APPENDIX E

MASS BALANCE CALCULATIONS

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E.1 MASS BALANCE CALCULATIONS

APPENDIX E

MASS BALANCE CALCULATIONS

E.1 CALCULATION ASSUMPTIONS

The mass balance presented in this Appendix has been prepared to provide a basis for the sizing and design of the equipment, pumps, and pipelines that will be utilized in the various sediment management activities that are described in this Draft Final Design Report. Since the submission of the Intermediate Design Report, the mass balance process flow diagrams (PFD) have been revised as part of the Final Design. The mass balance calculations have been revised accordingly.

The selected dredge contractor has proposed three dredges for the project. The production rates and slurry flow rates of each dredge have been calculated by the contractor based on the dredge characteristics, sediment geotechnical properties, booster pump locations, and pipeline size. These production rates and slurry flow rates are the basis for the mass balance calculations. As presented in this Appendix, two scenarios have been evaluated for each of Remediation Areas A, C, D, and E with the average precipitation, namely, the maximum flow produced by the dredge, and the average flow. The maximum flow scenario represents the mass balance of flows while dredging operations are ongoing using the largest dredge planned for each area. The average flow scenario incorporates the dredging "up-time" (assumed to be 70%) and estimated usage percentage of each dredge to produce combined average flows over the course of dredging in each area.

Due to the nature of dredging operations, the achieved percent solids produced will vary significantly over short periods of time, which will result in significant short-term variation in the proportion of water versus solids entering the system at a given time. The impact of these changes on processing equipment is expected to be minimal. Due to the time required for geotextile tube filtrate to flow through the gravel and/or drainage channels, water within the SCA will effectively have some residence time before reaching the basin sumps. This residence time will attenuate fluctuating solids content, limiting any potential impacts to the SCA WTP.

E.2 MATHCAD CALCULATIONS

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Sediment Management Design Mass Balance Calculation

1.0 Introduction

This package provides the mass balance calculations of the slurry transport, pre-processing, and geotextile tube dewatering for the Onondaga Lake project. The hydraulically dredged lake sediment will be transported as a slurry to the sediment consolidation area (SCA) located on Wastebed 13 via a pipeline. Upon reaching the SCA, the slurry will go through several steps of pre-processing and then the final geotextile tube dewatering. The geotextile tube filtrate, along with water from screened material stockpiles and surface contact water with the active SCA, will be treated in the water treatment plant located on Wastebed 13. The clarifier underflow and backwash water generated from the water treatment plant (WTP) will be sent back to the SCA and dewatered by geotextile tubes.

Following this introduction, Section 2 presents the definition of terms used in this calculation. Section 3 provides the assumptions. Section 4 contains a step-by-step mass balance calculation of the maximum flow scenario (5,500 gpm) for Remediation Areas (RA) D and E. Section 5 assembles the results in a table format. The calculations include average precipitation. The calculation of the average flow scenario (70% of the maximum flow or 3,850 gpm) uses the same set of equations and steps. The spreadsheets contained in this appendix present calculations for both the maximum and average flow scenarios. Mass balance calculation associated with the water treatment process has been provided in a separate submittal (DP#3) by O'Brien & Gere.

2.0 Definitions

Primary screening: The process of removing gravel-sized particles (> 1/4-inch) by passing the slurry through 1/4-inch screens.

Geotextile tube initial dewatering: The first 24 hours after the geotextile tube is filled.

Geotextile tube consolidation dewatering: The duration of 60 days after the initial dewatering. It is assumed that the primary consolidation within the geotextile tubes will complete during this period of time. Longer term consolidation or dewatering (secondary consolidation) is not considered in this calculation.

Filtrate: Including water and total suspended solids.

Geotextile tube filtrate: The summation of filtrate from the geotextile tube initial and consolidation dewatering.

Stockpile filtrate: The filtrate generated by change in water content of screened material stockpile (gravel-sized particles).

Total filtrate: The summation of geotextile tube filtrate and stockpile filtrate. The total filtrate will be sent to the SCA water treatment plant for treatment.

RA-D: For slurry from Remediation Areas D, the dewatering process includes primary screening for gravel-sized particle removal, polymer injection, and geotextile tube dewatering. It is expected the slurry from Remediation Area C will undergo the same process.

RA-E: For slurry from Remediation Area E, the dewatering process includes primary screening for gravel-sized particle removal, polymer and coagulant injection, and geotextile tube dewatering. It is expected the slurry from Remediation Areas A and B will undergo the same process.

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3.0 Parameters and Assumptions

- Geotextile tube consolidation dewatering is assumed to complete in 60 days after the initial dewatering. This calculation considers consolidation dewatering peak flow scenario, which starts from 61 days after the first tube is filled and ends at one day after the last tube is filled for the season.
- Polymer and coagulant particles injected to the slurry will be captured in the geotextile tube during the initial dewatering.
- $\rho_w \coloneqq 1 \frac{gm}{cm^3} \qquad \qquad \rho_w = 62.4279606 \cdot \frac{lb}{ft^3}$ Water density:
- Maximum slurry flow rate: q := 5500 gpm , where gpm is gallons per minute.
- Average slurry flow rate: $q_a := q.70\%$ $q_a = 3850 \cdot gpm$
- maximum slurry solids content by weight (Table 1):
 - RA-D: $P_{s D} := 12.0\%$
 - RA-E: $P_{s E} := 18.5\%$
- Specific gravity of lake sediment (Table 1):
 - RA-D: $Gs_D := 2.52$
 - RA-E: $Gs_{\mathbf{F}} := 2.58$
- The specific gravity of total suspended solids in geotextile tube filtrate and precipitation runoff is assumed to be the same as lake sediment of each remediation area.
- $WC_{istock} = 25\%$, based on vendor's estimate. Initial water content of screened material stockpile:
- Final water content of screened material stockpile: $WC_{fstock} \coloneqq 15\%$, assumed value.
- Total suspended solids (TSS) in geotextile tube filtrate, based on O'Brien & Gere's estimate:

$$TSS_{tube_filtrate} := 200 \frac{mg}{L}$$

Assumed TSS in stockpile filtrate (filtrate generated by change in stockpile water content):

$$TSS_{stock_filtrate} := 200 \frac{mg}{L}$$

- $A_{S1} := 40000 \text{ft}^2$ Stockpile runoff area (Sump#1):
- $TSS_{S1} := 200 \frac{mg}{T}$ Assumed TSS in runoff to stockpile area sump (Sump#1):
- $A_{S2} = 53483 \text{ft}^2$ Screen runoff area (Sump#2):
- $TSS_{S2} := 200 \frac{mg}{I}$ Assumed TSS in runoff to screen area sump (Sump#2):
- $A_{S3} := 37711 \text{ft}^2$ Polymer and decon runoff area (Sump#3):

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- Assumed TSS in runoff to polymer/decon area sump (Sump#3): ${
 m TSS}_{S3} := 200 \, {
 m mg}_{T}$
- $A_{S4} := 236949 \text{ft}^2$ WTP runoff area (Sump#4):
- $TSS_{S4} := 200 \frac{mg}{I}$ Assumed TSS in runoff to WTP area sump (Sump#4):
- Assumed specific gravity of TSS in runoff to Sump#1,2,3,4: $Gs_{runoff} := 2.6$
- $\text{Maximum booster pump seal water (each)} \ q_{\text{booster}} \coloneqq 0 \\ \text{gpm} \qquad \text{, booster pumps will use slurry decant water for seal water.}$
- Average booster pump seal water (each): $q_{booster} = 0 \cdot gpm$ $q_{booster\ a} := q_{booster} \cdot 70\%$
- Number of booster pumps: $N_{booster} := 4$
- Maximum geotextile tube feed pump seal water (each): $q_{tube\ pump} := 12gpm$
- Average geotextile tube feed pump seal water (each): $q_{tube_pump_a} = 8.4 \cdot gpm$ $q_{\text{tube pump a}} := q_{\text{tube pump}} \cdot 70\%$
- Number of active geotextile tube feed pumps: $N_{tube\ pump} := 2$
- Maximum primary screen wash water: $q_{primary} = 306.72 gpm$, based on vendor's estimate.
- Average primary screen wash water: $q_{primary a} := q_{primary} \cdot 70\%$ $q_{primary a} = 214.7 \cdot gpm$
- Clarifier underflow from the SCA water treatment plant, based on WTP DP#3.:

$$\label{eq:qclarifier} \textit{q}_{clarifier} \coloneqq 708.4 \textit{gpm} \quad \textit{TSS}_{clarifier} \coloneqq 1571 \, \frac{mg}{L} \qquad \qquad \text{, where TSS is total suspended solids.}$$

Spent MMF backwash from the SCA water treatment plant, based on WTP DP#3:

$$q_{MMF} := 166.3 \text{gpm}$$
 $TSS_{MMF} := 159.2 \frac{mg}{L}$

Spent GAC backwash from the SCA water treatment plant, based on WTP DP#3:

$$q_{GAC} := 117.7 \text{gpm}$$
 $TSS_{GAC} := 128.4 \frac{mg}{I}$

Average percentage of gravel-sized particle (removed by primary screen) (Table 1):

RA-D:
$$P_{gravel_D} = 0.5\%$$

RA-E:
$$P_{gravel_E} = 0.4\%$$

Average percentage of fines (silt and clay-sized particles) (Table 1):

RA-D:
$$P_{fine_D} = 90.0\%$$

$$P_{fine_E} = 43.3\%$$

Note: The polymer and coagulant dosage is based on dry weight of fines, not the total dry solids weight.

Solids content by weight after initial dewatering in geotextile tubes (i.e., after the first 24 hrs):

$$P_{s2} := 38\%$$
 ,based on P-GDT results.

Consolidation dewatering in the geotextile tube will take 60 days to complete, with equal daily filtrate volume. Total days of consolidation dewatering:

$$t_c := 60 \text{day}$$

Solids content by weight after consolidation dewatering in geotextile tubes (i.e., 60 days after the first 24 hrs):

$$P_{s3} := 50\%$$

- SCA and basins open area: $A_{SCA} := 71.25$ acre
- SCA WTP design capacity, based on WTP DP#3:

$$q_{WTP influent} := 5663 gpm$$

$$TSS_{WTP_influent} := 200.5 \frac{mg}{L}$$

Maximum discharge to Metro WTP from SCA WTP, based on WTP DP#3:

$$MAX_{discharge} := 6.5 \cdot 10^{6} \frac{gal}{day}$$
 $MAX_{discharge} = 4513.9 \cdot gpm$

$$TSS_{discharge} := 4.5 \frac{mg}{L}$$

 $PRE_{daily} := 0.15 \frac{in}{day}$ daily average precipitation based on onsite met data Precipitation:

$$PRE_{25yr} \coloneqq 4.5 \frac{in}{day}$$
 25-year 24-hour storm

$$PRE_{100yr} := 6 \frac{in}{day}$$
 100-year 24-hour storm

4.0 Calculations

4.1 Incoming Slurry

Slurry water content:

RA-D:
$$WC_D := \frac{1 - P_{s_D}}{P_{s_D}}$$
 $WC_D = 733.3.\%$

RA-E:
$$WC_E := \frac{1 - P_{s_E}}{P_{s_E}}$$
 $WC_E = 440.5 \cdot \%$

Water in slurry:

$$\text{Volume} \qquad \qquad q_{w_D} \coloneqq \frac{q \cdot \left(1 - P_{s_D}\right) \cdot G s_D}{P_{s_D} + \left(1 - P_{s_D}\right) \cdot G s_D} \qquad \qquad q_{w_D} = 7513429 \cdot \frac{gal}{day}$$

$$W_{w_D} := q_{w_D} \cdot \rho_w \qquad \qquad W_{w_D} = 62702608.2 \cdot \frac{lb}{day}$$

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RA-E:

$$\text{Volume} \qquad \qquad q_{w_E} \coloneqq \frac{q \cdot \left(1 - P_{s_E}\right) \cdot G s_E}{P_{s_E} + \left(1 - P_{s_E}\right) \cdot G s_E} \qquad \qquad q_{w_E} = 7279531 \cdot \frac{gal}{day}$$

$$q_{w_E} = 7279531 \cdot \frac{gal}{day}$$

$$w_{w_E} \coloneqq \mathsf{q}_{w_E} \cdot \mathsf{p}_w$$

$$W_{w_{-}E} = 60750636.8 \cdot \frac{lb}{day}$$

Solids in slurry:

RA-D:

$$\text{Volume (zero void ratio)} \quad q_{s_D} \coloneqq \frac{q \cdot P_{s_D}}{P_{s_D} + \left(1 - P_{s_D}\right) \cdot Gs_D} \qquad \qquad q_{s_D} = 406570.8 \cdot \frac{gal}{day}$$

$$q_{s_D} = 406570.8 \cdot \frac{\text{gal}}{\text{day}}$$

$$W_{s_D} := q_{s_D} \cdot Gs_D \cdot \rho_w$$

$$W_{s_D} = 8550356 \cdot \frac{lb}{day}$$

RA-E:

$$\label{eq:volume void ratio} \text{Volume (zero void ratio)} \quad q_{\underline{s}_E} \coloneqq \frac{q_{\cdot}P_{\underline{s}_E}}{P_{\underline{s}_E} + \left(1 - P_{\underline{s}_E}\right) \cdot Gs_E} \qquad \qquad q_{\underline{s}_E} = 640469 \cdot \frac{gal}{day}$$

$$\mathbf{q}_{s_E} = 640469 \cdot \frac{gal}{day}$$

$$W_{s_E} := q_{s_E} \cdot Gs_E \cdot \rho_W$$

$$W_{s_E} = 13790022 \cdot \frac{lb}{day}$$

4.2 Primary Screening for Gravel-Sized Particle Removal

Weight of removed gravel-sized particles:

RA-D:
$$W_{gravel_D} := W_{s_D} \cdot P_{gravel_D}$$
 $W_{gravel_D} = 42751.8 \cdot \frac{lb}{day}$

$$W_{gravel_D} = 42751.8 \cdot \frac{lb}{day}$$

RA-E:
$$W_{gravel_E} := W_{s_E} \cdot P_{gravel_E}$$
 $W_{gravel_E} = 55160.1 \cdot \frac{lb}{day}$

$$W_{gravel_E} = 55160.1 \cdot \frac{lb}{day}$$

Volume of removed gravel-sized particles (zero void ratio):

RA-D:
$$q_{gravel_D} := q_{s_D} \cdot P_{gravel_D}$$
 $q_{gravel_D} = 2032.9 \cdot \frac{gal}{day}$

$$q_{gravel_D} = 2032.9 \cdot \frac{gal}{day}$$

RA-E:
$$q_{gravel_E} := q_{s_E} \cdot P_{gravel_E}$$
 $q_{gravel_E} = 2561.9 \cdot \frac{gal}{day}$

$$q_{gravel_E} = 2561.9 \cdot \frac{gal}{day}$$

Weight of water removed with gravel-sized particles:

RA-D:
$$W_{w_gravel_D} := W_{gravel_D} \cdot WC_{istock}$$
 $W_{w_gravel_D} = 10687.9 \cdot \frac{lb}{day}$

$$W_{w_gravel_D} = 10687.9 \cdot \frac{lb}{day}$$

$$\mathsf{RA-E:} \quad \mathbf{W}_{\mathbf{w_gravel_E}} \coloneqq \mathbf{W}_{\mathbf{gravel_E}} \cdot \mathbf{WC}_{\mathbf{istock}}$$

$$W_{w_gravel_E} = 13790 \cdot \frac{lb}{day}$$

Volume of water removed with gravel-sized particles:

$$\text{RA-D:} \quad q_{w_gravel_D} \coloneqq \frac{W_{w_gravel_D}}{\rho_w}$$

$$q_{w_gravel_D} = 1280.7 \cdot \frac{gal}{day}$$

$$\text{RA-E:} \quad q_{w_gravel_E} \coloneqq \frac{W_{w_gravel_E}}{\rho_w} \qquad \qquad q_{w_gravel_E} = 1652.4 \cdot \frac{gal}{day}$$

$${\rm q_{w_gravel_E} = 1652.4.\frac{gal}{day}}$$

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Remaining dry solids weight in the slurry:

RA-D:
$$W_{sr1_D} := W_{s_D} - W_{gravel_D}$$
 $W_{sr1_D} = 8507603.9 \cdot \frac{lb}{day}$

RA-E:
$$W_{sr1_E} := W_{s_E} - W_{gravel_E}$$
 $W_{sr1_E} = 13734861.8 \cdot \frac{lb}{day}$

Remaining solids volume in the slurry (zero void ratio):

RA-D:
$$q_{sr1_D} := q_{s_D} - q_{gravel_D}$$
 $q_{sr1_D} = 404538 \cdot \frac{gal}{day}$

RA-E:
$$q_{sr1_E} := q_{s_E} - q_{gravel_E}$$
 $q_{sr1_E} := 637906.7 \cdot \frac{gal}{day}$

Remaining water weight in the slurry:

with screen wash water and geotextile tube feed pump seal water

RA-D:

$$\mathbf{W_{wr1_D}} \coloneqq \mathbf{W_{w_D}} - \mathbf{W_{w_gravel_D}} + \left(\mathbf{q_{primary}} + \mathbf{q_{tube_pump}} \cdot \mathbf{N_{tube_pump}}\right) \cdot \rho_{\mathbf{w}} \qquad \mathbf{W_{wr1_D}} = 66666309.2 \cdot \frac{\mathbf{lb}}{\mathbf{day}}$$

RA-E:

$$w_{wr1_E} \coloneqq w_{w_E} - w_{w_gravel_E} + \left(q_{primary} + q_{tube_pump} \cdot N_{tube_pump}\right) \cdot \rho_{w} \\ w_{wr1_E} = 64711235.6 \cdot \frac{lb}{day} \cdot \frac{lb}{day}$$

Remaining water volume in the slurry:

with screen wash water and geotextile tube feed pump seal water

RA-D:

$$q_{wr1_D} \coloneqq q_{w_D} - q_{w_gravel_D} + q_{primary} + q_{tube_pump} \cdot N_{tube_pump} \qquad q_{wr1_D} = 7988385.3 \cdot \frac{gal}{day}$$

RA-E:

$$q_{wr1_E} := q_{w_E} - q_{w_gravel_E} + q_{primary} + q_{tube_pump} \cdot N_{tube_pump}$$

$$q_{wr1_E} = 7754115.8 \cdot \frac{gal}{day}$$

4.5 Total Flow from SCA WTP (Clarifier Underflow and MMF and GAC Backwash Water)

Total flow from WTP:

$$\mathbf{q_{WTP}} \coloneqq \mathbf{q_{clarifier}} + \mathbf{q_{MMF}} + \mathbf{q_{GAC}} \qquad \qquad \mathbf{q_{WTP}} = 992.4 \cdot \mathbf{gpm} \qquad \qquad \mathbf{q_{WTP}} = 1429056 \cdot \frac{\mathbf{gal}}{\mathbf{day}}$$

Weight of total suspended solids (TSS) from SCA WTP:

All Remediation Areas:

$$W_{WTP_TSS} := q_{clarifier} \cdot TSS_{clarifier} + q_{MMF} \cdot TSS_{MMF} + q_{GAC} \cdot TSS_{GAC}$$

$$W_{\mbox{WTP_TSS}} = 9.6 \cdot \frac{\mbox{lb}}{\mbox{min}} \qquad \qquad W_{\mbox{WTP_TSS}} = 13873.8768703 \cdot \frac{\mbox{lb}}{\mbox{day}} \label{eq:WTP_TSS}$$

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Volume of total suspended solids (TSS) from SCA WTP (zero void ratio):

RA-D:

$$q_{\text{WTP_TSS_D}} \coloneqq \frac{W_{\text{WTP_TSS}}}{G_{s_{\text{D}}, \rho_{w}}}$$

$$q_{WTP_TSS_D} = 0.458 \cdot gpr$$

$$q_{WTP_TSS_D} = 0.458 \cdot \text{gpm}$$
 $q_{WTP_TSS_D} = 659.7 \cdot \frac{\text{gal}}{\text{day}}$

RA-E:

$$q_{\mbox{WTP_TSS_E}} \coloneqq \frac{\mbox{W}_{\mbox{WTP_TSS}}}{\mbox{Gs}_{\mbox{E}} \cdot \mbox{$\rho_{\mbox{W}}$}}$$

$$q_{WTP_TSS_E} = 0.447 \cdot gpn$$

$$q_{\text{WTP_TSS_E}} = 0.447 \cdot \text{gpm}$$
 $q_{\text{WTP_TSS_E}} = 644.4 \cdot \frac{\text{gal}}{\text{day}}$

Volume of water from SCA WTP:

RA-D:

$$\mathbf{q_{W_WTP_D}} := \mathbf{q_{clarifier}} \left(1 - \frac{\mathbf{TSS_{clarifier}}}{\mathbf{Gs_{D}} \cdot \rho_{w}} \right) + \mathbf{q_{MMF}} \left(1 - \frac{\mathbf{TSS_{MMF}}}{\mathbf{Gs_{D}} \cdot \rho_{w}} \right) + \mathbf{q_{GAC}} \left(1 - \frac{\mathbf{TSS_{GAC}}}{\mathbf{Gs_{D}} \cdot \rho_{w}} \right) \\ = \mathbf{q_{W_WTP_D}} = 991.9 \cdot \mathbf{gpm}$$

RA-E:

$$q_{\mbox{W-WTP_E}} := q_{\mbox{clarifier}} \cdot \left(1 - \frac{\mbox{TSS}_{\mbox{clarifier}}}{\mbox{Gs}_{\mbox{E}} \cdot \mbox{ρ_{W}}}\right) + q_{\mbox{MMF}} \left(1 - \frac{\mbox{TSS}_{\mbox{MMF}}}{\mbox{Gs}_{\mbox{E}} \cdot \mbox{ρ_{W}}}\right) + q_{\mbox{GAC}} \cdot \left(1 - \frac{\mbox{TSS}_{\mbox{GAC}}}{\mbox{Gs}_{\mbox{E}} \cdot \mbox{ρ_{W}}}\right) \\ = q_{\mbox{W-WTP_E}} = 992.0 \cdot \mbox{gpm}$$

Weight of water from SCA WTP:

RA-D:

$$W_{W_WTP_D} := q_{W_WTP_D} \cdot \rho_w$$

$$W_{W_WTP_D} = 8278.2 \cdot \frac{lb}{min}$$

$$W_{\text{W_WTP_D}} \coloneqq q_{\text{W_WTP_D}} \cdot \rho_{\text{w}} \qquad \qquad W_{\text{W_WTP_D}} = 8278.2 \cdot \frac{\text{lb}}{\text{min}} \qquad \qquad W_{\text{W_WTP_D}} = 11920545.4 \cdot \frac{\text{lb}}{\text{day}}$$

RA-E:

$$W_{W_WTP_E} := q_{W_WTP_E} \cdot \rho_{W}$$

$$W_{W_WTP_E} = 8278.2 \cdot \frac{lb}{min}$$

$$w_{W_WTP_E} \coloneqq q_{W_WTP_E} \cdot \rho_{w} \qquad \qquad w_{W_WTP_E} = 8278.2 \cdot \frac{lb}{min} \qquad \qquad w_{W_WTP_E} = 11920673.4 \cdot \frac{lb}{day}$$

4.6 Screened Material Stockpile Filtrate

Weight of water in filtrate from screened material stockpile:

RA-D:

$$W_{w_stock_filtrate_D} := \left(WC_{istock} - WC_{fstock}\right) \cdot W_{gravel_D} \qquad W_{w_stock_filtrate_D} = 4275.2 \cdot \frac{lb}{day}$$

$$W_{w_stock_filtrate_D} = 4275.2 \cdot \frac{lb}{day}$$

RA-E:

$$W_{w_stock_filtrate_E} := (WC_{istock} - WC_{fstock}) \cdot W_{gravel_E}$$
 $W_{w_stock_filtrate_E} = 5516 \cdot \frac{lb}{day}$

$$W_{w_stock_filtrate_E} = 5516 \cdot \frac{lb}{day}$$

Volume of water in filtrate from screened material stockpile:

$$q_{w_stock_filtrate_D} := \frac{W_{w_stock_filtrate_D}}{\rho_{w}} \qquad \qquad q_{w_stock_filtrate_D} = 512.3 \cdot \frac{gal}{day}$$

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RA-E:

$$q_{w_stock_filtrate_E} \coloneqq \frac{W_{w_stock_filtrate_E}}{\rho_{w}} \qquad \qquad q_{w_stock_filtrate_E} = 661 \cdot \frac{gal}{day}$$

Weight of total suspended solids in stockpile filtrate:

RA-D:

$$\begin{split} W_{TSS_stock_filtrate_D} &:= \frac{q_{w_stock_filtrate_D} \cdot TSS_{stock_filtrate} \cdot Gs_D \cdot \rho_w}{Gs_D \cdot \rho_w - TSS_{stock_filtrate}} \\ W_{TSS_stock_filtrate_D} &= 0.86 \cdot \frac{lb}{day} \qquad W_{TSS_stock_filtrate_D} &= 0.000269 \cdot \frac{kg}{min} \end{split}$$

RA-E:

$$\begin{split} W_{TSS_stock_filtrate_E} &:= \frac{q_{w_stock_filtrate_E} \cdot TSS_{stock_filtrate} \cdot Gs_E \cdot \rho_w}{Gs_E \cdot \rho_w - TSS_{stock_filtrate}} \\ W_{TSS_stock_filtrate_E} &= 1.1 \cdot \frac{lb}{day} & W_{TSS_stock_filtrate_E} &= 0.0003 \cdot \frac{kg}{min} \end{split}$$

Volume of total suspended solids in stockpile filtrate (zero void ratio):

RA-D:

RA-E:

$$\begin{aligned} q_{TSS_stock_filtrate_E} &:= \frac{W_{TSS_stock_filtrate_E}}{Gs_E \cdot \rho_w} \\ q_{TSS_stock_filtrate_E} &= 0.051 \cdot \frac{gal}{day} \\ q_{TSS_stock_filtrate_E} &= 3.558 \times 10^{-5} \cdot gpm \end{aligned}$$

Weight of stockpile filtrate:

RA-D:

$$W_{\text{stock_filtrate_D}} := W_{\text{w_stock_filtrate_D}} + W_{\text{TSS_stock_filtrate_D}}$$
 $W_{\text{stock_filtrate_D}} := 4276 \cdot \frac{\text{lb}}{\text{day}}$
 $W_{\text{stock_filtrate_D}} := 4276 \cdot \frac{\text{lb}}{\text{day}}$

RA-E:

$$W_{stock_filtrate_E} := W_{w_stock_filtrate_E} + W_{TSS_stock_filtrate_E}$$

$$W_{stock_filtrate_E} := 5517.1 \cdot \frac{lb}{day}$$

Volume of stockpile filtrate:

RA-D:

$$q_{stock_filtrate_D} := q_{w_stock_filtrate_D} + q_{TSS_stock_filtrate_D}$$

$$q_{stock_filtrate_D} = 512.3 \cdot \frac{gal}{day}$$

RA-E:

$$q_{stock_filtrate_E} := q_{w_stock_filtrate_E} + q_{TSS_stock_filtrate_E}$$

$$q_{stock_filtrate_E} = 661 \cdot \frac{gal}{day}$$

Weight of final dry solids in stockpile (total minus TSS):

$$W_{s_stock_D} := W_{gravel_D} - W_{TSS_stock_filtrate_D}$$

$$W_{s_stock_D} = 42750.9 \cdot \frac{lb}{day}$$

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RA-E:

$$W_{s_stock_E} \coloneqq W_{gravel_E} - W_{TSS_stock_filtrate_E}$$

$$W_{s_stock_E} = 55159 \cdot \frac{lb}{day}$$

Volume of final solids in stockpile (zero void ratio, total minus TSS):

RA-D:

$$\begin{split} q_{s_stock_D} &\coloneqq \frac{W_{s_stock_D}}{Gs_D \cdot \rho_w} & q_{s_stock_D} = 2032.8 \cdot \frac{gal}{day} \\ \text{RA-E:} & \\ q_{s_stock_E} &\coloneqq \frac{W_{s_stock_E}}{Gs_E \cdot \rho_w} & q_{s_stock_E} = 2561.8 \cdot \frac{gal}{day} \end{split}$$

$$q_{s_stock_D} = 2032.8 \cdot \frac{gal}{day}$$

$$q_{s_stock_E} := \frac{W_{s_stock_E}}{G_{s_E} \cdot \rho_W}$$

$$q_{s_stock_E} = 2561.8 \cdot \frac{gal}{day}$$

4.7 Runoff from WTP and Processing Area

4.7.1 Runoff from stockpile area (Sump#1)

Volume of water in runoff from stockpile area (Sump#1):

$$q_{w_S1} := A_{S1} \cdot PRE_{daily}$$

$$q_{w_S1} = 3740.3 \cdot \frac{gal}{day}$$
 $q_{w_S1} = 2.6 \cdot gpm$

$$q_{w_S1} = 2.6 \cdot gpm$$

Weight of water in runoff from stockpile area (Sump#1):

$$W_{w_S1} \coloneqq q_{w_S1} \cdot \rho_w$$

$$W_{w_S1} = 31214 \cdot \frac{lb}{day}$$
 $W_{w_S1} = 21.7 \cdot \frac{lb}{min}$

$$W_{w_S1} = 21.7 \cdot \frac{lb}{min}$$

Weight of total suspended solids in runoff from stockpile area (Sump#1):

RA-D:

$$\mathbf{W}_{TSS_S1_D} \coloneqq \frac{\mathbf{q}_{\mathbf{w}_S1} \cdot TSS_{S1} \cdot Gs_{D} \cdot \mathbf{\rho}_{\mathbf{w}}}{Gs_{D} \cdot \mathbf{\rho}_{\mathbf{w}} - TSS_{S1}}$$

$$W_{TSS_S1_D} = 6.24 \cdot \frac{lb}{day}$$

$$W_{TSS_S1_D} = 6.24 \cdot \frac{lb}{day} \qquad W_{TSS_S1_D} = 0.001967 \cdot \frac{kg}{min}$$

Þ RA-E:

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$$w_{TSS_S1_E} \coloneqq \frac{q_{w_S1} \cdot TSS_{S1} \cdot Gs_E \cdot \rho_w}{Gs_E \cdot \rho_w - TSS_{S1}} \qquad w_{TSS_S1_E} = 6.24 \cdot \frac{lb}{day} \qquad w_{TSS_S1_E} = 0.001967 \cdot \frac{kg}{min}$$

$$W_{TSS_S1_E} = 6.24 \cdot \frac{lb}{day}$$

$$W_{TSS_S1_E} = 0.001967 \cdot \frac{kg}{min}$$

Volume of total suspended solids in runoff from stockpile area (Sump#1, zero void ratio):

$$q_{TSS_S1_D} := \frac{W_{TSS_S1_D}}{Gs_{D} \cdot \rho_{w}}$$

$$q_{TSS_S1_D} = 0.297 \cdot \frac{gal}{day}$$

$$q_{TSS_S1_D} = 2.06159 \times 10^{-4} \text{ gpm}$$

RA-E:

$$q_{TSS_S1_E} := \frac{W_{TSS_S1_E}}{G_{SE}:0}$$

$$q_{TSS_S1_E} = 0.29 \cdot \frac{gal}{day}$$

$$q_{TSS_S1_E} \coloneqq \frac{W_{TSS_S1_E}}{G_{S_E} \cdot \rho_w} \qquad \qquad q_{TSS_S1_E} = 0.29 \cdot \frac{gal}{day} \qquad \qquad q_{TSS_S1_E} = 2.01365 \times 10^{-4} \cdot gpm$$

Weight of runoff from stockpile area (Sump#1):

$$W_{S1_D} := W_{W_S1} + W_{TSS_S1_D}$$

$$W_{S1_D} = 31220.2 \cdot \frac{lb}{day}$$

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RA-E:

$$W_{S1_E} := W_{w_S1} + W_{TSS_S1_E}$$

$$W_{S1_E} = 31220.2 \cdot \frac{lb}{day}$$

Volume of runoff from stockpile area (Sump#1):

RA-D:

$$q_{S1_D} := q_{w_S1} + q_{TSS_S1_D}$$

$$q_{S1_D} = 3740.6 \cdot \frac{gal}{day}$$

$$q_{S1}$$
 D = 2.6·gpm

RA-E:

$$q_{S1_E} := q_{w_S1} + q_{TSS_S1_E}$$

$$q_{S1_E} = 3740.5 \cdot \frac{gal}{day}$$

$$q_{S1_E} = 2.6 \cdot \text{gpm}$$

4.7.2 Runoff from screen area (Sump#2)

Volume of water in runoff from screen area (Sump#2):

$$q_{w_S2} := A_{S2} \cdot PRE_{daily}$$

$$q_{w_S2} = 5001 \cdot \frac{\text{gal}}{\text{day}}$$
 $q_{w_S2} = 3.47 \cdot \text{gpm}$

$$q_{w_S2} = 3.47 \cdot gpm$$

Weight of water in runoff from screen area (Sump#2):

$$W_{w_S2} \coloneqq q_{w_S2} \cdot \rho_w$$

$$W_{w_{-}S2} = 41735.4 \cdot \frac{lb}{day}$$
 $W_{w_{-}S2} = 29 \cdot \frac{lb}{min}$

$$W_{w_S2} = 29 \cdot \frac{lb}{min}$$

Weight of total suspended solids in runoff from screen area (Sump#2):

RA-D:

$$\mathbf{W}_{TSS_S2_D} \coloneqq \frac{\mathbf{q}_{\mathbf{W}_S2} \cdot TSS_{S2} \cdot Gs_{D} \cdot \rho_{\mathbf{W}}}{Gs_{D} \cdot \rho_{\mathbf{W}} - TSS_{S2}}$$

$$W_{TSS_S2_D} = 8.35 \cdot \frac{lb}{day}$$

$$W_{TSS_S2_D} = 8.35 \cdot \frac{lb}{day}$$
 $W_{TSS_S2_D} = 0.002629 \cdot \frac{kg}{min}$

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RA-E:

$$W_{TSS_S2_E} := \frac{q_{w_S2} \cdot TSS_{S2} \cdot Gs_{E} \cdot \rho_{w}}{Gs_{E} \cdot \rho_{w} - TSS_{S2}}$$

$$W_{TSS_S2_E} = 8.35 \cdot \frac{lb}{day}$$

$$W_{TSS_S2_E} = 8.35 \cdot \frac{lb}{day}$$
 $W_{TSS_S2_E} = 0.002629 \cdot \frac{kg}{min}$

Volume of total suspended solids in runoff from screen area (Sump#2, zero void ratio):

RA-D:

$$q_{TSS_S2_D} \coloneqq \frac{W_{TSS_S2_D}}{Gs_D.\rho_w}$$

$$q_{TSS_S2_D} = 0.397 \cdot \frac{gal}{day}$$

$$q_{TSS_S2_D} = 2.75651 \times 10^{-4} \cdot gpm$$

$$q_{TSS_S2_E} := \frac{W_{TSS_S2_E}}{G_{S_E} \cdot \rho_{vv}}$$

$$q_{TSS_S2_E} = 0.388 \cdot \frac{gal}{day}$$

$$q_{TSS_S2_E} = 2.6924 \times 10^{-4} \cdot gpm$$

Weight of runoff from screen area (Sump#2):

$$W_{S2_D} \coloneqq W_{w_S2} + W_{TSS_S2_D}$$

$$W_{S2_D} = 41743.8 \cdot \frac{lb}{day}$$

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Þ RA-E:

$$W_{S2} = W_{W S2} + W_{TSS S2} = W_{W S2} + W_{W S2} +$$

$$W_{S2_E} = 41743.8 \cdot \frac{lb}{day}$$

Volume of runoff from screen area (Sump#2):

RA-D:

$$q_{S2_D} := q_{w_S2} + q_{TSS_S2_D}$$

$$q_{S2_D} = 5001.4 \cdot \frac{gal}{day}$$

$$q_{S2_D} = 3.5 \cdot \text{gpm}$$

RA-E:

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$$q_{S2_E} := q_{w_S2} + q_{TSS_S2_E}$$

$$q_{S2_E} = 5001.4 \cdot \frac{gal}{day}$$

$$q_{S2_E} = 3.5 \cdot \text{gpm}$$

4.7.3 Runoff from polymer/decon area (Sump#3)

Volume of water in runoff from polymer/decon area (Sump#3):

$$q_{w_S3} := A_{S3} \cdot PRE_{daily}$$

$$q_{w_S3} = 3526.2 \cdot \frac{gal}{day}$$

$$q_{w_S3} = 2.45 \cdot \text{gpm}$$

Weight of water in runoff from polymer/decon area (Sump#3):

$$W_{w_S3} \coloneqq q_{w_S3} \cdot \rho_w$$

$$W_{W_S3} = 29427.8 \cdot \frac{lb}{day}$$
 $W_{W_S3} = 20.4 \cdot \frac{lb}{min}$

$$W_{w_S3} = 20.4 \cdot \frac{lb}{min}$$

Weight of total suspended solids in runoff from polymer/decon area (Sump#3):

