Municipal Preliminary Screener Calculation for Use of RO in Wisconsin

EPA 1995 Interim Economic Guidance

2/23/2015

Facility name:	Village of Turtle Lake, Turtle Lake Wisconsin
WI Permit #	WI-0025631-10-0

Spreadhseet: WDNR April 2011

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The following Data is Needed for Worksheets Used To Derive Calculated Municipal Preliminary Screener

Line	Description (Bold = user input, nonbold can use default)	Value	Comment
1	**Distance one way transport of RO reject water (miles)**	102	
2	Cost of transport of RO reject water	$0.0010	Default is 0.001$/mile one way/gallon brine
3	Cost of disposal of RO reject water at potw	$0.15	Default is 0.15 $/gallon
4	**Design flow (average) mgd**	0.57	from permit and variance applications
5	**WQBEL (mg/L)**	400	from DNR review of variance
6	**Target value (mg/L)**	830	from DNR review of variance
7	Fraction of treated wastewater discarded as RO reject water	0.25	Default is 0.25
8	**Annual Financed Capital Cost for RO Equipment over 20 years (2010 $)**	$628,140	Variance Application. See note 1.
9	**Chloride Removal O&M Cost (1992$)**	$208,050	Variance Application. See note 2.
10	**Number of households**	475	http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.x html
11	**Sewer cost per household**	$300	Annual cost per household of EXISTING pollution control is from the 2013 Wisconsin Sewer User Charge Survey Report if the applicant is not listed in the survey, this information is from the applicant.
12	**Median household income**	$40,952	http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.x html
13	Inflation correction for costs	2.4	Default is 2.4. Using 2.4 possibly underestimates the percentage of MHI.
14	Interest rate for financing (expressed as a decimal) (= I in annualization factor)	0.04375	DNR application represents annual financed cost over 20 years at 4.375%
15	Time period for financing (in years) (= n in annualization factor)	20	

Note 1

The variance application, form 3400-193 (R 4/06), Chloride Variance Application, is based on the design flow and assumes 1.125 million$ /MGD for present worth in 1992. Today's data shows present worth of 14.5 million/MGD for RO including preparation of effluent for RO treatment. Therefore it is necessary to determine how to adjust the values provided in the application to obtain costs that are valid for 2010. The ratio of annual costs to present worth, the a/p ratio, can be used to show the costs per year of financing of the present worth. Using 20 years and 4.375% interest, the a/p ratio is 0.076. Using today's data, given a plant with 1 MGD design flow, and 14.8 million dollars for present worth, the annual cost for capital expense is 1.125 million dollars / MGD = 14.8 million $/MGD x 0.076. In conclusion, the Department has determined that the application provides an estimate of annual capital cost over 20 years in 2010 dollars on an MGD basis. The present worth can be determined by using the a/p ratio: present worth = annual capital cost / (a/p).

Note 2 The variance application, form 3400-193 (R 4/06), Chloride Variance Application, is based on the design flow and assumes 1 $/gallon for O&M cost in 1992. Today's data shows costs of 1.8 to 2.6 million$/MGD for RO including preparation of effluent for RO treatment. Based on today's data, the value calculated in the application should be increased by a factor of 1.8 to 2.6. Therefore, using a factor of 2.4 here in the worksheet may underestimate the % of MHI.

The following Parameters are Derived from Data

Line	Description	Value	
17	Fraction treated	0.59	(line 6 - line 5)/(line 6 - line 7 x line 5)
18	Volume treated (gallons/year)	122,550,000	line 17 x line 4 x 365 x 1,000,000
19	Volume of RO reject water (gallons/year)	30,637,500	line 18 x line 7
20	O&M: Transportation costs ($/year)	$3,125,025	line 19 x line 1 x line 2
21	O&M: Disposal ($/year)	$4,595,625	line 19 x line 3
22	O&M: Total cost RO reject water transp and disposal ($/year)	$7,720,650	line 20 + line 21
23	Annual Financed Capital Cost for RO Equipment over 20 years (2010 $/year))	$628,140	line 8
24	Chloride Removal O&M Cost (2010 $/year)	$499,320	line 9 x line 13
25	Annualization factor = a/p = i(1+i)^n/[(1+i)^n-1]	0.076046	Calculated from lines 14 and 15
26	Capital Costs of Project to Ensure Compliance with WQS	$8,260,030.45	line 8 / line 25
27	Total annual cost of EXISTING pollution control ($/year)	$142,500	line 10 x line 11

