Brown AND Caldwell

2505 Fawcett Avenue
Tacoma, WA 98402

T: 253.302.8464

Technical Memorandum

Prepared for: Ebb Carbon (EC)

Project Title: Project Macoma, LLC, Preliminary Design

Project No.: 159812

Technical Memorandum

Subject: Port Angeles Mixing Analyses

Date: March 21, 2024

To: Todd Pelman (EC)

From: Matt DeBoer, Brown and Caldwell (BC)

Prepared by: ______________________
Matt DeBoer, P.E., Washington License 40948,
Expires 04/11/2025

Prepared by: ______________________
Shubhashini Oza*

Reviewed by: ______________________
Krystal Perez, Industrial Water National Practice Leader

** Professionally licensed in another state.*

Limitations:

Table of Contents

List of Figures

List of Tables

Section 1: Introduction

This Technical Memorandum (TM) evaluates potential water quality impacts of the Project Macoma, LLC, marine carbon dioxide removal (mCDR) system proposed to be constructed and operated temporarily at Terminal 7 of the Port of Port Angeles in Port Angeles, Washington. Project Macoma, LLC, is a wholly owned subsidiary of Ebb Carbon. Ebb Carbon has developed an mCDR technology to safely and permanently remove carbon dioxide (CO_2) from the atmosphere while reducing seawater acidity locally. The pilot-scale system would use electrochemical processes to remove acid from the ambient seawater of Port Angeles Harbor. The produced alkaline seawater that remains would be returned to the ocean where it can absorb carbon dioxide (CO_2) from the atmosphere and store it as bicarbonate—a safe and naturally abundant form of carbon storage in the ocean that doesn't acidify seawater.

The proposed Project Macoma facility would include a barge-mounted seawater intake and discharge outfall connected to process equipment and storage at the shoreline. The preliminary site layout is as shown in Figure 1-1.

Figure 1-1. Preliminary site layout

Brown and Caldwell (BC) analyses include hydrodynamic dilution modeling using Visual Plumes software (https://www.epa.gov/ceam/visual-plumes) and water quality/chemistry modeling using commercial OLI Systems software (www.olisystems.com). Modeling analyses are supported by collected data, where available, and conservative assumptions. The combined results of the dilution and chemistry modeling support evaluation of compliance with applicable water quality standards.

Section 2: Previous Analyses

The proposed facility will be a pilot scale version of an mCDR system developed by Ebb Carbon that has been running since Summer 2023 at the Department of Energy's (DOE) Pacific Northwest National Laboratory (PNNL) in Sequim, Washington. The Sequim facility is currently discharging alkaline seawater produced by Ebb Carbon's system from their existing wastewater outfall. Ebb Carbon is currently sampling water quality at the intake and several locations within the pre-treatment and electrochemical processes. PNNL has requested 2024 funding for monitoring carbonate chemistry in Sequim Bay. Data collected would be used to support and/or confirm the analyses presented herein.

In addition to PNNL, Ebb Carbon has partnered with other research institutions including the National Oceanic and Atmospheric Administration (NOAA) and the University of Washington to evaluate how its system could work at-scale and potential uses for acidic and alkaline process streams. Numerous experiments are being performed in parallel to understand biological and toxicological impacts on target species and to model the alkaline plume in the farfield beyond the immediate nearfield evaluated herein. Project Macoma, LLC will continue to partner with local scientific and academic partners to validate the efficacy and safety of the system.

Section 3: Ambient Water Quality

Ambient water column density data was collected by Ecology in Port Angeles Harbor between 2001 and 2004 at Station PAH003. Ecology mapping shows Station PAH003 approximately 650 feet north of the proposed Project Macoma, LLC discharge location. During the data collection period, 29 water column profiles were collected, including density, salinity, and temperature, at 0.5-meter depth increments. Most profiles indicated some level of density stratification. For the dilution model analyses presented in Section 5, representative maximum (June 2004) and minimum (March 2004) stratification conditions were selected to evaluate potential critical dilution conditions. Table 3-1 summarizes water column density (kilograms per cubic meter (kg/m^3)) data through a depth of 10 meters for the selected representative stratification conditions.

Table 3-1. Water Column Density–Maximum and Minimum Stratification Conditions

Depth (meters)	Maximum Stratification (June 2004)	Minimum Stratification (March 2004)
	Density (sigma t, kg/m^3)	Density (sigma t, kg/m^3)
1.0		24.02
1.5	23.62	24.02
2.0	23.65	24.02
2.5	23.79	24.02
3.0	23.93	24.02
3.5	24.04	24.02
4.0	24.10	24.02
4.5	24.17	24.02
5.0	24.22	24.02
5.5	24.26	24.02
6.0	24.30	24.03

Table 3-1. Water Column Density–Maximum and Minimum Stratification Conditions		
Depth (meters)	Maximum Stratification (June 2004)	Minimum Stratification (March 2004)
	Density (sigma t, kg/m^3)	Density (sigma t, kg/m^3)
6.5	24.33	24.03
7.0	24.39	24.03
7.5	24.46	24.03
8.0	24.47	24.03
8.5	24.48	24.03
9.0	24.48	24.03
9.5	24.49	24.03
10.0	24.50	24.03

Additional ambient water quality samples were collected by Ebb Carbon at the proposed discharge location to characterize the specific chemical (cation and anion) distribution of the process intake water. Ambient samples were also collected to determine the presence of trace metals. Anion, cation, and trace metals data are provided in Attachment A.

Section 4: Effluent Flow and Water Quality

The proposed Project Macoma, LLC, facility would produce three process streams, as shown schematically in Figure 4-1. Typically, the three process streams would be discharged as a combined flow through the outfall. However, Project Macoma, LLC, may operate the pilot facility, for limited durations, discharging only one or two of the component flow streams. These atypical operational strategies would provide additional data to Project Macoma, LLC, and further the understanding of potential impacts of the discharge to water chemistry/water quality. Each individual process stream is summarized as follows:

1. Outfall Stream 1 Alkaline Product–Saltwater solution with enhanced alkalinity produced via the bipolar electrodialysis (BPED) process.
2. Outfall Stream 2 Neutralized Acid–The acidic process stream produced via the BPED process is neutralized followed by post-neutralization settling and filtration. Neutralization may be achieved using mafic rocks (i.e., Olivine or basalt) or calcium carbonate ($CaCO_3$).
3. Outfall Stream 3 Pretreatment Reject–Saltwater reject from various filtration pretreatment steps. Most of this stream is comprised of nanofiltration (NF) membrane reject, but the process stream also includes flushes of other pretreatment processes as part of routine maintenance.

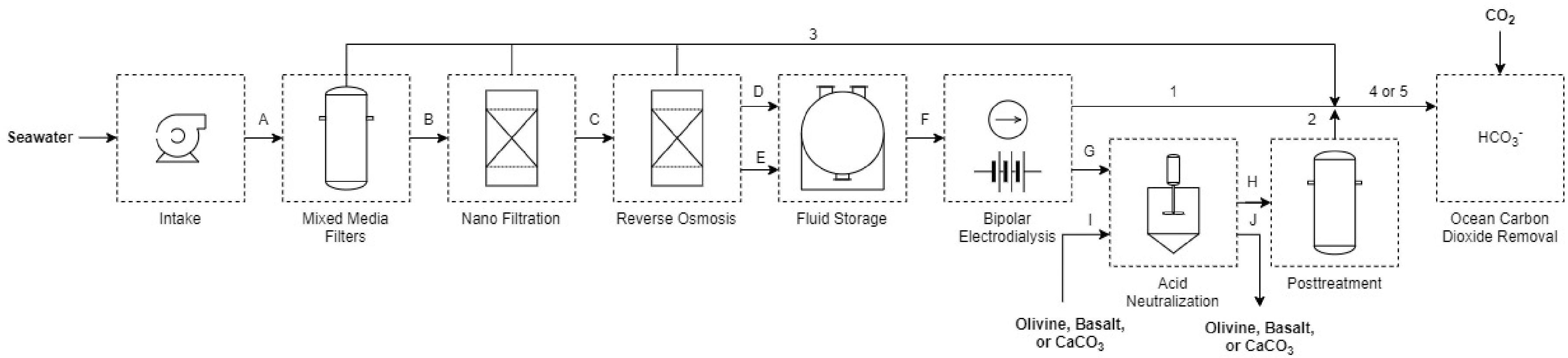

Figure 4-1. Process flow diagram

The dilution and water chemistry modeling discussed in this TM evaluated five discharge scenarios (and sub-scenarios) that reflect different combinations of process flow streams. Predicted effluent flow, pH, temperature, and density are summarized in Table 4-1 for the proposed scenarios. Table 4-1 also identifies anticipated frequency and duration for routine, maintenance, and scientific (targeted data collection) operating scenarios. These results and additional water chemistry data and assumptions specific to the water chemistry modeling are discussed in Section 6. Anion/cation and trace metals data for the effluent scenarios are provided in Attachment A. Trace metals data are based on samples collected in Port Angeles Harbor and from the Pretreatment Reject stream from the pilot at the PNNL facility.

Table 4-1. Effluent Flow and Water Quality Summary

Scenario	Frequency	Duration	Discharge Flow (L/hr)	Temperature (deg C)	Density (kg/m^3)	pH (s.u.)
Scientific Operations						
Scenario 1a–Alkaline Product Only (13.9 pH)	Not discharged–See Section 5.3		5,900	30.0	1,072	13.9
Scenario 1b–Alkaline Product Only (13.5 pH)	A few times per month	Single tidal cycle	5,900	30.0	1,028	13.5
Scenario 5b–All 3 Process Flows ($CaCO_3$ neutralization) [a]	1 or 2 times over project lifetime	Single tidal cycle	38,800	20.4	1,038	12.1
Maintenance Operations						
Scenario 2a–Neutralized Acid Only (with Olivine)	Weekly	<8 hours	5,900	30.0	1,020	2.3
Scenario 2b–Neutralized Acid Only (with $CaCO_3$)	Weekly	<8 hours	5,900	30.0	1,028	8.1
Scenario 3–Pretreatment Reject Only	Weekly	<8 hours	27,000	17.0	1,042	7.1
Scenario 4a–Neutralized Acid (with Olivine) + Pretreatment Reject	Weekly	<8 hours	32,900	19.3	1,038	6.4
Scenario 4b–Neutralized Acid (with $CaCO_3$) + Pretreatment Reject	Weekly	<8 hours	32,900	19.3	1,039	6.8
Routine Operations						
Scenario 5a–All 3 Process Flows (with Olivine neutralization)[1]	Daily	50% operating capacity	38,800	20.4	1,037	9.8

a. Scenarios 5a and 5b assume contribution of the alkaline product at a pH of 13.9 (Scenario 1a).

L/hr. = liters per hour; deg C = degree Celsius; s.u = standard units

Section 5: Model Predicted Initial Dilution

BC evaluated predicted dilution using the outfall dilution model UM3, as included in the most recent release of the United States Environmental Protection Agency (USEPA)-supported Visual Plumes modeling package (https://www.epa.gov/ceam/visual-plumes). The model is applicable to submerged single and multi-port diffusers with both positively or negatively buoyant plumes. BC selected Visual Plumes for dilution modeling since it is well proven and widely used in Washington and is appropriate for the type of discharge and receiving water conditions. Model results provide predicted effluent plume dilution and effluent plume dimensions, including whether the plume rises to the surface or traps at neutral buoyancy within the water column.

5.1 General Plume Mixing Concepts

The mixing of effluent discharged from an outfall to receiving waters is typically described in two distinct phases: 1) rapid initial dilution in the nearfield, and 2) slower subsequent dilution in the farfield. Rapid initial dilution in the nearfield has two distinct physical components. The first component is turbulent jet mixing and entrainment resulting from the momentum of the discharge exiting the diffuser ports. The second component is turbulent mixing and entrainment resulting from the plume rising (or falling) in the water column due to the effluent buoyancy. When the jet momentum and buoyancy mixing forces dissipate, the slower process of subsequent dilution continues in the farfield. Mixing and dispersion in the farfield occurs along the boundaries of the plume, primarily in the horizontal plane laterally and longitudinally as the plume is carried by ambient currents. The dilution analysis in this section conservatively reports minimum initial dilution after completion of nearfield mixing.

5.2 Key Model Input Parameters

Input parameters to the UM3 model include the physical configuration of the proposed outfall discharge, and effluent and receiving water characteristics. Input parameters were selected consistent with the guidance provided in Ecology's Permit Writer's Manual (Ecology 2018).

5.2.1 Effluent Scenarios

BC performed dilution model analyses for the five scenarios and the discharge characteristics as shown in Table 4-1. The Ebb Carbon process is not influenced by seasonal conditions nor are flows anticipated to fluctuate significantly while process equipment is operational. The flows and effluent characteristics in Table 4-1 are conservatively representative of maximum daily and monthly conditions.

5.2.2 Ambient Conditions

Water column density, including representative maximum and minimum stratification conditions, are shown in Table 3-1. Model runs for each scenario were evaluated using both maximum and minimum stratification conditions.

Ambient current speed and direction data are not available for the proposed discharge location; however, current speed distribution was measured to support dilution analyses of the Port Angeles municipal wastewater treatment facility which discharges to Port Angeles Harbor near the Harbor mouth (Ecology 2016). Reported 10^{th} and 50^{th} percentile current speeds for Outfall 001 at the Harbor mouth are 5.6 centimeters per second (cm/s) and 15.5 cm/s, respectively. For the present analyses, current speeds are conservatively assumed to be lower within the Harbor (10^{th} percentile = 2 cm/s and 50^{th} percentile = 5 cm/s). Ambient current direction was conservatively assumed to be co-flowing with the effluent (cross current flows result in higher predicted dilution).

5.2.3 Discharge Parameters

The proposed outfall discharge will be a barge-mounted multi-port diffuser located as shown in Figure 1-1. Water depth at the barge location, immediately adjacent to the pier, is approximately 25 feet mean lower low water (MLLW). Preliminary diffuser design parameters were selected to combine different momentum and negative buoyancy regimes to maintain the effluent plume near the water surface (promoting CO_2 absorption) and maximize dilution. Specifically, port depth and discharge angle, were used to generate initial plume trajectory upward through the water column before momentum dissipates and negative buoyancy draws the effluent plume downward prior to reaching equilibrium with ambient density.

