

Task 1 QA Evaluation of Plant Site GoldSim Model												
Model Name: NorthMet_PlantSite_Base_v01												
Workplan File: Water Modeling Workplan - Plant Site v5 APR2012.pdf												
Evaluation Performed by Interralagic, Inc.												
May 2012												
Description	Workplan Tables		GoldSim Model Elements		GoldSim Output Tables		Comments	Barr Response				
	Value	Units	Value	Units	Value	Units						
<b>Table 1-1, Page 1:</b>												
Surface_Constant_Standards(Hardness)	500				(missing)		Listed as 500 mg/L in Table 1-2, blank in model output table	Output added to the model so that the model output tables will not be blank				
Ground_Primary_Standards(Hardness)	999999				(missing)		Listed as 999999 in Table 1-4, blank in model output table	Output added to the model so that the model output tables will not be blank				
Ground_Secondary_Standards(Hardness)	999999				(missing)		Listed as 999999 in Table 1-4, blank in model output table	Output added to the model so that the model output tables will not be blank				
<b>Table 1-1, Page 2:</b>												
<i>(no issues found)</i>												
<b>Table 1-1, Page 3:</b>												
Table 1-5							Ambiguity as to which values are actually used in the model. See general comments for more info.	Headings changed to match the inputs used in the model.				
Table 1-6							Recommend column headings more similar to variable names	Headings changed to match the inputs used in the model.				
Table 1-6							Example of over-rounding of values shown in supporting tables - this is an issue impacting most supporting tables. Comparison of exact input values between supporting tables and model output was not possible due to truncation of significant figures.	Values in Excel input files rounded so that the value displayed in the work plan tables (PDF) is that ACTUAL value in the Excel input files, showing all significant digits.				
Table 1-7							Example of consequences of too much rounding: Values for TI at MLC-3 and MLC-4 shown as 0 in Table 1-7 but are actually 0.000001 in model output	Values in Excel input files rounded so that the value displayed in the work plan tables (PDF) is that ACTUAL value in the Excel input files, showing all significant digits.				
Mine_Site_Flow_Rate							Min and max input values for truncated normal distribution not shown on Table 1-8	Min and Max added to Table 1-1.				
Mine_Site_Conc							Min and max input values for truncated normal distribution not shown on Table 1-9 or 1-10	Min and Max values added to Table 1-1 to avoid creating additional tables.				
Mine_Site_Conc							Table 1-1 is missing a reference to Table 1-10 to show the standard deviation values used in the distribution. See general comments regarding the suggestion to incorporate more detailed documentation of the exact input vectors used to define uncertain variable distributions as a way to avoid this problem.	Table 1-1 changed to reference both Table 1-9 and Table 1-10.				
<b>Table 1-1, Page 4:</b>												
<i>(no issues found)</i>												
<b>Table 1-1, Page 5:</b>												
NM_Files_Release							Variable name as shown not found in model - suggest showing specific variable names used for each constituent on supporting tables to eliminate any ambiguity as to which model elements the table numbers are used.	Model changed to eliminate the ambiguity between work plan and model				
NM_Course_Release							Variable name as shown not found in model - suggest showing specific variable names used for each constituent on supporting tables to eliminate any ambiguity as to which model elements the table numbers are used.	Model changed to eliminate the ambiguity between work plan and model				
NM_Content		mg/kg					Units on Table 1-16 expressed as "ppm". Although functionally equivalent, units should be expressed consistently throughout the project. The use of "ppm" is often discouraged.	Work plan changed to use "mg/kg" instead of "ppm" since ppm is discouraged.				
LTVSMC_Content: Alkalinity	1.00E+20				1.00E+12		Assumed high values shown on Table 1-22 do not match values reported by model	Model updated to match work plan table.				
LTVSMC_Content: Cl	1.00E+20				1.00E+12		Assumed high values shown on Table 1-22 do not match values reported by model	Model updated to match work plan table.				