RA-D:

$$W_{TSS_S3_D} \coloneqq \frac{q_{w_S3} \cdot TSS_{S3} \cdot Gs_D \cdot \rho_w}{Gs_D \cdot \rho_w - TSS_{S3}}$$

$$W_{TSS_S3_D} = 5.89 \cdot \frac{lb}{day}$$

$$W_{TSS_S3_D} = 5.89 \cdot \frac{lb}{day}$$
 $W_{TSS_S3_D} = 0.001854 \cdot \frac{kg}{min}$

RA-E:

$$W_{TSS_S3_E} \coloneqq \frac{q_{w_S3} \cdot TSS_{S3} \cdot Gs_E \cdot \rho_w}{Gs_E \cdot \rho_w - TSS_{S3}}$$

$$W_{TSS_S3_E} = 5.89 \cdot \frac{lb}{day}$$

$$W_{TSS_S3_E} = 5.89 \cdot \frac{lb}{day} \qquad W_{TSS_S3_E} = 0.001854 \cdot \frac{kg}{min}$$

Volume of total suspended solids in runoff from polymer/decon area (Sump#3, zero void ratio):

RA-D:

$$q_{TSS_S3_D} \coloneqq \frac{W_{TSS_S3_D}}{Gs_D \cdot \rho_W}$$

$$q_{TSS_S3_D} = 0.28 \cdot \frac{gal}{day}$$

$$q_{TSS_S3_D} = 1.94362 \times 10^{-4} \cdot gpm$$

RA-E:

$$q_{TSS_S3_E} \coloneqq \frac{w_{TSS_S3_E}}{Gs_{F} \cdot \rho_{w}}$$

$$q_{TSS_S3_E} = 0.273 \cdot \frac{gal}{day}$$

$$q_{TSS_S3_E} = 1.89842 \times 10^{-4} \cdot gpm$$

Weight of runoff from polymer/decon area (Sump#3):

$$W_{S3_D} \coloneqq W_{w_S3} + W_{TSS_S3_D}$$

$$W_{S3_D} = 29433.6 \cdot \frac{lb}{day}$$

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RA-E:

$$\mathbf{W}_{\mathbf{S3_E}} \coloneqq \mathbf{W}_{\mathbf{W_S3}} + \mathbf{W}_{\mathbf{TSS_S3_E}}$$

$$W_{S3_E} = 29433.6 \cdot \frac{lb}{day}$$

Volume of runoff from polymer/decon area (Sump#3):

RA-D:

$$q_{S3_D} := q_{w_S3} + q_{TSS_S3_D}$$

$$q_{S3_D} = 3526.5 \cdot \frac{gal}{day}$$

$$\mathrm{q}_{S3_D} = 2.4 \cdot \mathrm{gpm}$$

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RA-E:

$$q_{S3_E} := q_{w_S3} + q_{TSS_S3_E}$$

$$q_{S3_E} = 3526.5 \cdot \frac{gal}{day}$$

$$q_{S3_E} = 2.4 \cdot gpm$$

4.7.4 Runoff from WTP area (Sump#4)

Volume of water in runoff from WTP area (Sump#4):

$$\mathbf{q}_{\mathbf{w_S4}} \coloneqq \mathbf{A_{S4}} \cdot \mathbf{PRE}_{\mathbf{daily}}$$

$$q_{w_S4} = 22156.3 \cdot \frac{\text{gal}}{\text{day}}$$

$$\mathrm{q}_{w_S4} = 15.39 \!\cdot\! \mathrm{gpm}$$

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Weight of water in runoff from WTP area (Sump#4):

$$\mathbf{W}_{\mathbf{w_S4}} \coloneqq \mathbf{q}_{\mathbf{w_S4}} \cdot \boldsymbol{\rho}_{\mathbf{w}}$$

$$W_{w_S4} = 184903 \cdot \frac{lb}{day}$$
 $W_{w_S4} = 128.4 \cdot \frac{lb}{min}$

$$W_{w_S4} = 128.4 \cdot \frac{lb}{min}$$

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Weight of total suspended solids in runoff from WTP area (Sump#4):

RA-D:

$$\mathbf{W}_{TSS_S4_D} \coloneqq \frac{\mathbf{q}_{w_S4}.\mathsf{TSS}_{S4}.\mathsf{Gs}_{D}.\boldsymbol{\rho}_{w}}{\mathsf{Gs}_{D}.\boldsymbol{\rho}_{w} - \mathsf{TSS}_{S4}}$$

$$W_{TSS_S4_D} = 36.98 \cdot \frac{lb}{day}$$

$$W_{TSS_S4_D} = 0.01165 \cdot \frac{kg}{min}$$

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RA-E:

$$W_{TSS_S4_E} \coloneqq \frac{q_{w_S4} \cdot TSS_{S4} \cdot Gs_{E} \cdot \rho_{w}}{Gs_{E} \cdot \rho_{w} - TSS_{S4}}$$

$$W_{TSS_S4_E} = 36.98 \cdot \frac{lb}{day}$$

$$W_{TSS_S4_E} = 36.98 \cdot \frac{lb}{day}$$
 $W_{TSS_S4_E} = 0.01165 \cdot \frac{kg}{min}$

Volume of total suspended solids in runoff from WTP area (Sump#4, zero void ratio):

RA-D:

$$q_{TSS_S4_D} := \frac{W_{TSS_S4_D}}{Gs_D \cdot \rho_w}$$

$$q_{TSS_S4_D} = 1.759 \cdot \frac{gal}{day}$$

$$q_{TSS_S4_D} = 1.22123 \times 10^{-3} \cdot gpm$$

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RA-E:

$$q_{TSS_S4_E} := \frac{W_{TSS_S4_E}}{G_{S_E} \cdot \rho_w}$$

$$q_{TSS_S4_E} = 1.718 \cdot \frac{gal}{day}$$

$$q_{TSS_S4_E} = 1.19283 \times 10^{-3} \cdot gpm$$

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Weight of runoff from WTP area (Sump#4):

RA-D:

$$\mathbf{W_{S4_D}} \coloneqq \mathbf{W_{W_S4}} + \mathbf{W_{TSS_S4_D}}$$

$$W_{S4_D} = 184940 \cdot \frac{lb}{day}$$

• RA-E:

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$$W_{S4} \to W_{WS4} + W_{TSS} + W_{TS$$

$$W_{S4_E} = 184940 \cdot \frac{lb}{day}$$

Volume of runoff from WTP area (Sump#4):

RA-D:

$$q_{S4_D} := q_{w_S4} + q_{TSS_S4_D}$$
 $q_{S4_D} = 22158 \cdot \frac{gal}{day}$ $q_{S4_D} = 15.4 \cdot gpm$

$$q_{S4_D} = 22158 \cdot \frac{\text{gal}}{\text{day}}$$

$$q_{S4_D} = 15.4 \cdot gpn$$

RA-E:

$$q_{S4_E} := q_{w_S4} + q_{TSS_S4_E}$$
 $q_{S4_E} = 22158 \cdot \frac{gal}{day}$ $q_{S4_E} = 15.4 \cdot gpm$

$$q_{S4_E} = 22158 \cdot \frac{gal}{day}$$

$$q_{S4} = 15.4 \cdot gpm$$

4.8 Polymer Injection

Under normal operation condition, polymer/coagulant injection is applied to the screened slurry only. The WTP sludge/back wash water and runoff collected from the four area sumps will be sent to dedicated geotextile tube(s) directly.

Dry polymer density:

$$\mathtt{DEN}_{polymer} \coloneqq 0.7 \frac{\mathtt{gm}}{\mathtt{cm}^3}$$
 , based on Ashland 2520 MSDS.

Dry polymer dosage rate:

$$\text{DOS}_{polymer} \coloneqq 1.59 \frac{\text{lb}}{\text{ton}}$$
 , based on P-GDT report.

Weight and volume of dry polymer:

RA-D:

$$W_{drypolymer_D} := DOS_{polymer}W_{s_D} \cdot P_{fine_D}$$

$$W_{drypolymer_D} = 4.248 \cdot \frac{lb}{min}$$

$$W_{drypolymer_D} = 4.248 \cdot \frac{lb}{min}$$
 $W_{drypolymer_D} = 6117.78 \cdot \frac{lb}{day}$

$$q_{drypolymer_D} \coloneqq \frac{w_{drypolymer_D}}{DEN_{polymer}}$$

$$q_{\text{drypolymer D}} = 0.7273 \cdot \text{gpm}$$

$$q_{drypolymer_D} = 0.7273 \cdot gpm$$
 $q_{drypolymer_D} = 1047.2 \cdot \frac{gal}{day}$

RA-E:

$$W_{drypolymer_E} := DOS_{polymer}W_{s_E} \cdot P_{fine_E}$$

$$W_{drypolymer_E} = 3.3 \cdot \frac{lb}{min}$$
 $W_{drypolymer_E} = 4747 \cdot \frac{lb}{day}$

$$W_{drypolymer_E} = 4747 \cdot \frac{lb}{day}$$

$$q_{drypolymer_E} := \frac{w_{drypolymer_E}}{DEN_{polymer}}$$

$$q_{drypolymer_E} = 0.6 \cdot gpm$$

$$q_{drypolymer_E} = 813 \cdot \frac{gal}{day}$$

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Weight and volume of polymer makeup water:

RA-D:

$$q_{polymerwater_D} \coloneqq \frac{w_{drypolymer_D} \cdot 200 \text{mL}}{0.4 \text{gm}}$$

$$q_{polymerwater_D} = 254.5 \cdot gpm$$

$$W_{polymerwater_D} := q_{polymerwater_D} \cdot \rho_{W}$$

$$W_{polymerwater_D} = 3058889.7 \cdot \frac{lb}{day}$$

$$q_{polymerwater_E} \coloneqq \frac{w_{drypolymer_E} \cdot 200 \text{mL}}{0.4 \text{gm}}$$

$$q_{polymerwater E} = 197.5 \cdot gpm$$

$$W_{polymerwater_E} := q_{polymerwater_E} \cdot \rho_{w}$$

$$W_{polymerwater_E} = 2373504.1 \cdot \frac{lb}{day}$$

Note: Assume polymer dissolves in makeup water. Makeup water volume is the polymer emulsion volume.

4.9 Coagulant Injection (emulsion, Remediation Areas A, B, E, and F only)

Coagulant emulsion dosage rate:

$$DOS_{coag} := 5.71 \frac{lb}{ton}$$

, based on P-GDT report.

Coagulant emulsion density:

$$\mathrm{DEN}_{coag} \coloneqq 1.03 \frac{gm}{cm}$$
 , based on Ashland 492 MSDS.

Coagulant emulsion weight:

$$W_{coag_E} := DOS_{coag} \cdot W_{s_E} \cdot P_{fine_E}$$

$$W_{coag_E} = 17047.4 \cdot \frac{lb}{day} \quad W_{coag_E} = 11.8 \cdot \frac{lb}{min}$$

Coagulant emulsion volume:

$$q_{\text{coag_E}} \coloneqq \frac{\text{DOS}_{\text{coag}} \cdot W_{\text{s_E}} \cdot P_{\text{fine_E}}}{\text{DEN}_{\text{coag}}}$$

$$\label{eq:qcoag} \mathbf{q}_{coag_E} = 1983.236 \cdot \frac{\mathrm{gal}}{\mathrm{day}} \qquad \mathbf{q}_{coag_E} = 1.38 \cdot \mathrm{gpm}$$

Coagulant emulsion makeup water (make down to 1% dilution):

$$q_{coagwater_E} := \frac{w_{coag_E} \cdot 100 \text{mL}}{1 \text{gm}} \\ q_{coagwater_E} = 141.9 \cdot \text{gpm} \\ q_{coagwater_E} = 204273.3 \cdot \frac{\text{gal}}{\text{day}} \\ q_{coagwater_E} = 141.9 \cdot \text{gpm}$$

$$q_{coagwater_E} = 141.9 \cdot gpm$$

$$q_{\text{coagwater}_E} = 204273.3 \cdot \frac{\text{gal}}{\text{day}}$$

$$W_{coagwater_E} := q_{coagwater_E} \cdot \rho_{w}$$

$$W_{coagwater_E} := q_{coagwater_E} \cdot \rho_{w} \qquad \qquad W_{coagwater_E} = 1704743.2 \cdot \frac{lb}{day} \quad W_{coagwater_E} = 1183.8494 \cdot \frac{lb}{min}$$

4.10 Geotextile Tube Dewatering

The screened and polymer/coagulant-added Slurry, stockpile filtrate, WTP sludge/backwash water, and runoff collected by the four area sumps (Sump#1,2,3,4) will be dewatered by the geotextile tubes at the SCA.

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4.10.1 Initial dewatering (the first 24 hrs)

Assume all dry polymer and/or coagulant are retained in the geotextile tubes during the initial dewatering.

Weight of dry solids retained in tubes after initial dewatering:

RA-D:

$$\begin{split} W_{S_ret2_D} \coloneqq W_{sr1_D} + W_{WTP_TSS} + W_{TSS_stock_filtrate_D} + W_{TSS_S1_D} \dots \\ + W_{TSS_S2_D} + W_{TSS_S3_D} + W_{TSS_S4_D} + W_{drypolymer_D} \end{split}$$

$$W_{s_ret2_D} = 8527654 \cdot \frac{lb}{day}$$

RA-E:

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$$\begin{split} \mathbf{W_{s_ret2_E}} &\coloneqq \mathbf{W_{sr1_E}} + \mathbf{W_{WTP_TSS}} + \mathbf{W_{TSS_stock_filtrate_E}} + \mathbf{W_{TSS_S1_E}} & \cdots \\ &\quad + \mathbf{W_{TSS_S2_E}} + \mathbf{W_{TSS_S3_E}} + \mathbf{W_{TSS_S4_E}} + \mathbf{W_{drypolymer_E}} + \mathbf{W_{coag_E}} \end{split}$$

$$W_{s_ret2_E} = 13770589 \cdot \frac{lb}{day}$$

Weight of water retained in tubes after initial dewatering:

RA-D

$$W_{w_ret2_D} := \frac{\left(1 - P_{s2}\right) \cdot W_{s_ret2_D}}{P_{s2}}$$

$$W_{w_ret2_D} = 13913541 \cdot \frac{lb}{day}$$

DΛE

$$W_{w_ret2_E} := \frac{\left(1 - P_{s2}\right) \cdot W_{s_ret2_E}}{P_{s2}}$$

$$W_{w_ret2_E} = 22467802.5 \cdot \frac{lb}{day}$$

Volume of water retained in tubes after initial dewatering:

RA-D:

$$q_{w_ret2_D} \coloneqq \frac{W_{w_ret2_D}}{\rho_{w}}$$

$$q_{w_ret2_D} = 1667209.8 \cdot \frac{gal}{day}$$

PA-E

$$\mathbf{q}_{w_ret2_E} \coloneqq \frac{\mathbf{W}_{w_ret2_E}}{\rho_{w}}$$

$$q_{w_ret2_E} = 2692236 \cdot \frac{gal}{day}$$

Weight of Water in initial filtrate:

$$\begin{aligned} \mathbf{W_{w_if_D}} &:= \mathbf{W_{wr1_D}} + \mathbf{W_{W_WTP_D}} + \mathbf{W_{w_stock_filtrate_D}} + \mathbf{W_{polymerwater_D}} & \cdots \\ &\quad + \left(\mathbf{q_{w_S1}} + \mathbf{q_{w_S2}} + \mathbf{q_{w_S3}} + \mathbf{q_{w_S4}} + \mathbf{q_{booster}} \cdot \mathbf{N_{booster}} + \mathbf{q_{tube_pump}} \cdot \mathbf{N_{tube_pump}} \right) \cdot \rho_{w} - \mathbf{W_{w_ret2_D}} \\ \end{aligned}$$

$$W_{w_if_D} = 68312176 \cdot \frac{lb}{day}$$

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RA-E:

$$\begin{aligned} \mathbf{W}_{w_if_E} &\coloneqq \mathbf{W}_{wr1_E} + \mathbf{W}_{w_wrp_E} + \mathbf{W}_{w_stock_filtrate_E} + \mathbf{W}_{polymerwater_E} + \mathbf{W}_{coagwater_E} \dots \\ &\quad + \left(\mathbf{q}_{w_S1} + \mathbf{q}_{w_S2} + \mathbf{q}_{w_S3} + \mathbf{q}_{w_S4} + \mathbf{q}_{booster} \cdot \mathbf{N}_{booster} + \mathbf{q}_{tube_pump} \cdot \mathbf{N}_{tube_pump} \cdot \mathbf{\rho}_{w} - \mathbf{W}_{w_ret2_E} \right) \cdot \mathbf{p}_{w} - \mathbf{W}_{w_ret2_E} \end{aligned}$$

$$W_{w_if_E} = 58823567 \cdot \frac{lb}{day}$$

Volume of water in initial filtrate:

RA-D:

$$\begin{aligned} q_{\text{W_if_D}} &:= q_{\text{Wr1_D}} + q_{\text{W_WTP_D}} + q_{\text{W_stock_filtrate_D}} + q_{\text{polymerwater_D}} \cdots \\ &+ q_{\text{W_S1}} + q_{\text{W_S2}} + q_{\text{W_S3}} + q_{\text{W_S4}} + q_{\text{booster}} \cdot N_{\text{booster}} + q_{\text{tube_pump}} \cdot N_{\text{tube_pump}} - q_{\text{W_ret2_D}} \end{aligned}$$

$$q_{w_if_D} = 8185603.6 \cdot \frac{gal}{day}$$

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RA-E:

$$\begin{aligned} q_{\text{W_if_E}} &\coloneqq q_{\text{Wr1_E}} + q_{\text{W_WTP_E}} + q_{\text{w_stock_filtrate_E}} + q_{\text{polymerwater_E}} + q_{\text{coagwater_E}} \dots \\ &\quad + q_{\text{W_S1}} + q_{\text{w_S2}} + q_{\text{w_S3}} + q_{\text{w_S4}} + q_{\text{booster}} \cdot N_{\text{booster}} + q_{\text{tube_pump}} \cdot N_{\text{tube_pump}} - q_{\text{w_ret2_E}} \end{aligned}$$

$$q_{w_if_E} = 7048618 \cdot \frac{gal}{day}$$

4.10.2 Consolidation dewatering (during 60 days after initial dewatering)

Weight of water retained in tubes after consolidation dewatering:

$$W_{w_ret3_D} := \frac{\left(1 - P_{s3}\right) \cdot W_{s_ret2_D}}{P_{s3}}$$
 $W_{w_ret3_D} = 8527654 \cdot \frac{lb}{day}$

$$W_{w_ret3_D} = 8527654 \cdot \frac{lb}{day}$$

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KA-E:

$$W_{w_ret3_E} := \frac{(1 - P_{s3}) \cdot W_{s_ret2_E}}{P_{s3}}$$
 $W_{w_ret3_E} = 13770589 \cdot \frac{lb}{day}$

Volume of water retained in tubes after consolidation dewatering:

$$\mathsf{q}_{w_ret3_D} \coloneqq \frac{\mathsf{W}_{w_ret3_D}}{\mathsf{p}_w}$$

$$q_{w_ret3_D} = 1021838 \cdot \frac{gal}{day}$$

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RA-E:

$$\mathbf{q}_{w_ret3_E} := \frac{\mathbf{W}_{w_ret3_E}}{\rho_w} \qquad \qquad \mathbf{q}_{w_ret3_E} = 1650080 \cdot \frac{gal}{day}$$

Peak weight of water in consolidation dewatering filtrate:

$$W_{w_cf_D} \coloneqq W_{w_ret2_D} - W_{w_ret3_D}$$

$$W_{w_cf_D} = 5385887 \cdot \frac{lb}{day}$$

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RA-E:

$$W_{w_cf_E} := W_{w_ret2_E} - W_{w_ret3_E}$$
 $W_{w_cf_E} = 8697214 \cdot \frac{lb}{day}$

$$W_{w_cf_E} = 8697214 \cdot \frac{lb}{day}$$

Peak volume of water in consolidation dewatering filtrate:

$$q_{w_cf_D} \coloneqq \frac{W_{w_cf_D}}{\rho_w}$$

$$q_{w_cf_D} = 645372 \cdot \frac{\text{gal}}{\text{day}}$$

• RA-E:

$$q_{w_cf_E} := \frac{W_{w_cf_E}}{\rho_w}$$

$$q_{w_cf_E} := \frac{W_{w_cf_E}}{\rho_w} \qquad \qquad q_{w_cf_E} = 1042156 \cdot \frac{gal}{day}$$

Note: Peak consolidation dewatering is assumed to start from 61 days after the first tube in filled and ends at 1 day after the last tube is filled for the season.

4.10.3 Geotextile tube filtrate

Volume of water in geotextile tube filtrate:

RA-D:

$$q_{w_tube_filtrate_D} := q_{w_if_D} + q_{w_cf_D}$$

$$q_{w_tube_filtrate_D} = 8830975 \cdot \frac{gal}{day}$$

Þ RA-E:

$$q_{w_tube_filtrate_E} := q_{w_if_E} + q_{w_cf_E}$$

$$q_{w_tube_filtrate_E} := q_{w_if_E} + q_{w_cf_E}$$
 $q_{w_tube_filtrate_E} = 8090774 \cdot \frac{gal}{day}$

Weight of total suspended solids in geotextile tube filtrate:

RA-D:

$$W_{TSS_tube_filtrate_D} := \frac{\left(q_{w_if_D} + q_{w_cf_D}\right) \cdot TSS_{tube_filtrate} \cdot G^{s}_{D} \cdot \rho_{w}}{G^{s}_{D} \cdot \rho_{w} - TSS_{tube_filtrate}}$$

$$W_{TSS_tube_filtrate_D} = 14740.8 \cdot \frac{lb}{day}$$

$$W_{TSS_tube_filtrate_D} = 4.64 \cdot \frac{kg}{min}$$

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$$W_{TSS_tube_filtrate_E} \coloneqq \frac{\left(q_{w_if_E} + q_{w_cf_E}\right) \cdot TSS_{tube_filtrate} \cdot Gs_E \cdot \rho_w}{Gs_E \cdot \rho_w - TSS_{tube_filtrate}}$$

$$q_{w_if_E} = 7048617.6 \cdot \frac{gal}{day}$$

$$W_{TSS_tube_filtrate_E} = 13505 \cdot \frac{lb}{day} \qquad \qquad W_{TSS_tube_filtrate_E} = 4.25 \cdot \frac{kg}{min}$$

$$W_{TSS_tube_filtrate_E} = 4.25 \cdot \frac{kg}{min}$$

 $q_{w_cf_E} = 1042156 \cdot \frac{gal}{day}$

Volume of total suspended solids in geotextile tube filtrate (zero void ratio):

$$q_{TSS_tube_filtrate_D} \coloneqq \frac{w_{TSS_tube_filtrate_D}}{Gs_D \cdot \rho_w}$$

$$q_{TSS_tube_filtrate_D} = 0.487 \cdot gpm$$

$$q_{TSS_tube_filtrate_D} = 701 \cdot \frac{gal}{day}$$

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RA-E:

$$\begin{array}{l} \text{PA-E:} \\ \text{PTSS_tube_filtrate_E:} = \frac{W_{\text{TSS_tube_filtrate_E}}}{Gs_{\text{E}} \cdot \rho_{\text{W}}} \end{array}$$

$$q_{TSS_tube_filtrate_E} = 0.436 \cdot gpm$$

$$q_{TSS_tube_filtrate_E} = 627.2 \cdot \frac{gal}{day}$$

Weight of geotextile tube filtrate (water and TSS):

RA-D:

$$W_{tube_filtrate_D} \coloneqq W_{w_if_D} + W_{w_cf_D} + W_{TSS_tube_filtrate_D}$$

$$W_{tube_filtrate_D} = 73712803.8 \cdot \frac{lb}{day}$$

Þ RA-E:

$$W_{tube_filtrate_E} := W_{w_if_E} + W_{w_cf_E} + W_{TSS_tube_filtrate_E}$$

$$W_{tube_filtrate_E} = 67534286.3 \cdot \frac{lb}{day}$$

Volume of geotextile tube filtrate (water and TSS):

RA-D:

$$q_{tube_filtrate_D} := q_{w_if_D} + q_{w_cf_D} + q_{TSS_tube_filtrate_D}$$

$$q_{tube_filtrate_D} = 8831676 \cdot \frac{gal}{day}$$

Þ RA-E:

$$q_{tube_filtrate_E} \coloneqq q_{w_if_E} + q_{w_cf_E} + q_{TSS_tube_filtrate_E}$$

$$q_{tube_filtrate_E} = 8091401 \cdot \frac{gal}{day}$$

Weight of final dry solids retained in geotextile tubes (total minus TSS):

RA-D:

$$\begin{split} W_{s_ret_D} \coloneqq W_{sr1_D} + W_{WTP_TSS} + W_{TSS_stock_filtrate_D} + W_{TSS_S1_D} \dots \\ + W_{TSS_S2_D} + W_{TSS_S3_D} + W_{TSS_S4_D} + W_{drypolymer_D} - W_{TSS_tube_filtrate_D} \end{split}$$

$$W_{s_ret_D} = 8512913.1 \cdot \frac{lb}{day}$$

RA-E:

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$$\begin{aligned} \mathbf{W_{s_ret_E}} &\coloneqq \mathbf{W_{sr1_E}} + \mathbf{W_{WTP_TSS}} + \mathbf{W_{TSS_stock_filtrate_E}} + \mathbf{W_{TSS_S1_E}} &\cdots \\ &+ \mathbf{W_{TSS_S2_E}} + \mathbf{W_{TSS_S3_E}} + \mathbf{W_{TSS_S4_E}} + \mathbf{W_{drypolymer_E}} + \mathbf{W_{coag_E}} - \mathbf{W_{TSS_tube_filtrate_E}} \end{aligned}$$

$$W_{s_ret_E} = 13757083.4 \cdot \frac{lb}{day}$$

Volume of final solids retained in geotextile tubes (zero void ratio, total minus TSS):

$$\mathbf{q}_{\mathbf{S_ret_D}} \coloneqq \begin{pmatrix} \mathbf{W_{Sr1_D}} + \mathbf{W_{WTP_TSS}} + \mathbf{W_{TSS_stock_filtrate_D}} + \mathbf{W_{TSS_S1_D}} & \\ + \mathbf{W_{TSS_S2_D}} + \mathbf{W_{TSS_S3_D}} + \mathbf{W_{TSS_S4_D}} - \mathbf{W_{TSS_tube_filtrate_D}} \\ \hline \mathbf{Gs_{D}} \cdot \rho_{\mathbf{W}} \end{pmatrix} + \mathbf{q_{drypolymer_D}}$$

$$q_{s_ret_D} = 405546.8 \cdot \frac{gal}{day}$$
 $q_{s_ret_D} = 281.63 \cdot gpm$

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RA-E:

$$q_{s_ret_E} := \left(\frac{W_{sr1_E} + W_{WTP_TSS} + W_{TSS_stock_filtrate_E} + W_{TSS_S1_E} \cdots}{+ W_{TSS_S2_E} + W_{TSS_S3_E} + W_{TSS_S4_E} - W_{TSS_tube_filtrate_E}}{Gs_{E} \cdot \rho_{W}} \right) + q_{drypolymer_E} + q_{coag_E}$$

$$\mathbf{q_{s_ret_E}} = 640722.4 \cdot \frac{\mathrm{gal}}{\mathrm{day}} \qquad \qquad \mathbf{q_{s_ret_E}} = 444.9 \cdot \mathrm{gpm}$$

$$q_{s_ret_E} = 444.9 \cdot gpm$$

4.11 Precipitation

Precipitation flow:

$$q_{PRE} := PRE_{daily} \cdot A_{SCA}$$

$$q_{PRE} = 201.5 \cdot gpm$$

$$q_{PRE} = 290211.4 \cdot \frac{gal}{day}$$

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4.12 Influent to SCA WTP

Weight of TSS in WTP influent:

$$W_{TSS_influent} := q_{WTP_influent} \cdot TSS_{WTP_influent}$$

$$W_{TSS_influent} = 13644.9 \cdot \frac{lb}{day}$$

Volume of TSS in WTP influent:

RA-D:

$$q_{TSS_WTP_influent_D} \coloneqq \frac{W_{TSS_influent}}{Gs_D \cdot \rho_W}$$

$$q_{TSS_WTP_influent_D} = 0.45057 \cdot gpm$$

RA-E:

$$q_{TSS_WTP_influent_E} \coloneqq \frac{w_{TSS_influent}}{Gs_{E} \cdot \rho_{w}}$$

$$q_{TSS_WTP_influent_E} = 0.44009 \cdot gpm$$

Weight of water in WTP influent:

RA-D:

$$W_{w_WTP_influent_D} := \left(q_{WTP_influent} - q_{TSS_WTP_influent_D}\right) \cdot \rho_w \\ W_{w_WTP_influent_D} = 68049025.3 \cdot \frac{lb}{day} \cdot \frac{lb}{$$

$$W_{w_WTP_influent_D} = 68049025.3 \cdot \frac{lb}{day}$$

RA-E:

$$W_{w_WTP_influent_E} := \left(q_{WTP_influent} - q_{TSS_WTP_influent_E}\right) \cdot \rho_{w} \\ W_{w_WTP_influent_E} = 68049151.2 \cdot \frac{lb}{day} \cdot \frac{lb$$

$$W_{w_WTP_influent_E} = 68049151.2 \cdot \frac{lb}{day}$$

Volume of water in WTP influent:

RA-D:

$$q_{W_WTP_influent_D} := q_{WTP_influent} - q_{TSS_WTP_influent_D}$$

$$q_{w_WTP_influent_D} = 5662.5 \cdot gpm$$

RA-E:

$$q_{w_WTP_influent_E} := q_{WTP_influent} - q_{TSS_WTP_influent_E}$$

$$q_{w_WTP_influent_E} = 5662.6 \cdot gpm$$

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4.13 Discharge from SCA WTP to Metro

Weight of TSS in discharge:

$$W_{TSS_dis} := MAX_{discharge} \cdot TSS_{discharge}$$
 $W_{TSS_dis} = 244.1 \cdot \frac{lb}{day}$

Volume of TSS in discharge:

RA-D:

$$\mathbf{q}_{TSS_dis_D} := \frac{\mathbf{W}_{TSS_dis}}{\mathbf{G}_{s_D} \cdot \rho_w} \qquad \qquad \mathbf{q}_{TSS_dis_D} = 0.00806 \cdot \mathrm{gpm}$$

RA-E:

$$\mathbf{q}_{TSS_dis_E} := \frac{\mathbf{W}_{TSS_dis}}{\mathbf{G}_{s_E} \cdot \rho_w} \qquad \qquad \mathbf{q}_{TSS_dis_E} = 0.008 \cdot \mathbf{gpm}$$

Weight of water in discharge:

$$W_{\text{w_dis_D}} := \left(\text{MAX}_{\text{discharge}} - q_{\text{TSS_dis_D}}\right) \cdot \rho_{\text{w}} \qquad W_{\text{w_dis_D}} = 54245034.7 \cdot \frac{\text{lb}}{\text{day}}$$

RA-E:

$$W_{w_dis_E} := (MAX_{discharge} - q_{TSS_dis_E}) \cdot \rho_w$$
 $W_{w_dis_E} = 54245037 \cdot \frac{lb}{day}$

Volume of water in discharge:

RA-D:

$$q_{w_dis_D} := MAX_{discharge} - q_{TSS_dis_D}$$
 $q_{w_dis_D} = 4513.9 \cdot gpm$

RA-E:

$$q_{w_dis_E} := MAX_{discharge} - q_{TSS_dis_E}$$
 $q_{w_dis_E} = 4513.9 \cdot gpm$

5.0 Mass and Water Balance Tables

This section provides the mass and water balance calculations of the maximum flow rate (5.500 gpm) for Remediation Areas D and E shown on Drawing D-002. The stream numbers are defined on Drawing D-001. Some of the stream numbers represent individual components, including the pre-processing steps, geotextile tube dewatering, and precipitation. The flow associated with these stream numbers is shown as positive if the component adds flow to the slurry (e.g., polymer injection); whereas, the flow is shown as negative if the component subtracts flow from the slurry (e.g., gravel-sized particle removal). The other stream numbers represents the subtotal flow at a given location along the flow streamline.

The flow at each Stream Number is shown as an array in the following format: (total flow rate, water flow rate, solids flow rate).

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5.1 RA-D Stream Numbers

Stream Number 1:Incoming slurry

$$S1_D := (q \ q_{w_D} \ q_{s_D})$$

$$S1_D = (5500 5217.7 282.3) \cdot gpm$$

Stream number 1A: Supplemental lake water intake (normally zero)

$$S1A_D := (0 \ 0 \ 0)gpm$$

Stream Number 2: booster pump seal water

$$S2_D := (N_{booster} \cdot q_{booster} \cdot N_{booster} \cdot q_{booster} \cdot Q_{booster})$$

$$S2_D = (0 \ 0 \ 0) \cdot gpm$$

Stream Number 3: Subtotal

$$S3_D := S1_D + S1A_D + S2_D$$

$$S3_D = (5500 5217.7 282.3) \cdot gpm$$

Stream Number 4: Primary Screen Wash Water

$$S4_D := (q_{primary} q_{primary} 0gpm)$$

$$S4_D = (306.7 \ 306.7 \ 0) \cdot gpm$$

Stream Number 5: gravel-sized Particle Removal

$$S5_D := \left[-(q_{w_gravel_D} + q_{gravel_D}) - q_{w_gravel_D} - q_{gravel_D} \right]$$

$$S5_D = (-2.3 -0.9 -1.4) \cdot gpm$$

Stream Number 6: Subtotal

$$S6_D := S3_D + S4_D + S5_D$$

$$S6_D = (5804.4 5523.5 280.9) \cdot gpm$$

Stream Number 7: Geotextile tube feed pump seal water

$$S7_D \coloneqq \left(N_{tube_pump} \cdot q_{tube_pump} \cdot N_{tube_pump} \cdot q_{tube_pump} \cdot Q_{pump} \right)$$

$$S7_D = (24 \ 24 \ 0) \cdot gpm$$

Stream Number 8: Subtotal

$$S8_D := S6_D + S7_D$$

$$S8_D = (5828.4 5547.5 280.9) \cdot gpm$$

Stream Number 9: SCA WTP clarifier underflow and filter backwash

$$S9_D := (q_{WTP} \ q_{W_WTP_D} \ q_{WTP_TSS_D})$$

$$S9_D = (992.4 991.942 0.458) \cdot gpm$$

Stream Number 10: Stockpile filtrate

$$S10_D := (q_{stock_filtrate_D} \ q_{w_stock_filtrate_D})$$

$$S10_D = (0.35578 \ 0.35575 \ 0.00003) \cdot gpm$$

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Stream Number 10a: Runoff to stockpile area sump (Sump#1)

$$S10a_D := (q_{S1_D} \ q_{w_S1} \ q_{TSS_S1_D})$$

$$S10a_D = (2.6 \ 2.6 \ 0) \cdot gpm$$

Stream Number 10b: Runoff to screen area sump (Sump#2)

$$S10b_D := (q_{S2_D} \quad q_{w_S2} \quad q_{TSS_S2_D})$$

$$S10b_D = (3.5 \ 3.5 \ 0) \cdot gpm$$

Stream Number 10c: Runoff to polymer/decon area sump (Sump#3)

$$S10c_D := (q_{S3_D} \quad q_{w_S3} \quad q_{TSS_S3_D})$$

$$S10c_D = (2.4 \ 2.4 \ 0) \cdot gpm$$

Stream Number 10d: Runoff to WTP area sump (Sump#4)

$$S10d_D := (q_{S4 D} q_{W S4} q_{TSS S4 D})$$

$$S10d_D = (15.4 \ 15.4 \ 0) \cdot gpm$$

Stream Number 11: Polymer and makeup water

$$S11_D := (q_{polymerwater_D} + q_{drypolymer_D} - q_{polymerwater_D} - q_{drypolymer_D})$$

$$S11_D = (255.266 \ 254.5388 \ 0.7273) \cdot gpm$$

Stream Number 12: Subtotal

$$\mathtt{S12}_D \coloneqq \mathtt{S8}_D + \mathtt{S9}_D + \mathtt{S10}_D + \mathtt{S10a}_D + \mathtt{S10b}_D + \mathtt{S10c}_D + \mathtt{S10d}_D + \mathtt{S110}_D \\ = \left(7100.3 - 6818.2 - 282.1\right) \cdot \mathtt{gpm}$$

$$S12_D = (7100.3 6818.2 282.1) \cdot gpm$$

Stream Number 13: Geotextile tube retention

$$S13_{D} := \begin{bmatrix} -(q_{w_ret3_D} + q_{s_ret_D}) & -q_{w_ret3_D} & -q_{s_ret_D} \end{bmatrix}$$

$$S13_D = (-991.2 -709.6 -281.6) \cdot gpm$$

Stream Number 14: Precipitation

$$S14_D := (q_{PRE} \ q_{PRE} \ Ogpm)$$

$$S14_D = (201.5 \ 201.5 \ 0) \cdot gpm$$

Stream Number 15: Subtotal

$$S15_D := S12_D + S13_D + S14_D$$

$$S15_D = (6310.644 \ 6310.157 \ 0.487) \cdot gpm$$

Stream Number 16: Primary screen wash water

$$S16_D := \left(-q_{primary} - q_{primary} 0gpm\right)$$

$$S16_D = (-306.7 -306.7 0) \cdot gpm$$

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Stream Number 17: Net flow to SCA basins

Three parameters define the net flow to SCA basins. The maximum flow is the WTP design capacity, which indicates the maximum flow the WTP can accept at any time. The allowable flow is the summation of WTP maximum allowable discharge to Metro (6.5MGD) and the flows that recycle through the WTP system (polymer makeup water, geotextile tube feed pump seal water, clarifier underflow, and GAC MMF backwash water). The available flow is what is available to the WTP from SCA dewatering process.