Input parameters used for model analyses include the following:

- Number of Ports = 25
- Port Diameter = 0.5 inches
- Port Spacing = 2 feet
- Port Discharge Angle = 45 degrees
- Port Depth = 2 meters

5.2.4 Mixing Zone Dimensions

Applicable mixing zone dimensions for discharges that meet all known, available and reasonable methods of prevention control and treatment (AKART) are established in Washington Administrative Code (WAC) 173-201A-400. The proposed mCDR technology and discharge do not have established AKART. The mCDR process, as described in Section 4, is state-of-the-art technology designed to return alkaline seawater to Port Angeles Harbor waters via a diffuser that promotes nearfield mixing. The design of the system increases localized pH values to achieve project goals, removing C02 safely and responsibly, without concentrating toxic parameters or other parameters impacting aquatic life uses within the mixing zone. Therefore, the proposed process and discharge meet AKART requirements and should be granted a mixing zone.

The analyses herein assume a designated chronic mixing zone of 207 feet in any horizontal direction of the diffuser ports and including the entire vertical water column. Acute water quality criteria apply within a smaller portion of the designated mixing zone, limited to 10 percent of the chronic mixing zone (20.7 feet), and including the entire vertical water column.

Figure 5-1 provides a plan view of the mixing zone with applicable dimensions scaled to the proposed outfall diffuser and in relationship to the existing pier and facility location.

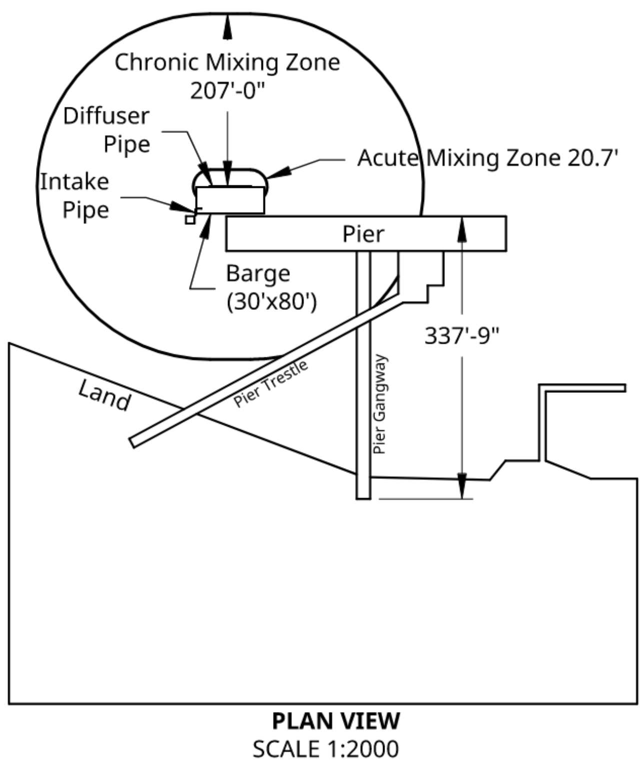

Figure 5-1. Mixing zone plan view

5.3 Model Results

Dilution model runs indicate that minimum dilutions occur for all scenarios using maximum stratification conditions. All model results presented herein conservatively assume maximum stratification conditions. Under these stratification conditions, and based on the diffuser port design, the effluent plume trajectory is initially upward through the water column before momentum dissipates and negative buoyancy draws the effluent plume downward prior to reaching equilibrium with ambient density. For most scenarios, the effluent plume is generally bounded within the upper 3 meters of the water column, changing between minimum and maximum depths as the governing dynamics transition from momentum- to buoyancy-based driving forces. However, due to the high density of Scenario 1a, the effluent plume is predicted to quickly reach depths near or at the sea bottom at low current speeds (in the range of those assumed for acute conditions) prior to rising slightly and attaining neutral buoyancy. Because it is desirable for the effluent plume to be near the water surface to promote carbon dioxide absorption, Project Macoma would not operate at the identified Scenario 1a conditions. Project Macoma proposes to use 13.9 pH alkaline process stream waters when combined with other process streams (Scenarios 5a and 5b) but would control alkaline process stream pH at 13.5 or below if discharged alone (Scenario 1b).

For all proposed discharge scenarios, the effluent plume achieves neutral buoyancy with the ambient harbor waters within approximately 12 meters (40 feet) laterally from the multi-port diffuser at the assumed 50th percentile current speeds. The lateral distance to achieve neutral buoyancy decreases at lower current speeds. The UM3 model terminates at this neutral buoyancy (nearfield) location. Additional farfield dilution occurs within the chronic mixing zone, but at a much lower magnitude. The model results herein conservatively report minimum initial dilution at the acute mixing zone boundary and at completion of nearfield mixing. Minimum nearfield mixing is used for analyses at the chronic mixing zone in Section 7.

Table 5-1 summarizes dilution model results for the proposed effluent scenarios, including minimum acute and nearfield dilution, nearfield mixing distance, and range of effluent plume centerline depth. Minimum acute and nearfield dilutions assume 10th percentile and 50th percentile ambient current speeds, respectively. UM3 model input/output data are provided in Attachment B.

Table 5-1. Dilution Model Results Summary

Scenario	Minimum Acute Dilution [a]	Minimum Nearfield Dilution [b]	Nearfield Mixing Distance (m)	Effluent Plume Centerline Depth (m)
Scenario 1b–Alkaline Product Only (pH = 13.5)	240:1	580:1	8.6	1.8–2.8
Scenario 2a–Neutralized Acid Only (Olivine)	160:1	415:1	9.8	1.2–2.0
Scenario 2b–Neutralized Acid Only ($CaCO_3$)	240:1	580:1	8.6	1.8–2.8
Scenario 3–Pretreatment Reject Only	215:1	520:1	11.6	1.5–5.1
Scenario 4a–Neutralized Acid (Olivine) + Pretreatment Reject	160:1	415:1	10.9	1.3–4.1
Scenario 4b–Neutralized Acid ($CaCO_3$) + Pretreatment Reject	170:1	430:1	11.1	1.3–4.4
Scenario 5a–All Process Flows (Olivine neutralization)	145:1	390:1	11.7	1.1–3.8
Scenario 5b–All Process Flows ($CaCO_3$ neutralization)	150:1	395:1	11.4	1.2–4.0

a. Minimum acute dilution reported at the effluent plume centerline

b. Minimum nearfield dilution reported as the flux average dilution of the effluent plume.

Model predicted dilution ratios presented in Table 5-1 do not account for effluent reflux, the long-term buildup of effluent in tidally impacted areas. Reflux has not been quantified within Port Angeles Harbor. Ecology guidance in the Permit Writer's Manual conservatively recommends reducing measured/predicted dilution by a factor of two to account for unquantified tidal reflux. The water quality analyses in Section 7 address reflux and the impact on model predicted dilution using the conservative Ecology guidance.

Section 6: Water Chemistry Modeling

BC evaluated mixed water chemistry using the commercial water chemistry modeling software OLI Studio (www.olisystems.com). The software is an electrolytic water chemistry model based on first principles, that provides the predicted equilibrium composition of blended streams under variable conditions. Specific model outputs of interest were the mixed pH and the potential for solids formation within the mixed effluent plume.

6.1 Chemistry Model Input Data

Ebb Carbon provided the water quality data and ion concentrations for ambient Port Angeles Harbor waters and the three process streams generated onsite (see Section 4) to be used as modeling input. The chemistry model input data is tabulated in Attachment A, Table A-1 (ambient) and Table A-2 (process streams).

To conduct water chemistry modeling, the following assumptions were made:

- Ionic charge balance of the waste streams was performed by adjusting (adding or removing) chloride ions prior to the blending evaluation.
- The alkaline process stream in Scenarios 1a and 1b was assumed to be a pure stream of sodium hydroxide (NaOH) with a pH of 13.9 or 13.5, respectively. The solution strength of NaOH necessary to reach the target pH was generated in the model.

6.2 Water Chemistry Modeling

This section provides example dilution calculations used for the chemistry modeling and presents findings related to predicted pH trends and potential particulate formation.

6.2.1 Dilution Ratios

The process stream scenarios were modeled at various dilution ratios. The dilution ratio is calculated by dividing the total volume of process stream and harbor water with the incoming process stream volume. For example, a dilution ratio of 10 = (5,900 L/hr process stream+ 60,000 L/hr harbor)/5,900 L/hr process stream. The dilution ratios were simulated by using a fixed volume of process stream entering the Port Angeles Harbor waters and considering the addition of increasingly higher volumes of Port Angeles Harbor water. Examples of a few selected dilution ratio calculations are presented in Table 6-1. Model outputs, including mixed pH, ion concentrations and potential precipitation for each scenario, are summarized and presented in Attachment C.

Table 6-1. Blending Ratios Calculation Examples

Process stream volume L/hr	Port Angeles Harbor volume L/hr	Total volume L/hr	Dilution Ratio
5,900	761,100	767,000	130
5,900	1,410,100	1,416,000	240
5,900	1,646,100	1,652,000	580

6.2.2 pH Trends

For Scenarios 2 through 4, the process stream pH is near ambient pH (7.8) at the point of discharge and achieves a mixed pH equal to the ambient at dilutions less than 100:1. For Scenarios 1 and 5, the process stream pH is significantly higher than the ambient pH. For these scenarios, mixed pH initially decreases rapidly or after periods of steps where pH changes little with dilution (Figure 6-1). Mixed pH for Scenario 1b achieves a value within 0.5 standard units at a dilution of approximately 500:1. Mixed pH for Scenarios 5a and 5b achieve a value within 0.5 standard units at a dilution of approximately 200:1.

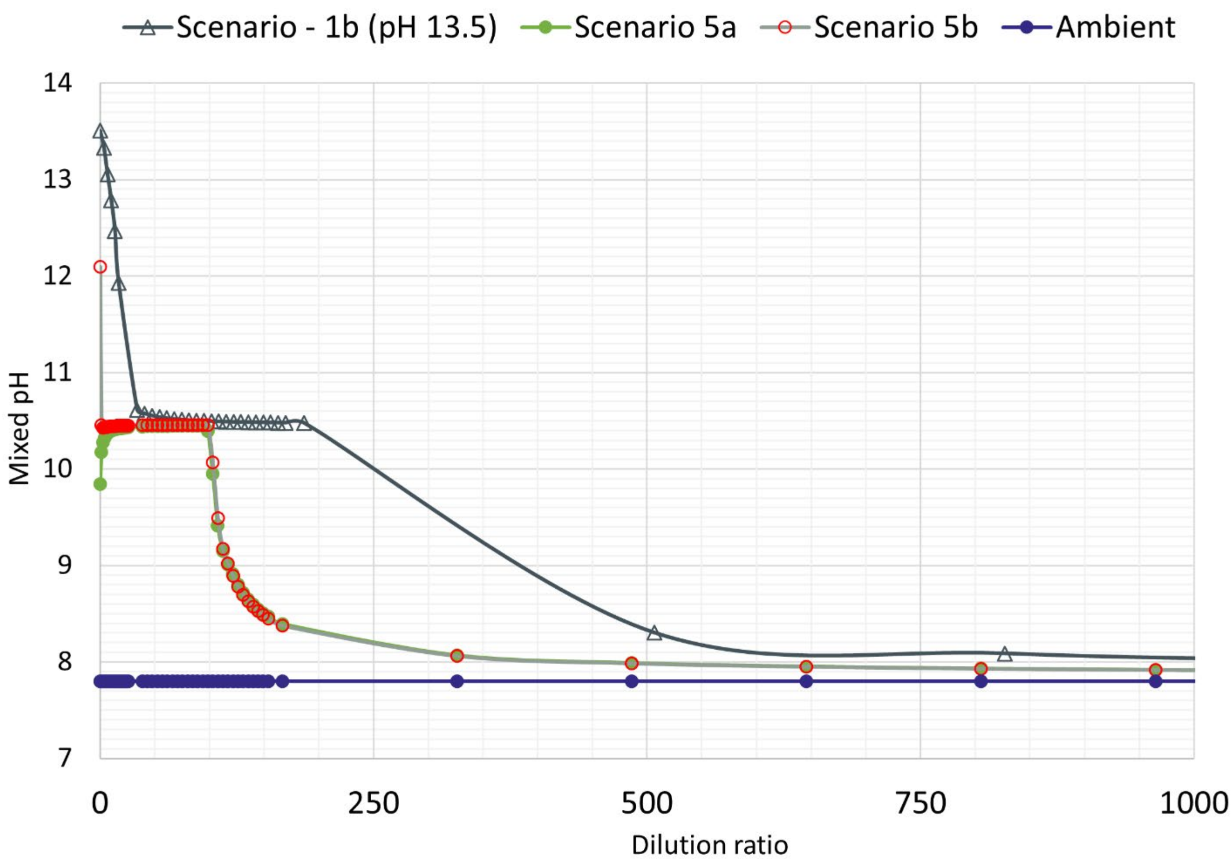

Figure 6-1. Chemistry model results–pH trends

6.2.3 Potential for Particulate Formation

Solids precipitation in OLI Studio is calculated as a reaction taking place in a closed system and at equilibrium conditions (i.e., the reaction immediately going to completion). Therefore, the solids generation predicted in the model is conservative and may not occur in an open/dynamic system. Further, the model predicts all the solids that could potentially be formed based on thermodynamics of the system. However, all the solids predicted by the model may not actually form and depending on the system parameters such as pH, temperature, alkalinity, nucleation sites available, competing ions, etc., the dominant scaling compound would most likely be formed. The dominate particulate as predicted by the model is Calcite ($CaCO_3$). Particulate formation involving trace heavy metals is negligible even using the conservative model methodology. Table 6-2 provides a conservative estimate of the solids that may be formed for the modeled scenarios at the minimum nearfield dilutions.

Table 6-2. Particulate Formation Summary			
Scenario	Chronic Dilution [a]	Mixed pH [b]	$CaCO_3$ (mg/L)
Scenario 1b–Alkaline Product Only (pH = 13.5)	290:1	9.2	225
Scenario 2a–Neutralized Acid Only (Olivine)	207:1	7.7	0
Scenario 2b–Neutralized Acid Only ($CaCO_3$)	290:1	7.8	4
Scenario 3–Pretreatment Reject Only	260:1	7.8	1
Scenario 4a–Neutralized Acid (Olivine) + Pretreatment Reject	207:1	7.8	1
Scenario 4b–Neutralized Acid ($CaCO_3$) + Pretreatment Reject	215:1	7.8	2
Scenario 5a–All Process Flows (Olivine neutralization)	195:1	8.3	150
Scenario 5b–All Process Flows ($CaCO_3$ neutralization)	200:1	8.3	150

a. Minimum nearfield dilution divided by two to account for tidal reflux.

b. OLI model runs assume an ambient pH of 7.8.