Description	Workplan Tables		GoldSim Model Elements		GoldSim Output Tables		Comments	Barr Response
	Value	Units	Value	Units	Value	Units		
LTVSMC_Content: F	1.00E+20				1.00E+12		Assumed high values shown on Table 1-22 do not match values reported by model	Model updated to match work plan table.
<b>Table 1-1, Page 6:</b>								
Size_factor(Maximum)	N/A		1e10				Table 1-1 does not show a max value for a truncated normal distribution	Work plan Table 1-1 updated to include 1e10 as maximum.
<b>Table 1-1, Page 7:</b>								
Dam_WT_Depth		m				ft	Table 1-1 should show units as ft (as in Table 1-29 and model output)	Table 1-1 corrected.
Beach_WT_Depth		m				ft	Table 1-1 should show units as ft (as in Table 1-29 and model output)	Table 1-1 corrected.
<b>Table 1-1, Page 8:</b>								
Pond_Bottom_Area (and other variables)							Time series output expressed as statistical summaries instead of values	Model will output actual values from the first realization rather than summary statistics.
Table 1-31							Model variable names not clearly related to Table 1-31 column headings	Headings changed to match the inputs used in the model.
Table 1-32							Model reports identical names for variables shown in Table 1-32	Model variable names updated and work Plan headings updated so that both match.
<b>Table 1-1, Page 9:</b>								
Cell_Areas		acre					Units inconsistent between Table 1-1 and Table 1-33 (uses sq. meters)	Table 1-1 changed so that units are m2.
Table 1-35							Numerous additional examples of over-rounding of values in supporting tables resulting in incorrect presentation of input values and inability to check all significant figures.	Values in Excel input files rounded so that the value displayed in the work plan tables (PDF) is that ACTUAL value in the Excel input files, showing all significant digits.
Table 1-37							Not clear where 4th group of columns in Table 1-37 (Pond) is output by model for QA purposes - values not confirmed	Overhaul of Excel output files will make this location more clear so that values can be confirmed the next time.
Table 1-39							Numerous additional examples of over-rounding of values in supporting tables resulting in incorrect presentation of input values and inability to check all significant figures.	Values in Excel input files rounded so that the value displayed in the work plan tables (PDF) is that ACTUAL value in the Excel input files, showing all significant digits.
Table 1-39	"Dams"				"Other"		Values for Seepage_Direction(Dams) in Table 1-39 shown in model output file as Seepage_Direction(Other). Should be greater similarity between inputs tables and names of model variables	Headings changed to match the inputs used in the model.
Initial_Pond_Concs_2E (Table 1-44): Ba	0.25				0.032			Work Plan is correct; model updated.
Initial_Pond_Concs_2E (Table 1-44): K	12				11.6			Work Plan is correct; model updated.
Initial_Pond_Concs_2E (Table 1-44): Pb	0.0016				0.0025			Work Plan is correct; model updated.
Initial_Pond_Concs_2E (Table 1-44): TI	0.00017				0.0002			Work Plan is correct; model updated.
Initial_Pond_Concs_2E (Table 1-44): Zn	0.013				0.015			Work Plan is correct; model updated.
Initial_Pond_Concs_1E (Table 1-44): Ba	0.25				0.032			Work Plan is correct; model updated.
Initial_Pond_Concs_1E (Table 1-44): Mg	47				46			Work Plan is correct; model updated.
Initial_Pond_Concs_1E (Table 1-44): Pb	0.0016				0.0003			Work Plan is correct; model updated.
Initial_Pond_Concs_1E (Table 1-44): TI	0.00017				0.0002			Work Plan is correct; model updated.
Initial_Pond_Concs_1E (Table 1-44): Zn	0.013				0.015			Work Plan is correct; model updated.
<b>Table 1-1, Page 10:</b>								
<i>(no issues found)</i>								
<b>Table 1-1, Page 11:</b>								
Babbitt_Effluent_Conc							Although listed as a model variable, a unique element with this name is not found in the model. As mentioned in the Description, Babbitt_WWTP uses SW_RO_Concentration as an input. Perhaps should not be listed as a separate uncertain variable, but instead shown as deterministic values linked to SW_RO_Concentration so it does not give the appearance of additional uncertainty.	Variable removed from Table 1-1.
Babbitt_Effluent_Conc		mg/L		ug/L			Units shown in table 1-1 not consistent with Table 1-6 and units in model	Variable removed from Table 1-1.

Description	Workplan Tables		GoldSim Model Elements		GoldSim Output Tables		Comments	Barr Response
	Value	Units	Value	Units	Value	Units		
PRB_Efficiency		%		%/day			Units shown in Table 1-1 not consistent with Table 1-45 and units in model	Model units are correct; work plan units and definition updated for more clarity.

Description	Workplan Tables		GoldSim Model Elements		GoldSim Output Tables		Comments	Barr Response
	Value	Units	Value	Units	Value	Units		
<b>Table 1-1, Page 12:</b>								
Table 1-46, Variable Name: L							Variable name shown on Table 1-46 (L) doesn't match variable name in Table 1-1 (La) and model output (La)	Work plan table 1-46 updated so that the variable name matches the model.
Table 1-46, Variable Name: Init_Grad	(positive values)				(negative values)			Negative values are correct; work plan Table 1-46 updated.
Table 1-47, Constituent: Sb					(not reported - "uncertain" variable)		Suggest that all uncertain variables and distribution characteristics be listed on Table 1-1 and not just on supporting tables	All input variables from Table 1-47 (3 constant deterministic and 1 uncertain) added to Table 1-1 to replace input variable Kd. Model updated accordingly.
Table 1-49	"--"				"0"		Table 1-49 shows some areas as "--", model output reports as "0". Might consider alternate means of representing non-existent values (i.e. -999999 for example) here and elsewhere.	Replaced "--" with 0 in Table 1-49.
<b>Table 1-1, Page 13:</b>								
Watershed_Yield							Although it might function as an uncertain variable when combined with additional model elements, the model element referenced by this name is a deterministic lookup table not an uncertain element.	Changed to a "deterministic, user defined lookup table by month".
Expected_Toe_Conc		mg/L		ug/L		ug/L	Units shown in table 1-1 not consistent with Table 1-54 and units in model	Table 1-1 updated to match Table 1-54 and model.
<b>Table 1-1, Miscellaneous</b>								
Perc_Ntoe_MLC3							Variable name not found in Table 1-1	Variable added to Work plan Table 1-1.