The smallest of the three flows controls the design and is the influent to the WTP. The difference between the available flow and WTP influent will be stored in the SCA basins, and sent to WTP for treatment when capacity allows.

$$\begin{split} \text{MAX}_D &:= \left(q_{WTP_influent} \ q_{w_WTP_influent_D} \ q_{TSS_WTP_influent_D} \right) \\ \text{MAX}_D &:= \left(5663 \ 5662.5 \ 0.5 \right) \cdot \text{gpm} \\ \text{Discharge}_D &:= \left(\text{MAX}_{discharge} \ q_{w_dis_D} \ q_{TSS_dis_D} \right) \\ \text{WTP}_{BWPS_D} &:= \left(q_{WTP} \ q_{W_WTP_D} \ q_{WTP_TSS_D} \right) \\ \text{Polymerwater}_D &:= \left(q_{polymerwater_D} \ q_{polymerwater_D} \ 0 \text{gpm} \right) \\ \text{Sealwater} &:= \left(N_{tube_pump} \ q_{tube_pump} \ N_{tube_pump} \ q_{tube_pump} \ 0 \text{gpm} \right) \\ \text{ALLOWABLE}_D &:= \text{Discharge}_D + \text{WTP}_{BWPS_D} + \text{Polymerwater}_D + \text{Sealwater} \quad \text{ALLOWABLE}_D &= \left(5784.828 \ 5784.361 \ 0.466 \right) \cdot \text{gpm} \\ \text{AVAILABLE}_D &:= \text{S15}_D + \text{S16}_D \qquad \text{AVAILABLE}_D &= \left(6003.9 \ 6003.4 \ 0.5 \right) \cdot \text{gpm} \\ \text{Min}_D &:= \min \left(\text{MAX}_{D_{0,0}} \cdot \text{ALLOWABLE}_{D_{0,0}} \cdot \text{AVAILABLE}_{D_{0,0}} \right) \qquad \text{Min}_D &= 5663 \cdot \text{gpm} \\ \text{INFLUENT}_D &:= \text{if} \left(\text{Min}_D &= \text{MAX}_{D_{0,0}} \cdot \text{AVAILABLE}_D \right) \\ \text{INFLUENT}_D &:= \text{if} \left(\text{Min}_D &= \text{MAX}_{D_{0,0}} \cdot \text{AVAILABLE}_D \right) \\ \text{INFLUENT}_D &= \left(5663 \ 5662.5 \ 0.5 \right) \cdot \text{gpm} \\ \text{Basin}_D &:= \text{if} \left[\text{AVAILABLE}_{D_{0,0}} > \text{INFLUENT}_{D_{0,0}} \cdot \text{AVAILABLE}_D - \text{INFLUENT}_D \cdot \left(0 \ 0 \ 0 \right) \text{gpm} \right] \\ \text{Basin}_D &:= \left(340.92 \ 340.89 \ 0.04 \right) \cdot \text{gpm} \\ \text{S17}_{Water} &:= -\text{Basin}_{D_{0,2}} \quad \text{S17}_{Water} &= -340.9 \cdot \text{gpm} \\ \\ \text{S17}_{TSS} &:= -\text{Basin}_{D_{0,2}} \quad \text{S17}_{TSS} &= -0.036 \cdot \text{gpm} \\ \end{aligned}$$

Stream Number 18: Effluent to SCA WTP

 $S17_{TSS} := -Basin_{D_{0,2}}$

 $S17_D := -Basin_D$

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$$S18_{D} := S15_{D} + S16_{D} + S17_{D}$$

$$S18_{D} = (5663 \ 5662.5 \ 0.5) \cdot \text{gpm}$$

$$S18_{D \ 25\text{yr}} := S15_{D \ 25\text{yr}} + S16_{D} + S17_{D \ 25\text{yr}}$$

$$S18_{D \ 25\text{yr}} = (5784.6 \ 5784.4 \ 0.3) \cdot \text{gpm}$$

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5.2 Mass and Water Balance Tables: Remediation Area D with Average Precipitation

Mass balance tables

	"Description"	"Total (gpm)"	"Water (gpm)"	"Solids (gpm)"
	"1. Incoming Slurry"	5500	5217.7	282.3
	"2. Booster Pump Seal Water"	0	0	0
	"3. Subtotal"	5500	5217.7	282.3
	"4. Primary Screen Wash Water"	306.7	306.7	0
	"5. Oversized Particle Removal"	-2.3	-0.9	-1.4
	"6. Subtotal"	5804.4	5523.5	280.9
	7. Geotextile tube Feed Pump Seal Water"	24	24	0
	"8. Subtotal"	5828.4	5547.5	280.9
	"9. WTP Underflow and Backwash"	992.4	991.9	0.5
	"10. Stockpile Filtrate"	0.4	0.4	0
$T_D =$	"10a. Stockpile Area Runoff"	2.6	2.6	0
	"10b. Screen Area Runoff"	3.5	3.5	0
	"10c. Polymer/Decon Area Runoff"	2.4	2.4	0
	"10d. WTP Area Runoff"	15.4	15.4	0
	"11. Polymer and Makeup Water"	255.3	254.5	0.7
	"12. Subtotal"	7100.3	6818.2	282.1
	"13. Geotextile tube Retention"	-991.2	-709.6	-281.6
	"14. Precipitation"	201.5	201.5	0
	"15. Subtotal"	6310.6	6310.2	0.5
	"16. Primary Screen Wash Water"	-306.7	-306.7	0
	"17. Net Flow to SCA Basins"	-340.9	-340.9	-0
	"18. Effluent to WTP"	5663	5662.5	0.5

	"Description"	"Solids (lbs/min)"
	"1. Incoming Slurry"	5937.7
	"2. Booster Pump Seal Water"	0
	"3. Subtotal"	5937.7
	"4. Primary Screen Wash Water"	0
	"5. Oversized Particle Removal"	-29.7
	"6. Subtotal"	5908.1
	"7. Geotextile tube Feed Pump Seal Water"	0
	"8. Subtotal"	5908.1
	"9. WTP Underflow and Backwash"	9.6
	"10. Stockpile Filtrate"	0
$S_D =$	"10a. Stockpile Area Runoff"	0
	"10b. Screen Area Runoff"	0
	"10c. Polymer/Decon Area Runoff"	0
	"10d. WTP Area Runoff"	0
	"11. Polymer and Makeup Water"	4.2
	"12. Subtotal"	5922
	"13. Geotextile tube Retention"	-5911.7
	"14. Precipitation"	0
	"15. Subtotal"	10.2
	"16. Primary Screen Wash Water"	0
	"17. Net Flow to SCA Basins"	-0.8
	"18. Effluent to WTP"	9.5

 $\frac{lb}{min}$

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Client: <u>Honeywell</u> Subject: <u>Mass Balance Calculation</u>

> "Description" "Concentration" "1. Incoming Slurry" 129363.4 "2. Booster Pump Seal Water" "3. Subtotal" 129363.4 "4. Primary Screen Wash Water "5. Oversized Particle Removal" 1546012.3 121966 "7. Geotextile tube Feed Pump Seal Water "8. Subtotal" 121463.7 "9. WTP Underflow and Backwash 1163.3 "10. Stockpile Filtrate" 200 $C_D =$ "10a. Stockpile Area Runoff" 200 "10b. Screen Area Runoff" 200 "10c. Polymer/Decon Area Runoff" 200 "10d. WTP Area Runoff" 200 "11. Polymer and Makeup Water' 1994.3 99940.2 "12. Subtotal" "13. Geotextile tube Retention' 714643.8 "14. Precipitation" "15. Subtotal" 194.4 "16. Primary Screen Wash Water" 0 "17. Net Flow to SCA Basins' 267.5 "18. Effluent to WTP" 200.5

Note: Stream Number 1A: Supplemental Lake Water Intake is not shown on these tables.

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5.3 RA-E Stream Numbers

Stream Number 1:Incoming slurry

$$S1_E := (q \ q_{w_E} \ q_{s_E})$$
 $S1_E = (5500 \ 5055.2 \ 444.8) \cdot gpm$

Stream number 1A: Supplemental lake water intake (normally zero)

$$S1A_E := (0 \ 0 \ 0)gpm$$

Stream Number 2: booster pump seal water

$$\mathrm{S2}_E \coloneqq \left(\mathrm{N}_{booster} \cdot \mathrm{q}_{booster} \cdot \mathrm{q}_{booster} \cdot \mathrm{q}_{booster} \cdot \mathrm{q}_{booster} \cdot \mathrm{q}_{booster} \cdot \mathrm{q}_{booster} \right) \\ \mathrm{S2}_E = \left(0 \quad 0 \quad 0 \right) \cdot \mathrm{gpm}$$

Stream Number 3: Subtotal

$$S3_E := S1_E + S1A_E + S2_E$$
 $S3_E = (5500 5055.2 444.8) \cdot gpm$

Stream Number 4: Primary Screen Wash Water

$$S4_E := (q_{primary} q_{primary} 0gpm)$$
 $S4_E = (306.7 306.7 0) \cdot gpm$

Stream Number 5: Gravel-sized Particle Removal

$$S5_{E} \coloneqq \begin{bmatrix} -\left(q_{w_gravel_E} + q_{gravel_E}\right) & -q_{w_gravel_E} & -q_{gravel_E} \end{bmatrix}$$

$$S5_E = (-2.9 -1.1 -1.8) \cdot gpm$$

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Stream Number 6: Subtotal

$$S6_E := S3_E + S4_E + S5_E$$

$$S6_E = (5803.8 \ 5360.8 \ 443) \cdot gpm$$

Stream Number 7: Geotextile tube feed pump seal water

$$S7_E := (N_{tube_pump} \cdot q_{tube_pump} \cdot N_{tube_pump} \cdot q_{tube_pump} \cdot Q_{tube_pump} \cdot Q_{tube_pump})$$

$$S7_E = (24 \ 24 \ 0) \cdot gpm$$

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Stream Number 8: Subtotal

$$S8_E := S6_E + S7_E$$

$$S8_{\rm F} = (5827.8 \ 5384.8 \ 443) \cdot \text{gpm}$$

Stream Number 9: SCA WTP clarifier underflow and filter backwash

$$S9_{E} := (q_{WTP} \ q_{W_WTP_E} \ q_{WTP_TSS_E})$$

$$S9_E = (992.4 992 0.4) \cdot gpm$$

Stream Number 10: Stockpile filtrate

$$S10_E := (q_{stock_filtrate_E} \ q_{w_stock_filtrate_E})$$

$$S10_E = (0.45904 \ 0.459 \ 0.00004) \cdot gpm$$

Stream Number 10a: Runoff to stockpile area sump (Sump#1)

$$S10a_E := (q_{S1_E} \ q_{w_S1} \ q_{TSS_S1_E})$$

$$S10a_F = (2.6 \ 2.6 \ 0) \cdot gpm$$

Stream Number 10b: Runoff to screen area sump (Sump#2)

$$S10b_E := (q_{S2_E} \ q_{W_S2} \ q_{TSS_S2_E})$$

$$S10b_E = (3.5 \ 3.5 \ 0) \cdot gpm$$

Stream Number 10c: Runoff to polymer/decon area sump (Sump#3)

$$S10c_E := (q_{S3_E} \ q_{w_S3} \ q_{TSS_S3_E})$$

$$S10c_F = (2.4 \ 2.4 \ 0) \cdot gpm$$

Stream Number 10d: Runoff to WTP area sump (Sump#4)

$$S10d_E := (q_{S4} E q_{W} S4 q_{TSS} S4 E)$$

$$S10d_E = (15.4 \ 15.4 \ 0) \cdot gpm$$

Stream Number 11: Coagulant, polymer, and makeup water

$$S11_E := (q_{coagwater_E} + q_{coag_E} + q_{polymerwater_E} + q_{drypolymer_E} + q_{coagwater_E} + q_{polymerwater_E} + q_{drypolymer_E})$$

$$S11_E = (341.304 \ 339.362 \ 1.942) \cdot gpm$$

Stream Number 12: Subtotal

$$\mathtt{S12}_E \coloneqq \mathtt{S8}_E + \mathtt{S9}_E + \mathtt{S10}_E + \mathtt{S10a}_E + \mathtt{S10a}_E + \mathtt{S10b}_E + \mathtt{S10c}_E + \mathtt{S10d}_E + \mathtt{S11}_E \\ \qquad \mathtt{S12}_E = \left(7185.9 - 6740.5 - 445.4\right) \cdot \mathtt{gpm}$$

Stream Number 13: Geotextile tube retention

$$S13_E := \left[-(q_{w_ret3_E} + q_{s_ret_E}) - q_{w_ret3_E} - q_{s_ret_E} \right]$$

$$S13_{\rm F} = (-1590.835244 - 1145.889138 - 444.946106) \cdot \text{gpm}$$

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Stream Number 14: Average precipitation

$$S14_E := (q_{PRE} q_{PRE} 0gpm)$$

$$S14_E = (201.5 \ 201.5 \ 0) \cdot gpm$$

Stream Number 15: Subtotal

$$S15_E := S12_E + S13_E + S14_E$$

$$S15_{\rm F} = (5796.564 \ 5796.128 \ 0.436) \cdot \text{gpm}$$

Stream Number 16: Primary screen wash water

$$S16_E := (-q_{primary} - q_{primary} 0gpm)$$

$$S16_E = (-306.7 -306.7 0) \cdot gpm$$

Stream Number 17: Net flow to SCA basins

$$MAX_E := (q_{WTP_influent} \ q_{w_WTP_influent_E} \ q_{TSS_WTP_influent_E})$$

$$MAX_E = (5663 \ 5662.6 \ 0.4) \cdot gpm$$

$$\mathsf{Discharge}_E \coloneqq \left(\mathsf{MAX}_{discharge} \ \ q_{w_dis_E} \ \ q_{TSS_dis_E} \right)$$

$$WTP_{BWPS_E} := (q_{WTP} \ q_{W_WTP_E} \ q_{WTP_TSS_E})$$

$$Polymerwater_{E} := \left(q_{polymerwater_E} + q_{coagwater_E} \quad q_{polymerwater_E} + q_{coagwater_E} \quad 0 \text{gpm}\right)$$

$$Sealwater := \left(N_{tube_pump} \cdot q_{tube_pump} \cdot N_{tube_pump} \cdot q_{tube_pump} \cdot Q_{gpm} \right)$$

$$ALLOWABLE_{E} := Discharge_{E} + WTP_{BWPS-E} + Polymerwater_{E} + Sealwater \qquad ALLOWABLE_{E} = \left(5869.651 - 5869.196 - 0.455\right) \cdot gpm$$

$$\text{AVAILABLE}_{E} \coloneqq \text{S15}_{E} + \text{S16}_{E} \qquad \qquad \text{AVAILABLE}_{E} = \left(5489.8 \quad 5489.4 \quad 0.4\right) \cdot \text{gpm}$$

$$\mathsf{Min}_E \coloneqq \mathsf{min} \Big(\mathsf{MAX}_{E_{0,0}}, \mathsf{ALLOWABLE}_{E_{0,0}}, \mathsf{AVAILABLE}_{E_{0,0}} \Big) \qquad \qquad \mathsf{Min}_E = 5489.8 \cdot \mathsf{gpm}$$

$$\mathsf{INFLUENT}_E \coloneqq \mathsf{if}\left(\mathsf{Min}_E = \mathsf{MAX}_{E_{0,0}}, \mathsf{MAX}_E, \mathsf{if}\left(\mathsf{Min}_E = \mathsf{ALLOWABLE}_{E_{0,0}}, \mathsf{ALLOWABLE}_E, \mathsf{AVAILABLE}_E\right)\right)$$

$$INFLUENT_F = (5489.8 5489.4 0.4) \cdot gpm$$

$$\mathsf{Basin}_E \coloneqq \mathsf{if} \bigg[\mathsf{AVAILABLE}_{E_{0,\,0}} > \mathsf{INFLUENT}_{E_{0,\,0}}, \mathsf{AVAILABLE}_E - \mathsf{INFLUENT}_E, \big(0 \quad 0 \quad 0\big) \mathsf{gpm} \bigg]$$

$$Basin_{\mathbf{F}} = (0 \ 0 \ 0) \cdot gpm$$

$$S17_{\text{water}} := -\text{Basin}_{E_{0,1}}$$
 $S17_{\text{water}} = 0 \cdot \text{gpm}$

$$S17_{TSS} := -Basin_{E_{0.2}}$$
 $S17_{TSS} = 0 \cdot gpm$

$$S17_E := -Basin_E$$

Stream Number 18: Effluent to SCA WTP

$$S18_E := S15_E + S16_E + S17_E$$
 $S18_E = (5489.8 5489.4 0.4) \cdot gpm$

Client: <u>Honeywell</u> Subject: <u>Mass Balance Calculation</u> Job No: <u>444853</u>
Calculation by: <u>XDH 1/11/2011</u>
Checked by: <u>MTO 1/14/2011</u>

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5.4 Mass and Water Balance Tables: Remediation Area E with Average Precipitation

	"Description"	"Total (gpm)"	"Water (gpm)"	"Solids (gpm)"	
	"1. Incoming Slurry"	5500	5055.2	444.8	
	"2. Booster Pump Seal Water"	0	0	0	
	"3. Subtotal"	5500	5055.2	444.8	
	"4. Primary Screen Wash Water"	306.7	306.7	0	
	"5. Oversized Particle Removal"	-2.9	-1.1	-1.8	
	"6. Subtotal"	5803.8	5360.8	443	
	"7. Geotextile tube Feed Pump Seal Water"	24	24	0	
	"8. Subtotal"	5827.8	5384.8	443	
	"9. WTP Underflow and Backwash"	992.4	992	0.4	
	"10. Stockpile Filtrate"	0.5	0.5	0	
$T_E =$	"10a. Stockpile Area Runoff"	2.6	2.6	0	∙gpm
	"10b. Screen Area Runoff"	3.5	3.5	0	
	"10c. Polymer/Decon Area Runoff"	2.4	2.4	0	
	"10d. WTP Area Runoff"	15.4	15.4	0	
	"11. Coag, Polymer, and Makeup Water"	341.3	339.4	1.9	
	"12. Subtotal"	7185.9	6740.5	445.4	
	"13. Geotextile tube Retention"	-1590.8	-1145.9	-444.9	
	"14. Average Precipitation"	201.5	201.5	0	
	"15. Subtotal"	5796.6	5796.1	0.4	
l	"16. Primary Screen Wash Water"	-306.7	-306.7	0	
	"17. Net Flow to SCA Basins"	0	0	0	
	"18. Effluent to WTP"	5489.8	5489.4	0.4	

	"1. Incoming Slurry"	9576.4
	"2. Booster Pump Seal Water"	0
	"3. Subtotal"	9576.4
	"4. Primary Screen Wash Water"	0
	"5. Oversized Particle Removal"	-38.3
	"6. Subtotal"	9538.1
	"7. Geotextile tube Feed Pump Seal Water"	0
	"8. Subtotal"	9538.1
	"9. WTP Underflow and Backwash"	9.6
	"10. Stockpile Filtrate"	0
$S_E =$	"10a. Stockpile Area Runoff"	0
	"10b. Screen Area Runoff"	0
	"10c. Polymer/Decon Area Runoff"	0
	"10d. WTP Area Runoff"	0
	"11. Coag, Polymer, and Makeup Water"	15.1
	"12. Subtotal"	9562.9
	"13. Geotextile tube Retention"	-9553.5
	"14. Average Precipitation"	0
	"15. Subtotal"	9.4
	"16. Primary Screen Wash Water"	0
	"17. Net Flow to SCA Basins"	0
	"18. Effluent to WTP"	9.4

"Description"

 $\frac{lb}{min}$

"Solids (lbs/min)"

Client: Honeywell Subject: Mass Balance Calculation

Job No: 444853 Calculation by: XDH 1/11/2011 Checked by: MTO 1/14/2011

"Description" "Concentration" "1. Incoming Slurry" 208637.5 "2. Booster Pump Seal Water" 0 "3. Subtotal" 208637.5 "4. Primary Screen Wash Water" 0 1568389.1 "5. Oversized Particle Removal" "6. Subtotal" 196925.7 "7. Geotextile tube Feed Pump Seal Water" 0 "8. Subtotal" 196114.7 "9. WTP Underflow and Backwash" 1163.3 "10. Stockpile Filtrate" 200 $C_E =$ 200 "10a. Stockpile Area Runoff" L "10b. Screen Area Runoff" 200 200 "10c. Polymer/Decon Area Runoff" "10d. WTP Area Runoff" 200 "11. Coag, Polymer, and Makeup Water" 5313.7 "12. Subtotal" 159464.4 "13. Geotextile tube Retention" 719600.2 "14. Average Precipitation" 0 "15. Subtotal" 193.9

0

0

204.7

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Note: Stream Number 1A: Supplemental Lake Water Intake is not shown on these tables.

"18. Effluent to WTP"

"16. Primary Screen Wash Water"

"17. Net Flow to SCA Basins"

Remediation Area											
	Water	Average in-situ Solids Conter by Weig (%) (%) (%) 7.2 2.68 56.4 7.2 2.68 56.4 56.0 2.74 56.8		Percent Gravel-	Percent Sand-	Percent	Percent	Average Percent Clay-Sized	Maximum Slurry Solids Content by Weight		
	(%)	Gravity Content by Weight (%) 2.68 56.4		(%)	(%)	(%)	(%)	(%)	(%)		
Α	77.2	2.68	56.4	0.3	23.0	76.7	58.7	18.0	16.2		
В	77.2	2.68	56.4	0.3	23.0	76.7	58.7	18.0	8.1		
С	76.0	2.74	56.8	15.6	30.2	54.2	32.6	21.6	10.3		
D (ILWD)	126.3	2.52	44.2	0.5	9.5	90.0	62.5	27.5	12.0		
E	61.9	2.58	61.8	0.4	56.3	43.3	31.8	11.5	18.5		

E.3 EXCEL CALCULATIONS

PARSONS

Project Number: 444853	Calc.No. from index: 3	Preparer: XDH	Date:1/11/2011	Rev:0	Preparer:	Date:	
Project Name: Sediment Mar	nagement Design Calcul	tion Title: Mass Balance	Reviewer: MTO	Date: 1/14/20)11	Reviewer:	Date:

Table 1. Weighted-Average Sediment Properties in Dredge Prism

Remediation Area	Average Water Content (%)	Average Specific Gravity	Average in-situ Solids Content by Weight (%)	Average Percent Gravel- Sized (%)	Average Percent Sand- Sized (%)	Average Percent Fines (%)	Average Percent Silt- Sized (%)	Average Percent Clay- Sized (%)
Α	77.2	2.68 56		0.3	23.0	76.7	58.7	18.0
B (1)	77.2	2.68	56.4	0.3	23.0	76.7	58.7	18.0
С	76.0			15.6	30.2	54.2	32.6	21.6
D (ILWD)	(D) 126.3 2.52		44.2	0.5	9.5	90.0	62.5	27.5
E	61.9	2.58	61.8	0.4	56.3	43.3	31.8	11.5

Table 2. Production Rate Calculations

Remediation	16X16 - 43"C	utter w/30'Spud stroke)	Carriage (10'	14X14-34"	Cutter w/30'Sp (10'stroke)	ud Carriage		8X8-28"Cutter		Weighted- Average	Weighted- Average Flow
Area	Production Rate (2) (icy/hr)	Flow Rate (2)	Estimated Usage	Production Rate (2) (icy/hr)	Flow Rate (2)	Estimated Usage	Production Rate (2) (icy/hr)	Flow Rate (2)	Estimated Usage	Production Rate (icy/hr)	Rate (gpm)
Α	338	5,500	20%	215	5,500	60%	30	1,500	20%	203	4,700
В	178	5,500	0%	159	5,500	100%	24	1,500	0%	159	5,500
С	216	5,500	0%	203	5,500	80%	22	1,500	20%	167	4,700
D (ILWD)	351	5,500	80%	224	5,500	20%	38	1,500	0%	326	5,500
E	342	5,500	40%	218	5,500	40%	30	1,500	20%	230	4,700

Table 3. Slurry Characteristics - Weighted-Average Production Rate

Remedia Area	Weighted- tion Average Production Rate (icy/hr)	Weighted- Average Flow Rate (gpm)	Production (gal/hr)	Average Water Content (%)	Solids Specific Gravity	In-situ Dry Density (pcf)	Solids Weight (lb/hr)	Solids Volume (gal/hr)	Slurry Flow (gal/hr)	Water Volume (gal/hr)	Water weight	Slurry Specific Gravity	Slurry Density (pcf)	Slurry Weight (lb/hr)	In-situ Percent Solids by volume	Solids Content by Weight	Solids Content by Volume
А	203	4,700	40,925	77.2	2.68	54.5	298,127	13,335	282,000	268,665	2,240,669	1.08	67.3	2,538,795	14.5%	11.7%	4.1%
В	159	5,500	32,118	77.2	2.68	54.5	233,969	10,465	330,000	319,535	2,664,922	1.05	65.7	2,898,891	9.7%	8.1%	2.9%
С	167	4,700	33,694	76.0	2.74	55.5	249,783	10,937	282,000	271,063	2,260,668	1.07	66.6	2,510,451	11.9%	9.9%	3.4%
D (ILW	O) 326	5,500	65,771	126.3	2.52	37.6	330,651	15,720	330,000	314,280	2,621,092	1.07	66.9	2,951,743	19.9%	11.2%	4.2%
E	230	4,700	46,460	61.9	2.58	62.0	385,017	17,893	282,000	264,107	2,202,654	1.10	68.6	2,587,671	16.5%	14.9%	5.3%

Table 4. Slurry Characteristics - Average Production Rate of the Largest Dredge Used in Each Remediation Area

Remediation Area	Average Production (icy/hr)	Flow Rate	Production (gal/hr)	Average Water Content (%)	Solids Specific Gravity	In-situ Dry Density (pcf)	Solids Weight	Solids Volume (gal/hr)	Slurry Flow	Water Volume (gal/hr)	Water weight	Slurry Specific Gravity	Slurry Density (pcf)	Slurry Weight	In-situ Percent Solids by volume	Solids Content by Weight	Solids Content by Volume
Α	338	5,500	68,276	77.2	2.68	54.5	497,369	22,246	330,000	307,754	2,566,665	1.11	69.5	3,064,033	20.7%	16.2%	5.5%
В	159	5,500	32,118	77.2	2.68	54.5	233,969	10,465	330,000	319,535	2,664,922	1.05	65.7	2,898,891	9.7%	8.1%	2.9%
С	203	5,500	41,006	76.0	2.74	55.5	303,993	13,310	330,000	316,690	2,641,192	1.07	66.8	2,945,185	12.4%	10.3%	3.5%
D (ILWD)	351	5,500	70,902	126.3	2.52	37.6	356,445	16,947	330,000	313,053	2,610,865	1.08	67.3	2,967,309	21.5%	12.0%	4.4%
E	342	5,500	69,084	61.9	2.58	62.0	572,504	26,606	330,000	303,394	2,530,307	1.13	70.3	3,102,811	20.9%	18.5%	6.4%

Table 5. Slurry Characteristics - Maximum Production Rate of the Largest Dredge Used in Each Remediation Area

Remediation Area	Max Production Rate (icy/hr)	Flow Rate (gpm)	Production (gal/hr)	Average Water Content (%)	Solids Specific Gravity	In-situ Dry Density (pcf)	Solids Weight	Solids Volume (gal/hr)	Slurry Flow (gal/hr)	Water Volume (gal/hr)	Water weight (lb/hr)	Slurry Specific Gravity	Slurry Density (pcf)	Slurry Weight (lb/hr)	In-situ Percent Solids by volume	Solids Content by Weight	Solids Content by Volume
Α	485	5,500	97,970	77.2	2.68	54.5	713,680	31,922	330,000	298,078	2,485,973	1.16	72.5	3,199,653	29.7%	22.3%	7.3%
В	234	5,500	47,268	77.2	2.68	54.5	344,332	15,401	330,000	314,599	2,623,752	1.08	67.3	2,968,085	14.3%	11.6%	4.0%
С	304	5,500	61,408	76.0	2.74	55.5	455,241	19,933	330,000	310,067	2,585,962	1.10	68.9	3,041,203	18.6%	15.0%	5.0%
D (ILWD)	485	5,500	97,970	126.3	2.52	37.6	492,523	23,416	330,000	306,584	2,556,908	1.11	69.1	3,049,431	29.7%	16.2%	5.8%
E	490	5,500	98,980	61.9	2.58	62.0	820,254	38,120	330,000	291,880	2,434,283	1.18	73.8	3,254,537	30.0%	25.2%	8.5%

Notes:

^{1.} Remediation Area B only has two available sample locations within the dredge prism for calculations; therefore, weighted-average analysis was not performed, and Remediation Area B design parameters are assumed to be the same as Remediation Area A.

^{2.} Production rates and flow rates are based on Appendix J - Dredging and Capping Equipment Selection and Production Rates, Draft Onondaga Lake Capping, Dredging and Habitat Intermediate Design, Parsons and Anchor QEA, January 24, 2011.

PARSONS

Project Number: 444853 Calc.No. from index: 3 Preparer: XDH Date:1/11/2011 Rev:0 Date: Project Name: Sediment Management Design Calculation Title: Mass Balance Reviewer: MTO Date: 1/14/2011

5,500 GPM Maximum Flow Scenario Average Precipitation 16.2% Solids Content by Weight

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Coagulant, Polymer, and Makeup Water from WTP	Subtotal		Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	
Total (gpm)	5,500	0	0	5,500	307	(1.9)	5,805	24	5,829	992	0.3	2.6	3.5	2.4	15.4	522	7,368	(1364.6)	202	6,205	(307)	(235)	5,663
Water (gpm)	5,130	0	0	5,130	307	(0.7)	5,436	24	5,460	992	0.3	2.6	3.5	2.4	15.4	520	6,996	(992.7)	202	6,204	(307)	(235)	5,663
Solids (gpm) (Note 2)	370	0.0	0	370	0	(1.1)	369	0	369	0.4	0.00002	0.00019	0.00026	0.00018	0.00115	3.0	372	(371.9)	0	0.4	0	(0.03)	0.4
Solids (lbs/min) (Note 2)	8,276.2	0.0	0.0	8,276.2	0.0	(24.8)	8,251.4	0.0	8,251.4	9.6	0.0	0.0	0.0	0.0	0.0	23.2	8,284.2	(8274.2)	0.0	10.1	0.0	(0.6)	9.5
Concentration (mg/L)	180,311.0	NA	NA	180,311.0	0.0	1,604,790.4	170,328.7	0.0	169,627.4	1,163.3	200.0	200.0	200.0	200.0	200.0	5,313.7	134,728.0	726,584.1	0.0	194.3	0.0	NA	200.5

5,500 GPM RA-C Maximum Flow Scenario Solids Content by Weight 10.3% Average Precipitation

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Polymer and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	5,500	0	0	5,500	307	(58.2)	5,749	24	5,773	992.4	9.5	2.6	3.5	2.4	15.4	131.0	6,929	(700.1)	202	6,431	(307)	(463)	5,661
Water (gpm)	5,279	0	0	5,279	307	(23.6)	5,562	24	5,586	992.0	9.5	2.6	3.5	2.4	15.4	130.6	6,742	(513.0)	202	6,430	(307)	(463)	5,660
Solids (gpm) (Note 2)	221.2	0.0	0.0	221.2	0.0	(34.5)	186.7	0.0	186.7	0.4	0.00069	0.00019	0.00025	0.00018	0.00112	0.4	187.5	(187.1)	0.0	0.5	0.0	(0.03)	0.4
Solids (lbs/min) (Note 2)	5,058.5	0.0	0.0	5,058.5	0.0	(789.1)	4,269.4	0.0	4,269.4	9.6	0.0158	0.0043	0.0058	0.0041	0.0257	2.2	4,281.3	(4,270.8)	0.0	10.4	0.0	(8.0)	9.7
Concentration (mg/L)	110,208.6	NA	NA	110,208.6	0.0	1,626,112.8	88,994.0	0.0	88,624.0	1,163.3	200.0	200.0	200.0	200.0	200.0	1,994.3	74,035.0	731,020.8	0.0	194.5	0.0	194.5	205.0

5,500 GPM RA-D Maximum Flow Scenario Average Precipitation Solids Content by Weight 12.0%

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Polymer and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	5,500	0	0	5,500	307	(2.3)	5,804	24	5,828	992.4	0.4	2.6	3.5	2.4	15.4	255.3	7,100	(991.2)	202	6,311	(307)	(341)	5,663
Water (gpm)	5,218	0	0	5,218	307	(0.9)	5,523	24	5,547	991.9	0.4	2.6	3.5	2.4	15.4	254.5	6,818	(709.6)	202	6,310	(307)	(341)	5,663
Solids (gpm) (Note 2)	282.3	0.0	0.0	282.3	0.0	(1.4)	280.9	0.0	280.9	0.5	0.00003	0.00021	0.00028	0.00019	0.00122	0.7	282.1	(281.6)	0.0	0.5	0.0	(0.04)	0.5
Solids (lbs/min) (Note 2)	5,937.7	0.0	0.0	5,937.7	0.0	(29.7)	5,908.1	0.0	5,908.1	9.6	0.0006	0.0043	0.0058	0.0041	0.0257	4.2	5,922.0	(5,911.7)	0.0	10.2	0.0	(0.8)	9.5
Concentration (mg/L)	129,363.5	NA	NA	129,363.5	0.0	1,546,012.3	121,966.0	0.0	121,463.7	1,163.3	200.0	200.0	200.0	200.0	200.0	1,994.3	99,940.2	714,643.8	0.0	194.4	0.0	267.5	200.5

5,500 GPM 18.5% Maximum Flow Scenario Average Precipitation Solids Content by Weight

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Coagulant, Polymer, and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	5,500	0	0	5,500	307	(2.9)	5,804	24	5,828	992	0.5	2.6	3.5	2.4	15.4	341	7,186	(1590.8)	202	5,797	(307)	0	5,490
Water (gpm)	5,055	0	0	5,055	307	(1.1)	5,361	24	5,385	992	0.5	2.6	3.5	2.4	15.4	339	6,740	(1145.9)	202	5,796	(307)	0	5,489
Solids (gpm) (Note 2)	445	0.0	0	445	0	(1.8)	443	0	443	0.4	0.00004	0.00020	0.00027	0.00019	0.00119	1.9	445	(444.9)	0	0.4	0	0.00	0.4
Solids (lbs/min) (Note 2)	9,576.4	0.0	0.0	9,576.4	0.0	(38.3)	9538.1	0.0	9538.1	9.6	0.0	0.0	0.0	0.0	0.0	15.1	9,562.9	(9553.5)	0.0	9.4	0.0	0.0	9.4
Concentration (mg/L)	208,637.5	NA	NA	208,637.5	0.0	1,568,389.1	196,925.7	0.0	196,114.7	1,163.3	200.0	200.0	200.0	200.0	200.0	5,313.7	159,464.4	719,600.2	0.0	193.9	0.0	NA	204.7

- Notes:

 (1). Numbers within parenthesis represent diverted flows.

 (2). Theoretical dry weight basis.

 (3). NA indicates not applicable.