Section 7: Water Quality Analyses

This section presents water quality analyses based on the supporting modeling discussed in Sections 5 and 6. Water quality analyses reference marine water quality standards identified in WAC 173-201A-210. Port Angeles Harbor is designated as 'Excellent Quality' for aquatic life uses. Input data for the analyses discussed in each section herein were selected consistent with the guidance provided in Ecology's Permit Writer's Manual. Individual water quality parameters are also evaluated with respect to Tier II antidegradation standards identified in WAC 173-201A-320.

7.1 Temperature

Compliance with temperature criteria was evaluated using Ecology's Reasonable Potential Analysis (RPA) methodology and supporting *PermitCalc* spreadsheets (see Attachment D). Input values for the calculations were conservatively selected as follows:

- Chronic Dilution Factor–The minimum nearfield dilution for all scenarios in Table 5-1 (390:1) was selected and divided by a factor of two to account for reflux. Temperature analyses assume a dilution factor of 195:1.
- Ambient Temperature–Ambient surface temperature data for the 29 sample dates at Ecology Station PAH003 were evaluated to develop 90th percentile values for May–September (11.4°C) and October–April (10.0°C).
- Effluent Temperature–The maximum effluent temperature for any discharge scenario is 30°C.

Using the above input values, there is no reasonable potential to exceed water quality criteria for temperature. The incremental temperature increase within the area of nearfield mixing is predicted to be 0.1°C or less, which is below the Tier II threshold for measurable change (+ 0.3°C). The values above combine worst case dilution and effluent conditions that are unlikely to occur simultaneously.

7.2 Dissolved Oxygen

The proposed discharge is not anticipated to contain chemical and/or biological oxygen demand. Therefore, compliance with dissolved oxygen (DO) criteria was evaluated using a volumetric mixing calculation. Input values for the calculation were conservatively selected as follows:

- Chronic Dilution Factor–The minimum nearfield dilution for all scenarios in Table 5-1 (390:1) was selected and divided by a factor of two to account for reflux. DO analyses assume a dilution factor of 195:1.
- Ambient DO–Ambient DO concentrations at the proposed discharge location are assumed to be 7.3 mg/L, based on the Ecology Fact Sheet analyses for the Port Angeles municipal wastewater treatment facility (Ecology 2016).
- Effluent DO–The minimum effluent DO for any discharge scenario is estimated to be 7.0 mg/L based upon sample analyses of process streams at the PNNL–Project Macoma facility.

The mixed DO concentration meets the applicable minimum water quality criteria (6.0 mg/L), has a negligible DO concentration change with respect to background and therefore is below the Tier II threshold for measurable change (0.2 mg/L). The input values above combine worst case dilution and effluent conditions that are unlikely to occur simultaneously.

7.3 pH

The OLI model discussed in Section 6 was used to predict mixed pH at the predicted minimum nearfield dilution for each scenario. Table 7-1 summarizes the minimum dilution factor (accounting for reflux), effluent pH, mixed pH, and pH change for each scenario. As shown in Table 7-1, except for Scenario 1b, all discharge scenarios meet applicable pH water quality criteria with a pH between 7.0 and 8.5, and a 0.5 standard unit change (or less) with respect to background.

Table 7-1. pH Water Quality Analyses Summary

Scenario	Chronic Dilution [a]	Effluent pH	Mixed pH [b]	pH Change
Scenario 1b–Alkaline Product Only (pH = 13.5)	290:1	13.5	9.2	1.4
Scenario 2a–Neutralized Acid Only (Olivine)	207:1	2.3	7.7	-0.1
Scenario 2b–Neutralized Acid Only ($CaCO_3$)	290:1	8.1	7.8	No change
Scenario 3–Pretreatment Reject Only	260:1	7.1	7.8	No change
Scenario 4a–Neutralized Acid (Olivine) + Pretreatment Reject	207:1	6.4	7.8	No change
Scenario 4b–Neutralized Acid ($CaCO_3$) + Pretreatment Reject	215:1	6.8	7.8	No change
Scenario 5a–All Process Flows (Olivine neutralization)	195:1	9.8	8.3	+0.5
Scenario 5b–All Process Flows ($CaCO_3$ neutralization)	200:1	12.1	8.3	+0.5

a. Minimum nearfield dilution divided by two to account for tidal reflux.

b. OLI model runs assume an ambient pH of 7.8.

For Scenario 1b, the predicted mixed pH would be 8.2 at the nearfield mixing boundary assuming the predicted effluent dilution (580:1) without accounting for tidal reflux. Therefore, Scenario 1b would meet pH standards without reflux. As noted in Section 4, Scenario 1 discharge would be for a limited duration, likely on the order of several hours to collect pilot data. Under this scenario, tidal reflux is not significant and should not be applied to the dilution predictions. Should Project Macoma temporarily discharge the alkaline product only, process controls would be in place to limit effluent pH below 13.5.

Typical scientific and routine operational scenarios would exceed the Tier II antidegradation criteria threshold for measurable change in pH of 0.1 units. However, per WAC 173-201A-320, a measurable change is permitted when necessary and in the overriding public interest. The purpose of mCDR technology is to create localized areas of increased alkaline/pH conditions to absorb carbon dioxide from the atmosphere and store it as bicarbonate and combat ocean acidification in local receiving waters. The environmental and societal benefit provided by the proposed mCDR facility is only possible with the pH gradient generated by the proposed discharge. Attachment E provides supporting documentation to assist Ecology's determination that the project is in the overriding public interest thereby meeting Tier II antidegradation analysis criteria.

7.4 Bacteria

The proposed discharge is not anticipated to contain pathogenic bacteria. Source water for the Project Macoma process is ambient Port Angeles Harbor water and the proposed process will not introduce human or animal wastes. The proposed discharge meets marine water quality and Tier II antidegradation criteria.

7.5 Turbidity

The potential for solids formation in the effluent plume of the proposed discharge is discussed in Section 6.2.3. The dominant particulate predicted by the model is calcite. For the typical discharge scenario, Scenario 5a, the chemistry model predicts worst case calcite concentrations near 150 mg/L in the nearfield. However, as discussed in Section 6, actual solids formation may be less in a dynamic condition versus model assumptions. Site-specific data that would correlate calcite concentrations to turbidity values are not available.

A basic mixing equation was used to predict mixed turbidity following the completion of nearfield dilution. While turbidity values may not respond linearly with dilution, and the relationship of potential calcite concentrations to turbidity is currently unknown, the analysis is informative for comparison to WAC criteria which allow for a 5 NTU increase above background when background is less than 50 NTU. Turbidity measured by Ecology in Sequim Bay (Station SEQ002) ranged between 0.5 and 2.0 NTU in 2014. Assuming a worst-case dilution of 195:1 and an ambient turbidity of 2.0 NTU, a discharge turbidity of 100 NTU would increase ambient turbidity approximately 0.5 NTU within the nearfield. These assumed conditions would also be at or below the Tier II threshold for measurable change (0.5 NTU).

Project Macoma, LLC proposes targeted monitoring of turbidity within the nearfield, along with pH, during initial operation of the facility to assess the impact of the discharge on the receiving water. Modeled calcite concentrations are higher at high pH values. Therefore, effluent pH controls could potentially be used to maintain turbidity values within applicable standards, as needed. Because calcite formation decreases the efficiency of the proposed system with respect to CO_2 absorption, Project Macoma, LLC is actively developing methods to minimize the potential for calcite precipitation.

7.6 Toxics

Trace heavy metals data collected from Port Angeles Harbor and the PNNL pretreatment reject stream are either non-detect or below applicable acute water quality criteria at the point of discharge. The proposed process does not concentrate toxic parameters present in the ambient Port Angeles Harbor waters. The proposed discharge meets marine water quality and Tier II antidegradation criteria.

Section 8: Conclusions

The combined results of the dilution and chemistry modeling presented herein support the determination of compliance with applicable water quality standards based upon collected data, where available, and conservative assumptions. For most parameters, except for temperature, pH and turbidity, the proposed discharge would not be anticipated to be significantly changed from the process source waters (Port Angeles Harbor). Specific conclusions related to the mixing zone as well as the modeled mixing of temperature, pH and turbidity within the mixing zone are as follows:

- Dilution model analyses indicate nearfield dilution, the basis of the conservative water quality analyses herein, is complete within 12 meters (40 feet) laterally from the diffuser at the assumed 50^{th} percentile current speeds. The entire WAC-defined mixing zone (207 feet) is not required to attain applicable water quality standards. Ebb Carbon proposes monitoring acute and chronic mixing zone dimensions at 15 and 150 feet, respectively, to account for potential nearfield conditions and process assumptions that differ from those modeled.
- Except for Scenario 1b, mixed pH for all scenarios will meet applicable marine aquatic life use standards within the mixing zone and accounting for reflux. For Scenario 1b, the predicted mixed pH would be 8.2 at the nearfield mixing boundary assuming the predicted effluent dilution (580:1) without accounting for tidal reflux. As noted in Section 4, Scenario 1 discharge would be for a limited duration, likely on the order of several hours to collect pilot data. Under this scenario, tidal reflux is not significant and should not be applied to the dilution predictions. Should Project Macoma temporarily discharge the alkaline product only, process controls would be in place to limit effluent pH at or below 13.5.

  Typical scientific and routine operational scenarios would exceed the Tier II antidegradation criteria threshold for measurable change in pH of 0.1 units. However, the environmental and societal benefit provided by the proposed pilot study of the mCDR facility is only possible with the pH gradient generated by the proposed discharge. The proposed pilot-scale system will provide valuable field-tested data that will be used to both improve process efficiency and reduce potential impacts to the surrounding receiving waters through rigorous study. Any potential temporary lowering of immediate nearfield water quality with respect to pH is necessary and in the overriding public interest given the anticipated benefits associated with restoring water quality closer to pre-anthropogenic conditions and permanently removing atmospheric carbon dioxide, thereby meeting Tier II antidegradation analysis criteria as more fully articulated in the documentation provided in Attachment E.
- Assuming a maximum effluent temperature (30°C) and worst-case modeled conditions, the incremental temperature increase within the area of nearfield mixing is predicted to be 0.1°C or less. Mixed temperature decreases rapidly from the point of discharge and approaches background temperature well within the proposed chronic mixing zone dimensions.
- For the typical discharge, Scenario 5a, the chemistry model predicts worst case calcite precipitate concentrations near 150 mg/L in the nearfield. Turbidity analyses are qualitative, because site-specific data that would correlate calcite concentrations to turbidity values are not currently available. However, using high effluent turbidity assumptions simple dilution calculations indicate that predicted mixed turbidity would be within the allowable range of increase above background. Project Macoma, LLC, proposes targeted monitoring of turbidity within the nearfield, along with pH, during initial operation of the facility to assess the impact of the discharge on the receiving water.

References

Ecology 2016. National Pollutant Discharge Elimination System Permit No. WA0023973 and Fact Sheet. Ecology Water Quality Program. Effective February 2016.

Ecology 2018. Water Quality Program Permit Writer's Manual. Publication No. 92-109. Revised July 2018.

Frick, et al. 2003. Dilution Models for Effluent Discharges, 4th Edition (Visual Plumes). Environmental Research Division, USEPA. Athens, Georgia.

Attachment A: Ambient and Process Stream Water Quality Data

Table A-1. Port of Port Angeles Water Quality Data

Parameter	Units	Value
pH		7.78
Conductivity	µmhos/cm	47,000
Total sulfide	mg/L	< 0.05
Total dissolved solids	mg/L	34,000
Total suspended solids	mg/L	48.0
Bulk density	g/cm^3	1.002
Total organic carbon	mg/L as C	1.6
Total alkalinity	mg/L as $CaCO_3$	130
Carbonate alkalinity	mg/L as $CaCO_3$	< 2
Bicarbonate alkalinity	mg/L as $CaCO_3$	130
Bromide	mg/L	51.9
Chloride	mg/L	18,400
Fluoride	mg/L	< 5
Sulfate	mg/L	2,420
Calcium	mg/L	300
Potassium	mg/L	330
Magnesium	mg/L	460
Sodium	mg/L	8,570
Ammonia	mg/L as N	0.026
Nitrite	mg/L as N	< 0.5
Nitrate	mg/L as N	< 2.5
Orthophosphate	mg/L as P	0.04
Total phosphorus	mg/L as P	0.064
Aluminum	mg/L	< 0.30
Arsenic	mg/L	< 0.01
Barium	mg/L	< 0.01
Beryllium	mg/L	< 0.01
Cadmium	mg/L	< 0.005
Cobalt	mg/L	< 0.01
Chromium	mg/L	< 0.02
Copper	mg/L	< 0.01
Iron	mg/L	< 0.03
Mercury	mg/L	< 0.0001
Manganese	mg/L	< 0.01
Nickel	mg/L	< 0.01
Lead	mg/L	< 0.02
Antimony	mg/L	< 0.02
Silica	mg/L as SiO_2	1.40

Table A-1. Water Quality (Nominal) of Various Waste Streams					
Parameter	Units	Alkaline Product	Acid with Olivine	Acid with Limestone	Pretreat Reject
Flow	L/hr	5,900	5,900	5,900	27,000
pH		13.93	2.26	8.10	8.00
Temperature	°C	30.0	30.0	30.0	17.0
Sodium	mg/L	--	--	--	12,500
Magnesium	mg/L	ND	7,379	198	4,631
Calcium	mg/L	ND	137.6	13,954	1,350
Iron	mg/L	ND	2.43	ND	ND
Nickel	mg/L	ND	18.13	0.001	ND
Cobalt	mg/L	ND	0.853	0.0003	ND
Silica	mg/L	ND	114.8	ND	ND
Aluminum	mg/L	ND	1.13	ND	ND
Phosphorus	mg/L	ND	0.133	ND	ND
Titanium	mg/L	ND	0.061	ND	ND
Chromium	mg/L	ND	0.051	ND	ND
Arsenic	mg/L	ND	ND	0.05	ND
Cadmium	mg/L	ND	ND	0.0002	ND
Mercury	mg/L	ND	ND	0.002	ND
Molybdenum	mg/L	ND	ND	0.0001	ND
Lead	mg/L	ND	ND	0.0025	ND
Selenium	mg/L	ND	ND	0.019	ND
Zinc	mg/L	ND	ND	0.0003	ND
Chloride	mg/L	--	22,055	26,300	27,203
Carbonate	mg/L	--	--	--	18.0
Bicarbonate	mg/L	--	--	172.26	216
Bromide	mg/L	--	--	--	53.0
Fluoride	mg/L	--	--	--	ND
Sulfate	mg/L	--	--	--	4,922
Carbon-dioxide	mg/L	--	--	0.42	--
CaHCO3+1	mg/L	--	--	92.8	--
Total dissolved solids	mg/L	--	30,629	41,033	50,893

