious solution to help screen out a significant number of sites from consideration as a source. The table of grid sample data

includes a calculation of 20 as one possibility for background values. Most of the current background values for CNC represent a 95% UTL approach. A 95% UTL for iron has not been calculated for all of the zones but, for purposes of comparison, the UTL for iron in surface soil in Zones H and I was determined to be 30,910 mg/kg and 62,600 mg/kg respectively. Based on the range of detections observed in site samples, either method of calculating a background value will still result in the identification of a number sites that will have to be evaluated even further to determine if a valid migration pathway to the water bodies exists to decide if the site should be considered a source area. Whether this time consuming effort will add any value to the process is doubtful considering every upland area subject to erosion within the boundaries of the Cooper River watershed can probably be considered a source for iron.

Under the ERA process, a risk management decision regarding whether or not to eliminate iron as a COPC will be reserved for Step 3 of the ERA. As an alternative to waiting to address iron through the normal ERA process, the Navy and EnSafe would like to pose the question of whether or not SCDHEC and EPA would be willing to consider making a risk management decision to drop iron from further evaluation at this time if the available data can be presented in a manner to support such a decision?

**Summary of Iron Concentrations (mg/kg)
Background Gnd Soil Samples
Charleston Naval Complex**

Zone	Interval 01 = Surf >01 = Subsurf	Number of Samples	Number of Detections	Minimum Detection	Maximum Detection	Mean of Detections	2σ
A	01	13	13	1530	15700	7460.77	14921.54
A	02	12	12	2550	37400	10153.33	20306.67
B	01	15	15	2630	48700	12682.00	25364.00
B	02	14	14	1470	49100	11667.14	23334.29
C	01	40	40	841	12000	3956.78	7913.55
C	02	27	27	726	36700	5786.96	11573.93
D	01	6	6	966	3600	2239.33	4478.67
D	02	6	6	916	11100	3134.33	6268.67
E	01	30	25	715	30600	9269.50	18539.00
E	02	28	24	675	35800	9253.54	18507.07
F	01	6	6	3570	28200	11755.00	23510.00
F	02	6	6	7850	34800	12996.33	25996.67
G	01	9	9	4300	32700	14576.67	29153.33
G	02	7	7	3110	58100	17912.86	35825.71
H	01	96	96	695	38800	9514.32	19028.65
H	02	58	58	1210	54300	14462.93	28925.86
I	01	15	15	1730	22700	10548.67	21097.33
I	02	6	6	3730	14200	6766.67	13533.33
K-Annex	01	9	9	1200	7990	3528.89	7057.78
K-Annex	02	9	9	560	10900	2550.11	5100.22
K-Clouter Island	01	4	4	10400	23400	16575.00	33150.00
K-Clouter Island	02	1	1	17200	17200	17200.00	34400.00

Summary of Iron Concentrations (mg/kg)

**Site Soil Samples
Charleston Naval Complex**

Zone	Interval 01 = Surf 02 = Subsoil	Number of Samples	Number of Detections	Minimum Detection	Maximum Detection	Mean of Detections
A	01	164	161	5.3	47500	8018.00
A	02	125	121	4.1	36700	8026.05
B	01	12	12	1330	10500	5342.50
B	02	11	11	421	8980	3324.00
C	01	122	121	32.3	99500	7740.30
C	02	75	75	532	45200	5871.13
D	01					No Samples
D	02					No Samples
E	01	460	452	482	60000	8421.73
E	02	416	408	595	139000	10483.41
F	01	143	143	197	39600	11153.27
F	02	123	123	921	43500	17701.55
G	01	175	175	669	38200	7588.45
G	02	128	128	159	53500	14030.76
H	01	261	261	452	80800	8738.05
H	02	156	156	818	239000	13221.27
I	01	167	167	258	41500	9237.01
I	02	79	79	1190	47700	14148.86
K-Annex	01	104	104	337	10500	3451.51
K-Annex	02	100	100	265	15000	2356.59
K-Clouter Island	01	54	54	2170	43200	23013.33
K-Clouter Island	02	29	29	3020	38000	17163.79

Summary of Iron Concentrations (mg/kg) Water Body Sediment Charleston Naval Complex				
Area	Number of Samples	Number of Detections	Minimum Detection	Maximum Detection
Cooper River	48	48	1560	31800
Shipyards Creek	22	22	5010	32100
Noisette Creek	10	10	1810	31700