Project Number: 444853 Calc.No. from index: 3 Preparer: XDH Date:1/11/2011 Rev:0 Date: Project Name: Sediment Management Design Calculation Title: Mass Balance Reviewer: MTO Date: 1/14/2011 Reviewer: Date:

3,850 GPM Average Flow Scenario Average Precipitation Solids Content by Weight 11.7%

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Coagulant, Polymer, and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	3,850	0	0	3,850	215	(0.9)	4,064	17	4,081	992	0.1	2.6	3.5	2.4	15.4	256	5,353	(669.5)	202	4,885	(215)	0.0	4,670
Water (gpm)	3,669	0	0	3,669	215	(0.4)	3,883	17	3,900	992	0.1	2.6	3.5	2.4	15.4	255	5,170	(487.2)	202	4,885	(215)	0.0	4,670
Solids (gpm) (Note 2)	181	0.0	0	181	0	(0.5)	181	0	181	0.4	0.00001	0.00019	0.00026	0.00018	0.00115	1.5	183	(182.4)	0	0.4	0	0.00	0.4
Solids (lbs/min) (Note 2)	4,056.7	0.0	0.0	4,056.7	0.0	(12.2)	4,044.6	0.0	4,044.6	9.6	0.0	0.0	0.0	0.0	0.0	11.4	4,065.6	(4057.7)	0.0	7.8	0.0	0.0	7.8
Concentration (mg/L)	126,260.3	NA	NA	126,260.3	0.0	1,604,790.4	119,259.0	0.0	118,768.0	1,163.3	200.0	200.0	200.0	200.0	200.0	5,313.7	91,005.1	726,206.0	0.0	192.4	0.0	NA	201.3

3,850 GPM RA-C Average Flow Scenario Solids Content by Weight 9.9% Average Precipitation

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Polymer and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	3,850	0	0	3,850	215	(39.0)	4,026	17	4,042	992.4	6.3	2.6	3.5	2.4	15.4	87.9	5,153	(470.2)	202	4,884	(215)	0	4,670
Water (gpm)	3,702	0	0	3,702	215	(15.9)	3,900	17	3,917	992.0	6.3	2.6	3.5	2.4	15.4	87.6	5,027	(344.6)	202	4,884	(215)	0	4,669
Solids (gpm) (Note 2)	148.4	0.0	0.0	148.4	0.0	(23.2)	125.3	0.0	125.3	0.4	0.00046	0.00019	0.00025	0.00018	0.00112	0.3	126.0	(125.6)	0.0	0.3	0.0	0.00	0.3
Solids (lbs/min) (Note 2)	3,394.2	0.0	0.0	3,394.2	0.0	(529.5)	2,864.7	0.0	2,864.7	9.6	0.0106	0.0043	0.0058	0.0041	0.0257	1.5	2,875.9	(2,868.0)	0.0	7.8	0.0	0.0	7.8
Concentration (mg/L)	105,641.5	NA	NA	105,641.5	0.0	1,626,112.8	85,270.3	0.0	84,916.0	1,163.3	200.0	200.0	200.0	200.0	200.0	1,994.3	66,874.9	730,865.5	0.0	192.4	0.0	NA	201.3

RA-D Average Flow Scenario 3,850 GPM Average Precipitation Solids Content by Weight 11.2%

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Polymer and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	3,850	0	0	3,850	215	(1.5)	4,063	17	4,080	992.4	0.2	2.6	3.5	2.4	15.4	165.9	5,262	(644.8)	202	4,819	(215)	0	4,605
Water (gpm)	3,666	0	0	3,666	215	(0.6)	3,881	17	3,897	991.9	0.2	2.6	3.5	2.4	15.4	165.4	5,079	(461.6)	202	4,819	(215)	0	4,604
Solids (gpm) (Note 2)	183.5	0.0	0.0	183.5	0.0	(0.9)	182.6	0.0	182.6	0.5	0.00002	0.00021	0.00028	0.00019	0.00122	0.5	183.5	(183.2)	0.0	0.4	0.0	0.00	0.4
Solids (lbs/min) (Note 2)	3,859.3	0.0	0.0	3,859.3	0.0	(19.3)	3,840.0	0.0	3,840.0	9.6	0.0004	0.0043	0.0058	0.0041	0.0257	2.8	3,852.4	(3,844.7)	0.0	7.7	0.0	0.0	7.7
Concentration (mg/L)	120,114.4	NA	NA	120,114.4	0.0	1,546,012.3	113,242.6	0.0	112,776.3	1,163.3	200.0	200.0	200.0	200.0	200.0	1,994.3	87,719.2	714,500.9	0.0	192.3	0.0	NA	201.3

RA-E Average Flow Scenario 3,850 GPM Solids Content by Weight Average Precipitation 14.9%

Stream Number	1	1A	2	3	4	5	6	7	8	9	10	10a	10b	10c	10d	11	12	13	14	15	16	17	18
Description	Dredge Slurry	Supplemental Lake Water Intake	Booster Pumps Seal Water	Subtotal	Primary Screen Wash Water	Gravel-Sized Removed from Primary Screen	Subtotal	Geotextile Tube Feed Pumps Seal Water from WTP	Subtotal	Clarifier Underflow and Filter Backwash from WTP	Filtrate from Screened Material Stockpile	Runoff to Stockpile Sump (Sump#1)	Runoff to Screen Area Sump (Sump#2)	Runoff to Polymer/Dec on Area Sump (Sump#3)	Runoff to WTP Area Sump (Sump#4)	Coagulant, Polymer, and Makeup Water from WTP	Subtotal	Geotextile Tube Retention	Precipitation in SCA and Basins	Subtotal	Primary Screen Wash Water	Net Flow to SCA Basins	Dewatering Effluent to SCA WTP Influent
Total (gpm)	3,850	0	0	3,850	215	(1.6)	4,063	17	4,080	992	0.3	2.6	3.5	2.4	15.4	188	5,284	(875.7)	202	4,610	(215)	0.0	4,395
Water (gpm)	3,605	0	0	3,605	215	(0.6)	3,819	17	3,836	992	0.3	2.6	3.5	2.4	15.4	187	5,039	(630.9)	202	4,610	(215)	0.0	4,395
Solids (gpm) (Note 2)	245	0.0	0	245	0	(1.0)	244	0	244	0.4	0.00002	0.00020	0.00027	0.00019	0.00119	1.1	245	(244.9)	0	0.3	0	0.00	0.3
Solids (lbs/min) (Note 2)	5,268.0	0.0	0.0	5,268.0	0.0	(21.1)	5,247.0	0.0	5,247.0	9.6	0.0	0.0	0.0	0.0	0.0	8.3	5,265.0	(5257.6)	0.0	7.4	0.0	0.0	7.4
Concentration (mg/L)	163,961.1	NA	NA	163,961.1	0.0	1,568,389.1	154,740.5	0.0	154,103.4	1,163.3	200.0	200.0	200.0	200.0	200.0	5,313.7	119,390.2	719,381.4	0.0	192.0	0.0	NA	201.4

- Notes:

 (1). Numbers within parenthesis represent diverted flows.

 (2). Theoretical dry weight basis.

 (3). NA indicates not applicable.

							1 0	<u> </u>							1		1		
1	PARSONS	A CLAY (CLAY (C)C) (CLAY (C)) (Clay	B C	D	E	F	G		Н	<u> </u>		J		K	1	L		M	N
2	PARSUNS	Project Number: 444853 Calc.No. from index	: 3 Preparer: XDH Da	te:1/11/2011 R	lev:0 Pi	reparer:	Date:												
3		Project Name: Sediment Management Design Cal	culation Title: Mass Balance Re	viewer: MTO Da	ite: 1/14/2011		Reviewer:	Date:											
4 5																			
	ncoming Slurry						Notes												
7	ncoming order y	Slurry Flow Rate, q	5,500 gpm				Maximum flow												
8		Working Hours, t	24 hr/day																
9		Daily Slurry Volume, q _T	7,920,000 gallons/day	1,058,750 f	ft ³ /day														
10		Solids Content by Weight of Incoming Slurry, Ps	10.3%				Tab "Properties		_										
11		Specific Gravity of Solids, G _s	2.74				Tab "Properties	s", volume	e and dry	density-	weighted a	average va	lue.						
12		Unit Weight of Water, γ _w	62.4279606 pcf																
13		Slurry Water Content, WC Water Flow Rate, q _w	871%																
14 15		Dry Solids Flow Rate, q _s	5279 gpm 221 gpm																
16		Daily Water Volume, q _w	7,601,441 gallons/day	1,016,165 f	ft ³ /day														
17		Daily Water Volume, q_w	63,437,101 lbs/day	1,010,100	it ruay														
18		Daily Water Weight, Ww	318,559 gallons/day	42,585 f	ft ³ /day														
19		Daily Dry Solids Weight, W _s	7,284,305 lbs/day	12,000	it ruay														
20		Slurry Concentration, C _{s1}	0.92 lbs/gallon	6.9	b/ft ³														
21		% Water in Slurry (by Volume)	96%	5.5 .	5710														
22																			
23																			
	Booster Pump Seal Water	Booster Pump Seal Water (each), q _{booster}	0 ann				Booster pumps	uoo olurr	n, oo oool	water									
25 26		Number of Booster Pumps, N _{booster}	0 gpm				booster pumps	use siuii	y as seai	water									
27		Daily Volume of Booster Pump Seal Water	0 gallons/day	0 f	ft ³ /day														
28		Daily Weight of Booster Seal Water	0 lbs/day	•	,,,,,														
29																			
30 F	Primary Screen Wash Water																		
31		Primary Screen Wash Water (each), q _{screen-wash}	51.1 gpm				Vendor's data												
32		Number of Screens, N _{creen}	6																
33		Daily Volume of Screen Wash Water	441,677 gallons/day	59,044 f	ft ³ /day														
34		Daily Weight of Screen Wash Water	3,685,972 lbs/day																
35																			
	Seotextile Tube Feed Pump	Seal Water																	
37		extile Tube Feed Pump Seal Water (each), q _{tube-pump}	12 gpm																
38		Number of Geotextile Tube Feed Pumps, N _{tube-pump}	2																
39		Daily Volume of Tube Feed Pump Seal Water	34,560 gallons/day	4,620 f	ft ³ /dav														
40		Daily Weight of Tube Feed Pump Seal Water	288,417 lbs/day	7,020 1															
41		Sany Troight of Tube Food Fullip Oddi Water	200,711 100/day	<u> </u>															
	Primary Screens (Gravel-Size	ted Particle Removal, >1/4-inch)																	
43		age Percentage of Gravel-Sized Particles, P _{gravel-sized}	15.60%				Tab "Properties	s"											
44		/eight of Removed Gravel-Sized Particle, W _{gravel-sized}	1,136,352 lbs/day																
45		olume of Removed Gravel-Sized Particle, q _{gravel-sized}	49,695 gallons/day	6,643 f	ft ³ /dav														
46	Initial Water Content of Re	emoved Gravel-Sized Particles in Stockpile, WC _{istock}	25%	2,2.01															
47		r Removed with Gravel-Sized Particles, W _{w-gravel-sized}	284,088 lbs/day																
48		er Removed with Gravel-Sized Particles, q _{w-gravel-sized}	34,041 gallons/day	4,551 f	ft ³ /dav														
49	· · · · · · · · · · · · · · · · · · ·	Remaining Daily Dry Solids Weight in Slurry, W _{sr1}	6,147,953 lbs/day	,															
50		Remaining Daily Water Weight Slurry, W _{wr1}	67,127,402 lbs/day																
51		Remaining Daily Solids Volume Slurry, q _{sr1}	268,864 gallons/day	35,942 f	ft ³ /dav														
52		Remaining Daily Water Volume Slurry, q _{wr1}	8,043,636 gallons/day	1,075,278 f															

	A	В С	D E	F G	H I J K L M N
53					
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)	.==.	50400 / "	0.004 /	WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	0.41 gpm			
59	Flow Rate of Water in Clarifier Sludge, q _{w-clarifier}	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, W _{TSS-clarifier}	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)				
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, W _{TSS-MMF}	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)				
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, $q_{\text{TSS-GAC}}$	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, qw-GAC	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
73	SCA WTP Total				
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.4 gpm	607 gallons/day	81 ft³/day	
76	Water Flow Rate, q _{w-WTP}	992.0 gpm	1,428,449 gallons/day	190,956 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,987 lbs/day			
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79	<u> </u>		<u>'</u>		
80	Water from Screened Material Stockpile (>1/4 in)				
81	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82	Sand Water Content	25% 25%			
83	Assumed Initial Water Content of Screened Material Stockpile, WC _{istock} Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
84	Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15 %			
85	Weight of Water Removed from Stocknille (Water Content from 250), to 450(), M.	T			
06	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _{w-}	112 625 lba/day			
86	$\frac{\text{stock}}{\text{Volume of Water Removed from Stockpile (Water Content from 25% to 15%), q_w}}$	113,635 lbs/day			
97	volume of vvaler Removed from Stockpile (water Content from 25% to 15%), q _w	13,616 gallons/day	1,820 ft ³ /day		
87 88	stock Weight of Water Remained in Stockpile, W _{wr-stock}	170,453 lbs/day			
89	Volume of Water Remained in Stockpile, w _{wr-stock}		2 720 637		
	Volume of Water Normalited in Otookpile, Ywr-stock	20,425 gallons/day	2,730 ft ³ /day		
90	Total Suspended Solids in Stockpile Filtrate	Т			
92	Total Suspended Solids in Stockpile Fittrate Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	9.5 gpm	13617 gallons/day	0.000 i galloli/galloli	(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
93	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	0.000690262 gpm		0 ft ³ /day	(Sump#1 timough 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
95	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	9.46 gpm	0.99 gallons/day 13616.49 gallons/day	υπ/day	
	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}				
96		0.007159 kg/min	22.73 lbs/day		
97	Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	113,635 lbs/day			
98					

A	В	С	D E	F	G	Н	1	J	K	L	M	N
99 Runoff from Stockpile Area (Sump#1)		2										
100 Stockpile Area	40,00											
101 Daily Precipitation, PRE _{daily}	0.1	,										
102 Runoff Flowrate, q _{S1}	2.60	36	3740.3 gallons/da									
103 Total Suspended Solids, TSS _{S1}		mg/L	757.1 mg/gallon	0.0001	allon/gallon							
Total Sump#1 Flow Rate, q _{S1}	2.60	gpm	3741 gallons/da									
Flow Rate of Solids in Sump#1 Flow, q _{s-S1}	0.00019) gpm	0.273 gallons/da	y 0 1	t ³ /day							
Flow Rate of Water in Sump#1 Flow, q _{w-S1}	2.60	gpm gpm	3740.26 gallons/da	у								
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.00196	7 kg/min	6.24 lbs/day									
108 Weight of Water in Sump#1 Flow, W _{w-S1}	31,21	4 lbs/day										
109												
110 Runoff from Screen Area (Sump#2)												
111 Screen Area	53,48	3 ft ²										
112 Daily Precipitation, PRE _{daily}	0.1	inch/day										
113 Runoff Flowrate, q _{S2}	3.4	7 gpm	5001.0 gallons/da	ay								
114 Total Suspended Solids, TSS _{S2}	20	mg/L	757.1 mg/gallon	0.0001	allon/gallon							
115 Total Sump#2 Flow Rate, q _{S2}	3.47	gpm	5001 gallons/da	у								
116 Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.000254	•	0.37 gallons/da	y 0 1	t ³ /day							
117 Flow Rate of Water in Sump#2 Flow, q _{w-S2}		7 gpm	5001.01 gallons/da		•							
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.002629	9 ka/min	8.35 lbs/day	-								
119 Weight of Water in Sump#2 Flow, W _{w-S2}		5 lbs/day	, ,									
120	,	,				7						
121 Runoff from Polymer and Decon Area (Sump#3)						7						
122 Polymer and Decon Area	37,71°	1 ft ²										
123 Daily Precipitation, PRE _{daily}	0.1	inch/day										
124 Runoff Flowrate, q _{S3}	2.4		3526.2 gallons/da	av								
	20	mg/L	757.1 mg/gallon		allon/gallon							
125 Total Suspended Solids, TSS _{S3} 126 Total Sump#3 Flow Rate, q _{S3}		gpm	3526 gallons/da		, 5							
127 Flow Rate of Solids in Sump#3 Flow, q _{s-S3}	0.000179	•	0.26 gallons/da		t ³ /day							
128 Flow Rate of Water in Sump#3 Flow, q _{w-S3}		5 gpm	3526.22 gallons/da		raay							
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.00185		5.89 lbs/day	,								
130 Weight of Water in Sump#3 Flow, W _{w-S3}		3 lbs/day	3.03 ib3/day			=						
131	25,420	<i>y</i>				- 						
132 Runoff from WTP Area (Sump#4)						7						
133 WTP Area	236.94	ft ²										
134 Daily Precipitation, PRE _{daily}	0.1											
135 Runoff Flowrate, q _{S4}	15.3	•	22156.3 gallons/da	av								
136 Total Suspended Solids, TSS _{S4}		mg/L	757.1 mg/gallon		allon/gallon							
137 Total Sump#4 Flow Rate, q_{S4}		gpm	22158 gallons/da		,	-						
	0.00112		1.62 gallons/da	•	t ³ /day	=						
139 Flow Rate of Water in Sump#4 Flow, q _{w-S4}		g gpm	22156.27 gallons/da		. ruay	-						
138Flow Rate of Solids in Sump#4 Flow, q _{s-S4} 139Flow Rate of Water in Sump#4 Flow, q _{w-S4} 140Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} 141Weight of Water in Sump#4 Flow, W _{w-S4}				y		-						
140 Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} 141 Weight of Water in Sump#4 Flow, W _{w-S4}	0.011649		36.98 lbs/day			-						
141 Weight of Water in Sump#4 Flow, W _{w-S4}	184,90	3 lbs/day				-						
143 Polymer and Makeup Water						- 						
144 Percent Fines in Slurry Solids, P _{fine}	54.2%	' 2				-						
145 Fine Solids Weight	3948093.2					-						
146 Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}		bs/ton				-	Based on P	GDT draft rep	ort			
147 Dry Polymer Density, DEN _{polymer}		g/cm ³				-	Ashland 252		O. C.			
148 Daily Dry Polymer Needed, W _{drypolymer}		3 lbs/day	2.180 lbs/min			-	ASHIANU 252	O IVIOUS				
140 Dry Dolymor Volume				70	t ³ /day	-						
148 Daily Dry Polymer Needed, W _{drypolymer} 149 Dry Polymer Volume, q _{drypolymer} 150 Polymer Makeup Water Volume, q _{makeupwater}	0.373		537 gallons/da	·		-		ODT 1 "	10.00/ !!! ::			
Polymer Makeup Water Volume, q _{makeupwater}	130.59		188,052 gallons/da	y 25,139 ¹	ı /uay		Based on P-	GDT draft rep	ort 0.2% dilutio	on		
Polymer Makeup water Weight, W _{makeupwater}	1,569,36	7 lbs/day										

	۸	В	С	D	E	E C	ш		1			1	M		V
152	Α	D		Ιυ	E	F G	Н		1	J	1 N	L	IVI	ı ı	N
	Page dant (Fundaian)						7								
	Coagulant (Emulsion)						4								
154	Coagulant Dosage Rate lbs of emulsion per dry ton of solids, DOS _{coag}														
155	Coagulant Density, DEN _{coag}			Not App	plicable										
156	Coagulant Flow Rate, q _{coag}			710171	p30010										
157	Coagulant Weight, W _{coag}														
158	<u>'</u>						_								
159	RA-A Primary Screens and Poly	mer Injection				Notes									
160 I	nitial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)														
161	Daily Weight of Water in Influent to Tubes	81,019,809	lbs/day												
162	Daily Volume of Water in Influent to Tubes	9,708,314	gallons/day	1297812.84	45 ft ³ /day										
163	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%				Based on P-GD1	√ draft report.								
164	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	6,165,046	lbs/day												
165	Daily Volume of Solids Retained in Tubes,q _{s-ret2}		gallons/day	36.09	95 ft ³ /day										
166	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	10,058,759		1	,										
167	Daily Volume of Water Retained in Tubes after Initial Dewatering, q _{ret2}		gallons/day	161125.868	87 ft ³ /day										
168	Daily Weight of Water in Initial Filtrate Weight, W _{if}	71,248,330		10.1120.000	- it /uay										
169	Daily Volume of Water in Initial Filtrate, q _{if}		gallons/day	1141288.76	64 tr3/-1-										
	2	0,001,432	yallulis/uay	1141200.70	υ ¬ π⁻/day										
	Consolidation Dewatering in Geotextile Tubes	Foot		1		A = =:									
171	Solids Content by Weight after Consolidation Dewatering, P _{s3}	50%		1		Assumed value									
470	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering,	0.405.040	lba/da:												
172	W _{ret3}	6,165,046	ibs/day	1											
	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,	738.735	gallons/day	98.75	55 ft ³ /day										
173	Q _{ret3}			33,70											
174	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	3,893,713													
175	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q_{cf}		gallons/day	62,37	71 ft³/day										
176	Consolidation Dewatering Duration, t _c	60	days												
177	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}	7,776	gallons/day	1,04	40 ft ³ /day										
178					j										
179	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	9,004,002	gallons/day	1,203,66	60 ft ³ /day										
180	Daily Water Retained in Geotextile Tube, q _{w-retained}		gallons/day		55 ft ³ /day										
181		,		, ,											
	otal Suspended Solids in Geotextile Tube Filtrate						7	No	otes						
183	Total Suspended Solids, TSS _{tube-filtrate}	200	mg/L	757	'.1 mg/gallon	0.0001 gallon/gallon	1		BOD						
184	Total Geotextile Tube Filtrate Flow Rate, q _{tube-filtrate}	6253.2		1	59 gallons/day	3 3	1								
185	Flow Rate of Solids in Geotextile Tube Filtrate, q _{s-tube-filtrate}		gpm	1	57 gallons/day		1								
186	Flow Rate of Water in Geotextile Tube Filtrate, q _{w-tube-filtrate}	6252.8			02 gallons/day		┪								
	Weight of Dry Solids in Geotextile Tube Filtrate, V _{TSS-tube-filtrate}						1								
187	WEIGHT OF DITY SOHOS IN GEOLEXURE TUDE FINITALE, WTSS-tube-filtrate	4.73	kg/min	15,03	30 lbs/day		⊥								
188	Precipitation in SCA and SCA Basins														
109		Open Area, A _{SCA}	Flow Data	Flow Pote	_										
100	Daily Precipitation, PRE _{daily} (inch)	(acres)													
190 191	0.15	71.25	q _{PRE} (gpd) 290,211	q _{PRE} (gpm) 201.5	<u>'</u>			On	site met da	ıta					
191	0.15	71.20	200,211	201.0	—			OII-8	nie mei ua	ııa.					
	H Adjust Tank Influent (OBG line number 11)						7								
104	Total Suspended Solids, TSS _{influent}	200.5	ma/l	759 (98 mg/gallon	7.31752E-05 gallon/gallon	╡								
194	Total Flow Rate , MAX _{influent}					7.31732L-03 gall01/gall011	Mavir								
195		5,663			20 gallons/day		Maximum								
196	Flow Rate of Solids in Influent, q _{TSS-influent}	0.414		_	97 gallons/day		4								
197	Flow Rate of Water in Influent, q _{w-influent}	5662.59			23 gallons/day		4								
198	Weight of Dry Solids in Influent, W _{TSS-influent}	4.30	kg/min	568	3.5 lbs/hr	13644.9 lbs/day	<u> </u>								
199					·		_								
200 I	ffluent Tank Discharge (OBG line number 23)						4								
201	Total Suspended Solids, TSS _{discharge}	4.5	mg/L	17.0	03 mg/gallon	1.64234E-06 gallon/gallon	_	WTP	DP#3						
202	Total Flow Rate , MAX _{discharge}	4,514	gpm	6,500,00	00 gallons/day		_								
203	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.007		1	11 gallons/day										
204	Flow Rate of Water in Discharge, q _{w-dis}	4513.88			89 gallons/day		1								
205	Weight of Dry Solids in Discharge, W _{TSS-dis}		kg/min		0.2 lbs/hr	244.1 lbs/day	1								
_00		3.00					_1								

	A	В	С	D	Е	F	G	Н	I	J	K	L	М	N
206 207			M											
207				lance Tables	5									
208				RA-C			1	Λ				T N-4		
209			Ir	ncremental	Solids	Ctroom		Acc	cumulative Solids	1	Stream	Notes		
210		Total (gpm)	Water (gnm)	Solids (gpm)	(lbs/min)	Stream Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number			
211	Dredge Slurry	5500	5279	221	5058.5	1	5,500	5,279	221	5058.5	rtamber			
212	Booster Pumps Seal Water	0	0	0	0.0	2	5,500	5,279	221	5058.5	3			
213	Primary Screen Wash Water	307	307	0	0.0	4	5.807	5.585	221	5058.5	_			
214	Gravel-Sized Removed from Primary Screen	(58.2)	(23.6)	(34.5)	(789.1)	5	5,749	5,562	187	4269.4	6			
215	Geotextile Tube Feed Pumps Seal Water from WTP	24	24	0	0.0	7	5,773	5,586	187	4269.4	8	1		
216	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0			·				1		
217	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		5,773	5,586	187	4269.4		1		
218	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		5,773	5,586	187	4269.4				
219	Clarifier Underflow and Filter Backwash from WTP	992	992	0.4	9.6	9	6,765	6,578	187	4279.0				
220	Filtrate from Screened Material Stockpile	9.5	9.5	0.00069	0.0	10								
221	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00019	0.0	10a								
222	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00025	0.0	10b						1		
223	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00018	0.0	10c								
224	Runoff to WTP Area Sump (Sump#4)	15.4	15.4	0.00112	0.0	10d						1		
225	Coagulant Emulsion and Makeup Water from WTP	0	0	0.000	0.0							1		
226	Polymer and Makeup Water from WTP	131	131	0.4	2.2	11	6,929	6,742	188	4281.3	12			
227	Geotextile Tube Retention	(700.1)	(513.0)	(187.1)	(4270.8)	13	6229.2	6228.8	0.5	10.4				
228	Precipitation in SCA and Basins	202	202	0	0.0	14	6430.8	6430.3	0.5	10.4	15			
229	Primary Screen Wash Water	(307)	(307)	0	0.0	16	6124.1	6123.6	0.5	10.4	available			
230		(463.2)	(463.1)	(0.03)	(8.0)		5660.9	5660.5	0.4	9.7				
231	Net Flow to SCA Basins	(463.2)	(463.1)	(0.03)	(0.8)	17	5660.9	5660.5	0.4	9.7		Maximum Flow fr	om EQ Basin to W	TP
232	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.4)	(9.6)		5,660.88	5,660.45	0.429		allowable			
233	Primary Screen Wash Water from WTP	0	0	0.0										
234	Geotextile Tube Feed Pumps Seal Water from WTP	(24)	(24)	0.0										
235	Polymer Makeup Water	(131)	(131)	0			4,668.48	4,668.47	0.007			Flow from WTP		
236	Net Flow to Holding Basin (Downstream Storage)	0	0	0		·								
237	Maximum Discharge to Metro						4,513.89	4,513.88	0.007			Maximum Discha	rge to Metro (6.5 M	IGD)

1		Α		В	С	D	E	F	G		Н			J	K	l	L	М	N	_
2	PARSONS	Project Number: 444853	Calc.No. from in	dex: 3 Pr	eparer: XDH D	ate:1/11/2011	Rev:0	Preparer:	Date:											
3		Project Name: Sediment Ma	anagement Design	Calculation Title: N	Mass Balance R	eviewer: MTO	Date: 1/14/	/2011	Reviewer:	Dat	te:									
4																				
5 6 In	ncoming Slurry								Notes											
7	iconning Sturry	9	Slurry Flow Rate, q	5.50	00 gpm				Maximum flo	w										
8			Working Hours, t		24 hr/day				Waxiii iio											
9		Daily	Slurry Volume, q _T		00 gallons/day	1.058.75	50 ft ³ /day													
10		Solids Content by Weight of Ir		12.0		1,000,11			Tab "Properti	es", b	ased on weig	hted averag	e product	ion rate.						
11		Specific Gr	avity of Solids, G _s	2.	52				Tab "Properti	es", v	olume and dr	y density-we	ighted av	erage valu	e.					
12		Unit W	eight of Water, γ _w	62.427960	06 pcf															
13		Slurry W	/ater Content, WC	733																
14			ater Flow Rate, q _w		18 gpm															
15			olids Flow Rate, q _s		32 gpm															
16			Water Volume, q _w		29 gallons/day	1,004,39	99 ft³/day													
17			Water Weight, W _w		08 lbs/day															
18			Solids Volume, q _s		71 gallons/day	54,35	51 ft ³ /day	_												
19			Solids Weight, W _s		56 lbs/day															
20			Concentration, C _{s1}		08 lbs/gallon	8	.1 lb/ft ³													
21		% Water in S	Slurry (by Volume)	95	%															
23																				
	ooster Pump Seal Water																			
25	ooster rump ocur water	Booster Pump Seal Wa	ater (each), q _{booster}		0 gpm				Booster pum	ps use	e slurry as sea	al water								
26		Number of Boos	ter Pumps, N _{booster}		4				•		•									
27		Daily Volume of Booster			0 gallons/day		0 ft ³ /day													
28		Daily Weight of Be	ooster Seal Water		0 lbs/day															
29						1														
	rimary Screen Wash Water																			
31		Primary Screen Wash Water		51	.1 gpm				Vendor's data	а										
32		Number	of Screens, N _{creen}		6															
33		Daily Volume of Sc	reen Wash Water	441,67	77 gallons/day	59,04	44 ft ³ /day													
34		Daily Weight of Sc	reen Wash Water	3,685,97	72 lbs/day															
35																				
36 G	eotextile Tube Feed Pump S	Seal Water																		
37		extile Tube Feed Pump Seal Wate	er (each), q _{tube-numn}		12 gpm															
38		Number of Geotextile Tube Feed			2															
39		Daily Volume of Tube Feed		3/1 5/	60 gallons/day	4 60	20 ft ³ /day	\dashv												
40		Daily Weight of Tube Feed			17 lbs/day	4,02	_o it /day													
		Daily Weight of Tube Feed	i ump ocai water	200,4	i i ibsruay	I														
41 42 B	rimary Caroona (Crayal Ci-	od Partiala Pamayal + 4/4 imah	T			1														
42 P		ed Particle Removal, >1/4-inch) ge Percentage of Gravel-Sized Pa		0.50	0/2	1		\dashv	Tab "Properti	es"										
44		eight of Removed Gravel-Sized P			52 lbs/day	1			ias i iopeit											
45		olume of Removed Gravel-Sized			33 gallons/day	27	72 ft ³ /day	\dashv												
46		emoved Gravel-Sized Particles in		25			- It /uay													
47		Removed with Gravel-Sized Part			38 lbs/day															
48		er Removed with Gravel-Sized Pa			31 gallons/day	1-	71 ft ³ /day	\dashv												
49	Daily volume of Wate	Remaining Daily Dry Solids Wei			04 lbs/day	1	· it /day	\dashv												
50		Remaining Daily Water W			09 lbs/day			\dashv												
51		Remaining Daily Water W			38 gallons/day	54.0	در3ره ۲۵													
52		Remaining Daily Water V					79 ft ³ /day													
UZ.		Nemaining Daily Water V	Giuille Giully, 4 _{wr1}	1,900,30	35 gallons/day	1,007,88	92 ft ³ /day													

	A	ВС	D E	F G	H I J K L M N
53					
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)				WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	0.44 gpm			
59	Flow Rate of Water in Clarifier Sludge, q _{w-clarifier}	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, W _{TSS-clarifier}	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)				
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, $W_{TSS-MMF}$	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)				
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, q _{w-GAC}	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
73	SCA WTP Total			j	
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.5 gpm	660 gallons/day	88 ft ³ /day	
76	Water Flow Rate, q _{w-WTP}	991.9 gpm	1,428,396 gallons/day	190,949 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,545 lbs/day	, -,	,	
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79	5 5 1 5 5 5 1 W IF-100	10,071			
	Water from Screened Material Stockpile (>1/4 in)		1		
	,				
81	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82	Sand Water Content	25%			
83	Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25%			
84	Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
85	W				
	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _w				
86	stock	4,275 lbs/day			
	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), \mathbf{q}_{w}	512 gallons/day	68 ft ³ /day		
87	stock		- it rady		
88	Weight of Water Remained in Stockpile, W _{wr-stock}	6,413 lbs/day	400 ^		
89	Volume of Water Remained in Stockpile, q _{wr-stock}	768 gallons/day	103 ft ³ /day		
90	T (10	Т	ı		
	Total Suspended Solids in Stockpile Filtrate	000	757.4 ' "	0.0004 ==="" / "	
92	Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	0.4 gpm	512 gallons/day	- 3	(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	2.82363E-05 gpm	0.04 gallons/day	0 ft ³ /day	
95	Flow Rate of Water in Stockpile Filtrate, q _{w-stock-filtrate}	0.36 gpm	512.28 gallons/day		
96	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.000269 kg/min	0.86 lbs/day		
97	Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	4,275 lbs/day			
98					

99 Runoff from Stockpile Area (Sump#1) 100 Stockpile Area 101 Daily Precipitation, PRE _{daily} 102 Runoff Flowrate, q _{S1} 103 Total Suspended Solids, TSS _{S1} 104 Total Sump#1 Flow Rate, q _{S1} 105 Flow Rate of Solids in Sump#1 Flow, q _{S-S1} 106 Flow Rate of Water in Sump#1 Flow, q _{W-S1}	B C 40,000 ft² 0.15 inch/day 2.60 gpm 200 mg/L 2.60 gpm 0.000206 gpm 2.60 gpm	3740.3 gallons/day 757.1 mg/gallon	F G	н	l J	K	L	M	N
100 Stockpile Area 101 Daily Precipitation, PRE _{daily} 102 Runoff Flowrate, q _{S1} 103 Total Suspended Solids, TSS _{S1} 104 Total Sump#1 Flow Rate, q _{S1} 105 Flow Rate of Solids in Sump#1 Flow, q _{S-S1} 106 Flow Rate of Water in Sump#1 Flow, q _{W-S1}	0.15 inch/day 2.60 gpm 200 mg/L 2.60 gpm 0.000206 gpm	757.1 mg/gallon		1					
101 Daily Precipitation, PRE _{daily} 102 Runoff Flowrate, q _{S1} 103 Total Suspended Solids, TSS _{S1} 104 Total Sump#1 Flow Rate, q _{S1} 105 Flow Rate of Solids in Sump#1 Flow, q _{s-S1} 106 Flow Rate of Water in Sump#1 Flow, q _{w-S1}	0.15 inch/day 2.60 gpm 200 mg/L 2.60 gpm 0.000206 gpm	757.1 mg/gallon		_					
102 Runoff Flowrate, q _{S1} 103 Total Suspended Solids, TSS _{S1} 104 Total Sump#1 Flow Rate, q _{S1} 105 Flow Rate of Solids in Sump#1 Flow, q _{s-S1} 106 Flow Rate of Water in Sump#1 Flow, q _{w-S1}	2.60 gpm 200 mg/L 2.60 gpm 0.000206 gpm	757.1 mg/gallon							
Total Suspended Solids, TSS _{S1} 104 Total Sump#1 Flow Rate, q _{S1} 105 Flow Rate of Solids in Sump#1 Flow, q _{s-S1} 106 Flow Rate of Water in Sump#1 Flow, q _{w-S1}	200 mg/L 2.60 gpm 0.000206 gpm	757.1 mg/gallon		1					
Total Sump#1 Flow Rate, q _{S1} 105 Flow Rate of Solids in Sump#1 Flow, q _{s-S1} 106 Flow Rate of Water in Sump#1 Flow, q _{w-S1}	2.60 gpm 0.000206 gpm	'	· · · · · · · · · · · · · · · · · · ·						
Flow Rate of Solids in Sump#1 Flow, q _{s-S1} Flow Rate of Water in Sump#1 Flow, q _{w-S1}	0.000206 gpm	27/11 college/day	0.0001 gallon/gallon						
Flow Rate of Water in Sump#1 Flow, q _{w-S1}	<u> </u>	3741 gallons/day							
Flow Rate of Water in Sump#1 Flow, q _{w-S1}	a co anm	0.297 gallons/day	0 ft ³ /day						
		3740.26 gallons/day							
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.001967 kg/min	6.24 lbs/day							
Weight of Water in Sump#1 Flow, W _{w-S1}	31,214 lbs/day								
109]					
110 Runoff from Screen Area (Sump#2)									
111 Screen Area	53,483 ft ²								
112 Daily Precipitation, PRE _{daily}	0.15 inch/day								
113 Runoff Flowrate, q _{S2}	3.47 gpm	5001.0 gallons/day							
Total Suspended Solids, TSS _{S2}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
Total Sump#2 Flow Rate, q _{S2}	3.47 gpm	5001 gallons/day							
Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.000276 gpm	0.40 gallons/day	0 ft ³ /day						
Flow Rate of Water in Sump#2 Flow, q _{w-S2}	3.47 gpm	5001.01 gallons/day							
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.002629 kg/min	8.35 lbs/day							
119 Weight of Water in Sump#2 Flow, W _{w-S2}	41,735 lbs/day			1					
120	<u> </u>	· ·		1					
121 Runoff from Polymer and Decon Area (Sump#3)]					
122 Polymer and Decon Area	37,711 ft ²								
123 Daily Precipitation, PRE _{daily}	0.15 inch/day								
124 Runoff Flowrate, q _{S3}	2.45 gpm	3526.2 gallons/day							
Total Suspended Solids, TSS _{S3}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
125 Total Suspended Solids, TSS _{S3} 126 Total Sump#3 Flow Rate, q _{S3}	2.45 gpm	3527 gallons/day							
Flow Rate of Solids in Sump#3 Flow, q _{s-S3}	0.000194 gpm	0.28 gallons/day	0 ft ³ /day						
Flow Rate of Water in Sump#3 Flow, q _{w-S3}	2.45 gpm	3526.22 gallons/day	-						
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.001854 kg/min	5.89 lbs/day		1					
130 Weight of Water in Sump#3 Flow, W _{w-S3}	29,428 lbs/day								
131	<u> </u>	· ·		1					
132 Runoff from WTP Area (Sump#4)									
133 WTP Area	236,949 ft ²								
134 Daily Precipitation, PRE _{daily}	0.15 inch/day								
135 Runoff Flowrate, q _{S4}	15.39 gpm	22156.3 gallons/day							
136 Total Suspended Solids, TSS _{S4}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
Total Sump#4 Flow Rate, q _{S4}	15.39 gpm	22158 gallons/day							
	0.001221 gpm	1.76 gallons/day	0 ft ³ /day						
Flow Rate of Water in Sump#4 Flow, q _{w-S4}	15.39 gpm	22156.27 gallons/day	•						
Flow Rate of Solids in Sump#4 Flow, q _{s-S4} Flow Rate of Water in Sump#4 Flow, q _{w-S4} Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} Weight of Water in Sump#4 Flow, W _{w-S4}	0.011649 kg/min	36.98 lbs/day		1					
Weight of Water in Sump#4 Flow, W _{w-S4}	184,903 lbs/day			1					
142		•		1					
143 Polymer and Makeup Water]					
Percent Fines in Slurry Solids, P _{fine}	90.0%								
145 Fine Solids Weight	7695320.12 lbs/day								
Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}	1.59 lbs/ton			Ва	sed on P-GDT draf	t report.			
Dry Polymer Density, DEN _{polymer}	0.70 g/cm ³			As	shland 2520 MSDS				
Daily Dry Polymer Needed, W _{drypolymer}	6117.78 lbs/day	4.248 lbs/min							
Dry Polymer Volume, q _{drypolymer}	0.7273 gpm	1047 gallons/day	140 ft ³ /day						
148 Daily Dry Polymer Needed, W _{drypolymer} 149 Dry Polymer Volume, q _{drypolymer} 150 Polymer Makeup Water Volume, q _{makeupwater}	254.54 gpm	366,536 gallons/day	48,999 ft ³ /day	Ва	sed on P-GDT draf	t report 0.2% dilution	1		
151 Polymer Makeup water Weight, W _{makeupwater}	3,058,890 lbs/day			1					