Attachment B: Dilution Model Input/Output

Scenario 1b – Alkaline Product Only (pH=13.5)

Acute Conditions

```
Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-den   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.020     90.00     30.95     11.20       0.0       0.0         -         -    0.0003  23.62000
     3.000     0.020     90.00     31.17     10.35       0.0       0.0         -         -    0.0003  23.93000
     6.000     0.020     90.00     31.16     9.690       0.0       0.0         -         -    0.0003  24.03000
     9.000     0.020     90.00     31.68     9.440       0.0       0.0         -         -    0.0003  24.48000
     12.00     0.020     90.00     31.76     9.340       0.0       0.0         -         -    0.0003  24.56000
     15.00     0.020     90.00     31.87     9.220       0.0       0.0         -         -    0.0003  24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)   (deg)   (deg)     (m)     (m)      ()    (ft)    (ft)(concent)     (m)  (m3/s) (kg/m3)     (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 1.64E-3  1028.0  30.000  100.00

Simulation:
Froude No:     -23.03; Strat No:-3.16E-4; Spcg No:   48.00; k:   25.89; eff den (sigmaT)  28.00000; eff vel     0.518(
         Depth  Amb-cur     P-dia  Polutnt    Dilutn  CL-diln    x-posn    y-posn      Time   Iso dia
Step       (m)   (cm/s)      (in)      (%)        ()       ()       (m)       (m)       (s)       (m)
   0     2.000    2.000     0.500    100.0     1.000    1.000       0.0       0.0       0.0    0.0127;
  50     1.962    2.000     1.346    36.10     2.770    1.385     0.000    0.0402     0.198   0.03418;
 100     1.885    2.000     3.389    13.94     7.173    3.586     0.000     0.144     1.354   0.08608;
 150     1.834    2.000     5.491    8.347     11.98    5.990     0.000     0.260     3.403    0.1395;
 200     1.815    2.000     6.968    6.329     15.80    7.901     0.000     0.372     5.917    0.1770;
 209     1.815    2.000     7.180    6.089     16.42    8.212     0.000     0.393     6.421    0.1824; local maximum rise o
 250     1.826    2.000     8.062    5.142     19.45    9.725     0.000     0.495     8.995    0.2048;
 300     1.888    2.000     10.09    3.535     28.29    14.15     0.000     0.667     13.92    0.2563;
 350     2.120    2.000     17.55    1.403     71.30    35.65     0.000     1.041     27.44    0.4458;
 376     2.286    2.000     24.01    0.838     119.3    59.66     0.000     1.304     38.51    0.6100; merging;
 400     2.498    2.000     32.43    0.528     189.3    103.8     0.000     1.702     56.41    0.8237;
 402     2.514    2.000     33.11    0.513     194.8    107.6     0.000     1.738     58.03    0.8409; trap level;
 450     2.722    2.000     43.05    0.368     271.7    169.5     0.000     2.371     87.55    1.0934;
 488     2.759    2.000     45.50    0.346     289.4    186.4     0.000     2.776     106.6    1.1557; local maximum rise o
 500     2.755    2.000     45.59    0.344     290.6 [illegible]   0.000     2.903     112.6    1.1580;
 549     2.505    2.000     51.26    0.278     359.4    239.6     0.000     3.998     164.5    1.3021; trap level;
Horiz plane projections in effluent direction: radius(m):      0.0; CL(m):    3.9984
```

Chronic Conditions

```
Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-den   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.050     90.00     30.95     11.20       0.0       0.0         -         -    0.0003  23.62000
     3.000     0.050     90.00     31.17     10.35       0.0       0.0         -         -    0.0003  23.93000
     6.000     0.050     90.00     31.16     9.690       0.0       0.0         -         -    0.0003  24.03000
     9.000     0.050     90.00     31.68     9.440       0.0       0.0         -         -    0.0003  24.48000
     12.00     0.050     90.00     31.76     9.340       0.0       0.0         -         -    0.0003  24.56000
     15.00     0.050     90.00     31.87     9.220       0.0       0.0         -         -    0.0003  24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)   (deg)   (deg)     (m)     (m)      ()    (ft)    (ft)(concent)     (m)  (m3/s) (kg/m3)     (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 1.64E-3  1028.0  30.000  100.00

Simulation:
Froude No:     -23.03; Strat No:-3.16E-4; Spcg No:   48.00; k:   10.36; eff den (sigmaT)  28.00000; eff vel     0.518(
         Depth  Amb-cur     P-dia  Polutnt    Dilutn  CL-diln    x-posn    y-posn      Time   Iso dia
Step       (m)   (cm/s)      (in)      (%)        ()       ()       (m)       (m)       (s)       (m)
   0     2.000    5.000     0.500    100.0     1.000    1.000       0.0       0.0       0.0    0.0127;
  50     1.965    5.000     1.296    36.17     2.765    1.382     0.000     0.039     0.177   0.03292;
 100     1.916    5.000     2.974    13.91     7.191    3.596     0.000     0.119     0.867   0.07555;
 150     1.872    5.000     5.259    6.473     15.45    7.725     0.000     0.258     2.639    0.1336;
 191     1.852    5.000     7.016    4.155     24.07    12.03     0.000     0.505     6.406    0.1782; local maximum rise o
 200     1.854    5.000     7.297    3.890     25.71    12.85     0.000     0.581     7.605    0.1854;
 250     1.943    5.000     11.87    1.631     61.32    30.66     0.000     1.167     17.65    0.3015;
 300     2.105    5.000     20.13    0.606     165.1    82.53     0.000     2.029     33.90    0.5113;
 318     2.184    5.000     24.24    0.424     235.7    117.9     0.000     2.530     43.62    0.6157; merging;
 334     2.282    5.000     28.79    0.309     323.6    170.3     0.000     3.277     58.22    0.7313; trap level;
 350     2.407    5.000     34.20    0.230     435.4    243.5     0.000     4.726     86.73    0.8686;
 361     2.433    5.000     35.67    0.215 [illegible]   265.2     0.000     5.787     107.7    0.9061; local maximum rise o
 382     2.272    5.000     40.65    0.172     581.6    351.8     0.000     8.609     163.4    1.0325; trap level;
Horiz plane projections in effluent direction: radius(m):      0.0; CL(m):    8.6092
```

Scenario 2a – Neutralized Acid Only (Olivine)

Acute Conditions

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.020	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.020	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.020	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.020	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.020	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.020	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia	Ver angl	H-Angle	SourceX	SourceY	Ports	Spacing	MZ-dis	Isoplth	P-depth	Ttl-flo	Eff-den	Temp	Polutnt
(in)	(deg)	(deg)	(m)	(m)	()	(ft)	(ft)	(concent)	(m)	(m3/s)	(kg/m3)	(C)	(%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	1.64E-3	1020.0	30.000	100.00

Simulation:

Froude No: 23.95; Strat No: 3.44E-4; Spcg No: 48.00; k: 25.89; eff den (sigmaT) 20.00000; eff vel 0.518(r

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	Time	Iso dia	
	(m)	(cm/s)	(in)	(%)	()	()	(m)	(m)	(s)	(m)	
0	2.000	2.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.962	2.000	1.331	36.27	2.757	1.379	0.000	0.0395	0.194	0.0338;	
100	1.875	2.000	3.328	13.48	7.416	3.708	0.000	0.141	1.332	0.08453;	
150	1.731	2.000	7.585	5.011	19.96	9.979	0.000	0.342	5.642	0.1927;	
200	1.537	2.000	15.40	1.862	53.72	26.86	0.000	0.696	17.42	0.3913;	
233	1.379	2.000	23.34	0.968	103.3	51.63	0.000	1.109	34.30	0.5927;	trap level;
236	1.364	2.000	24.17	0.914	109.4	54.68	0.000	1.160	36.47	0.6139;	merging;
250	1.298	2.000	27.64	0.740	135.2	70.25	0.000	1.419	47.83	0.7022;	
294	1.214	2.000	32.38	0.584	171.1	93.74	0.000	2.203	83.20	0.8224;	local maximum rise o
300	1.216	2.000	32.50	0.581	172.2	94.48	0.000	2.307	87.90	0.8255;	
334	1.371	2.000	37.57	0.453	220.8	128.6	0.000	3.425	139.2	0.9542;	trap level;
350	1.445	2.000	41.02	0.401	249.1	151.4	0.000	3.981	165.1	1.0420;	
367	1.459	2.000	41.99	0.389	256.8	158.0	0.000	4.349	182.4	1.0665;	local maximum rise o

Horiz plane projections in effluent direction: radius(m): 0.0; CL(m): 4.3489

Lmz(m): 4.3489

Chronic Conditions

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.050	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.050	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.050	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.050	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.050	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.050	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia	Ver angl	H-Angle	SourceX	SourceY	Ports	Spacing	MZ-dis	Isoplth	P-depth	Ttl-flo	Eff-den	Temp	Polutnt
(in)	(deg)	(deg)	(m)	(m)	()	(ft)	(ft)	(concent)	(m)	(m3/s)	(kg/m3)	(C)	(%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	1.64E-3	1020.0	30.000	100.00

Simulation:

Froude No: 23.95; Strat No: 3.44E-4; Spcg No: 48.00; k: 10.36; eff den (sigmaT) 20.00000; eff vel 0.518(r

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	Time	Iso dia	
	(m)	(cm/s)	(in)	(%)	()	()	(m)	(m)	(s)	(m)	
0	2.000	5.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.965	5.000	1.284	36.34	2.752	1.376	0.000	0.0384	0.174	0.03262;	
100	1.912	5.000	2.986	13.51	7.402	3.701	0.000	0.118	0.864	0.07585;	
150	1.844	5.000	6.084	5.020	19.92	9.960	0.000	0.278	3.012	0.1545;	
200	1.752	5.000	11.04	1.865	53.61	26.81	0.000	0.670	9.657	0.2804;	
250	1.608	5.000	18.87	0.693	144.3	72.15	0.000	1.769	30.25	0.4792;	
255	1.590	5.000	19.87	0.628	159.3	79.66	0.000	1.965	34.01	0.5047;	trap level;
274	1.515	5.000	24.17	0.431	232.1	116.0	0.000	3.089	55.79	0.6138;	merging;
285	1.484	5.000	26.45	0.364	274.6	140.9	0.000	4.568	84.69	0.6717;	local maximum rise o
300	1.571	5.000	29.75	0.293	341.2	181.5	0.000	7.071	133.7	0.7557;	
301	1.578	5.000	30.08	0.287	[illegible]	185.8	0.000	7.239	137.0	0.7641;	trap level;
313	1.638	5.000	33.31	0.241	414.7	229.6	0.000	9.752	186.5	0.8460;	local maximum rise o

Horiz plane projections in effluent direction: radius(m): 0.0; CL(m): 9.7519

Lmz(m): 9.7519

Scenario 2b – Neutralized Acid Only ($CaCO_3$)

Acute Conditions

```
Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-den   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.020     90.00     30.95     11.20       0.0       0.0         -         -    0.0003  23.62000
     3.000     0.020     90.00     31.17     10.35       0.0       0.0         -         -    0.0003  23.93000
     6.000     0.020     90.00     31.16     9.690       0.0       0.0         -         -    0.0003  24.03000
     9.000     0.020     90.00     31.68     9.440       0.0       0.0         -         -    0.0003  24.48000
     12.00     0.020     90.00     31.76     9.340       0.0       0.0         -         -    0.0003  24.56000
     15.00     0.020     90.00     31.87     9.220       0.0       0.0         -         -    0.0003  24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)   (deg)   (deg)     (m)     (m)     ()    (ft)    (ft)(concent)    (m)  (m3/s) (kg/m3)     (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 1.64E-3  1028.0  30.000  100.00

Simulation:
Froude No:    -23.03; Strat No:-3.16E-4; Spcg No:   48.00; k:   25.89; eff den (sigmaT)  28.00000; eff vel     0.518(r
        Depth  Amb-cur     P-dia  Polutnt    Dilutn   CL-diln   x-posn    y-posn      Time    Iso dia
Step      (m)   (cm/s)      (in)      (%)        ()        ()      (m)       (m)       (s)        (m)
   0     2.000    2.000    0.500    100.0     1.000     1.000      0.0       0.0       0.0    0.0127;
  50     1.962    2.000    1.346    36.10     2.770     1.385    0.000    0.0402     0.198   0.03418;
 100     1.885    2.000    3.389    13.94     7.173     3.586    0.000     0.144     1.354   0.08608;
 150     1.834    2.000    5.491    8.347     11.98     5.990    0.000     0.260     3.403    0.1395;
 200     1.815    2.000    6.968    6.329     15.80     7.901    0.000     0.372     5.917    0.1770;
 209     1.815    2.000    7.180    6.089     16.42     8.212    0.000     0.393     6.421    0.1824; local maximum rise c
 250     1.826    2.000    8.062    5.142     19.45     9.725    0.000     0.495     8.995    0.2048;
 300     1.888    2.000    10.09    3.535     28.29     14.15    0.000     0.667     13.92    0.2563;
 350     2.120    2.000    17.55    1.403     71.30     35.65    0.000     1.041     27.44    0.4458;
 376     2.286    2.000    24.01    0.838     119.3     59.66    0.000     1.304     38.51    0.6100; merging;
 400     2.498    2.000    32.43    0.528     189.3     103.8    0.000     1.702     56.41    0.8237;
 402     2.514    2.000    33.11    0.513     194.8     107.6    0.000     1.738     58.03    0.8409; trap level;
 450     2.722    2.000    43.05    0.368     271.7     169.5    0.000     2.371     87.55    1.0934;
 488     2.759    2.000    45.50    0.346     289.4     186.4    0.000     2.776     106.6    1.1557; local maximum rise c
 500     2.755    2.000    45.59    0.344     290.6  [illegible]  0.000     2.903     112.6    1.1580;
 549     2.505    2.000    51.26    0.278     359.4     239.6    0.000     3.998     164.5    1.3021; trap level;
Horiz plane projections in effluent direction: radius(m):    0.0; CL(m):    3.9984
```