The following inputs are calculated from above data and parameters and used in the Municipal Preliminary Screener Calculation

Worksheet B Inputs

Section	Line	Description	Input	
A		Capital Costs of Project to Ensure Compliance with WQS	$8,260,030.45	Line 26, above
A		Item 1 Annual O and M for operation of pollution control to ensure compliance with WQS	$499,320.00	Line 24, above
A		Item 2 Annual O and M for operation of pollution control to ensure compliance with WQS	$7,720,650.00	Line 22, above (disposal costs)

Worksheet C

Section	Line	Description	Input	Data Source
A	1	Total annual cost of EXISTING pollution control ($/year)	not determined	
A	4	Number of households	not determined	

Worsheet D

Municipal Preliminary Screener

Section	Line	Description	Input	Data Source
A	2	Median household income ($/year)	$40,952.00	Line 12, above

Data Inputs

Worksheet B Inputs

Section	Line	Description	Input	Data Source/notes
A		Capital Costs of Project to Ensure Compliance with WQS	$8,260,030.45	Line 26, above
A		Other one-time costs of the project	$0.00	default
A	2	Portion of capital costs to be paid for with grant monies	$0.00	default
A	3	Capital costs to be financed	$8,260,030.45	Capital ÷ one-time - grant
A		Type of financing	loan	
A		Interest rate for financing (expressed as a decimal) (= i in annualization factor)	0.04375	line 14
A		Time period for financing (in years) (= n in annualization factor)	20.00000	line 15
B		Item 1 Annual O and M for operation of pollution control to ensure compliance with WQS	$7,720,650.00	Line 22, above (disposal costs)
B		Item 2 Annual O and M for operation of pollution control to ensure compliance with WQS	$499,320.00	Line 24, above
B		Item 3 Annual O and M for operation of pollution control to ensure compliance with WQS		
B		Item 4 Annual O and M for operation of pollution control to ensure compliance with WQS		

Worksheet C

Section	Line	Description	Input	Data Source
A	1	Total annual cost of EXISTING pollution control	$142,500.00	Line 27, above
A	2	Amount of existing pollution control cost paid by households in the community	$142,500.00	Assumed 100%
A	3	Percent of existing pollution control cost paid by households in the community	100%	No other sources of revenue
A	4	Number of households	475	Line 10, above
B	6	Are households expected to provide revenues for the new polution control project in the same proportion that they support existing pollution control? YES [line 6 = percent from line 3 above], NO [Enter percentage households will pay]	100%	default assumes no other sources of revenue
C, Opt. A.		**Calculation of Total Annual Pollution Control Costs Per Household Based on Flow**		
CA	1	Expected total usage of project (e.g., MGD for wastewater treatment)	1	100% domestic
CA	2	Usage attributable to household use (MGD of household wastewater treatment capacity)	1	100% domestic

CA	4	Total annual cost of new wastewater pollution control to comply with WQS	$0.00	Worksheet C, Option A not used
CA	5	Industrial surcharges, if any	$0.00	Worksheet C, Option A not used

Worsheet D

Municipal Preliminary Screener

Section	Line	Description	Input	Data Source
A	2	Median household income	$40,952.00	Line 12, above
CALCULATED MUNICIPAL PRELIMINARY SCREENER			46.22%	