	A	В С	D E	F G	Н	I J K	· L	М	N
152									
153	Coagulant (Emulsion)								
154	Coagulant Dosage Rate lbs of emulsion per dry ton of solids, DOS _{coag}								
155	Coagulant Density, DEN _{coag}		Not Applicable						
156	Coagulant Flow Rate, q _{coag}		Not Applicable						
157	Coagulant Weight, W _{coag}								
158				,					
159	RA-A Primary Screens and Polyr	mer Injection		Notes					
	Initial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)			1					
161	Daily Weight of Water in Influent to Tubes	81,938,437 lbs/day	10/0707 27 23:	1					
162	Daily Volume of Water in Influent to Tubes	9,818,390 gallons/day	1312527.85 ft ³ /day	n	droft '				
163	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%		Based on P-GDT	uraπ report.				
164	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	8,527,654 lbs/day	F1007 2	1					
165	Daily Volume of Solids Retained in Tubes,q _{s-ret2}	406,248 gallons/day	54,307 ft ³ /day	1					
166	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	13,913,541 lbs/day		1					
167	Daily Volume of Water Retained in Tubes after Initial Dewatering, q _{ret2}	1,667,210 gallons/day	222873.5394 ft ³ /day	1					
168	Daily Weight of Water in Initial Filtrate Weight, Wif	68,312,177 lbs/day		1					
169	Daily Volume of Water in Initial Filtrate, q _{if}	8,185,604 gallons/day	1094256.098 ft ³ /day	1					
	Consolidation Dewatering in Geotextile Tubes			1					
171	Solids Content by Weight after Consolidation Dewatering, P _{s3}	50%		Assumed value					
	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering,			1					
172	W _{ret3}	8,527,654 lbs/day		1					
	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,	1,021,838 gallons/day	136,600 ft ³ /day	1					
173	q_{ret3} Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	,	<u> </u>	1					
174		5,385,887 lbs/day	96 974 631	1					
175	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q _{cf}	645,372 gallons/day	86,274 ft ³ /day	1					
176	Consolidation Dewatering Duration, t _c	60 days	4.400 2	1					
177	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}	10,756 gallons/day	1,438 ft ³ /day	1					
178	Dook Volumes of Materia Contactly T. J. Etc.	0.000.075 " ''	4.400.500 -3:	1					
179	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	8,830,975 gallons/day	1,180,530 ft ³ /day	1					
180	Daily Water Retained in Geotextile Tube, q _{w-retained}	1,021,838 gallons/day	136,600 ft ³ /day	1					
181	otal Suspended Solids in Costaville Title Filtret				T	Notes			
	Total Suspended Solids in Geotextile Tube Filtrate Total Suspended Solids, TSS _{tube-filtrate}	200 mm m II	757 1 22/22/1	0.0004 gallan/gallan	+	Notes			
183		200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	4	WTP BOD			
184	Total Geotextile Tube Filtrate Flow Rate, q _{tube-filtrate}	6133.1 gpm	8,831,676 gallons/day	1	-				
185	Flow Rate of Solids in Geotextile Tube Filtrate, q _{s-tube-filtrate}	0.49 gpm	701 gallons/day	1	4				
186	Flow Rate of Water in Geotextile Tube Filtrate, q _{w-tube-filtrate}	6132.6 gpm	8,830,975 gallons/day	1	4				
187	Weight of Dry Solids in Geotextile Tube Filtrate, $W_{\text{TSS-tube-filtrate}}$	4.64 kg/min	14,741 lbs/day	1	1				
188	Precipitation in SCA and SCA Basins								
109		Open Area, A _{SCA} Flow Rate,	Flow Pato						
100	Daily Precipitation, PRE _{daily} (inch)	•	Flow Rate, q _{PRE} (gpm)						
190 191	0.15	(acres) q _{PRE} (gpd) 71.25 290,211	q _{PRE} (gpm) 201.5			On-site met data.			
192	0.15	200,211				S Oito mot data.			
	pH Adjust Tank Influent (OBG line number 11)				Τ				
194	Total Suspended Solids, TSS _{influent}	200.5 mg/L	758.98 mg/gallon	7.95635E-05 gallon/gallon	1				
195	Total Flow Rate , MAX _{influent}	5,663 gpm	8,154,720 gallons/day		Maximum				
196	Flow Rate of Solids in Influent, q _{TSS-influent}	0.451 gpm	649 gallons/day						
197	Flow Rate of Water in Influent, q _{w-influent}	5662.55 gpm	8,154,071 gallons/day		1				
198	Weight of Dry Solids in Influent, W _{TSS-influent}	4.30 kg/min	568.5 lbs/hr	13644.9 lbs/day	1				
198	Worght of Dry Condo in Initident, WTSS-influent	4.50 kg/mill	000.0 IDS/III	10077.8 IDS/Uay	7				
	Effluent Tank Discharge (OBG line number 23)				7				
201	Total Suspended Solids, TSS _{discharge}	4.5 mg/L	17.03 mg/gallon	1.78571E-06 gallon/gallon	1	WTP DP#3			
202	Total Flow Rate , MAX _{discharge}	4,514 gpm	6,500,000 gallons/day		1	5			
202	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.008 gpm	12 gallons/day		1				
203	Flow Rate of Solids in Discharge, q _{rss-dis}	4513.88 gpm	6,499,988 gallons/day	1	1				
204	Weight of Dry Solids in Discharge, W _{TSS-dis}			244.1 lbe/day	1				
∠∪5	weight of Dity Solids in Discharge, W _{TSS-dis}	0.08 kg/min	10.2 lbs/hr	244.1 lbs/day					

	A	В	С	D	Е	F	G	Н	I	J	K	L M	N
206 207 208			Mass Ba	Janas Tablas	_								
207				llance Tables RA-D	5								
209				ncremental				Acc	umulative			Notes	
					Solids	Stream			Solids		Stream	1	
210		Total (gpm)	Water (gpm)	Solids (gpm)	(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number		
211	Dredge Slurry	5500	5218	282	5937.7	1	5,500	5,218	282	5937.7			
212	Booster Pumps Seal Water	0	0	0	0.0	2	5,500	5,218	282	5937.7	3		
213	Primary Screen Wash Water	307	307	0	0.0	4	5,807	5,524	282	5937.7			
214	Gravel-Sized Removed from Primary Screen	(2.3)	(0.9)	(1.4)	(29.7)	5	5,804	5,523	281	5908.1	6		
215	Geotextile Tube Feed Pumps Seal Water from WTP	24	24	0	0.0	7	5,828	5,547	281	5908.1	8		
216	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0								
217	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		5,828	5,547	281	5908.1			
218	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		5,828	5,547	281	5908.1		1	
219	Clarifier Underflow and Filter Backwash from WTP	992	992	0.5	9.6	9	6,821	6,539	281	5917.7			
220	Filtrate from Screened Material Stockpile	0.4	0.4	0.00003	0.0	10						1	
221	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00021	0.0	10a						1	
222	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00028	0.0	10b						1	
223	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00019	0.0	10c						1	
220 221 222 223 224	Runoff to WTP Area Sump (Sump#4)	15.4	15.4	0.00122	0.0	10d							
225	Coagulant Emulsion and Makeup Water from WTP	0	0	0.000	0.0								
226	Polymer and Makeup Water from WTP	255	255	0.7	4.2	11	7,100	6,818	282	5922.0	12		
227	Geotextile Tube Retention	(991.2)	(709.6)	(281.6)	(5911.7)	13	6109.1	6108.6	0.5	10.2		1	
228	Precipitation in SCA and Basins	202	202	0	0.0	14	6310.6	6310.2	0.5	10.2	15	1	
229	Primary Screen Wash Water	(307)	(307)	0	0.0	16	6003.9	6003.4	0.5	10.2	available	1	
230		(219.1)	(219.1)	(0.02)	(0.4)		5784.8	5784.4	0.5	9.9		Ī	
231	Net Flow to SCA Basins	(340.9)	(340.9)	(0.04)	(0.8)	17	5663.0	5662.5	0.5	9.5	18	Maximum Flow from EQ Basin to WT	P
232	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.5)	(9.6)		5,784.83	5,784.36	0.466		allowable	1	
232 233	Primary Screen Wash Water from WTP	0	0	0.0	, ,							1	
234	Geotextile Tube Feed Pumps Seal Water from WTP	(24)	(24)	0.0								1	
234 235 236	Polymer Makeup Water	(255)	(255)	0			4,792.43	4,792.42	0.008			Flow from WTP	
236	Net Flow to Holding Basin (Downstream Storage)	0	0	0								1	
237	Maximum Discharge to Metro						4,513.89	4,513.88	0.008			Maximum Discharge to Metro (6.5 M	GD)

	Λ		D E			1 11					V		ı		N
1	A Project Number: 444853 Calc.No. from	B C	D E	F	G	Н Н	<u> </u>		J		K	L		M	N
2	Project Number: 444853 Calc.No. from	index: 3 Preparer: XDH Da	te:1/11/2011 Rev:0	Preparer:	Date:										
3	Project Name: Sediment Management Design	Calculation Title: Mass Balance Re	viewer: MTO Date: 1/14/20	011	Reviewer:	Date:									
<u>4</u> 5															
5	in a Olumni			_	Mataa										
7 T	ncoming Slurry Slurry Flow Rate, c	5,500 gpm		-	Notes Maximum flov	.,									
8	Working Hours, 1	24 hr/day		_	Maximum nov	V									
9	Daily Slurry Volume, q	7,920,000 gallons/day	1,058,750 ft ³ /day	-											
10	Solids Content by Weight of Incoming Slurry, P	16.2%	1,000,700 it 7day	-	Tab "Propertie	es", based on weigh	ted avera	age produ	ction rate.						
11	Specific Gravity of Solids, G	2.68		1	Tab "Propertie	es", volume and dry	density-	veighted a	average va	lue.					
12	Unit Weight of Water, γ _ν	62.4279606 pcf					•	Ū	Ü						
13	Slurry Water Content, WC	<u> </u>		-											
14	Water Flow Rate, q _w	5130 gpm		1											
15	Dry Solids Flow Rate, q	370 gpm													
16	Daily Water Volume, q _w	7,387,141 gallons/day	987,517 ft ³ /day												
17	Daily Water Weight, W _v	61,648,680 lbs/day		_]											
18	Daily Dry Solids Volume, q	532,859 gallons/day	71,233 ft ³ /day												
19	Daily Dry Solids Weight, W _s	11,917,764 lbs/day													
20	Slurry Concentration, C _s	1.50 lbs/gallon	11.3 lb/ft ³												
21	% Water in Slurry (by Volume)	93%		4											
22				4											
23	Booster Pump Seal Water	T		-											
25	Booster Pump Seal Water (each), q _{booster}	0 gpm		_	Booster pump	s use slurry as sea	l water								
25 26	Number of Booster Pumps, N _{booste}	4		1		,									
27	Daily Volume of Booster Pump Seal Water	0 gallons/day	0 ft ³ /day	1											
28	Daily Weight of Booster Seal Water	0 lbs/day													
29				_											
	Primary Screen Wash Water														
31	Primary Screen Wash Water (each), q _{screen-wash}				Vendor's data										
32	Number of Screens, N_{creen}	6													
33	Daily Volume of Screen Wash Water	441,677 gallons/day	59,044 ft ³ /day												
34	Daily Weight of Screen Wash Water	3,685,972 lbs/day													
35															
	Geotextile Tube Feed Pump Seal Water			1											
37	Geotextile Tube Feed Pump Seal Water (each), q _{tube-pump}	12 gpm		1											
38	Number of Geotextile Tube Feed Pumps, N _{tube-pump}			1											
39	Daily Volume of Tube Feed Pump Seal Water	34,560 gallons/day	4,620 ft ³ /day	1											
40	Daily Weight of Tube Feed Pump Seal Water		+,020 π /uay	1											
	Daily Weight of Tube Feed Fullip Seal Water	200,417 lb5/day		_											
41 42 B	Primary Screens (Gravel-Sized Particle Removal, >1/4-inch)	T		7											
42 P	Average Percentage of Gravel-Sized Particle Removal, >174-Inch)	0.30%		1	Tab "Propertie	2 c "									
44	Daily Dry Weight of Removed Gravel-Sized Particle, W _{gravel-sized}			1	iab i iopeille										
45	Daily Volume of Removed Gravel-Sized Particle, q _{gravel-sized}		214 ft ³ /day	1											
46	Initial Water Content of Removed Gravel-Sized Particles in Stockpile, WC _{istocl}		Zi+ it /uay	1											
47	Daily Weight f Water Removed with Gravel-Sized Particles, W _{w-gravel-sized}			1											
48	Daily Volume of Water Removed with Gravel-Sized Particles, qw-gravel-sized	1,071 gallons/day	143 ft ³ /day	-											
49	Remaining Daily Dry Solids Weight in Slurry, W _{sr}		i+ο π/day	-1											
50		•		-											
50	Remaining Daily Water Weight Slurry, W _{wr}	65,614,130 lbs/day	74.040.6344	-1											
51 52	Remaining Daily Solids Volume Slurry, q _{sr}	531,261 gallons/day	71,019 ft ³ /day	-1											
52	Remaining Daily Water Volume Slurry, q _{wr}	7,862,306 gallons/day	1,051,038 ft ³ /day												

	A	ВС	D E	F G	H I J K L M N
53			· · · · · · · · · · · · · · · · · · ·		
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)		1		WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	0.42 gpm			
59	Flow Rate of Water in Clarifier Sludge, q _{w-clarifier}	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, $W_{TSS-clarifier}$	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)		1		
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, W _{TSS-MMF}	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)				
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, q _{w-GAC}	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
73	SCA WTP Total				
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.4 gpm	620 gallons/day	83 ft³/day	
76	Water Flow Rate, q _{w-WTP}	992.0 gpm	1,428,436 gallons/day	190,954 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,874 lbs/day			
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79		<u> </u>	•		
80	Water from Screened Material Stockpile (>1/4 in)				
	T	000/			
81 82	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%) Sand Water Content	80% 25%		DelTank TCW-300	0
83	Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25%			
84	Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
85	7 ISSUMED THAT WATER CONTENT OF COLCETED WATER A COOKPILE, WO TSTOCK	.575			
03	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _{w-}	T			
86	Total Control of the	3,575 lbs/day			
55	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), q_{w-}				
87	etock	428 gallons/day	57 ft ³ /day		
88	Weight of Water Remained in Stockpile, W _{wr-stock}	5,363 lbs/day			
89	Volume of Water Remained in Stockpile, q _{wr-stock}	643 gallons/day	86 ft ³ /day		
90		- 3 ,	it rady		
	Total Suspended Solids in Stockpile Filtrate			T	
92	Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	0.3 gpm	428 gallons/day		(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	2.22041E-05 gpm	0.03 gallons/day	0 ft ³ /day	. , , , , , , , , , , , , , , , , , , ,
95	Flow Rate of Water in Stockpile Filtrate, q _{w-stock-filtrate}	0.30 gpm	428.42 gallons/day		
96	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.000225 kg/min	0.72 lbs/day		
97	Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	3,575 lbs/day	J.,		
98	- G	5,5.0			
<u> </u>					

Section Company Comp	<u> </u>				
100 Security 100	DEFGHIJKLMN	G	E	С	
10 Daily Precipitation, PREssy 1.0				2	
102 Surperf Flowrate, q ₀ 2666 gpm 5740.3 gallonicidary 1757.1 mg/gallonicidary 105 1					
Total Suspended Solids, TSSs. 290 mg/L 757.1 mg/gatter 0.0001 galton/gation 106 Total Suspend Flow Res. g. 2.60 gpm 3.741 galton/sday 0.17 day 106 Flow Nate of Yader in Sump#1 Flow, Qube 0.000194 gpm 0.272 galton/sday 0.17 day 107 108 1					
Total Sumper Flow Rate of Stories in Sumper Flow, Rate 2.60 gpm 3741 gallomatdary 174				3F···	
Flow Rate of Solids in Sump# Flow Co. 12 0.000194 gom 0.279 gallonacidary 0.17/day		0.0001 gallon/gallon			
106			3741 gallons/day	.	104 Total Sump#1 Flow Rate, q _{S1}
	•	0 ft ³ /day	<u> </u>		105 Flow Rate of Solids in Sump#1 Flow, q _{s-S1}
108	3740.26 gallons/day		740.26 gallons/day		106 Flow Rate of Water in Sump#1 Flow, q _{w-S1}
108	6.24 lbs/day		6.24 lbs/day		
110 Screen Area (Sump#2)				31,214 lbs/day	
11 Screen Area					
112 Daily Precipitation, PRE _{enly}					
113 Runoff Flowrate, q ₅₂ 3.47 gpm 5001.0 gallons/day 115 Total Suspended Solids, TSS ₂₂ 260 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 115 Total Sump#2 Flow Rate, q ₅₂ 3.47 gpm 5001.0 gallons/day 0.17 day 117 Flow Rate of Solids in Sump#2 Flow, q ₆₋₅₂ 0.000259 gpm 0.37 gallons/day 0.17 day 117 Flow Rate of Water in Sump#2 Flow, q ₆₋₅₂ 0.000259 gpm 0.37 gallons/day 0.17 day 118 Weight of Dry Solids in Sump#2 Flow, W ₆₋₅₂ 0.002629 kgmin 8.35 lbs/day 119 Weight of Dry Solids in Sump#2 Flow, W ₆₋₅₂ 41,735 lbs/day 120					
Total Suspended Solids, TSS ₁₀ 116				,	
Total Sump#2 Flow Rate, qs2	5001.0 gallons/day		5001.0 gallons/day	3.47 gpm	
Flow Rate of Solids in Sump#2 Flow, Q ₆₋₅₅ 0.000259 gpm 0.37 gallons/day 0 ft²/day	757.1 mg/gallon 0.0001 gallon/gallon	0.0001 gallon/gallon	757.1 mg/gallon	200 mg/L	
Flow Rate of Water in Sump#3 Flow, Q ₈₋₅₀ 3.47 gpm 5001.01 gallons/day	5001 gallons/day		5001 gallons/day	3.47 gpm	
Flow Rate of Water in Sump#3 Flow, Q _{moss} 3.47 gpm 5001.01 gallons/day	0.37 gallons/day 0 ft³/day	0 ft ³ /day	0.37 gallons/day	00259 gpm	116 Flow Rate of Solids in Sump#2 Flow, q _{s-S2}
119 Weight of Water in Sump#2 Flow, W _{w-S2} 41,735 bs/day	5001.01 gallons/day		001.01 gallons/day	3.47 gpm	
119	8.35 lbs/day		8.35 lbs/day	02629 kg/min	118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}
121 Runoff from Polymer and Decon Area (Sump#3) 122 Polymer and Decon Area 37,711 ft² 123 Daily Precipitation, PRE_daily 0.15 inch/day 124 Runoff Flowrate, qss 2.45 gpm 3526.2 gallons/day 125 Total Suspended Solids, TSSs 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 126 Total Sump#3 Flow, qs, ss 2.45 gpm 3526 gallons/day 127 Flow Rate of Solids in Sump#3 Flow, qs, ss 0.000183 gpm 0.26 gallons/day 0 ft³/day 128 Flow Rate of Water in Sump#3 Flow, qs, ss 2.45 gpm 3568.22 gallons/day 0 ft³/day 128 Flow Rate of Water in Sump#3 Flow, qs, ss 2.45 gpm 3568.22 gallons/day 0 ft³/day 128 Weight of Dry Solids in Sump#3 Flow, qs, ss 2.45 gpm 3568.22 gallons/day 0 ft³/day 129 Weight of Dry Solids in Sump#3 Flow, qs, ss 2.45 gpm 3568.22 gallons/day 129 Weight of Dry Solids in Sump#3 Flow, qs, ss 2.45 gpm 3568.22 gallons/day 129 Weight of Water in Sump#3 Flow, qs, ss 2.45 gpm 3568.22 gallons/day 129 Weight of Dry Solids in Sump#3 Flow, Ws, ss 2.45 gpm 3568.22 gallons/day 129 Weight of Dry Solids in Sump#3 Flow, Ws, ss 2.45 gpm 3568.23 gallons/day 120			-		
122 Polymer and Decon Area 37,771 ft²			L.	<u>.</u>	120
123 Daily Precipitation, PRE _{daily} 124 Runoff Flowrate, qs3 2.45 gpm 3526.2 gallons/day 125 Total Suspended Solids, TSS ₈₅ 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 126 Total Sump#3 Flow Rate, qs3 2.45 gpm 3526 gallons/day 127 Flow Rate of Solids in Sump#3 Flow, qs3 0.000183 gpm 0.26 gallons/day 0 ft³/day 128 Flow Rate of Water in Sump#3 Flow, qs3 0.45 gpm 3526.2 gallons/day 0 ft³/day 129 Weight of Dry Solids in Sump#3 Flow, Wrsss 0.001854 kg/min 5.89 lbs/day 130 Weight of Water in Sump#3 Flow, Wrsss 29,428 lbs/day 131 132 Runoff from WTP Area (Sump#4) 133 WTP Area 236,949 ft² 134 Daily Precipitation, PRE _{daily} 0.15 inch/day 15.89 gpm 22156.3 gallons/day 15.39 22156.3 gallons/day 15.39 gpm 22156.3 gallons/day 15.39 gpm 22156.3 gallons/day 15.39 gpm 22156.3 gallons/day 15.39 gpm 22156.3 gallons/day 15.39 22156.3 gallons/day 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30 15.30					121 Runoff from Polymer and Decon Area (Sump#3)
124 Runoff Flowrate, Qs3 2.45 gpm 3526.2 gallons/day 125 Total Suspended Solids, TSS ₈₃ 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 126 Total Sump#3 Flow Rate, qs3 2.45 gpm 3526 gallons/day 0.0001 gallons/day 127 Flow Rate of Solids in Sump#3 Flow, qs3 0.00183 gpm 0.26 gallons/day 0 ft³/day 128 Flow Rate of Walter in Sump#3 Flow, qs3 2.45 gpm 3526.22 gallons/day 0 ft³/day 129 Weight of Dry Solids in Sump#3 Flow, Wrss-ss 0.001854 kg/min 5.89 lbs/day 5.89 lbs/day 130 Weight of Water in Sump#3 Flow, Wrss-ss 0.001854 kg/min 5.89 lbs/day 5.89 lbs/day 131 Runoff from WTP Area (Sump#4) 132 Runoff from WTP Area (Sump#4) 133 light precipitation, PREdaily 0.15 inch/day 135 Runoff Flowrate, qs4 15.39 gpm 22156.3 gallons/day 0.0001 gallon/gallon 137 Total Suspended Solids, TSS ₈₄ 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, qs4 15.39 gpm 22158 gallons/day				37,711 ft ²	
Total Suspended Solids, TSS ₃₃				0.15 inch/day	123 Daily Precipitation, PRE _{daily}
Total Sump#3 Flow Rate, q _{S3}	3526.2 gallons/day		3526.2 gallons/day	2.45 gpm	124 Runoff Flowrate, q _{S3}
127	757.1 mg/gallon 0.0001 gallon/gallon	0.0001 gallon/gallon	757.1 mg/gallon	200 mg/L	125 Total Suspended Solids, TSS _{S3}
127	3526 gallons/day		3526 gallons/day	2.45 gpm	126 Total Sump#3 Flow Rate, q _{S3}
128 Flow Rate of Water in Sump#3 Flow, Q _{w-S3} 2.45 gpm 3526.22 gallons/day 129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3} 0.001854 kg/min 5.89 lbs/day 130 Weight of Water in Sump#3 Flow, W _{w-S3} 29,428 lbs/day 131 Total Sump#4) 132 Runoff from WTP Area (Sump#4) Total Suspended Solids, TSS ₈₄ Comp/L 757.1 mg/gallon 136 Total Suspended Solids, TSS ₈₄ 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, q ₈₄ 15.39 gpm 22158 gallons/day	0.26 gallons/day 0 ft³/day	0 ft ³ /day	0.26 gallons/day	00183 gpm	127 Flow Rate of Solids in Sump#3 Flow, q _{s-S3}
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3} 0.001854 kg/min 5.89 lbs/day 130 Weight of Water in Sump#3 Flow, W _{w-S3} 29,428 lbs/day 131 132 Runoff from WTP Area (Sump#4) 133 WTP Area 236,949 ft² 134 Daily Precipitation, PRE _{daily} 0.15 inch/day 15.39 gpm 22156.3 gallons/day 136 Total Suspended Solids, TSS _{S4} 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, q _{S4} 15.39 gpm 22158 gallons/day 15.39 gpm 15.39	3526.22 gallons/day		526.22 gallons/day	2.45 gpm	128 Flow Rate of Water in Sump#3 Flow, q _{w-S3}
130 Weight of Water in Sump#3 Flow, Ww.s3 29,428 lbs/day 131 132 Runoff from WTP Area (Sump#4) 133 WTP Area 236,949 ft² 134 Daily Precipitation, PRE _{daily} 0.15 inch/day 135 Runoff Flowrate, qs4 15.39 gpm 22156.3 gallons/day 136 Total Suspended Solids, TSS ₅₄ 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, qs4 15.39 gpm 22158 gallons/day	5.89 lbs/day		5.89 lbs/day	01854 kg/min	129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}
131			·		130 Weight of Water in Sump#3 Flow, W _{w-S3}
133 WTP Area 236,949 ft² 134 Daily Precipitation, PRE _{daily} 0.15 inch/day 135 Runoff Flowrate, qs4 15.39 gpm 22156.3 gallons/day 136 Total Suspended Solids, TSSs4 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, qs4 15.39 gpm 22158 gallons/day			L.	<u>.</u>	
134 Daily Precipitation, PRE _{daily} 0.15 inch/day 135 Runoff Flowrate, q _{S4} 15.39 gpm 22156.3 gallons/day 136 Total Suspended Solids, TSS _{S4} 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, q _{S4} 15.39 gpm 22158 gallons/day					132 Runoff from WTP Area (Sump#4)
135 Runoff Flowrate, q _{S4} 15.39 gpm 22156.3 gallons/day 136 Total Suspended Solids, TSS _{S4} 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, q _{S4} 15.39 gpm 22158 gallons/day				36,949 ft ²	
136 Total Suspended Solids, TSS _{S4} 200 mg/L 757.1 mg/gallon 0.0001 gallon/gallon 137 Total Sump#4 Flow Rate, q _{S4} 15.39 gpm 22158 gallons/day				0.15 inch/day	134 Daily Precipitation, PRE _{daily}
137 Total Sump#4 Flow Rate, q _{S4} 15.39 gpm 22158 gallons/day	22156.3 gallons/day		2156.3 gallons/day	15.39 gpm	135 Runoff Flowrate, q _{S4}
Total Sump#4 Flow Rate, q _{S4} 15.39 gpm 22158 gallons/day		0.0001 gallon/gallon		200 mg/L	
	22158 gallons/day		22158 gallons/day	15.39 gpm	137 Total Sump#4 Flow Rate, q _{S4}
Flow Rate of Water in Sump#4 Flow, q _{w-S4} 15.39 gpm 22156.27 gallons/day Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} 0.011649 kg/min 36.98 lbs/day Weight of Water in Sump#4 Flow, W _{w-S4} 184,903 lbs/day	1.65 gallons/day 0 ft³/day	0 ft ³ /day	1.65 gallons/day		
Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} 0.011649 kg/min 36.98 lbs/day Weight of Water in Sump#4 Flow, W _{w-S4} 184,903 lbs/day					139 Flow Rate of Water in Sump#4 Flow, q _{w-S4}
Weight of Water in Sump#4 Flow, W _{w-S4} 184,903 lbs/day					140 Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4}
			•		Weight of Water in Sump#4 Flow, W _{w.S4}
142					142
143 Polymer and Makeup Water					143 Polymer and Makeup Water
Percent Fines in Slurry Solids, P _{fine} 76.7%					144 Percent Fines in Slurry Solids, P _{fine}
145 Fine Solids Weight 9140924.90 lbs/day				924.90 lbs/day	145 Fine Solids Weight
Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer} 1.59 lbs/ton Based on P-GDT draft report.	Based on P-GDT draft report.			1.59 lbs/ton	
Dry Polymer Density, DEN _{polymer} 0.70 g/cm ³ Ashland 2520 MSDS					Dry Polymer Density, DEN _{polymer}
Daily Dry Polymer Needed, W _{drypolymer} 7267.04 lbs/day 5.047 lbs/min			5.047 lbs/min	267.04 lbs/day	Daily Dry Polymer Needed, W _{drypolymer}
Dry Polymer Volume, q _{drypolymer} 0.8639 gpm 1244 gallons/day 166 ft ³ /day	1244 gallons/day 166 ft ³ /day	166 ft ³ /day	1244 gallons/day	0.8639 gpm	Dry Polymer Volume, q _{drypolymer}
148 Daily Dry Polymer Needed, W _{drypolymer} 7267.04 İbs/day 5.047 İbs/min 149 Dry Polymer Volume, q _{drypolymer} 0.8639 gpm 1244 gallons/day 166 ft³/day 150 Polymer Makeup Water Volume, q _{makeupwater} 302.36 gpm 435,391 gallons/day 58,203 ft³/day Based on P-GDT draft report 0.2% dilution	3	58,203 ft ³ /day			Polymer Makeup Water Volume, q _{makeupwater}
151 Polymer Makeup water Weight, W _{makeupwater} 3,633,518 lbs/day			. 5		151 Polymer Makeup water Weight, W _{makeupwater}

	A	В	С	D E	F G	Н		١
152	· ·	_			· · · · · ·			-
153	Coagulant (Emulsion)					7		
154	Coagulant Dosage Rate (lbs of emulsion per dry ton of solids), DOS _{coag}	5.71	lbs/ton			1	Based on P-GDT draft report.	
155	Coagulant Emulsion Density, DEN _{coag}	1.03	g/cm ³	64.300799 pcf			Based on Ashland 492 MSDS	
156	Coagulant Emulsion Flow Rate, q _{coag}	2.11	gpm	3036 gallons/day	406 ft³/day	1		
157	Coagulant Emulsion Weight, W _{coag}		lbs/min	26,097 lbs/day		1		
158	Weight of Coagulant Makeup Water, W _{coagwater}	1812.3	lbs/min	2,609,734 lbs/day		†		
159	Volume of Coagulant Makeup Water, q _{coagwater}	217.2		312715 gallons/day		1		
160	- I locaginate					1		
161	RA-A Primary Screens and Pol	ymer Injection			Notes			
162	nitial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)							
163	Daily Weight of Water in Influent to Tubes	81,460,515						
164	Daily Volume of Water in Influent to Tubes	9,761,122	gallons/day	1304872.271 ft ³ /day				
165	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%			Based on P-GDT	draft report.		
166	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	11,929,307						
167	Daily Volume of Solids Retained in Tubes,q _{s-ret2}		gallons/day	71,675 ft ³ /day				
168	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	19,463,606	•	044=== 022= 2				
169	Daily Volume of Water Retained in Tubes after Initial Dewatering,q _{ret2}		gallons/day	311777.0627 ft ³ /day				
170	Daily Weight of Water in Initial Filtrate Weight, W _{if}	64,893,923		4000,000,000				
171	Daily Volume of Water in Initial Filtrate, q _{if}	7,776,007	gallons/day	1039500.925 ft ³ /day				
	Consolidation Dewatering in Geotextile Tubes	East.			A 1 1			
173	Solids Content by Weight after Consolidation Dewatering, P _{s3}	50%			Assumed value			
174	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering, W_{ret3}	11,929,307	lhe/day					
174	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,	11,929,307	ibs/day					
175	Grazia	1,429,446	gallons/day	191,089 ft ³ /day				
176	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	7,534,299	lbs/day					
177	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q _{cf}		gallons/day	120,688 ft ³ /day				
178	Consolidation Dewatering Duration, t _c		days	120,000 it /uay				
179	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}		gallons/day	2,011 ft ³ /day				
180	Ç , Ç. ,	,	gamera	=,+++ it /day				
181	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	8,678,815	gallons/day	1,160,189 ft ³ /day				
182	Daily Water Retained in Geotextile Tube, q _{w-retained}		gallons/day	191,089 ft ³ /day				
183			•	.,,				
184	Total Suspended Solids in Geotextile Tube Filtrate						Notes	
185	Total Suspended Solids, TSS _{tube-filtrate}		mg/L	757.1 mg/gallon	0.0001 gallon/gallon		WTP BOD	
186	Total Geotextile Tube Filtrate Flow Rate, $q_{\text{tube-filtrate}}$	6027.4	gpm	8,679,462 gallons/day				
187	Flow Rate of Solids in Geotextile Tube Filtrate, $q_{\text{s-tube-filtrate}}$	0.45	gpm	648 gallons/day				
188	Flow Rate of Water in Geotextile Tube Filtrate, $q_{\text{w-tube-filtrate}}$	6027.0		8,678,815 gallons/day]		
189	Weight of Dry Solids in Geotextile Tube Filtrate, $W_{\text{TSS-tube-filtrate}}$	4.56	kg/min	14,487 lbs/day		1		
190	Descinitation in CCA and CCA Desire							
191	Precipitation in SCA and SCA Basins	Open Area, A _{SCA}	Flow D. 1	Flaw Dat-				
192	Daily Precipitation, PRE _{daily} (inch)	(acres)	Flow Rate, q _{PRE} (gpd)	Flow Rate, q _{PRE} (gpm)				
192	0.15	71.25	⁴ PRE (9Pu) 290,211	4 _{PRE} (9pm) 201.5			On-site met data.	
194	0.13		,—				5 5.65 water	
	pH Adjust Tank Influent (OBG line number 11)					7		
196	Total Suspended Solids, TSS _{influent}	200.5	mg/L	758.98 mg/gallon	7.48134E-05 gallon/gallon	1		
197	Total Flow Rate , MAX _{influent}	5,663		8,154,720 gallons/day		Maximum		
198	Flow Rate of Solids in Influent, q _{TSS-influent}	0.424		610 gallons/day				
199	Flow Rate of Water in Influent, q _{w-influent}	5662.58	gpm	8,154,110 gallons/day				
200	Weight of Dry Solids in Influent, W _{TSS-influent}	4.30	kg/min	568.5 lbs/hr	13644.9 lbs/day	1		
201						- -		
	Effluent Tank Discharge (OBG line number 23)					4		
203	Total Suspended Solids, TSS _{discharge}		mg/L	17.03 mg/gallon	1.6791E-06 gallon/gallon	4	WTP DP#3	
204	Total Flow Rate , MAX _{discharge}	4,514		6,500,000 gallons/day		4		
205	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.008	•	11 gallons/day		4		
206	Flow Rate of Water in Discharge, q _{w-dis}	4513.88		6,499,989 gallons/day		4		
207	Weight of Dry Solids in Discharge, $W_{TSS-dis}$	0.08	kg/min	10.2 lbs/hr	244.1 lbs/day	1		
		· 		·	· · · · · · · · · · · · · · · · · · ·			