Chronic Conditions

```
Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-den   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.050     90.00     30.95     11.20       0.0       0.0         -         -    0.0003  23.62000
     3.000     0.050     90.00     31.17     10.35       0.0       0.0         -         -    0.0003  23.93000
     6.000     0.050     90.00     31.16     9.690       0.0       0.0         -         -    0.0003  24.03000
     9.000     0.050     90.00     31.68     9.440       0.0       0.0         -         -    0.0003  24.48000
     12.00     0.050     90.00     31.76     9.340       0.0       0.0         -         -    0.0003  24.56000
     15.00     0.050     90.00     31.87     9.220       0.0       0.0         -         -    0.0003  24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)   (deg)   (deg)     (m)     (m)     ()    (ft)    (ft)(concent)    (m)  (m3/s) (kg/m3)     (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 1.64E-3  1028.0  30.000  100.00

Simulation:
Froude No:    -23.03; Strat No:-3.16E-4; Spcg No:   48.00; k:   10.36; eff den (sigmaT)  28.00000; eff vel     0.518(r
        Depth  Amb-cur     P-dia  Polutnt    Dilutn   CL-diln   x-posn    y-posn      Time    Iso dia
Step      (m)   (cm/s)      (in)      (%)        ()        ()      (m)       (m)       (s)        (m)
   0     2.000    5.000    0.500    100.0     1.000     1.000      0.0       0.0       0.0    0.0127;
  50     1.965    5.000    1.296    36.17     2.765     1.382    0.000     0.039     0.177   0.03292;
 100     1.916    5.000    2.974    13.91     7.191     3.596    0.000     0.119     0.867   0.07555;
 150     1.872    5.000    5.259    6.473     15.45     7.725    0.000     0.258     2.639    0.1336;
 191     1.852    5.000    7.016    4.155     24.07     12.03    0.000     0.505     6.406    0.1782; local maximum rise c
 200     1.854    5.000    7.297    3.890     25.71     12.85    0.000     0.581     7.605    0.1854;
 250     1.943    5.000    11.87    1.631     61.32     30.66    0.000     1.167     17.65    0.3015;
 300     2.105    5.000    20.13    0.606     165.1     82.53    0.000     2.029     33.90    0.5113;
 318     2.184    5.000    24.24    0.424     235.7     117.9    0.000     2.530     43.62    0.6157; merging;
 334     2.282    5.000    28.79    0.309     323.6     170.3    0.000     3.277     58.22    0.7313; trap level;
 350     2.407    5.000    34.20    0.230     435.4     243.5    0.000     4.726     86.73    0.8686;
 361     2.433    5.000    35.67    0.215     466.0     265.2    0.000     5.787     107.7    0.9061; local maximum rise c
 382     2.272    5.000    40.65    0.172     581.6     351.8    0.000     8.609     163.4    1.0325; trap level;
Horiz plane projections in effluent direction: radius(m):    0.0; CL(m):    8.6092
```

Scenario 3 – Pretreatment Reject Only

Acute Conditions

Depth (m)	Amb-cur (m/s)	Amb-dir (deg)	Amb-den (psu)	Amb-tem (C)	Amb-pol (kg/kg)	Decay (s-1)	Far-spd (m/s)	Far-dir (deg)	Disprsn (m0.67/s2)	Density (sigma-T)
0.0	0.020	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.020	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.020	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.020	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.020	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.020	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia (in)	Ver angl (deg)	H-Angle (deg)	SourceX (m)	SourceY (m)	Ports ()	Spacing (ft)	MZ-dis (ft)	Isoplth (concent)	P-depth (m)	Ttl-flo (m3/s)	Eff-den (kg/m3)	Temp (C)	Polutnt (%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	7.50E-3	1042.0	17.000	100.00

Simulation:

Froude No: -50.81; Strat No:-7.25E-5; Spcg No: 48.00; k: 118.4; eff den (sigmaT) 42.00000; eff vel 2.368(

Step	Depth (m)	Amb-cur (cm/s)	P-dia (in)	Polutnt (%)	Dilutn ()	CL-diln ()	x-posn (m)	y-posn (m)	Time (s)	Iso dia (m)	
0	2.000	2.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.951	2.000	1.594	30.73	3.255	1.627	0.000	0.0494	0.0626	0.04048;	
100	1.835	2.000	4.270	11.38	8.790	4.395	0.000	0.176	0.488	0.1085;	
150	1.614	2.000	10.36	4.746	21.07	10.53	0.000	0.483	2.822	0.2633;	
200	1.504	2.000	15.08	3.306	30.25	15.12	0.000	0.746	5.909	0.3830;	
250	1.473	2.000	18.31	2.694	37.12	18.56	0.000	0.964	9.036	0.4652;	
254	1.473	2.000	18.53	2.658	37.62	18.81	0.000	0.981	9.295	0.4706;	local maximum rise c
300	1.497	2.000	20.61	2.305	43.39	21.69	0.000	1.177	12.49	0.5235;	
350	1.592	2.000	22.82	1.923	52.00	26.00	0.000	1.423	16.92	0.5797;	
369	1.661	2.000	24.05	1.741	57.44	28.72	0.000	1.539	19.21	0.6109;	merging;
400	1.855	2.000	26.99	1.403	71.29	36.79	0.000	1.789	24.61	0.6855;	
450	3.090	2.000	45.55	0.656	152.5	98.31	0.000	2.838	54.07	1.1569;	
465	3.823	2.000	61.82	0.495	202.0	134.7	0.000	3.453	74.97	1.5703;	trap level;
500	4.588	2.000	91.73	0.383	261.2	174.1	0.000	4.256	104.4	2.3299;	
529	4.855	2.000	111.4	0.346	289.2	192.8	0.000	4.655	119.7	2.8294;	begin overlap;
550	4.974	2.000	122.8	0.331	302.5	201.7	0.000	4.897	129.1	3.1189;	
600	5.121	2.000	138.1	0.316	316.0	210.7	0.000	5.393	148.7	3.5086;	
632	5.142	2.000	141.1	0.314	318.2	212.2	0.000	5.680	160.0	3.5832;	local maximum rise c
650	5.134	2.000	140.8	0.314	318.6	[illegible]	0.000	5.840	166.3	3.5767;	
700	5.022	2.000	135.7	0.311	321.9	214.6	0.000	6.332	185.8	3.4465;	
726	4.873	2.000	131.8	0.305	327.9	[illegible]	0.000	6.672	199.3	3.3467;	end overlap;
750	4.576	2.000	129.7	0.292	342.1	228.1	0.000	7.171	219.2	3.2932;	
764	3.793	2.000	140.9	0.258	387.2	258.1	0.000	8.262	263.6	3.5789;	trap level;

Chronic Conditions

Ambient Table:

Depth (m)	Amb-cur (m/s)	Amb-dir (deg)	Amb-den (psu)	Amb-tem (C)	Amb-pol (kg/kg)	Decay (s-1)	Far-spd (m/s)	Far-dir (deg)	Disprsn (m0.67/s2)	Density (sigma-T)
0.0	0.050	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.050	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.050	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.050	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.050	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.050	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia (in)	Ver angl (deg)	H-Angle (deg)	SourceX (m)	SourceY (m)	Ports ()	Spacing (ft)	MZ-dis (ft)	Isoplth (concent)	P-depth (m)	Ttl-flo (m3/s)	Eff-den (kg/m3)	Temp (C)	Polutnt (%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	7.50E-3	1042.0	17.000	100.00

Simulation:

Froude No: -50.81; Strat No:-7.25E-5; Spcg No: 48.00; k: 47.36; eff den (sigmaT) 42.00000; eff vel 2.368(

Step	Depth (m)	Amb-cur (cm/s)	P-dia (in)	Polutnt (%)	Dilutn ()	CL-diln ()	x-posn (m)	y-posn (m)	Time (s)	Iso dia (m)	
0	2.000	5.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.952	5.000	1.576	30.78	3.249	1.625	0.000	0.0496	0.0613	0.04003;	
100	1.844	5.000	4.117	11.39	8.776	4.388	0.000	0.177	0.456	0.1046;	
150	1.666	5.000	9.618	4.565	21.90	10.95	0.000	0.465	2.258	0.2443;	
200	1.555	5.000	15.23	2.655	37.67	18.84	0.000	0.811	5.541	0.3869;	
239	1.525	5.000	18.46	2.062	48.49	24.24	0.000	1.138	9.255	0.4688;	local maximum rise c
250	1.528	5.000	19.22	1.945	51.42	25.71	0.000	1.241	10.49	0.4882;	
295	1.625	5.000	24.02	1.358	73.62	36.81	0.000	1.776	17.42	0.6101;	merging;
300	1.652	5.000	25.08	1.266	78.99	39.95	0.000	1.865	18.66	0.6369;	
350	2.377	5.000	47.13	0.491	203.8	134.2	0.000	3.545	45.55	1.1970;	
365	2.761	5.000	59.85	0.367	272.4	181.6	0.000	4.432	61.14	1.5201;	trap level;
400	3.203	5.000	80.08	0.274	365.6	243.7	0.000	5.908	87.90	2.0340;	
441	3.377	5.000	90.85	0.243	411.9	274.6	0.000	7.709	121.1	2.3077;	local maximum rise c
450	3.366	5.000	91.32	0.241	[illegible]	276.4	0.000	8.120	128.7	2.3195;	
494	2.708	5.000	108.5	0.191	522.6	348.4	0.000	11.63	194.3	2.7556;	trap level;

Horiz plane projections in effluent direction: radius(m): 0.0; CL(m): 11.633

[illegible]

Scenario 4a – Neutralized Acid (Olivine) + Pretreatment Reject

Acute Conditions

```
Ambient Table:
     Depth    Amb-cur    Amb-dir    Amb-den    Amb-tem    Amb-pol      Decay   Far-spd    Far-dir   Disprsn    Density
         m        m/s        deg        psu          C      kg/kg        s-1       m/s        deg   m0.67/s2    sigma-T
       0.0      0.020      90.00      30.95      11.20        0.0        0.0         -          -     0.0003   23.62000
     3.000      0.020      90.00      31.17      10.35        0.0        0.0         -          -     0.0003   23.93000
     6.000      0.020      90.00      31.16      9.690        0.0        0.0         -          -     0.0003   24.03000
     9.000      0.020      90.00      31.68      9.440        0.0        0.0         -          -     0.0003   24.48000
     12.00      0.020      90.00      31.76      9.340        0.0        0.0         -          -     0.0003   24.56000
     15.00      0.020      90.00      31.87      9.220        0.0        0.0         -          -     0.0003   24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)    (deg)   (deg)     (m)     (m)      ()    (ft)    (ft)(concent)    (m)   (m3/s)  (kg/m3)      (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 9.10E-3  1038.0  19.300  100.00

Simulation:
Froude No:    -69.68; Strat No:-9.29E-5; Spcg No:   48.00; k:   143.7; eff den (sigmaT)  38.00000; eff vel     2.873(
          Depth  Amb-cur     P-dia  Polutnt    Dilutn  CL-diln    x-posn    y-posn      Time   Iso dia
Step        (m)   (cm/s)      (in)      (%)        ()       ()       (m)       (m)       (s)       (m)
   0      2.000    2.000     0.500    100.0     1.000    1.000       0.0       0.0       0.0    0.0127;
  50      1.949    2.000     1.655    29.64     3.374    1.687     0.000    0.0517    0.0559   0.04203;
 100      1.828    2.000     4.424    10.98     9.105    4.553     0.000     0.181     0.433    0.1124;
 150      1.548    2.000     11.64    4.173     23.97    11.98     0.000     0.542     2.972    0.2956;
 200      1.358    2.000     18.75    2.621     38.16    19.08     0.000     0.931     7.524    0.4763;
 250      1.294    2.000     23.51    2.075     48.20    24.10     0.000     1.241     12.15    0.5971;
 257      1.292    2.000     24.05    2.022     49.47    24.73     0.000     1.282     12.81    0.6109; merging;
 265      1.291    2.000     24.62    1.968     50.80    25.56     0.000     1.328     13.58    0.6252; local maximum rise o
 300      1.310    2.000     26.59    1.785     56.02    28.79     0.000     1.536     17.15    0.6754;
 350      1.416    2.000     28.99    1.543     64.80    34.18     0.000     1.868     23.32    0.7363;
 400      1.726    2.000     33.30    1.198     83.48    46.22     0.000     2.357     33.57    0.8459;
 442      2.952    2.000     53.61    0.656     152.5    101.7     0.000     3.596     66.49    1.3617; trap level;
 450      3.167    2.000     60.31    0.603     165.8    110.5     0.000     3.819     73.31    1.5320;
 500      3.811    2.000     90.58    0.471     212.2    141.5     0.000     4.698     101.9    2.3007;
 523      3.946    2.000     101.6    0.444     225.5    150.3     0.000     4.988     111.8    2.5808; begin overlap;
 550      4.044    2.000     111.1    0.425     235.5    157.0     0.000     5.295     122.4    2.8218;
 599      4.106    2.000     118.1    0.413     242.2    161.4     0.000     5.807     140.4    3.0001; local maximum rise o
 600      4.106    2.000     118.1    0.413     242.2    161.5     0.000     5.817     140.7    3.0009;
 650      4.031    2.000     116.6    0.408     245.3    163.5     0.000     6.353     159.6    2.9609;
 671      3.944    2.000     115.0    0.402     248.7    165.8     0.000     6.621     169.1    2.9214; end overlap;
 700      3.710    2.000     113.3    0.387     258.3    172.2     0.000     7.116     186.8    2.8788;
 726      2.755    2.000     126.0    0.328     304.9    203.3     0.000     8.557     239.6    3.2008; trap level;
```