Worksheets Used To Derive Calculated Municipal Preliminary Screener

Worksheet B

Calculation of Total Annualized Project Costs

Section	Line #	Description	Value	Highlighted cells = user input values
A		**Capital Costs**		
A		Capital Costs of Project to Ensure Compliance with WQS	$8,260,030.45	line 26
A		Other one-time costs of the project	$0.00	
A	1	**Total Capital Costs**	$8,260,030.45	Sum of above
A	2	Portion of capital costs to be paid for with grant monies	$0.00	default
A	3	Capital costs to be financed	$8,260,030.45	total minus grant
A		Type of financing	loan	
A		Interest rate for financing (expressed as a decimal) (= I in annualization factor)	0.04375	line 14
A		Time period for financing (in years) (= n in annualization factor)	20	line 15
A	4	Annualization factor = a/p = i(1+i)^n/[(1+i)^n-1]	0.076046	calculated from i and n
A	5	**Annualized Capital Cost**	$628,140.00	line A3 x A4
B		**Operating and Maintenance Costs** Itemized. Include, monitoring, inspection, permitting fees, waste disposal charges, repair, administration, and replacement		
B		Item 1 Annual O and M for operation of pollution control to ensure compliance with WQS	$499,320	line 24
B		Item 2 Annual O and M for operation of pollution control to ensure compliance with WQS	$7,720,650	Line 22, above (disposal costs)
B		Item 3 Annual O and M for operation of pollution control to ensure compliance with WQS	$0	
B		Item 4 Annual O and M for operation of pollution control to ensure compliance with WQS	$0	
B				
B	6	**Total O&M Costs**	$8,219,970	sum

C	7	**Total Annual Cost of Pollution Control Necessary to Ensure Compliance with WQS**	$8,848,110.00	sum A5 and B6

Worksheet C

Calculation of Total Annual Wastewater Pollution Control Costs Per Household

A		**Current Pollution Control Costs:**		
A	1	Total annual cost of EXISTING pollution control	$142,500.00	line 27
A	2	Amount of existing pollution control cost paid by households in the community	$142,500.00	Assumed 100%
A	3	Percent of existing pollution control cost paid by households in the community	100%	
A	4	Number of households	475	Line 10, above
A	5	**Annual cost per household of EXISTING pollution control**	**$300.00**	Line A2/A4, above
B		**New Pollution Control Costs to Comply with WQS**		
B	6	Are households expected to provide revenues for the new polution control project in the same proportion that they support existing pollution control? YES [line 6 = percent from line 3 above], NO [Enter percentage households will pay]	100%	Assumed YES
B	7	Total annual cost of pollution control project [from C7 above]	$8,848,110.00	C7 Above
B	8	Proportion of costs households are expected to pay	100%	Assumed same as existing costs 100%
B	9	Amount to be paid by households [line 7 x line 8]	$8,848,110.00	B7 x B8
B	10	Annual cost per household for additional pollution control to comply with WQS.	$18,627.60	B9/Line 10
C		**Total (current + new wastewater pollution control to comply with WQS) pollution control cost per household**		
C	11	**Total annual cost of pollution control per household to comply with WQS**	**$18,927.60**	A5 + B10
C, Opt. A.		**Calculation of Total Annual Pollution Control Costs Per Household Based on Flow**		
CA		**Calculating project costs incurred by housholds based on flow**		
CA	1	Expected total usage of project (e.g., MGD for wastewater treatment)	1	
CA	2	Usage attributable to household use (MGD of household wastewater treatment capacity)	1	
CA	3	Percent of usage attributable to household huse	100.00%	
CA	4	Total annual cost of new wastewater pollution control to comply with WQS	$0.00	
CA	5	Industrial surcharges, if any	$0.00	
CA	6	Costs to be allocated	$0.00	

CA	7	Amount to be paid by households	$0.00	
CA	8	Annual project cost per household [= line 7/ line 4, worksheet C]	$0.00	
CA		**Total (current + new wastewater pollution control to comply with WQS) pollution control cost per household**		
CA	9 (C5)	Annual existing costs per household [from worksheet C, line 5]	$300.00	
CA	10	**Total annual cost of pollution control per household to comply with WQS**	$300.00	

Worsheet D

Municipal Preliminary Screener

The municipal preliminary screener indicates quickly whether a public entity will not incur any substantial economic impacts as a result of the proposed wastewater pollution control project. The formula is: (Total Annual Pollution Control Cost Per Household/Median Household Income) x 100

A		**Calculation of the Municipal Preliminary Screener**		
A	1	Total annual pollution control cost per household [either worksheet C, line 11 or worksheet C, Option A, Line 10]	$18,927.60	C11
A	2	Median household income	$40,952.00	Line 12
A	3	**Municipal Preliminary Screener**	46.22%	