	A	В	С	D	Е	F	G	Н	I	J	K	L	M	N
208 209 210														
209				lance Tables	3									
				RA-A								•		
211			Ir	ncremental				Acc	cumulative	,		Notes		
		-			Solids	Stream	-		Solids	0 " 1 " 1 1 1	Stream			
212		Total (gpm)		Solids (gpm)	(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number			
213	Dredge Slurry	5500	5130	370	8276.2	1	5,500	5,130	370	8276.2				
214	Booster Pumps Seal Water	0	0	0	0.0	2	5,500	5,130	370	8276.2	3			
215	Primary Screen Wash Water	307	307	0	0.0	4	5,807	5,437	370	8276.2				
216	Gravel-Sized Removed from Primary Screen	(1.9)	(0.7)	(1.1)	(24.8)	5 7	5,805	5,436	369	8251.4	6	ĺ		
217	Geotextile Tube Feed Pumps Seal Water from WTP	24	24	0	0.0		5,829	5,460	369	8251.4	8			
218	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0		5 000	5 400	000	0054.4				
219	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		5,829	5,460	369	8251.4				
220	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		5,829	5,460	369	8251.4				
221	Clarifier Underflow and Filter Backwash from WTP	992	992	0.4	9.6	9	6,821	6,452	369	8261.0				
222	Filtrate from Screened Material Stockpile	0.3	0.3	0.00002	0.0	10								
223	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00019	0.0	10a								
224	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00026	0.0	10b								
225	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00018	0.0	10c								
226	Runoff to WTP Area Sump (Sump#4)	15.4	15.4	0.00115	0.0	10d	7.000	0.000	070	00040	40			
227	Coagulant, Polymer, and Makeup Water from WTP	522	520	3.0	23.2	11	7,368	6,996	372	8284.2	12			
228	Geotextile Tube Retention	(1364.6)	(992.7)	(371.9)	(8274.2)	13	6003.4	6003.0	0.4	10.1	4.5			
229 230	Precipitation in SCA and Basins	202	(307)	0	0.0	14 16	6204.9 5898.2	6204.5 5897.8	0.4	10.1	15			
	Primary Screen Wash Water	(307)	` '	0		10				10.1	available	ļ		
231	Net Floreta COA Desira	0.0	0.0	0.00	0.0	47	5898.2	5897.8	0.4	10.1	40	Massinasuna Elessifia	om EO Dooin to M	TD
232	Net Flow to SCA Basins	(235.2)	(235.2)	(0.03)	(0.6)	17	5663.0	5662.6	0.4	9.5		iviaximum Fi0W fr	om EQ Basin to W	IP .
233	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.4)	(9.6)		6,049.81	6,049.37	0.438		allowable	l		
234	Primary Screen Wash Water from WTP	0 (24)	(24)	0.0										
235	Geotextile Tube Feed Pumps Seal Water from WTP	(24)	(24)	0.0			5.057.44	5.057.40	0.000			[]f \\/TD		
236	Polymer Makeup Water	(520)	(520)	0			5,057.41	5,057.40	0.008			Flow from WTP		
237	Net Flow to Holding Basin (Downstream Storage)	0	U	0			4 542 00	4 542 00	0.000			Mayimyum Dia - b -	ran to Motro (C. T. N.	ICD)
238	Maximum Discharge to Metro						4,513.89	4,513.88	0.008			Iviaximum Discha	rge to Metro (6.5 N	IGD)

	<u> </u>		D C	D	- -		11		, ,				NA.	N
1	ARSONS Project Number		B C	D	<u>E F</u>	G	Н		1	J	K	L	M	N
2	ARSUNS Project Number	r: 444853 Calc.No. from index	x: 3 Preparer: XDH Da	te:1/11/2011 Rev:	0 Preparer	: Date:								
3	Project Name: S	Sediment Management Design Cal	Iculation Title: Mass Balance Re	viewer: MTO Date:	1/14/2011	Reviewer:	Date:							
5														
5	Character					Natas								
7	coming Slurry	Slurry Flow Rate, q	5,500 gpm			Notes Maximum fle								
8		Working Hours, t	24 hr/day			Waxiiiiuiii ii	ΟVV							
9		Daily Slurry Volume, q _T	7,920,000 gallons/day	1,058,750 ft ³ /d	lav.									
10	Solids Content by	Weight of Incoming Slurry, P _s	18.5%	1,030,730 11 70	lay	Tab "Proper	ties", based on we	eighted a	verage prod	uction rate.				
11		Specific Gravity of Solids, G _s	2.58			Tab "Proper	ties", volume and	dry dens	ity-weighted	average va	ue.			
12		Unit Weight of Water, γ _w	62.4279606 pcf			·		•	, ,					
13		Slurry Water Content, WC	441%											
14		Water Flow Rate, q _w	5055 gpm											
15		Dry Solids Flow Rate, q _s	445 gpm											
16		Daily Water Volume, q _w	7,279,531 gallons/day	973,132 ft ³ /d	lay									
17		Daily Water Weight, W _w	60,750,637 lbs/day											
18		Daily Dry Solids Volume, q _s	640,469 gallons/day	85,618 ft ³ /d	ay									
19		Daily Dry Solids Weight, W _s	13,790,022 lbs/day											
20		Slurry Concentration, C _{s1}	1.74 lbs/gallon	13.0 lb/ft	3									
21		% Water in Slurry (by Volume)	92%											
22														
23 Po	ooster Pump Seal Water													
25	Booster Pullip Seal Water Booster Pi	ump Seal Water (each), q _{booster}	0 gpm			Booster pun	nps use slurry as	seal wate	r					
25 26	Nun	nber of Booster Pumps, N _{booster}	4				.,,							
27		e of Booster Pump Seal Water	0 gallons/day	0 ft ³ /d	lay									
28	Daily	Weight of Booster Seal Water	0 lbs/day											
29														
	imary Screen Wash Water													
31	Primary Screen	Wash Water (each), q _{screen-wash}	51.1 gpm			Vendor's da	ta							
32		Number of Screens, N _{creen}	6											
33	Daily \	Volume of Screen Wash Water	441,677 gallons/day	59,044 ft ³ /d	ay									
34	Daily	Weight of Screen Wash Water	3,685,972 lbs/day											
35			-											
	eotextile Tube Feed Pump Seal Water													
37		np Seal Water (each), q _{tube-pump}	12 gpm											
38		le Tube Feed Pumps, N _{tube-pump}	2											
39		f Tube Feed Pump Seal Water	34,560 gallons/day	4,620 ft ³ /d	av									
40	•	f Tube Feed Pump Seal Water	288,417 lbs/day	4,020 11 /0	- Lay									
-	Daily Weight 0	Tube reed rump Seal Water	200,417 IDS/Uay											
41 Dri	imary Screens (Gravel-Sized Particle Remova	L v 4/4 in ah)			 1									
42 Pri		avel-Sized Particles, P _{gravel-sized}	0.40%			Tab "Proper	ties"							
44	Daily Dry Weight of Removed Gr		55,160 lbs/day			rab i iopei								
45		Gravel-Sized Particle, V _{gravel-sized}	2,562 gallons/day	342 ft ³ /d	lav									
46	Initial Water Content of Removed Gravel-Sized		2,562 galloris/day 25%	J4∠ IT*/0	ay									
47	Daily Weight f Water Removed with Grav		13,790 lbs/day											
48	Daily Volume of Water Removed with Grav	vel-Sized Particles o	1,652 gallons/day	221 ft ³ /d	lav									
49		ry Solids Weight in Slurry, W _{sr1}	13,734,862 lbs/day	22 I Tt 70	ay									
						0								
50		Daily Water Weight Slurry, W _{wr1}	64,711,236 lbs/day	0F 070 e3.		0								
51 52		Daily Solids Volume Slurry, q _{sr1}	637,907 gallons/day	85,276 ft ³ /d		0								
52	kemaining L	Daily Water Volume Slurry, q _{wr1}	7,754,116 gallons/day	1,036,575 ft ³ /d	ay	0								

	A	ВС	D E	F G	H I J K L M N
53					
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)				WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, $q_{\text{TSS-clarifier}}$	0.43 gpm			
59	Flow Rate of Water in Clarifier Sludge, $q_{\text{w-clarifier}}$	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, W _{TSS-clarifier}	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)				
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, W _{TSS-MMF}	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)		·	·	
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, q _{w-GAC}	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
	SCA WTP Total		· · · · · · · · · · · · · · · · · · ·	,	
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.4 gpm	644 gallons/day	86 ft ³ /day	
76	Water Flow Rate, q _{w-WTP}	992.0 gpm	1,428,412 gallons/day	190,951 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,673 lbs/day	1,120,112 0	100,001	
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79	Conds Weight, WWTP-TSS	13,674 1557443			
	Water from Screened Material Stockpile (>1/4 in)				
	,				
81	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82	Sand Water Content	25%			
83	Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25%			
84	Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
85					
	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _w .		コー		
86	stock	5,516 lbs/day			
	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), $\mathbf{q}_{\text{w-}}$	661 gallons/day	88 ft ³ /day		
87	stock	ů ,	oo it /day		
88	Weight of Water Remained in Stockpile, W _{wr-stock}	8,274 lbs/day			
89	Volume of Water Remained in Stockpile, q _{wr-stock}	991 gallons/day	133 ft ³ /day		
90					
	Total Suspended Solids in Stockpile Filtrate				
92	Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	0.5 gpm	661 gallons/day		(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	3.55843E-05 gpm	0.05 gallons/day	0 ft ³ /day	
95	Flow Rate of Water in Stockpile Filtrate, q _{w-stock-filtrate}	0.46 gpm	660.96 gallons/day		
96	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.000348 kg/min	1.10 lbs/day		
97	Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	5,516 lbs/day			
98					

A	В	С	D	E	F	G	Н	I	J	K		L	M	N
99 Runoff from Stockpile Area (Sump#1)		2												
100 Stockpile Area	40,00													
101 Daily Precipitation, PRE _{daily}	0.1	,												
102 Runoff Flowrate, q _{S1}	2.60	31	3740.3 ga											
Total Suspended Solids, TSS _{S1}		0 mg/L	757.1 mg		0.0001	gallon/gallon								
104 Total Sump#1 Flow Rate, q _{S1}		gpm	3741 gal	lons/day										
Flow Rate of Solids in Sump#1 Flow, q _{s-S1}	0.00020		0.290 gal		0	t ³ /day								
Flow Rate of Water in Sump#1 Flow, q _{w-S1}		gpm gpm	3740.26 gal	lons/day										
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.00196		6.24 lbs	/day										
108 Weight of Water in Sump#1 Flow, W _{w-S1}	31,21	4 lbs/day												
109														
110 Runoff from Screen Area (Sump#2)		2												
111 Screen Area	53,48	11												
112 Daily Precipitation, PRE _{daily}	0.1													
113 Runoff Flowrate, q _{S2}	3.4	OI .	5001.0 ga											
Total Suspended Solids, TSS _{S2}	20	0 mg/L	757.1 mg	/gallon	0.0001	gallon/gallon								
Total Sump#2 Flow Rate, q _{S2}	3.47	gpm	5001 gal	lons/day										
Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.000269	9 gpm	0.39 gal		0	t³/day								
Flow Rate of Water in Sump#2 Flow, q _{w-S2}	3.4	7 gpm	5001.01 gal	lons/day										
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.002629	9 kg/min	8.35 lbs	/day										
119 Weight of Water in Sump#2 Flow, W _{w-S2}	41,73	5 lbs/day												
120]							
121 Runoff from Polymer and Decon Area (Sump#3)														
122 Polymer and Decon Area	37,71°	1 ft ²												
123 Daily Precipitation, PRE _{daily}	0.1	inch/day												
124 Runoff Flowrate, q _{S3}	2.4	5 gpm	3526.2 ga	llons/day										
125 Total Suspended Solids, TSS _{S3} 126 Total Sump#3 Flow Rate, q _{S3}	20	0 mg/L	757.1 mg	/gallon	0.0001	gallon/gallon								
Total Sump#3 Flow Rate, q _{S3}	2.45	gpm	3526 gal	lons/day										
Flow Rate of Solids in Sump#3 Flow, q _{s-S3}	0.00019	0 gpm	0.27 gal	lons/day	0	t ³ /day								
128 Flow Rate of Water in Sump#3 Flow, q _{w-S3}	2.4	5 gpm	3526.22 gal	lons/day										
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.00185	4 kg/min	5.89 lbs	/day										
130 Weight of Water in Sump#3 Flow, W _{w-S3}	29,42	g lbs/day												
131]							
132 Runoff from WTP Area (Sump#4)														
133 WTP Area	236,94													
134 Daily Precipitation, PRE _{daily}	0.1	inch/day												
135 Runoff Flowrate, q _{S4}	15.3	gpm gpm	22156.3 ga	llons/day										
Total Suspended Solids, TSS _{S4}		mg/L	757.1 mg	/gallon	0.0001	gallon/gallon								
Total Sump#4 Flow Rate, q _{S4}	15.39	gpm	22158 gal	lons/day										
Flow Rate of Solids in Sump#4 Flow, q _{s-S4}	0.00119		1.72 gal		0	t ³ /day								
Flow Rate of Solids in Sump#4 Flow, q _{s-S4} Flow Rate of Water in Sump#4 Flow, q _{w-S4} Flow Rate of Water in Sump#4 Flow, W _{w-S4} Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} Weight of Water in Sump#4 Flow, W _{w-S4}	15.39	g gpm	22156.27 gal	lons/day										
Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4}	0.01164	9 kg/min	36.98 lbs	/day										
141 Weight of Water in Sump#4 Flow, W _{w-S4}		3 lbs/day												
142														
143 Polymer and Makeup Water														
Percent Fines in Slurry Solids, P _{fine}	43.3%													
145 Fine Solids Weight	5971079.4							_						
Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}		9 lbs/ton							P-GDT draft rep	ort.				
Dry Polymer Density, DEN _{polymer}		0 g/cm ³						Ashland 25	20 MSDS					
Daily Dry Polymer Needed, W _{drypolymer}		1 lbs/day	3.297 lbs			3								
148 Daily Dry Polymer Needed, W _{drypolymer} 149 Dry Polymer Volume, q _{drypolymer} 150 Polymer Makeup Water Volume, q _{makeupwater}	0.564	3 gpm	813 gal	lons/day		t ³ /day								
Polymer Makeup Water Volume, q _{makeupwater}		1 gpm	284,409 gal	lons/day	38,020	t³/day		Based on F	P-GDT draft rep	ort 0.2% dilut	ion			
Polymer Makeup water Weight, W _{makeupwater}	2,373,504													

	A	В	С	D E	F G	Н	III J K L M I	N
152	••		-	<u> </u>	· · ·			
	Coagulant (Emulsion)					7		
154	Coagulant Dosage Rate (lbs of emulsion per dry ton of solids), DOS _{coag}	5.71 lt	os/ton			1	Based on P-GDT draft report.	
155	Coagulant Emulsion Density, DEN _{coag}	1.03 9	ı/cm ³	64.300799 pcf			Based on Ashland 492 MSDS	
156	Coagulant Emulsion Flow Rate, q _{coaq}	1.38 g	ıpm	1983 gallons/day	265 ft³/day	1		
157	Coagulant Emulsion Weight, W _{coag}	11.8 lk		17,047 lbs/day		1		
158	Weight of Coagulant Makeup Water, W _{coagwater}	1183.8 lt	os/min	1,704,743 lbs/day		1		
159	Volume of Coagulant Makeup Water, q _{coagwater}	141.9 9		204273 gallons/day		1		
160						1		
161	RA-A Primary Screens and Pol	ymer Injection			Notes			
	nitial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)							
163	Daily Weight of Water in Influent to Tubes	79,299,347 lb	,	2				
164	Daily Volume of Water in Influent to Tubes	9,502,157 g	jallons/day	1270253.679 ft ³ /day				
165	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%			Based on P-GDT	draft report.		
166	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	13,770,589 lk						
167	Daily Volume of Solids Retained in Tubes,q _{s-ret2}	641,350 g	•	85,736 ft ³ /day				
168	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	22,467,803 lb		0,50000,05500,0				
169	Daily Volume of Water Retained in Tubes after Initial Dewatering,q _{ret2}	2,692,236 g		359899.6724 ft ³ /day				
170	Daily Weight of Water in Initial Filtrate Weight, W _{if}	58,823,567 lk	-	040000 4700 3				
171	Daily Volume of Water in Initial Filtrate, q _{if}	7,048,618 g	jallons/day	942263.1599 ft ³ /day				
_	Consolidation Dewatering in Geotextile Tubes	F00/	1		A			
173	Solids Content by Weight after Consolidation Dewatering, P _{s3}	50%			Assumed value			
174	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering, W_{ret3}	13,770,589 lb	ne/day					
174	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,	· · · · · · · · · · · · · · · · · · ·						
175	Canal	1,650,080 g	allons/day	220,584 ft ³ /day				
176	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	8,697,214 lt	ns/day					
177	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q _{of}	1,042,156 g		139,316 ft ³ /day				
178	Consolidation Dewatering Duration, t _c	1,042,130 g		. oo,oro it /uay				
179	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}		allons/day	2,322 ft ³ /day				
180		11,000 9	,	=; ~== it /uay				
181	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	8,090,774 g	jallons/day	1,081,579 ft ³ /day				
182	Daily Water Retained in Geotextile Tube, q _{w-retained}	1,650,080 g		220,584 ft ³ /day				
183		, , , , , , , , , , , , , , , , , , ,	,	. It rady				
184	Total Suspended Solids in Geotextile Tube Filtrate]	Notes	
185	Total Suspended Solids, TSS _{tube-filtrate}	200 n		757.1 mg/gallon	0.0001 gallon/gallon]	WTP BOD	
186	Total Geotextile Tube Filtrate Flow Rate, $q_{\text{tube-filtrate}}$	5619.0 g	jpm	8,091,401 gallons/day]		
187	Flow Rate of Solids in Geotextile Tube Filtrate, $\textbf{q}_{\text{s-tube-filtrate}}$	0.44 g		627 gallons/day]		
188	Flow Rate of Water in Geotextile Tube Filtrate, $q_{\text{w-tube-filtrate}}$	5618.6 9	jpm	8,090,774 gallons/day]		
189	Weight of Dry Solids in Geotextile Tube Filtrate, $W_{\text{TSS-tube-filtrate}}$	4.25 k	g/min	13,505 lbs/day		1		
190								
191	Precipitation in SCA and SCA Basins	Open Area A	<u> </u>					
100	Daily Precipitation, PRE _{daily} (inch)		Flow Rate,	Flow Rate,				
192 193		(acres) 71.25	q _{PRE} (gpd) 290,211	q _{PRE} (gpm) 201.5			On-site met data.	
193	0.15	11.20	200,211	201.0			On-Site Met data.	
1 L	pH Adjust Tank Influent (OBG line number 11)					7		
196	Total Suspended Solids, TSS _{influent}	200.5 n	ng/L	758.98 mg/gallon	7.77132E-05 gallon/gallon	1		
197	Total Flow Rate , MAX _{influent}	5,663 g		8,154,720 gallons/day	J J	Maximum		
198	Flow Rate of Solids in Influent, q _{TSS-influent}	0.440 g		634 gallons/day		1		
199	Flow Rate of Water in Influent, q _{w-influent}	5662.56 g		8,154,086 gallons/day		1		
200	Weight of Dry Solids in Influent, W _{TSS-influent}	4.30 k		568.5 lbs/hr	13644.9 lbs/day	1		
201	. J ,			#110		•		
	Effluent Tank Discharge (OBG line number 23)					Ī		
203	Total Suspended Solids, TSS _{discharge}	4.5 n	ng/L	17.03 mg/gallon	1.74419E-06 gallon/gallon		WTP DP#3	
204	Total Flow Rate , MAX _{discharge}	4,514 g	jpm	6,500,000 gallons/day]		
205	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.008 g		11 gallons/day]		
206	Flow Rate of Water in Discharge, q _{w-dis}	4513.88 g	ıpm	6,499,989 gallons/day				
207	Weight of Dry Solids in Discharge, W _{TSS-dis}	0.08 k	g/min	10.2 lbs/hr	244.1 lbs/day	1		
			J		•	-		

	A	В	С	D	Е	F	G	Н	I	J	K	L M	N
208 209 210													
209				lance Tables	3								
				RA-E								-	
211			<u>In</u>	cremental				Acc	cumulative	1		Notes	
		-		0 " 1 ()	Solids	Stream			Solids	0 " 1 " 1 1 1	Stream		
212	D 1 0	Total (gpm)	Water (gpm)	ίζι,	(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number		
213 214	Dredge Slurry	5500	5055	445	9576.4	1	5,500	5,055	445	9576.4			
215	Booster Pumps Seal Water	0	Ü	0	0.0	2 4	5,500	5,055	445	9576.4	3		
216	Primary Screen Wash Water	307	307	0 (1.0)	0.0	4 5	5,807	5,362	445	9576.4		1	
217	Gravel-Sized Removed from Primary Screen Geotextile Tube Feed Pumps Seal Water from WTP	(2.9) 24	(1.1)	(1.8) 0	(38.3)	5 7	5,804 5,828	5,361 5,385	443 443	9538.1 9538.1	8	ł	
218	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0		5,020	5,365	443	9556.1	0	1	
219	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		5.828	5.385	443	9538.1		1	
220	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		5.828	5,385	443	9538.1			
221	Clarifier Underflow and Filter Backwash from WTP	992	992	0.4	9.6	9	6,820	6,377	443	9547.7		1	
222	Filtrate from Screened Material Stockpile	0.5	0.5	0.00004	0.0	10	0,020	0,077	110	001111		1	
223	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00020	0.0	10a						1	
223 224	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00027	0.0	10b						1	
225	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00019	0.0	10c						1	
226	Runoff to WTP Area Sump (Sump#4)	15.4	15.4	0.00119	0.0	10d						1	
227	Coagulant, Polymer, and Makeup Water from WTP	341	339	1.9	15.1	11	7,186	6,740	445	9562.9	12	1	
228 229 230	Geotextile Tube Retention	(1590.8)	(1145.9)	(444.9)	(9553.5)	13	5595.0	5594.6	0.4	9.4		1	
229	Precipitation in SCA and Basins	202	202	0	0.0	14	5796.6	5796.1	0.4	9.4	15	1	
230	Primary Screen Wash Water	(307)	(307)	0	0.0	16	5489.8	5489.4	0.4	9.4	available	1	
231		0.0	0.0	0.00	0.0		5489.8	5489.4	0.4	9.4]	
232	Net Flow to SCA Basins	0.0	0.0	0.00	0.0	17	5489.8	5489.4	0.4	9.4	18	Maximum Flow from EQ Basin to W	TP
233 234	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.4)	(9.6)		5,869.65	5,869.20	0.455		allowable		
234	Primary Screen Wash Water from WTP	0	0	0.0									
235	Geotextile Tube Feed Pumps Seal Water from WTP	(24)	(24)	0.0									
236	Polymer Makeup Water	(339)	(339)	0			4,877.25	4,877.24	0.008			Flow from WTP	
237 238	Net Flow to Holding Basin (Downstream Storage)	0	0	0								.	
238	Maximum Discharge to Metro						4,513.89	4,513.88	0.008			Maximum Discharge to Metro (6.5 M	IGD)

										1 1/			
1 🗖	A PARSONS Project Number: 444853 Calc.No. from in	B C	D E	F	G	H		1	J	K	. L	M	N
2	Project Number: 444853 Calc.No. from in	ndex: 3 Preparer: XDH Da	ate:1/11/2011 Rev:0	Preparer:	Date:								
3	Project Name: Sediment Management Design	Calculation Title: Mass Balance Re	eviewer: MTO Date: 1/14/20	011	Reviewer:	Date:							
4													
5 6 In	ncoming Slurry			7	Notes								
7	Slurry Flow Rate, q	3,850 gpm				v (70% of maximur	n flow)						
8	Working Hours, t	24 hr/day			, wordgo no	V (1070 or maxima							
9	Daily Slurry Volume, q _T	5,544,000 gallons/day	741,125 ft ³ /day										
10	Solids Content by Weight of Incoming Slurry, Ps	9.9%	,		Tab "Proper	ties", based on we	ighted av	erage pro	duction rate.				
11	Specific Gravity of Solids, G _s	2.74			Tab "Proper	ties", volume and o	dry densi	y-weighte	ed average va	alue.			
12	Unit Weight of Water, γ _w	62.4279606 pcf											
13	Slurry Water Content, WC	910%											
14	Water Flow Rate, q _w	3702 gpm											
15	Dry Solids Flow Rate, q _s	148 gpm											
16	Daily Water Volume, q _w	5,330,249 gallons/day	712,551 ft ³ /day										
17	Daily Water Weight, $W_{\rm w}$	44,483,089 lbs/day											
18	Daily Dry Solids Volume, q _s	213,751 gallons/day	28,574 ft ³ /day										
19	Daily Dry Solids Weight, W _s	4,887,709 lbs/day											
20	Slurry Concentration, C _{s1}	0.88 lbs/gallon	6.6 lb/ft ³										
21	% Water in Slurry (by Volume)	96%											
22													
23			1										
24 B c	ooster Pump Seal Water Booster Pump Seal Water (each), q _{booster}	0 gpm			Booster num	nps use slurry as s	eal water						
26	Number of Booster Pumps, N _{booster}	4			booster puri	ips use siurry as s	cai watei						
27	Daily Volume of Booster Pump Seal Water	0 gallons/day	0 ft ³ /day										
28	Daily Weight of Booster Seal Water	0 lbs/day	0 it raay										
29		,											
30 P r	rimary Screen Wash Water												
31	Primary Screen Wash Water (each), q _{screen-wash}	35.8 gpm			Vendor's da	ta							
32	Number of Screens, N _{creen}	6											
33	Daily Volume of Screen Wash Water	309,174 gallons/day	41,331 ft ³ /day										
34	Daily Weight of Screen Wash Water	2,580,180 lbs/day	41,001 it /day										
35	Daily Weight of Screen Wash Water	2,360,100 lbs/day											
	eotextile Tube Feed Pump Seal Water												
37	Geotextile Tube Feed Pump Seal Water (each), q _{tube-pump}	8.4 gpm											
38	Number of Geotextile Tube Feed Pumps, $N_{\text{tube-pump}}$	2											
39	Daily Volume of Tube Feed Pump Seal Water	24,192 gallons/day	3,234 ft ³ /day										
40	Daily Weight of Tube Feed Pump Seal Water	201,892 lbs/day											
41				_									
	rimary Screens (Gravel-Sized Particle Removal, >1/4-inch)												
43	Average Percentage of Gravel-Sized Particles, $P_{\text{gravel-sized}}$	15.60%			Tab "Proper	ties"							
44	Daily Dry Weight of Removed Gravel-Sized Particle, W _{gravel-sized}	762,483 lbs/day											
45	Daily Volume of Removed Gravel-Sized Particle, $q_{\text{gravel-sized}}$	33,345 gallons/day	4,458 ft ³ /day										
46	Initial Water Content of Removed Gravel-Sized Particles in Stockpile, WC _{istock}	25%											
47	Daily Weight f Water Removed with Gravel-Sized Particles, W _{w-gravel-sized}	190,621 lbs/day											
48	Daily Volume of Water Removed with Gravel-Sized Particles, qw-gravel-sized	22,841 gallons/day	3,053 ft ³ /day										
49	Remaining Daily Dry Solids Weight in Slurry, W _{sr1}	4,125,226 lbs/day	•										
50	Remaining Daily Water Weight Slurry, W _{wr1}	47,074,541 lbs/day											
51	Remaining Daily Solids Volume Slurry, q _{sr1}	180,406 gallons/day	24,117 ft ³ /day										
52	Remaining Daily Water Volume Slurry, q _{wr1}	5,640,774 gallons/day	754,062 ft ³ /day	1									
——		, , 5	, it raay	_1									

	A	В С	D E	F G	H I J K L M N
53	OOA WTD				
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)	4574	5040.0	0.004	WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	0.41 gpm			
59	Flow Rate of Water in Clarifier Sludge, q _{w-clarifier}	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, W _{TSS-clarifier}	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)	170.0	200 0 4 11	0.0004 # / #	
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, W _{TSS-MMF}	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)				
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, q _{w-GAC}	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
73	SCA WTP Total				
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.4 gpm	607 gallons/day	81 ft ³ /day	
76	Water Flow Rate, q _{w-WTP}	992.0 gpm	1,428,449 gallons/day	190,956 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,987 lbs/day			
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79					
80	Water from Screened Material Stockpile (>1/4 in)				
	T	2004			
81	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82	Sand Water Content Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25% 25%			
84	Assumed finial Water Content of Screened Material Stockpile, WC _{istock} Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
85	Assumed I mai Water Content of Screened Waterial Stockpile, Wofstock	1370			
00	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _{w-}	Г			
86		76,248 lbs/day			
30	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), q _w				
87	voiding of tration removed from electronic (viater content from 20% to 10%), qw-	9,137 gallons/day	1,221 ft ³ /day		
88	Weight of Water Remained in Stockpile, W _{wr-stock}	114,372 lbs/day			
89	Volume of Water Remained in Stockpile, Wwr-stock	13,705 gallons/day	1,832 ft ³ /day		
90	- Wil-Slock	ro,roo ganonorady	1,002 It /uay		
91	Total Suspended Solids in Stockpile Filtrate				
92	Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	6.3 gpm	9137 gallons/day		(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	0.00046316 gpm	0.67 gallons/day	0 ft ³ /day	(Sumply I unloagh 4) will be sent to a dealeated geolecule table directly, without polymer addition.
95	Flow Rate of Water in Stockpile Filtrate, qw-stock-filtrate	6.34 gpm	9136.56 gallons/day	o it /day	
96	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.004804 kg/min	15.25 lbs/day		
97	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate} Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	76,248 lbs/day	10.20 ID5/Udy		
98	VVEIGHT OF VVALET III STOCKPHE FILLIALE, VVW-stock-filtrate	70,248 IDS/Uay			
30					

									PAF
Α	В	D E	F G	Н	I J	K	L	M	N
99 Runoff from Stockpile Area (Sump#1)		2							
100 Stockpile Area	- /	l ²							
101 Daily Precipitation, PRE _{daily}		/day							
102 Runoff Flowrate, q _{S1}		om 3740.3 gallons/da							
Total Suspended Solids, TSS _{S1}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
Total Sump#1 Flow Rate, q _{S1}	2.60 gpm	3741 gallons/da							
Flow Rate of Solids in Sump#1 Flow, q _{s-S1}	0.000190 gpm	0.273 gallons/da							
Flow Rate of Water in Sump#1 Flow, q _{w-S1}	2.60 gpm	3740.26 gallons/da	/						
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.001967 kg/min	6.24 lbs/day							
108 Weight of Water in Sump#1 Flow, W _{w-S1}	31,214 lbs/day	/							
109									
110 Runoff from Screen Area (Sump#2)									
111 Screen Area	,	l ²							
112 Daily Precipitation, PRE _{daily}		/day							
113 Runoff Flowrate, q _{S2}	3.47 gr								
114 Total Suspended Solids, TSS _{S2}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
Total Sump#2 Flow Rate, q _{S2}	3.47 gpm	5001 gallons/da							
Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.000254 gpm	0.37 gallons/da							
Flow Rate of Water in Sump#2 Flow, q _{w-S2}	3.47 gpm	5001.01 gallons/da	/						
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.002629 kg/min								
119 Weight of Water in Sump#2 Flow, W _{w-S2}	41,735 lbs/day	/							
120			_						
121 Runoff from Polymer and Decon Area (Sump#3)		2							
122 Polymer and Decon Area	- /	1 ²							
123 Daily Precipitation, PRE _{daily}		/day							
124 Runoff Flowrate, q _{S3}		om 3526.2 gallons/da							
125 Total Suspended Solids, TSS _{S3}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
Total Sump#3 Flow Rate, q _{S3}	2.45 gpm	3526 gallons/da							
127 Flow Rate of Solids in Sump#3 Flow, q _{s-S3}	0.000179 gpm	0.26 gallons/da							
Flow Rate of Water in Sump#3 Flow, q _{w-S3}	2.45 gpm	3526.22 gallons/da	/						
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.001854 kg/min								
130 Weight of Water in Sump#3 Flow, W _{w-S3}	29,428 lbs/day	/							
131									
132 Runoff from WTP Area (Sump#4)		2							
133 WTP Area	7	t ²							
134 Daily Precipitation, PRE _{daily}	.=	/day							
135 Runoff Flowrate, q _{S4}		om 22156.3 gallons/da							
136 Total Suspended Solids, TSS _{S4}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon						
Total Sump#4 Flow Rate, q _{S4}	15.39 gpm	22158 gallons/da							
138 Flow Rate of Solids in Sump#4 Flow, q _{s-S4}	0.001123 gpm	1.62 gallons/da							
Flow Rate of Water in Sump#4 Flow, q _{w-S4}	15.39 gpm	22156.27 gallons/da	/	\dashv					
 Weight of Dry Solids in Sump#4 Flow, W_{TSS-S4} Weight of Water in Sump#4 Flow, W_{w-S4} 	0.011649 kg/min	•							
141 Weight of Water in Sump#4 Flow, W _{w-S4}	184,903 lbs/day	/		<u> </u>					
142				 					
 143 Polymer and Makeup Water Percent Fines in Slurry Solids, P_{fine} 	54.2%								
144 Percent Fines in Slurry Solids, P _{fine} 145 Fine Solids Weight	2649138.29 lbs/day	,		_					
146 Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}	1.59 lbs/ton			Page	ed on P-GDT draft repor	+			
147 Dry Polymer Dosage Rate (ibs of dry polymer per dry toff of solids), DOS _{polymer}						ι.			
147 Dily Folymer Density, DEN polymer 148 Daily Dry Polymer Needed, W _{drypolymer}	0.70 g/cm ³ 2106.06 lbs/day	/ 1.463 lbs/min		ASNI	and 2520 MSDS				
			y 48 ft ³ /day	_					
Dry Polymer Volume, q _{drypolymer}	0.2504 gpm	361 gallons/da	,		1 DODT : "				
Polymer Makeup Water Volume, q _{makeupwater}	87.63 gpm	126,181 gallons/da	y 16,868 ft ³ /day	Base	ed on P-GDT draft repor	τ 0.2% dilution			
Polymer Makeup water Weight, W _{makeupwater}	1,053,032 lbs/day	1							