Chronic Conditions

```
Ambient Table:
     Depth    Amb-cur    Amb-dir    Amb-den    Amb-tem    Amb-pol      Decay   Far-spd    Far-dir   Disprsn    Density
         m        m/s        deg        psu          C      kg/kg        s-1       m/s        deg   m0.67/s2    sigma-T
       0.0      0.050      90.00      30.95      11.20        0.0        0.0         -          -     0.0003   23.62000
     3.000      0.050      90.00      31.17      10.35        0.0        0.0         -          -     0.0003   23.93000
     6.000      0.050      90.00      31.16      9.690        0.0        0.0         -          -     0.0003   24.03000
     9.000      0.050      90.00      31.68      9.440        0.0        0.0         -          -     0.0003   24.48000
     12.00      0.050      90.00      31.76      9.340        0.0        0.0         -          -     0.0003   24.56000
     15.00      0.050      90.00      31.87      9.220        0.0        0.0         -          -     0.0003   24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)    (deg)   (deg)     (m)     (m)      ()    (ft)    (ft)(concent)    (m)   (m3/s)  (kg/m3)      (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 9.10E-3  1038.0  19.300  100.00

Simulation:
Froude No:    -69.68; Strat No:-9.29E-5; Spcg No:   48.00; k:   57.47; eff den (sigmaT)  38.00000; eff vel     2.873(
          Depth  Amb-cur     P-dia  Polutnt    Dilutn  CL-diln    x-posn    y-posn      Time   Iso dia
Step        (m)   (cm/s)      (in)      (%)        ()       ()       (m)       (m)       (s)       (m)
   0      2.000    5.000     0.500    100.0     1.000    1.000       0.0       0.0       0.0    0.0127;
  50      1.950    5.000     1.638    29.69     3.369    1.684     0.000    0.0519    0.0549   0.04161;
 100      1.835    5.000     4.289    11.00     9.091    4.546     0.000     0.183     0.409    0.1089;
 150      1.614    5.000     10.64    4.141     24.15    12.07     0.000     0.515     2.322    0.2703;
 200      1.439    5.000     18.60    2.149     46.53    23.26     0.000     0.973     6.598    0.4724;
 243      1.372    5.000     24.00    1.537     65.06    32.53     0.000     1.479     12.50    0.6097; merging;
 250      1.371    5.000     24.67    1.479     67.60    34.04     0.000     1.573     13.67    0.6265; local maximum rise o
 300      1.487    5.000     30.25    1.085     92.18    49.30     0.000     2.395     24.56    0.7684;
 350      2.346    5.000     56.17    0.461     217.0    144.7     0.000     4.656     59.98    1.4267;
 354      2.461    5.000     60.17    0.426     234.7    156.5     0.000     4.959     65.14    1.5284; trap level;
 400      2.953    5.000     83.97    0.308     324.3    216.2     0.000     6.894     99.03    2.1328;
 425      2.999    5.000     87.80    0.296     337.5    225.0     0.000     7.707     113.5    2.2302; local maximum rise o
 450      2.939    5.000     89.36    0.289     346.5    231.0     0.000     8.562     128.8    2.2698;
 478      2.426    5.000     102.6    0.240     416.6    277.7     0.000     10.90     171.1    2.6060; trap level;
Horiz plane projections in effluent direction: radius(m):      0.0; CL(m):    10.902
```

Scenario 4b – Neutralized Acid (CaCO3) + Pretreatment Reject

Acute Conditions

```
Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-den   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.020     90.00     30.95     11.20       0.0       0.0         -         -    0.0003  23.62000
     3.000     0.020     90.00     31.17     10.35       0.0       0.0         -         -    0.0003  23.93000
     6.000     0.020     90.00     31.16     9.690       0.0       0.0         -         -    0.0003  24.03000
     9.000     0.020     90.00     31.68     9.440       0.0       0.0         -         -    0.0003  24.48000
     12.00     0.020     90.00     31.76     9.340       0.0       0.0         -         -    0.0003  24.56000
     15.00     0.020     90.00     31.87     9.220       0.0       0.0         -         -    0.0003  24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)   (deg)   (deg)     (m)     (m)      ()    (ft)    (ft)(concent)    (m)  (m3/s) (kg/m3)     (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 9.10E-3  1039.0  19.300  100.00

Simulation:
Froude No:    -67.38; Strat No:-8.68E-5; Spcg No:   48.00; k:   143.7; eff den (sigmaT)  39.00000; eff vel     2.873(r
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn     Time   Iso dia
Step      (m)   (cm/s)     (in)      (%)       ()       ()      (m)      (m)      (s)      (m)
   0    2.000    2.000    0.500    100.0    1.000    1.000      0.0      0.0      0.0   0.0127;
  50    1.949    2.000    1.655    29.62    3.376    1.688    0.000   0.0517   0.0559  0.04204;
 100    1.828    2.000    4.427    10.98    9.111    4.556    0.000    0.181    0.434   0.1125;
 150    1.552    2.000    11.58    4.202    23.80    11.90    0.000    0.539    2.938   0.2943;
 200    1.373    2.000    18.38    2.684    37.26    18.63    0.000    0.911    7.233   0.4669;
 250    1.314    2.000    22.94    2.135    46.83    23.42    0.000    1.208    11.57   0.5827;
 264    1.312    2.000    23.96    2.031    49.23    24.61    0.000    1.286    12.83   0.6085; local maximum rise c
 265    1.312    2.000    24.03    2.025    49.39    24.70    0.000    1.292    12.92   0.6103; merging;
 300    1.331    2.000    25.98    1.832    54.59    27.87    0.000    1.490    16.27   0.6598;
 350    1.434    2.000    28.30    1.583    63.18    33.07    0.000    1.807    22.06   0.7189;
 400    1.729    2.000    32.35    1.234    81.06    44.39    0.000    2.268    31.57   0.8218;
 446    3.049    2.000    53.63    0.644    155.2    103.4    0.000    3.550    65.57   1.3622; trap level;
 450    3.184    2.000    57.50    0.612    163.3    108.9    0.000    3.682    69.59   1.4605;
 500    4.001    2.000    91.98    0.456    219.3    146.2    0.000    4.693    102.6   2.3362;
 526    4.175    2.000    105.9    0.424    236.0    157.4    0.000    5.036    114.4   2.6894; begin overlap;
 550    4.276    2.000    115.5    0.406    246.0    164.0    0.000    5.315    124.2   2.9347;
 600    4.361    2.000    124.7    0.393    254.1    169.4    0.000    5.841    142.9   3.1684;
 607    4.362    2.000    125.1    0.393    254.5    169.7    0.000    5.912    145.5   3.1767; local maximum rise c
 650    4.311    2.000    123.8    0.390    256.6    171.1    0.000    6.361    161.5   3.1454;
 685    4.171    2.000    120.8    0.382    261.7    174.5    0.000    6.799    177.2   3.0678; end overlap;
 700    4.060    2.000    119.6    0.376    266.3    177.5    0.000    7.042    186.0   3.0375;
 735    2.993    2.000    131.5    0.315    317.1    211.4    0.000    8.679    246.5   3.3404; trap level;
```

Chronic Conditions

```
Ambient Table:
     Depth   Amb-cur   Amb-dir   Amb-den   Amb-tem   Amb-pol     Decay   Far-spd   Far-dir   Disprsn   Density
         m       m/s       deg       psu         C     kg/kg       s-1       m/s       deg  m0.67/s2   sigma-T
       0.0     0.050     90.00     30.95     11.20       0.0       0.0         -         -    0.0003  23.62000
     3.000     0.050     90.00     31.17     10.35       0.0       0.0         -         -    0.0003  23.93000
     6.000     0.050     90.00     31.16     9.690       0.0       0.0         -         -    0.0003  24.03000
     9.000     0.050     90.00     31.68     9.440       0.0       0.0         -         -    0.0003  24.48000
     12.00     0.050     90.00     31.76     9.340       0.0       0.0         -         -    0.0003  24.56000
     15.00     0.050     90.00     31.87     9.220       0.0       0.0         -         -    0.0003  24.66000

Diffuser table:
   P-diaVer angl H-Angle SourceX SourceY   Ports Spacing  MZ-dis Isoplth P-depth Ttl-flo Eff-den    Temp Polutnt
    (in)   (deg)   (deg)     (m)     (m)      ()    (ft)    (ft)(concent)    (m)  (m3/s) (kg/m3)     (C)     (%)
  0.5000  45.000  90.000     0.0     0.0  25.000  2.0000  200.00     0.0  2.0000 9.10E-3  1039.0  19.300  100.00

Simulation:
Froude No:    -67.38; Strat No:-8.68E-5; Spcg No:   48.00; k:   57.47; eff den (sigmaT)  39.00000; eff vel     2.873(r
        Depth  Amb-cur    P-dia  Polutnt   Dilutn  CL-diln   x-posn   y-posn     Time   Iso dia
Step      (m)   (cm/s)     (in)      (%)       ()       ()      (m)      (m)      (s)      (m)
   0    2.000    5.000    0.500    100.0    1.000    1.000      0.0      0.0      0.0   0.0127;
  50    1.950    5.000    1.639    29.67    3.370    1.685    0.000   0.0519   0.0549  0.04162;
 100    1.835    5.000    4.291    10.99    9.097    4.549    0.000    0.183    0.410   0.1090;
 150    1.616    5.000    10.61    4.160    24.04    12.02    0.000    0.514    2.309   0.2696;
 200    1.448    5.000    18.28    2.202    45.42    22.71    0.000    0.958    6.415   0.4643;
 249    1.386    5.000    23.98    1.540    64.93    32.47    0.000    1.514    12.88   0.6090; local maximum rise c
 250    1.386    5.000    24.07    1.531    65.30    32.65    0.000    1.526    13.04   0.6114; merging;
 300    1.498    5.000    29.52    1.121    89.19    47.32    0.000    2.298    23.12   0.7499;
 350    2.314    5.000    53.66    0.484    206.8    137.9    0.000    4.372    55.31   1.3630;
 358    2.544    5.000    61.48    0.414    241.6    161.1    0.000    4.943    65.00   1.5615; trap level;
 400    3.015    5.000    84.28    0.306    327.0    218.0    0.000    6.667    95.25   2.1407;
 431    3.091    5.000    90.01    0.288    346.8    231.2    0.000    7.724    114.2   2.2864; local maximum rise c
 450    3.054    5.000    91.11    0.283    352.8    235.2    0.000    8.403    126.3   2.3141;
 486    2.467    5.000    106.2    0.231    432.8    288.5    0.000    11.12    175.5   2.6965; trap level;
Horiz plane projections in effluent direction: radius(m):      0.0; CL(m):   11.118
```

Scenario 5a – All Process Flows (Olivine neutralization)

Acute Conditions

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.020	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.020	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.020	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.020	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.020	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.020	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia	Ver angl	H-Angle	SourceX	SourceY	Ports	Spacing	MZ-dis	Isoplth	P-depth	Ttl-flo	Eff-den	Temp	Polutnt
(in)	(deg)	(deg)	(m)	(m)	()	(ft)	(ft)	(concent)	(m)	(m3/s)	(kg/m3)	(C)	(%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	0.0108	1037.0	20.400	100.00

Simulation:
Froude No: -85.74; Strat No:-1.00E-4; Spcg No: 48.00; k: 170.5; eff den (sigmaT) 37.00000; eff vel 3.410(r

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	Time	Iso dia	
	(m)	(cm/s)	(in)	(%)	()	()	(m)	(m)	(s)	(m)	
0	2.000	2.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.946	2.000	1.721	28.52	3.506	1.753	0.000	0.0542	0.0512	0.0437;	
100	1.820	2.000	4.601	10.57	9.460	4.730	0.000	0.188	0.395	0.1169;	
150	1.510	2.000	12.31	3.926	25.47	12.74	0.000	0.571	2.825	0.3127;	
200	1.242	2.000	21.57	2.270	44.05	22.02	0.000	1.067	8.385	0.5479;	
218	1.195	2.000	24.01	2.041	48.99	24.49	0.000	1.211	10.39	0.6098;	merging;
250	1.149	2.000	27.36	1.796	55.68	28.85	0.000	1.449	13.99	0.6949;	
273	1.140	2.000	29.18	1.680	59.53	31.46	0.000	1.613	16.64	0.7412;	local maximum rise o
300	1.154	2.000	30.88	1.571	63.64	34.28	0.000	1.806	19.88	0.7844;	
350	1.263	2.000	33.44	1.385	72.18	40.02	0.000	2.197	26.91	0.8493;	
400	1.589	2.000	37.70	1.117	89.51	52.21	0.000	2.759	38.12	0.9576;	
439	2.790	2.000	57.17	0.674	148.4	98.95	0.000	4.071	70.41	1.4520;	trap level;
450	3.057	2.000	66.26	0.613	163.2	108.8	0.000	4.374	78.95	1.6831;	
500	3.565	2.000	93.42	0.508	196.9	131.3	0.000	5.152	102.2	2.3729;	
515	3.643	2.000	100.0	0.491	203.8	135.8	0.000	5.335	107.9	2.5401;	begin overlap;
550	3.754	2.000	110.7	0.468	213.6	142.4	0.000	5.725	120.3	2.8130;	
589	3.791	2.000	115.4	0.459	217.7	145.1	0.000	6.128	133.2	2.9310;	local maximum rise o
600	3.788	2.000	115.6	0.458	218.2	145.5	0.000	6.241	136.8	2.9370;	
650	3.681	2.000	113.4	0.451	222.0	148.0	0.000	6.792	154.6	2.8809;	
662	3.626	2.000	112.6	0.447	224.0	149.3	0.000	6.948	159.6	2.8593;	end overlap;
700	3.281	2.000	110.6	0.423	236.5	157.7	0.000	7.619	181.6	2.8102;	
720	2.519	2.000	119.7	0.373	268.3	178.9	0.000	8.704	218.3	3.0412;	trap level;

Horiz plane projections in effluent direction: radius(m): 0.0; CL(m): 8.7036

Chronic Conditions

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.050	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.050	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.050	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.050	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.050	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.050	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia	Ver angl	H-Angle	SourceX	SourceY	Ports	Spacing	MZ-dis	Isoplth	P-depth	Ttl-flo	Eff-den	Temp	Polutnt
(in)	(deg)	(deg)	(m)	(m)	()	(ft)	(ft)	(concent)	(m)	(m3/s)	(kg/m3)	(C)	(%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	0.0108	1037.0	20.400	100.00

Simulation:
Froude No: -85.74; Strat No:-1.00E-4; Spcg No: 48.00; k: 68.20; eff den (sigmaT) 37.00000; eff vel 3.410(:

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	Time	Iso dia	
	(m)	(cm/s)	(in)	(%)	()	()	(m)	(m)	(s)	(m)	
0	2.000	5.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.947	5.000	1.705	28.56	3.501	1.750	0.000	0.0543	0.0504	0.04331;	
100	1.826	5.000	4.477	10.59	9.445	4.723	0.000	0.190	0.376	0.1137;	
150	1.575	5.000	11.32	3.932	25.43	12.72	0.000	0.548	2.262	0.2875;	
200	1.345	5.000	21.08	1.913	52.27	26.13	0.000	1.091	7.097	0.5353;	
217	1.294	5.000	24.15	1.612	62.04	31.02	0.000	1.305	9.438	0.6133;	merging;
250	1.240	5.000	28.45	1.312	76.24	39.97	0.000	1.795	15.26	0.7226;	
257	1.239	5.000	29.12	1.272	78.59	41.51	0.000	1.908	16.66	0.7397;	local maximum rise
300	1.333	5.000	33.75	1.029	97.14	54.06	0.000	2.708	26.99	0.8571;	
350	2.188	5.000	58.66	0.492	203.1	135.4	0.000	5.063	62.24	1.4900;	
355	2.348	5.000	64.17	0.446	224.0	149.4	0.000	5.480	69.07	1.6298;	trap level;
400	2.844	5.000	89.03	0.331	302.5	201.7	0.000	7.413	101.9	2.2614;	
426	2.894	5.000	93.43	0.317	315.4	210.2	0.000	8.259	116.5	2.3732;	local maximum rise
450	2.838	5.000	95.04	0.309	323.2	215.4	0.000	9.073	130.7	2.4140;	
481	2.252	5.000	110.4	0.255	392.0	261.3	0.000	11.68	176.5	2.8031;	trap level;

Horiz plane projections in effluent direction: radius(m): 0.0; CL(m): 11.676
Lmz(m): 11.676

Scenario 5b – All Process Flows ($CaCO_3$ neutralization)

Acute Conditions

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.020	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.020	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.020	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.020	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.020	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.020	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia	Ver angl	H-Angle	SourceX	SourceY	Ports	Spacing	MZ-dis	Isoplth	P-depth	Ttl-flo	Eff-den	Temp	Polutnt
(in)	(deg)	(deg)	(m)	(m)	()	(ft)	(ft)	(concent)	(m)	(m3/s)	(kg/m3)	(C)	(%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	0.0108	1038.0	20.400	100.00

Simulation:

Froude No: -82.70; Strat No:-9.29E-5; Spcg No: 48.00; k: 170.5; eff den (sigmaT) 38.00000; eff vel 3.410(r

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	Time	Iso dia	
	(m)	(cm/s)	(in)	(%)	()	()	(m)	(m)	(s)	(m)	
0	2.000	2.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.946	2.000	1.721	28.51	3.508	1.754	0.000	0.0542	0.0512	0.04371;	
100	1.819	2.000	4.603	10.56	9.466	4.733	0.000	0.188	0.395	0.1169;	
150	1.512	2.000	12.32	3.930	25.44	12.72	0.000	0.571	2.824	0.3130;	
200	1.259	2.000	21.16	2.323	43.05	21.52	0.000	1.045	8.073	0.5375;	
223	1.206	2.000	24.08	2.043	48.94	24.47	0.000	1.220	10.48	0.6117;	merging;
250	1.173	2.000	26.76	1.841	54.31	27.96	0.000	1.411	13.34	0.6796;	
272	1.165	2.000	28.45	1.727	57.91	30.36	0.000	1.561	15.72	0.7226;	local maximum rise c
300	1.180	2.000	30.16	1.611	62.08	33.17	0.000	1.752	18.88	0.7661;	
350	1.286	2.000	32.62	1.420	70.43	38.69	0.000	2.127	25.50	0.8287;	
400	1.598	2.000	36.62	1.149	87.05	50.11	0.000	2.657	35.90	0.9301;	
443	2.895	2.000	57.08	0.664	150.5	100.4	0.000	4.020	69.34	1.4500;	trap level;
450	3.100	2.000	63.60	0.619	161.6	107.7	0.000	4.237	75.46	1.6154;	
500	3.745	2.000	94.40	0.495	202.1	134.7	0.000	5.132	102.3	2.3978;	
521	3.870	2.000	104.7	0.470	212.7	141.8	0.000	5.403	110.9	2.6582;	begin overlap;
550	3.976	2.000	114.9	0.451	222.0	148.0	0.000	5.740	121.7	2.9186;	
597	4.034	2.000	121.7	0.439	227.6	[151.7]	0.000	6.239	138.0	3.0914;	local maximum rise c
600	4.034	2.000	121.8	0.439	227.8	**151.8**	0.000	6.270	139.0	3.0941;	
650	3.953	2.000	120.1	0.433	230.7	[153.8]	0.000	6.816	156.8	3.0502;	
673	3.852	2.000	118.2	0.427	234.2	156.1	0.000	7.115	166.7	3.0031;	end overlap;
700	3.627	2.000	116.4	0.413	242.4	161.6	0.000	7.577	182.0	2.9565;	
729	2.640	2.000	126.9	0.353	282.9	188.6	0.000	9.004	230.7	3.2234;	trap level;

Chronic Conditions

Ambient Table:

Depth	Amb-cur	Amb-dir	Amb-den	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn	Density
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2	sigma-T
0.0	0.050	90.00	30.95	11.20	0.0	0.0	-	-	0.0003	23.62000
3.000	0.050	90.00	31.17	10.35	0.0	0.0	-	-	0.0003	23.93000
6.000	0.050	90.00	31.16	9.690	0.0	0.0	-	-	0.0003	24.03000
9.000	0.050	90.00	31.68	9.440	0.0	0.0	-	-	0.0003	24.48000
12.00	0.050	90.00	31.76	9.340	0.0	0.0	-	-	0.0003	24.56000
15.00	0.050	90.00	31.87	9.220	0.0	0.0	-	-	0.0003	24.66000

Diffuser table:

P-dia	Ver angl	H-Angle	SourceX	SourceY	Ports	Spacing	MZ-dis	Isoplth	P-depth	Ttl-flo	Eff-den	Temp	Polutnt
(in)	(deg)	(deg)	(m)	(m)	()	(ft)	(ft)	(concent)	(m)	(m3/s)	(kg/m3)	(C)	(%)
0.5000	45.000	90.000	0.0	0.0	25.000	2.0000	200.00	0.0	2.0000	0.0108	1038.0	20.400	100.00

Simulation:

Froude No: -82.70; Strat No:-9.29E-5; Spcg No: 48.00; k: 68.20; eff den (sigmaT) 38.00000; eff vel 3.410(r

Step	Depth	Amb-cur	P-dia	Polutnt	Dilutn	CL-diln	x-posn	y-posn	Time	Iso dia	
	(m)	(cm/s)	(in)	(%)	()	()	(m)	(m)	(s)	(m)	
0	2.000	5.000	0.500	100.0	1.000	1.000	0.0	0.0	0.0	0.0127;	
50	1.947	5.000	1.705	28.55	3.502	1.751	0.000	0.0544	0.0504	0.04332;	
100	1.826	5.000	4.479	10.58	9.451	4.726	0.000	0.190	0.376	0.1138;	
150	1.576	5.000	11.32	3.934	25.42	12.71	0.000	0.548	2.263	0.2876;	
200	1.356	5.000	20.75	1.955	51.14	25.57	0.000	1.075	6.919	0.5270;	
220	1.300	5.000	24.15	1.615	61.91	30.96	0.000	1.319	9.570	0.6135;	merging;
250	1.258	5.000	27.81	1.352	73.97	38.51	0.000	1.744	14.58	0.7064;	
256	1.257	5.000	28.37	1.317	75.93	39.78	0.000	1.836	15.69	0.7206;	local maximum rise c
300	1.350	5.000	32.94	1.062	94.20	51.93	0.000	2.604	25.49	0.8367;	
350	2.155	5.000	55.87	0.518	193.2	128.8	0.000	4.755	57.34	1.4191;	
358	2.411	5.000	64.39	0.442	226.1	150.7	0.000	5.385	67.61	1.6354;	trap level;
400	2.914	5.000	89.18	0.328	304.4	203.0	0.000	7.175	97.99	2.2651;	
432	2.989	5.000	95.38	0.310	322.3	214.9	0.000	8.186	115.5	2.4226;	local maximum rise c
450	2.959	5.000	96.38	0.306	[327.0]	218.0	0.000	8.761	125.6	2.4480;	
488	2.368	5.000	111.0	0.253	**395.0**	263.4	0.000	11.44	172.8	2.8188;	trap level;

Horiz plane projections in effluent direction: radius(m): 0.0; CL(m): 11.437

Lmz(m): 11.437

Attachment C: Chemistry Model Output

Model Scenarios				
Scenario No.		Streams	Flow Rate* (L/hr.)	Refernce Tab
Scenario 1		Alkaline product only	5,900	
		at pH 13.5		Scenario1_pH13-5
		at pH 13.9		Scenario1_pH13-9
Scenario 2		Reacted acid only	5,900	
	2A	Reacted acid with Olivine		Scenario2A
	2B	Reacted acid with CaCO3		Scenario2B
Scenario 3		Pretreat NF reject +IX waste	27,000	Scenario3
Scenario 4		Reacted acid+Pretreat reject waste	32,900	
	4A	Reacted acid with Olivine		Scenario4A
	4B	Reacted acid with CaCO3		Scenario4B
Scenario 5		Alkaline+Reacted acid+Pretreat reject waste	38,800	
	5A	Reacted acid with Olivine		Scenario5A
	5B	Reacted acid with CaCO3		Scenario5B

SCENARIO 1 at pH 13.5

Dilution Ratio	Volume - PoPA	Volume - Total	pH	Total Dissolved Solids	Temperature	Density - Total	Cl(-1) Liq1	Salinity	Si(+4)	Se(+4)	Sb(+5)	S(+6)	Pb(+2)	P(+5)	Ni(+2)	Na(+1)	N(-3)	N(+5)	N(+3)	Mn(+2)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	5,900	13.5	19,860	30.0	1,028	0	0	0	0	0	0	0	0.000	0	17,434	0.000	0.000	0.000	0
3	20,000	25,908	13.3	30,350	13.2	1,026	14,210	25.0	0.505	6.05E-04	0.008	624	0	0.002	0	13,054	0.016	0.218	0.059	0.004
7	40,000	45,927	13.1	31,748	11.0	1,025	16,033	28.2	0.125	6.82E-04	0.009	704	0	0.001	0	12,488	0.018	0.246	0.066	0.004
10	60,000	65,948	12.8	32,280	10.2	1,025	16,749	29.5	0.044	7.13E-04	0.009	735	0	0.001	0	12,265	0.018	0.257	0.069	0.005
14	80,000	85,969	12.5	32,322	9.71	1,025	17,131	30.2	0.017	7.29E-04	0.009	752	0	0.001	0	12,146	0.019	0.263	0.071	0.005
17	1.00E+05	1.06E+05	11.9	32,349	9.43	1,025	17,369	30.6	0.004	7.39E-04	0.009	763	0	0.001	0	12,072	0.019	0.267	0.072	0.005
34	2.00E+05	2.06E+05	10.6	32,929	8.87	1,025	17,869	31.5	0.000	7.60E-04	0.010	785	0	0.008	0	11,921	0.020	0.274	0.074	0.005
41	2.40E+05	2.46E+05	10.6	33,073	8.77	1,025	17,956	31.6	0.000	7.64E-04	0.010	788	0	0.009	0	11,894	0.020	0.276	0.074	0.005
47	2.80E+05	2.86E+05	10.6	33,191	8.70	1,025	18,018	31.7	0.000	7.67E-04	0.010	791	0	0.010	0	11,876	0.020	0.277	0.075	0.005
54	3.20E+05	3.26E+05	10.5	33,273	8.65	1,025	18,065	31.8	0.000	7.69E-04	0.010	793	0	0.011	0	11,862	0.020	0.277	0.075	0.005
61	3.60E+05	3.66E+05	10.5	33,325	8.61	1,025	18,102	31.9	0.000	7.70E-04	0.010	795	0	0.011	0	11,850	0.020	0.278	0.075	0.005
68	4.00E+05	4.06E+05	10.5	33,368	8.58	1,025	18,131	31.9	0.000	7.71E-04	0.010	796	0	0.011	0	11,842	0.020	0.278	0.075	0.005
75	4.40E+05	4.46E+05	10.5	33,409	8.55	1,025	18,155	32.0	0.000	7.72E-04	0.010	797	0	0.011	0	11,834	0.020	0.279	0.075	0.005
81	4.80E+05	4.86E+05	10.5	33,462	8.53	1,025	18,175	32.0	0.000	7.73E-04	0.010	798	0	0.012	0	11,828	0.020	0.279	0.075	0.005
88	5.20E+05	5.26E+05	10.5	33,473	8.51	1,025	18,192	32.1	0.000	7.74E-04	0.010	799	0	0.012	0	11,823	0.020	0.279	0.075	0.005
95	5.60E+05	5.66E+05	10.5	33,522	8.49	1,025	18,207	32.1	0.000	7.75E-04	0.010	799	0	0.012	0	11,819	0.020	0.279	0.075	0.005
102	6.00E+05	6.06E+05	10.5	33,538	8.48	1,025	18,220	32.1	0.000	7.75E-04	0.010	800	0	0.012	0	11,815	0.020	0.280	0.075	0.005
108	6.40E+05	6.46E+05	10.5	33,547	8.47	1,025	18,231	32.1	0.000	7.76E-04	0.010	800	0	0.012	0	11,811	0.020	0.280	0.075	0.005
115	6.80E+05	6.86E+05	10.5	33,553	8.46	1,025	18,241	32.1	0.000	7.76E-04	0.010	801	0	0.012	0	11,808	0.020	0.280	0.075	0.005
122	7.20E+05	7.26E+05	10.5	33,559	8.45	1,025	18,250	32.2	0.000	7.76E-04	0.010	801	0	0.012	0	11,806	0.020	0.280	0.075	0.005
129	7.60E+05	7.66E+05	10.5	33,564	8.44	1,025	18,257	32.2	0.000	7.77E-04	0.010	802	0	0.012	0	11,803	0.020	0.280	0.076	0.005
136	8.00E+05	8.06E+05	10.5	33,569	8.43	1,025	18,265	32.2	0.000	7.77E-04	0.010	802	0	0.012	0	11,801	0.020	0.280	0.076	0.005
142	8.40E+05	8.46E+05	10.5	33,573	8.42	1,025	18,271	32.2	0.000	7.77E-04	0.010	802	0	0.012	0	11,799	0.020	0.280	0.076	0.005
149	8.80E+05	8.86E+05	10.48	33,577	8.42	1,025	18,277	32.2	0.000	7.78E-04	0.010	802	0	0.013	0	11,798	0.020	0.280	0.076	0.005
156	9.20E+05	9.26E+05	10.48	33,580	8.41	1,025	18,282	32.2	0.000	7.78E-04	0.010	803	0	0.013	0	11,796	0.020	0.281	0.076	0.005
163	9.60E+05	9.66E+05	10.48	33,583	8.40	1,025	18,287	32.2	0.000	7.78E-04	0.010	803	0	0.013	0	11,794	0.020	0.281	0.076	0.005
169	1.00E+06	1.01E+06	10.48	33,586	8.40	1,025	18,292	32.2	0.000	7.78E-04	0.010	803	0	0.013	0	11,793	0.020	0.281	0.076	0.005
186	1.10E+06	1.11E+06	10.48	33,593	8.39	1,025	18,301	32.2	0.000	7.79E-04	0.010	803	0	0.013	0	11,790	0.020	0.281	0.076	0.005
507	2.99E+06	3.00E+06	8.30	33,657	8.31	1,026	18,364	32.3	0.653	7.81E-04	0.010	806	0	0.040	0	11,771	0.020	0.282	0.076	0.005
827	4.88E+06	4.89E+06	8.09	33,680	8.28	1,026	18,378	32.4	0.654	7.82E-04	0.010	807	0	0.040	0	11,767	0.020	0.282	0.076	0.005
1147	6.77E+06	6.78E+06	8.01	33,691	8.27	1,026	18,384	32.4	0.654	7.82E-04	0.010	807	0	0.040	0	11,765	0.020	0.282	0.076	0.005
1468	8.66E+06	8.67E+06	7.97	33,696	8.27	1,026	18,387	32.4	0.654	7.82E-04	0.010	807	0	0.040	0	11,764	0.020	0.282	0.076	0.005
1788	1.06E+07	1.06E+07	7.95	33,703	8.27	1,026	18,390	32.4	0.654	7.82E-04	0.010	807	0	0.040	0	11,763	0.020	0.282	0.076	0.005
2108	1.24E+07	1.24E+07	7.93	33,709	8.26	1,026	18,391	32.4	0.654	7.82E-04	0.010	807	0	0.040	0	11,763	0.020	0.282	0.076	0.005
2429	1.43E+07	1.43E+07	7.92	33,713	8.26	1,026	18,392	32.4	0.654	7.82E-04	0.010	807	0	0.040	0	11,762	0.020	0.282	0.076	0.005
2749	1.62E+07	1.62E+07	7.92	33,716	8.26	1,026	18,393	32.4	0.654	7.82E-04	0.010	808	0	0.040	0	11,762	0.020	0.282	0.076	0.005
3069	1.81E+07	1.81E+07	7.91	33,718	8.26	1,026	18,394	32.4	0.654	7.83E-04	0.010	808	0	0.040	0	11,762	0.020	0.282	0.076	0.005
3390	2.00E+07	2.00E+07	7.90	33,720	8.26	1,026	18,395	32.4	0.654	7.83E-04	0.010	808	0	0.040	0	11,762	0.020	0.282	0.076	0.005