	Λ	В	С	D	E	E C	ш		1		l V	1	M	N	
152	A	D	U	ט	l E	F G	Н		1	J	N		IVI	I N	
	Securious / Consideral						7								
	Coagulant (Emulsion) Coagulant Dosage Rate lbs of emulsion per dry ton of solids, DOS														
154															
155	Coagulant Density, DEN _{coag}			Not App	olicable										
156	Coagulant Flow Rate, q _{coag}														
157	Coagulant Weight, W _{coag}						1								
158							_								
159	RA-A Primary Screens and Poly	mer Injection				Notes									
160	nitial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)														
161	Daily Weight of Water in Influent to Tubes	60,326,701 lb	bs/day		_										
162	Daily Volume of Water in Influent to Tubes	7,228,733 g	gallons/day	966341.051	I5 ft³/day										
163	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%				Based on P-GD1	draft report.								
164	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	4,141,279 lb	bs/day												
165	Daily Volume of Solids Retained in Tubes,q _{s-ret2}	181,376 g	gallons/day	24,24	16 ft ³ /day										
166	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	6,756,824 lb	bs/day		j										
167	Daily Volume of Water Retained in Tubes after Initial Dewatering, q _{ret2}	809,646 g	gallons/dav	108233.933	37 ft ³ /day										
168	Daily Weight of Water in Initial Filtrate Weight, W _{if}	53,857,158 lb													
169	Daily Volume of Water in Initial Filtrate, q _{if}	6,453,510 g		862708.905	52 ft ³ /day										
	Consolidation Dewatering in Geotextile Tubes	0,700,010 g	janon orady	002700.000	⊬ π /uay										
171	Solids Content by Weight after Consolidation Dewatering, P _{s3}	50%				Assumed value									
17.1	, 0	3U %				Assumed value									
170	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering, W _{ret3}	4,141,279 lb	he/day												
172	100	4, 14 1, 2 <i>1</i> 9 10	us/uay												
470	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,	496,235 g	gallons/day	66,33	37 ft ³ /day										
173	Qret3			-	,										
174	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	2,615,545 lb			- 2										
175	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q _{cf}	313,411 g		41,89	97 ft³/day										
176	Consolidation Dewatering Duration, t _c	60 d	,												
177	Average Water Volume from Consolidation Dewatering of One Day Filling, q_{dcf}	5,224 g	gallons/day	69	⁹⁸ ft³/day										
178															
179	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	6,766,922 g	gallons/day	904,60	06 ft³/day										
180	Daily Water Retained in Geotextile Tube, q _{w-retained}	496,235 g	gallons/day	66,33	37 ft ³ /day										
181															
182	Total Suspended Solids in Geotextile Tube Filtrate						J	N	otes						
183	Total Suspended Solids, TSS _{tube-filtrate}	200 m	ng/L	757.	.1 mg/gallon	0.0001 gallon/gallon		WTF	PBOD						
184	Total Geotextile Tube Filtrate Flow Rate, q _{tube-filtrate}	4699.6 g	gpm	6,767,41	16 gallons/day										
185	Flow Rate of Solids in Geotextile Tube Filtrate, q _{s-tiltrate}	0.34 g			94 gallons/day		1								
186	Flow Rate of Water in Geotextile Tube Filtrate, q _{w-tube-filtrate}	4699.3 g			22 gallons/day		1								
187	Weight of Dry Solids in Geotextile Tube Filtrate, W _{TSS-tube-filtrate}	3.56 kg			95 lbs/day		1								
188	Trongine of Dry Condo in Coolecture Table Fillrate	5.50 K	·9/111111	11,23	20 IDD/ddy		4								
	Precipitation in SCA and SCA Basins														
		Open Area, A _{SCA}	Flow Rate	Flow Rate	\neg										
190	Daily Precipitation, PRE _{daily} (inch)		q _{PRE} (gpd)	q _{PRE} (gpm)											
191	0.15	71.25	290,211	201.5	┥			On-s	site met da	ata.					
192	0.10		•	1	-			2							
	oH Adjust Tank Influent (OBG line number 11)						7								
194	Total Suspended Solids, TSS _{influent}	200.5 m	mg/L	758.9	98 mg/gallon	7.31752E-05 gallon/gallon	1								
195	Total Flow Rate , MAX _{influent}	5,663 g			20 gallons/day	3 3	Maximum								
196	Flow Rate of Solids in Influent, q _{TSS-influent}	0.414 g			97 gallons/day		1								
197	Flow Rate of Water in Influent, q _{w-influent}	5662.59 g			23 gallons/day		1								
	Weight of Dry Solids in Influent, W _{TSS-influent}					12614 O lba/d	1								
198	Weight of Dry Solids in Influent, W _{TSS-influent}	4.30 kg	у/ппП	568.	.5 lbs/hr	13644.9 lbs/day	1								
199	Effluent Tank Discharge (OBC line number 22)						7								
	Effluent Tank Discharge (OBG line number 23) Total Suspended Solids, TSS _{discharge}			170)O mag/m=!!=:-	4.640045.06	-{	14/77	DDVO						
201	Total Suspended Solids, 155 _{discharge}	4.5 m			03 mg/gallon	1.64234E-06 gallon/gallon	-{	WIF	P DP#3						
202	Total Flow Rate , MAX _{discharge}	4,514 g			00 gallons/day		4								
203	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.007 g			I1 gallons/day		4								
204	Flow Rate of Water in Discharge, q _{w-dis}	4513.88 g			39 gallons/day		1								
205	Weight of Dry Solids in Discharge, W _{TSS-dis}	0.08 kg	kg/min	10.	.2 lbs/hr	244.1 lbs/day									
	<u> </u>														

	A	В	С	D	Е	F	G	Н	1	J	K	L M	N
206	<u>.</u>								•	•		<u> </u>	•
207 208			Mass Ba	lance Tables	S								
				RA-C									
209			In	cremental				Acc	cumulative			Notes	
					Solids	Stream			Solids		Stream		
210		Total (gpm)	Water (gpm)	Solids (gpm)	(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number		
211	Dredge Slurry	3850	3702	148	3394.2	1	3,850	3,702	148	3394.2			
212	Booster Pumps Seal Water	0	0	0	0.0	2	3,850	3,702	148	3394.2	3		
213	Primary Screen Wash Water	215	215	0	0.0	4	4,065	3,916	148	3394.2	<u>'</u>]	
214	Gravel-Sized Removed from Primary Screen	(39.0)	(15.9)	(23.2)	(529.5)	5	4,026	3,900	125	2864.7	6		
215	Geotextile Tube Feed Pumps Seal Water from WTP	17	17	0	0.0	7	4,042	3,917	125	2864.7	8		
216	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0								
217	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		4,042	3,917	125	2864.7			
218	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		4,042	3,917	125	2864.7		_	
219	Clarifier Underflow and Filter Backwash from WTP	992	992	0.4	9.6	9	5,035	4,909	126	2874.4		_	
220 221	Filtrate from Screened Material Stockpile	6.3	6.3	0.00046	0.0	10						_	
221	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00019	0.0	10a						_	
222 223	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00025	0.0	10b						_	
223	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00018	0.0	10c						_	
224	Runoff to WTP Area Sump (Sump#4)	15.4	15.4	0.00112	0.0	10d						_	
225	Coagulant Emulsion and Makeup Water from WTP	0	0	0.000	0.0							_	
225 226 227	Polymer and Makeup Water from WTP	88	88	0.3	1.5	11	5,153	5,027	126	2875.9	12		
227	Geotextile Tube Retention	(470.2)	(344.6)	(125.6)	(2868.0)	13	4682.8	4682.5	0.3	7.8			
228	Precipitation in SCA and Basins	202	202	0	0.0	14	4884.3	4884.0	0.3	7.8	15	_	
229	Primary Screen Wash Water	(215)	(215)	0	0.0	16	4669.6	4669.3	0.3	7.8	available	1	
230		0.0	0.0	0.00	0.0		4669.6	4669.3	0.3	7.8	<u>'</u>]	
231	Net Flow to SCA Basins	0.0	0.0	0.00	0.0	17	4669.6	4669.3	0.3	7.8		Maximum Flow from EQ Basin to W	P
232	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.4)	(9.6)		5,610.71	5,610.29	0.429		allowable]	
233	Primary Screen Wash Water from WTP	0	0	0.0									
234	Geotextile Tube Feed Pumps Seal Water from WTP	(17)	(17)	0.0]	
235	Polymer Makeup Water	(88)	(88)	0			4,618.31	4,618.31	0.007			Flow from WTP	
236	Net Flow to Holding Basin (Downstream Storage)	0	0	0									
237	Maximum Discharge to Metro	·				·	4,513.89	4,513.88	0.007			Maximum Discharge to Metro (6.5 M	GD)

	A	T 5											12					
1 🗖	A PARSONS Project Number: 444853 Calc.No. froj	B B	Preparer: XDH Da	D D	E PourO	Droparor:	Date:		Н			J	K	L L		М	N	
2	Project Number: 444853 Calc.No. Irol	ill illuex. 5	reparer. ADH Da	ate.1/11/2011	. Rev.u	Preparer:	Date.			_								
3	Project Name: Sediment Management Designment	gn Calculation Title:	Mass Balance Re	eviewer: MTO	Date: 1/14/	2011	Reviewer:	Da	te:									
5																		
	ncoming Slurry					_	Notes											
7	Slurry Flow Rate,	g 3.8	850 gpm			_			of maximum fl	w)								
8	Working Hours		24 hr/day					,		,								
9	Daily Slurry Volume, o		000 gallons/day	741,12	25 ft ³ /day													
10	Solids Content by Weight of Incoming Slurry, I						Tab "Prope	rties", b	pased on weight	ed averag	e produ	ction rate.						
11	Specific Gravity of Solids, O	G _s 2	2.52				Tab "Prope	rties", v	olume and dry	density-we	eighted a	verage val	ıe.					
12	Unit Weight of Water, v																	
13	Slurry Water Content, W		3%															
14	Water Flow Rate, (666 gpm															
15	Dry Solids Flow Rate,		184 gpm		00 -3													
16	Daily Water Volume, o		748 gallons/day	705,80	00 ft ³ /day													
17	Daily Water Weight, W		637 lbs/day	05.00	2 2													
18	Daily Dry Solids Volume,		252 gallons/day	35,32	25 ft ³ /day	_												
19	Daily Dry Solids Weight, V		324 lbs/day	<u> </u>	3	_												
20	Slurry Concentration, C		.00 lbs/gallon	7	7.5 lb/ft ³													
21	% Water in Slurry (by Volum	e) 9	5%															
23						-												
	Booster Pump Seal Water					_												
25	Booster Pump Seal Water (each), q _{boos}		0 gpm				Booster pur	nps use	e slurry as seal	water								
26	Number of Booster Pumps, N _{boos}		4															
27	Daily Volume of Booster Pump Seal Wat		0 gallons/day		0 ft ³ /day													
28	Daily Weight of Booster Seal Wat	er	0 lbs/day															
29		1				_												
	Primary Screen Wash Water					_												
31	Primary Screen Wash Water (each), q _{screen-wa}		5.8 gpm				Vendor's da	ata										
32	Number of Screens, N _{cre}		6															
33	Daily Volume of Screen Wash Wat		174 gallons/day	41,33	31 ft ³ /day													
34	Daily Weight of Screen Wash Wat	er 2,580,	180 lbs/day															
35																		
36 G	Geotextile Tube Feed Pump Seal Water																	
37	Geotextile Tube Feed Pump Seal Water (each), q _{tube-pur}	mp	8.4 gpm															
38	Number of Geotextile Tube Feed Pumps, N _{tube-pur}	mp	2															
39	Daily Volume of Tube Feed Pump Seal Wat	· ·	192 gallons/day	3 23	34 ft ³ /day													
40	Daily Weight of Tube Feed Pump Seal Wat		892 lbs/day	,=0	,													
41	,g 2 2 2 2 2 2																	
	Primary Screens (Gravel-Sized Particle Removal, >1/4-inch)																	
43	Average Percentage of Gravel-Sized Particles, P _{gravel-siz}	zed 0.5	0%				Tab "Prope	rties"										
44	Daily Dry Weight of Removed Gravel-Sized Particle, W _{gravel-siz}		787 lbs/day				r											
45	Daily Volume of Removed Gravel-Sized Particle, q _{gravel-siz}		321 gallons/day	17	77 ft ³ /day													
46	Initial Water Content of Removed Gravel-Sized Particles in Stockpile, WC _{ist}		5%		,													
47	Daily Weight f Water Removed with Gravel-Sized Particles, W _{w-gravel-siz}		947 lbs/day															
48	Daily Volume of Water Removed with Gravel-Sized Particles, q _{w-gravel-siz}		832 gallons/day	11	11 ft ³ /day													
49	Remaining Daily Dry Solids Weight in Slurry, W		537 lbs/day	· ·	ic / duy													
50	Remaining Daily Water Weight Slurry, W _v		763 lbs/day															
51	Remaining Daily Solids Volume Slurry, q		930 gallons/day	35 14	49 ft ³ /day													
52	Remaining Daily Water Volume Slurry, q		282 gallons/day		53 ft ³ /day													
		5,512,			- It /day	ı												

	A	ВС	D E	F G	H I J K L M N
53	OOA WITD				
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)	4574	5040 0 mm/mmllan	0.004	WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	0.44 gpm			
59	Flow Rate of Water in Clarifier Sludge, q _{w-clarifier}	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, $W_{\text{TSS-clarifier}}$	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)				
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, $W_{\text{TSS-MMF}}$	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)				
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, q _{w-GAC}	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
73	SCA WTP Total				
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.5 gpm	660 gallons/day	88 ft³/day	
76	Water Flow Rate, q _{w-WTP}	991.9 gpm	1,428,396 gallons/day	190,949 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,545 lbs/day			
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79					
80	Water from Screened Material Stockpile (>1/4 in)				
	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82 83	Sand Water Content Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25% 25%			
84	Assumed Final Water Content of Screened Material Stockpile, WC _{istock}	15%			
85	Assumed I man water content of screened material stockpile, wo fstock	1370			
	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), Ww.				
86		2,779 lbs/day			
	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), q _w .	2,113 ID3/day			
87	Volume of Vvaler Nemoved from Glockpile (Vvaler Content from 25% to 15%), qw-	333 gallons/day	45 ft ³ /day		
88	weight of Water Remained in Stockpile, W _{wr-stock}	4,168 lbs/day			
89	Volume of Water Remained in Stockpile, V _{wr-stock}	499 gallons/day	67 ft ³ /day		
90	The state of the s	-55 gailons/day	or it raay		
00	Total Suspended Solids in Stockpile Filtrate	1		 1	
92	Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	0.2 gpm	333 gallons/day	gg	(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	1.83523E-05 gpm	0.03 gallons/day	0 ft ³ /day	(Sampir Landagh 4) will be sent to a dedicated geolexilic table directly, without polymer addition.
95	Flow Rate of Water in Stockpile Filtrate, qw-stock-filtrate	0.23 gpm	332.96 gallons/day	o it /day	
-	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.000175 kg/min			
96 97	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate} Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	·	0.56 lbs/day		
98	weight of water in Stockpile Filtrate, W _{w-stock-filtrate}	2,779 lbs/day			
90					

A	В	С	D	E		G	Н	1	T .	K		L I	M	N
99 Runoff from Stockpile Area (Sump#1)	ь	C	D		Г	<u> </u>		<u> </u>] J	K	<u>l</u>	L	IVI	I IN
100 Stockpile Area	40.000	ft ²												
101 Daily Precipitation, PRE _{daily}	0.15													
102 Runoff Flowrate, q _{S1}	2.60		3740.3 ga	llons/dav										
103 Total Suspended Solids, TSS _{S1}		mg/L	757.1 mg	-	0.0001	gallon/gallon								
104 Total Sump#1 Flow Rate, q _{S1}		gpm	3741 gal			,g								
105 Flow Rate of Solids in Sump#1 Flow, q _{s-S1}	0.000206		0.297 gal		0 f	t ³ /day								
106 Flow Rate of Water in Sump#1 Flow, q _{w-S1}		gpm	3740.26 gal			,								
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.001967		6.24 lbs											
108 Weight of Water in Sump#1 Flow, W _{w-S1}		lbs/day												
109	·	-		<u> </u>			7							
110 Runoff from Screen Area (Sump#2)														
111 Screen Area	53,483	ft ²												
112 Daily Precipitation, PRE _{daily}	0.15	inch/day												
113 Runoff Flowrate, q _{S2}	3.47	gpm	5001.0 ga	llons/day			_							
Total Suspended Solids, TSS _{S2}		mg/L	757.1 mg	/gallon	0.0001	gallon/gallon	_							
Total Sump#2 Flow Rate, q _{S2}	3.47	gpm	5001 gal	lons/day			_							
116 Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.000276		0.40 gal		0 f	t ³ /day								
Flow Rate of Water in Sump#2 Flow, q _{w-S2}		gpm gpm	5001.01 gal	lons/day										
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.002629	kg/min	8.35 lbs.	/day										
119 Weight of Water in Sump#2 Flow, W _{w-S2}	41,735	lbs/day												
120							_							
121 Runoff from Polymer and Decon Area (Sump#3)		5.2												
122 Polymer and Decon Area	37,711													
123 Daily Precipitation, PRE _{daily} 124 Runoff Flowrate, q _{S3}	0.15	,	2500.0	U = /-l =										
	2.45	OI.	3526.2 ga		0.0001	vallan/gallan								
125 Total Suspended Solids, TSS _{S3} 126 Total Sump#3 Flow Rate, q _{S3}		mg/L	757.1 mg		0.0001 (gallon/gallon								
126 Total Sump#3 Flow Rate, q_{S3} 127 Flow Rate of Solids in Sump#3 Flow, q_{s-S3}		gpm	3527 gal		0.4	t ³ /day								
128 Flow Rate of Solids in Sump#3 Flow, q _{s-S3} Flow Rate of Water in Sump#3 Flow, q _{w-S3}	0.000194	gpm	0.28 gal 3526.22 gal		0 1	i /uay								
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.001854		5.89 lbs											
130 Weight of Water in Sump#3 Flow, W _{w-S3}		lbs/day	5.09 105	luay										
131	29,420	, ibo/day					-							
132 Runoff from WTP Area (Sump#4)							7							
133 WTP Area	236,949	ft ²												
134 Daily Precipitation, PRE _{daily}	0.15	inch/day												
135 Runoff Flowrate, q _{S4}	15.39	gpm	22156.3 ga	llons/day										
136 Total Suspended Solids, TSS _{S4}	200	mg/L	757.1 mg		0.0001	gallon/gallon								
Total Sump#4 Flow Rate, q _{S4}	15.39	gpm	22158 gal	lons/day										
138 Flow Rate of Solids in Sump#4 Flow, q _{s-S4}	0.001221		1.76 gal		0 f	t ³ /day	╝							
139 Flow Rate of Water in Sump#4 Flow, q _{w-S4}	15.39	gpm	22156.27 gal											
140 Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4}	0.011649		36.98 lbs	/day			_							
141 Weight of Water in Sump#4 Flow, W _{w-S4}	184,903	lbs/day												
142														
143 Polymer and Makeup Water	00.00						4							
Percent Fines in Slurry Solids, P _{fine} 145 Percent Fines in Slurry Solids, P _{fine} Fine Solids Weight	90.0 %						4							
Fine Solids Weight Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}	5001591.28	lbs/ton					-	Paced co	D CDT draft -	anort				
147 Dry Polymer Dosage Rate (ibs of dry polymer per dry ton of solids), DO3 _{polymer}							\dashv		i P-GDT draft ro 2520 MSDS	ε ρθιί.				
148 Daily Dry Polymer Needed, W _{drypolymer}		g/cm³ lbs/day	2.761 lbs	/min			\dashv	ASHIANG 2	2020 IVIODO					
149 Dry Polymer Needed, Wdrypolymer Ory Polymer Volume, Qdrypolymer	0.4727		681 gal		Ω1 f	t ³ /day	\dashv							
2.7					31,847 f		\dashv	Paced co	D CDT draft -	anort 0 20/ 4:1	ution			
Polymer Makeup Water Volume, q _{makeupwater} 151 Polymer Makeup water Weight, W _{makeupwater}	165.44 1,988,133		238,231 gal	ions/day	31,847	. ruay	=	Daseu on	P-GDT draft re	- μυιι υ.Ζ% αΙΙΙ	utiOH			
1 Olymer Makeupwater	1,900,133	,,					<u> </u>							

	٨	В	С	D	E	F C	П			1		$\overline{}$	 I м		N
152	Α	D	l C	Ιυ		F G	Н		1	J	<u>r</u> _		 IVI	!	IN
	and (Francisco)						T								
	cagulant (Emulsion) Coagulant Dosage Rate lbs of emulsion per dry ton of solids, DOScoad														!
154															!
155	Coagulant Density, DEN _{coag}			Not An	plicable		ĺ								
156	Coagulant Flow Rate, q _{coag}				p000.0										!
157	Coagulant Weight, W _{coag}					<u></u>	I								
158							-								
159	RA-A Primary Screens and Poly	mer Injection				Notes									
-	itial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)														
161	Daily Weight of Water in Influent to Tubes	60,950,112	2 lbs/day												!
162	Daily Volume of Water in Influent to Tubes	7,303,434	gallons/day	976327.13	24 ft ³ /day										!
163	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%	6			Based on P-GDT	draft report.								!
164	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	5,547,445	5 lbs/day												!
165	Daily Volume of Solids Retained in Tubes,q _{s-ret2}	264,274	1 gallons/day	35,3	28 ft ³ /day										!
166	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	9,051,095	5 lbs/day		,										!
167	Daily Volume of Water Retained in Tubes after Initial Dewatering, q _{ret2}		gallons/day	144984.63	02 ft ³ /day										!
168	Daily Weight of Water in Initial Filtrate Weight, W _{if}	52,186,297		111001.00	- it rudy										
169	Daily Volume of Water in Initial Filtrate, q _{if}		7 gallons/day	835944.28	97 # ³ /da										
	onsolidation Dewatering in Geotextile Tubes	0,233,297	ganons/day	000044.20	∵ it /uay										
	Solids Content by Weight after Consolidation Dewatering, P_{s3}	FOO	,			Assumed value									
171	, , ,	50%	0			Assumed value									
170	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering,	E E A 7 . 4.45	E lbo/dc:												
172	W _{ret3}	5,547,445	D IDS/Udy												
	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,	664,731	1 gallons/day	88.88	62 ft ³ /day										
173	q _{ret3}			1	,										
174	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	3,503,650													
175	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q_{cf}		gallons/day	56,1	23 ft ³ /day										
176	Consolidation Dewatering Duration, t _c	60) days												
177	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}	6,997	7 gallons/day	9:	35 ft³/day										
178					· ·										
179	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	6,673,127	7 gallons/day	892,0	67 ft ³ /day										
180	Daily Water Retained in Geotextile Tube, q _{w-retained}		1 gallons/day		62 ft ³ /day										
181		, -	<u> </u>												
	otal Suspended Solids in Geotextile Tube Filtrate						Ī	No	otes						
183	Total Suspended Solids, TSS _{tube-filtrate}	200	mg/L	757	7.1 mg/gallon	0.0001 gallon/gallon	1		BOD						
184	Total Geotextile Tube Filtrate Flow Rate, q _{tube-filtrate}	4634.5			57 gallons/day		1	****							
185	Flow Rate of Solids in Geotextile Tube Filtrate, q _{s-tube-filtrate}		7 gpm		30 gallons/day		1								
186	Flow Rate of Water in Geotextile Tube Filtrate, q _{w-tube-filtrate}	4634.1			27 gallons/day		1								
							ĺ								
187	Weight of Dry Solids in Geotextile Tube Filtrate, W _{TSS-tube-filtrate}	3.51	1 kg/min	11,1	39 lbs/day		ı								
188	racinitation in SCA and SCA Basins														
109 7	recipitation in SCA and SCA Basins	Onen Area A	Flour Dat-	Flow Dot-	_										
100	Daily Precipitation, PRE _{daily} (inch)	Open Area, A _{SCA} (acres)													
190		71.25	q _{PRE} (gpd) 290,211	q _{PRE} (gpm) 201.5)			00.0	site met da	nto.					
191 192	0.15	11.20	250,211	201.5				On-S	ne met da	ııd.					Į.
	Adjust Tank Influent (ORG line number 11)						T								Į.
193 pi	H Adjust Tank Influent (OBG line number 11) Total Suspended Solids, TSS _{influent}	200	ma/l	750	00 ma/acilon	7.05625E 05.collon/gollon	ĺ								
194			5 mg/L		98 mg/gallon	7.95635E-05 gallon/gallon	 .								
195	Total Flow Rate , MAX _{influent}		3 gpm		20 gallons/day		Maximum								
196	Flow Rate of Solids in Influent, q _{TSS-influent}		1 gpm		49 gallons/day		Í								
197	Flow Rate of Water in Influent, q _{w-influent}	5662.55			71 gallons/day		ĺ								
198	Weight of Dry Solids in Influent, W _{TSS-influent}	4.30) kg/min	568	3.5 lbs/hr	13644.9 lbs/day	I								
199							= ■								
200 E f	fluent Tank Discharge (OBG line number 23)]								
201	Total Suspended Solids, TSS _{discharge}	4.5	mg/L	17.	03 mg/gallon	1.78571E-06 gallon/gallon	j	WTP	DP#3						
202	Total Flow Rate, MAX _{discharge}	4,514	1 gpm	6,500,0	00 gallons/day		ĺ								
203	Flow Rate of Solids in Discharge, q _{TSS-dis}		gpm		12 gallons/day		1								
			JIT · · ·	1			1								"
2041			3 apm	6.499 9	88 gallons/dav										
204	Flow Rate of Water in Discharge, q _{w-dis} Weight of Dry Solids in Discharge, W _{TSS-dis}	4513.88	3 gpm 3 kg/min		88 gallons/day 0.2 lbs/hr	244.1 lbs/day									I

	A	В	С	D	Е	F	G	Н	ı	J	K	L	М		N
206													•	•	•
207			Mass Ba	lance Tables	3										
208				RA-D								_			
209			In	ncremental				Acc	cumulative			Notes			
					Solids	Stream			Solids		Stream				
210		Total (gpm)	Water (gpm)		(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number				
211	Dredge Slurry	3850	3666	184	3859.3	1	3,850	3,666	184	3859.3					
212	Booster Pumps Seal Water	0	0	0	0.0	2	3,850	3,666	184	3859.3	3				
213	Primary Screen Wash Water	215	215	0	0.0	4	4,065	3,881	184	3859.3					
214	Gravel-Sized Removed from Primary Screen	(1.5)	(0.6)	(0.9)	(19.3)	5	4,063	3,881	183	3840.0	6				
215	Geotextile Tube Feed Pumps Seal Water from WTP	17	17	0	0.0	7	4,080	3,897	183	3840.0	8				
216	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0										
217	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		4,080	3,897	183	3840.0					
218	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		4,080	3,897	183	3840.0					
219	Clarifier Underflow and Filter Backwash from WTP	992	992	0.5	9.6	9	5,072	4,889	183	3849.6					
220	Filtrate from Screened Material Stockpile	0.2	0.2	0.00002	0.0	10									
221	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00021	0.0	1 0 a									
222	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00028	0.0	10b									
223	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00019	0.0	10c									
224	Runoff to WTP Area Sump (Sump#4)	15.4	15.4	0.00122	0.0	10d									
225	Coagulant Emulsion and Makeup Water from WTP	0	0	0.000	0.0										
226	Polymer and Makeup Water from WTP	166	165	0.5	2.8	11	5,262	5,079	184	3852.4	12				
227	Geotextile Tube Retention	(644.8)	(461.6)	(183.2)	(3844.7)	13	4617.7	4617.3	0.4	7.7					
228	Precipitation in SCA and Basins	202	202	0	0.0	14	4819.2	4818.9	0.4	7.7	15				
229	Primary Screen Wash Water	(215)	(215)	0	0.0	16	4604.5	4604.1	0.4	7.7	available				
230		0.0	0.0	0.00	0.0		4604.5	4604.1	0.4	7.7					
231	Net Flow to SCA Basins	0.0	0.0	0.00	0.0	17	4604.5	4604.1	0.4	7.7	18	Maximum Flow fi	rom EQ Basin to V	VTP	
232	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.5)	(9.6)	•	5,688.53	5,688.06	0.466		allowable				
233	Primary Screen Wash Water from WTP	0	0	0.0											
234	Geotextile Tube Feed Pumps Seal Water from WTP	(17)	(17)	0.0											
235	Polymer Makeup Water	(165)	(165)	0			4,696.13	4,696.12	0.008			Flow from WTP			
236	Net Flow to Holding Basin (Downstream Storage)	0	0	0											
237	Maximum Discharge to Metro						4,513.89	4,513.88	0.008		-	Maximum Discha	arge to Metro (6.5	MGD)	

								,	-		-						1
1		A	В	С		E	F	G		Н		I	J	K	L	M	N
2	PARSONS	Project Number: 444853 Calc.No. from	index: 3 Pre	parer: XDH Da	te:1/11/2011	L Rev:0	Preparer	: Date:									
3		Project Name: Sediment Management Design	Calculation Title: Ma	ass Balance Rev	viewer: MTO	Date: 1/14	/2011	Reviewer:	Da	ate:							
4		, ,															
5	·							N 4									
6 Ir	ncoming Slurry	Slurry Flow Rate, q	2 050	gpm			_	Note		% of maximu	ım flour)						
8		Working Hours, t		hr/day				Average i	iow (705	% OI IIIAXIIIIU	iiii iiow)						
9		Daily Slurry Volume, q _T) gallons/day	7/1 1	25 ft ³ /day											
10		Solids Content by Weight of Incoming Slurry, P _s	11.7%	galloris/day	741,1	25 it /uay		Tab "Prop	erties",	based on we	eighted ave	rage prod	uction rate.				
11		Specific Gravity of Solids, G _s	2.68	3						volume and				lue.			
12		Unit Weight of Water, yw	62.4279606	o pcf								J	Ü				
13		Slurry Water Content, WC	755%	•													
14		Water Flow Rate, q _w		gpm													
15		Dry Solids Flow Rate, q _s	181	gpm													
16		Daily Water Volume, q _w	5,282,811	gallons/day	706,2	09 ft ³ /day											
17		Daily Water Weight, W _w	44,087,194	l lbs/day													
18		Daily Dry Solids Volume, q _s	261,189	gallons/day	34,9	16 ft ³ /day											
19		Daily Dry Solids Weight, W _s	5,841,678	B lbs/day		•											
20		Slurry Concentration, C _{s1}	1.05	b lbs/gallon	7	7.9 lb/ft ³											
21		% Water in Slurry (by Volume)	95%)													
22																	
23																	
24 B	Sooster Pump Seal Water	Booster Pump Seal Water (each), q _{booster}		anm				Pagetor n	umna u	se slurry as	anal water						
26		Number of Booster Pumps, N _{booster}		gpm				booster p	unips us	se siurry as	Seai Walei						
27		Daily Volume of Booster Pump Seal Water		gallons/day		0 ft ³ /day											
28		Daily Weight of Booster Seal Water) lbs/day		0 It rady											
29		, ,		, ,													
30 P	rimary Screen Wash Water																
31		Primary Screen Wash Water (each), q _{screen-wash}	35.8	gpm				Vendor's	data								
32		Number of Screens, N _{creen}	6	3													
33		Daily Volume of Screen Wash Water	300 17/	gallons/day	/11 3	31 ft ³ /day											
34		Daily Weight of Screen Wash Water	2,580,180		41,0	51 It /day											
35		Daily Weight of Screen Wash Water	2,300,100	ibs/day													
-		2 114 4					_										
	Seotextile Tube Feed Pump S																
37		extile Tube Feed Pump Seal Water (each), q _{tube-pump}	8.4	gpm													
38		Number of Geotextile Tube Feed Pumps, $N_{\text{tube-pump}}$	2	4													
39		Daily Volume of Tube Feed Pump Seal Water		gallons/day	3,2	34 ft ³ /day											
40		Daily Weight of Tube Feed Pump Seal Water	201,892	2 lbs/day													
41																	
		ed Particle Removal, >1/4-inch)															
43		ge Percentage of Gravel-Sized Particles, $P_{\text{gravel-sized}}$	0.30%					Tab "Prop	erties"								
44		eight of Removed Gravel-Sized Particle, $W_{\text{gravel-sized}}$	17,525	b lbs/day													
45		olume of Removed Gravel-Sized Particle, $q_{\text{gravel-sized}}$	784	gallons/day	1	05 ft ³ /day											
46		moved Gravel-Sized Particles in Stockpile, WC _{istock}	25%	<u> </u>													
47		Removed with Gravel-Sized Particles, $W_{w\text{-gravel-sized}}$	4,381	lbs/day													
48	Daily Volume of Wate	er Removed with Gravel-Sized Particles, $q_{w\text{-gravel-sized}}$	525	gallons/day		70 ft ³ /day											
49		Remaining Daily Dry Solids Weight in Slurry, W _{sr1}	5,824,153	B lbs/day													
50		Remaining Daily Water Weight Slurry, Wwr1	46,864,885	b lbs/day													
51		Remaining Daily Solids Volume Slurry, q _{sr1}	260,406	gallons/day	34,8	11 ft ³ /day											
52		Remaining Daily Water Volume Slurry, q _{wr1}	5,615,651	gallons/day		03 ft ³ /day											

	A	В С	D E	F G	H I J K L M N
53	OOA WTD				
	SCA WTP				Notes
55 56	I.P Clarifier Sludge (OBG line number <mark>18</mark>) Total Suspended Solids, TSS _{clarifier}	1571 mg/l	5046 0 mg/gallon	0.001 gallon/gallon	WTP DP#3. Under normal operation condition, WTP sludge and backwash water
	Clarifier Sludge Flow Rate, q _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Studge, q _{TSS-clarifier} Flow Rate of Water in Clarifier Studge, q _{w-clarifier}	0.42 gpm			
59		708.0 gpm	557.0 lbo/br	40.074.11.41	
60 61	Weight of Dry Solids in Clarifier Sludge, W _{TSS-clarifier}	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
62	Spent MMF Backwash (OBG line number 24) Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}		002.0 Hig/gallon	0.000 F galloff/galloff	
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	166.3 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	0.01 gpm 166.3 gpm			
			40.0 lba/br	040 11 / 1	
66 67	Weight of Dry Solids in MMF Backwash, W _{TSS-MMF} Spent GAC Backwash (OBG line number 25)	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
68	Spent GAC Backwash (OBG line number 25) Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
	GAC Backwash Flow Rate, q _{GAC}		400.0 mg/gailon	0.00000 gallon/gallon	
69 70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC} Flow Rate of Water in GAC Backwash, q _{w-GAC}	0.006 gpm 117.7 gpm			
			7.0 lbo/br	400 11 / 1	
72	Weight of Dry Solids in GAC Backwash, W _{TSS-GAC}	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
	SCA WTP Total Total Flow Rate, q _{WTP}	000.4	4 400 050	404 007 #3/4	
74	Solid Flow Rate, q _{WTP-TSS}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75 76		0.4 gpm	620 gallons/day	83 ft ³ /day 190,954 ft ³ /day	
	Water Flow Rate, q _{w-WTP}	992.0 gpm	1,428,436 gallons/day	190,954 it /day	
77	Water Weight, W _{w-WTP}	11,920,874 lbs/day			
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79	Water from Screened Material Stockpile (>1/4 in)				
00	Water Holli Screened Material Stockpile (21/4 III)				
81	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82	Sand Water Content	25%			
83	Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25%			
84	Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
85					
	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _w				
86	stock	1,753 lbs/day			
	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), $\mathbf{q}_{\text{w-}}$	210 gallons/day	28 ft ³ /day		
87	stock	,	== 1c/day		
88	Weight of Water Remained in Stockpile, W _{wr-stock}	2,629 lbs/day	40. 2		
89	Volume of Water Remained in Stockpile, q _{wr-stock}	315 gallons/day	42 ft ³ /day		
30	Total Suspended Solids in Steeknile Filtrate		I	1	
	Total Suspended Solids in Stockpile Filtrate Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition of advails filtrate and muself callested by the array
92	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}			0.000 i gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93 94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	0.1 gpm	210 gallons/day	0 # ³ /do	(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate} Flow Rate of Water in Stockpile Filtrate, q _{w-stock-filtrate}	1.08837E-05 gpm 0.15 gpm	0.02 gallons/day 210.00 gallons/day	0 ft ³ /day	
96	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.000110 kg/min	0.35 lbs/day		
97	Weight of Water in Stockpile Filtrate, W _{w-stock-filtrate}	1,753 lbs/day			
98					

A	В	С	D E	F	G	Н	I	J	K	L	M	N
99 Runoff from Stockpile Area (Sump#1)		2										
100 Stockpile Area	40,00											
101 Daily Precipitation, PRE _{daily}	0.1	,										
102 Runoff Flowrate, q _{S1}	2.60	31	3740.3 gallons/day									
103 Total Suspended Solids, TSS _{S1}		0 mg/L	757.1 mg/gallon	0.0001 ga	0.0001 gallon/gallon							
104 Total Sump#1 Flow Rate, q _{S1}		gpm	3741 gallons/day									
Flow Rate of Solids in Sump#1 Flow, q _{s-S1}	0.00019		0.279 gallons/day	0 ft ³ /	day							
Flow Rate of Water in Sump#1 Flow, q _{w-S1}		gpm gpm	3740.26 gallons/day									
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.00196		6.24 lbs/day									
108 Weight of Water in Sump#1 Flow, W _{w-S1}	31,21	4 lbs/day										
109												
110 Runoff from Screen Area (Sump#2)												
111 Screen Area	53,48											
112 Daily Precipitation, PRE _{daily}	0.1											
113 Runoff Flowrate, q _{S2}	3.4	7 gpm	5001.0 gallons/day									
114 Total Suspended Solids, TSS _{S2}	20	mg/L	757.1 mg/gallon	0.0001 ga	llon/gallon							
Total Sump#2 Flow Rate, q _{S2}	3.47	gpm	5001 gallons/day									
Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.00025	9 gpm	0.37 gallons/day	0 ft ³ /	day							
Flow Rate of Water in Sump#2 Flow, q _{w-S2}	3.4	7 gpm	5001.01 gallons/day									
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.00262	9 kg/min	8.35 lbs/day									
119 Weight of Water in Sump#2 Flow, W _{w-S2}		5 lbs/day	-									
120						7						
121 Runoff from Polymer and Decon Area (Sump#3)												
122 Polymer and Decon Area	37,71°	1 ft ²										
123 Daily Precipitation, PRE _{daily}	0.1	inch/day										
124 Runoff Flowrate, q _{S3}	2.4	5 gpm	3526.2 gallons/day									
125 Total Suspended Solids, TSS _{S3}	20	0 mg/L	757.1 mg/gallon	0.0001 ga	llon/gallon							
125 Total Suspended Solids, TSS _{S3} 126 Total Sump#3 Flow Rate, q _{S3}	2.45	gpm	3526 gallons/day									
Flow Rate of Solids in Sump#3 Flow, q _{s-S3}	0.00018	3 gpm	0.26 gallons/day	0 ft ³ /	day							
128 Flow Rate of Water in Sump#3 Flow, q _{w-S3}	2.4	5 gpm	3526.22 gallons/day		-							
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.001854	4 kg/min	5.89 lbs/day									
130 Weight of Water in Sump#3 Flow, W _{w-S3}		g lbs/day										
131						7						
132 Runoff from WTP Area (Sump#4)												
133 WTP Area	236,94	9 ft ²										
134 Daily Precipitation, PRE _{daily}	0.1	inch/day										
135 Runoff Flowrate, q _{S4}	15.3	gpm	22156.3 gallons/day									
136 Total Suspended Solids, TSS _{S4}	20	mg/L	757.1 mg/gallon	0.0001 ga	llon/gallon							
137 Total Sump#4 Flow Rate, q _{S4}	15.39	gpm	22158 gallons/day									
	0.00114		1.65 gallons/day	0 ft ³ /	day							
138 Flow Rate of Solids in Sump#4 Flow, q _{s-S4} 139 Flow Rate of Water in Sump#4 Flow, q _{w-S4} 140 Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} 141 Weight of Water in Sump#4 Flow, W _{w-S4}		g gpm	22156.27 gallons/day		-	7						
140 Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4}	0.01164		36.98 lbs/day			7						
141 Weight of Water in Sump#4 Flow, W _{w-S4}		3 lbs/day	,									
142	- ,	·				7						
143 Polymer and Makeup Water												
Percent Fines in Slurry Solids, Pfine	76.7%	6										
145 Fine Solids Weight	4480567.0	5 lbs/day										
Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}	1.59	9 lbs/ton					Based on P	-GDT draft rep	ort.			
Dry Polymer Density, DEN _{polymer}		0 g/cm ³					Ashland 25	20 MSDS				
Daily Dry Polymer Needed, W _{drypolymer}		5 lbs/day	2.474 lbs/min									
Dry Polymer Volume, q _{drypolymer}	0.4234	4 gpm	610 gallons/day	82 ft ³ /	day							
150 Polymer Makeup Water Volume, q _{makeupwater}	148.20		213,414 gallons/day	28,529 ft ³ /		7	Based on P	-GDT draft rep	ort 0.2% dilutio	on		
151 Polymer Makeup water Weight, W _{makeupwater}		5 lbs/day		20,020	•	=		op		-		
,	1,701,021			1		_						

	A	В	С	D E	F G	Н	I J K L M	N
152	i							
153	Coagulant (Emulsion)					7		
154	Coagulant Dosage Rate (lbs of emulsion per dry ton of solids), DOS _{coag}		lbs/ton]	Based on P-GDT draft report.	
155	Coagulant Emulsion Density, DEN _{coag}	1.03	g/cm ³	64.300799 pcf			Based on Ashland 492 MSDS	
156	Coagulant Emulsion Flow Rate, q _{coag}	1.03	gpm	1488 gallons/d	ay 199 ft³/day			
157	Coagulant Emulsion Weight, W _{coag}		lbs/min	12,792 lbs/day				
158	Weight of Coagulant Makeup Water, W _{coagwater}	888.3	lbs/min	1,279,202 lbs/day		7		
159	Volume of Coagulant Makeup Water, q _{coagwater}	106.4		153282 gallons/d	ay	1		
160	, loogida			<u> </u>		-		
161	RA-A Primary Screens and Poly	ymer Injection			Notes			
	Initial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)							
163	Daily Weight of Water in Influent to Tubes	60,770,429		2	_			
164	Daily Volume of Water in Influent to Tubes	7,281,903	gallons/day	973448.8924 ft ³ /day	-			
165	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%	Us a falla		Based on P-GDT	ı araπ report.		
166	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	5,854,439		05.475 °	\rightarrow			
167	Daily Volume of Solids Retained in Tubes, q _{s-ret2}	· ·	gallons/day	35,175 ft ³ /day	\rightarrow			ı
168	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	9,551,979	,	450000 0004 2	_			ı
169	Daily Volume of Water Retained in Tubes after Initial Dewatering, q _{ret2}		gallons/day	153008.0261 ft ³ /day	_			ı
170	Daily Weight of Water in Initial Filtrate Weight, W _{if}	52,784,932		045500 5005 0	\dashv			ļ
171	Daily Volume of Water in Initial Filtrate, q _{if}	6,325,030	gallons/day	845533.5025 ft ³ /day	\dashv			ļ
	Consolidation Dewatering in Geotextile Tubes			1	-			ļ
173	Solids Content by Weight after Consolidation Dewatering, P _{s3}	50%			Assumed value			ļ
174	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering, W_{rei3}	5,854,439	lhs/day					i
1,4	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,		·	 	\dashv			ļ
175	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering, q _{ret3}	701,516	gallons/day	93,779 ft ³ /day				ļ
176	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	3,697,540	lbs/dav	 				i
177	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q _{cf}		gallons/day	59,229 ft ³ /day	_			i
178	Consolidation Dewatering Duration, t _c		days	, it /uay				ļ
179	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}		gallons/day	987 ft ³ /day				ļ
180	J 7 9, 1001	,	<u> </u>	it /uay	\dashv			ļ
181	Peak Volume of Water in Geotextile Tube Filtrate, q _{tube-filtrate}	6,768,093	gallons/day	904,762 ft ³ /day	\neg			i
182	Daily Water Retained in Geotextile Tube, q _{w-retained}		gallons/day	93,779 ft ³ /day	\neg			i
183						_		ļ
-	Total Suspended Solids in Geotextile Tube Filtrate					1	Notes	ļ
185	Total Suspended Solids, TSS _{tube-filtrate}		mg/L	757.1 mg/gallor		1	WTP BOD	ļ
186	Total Geotextile Tube Filtrate Flow Rate, $q_{\text{tube-filtrate}}$	4700.4		6,768,598 gallons/d		1		i
187	Flow Rate of Solids in Geotextile Tube Filtrate, q _{s-tube-filtrate}		gpm	505 gallons/d		1		i
188	Flow Rate of Water in Geotextile Tube Filtrate, q _{w-tube-filtrate}	4700.1		6,768,093 gallons/d	ay	1		i
189	Weight of Dry Solids in Geotextile Tube Filtrate, $W_{\text{TSS-tube-filtrate}}$	3.56	kg/min	11,297 lbs/day		1		ļ
190	Precipitation in SCA and SCA Basins	_ _	_					ļ
191	· ·	Open Area, A _{SCA}	Elow Det	Flour Data				ļ
192	Daily Precipitation, PRE _{daily} (inch)	(acres)	Flow Rate, q _{PRE} (gpd)	Flow Rate, q _{PRE} (gpm)				ļ
192	0.15		290,211	201.5			On-site met data.	ļ
193	0.15]		,, .	<u> </u>				ļ
	pH Adjust Tank Influent (OBG line number 11)					7		ļ
196	Total Suspended Solids, TSS _{influent}	200.5	mg/L	758.98 mg/gallor	n 7.48134E-05 gallon/gallon			i
197	Total Flow Rate , MAX _{influent}	5,663		8,154,720 gallons/d		Maximum		i
198	Flow Rate of Solids in Influent, q _{TSS-influent}	0.424		610 gallons/d				ļ
199	Flow Rate of Water in Influent, q _{w-influent}	5662.58		8,154,110 gallons/d	,			i
200	Weight of Dry Solids in Influent, W _{TSS-influent}		kg/min	568.5 lbs/hr	13644.9 lbs/day			i
201						-		ļ
202	Effluent Tank Discharge (OBG line number 23)					1		ļ
203	Total Suspended Solids, TSS _{discharge}	4.5	mg/L	17.03 mg/gallor	n 1.6791E-06 gallon/gallon	1	WTP DP#3	i
204	Total Flow Rate , MAX _{discharge}	4,514		6,500,000 gallons/d	ау	1		ļ
205	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.008	gpm	11 gallons/d	ay	1		ļ
206	Flow Rate of Water in Discharge, q _{w-dis}	4513.88	gpm	6,499,989 gallons/d]		i
207	Weight of Dry Solids in Discharge, $W_{TSS\text{-dis}}$	0.08	kg/min	10.2 lbs/hr	244.1 lbs/day			
					· · · · · · · · · · · · · · · · · · ·	_		

	A	В	С	D	Е	F	G	Н	I	J	K	L M	N
208	·												
209 210			Mass Ba	lance Tables	5								
				RA-A									
211			<u> </u>	ncremental				Acc	umulative			Notes	
					Solids	Stream			Solids		Stream		
212		Total (gpm)		Solids (gpm)	(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number	_	
213	Dredge Slurry	3850	3669	181	4056.7	1	3,850	3,669	181	4056.7			
214	Booster Pumps Seal Water	0	0	0	0.0	2	3,850	3,669	181	4056.7	3		
215	Primary Screen Wash Water	215	215	0	0.0	4	4,065	3,883	181	4056.7			
216	Gravel-Sized Removed from Primary Screen	(0.9)	(0.4)	(0.5)	(12.2)	5	4,064	3,883	181	4044.6	6	4	
217	Geotextile Tube Feed Pumps Seal Water from WTP	17	17	0	0.0	7	4,081	3,900	181	4044.6	8	4	
218	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0		1 001	2 222	101	10110		4	
219	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		4,081	3,900	181	4044.6			
220	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		4,081	3,900	181	4044.6		_	
221	Clarifier Underflow and Filter Backwash from WTP	992	992	0.4	9.6	9	5,073	4,892	181	4054.2			
222	Filtrate from Screened Material Stockpile	0.1	0.1	0.00001	0.0	10							
223	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00019	0.0	10a						4	
222 223 224 225	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00026	0.0	10b						4	
226	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00018	0.0	10c 10d						4	
227	Runoff to WTP Area Sump (Sump#4) Coagulant, Polymer, and Makeup Water from WTP	15.4 256	15.4 255	0.00115 1.5	11.4	110	5.353	5.170	183	4065.6	12	4	
228	Geotextile Tube Retention	(669.5)	(487.2)	(182.4)	(4057.7)	13	4683.6	4683.3	0.4	7.8	12	-	
229	Precipitation in SCA and Basins	202	202	(162.4)	0.0	14	4885.2	4884.8	0.4	7.8	15	1	
230	Primary Screen Wash Water	(215)	(215)	0	0.0	16	4670.4	4670.1	0.4	7.8	available	1	
231	i fillary ocicen wash water	0.0	0.0	0.00	0.0	.0	4670.4	4670.1	0.4	7.8	available	+	
232	Net Flow to SCA Basins	0.0	0.0	0.00	0.0	17	4670.4	4670.1	0.4	7.8	18	Maximum Flow from EQ Basin t	o WTP
233	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.4)	(9.6)		5,777.74	5,777.30	0.438	7.0	allowable	Maximum Flow Holli EQ Dasiii t	O ** 11
233 234	Primary Screen Wash Water from WTP	0	0	0.0	(0.0)		5,111.14	5,777.50	0.400		unowabie	1	
235	Geotextile Tube Feed Pumps Seal Water from WTP	(17)	(17)	0.0								1	
236	Polymer Makeup Water	(255)	(255)	0			4,785.34	4,785.33	0.008			Flow from WTP	
237	Net Flow to Holding Basin (Downstream Storage)	0	0	0			.,. 30.01	.,. 50.00	0.000			1	
237 238	Maximum Discharge to Metro			, i			4,513.89	4,513.88	0.008			Maximum Discharge to Metro (6	6.5 MGD)

		P 1				1				1 1/2			
1 🗖	A PARSONS Project Number: 444853 Calc.No. from i	B C	D E	F	G	H			J	K	L	M	N
2	Project Number: 444853 Calc.No. from i	index: 3 Preparer: XDH Da	ate:1/11/2011 Rev:0	Preparer:	Date:		_						
3	Project Name: Sediment Management Design	Calculation Title: Mass Balance Re	eviewer: MTO Date: 1/14,	/2011	Reviewer:	Date:							
4													
5 6 Inc	coming Clurry				Notes								
7	coming Slurry Slurry Flow Rate, q	3,850 gpm				w (70% of maximum fl	2147)						
8	Working Hours, t	24 hr/day			Average not	w (70 % Of Illaxilliulli li	Jvv)						
9	Daily Slurry Volume, q _T	5,544,000 gallons/day	741,125 ft ³ /day										
10	Solids Content by Weight of Incoming Slurry, P _s	14.9%	741,120 1t /day		Tab "Proper	ties", based on weigh	ed avera	ge produc	ction rate.				
11	Specific Gravity of Solids, G _s	2.58				ties", volume and dry		-		e.			
12	Unit Weight of Water, y _w	62.4279606 pcf			·	•		-	-				
13	Slurry Water Content, WC	571%											
14	Water Flow Rate, q _w	3605 gpm											
15	Dry Solids Flow Rate, q _s	245 gpm											
16	Daily Water Volume, q _w	5,191,674 gallons/day	694,026 ft ³ /day										
17	Daily Water Weight, W _w	43,326,623 lbs/day											
18	Daily Dry Solids Volume, q _s	352,326 gallons/day	47,099 ft ³ /day										
19	Daily Dry Solids Weight, W _s	7,585,978 lbs/day											
20	Slurry Concentration, C _{s1}	1.37 lbs/gallon	10.2 lb/ft ³										
21	% Water in Slurry (by Volume)	94%											
22													
23													
24 Bo	ooster Pump Seal Water Booster Pump Seal Water (each), q _{booster}	0 gpm			Rooster nun	nps use slurry as seal	water						
26	Number of Booster Pumps, N _{booster}	4			Booster puri	ips use siuity as seai	watei						
27	Daily Volume of Booster Pump Seal Water	0 gallons/day	0 ft ³ /day										
28	Daily Weight of Booster Seal Water	0 lbs/day	o it raay										
29		·	1										
30 P ri	rimary Screen Wash Water												
31	Primary Screen Wash Water (each), q _{screen-wash}	35.8 gpm			Vendor's da	ta							
32	Number of Screens, N _{creen}	6											
33	Daily Volume of Screen Wash Water	309,174 gallons/day	41,331 ft ³ /day										
34	Daily Weight of Screen Wash Water	2,580,180 lbs/day	41,001 it /day										
35	Daily Weight of Ocicen Wash Water	2,300,100 lb3/day											
	((" T 5 15 0 1W (_									
	eotextile Tube Feed Pump Seal Water	0.4											
37	Geotextile Tube Feed Pump Seal Water (each), q _{tube-pump}	8.4 gpm		_									
38	Number of Geotextile Tube Feed Pumps, N _{tube-pump}	2											
39	Daily Volume of Tube Feed Pump Seal Water	24,192 gallons/day	3,234 ft ³ /day										
40	Daily Weight of Tube Feed Pump Seal Water	201,892 lbs/day											
41													
	rimary Screens (Gravel-Sized Particle Removal, >1/4-inch)												
43	Average Percentage of Gravel-Sized Particles, P _{gravel-sized}	0.40%			Tab "Proper	ties"							
44	Daily Dry Weight of Removed Gravel-Sized Particle, $\mathbf{W}_{\text{gravel-sized}}$	30,344 lbs/day											
45	Daily Volume of Removed Gravel-Sized Particle, $q_{\text{gravel-sized}}$	1,409 gallons/day	188 ft ³ /day										
46	Initial Water Content of Removed Gravel-Sized Particles in Stockpile, WC_{istock}	25%											
47	Daily Weight f Water Removed with Gravel-Sized Particles, W _{w-gravel-sized}	7,586 lbs/day											
48	Daily Volume of Water Removed with Gravel-Sized Particles, qw-gravel-sized	909 gallons/day	122 ft ³ /day										
49	Remaining Daily Dry Solids Weight in Slurry, W _{sr1}	7,555,634 lbs/day											
50	Remaining Daily Water Weight Slurry, W _{wr1}	46,101,110 lbs/day											
51	Remaining Daily Solids Volume Slurry, q _{sr1}	350,916 gallons/day	46,911 ft ³ /day										
52	Remaining Daily Water Volume Slurry, q _{wr1}	5,524,131 gallons/day	738,469 ft ³ /day										
	5 , mi												

	A	ВС	D E	F G	H I J K L M N
53	OOA WTD				
	SCA WTP				Notes
55	I.P Clarifier Sludge (OBG line number 18)	4574	5040 0 mm/mmllan	0.004	WTP DP#3. Under normal operation condition, WTP sludge and backwash water
56	Total Suspended Solids, TSS _{clarifier}	1571 mg/L	5946.9 mg/gallon	0.001 gallon/gallon	will be sent to a dedicated geotextile tube directly, without polymer addition.
57	Clarifier Sludge Flow Rate, q _{clarifier}	708.4 gpm			
58	Flow Rate of Solids in Clarifier Sludge, q _{TSS-clarifier}	0.43 gpm			
59	Flow Rate of Water in Clarifier Sludge, q _{w-clarifier}	708.0 gpm			
60	Weight of Dry Solids in Clarifier Sludge, W _{TSS-clarifier}	4.21 kg/min	557.3 lbs/hr	13,374 lbs/day	
61	Spent MMF Backwash (OBG line number 24)		222 2 4 11	0.0004 /	
62	Total Suspended Solids, TSS _{MMF}	159.2 mg/L	602.6 mg/gallon	0.0001 gallon/gallon	
63	MMF Backwash Flow Rate, q _{MMF}	166.3 gpm			
64	Flow Rate of Solids in MMF Backwash, q _{TSS-MMF}	0.01 gpm			
65	Flow Rate of Water in MMF Backwash, q _{w-MMF}	166.3 gpm			
66	Weight of Dry Solids in MMF Backwash, W _{TSS-MMF}	0.10 kg/min	13.3 lbs/hr	318 lbs/day	
67	Spent GAC Backwash (OBG line number 25)				
68	Total Suspended Solids, TSS _{GAC}	128.4 mg/L	486.0 mg/gallon	0.00005 gallon/gallon	
69	GAC Backwash Flow Rate, q _{GAC}	117.7 gpm			
70	Flow Rate of Solids in GAC Backwash, q _{TSS-GAC}	0.006 gpm			
71	Flow Rate of Water in GAC Backwash, q _{w-GAC}	117.7 gpm			
72	Weight of Dry Solids in GAC Backwash, $W_{TSS\text{-}GAC}$	0.06 kg/min	7.6 lbs/hr	182 lbs/day	
	SCA WTP Total				
74	Total Flow Rate, q _{WTP}	992.4 gpm	1,429,056 gallons/day	191,037 ft ³ /day	
75	Solid Flow Rate, q _{WTP-TSS}	0.4 gpm	644 gallons/day	86 ft ³ /day	
76	Water Flow Rate, q _{w-WTP}	992.0 gpm	1,428,412 gallons/day	190,951 ft ³ /day	
77	Water Weight, W _{w-WTP}	11,920,673 lbs/day			
78	Solids Weight, W _{WTP-TSS}	13,874 lbs/day			
79		·			
80	Water from Screened Material Stockpile (>1/4 in)				
81	Typical Solids Content of Sand from Hydrocyclone Shaker (TotalClean) (75-85%)	80%		DelTank TCW-300	00
82	Sand Water Content Assumed Initial Water Content of Screened Material Stockpile, WC _{istock}	25% 25%			
84	Assumed finial Water Content of Screened Material Stockpile, WC _{istock} Assumed Final Water Content of Screened Material Stockpile, WC _{fstock}	15%			
85	Assumed I mai water content of screened waterial stockpile, wo fstock	1070			
60	Weight of Water Removed from Stockpile (Water Content from 25% to 15%), W _w	Т			
86		3,034 lbs/day	1		
00	Volume of Water Removed from Stockpile (Water Content from 25% to 15%), q _w	5,057 ib3/day			
87	voiding of viator Normoved from Gloorphic (viator Content from 20% to 10%), qw.	364 gallons/day	49 ft³/day		
88	Weight of Water Remained in Stockpile, W _{wr-stock}	4,552 lbs/day			
89	Volume of Water Remained in Stockpile, Wwr-stock	545 gallons/day	73 ft ³ /day		
90	- William Amilian Amil	o ro ganono, day	i ∨ it /uay		
91	Total Suspended Solids in Stockpile Filtrate				
92	Total Suspended Solids, TSS _{stock-filtrate}	200 mg/L	757.1 mg/gallon	0.0001 gallon/gallon	Under normal operation condition, stockpile filtrate and runoff collected by the area sumps
93	Total Stockpile Filtrate Flow Rate, q _{stock-filtrate}	0.3 gpm	364 gallons/day		(Sump#1 through 4) will be sent to a dedicated geotextile tube directly, without polymer addition.
94	Flow Rate of Solids in Stockpile Filtrate, q _{s-stock-filtrate}	1.95752E-05 gpm	0.03 gallons/day	0 ft ³ /day	(Sample Landage 1) this so some to a desirence geotextile tube already, majour polyfile addition.
95	Flow Rate of Water in Stockpile Filtrate, q _{w-stock-filtrate}	0.25 gpm	363.60 gallons/day	o it /day	
96	Weight of Dry Solids in Stockpile Filtrate, W _{TSS-stock-filtrate}	0.000191 kg/min	0.61 lbs/day		
97	Weight of Dry Solids in Stockpile Filtrate, W _{w-stock-filtrate}	3,034 lbs/day	U.U I IDS/Udy		
98	VVEIGHT OF VVALET IT STOCKPHE FILLIALE, VVW-stock-filtrate	3,034 105/day			
30					

A	В	С	D E	F	G	Н	1	J	K	L	M	N
99 Runoff from Stockpile Area (Sump#1)		2										
100 Stockpile Area	40,000											
101 Daily Precipitation, PRE _{daily}	0.1	,										
102 Runoff Flowrate, q _{S1}	2.60	36	3740.3 gallons/day									
103 Total Suspended Solids, TSS _{S1}		mg/L	757.1 mg/gallon		0.0001 gallon/gallon							
104 Total Sump#1 Flow Rate, q _{S1}		gpm	3741 gallons/day									
Flow Rate of Solids in Sump#1 Flow, q _{s-S1}	0.00020		0.290 gallons/day		/day							
Flow Rate of Water in Sump#1 Flow, q _{w-S1}) gpm	3740.26 gallons/day									
107 Weight of Dry Solids in Sump#1 Flow, W _{TSS-S1}	0.001967		6.24 lbs/day									
108 Weight of Water in Sump#1 Flow, W _{w-S1}	31,21	4 lbs/day										
109												
110 Runoff from Screen Area (Sump#2)												
111 Screen Area	53,483	.,										
112 Daily Precipitation, PRE _{daily}	0.1	,										
113 Runoff Flowrate, q _{S2}	3.47	7 gpm	5001.0 gallons/day	/								
Total Suspended Solids, TSS _{S2}	200	mg/L	757.1 mg/gallon	0.0001 ga	allon/gallon							
Total Sump#2 Flow Rate, q _{S2}	3.47	gpm	5001 gallons/day									
Flow Rate of Solids in Sump#2 Flow, q _{s-S2}	0.000269	9 gpm	0.39 gallons/day		/day	╝						
Flow Rate of Water in Sump#2 Flow, q _{w-S2}	3.4	7 gpm	5001.01 gallons/day									
118 Weight of Dry Solids in Sump#2 Flow, W _{TSS-S2}	0.002629	9 kg/min	8.35 lbs/day									
119 Weight of Water in Sump#2 Flow, W _{w-S2}		5 lbs/day										
120				<u> </u>		7						
121 Runoff from Polymer and Decon Area (Sump#3)												
122 Polymer and Decon Area	37,71°	1 ft ²										
123 Daily Precipitation, PRE _{daily}	0.1	inch/day										
124 Runoff Flowrate, q _{s3}	2.4	5 gpm	3526.2 gallons/day	/								
125 Total Suspended Solids, TSS _{S3}	200	mg/L	757.1 mg/gallon	0.0001 ga	allon/gallon							
125 Total Suspended Solids, TSS _{S3} 126 Total Sump#3 Flow Rate, q _{S3}	2.45	gpm	3526 gallons/day									
Flow Rate of Solids in Sump#3 Flow, q _{s-S3}	0.000190	gpm gpm	0.27 gallons/day	0 ft ³	/day							
Flow Rate of Water in Sump#3 Flow, q _{w-S3}	2.4	5 gpm	3526.22 gallons/day		-							
129 Weight of Dry Solids in Sump#3 Flow, W _{TSS-S3}	0.001854	4 kg/min	5.89 lbs/day									
130 Weight of Water in Sump#3 Flow, W _{w-S3}		3 lbs/day	•									
131				<u> </u>		7						
132 Runoff from WTP Area (Sump#4)												
133 WTP Area	236,949	ft ²										
134 Daily Precipitation, PRE _{daily}	0.1	inch/day										
135 Runoff Flowrate, q _{S4}	15.39	g pm	22156.3 gallons/day	/								
136 Total Suspended Solids, TSS _{S4}	200	mg/L	757.1 mg/gallon		allon/gallon							
137 Total Sump#4 Flow Rate, q _{S4}		gpm	22158 gallons/day									
	0.001193		1.72 gallons/day	0 ft ³	/day	7						
Flow Rate of Water in Sump#4 Flow, q _{w-S4}		gpm	22156.27 gallons/day		•	7						
138Flow Rate of Solids in Sump#4 Flow, q _{s-S4} 139Flow Rate of Water in Sump#4 Flow, q _{w-S4} 140Weight of Dry Solids in Sump#4 Flow, W _{TSS-S4} 141Weight of Water in Sump#4 Flow, W _{w-S4}	0.011649		36.98 lbs/day			7						
141 Weight of Water in Sump#4 Flow, W _{w-S4}		3 lbs/day				7						
142	- ,55	·		1		7						
143 Polymer and Makeup Water												
144 Percent Fines in Slurry Solids, P _{fine}	43.3%											
145 Fine Solids Weight	3284728.2											
Polymer Dosage Rate (lbs of dry polymer per dry ton of solids), DOS _{polymer}	1.59	lbs/ton					Based on P-	GDT draft rep	ort.			
Dry Polymer Density, DEN _{polymer}		g/cm ³					Ashland 252	0 MSDS				
Daily Dry Polymer Needed, W _{drypolymer}		3 lbs/day	1.813 lbs/min									
Dry Polymer Volume, q _{drypolymer}	0.3104	4 gpm	447 gallons/day	60 ft ³	/day							
148 Daily Dry Polymer Needed, W _{drypolymer} 149 Dry Polymer Volume, q _{drypolymer} 150 Polymer Makeup Water Volume, q _{makeupwater}	108.6		156,455 gallons/day			7	Based on P-	GDT draft ren	ort 0.2% dilutio	on		
151 Polymer Makeup water Weight, W _{makeupwater}	1,305,679		, ga	20,0.0	•	=				-		
1 Olymon Makeup Water Weight, Wanakeupwater	1,305,078	July		<u> </u>								

	A	В	С	D E	F G	Н	I J K L I	М	N
152	<u>.</u>	1	·	<u> </u>			_		<u> </u>
153	Coagulant (Emulsion)]			
154	Coagulant Dosage Rate (lbs of emulsion per dry ton of solids), DOS _{coag}		lbs/ton]	Based on P-GDT draft report.		
155	Coagulant Emulsion Density, DEN _{coag}	1.03 9	g/cm ³	64.300799 pcf]	Based on Ashland 492 MSDS		
156	Coagulant Emulsion Flow Rate, q _{coag}	0.76 g	mqp	1091 gallons/o	day 146 ft ³ /day	1			
157	Coagulant Emulsion Weight, W _{coag}		lbs/min	9,378 lbs/day		1			
158	Weight of Coagulant Makeup Water, W _{coagwater}	651.2	'bs/min	937,790 lbs/day		7			
159	Volume of Coagulant Makeup Water, q _{coagwater}	78.0 9		112372 gallons/d		1			
160						_			
161	RA-A Primary Screens and Poly	ymer Injection			Notes				
	nitial Dewatering in Geotextile Tubes (i.e., the first 24 hrs in the tubes)								
163	Daily Weight of Water in Influent to Tubes	59,532,389 II		2	\rightarrow				
164	Daily Volume of Water in Influent to Tubes	7,133,553 g	gallons/day	953617.3915 ft ³ /day		due ft			
165	Solids Content by Weight after Initial Dewatering in Tubes, P _{s2}	38%	`no/-!-	<u> </u>	Based on P-GDT	uraπ report.			
166	Daily Weight of Dry Solids Retained in Tubes, W _{s-ret2}	7,581,555 II		47.000 2	\rightarrow				
167	Daily Volume of Solids Retained in Tubes, q _{s-ret2}		gallons/day	47,203 ft ³ /day	\rightarrow				
168	Daily Weight of Water Retained in Tubes after Initial Dewatering, W _{ret2}	12,369,905 II		100440.0700.2	\rightarrow				,
169	Daily Volume of Water Retained in Tubes after Initial Dewatering, q _{ret2}	1,482,241 g		198146.8736 ft ³ /day	\rightarrow				,
170	Daily Weight of Water in Initial Filtrate Weight, W _{if} Daily Volume of Water in Initial Filtrate, q _{if}	48,387,554 II	-	775004.0500 2	\rightarrow				į
171	· ·	5,798,107 g	galions/day	775094.2588 ft ³ /day	\rightarrow				į
172 C	Consolidation Dewatering in Geotextile Tubes Solids Content by Weight after Consolidation Dewatering P.	F00/		τ	Appropriation				į
1/3	Solids Content by Weight after Consolidation Dewatering, P _{s3} Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering,	50%		 	Assumed value				ı
174	Peak Daily Weight of Retained Water in Tubes after Consolidation Dewatering, W_{ret3}	7,581,555	bs/dav						ı
	Peak Daily Volume of Retained Water in Tubes after Consolidation Dewatering,			<u> </u>	 				ı
175	G	908,471 ડ્	gallons/day	121,445 ft ³ /day					1
176	Peak Daily Weight of Water in Consolidation Dewatering Filtrate, W _{cf}	4,788,350 II	'bs/day	†					ı
177	Peak Daily Volume of Water in Consolidation Dewatering Filtrate, q _{cf}		gallons/day	76,702 ft ³ /day					ı
178	Consolidation Dewatering Duration, t _c		days	, it /day					ı
179	Average Water Volume from Consolidation Dewatering of One Day Filling, q _{dcf}		gallons/day	1,278 ft ³ /day					i
180									ı
181	Peak Volume of Water in Geotextile Tube Filtrate, $q_{\text{tube-filtrate}}$	6,371,878 (gallons/day	851,796 ft ³ /day					ı
182	Daily Water Retained in Geotextile Tube, q _{w-retained}		gallons/day	121,445 ft ³ /day					ı
183						-			ı
	Total Suspended Solids in Geotextile Tube Filtrate		_ 			1	Notes		ı
185	Total Suspended Solids, TSS _{tube-filtrate}	200 n		757.1 mg/gallo	ů č	4	WTP BOD		1
186	Total Geotextile Tube Filtrate Flow Rate, q _{tube-filtrate}	4425.3 g		6,372,372 gallons/d		4			ı
187	Flow Rate of Solids in Geotextile Tube Filtrate, q _{s-tube-filtrate}	0.34 g		494 gallons/o	,	4			ı
188	Flow Rate of Water in Geotextile Tube Filtrate, q _{w-tube-filtrate}	4424.9 9		6,371,878 gallons/d	day	4			ı
189	Weight of Dry Solids in Geotextile Tube Filtrate, $W_{\text{TSS-tube-filtrate}}$	3.35	kg/min	10,636 lbs/day		1			ı
190 191 F	Precipitation in SCA and SCA Basins								i
191		Open Area, A _{SCA}	Flow Rate,	Flow Rate,					i
192	Daily Precipitation, PRE _{daily} (inch)	(acres)	riow Rate, q _{PRE} (gpd)	riow Rate, q _{PRE} (gpm)					ı
193	0.15	71.25	⁴ PRE (9Pu) 290,211	201.5			On-site met data.		i
194				<u></u>		_			i
	pH Adjust Tank Influent (OBG line number 11)]			ı
196	Total Suspended Solids, TSS _{influent}	200.5 n	mg/L	758.98 mg/gallo		1			ı
197	Total Flow Rate , MAX _{influent}	5,663 g		8,154,720 gallons/d	day	Maximum			ı
198	Flow Rate of Solids in Influent, q _{TSS-influent}	0.440 g	gpm	634 gallons/o	•	1			ı
199	Flow Rate of Water in Influent, q _{w-influent}	5662.56 g		8,154,086 gallons/d	day	1			ı
200	Weight of Dry Solids in Influent, W _{TSS-influent}		kg/min	568.5 lbs/hr	13644.9 lbs/day	1			į
201						- -			i
	Effluent Tank Discharge (OBG line number 23)					1			ı
203	Total Suspended Solids, TSS _{discharge}	4.5 n		17.03 mg/gallo		1	WTP DP#3		ı
204	Total Flow Rate , MAX _{discharge}	4,514 g		6,500,000 gallons/o		4			1
205	Flow Rate of Solids in Discharge, q _{TSS-dis}	0.008 g		11 gallons/o		4			ı
206	Flow Rate of Water in Discharge, q _{w-dis}	4513.88 g		6,499,989 gallons/d		1			ı
207	Weight of Dry Solids in Discharge, $W_{TSS\text{-}dis}$	0.08 i	kg/min	10.2 lbs/hr	244.1 lbs/day	1			
					·				

	A	В	С	D	Е	F	G	Н	ı	J	K	L M	N
208	·												
209 210			Mass Ba	lance Tables	5								
				RA-E								_	
211			In	cremental				Acc	umulative			Notes	
					Solids	Stream			Solids		Stream		
212		Total (gpm)	Water (gpm)		(lbs/min)	Number	Total (gpm)	Water (gpm)	(gpm)	Solids (lbs/min)	Number		
213	Dredge Slurry	3850	3605	245	5268.0	1	3,850	3,605	245	5268.0		1	
214	Booster Pumps Seal Water	0	0	0	0.0	2	3,850	3,605	245	5268.0	3	1	
215	Primary Screen Wash Water	215	215	0	0.0	4	4,065	3,820	245	5268.0		1	
216	Gravel-Sized Removed from Primary Screen	(1.6)	(0.6)	(1.0)	(21.1)	5	4,063	3,819	244	5247.0	6	4	
217	Geotextile Tube Feed Pumps Seal Water from WTP	17	17	0	0.0	7	4,080	3,836	244	5247.0	8	4	
218	Secondary Screen and Hydrocyclone Screen Wash Water from WTP	0	0	0	0.0		4 000	0.000	0.1.1			4	
219	Gravel Removed from Secondary Screen	0.0	0.0	0.0	0.0		4,080	3,836	244	5247.0			
220	Sand Removed from Hydrocyclone	0.0	0.0	0.0	0.0		4,080	3,836	244	5247.0			
221	Clarifier Underflow and Filter Backwash from WTP	992	992	0.4	9.6	9	5,072	4,828	244	5256.6		4	
222	Filtrate from Screened Material Stockpile	0.3	0.3	0.00002	0.0	10							
223	Runoff to Stockpile Sump (Sump#1)	2.6	2.6	0.00020	0.0	10a						4	
222 223 224 225	Runoff to Screen Area Sump (Sump#2)	3.5	3.5	0.00027	0.0	10b						4	
226	Runoff to Polymer/Decon Area Sump (Sump#3)	2.4	2.4	0.00019	0.0	10c						4	
227	Runoff to WTP Area Sump (Sump#4) Coagulant, Polymer, and Makeup Water from WTP	15.4 188	15.4 187	0.00119 1.1	0.0 8.3	10d 11	5.284	5.039	245	5265.0	12	4	
228	Geotextile Tube Retention	(875.7)	(630.9)	(244.9)	(5257.6)	13	5,284 4408.5	4408.1	0.3	7.4	12	-	
229	Precipitation in SCA and Basins	202	202	(244.9)	0.0	14	4408.5 4610.0	4408.1	0.3	7.4	15	-	
230	Primary Screen Wash Water	(215)	(215)	0	0.0	16	4395.3	4394.9	0.3	7.4	available	-	
231	i ililaly ocieeli wasii watei	0.0	0.0	0.00	0.0	10	4395.3	4394.9	0.3	7.4	available	┪	
232	Net Flow to SCA Basins	0.0	0.0	0.00	0.0	17	4395.3	4394.9	0.3	7.4	18	Maximum Flow from EQ Basin to WTF)
233	Clarifier Underflow and Filter Backwash	(992)	(992)	(0.4)	(9.6)	- 17	5,709.77	5,709.32	0.455	7.4	allowable	Maximum Flow Holli EQ Basili to Will	
233 234	Primary Screen Wash Water from WTP	0	(992)	0.0	(3.0)		5,105.11	5,705.52	0.700		anowable	1	
235	Geotextile Tube Feed Pumps Seal Water from WTP	(17)	(17)	0.0								1	
236	Polymer Makeup Water	(187)	(187)	0			4,717.37	4,717.37	0.008			Flow from WTP	
237	Net Flow to Holding Basin (Downstream Storage)	0	0	0			1,1 11.01	1,7 17.07	0.000				
237 238	Maximum Discharge to Metro		1 -	<u> </u>			4,513.89	4,513.88	0.008			Maximum Discharge to Metro (6.5 MG	D)