Dilution Ratio	Mg(+2)	K(+1)	Hg(+2)	Fe(+2)	F(-1)	Cu(+2)	Cr(+6)	Cr(+3)	Co(+2)	Zn(+2)	Cd(+2)	Ca(+2)	Br(-1)	Be(+2)	Ba(+2)	As(+5)	Al(+3)	NiCr2O4	NaAlCO3(OH)2 (Dawsonite) -	CoCr2O4 -	CaCO3 (Calcite) -
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0.001	254.86	2.70E-07	1.16E-02	1.93E+00	1.44E-03	9.77E-05	0.0	0.0	4.94E-03	2.61E-05	1.53E+02	40.0827	0.004	0.004	0.0033	0.116	0	0.000	0.003	195.449
7	0.005	287.55	3.05E-07	1.31E-02	2.18E+00	1.62E-03	1.10E-04	0	0.0	5.58E-03	2.95E-05	1.72E+02	45.2241	0.004	0.004	0.0037	0.131	0	0.000	0.003	222.677
10	0.013	300.39	3.19E-07	1.37E-02	2.28E+00	1.69E-03	1.15E-04	0	0.0	5.83E-03	3.08E-05	1.80E+02	47.2432	0.005	0.005	0.0039	0.137	0	0.000	0.003	233.29
14	0.048	307.25	3.26E-07	1.23E-02	2.33E+00	1.73E-03	1.18E-04	0	0.0	5.96E-03	3.15E-05	1.84E+02	48.3217	0.005	0.005	0.0040	0.140	0	0.000	0.003	238.93
17	0.500	311.51	3.30E-07	8.20E-03	2.36E+00	1.76E-03	1.19E-04	0	0.0	6.04E-03	3.19E-05	1.86E+02	48.9927	0.005	0.005	0.0041	0.142	0	0.000	0.003	242.42
34	216.407	320.48	3.40E-07	1.46E-02	2.43E+00	1.25E-04	1.23E-04	0	0.0	6.22E-03	3.28E-05	1.92E+02	50.4034	0.004	0.005	0.0042	0.081	0	0.000	0.004	248.37
41	261.486	322.03	3.42E-07	1.46E-02	2.44E+00	1.15E-04	1.23E-04	0	0.0	6.25E-03	3.30E-05	1.93E+02	50.6469	0.004	0.005	0.0042	0.073	0	0.000	0.004	249.42
47	293.982	323.15	3.43E-07	1.47E-02	2.45E+00	1.10E-04	1.24E-04	0	0.0	6.27E-03	3.31E-05	1.94E+02	50.8222	0.004	0.005	0.0042	0.069	0	0.000	0.004	250.19
54	318.514	323.99	3.44E-07	1.47E-02	2.45E+00	1.07E-04	1.24E-04	0	0.0	6.28E-03	3.32E-05	1.94E+02	50.9546	0.004	0.005	0.0042	0.066	0	0.000	0.004	250.76
61	337.688	324.65	3.44E-07	1.48E-02	2.46E+00	1.04E-04	1.24E-04	0	0.0	6.30E-03	3.33E-05	1.94E+02	51.058	0.004	0.005	0.0042	0.064	0	0.000	0.004	251.21
68	353.086	325.17	3.45E-07	1.48E-02	2.46E+00	1.03E-04	1.25E-04	0	0.0	6.31E-03	3.33E-05	1.95E+02	51.141	0.004	0.005	0.0042	0.062	0	0.000	0.004	251.58
75	365.724	325.61	3.45E-07	1.48E-02	2.47E+00	1.01E-04	1.25E-04	0	0.0	6.31E-03	3.34E-05	1.95E+02	51.2091	0.004	0.005	0.0042	0.061	0	0.000	0.004	251.88
81	376.282	325.97	3.46E-07	1.48E-02	2.47E+00	1.00E-04	1.25E-04	0	0.0	6.32E-03	3.34E-05	1.95E+02	51.266	0.004	0.005	0.0043	0.060	0	0.000	0.004	252.13
88	385.236	326.28	3.46E-07	1.48E-02	2.47E+00	9.94E-05	1.25E-04	0	0.0	6.33E-03	3.34E-05	1.96E+02	51.3142	0.004	0.005	0.0043	0.059	0	0.000	0.004	252.34
95	392.924	326.54	3.46E-07	1.48E-02	2.47E+00	9.87E-05	1.25E-04	0	0.0	6.33E-03	3.34E-05	1.96E+02	51.3557	0.004	0.005	0.0043	0.059	0	0.000	0.004	252.52
102	399.597	326.77	3.47E-07	1.49E-02	2.48E+00	9.80E-05	1.25E-04	0	0.0	6.34E-03	3.35E-05	1.96E+02	51.3916	0.004	0.005	0.0043	0.058	0	0.000	0.004	252.68
108	405.444	326.97	3.47E-07	1.49E-02	2.48E+00	9.75E-05	1.25E-04	0	0.0	6.34E-03	3.35E-05	1.96E+02	51.4231	0.004	0.005	0.0043	0.058	0	0.000	0.004	252.82
115	410.609	327.15	3.47E-07	1.49E-02	2.48E+00	9.71E-05	1.25E-04	0	0.0	6.34E-03	3.35E-05	1.96E+02	51.451	0.004	0.005	0.0043	0.057	0	0.000	0.004	252.94
122	415.206	327.30	3.47E-07	1.49E-02	2.48E+00	9.67E-05	1.25E-04	0	0.0	6.35E-03	3.35E-05	1.96E+02	51.4757	0.004	0.005	0.0043	0.057	0	0.000	0.004	253.05
129	419.322	327.44	3.47E-07	1.49E-02	2.48E+00	9.63E-05	1.26E-04	0	0.0	6.35E-03	3.35E-05	1.96E+02	51.4979	0.004	0.005	0.0043	0.057	0	0.000	0.004	253.15
136	423.030	327.57	3.47E-07	1.49E-02	2.48E+00	9.60E-05	1.26E-04	0	0.0	6.35E-03	3.36E-05	1.96E+02	51.5179	0.004	0.005	0.0043	0.056	0	0.000	0.004	253.24
142	426.387	327.69	3.48E-07	1.49E-02	2.48E+00	9.58E-05	1.26E-04	0	0.0	6.36E-03	3.36E-05	1.96E+02	51.536	0.004	0.005	0.0043	0.056	0	0.000	0.004	253.31
149	429.441	327.79	3.48E-07	1.49E-02	2.48E+00	9.55E-05	1.26E-04	0	0.0	6.36E-03	3.36E-05	1.96E+02	51.5524	0.004	0.005	0.0043	0.056	0	0.000	0.004	253.39
156	432.232	327.89	3.48E-07	1.49E-02	2.48E+00	9.53E-05	1.26E-04	0	0.0	6.36E-03	3.36E-05	1.97E+02	51.5674	0.005	0.005	0.0043	0.056	0	0.000	0.004	253.45
163	434.791	327.97	3.48E-07	1.49E-02	2.48E+00	9.51E-05	1.26E-04	0	0.0	6.36E-03	3.36E-05	1.97E+02	51.5812	0.005	0.005	0.0043	0.056	0	0.000	0.004	253.51
169	437.147	328.05	3.48E-07	1.49E-02	2.49E+00	9.49E-05	1.26E-04	0	0.0	6.36E-03	3.36E-05	1.97E+02	51.5939	0.005	0.005	0.0043	0.055	0	0.000	0.004	253.57
186	442.291	328.23	3.48E-07	1.49E-02	2.49E+00	9.45E-05	1.26E-04	0	0.0	6.37E-03	3.36E-05	1.97E+02	51.6216	0.005	0.005	0.0043	0.055	0	0.000	0.004	253.69
507	459.090	329.35	3.49E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.39E-03	3.37E-05	2.41E+02	51.7973	0.005	0.005	0.0043	0.000	0	0.797	0.003	144.65
827	459.442	329.60	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.39E-03	3.38E-05	2.64E+02	5.18E+01	0.005	0.005	0.0043	0.000	0	0.799	0.003	88.6126
1147	459.598	329.71	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.39E-03	3.38E-05	2.74E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.799	0.003	64.0244
1468	459.685	329.77	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.80E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	50.2176
1788	459.742	329.82	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.83E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	41.3772
2108	459.781	329.84	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.86E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	35.2322
2429	459.810	329.86	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.88E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	30.713
2749	459.832	329.88	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.89E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	27.2499
3069	459.849	329.89	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.90E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	24.5113
3390	459.864	329.90	3.50E-07	1.50E-02	2.50E+00	1.86E-03	1.26E-04	0	0.0	6.40E-03	3.38E-05	2.91E+02	5.19E+01	0.005	0.005	0.0043	0.000	0	0.800	0.003	22.2915

SCENARIO 1 at pH 13.93

Dilution Ratio	Volume PoPA	Volume - Total	pH	Total Dissolved Solids	Temperature	Density	Cl(-1)	Salinity	Pb(+2)	P(+5)	Ni(+2)	Na(+1)	N(-3)	N(+5)	N(+3)	Mn(+2)	Mg(+2)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	5,900	13.9	49,508	30.0	1,072	0	0.0	0	0	0	43,459	0	0	0	0	0
3	20,000	25,882	13.8	36,840	13.2	1,037	14,226	24.8	3.30E-05	0.018	5.03E-07	19,004	0.016	0.218	0.059	3.87E-03	0.000
7	40,000	45,894	13.6	35,498	11.0	1,032	16,045	28.1	3.72E-05	0.002	4.69E-07	15,845	0.018	0.246	0.066	4.36E-03	0.001
10	60,000	65,912	13.4	34,906	10.1	1,030	16,758	29.4	3.89E-05	0.002	4.47E-07	14,603	0.018	0.257	0.069	4.55E-03	0.002
14	80,000	85,932	13.3	34,591	9.69	1,028	17,139	30.1	3.98E-05	0.001	4.36E-07	13,939	0.019	0.263	0.071	4.66E-03	0.003
17	1.00E+05	1.06E+05	13.1	34,397	9.41	1,028	17,375	30.5	4.03E-05	0.001	4.37E-07	13,527	0.019	0.267	0.072	4.72E-03	0.004
34	2.00E+05	2.06E+05	12.5	33,707	8.82	1,026	17,869	31.5	4.15E-05	0.001	9.77E-07	12,666	0.020	0.274	0.074	4.86E-03	0.048
41	2.40E+05	2.46E+05	12.1	33,504	8.72	1,026	17,954	31.6	4.17E-05	0.001	2.69E-06	12,517	0.020	0.276	0.074	4.88E-03	0.258
47	2.80E+05	2.86E+05	11.2	33,396	8.65	1,026	18,015	31.7	4.18E-05	0.003	2.71E-05	12,411	0.020	0.276	0.075	4.90E-03	16.3
54	3.20E+05	3.26E+05	10.9	33,420	8.61	1,026	18,062	31.8	4.19E-05	0.005	5.99E-05	12,331	0.020	0.277	0.075	4.91E-03	71.4
61	3.60E+05	3.66E+05	10.8	33,445	8.57	1,026	18,099	31.9	4.20E-05	0.006	7.82E-05	12,269	0.020	0.278	0.075	4.92E-03	117
68	4.00E+05	4.06E+05	10.7	33,466	8.54	1,026	18,129	31.9	4.21E-05	0.007	9.06E-05	12,218	0.020	0.278	0.075	4.93E-03	154
75	4.40E+05	4.46E+05	10.7	33,484	8.52	1,026	18,153	32.0	4.21E-05	0.008	9.99E-05	12,177	0.020	0.279	0.075	4.93E-03	184
81	4.80E+05	4.86E+05	10.6	33,498	8.50	1,026	18,174	32.0	4.22E-05	0.008	1.02E-04	12,143	0.020	0.279	0.075	4.94E-03	210
88	5.20E+05	5.26E+05	10.6	33,510	8.48	1,026	18,191	32.0	4.22E-05	0.009	9.81E-05	12,114	0.020	0.279	0.075	4.94E-03	231
95	5.60E+05	5.66E+05	10.6	33,532	8.47	1,026	18,206	32.1	4.22E-05	0.009	9.55E-05	12,089	0.020	0.279	0.075	4.95E-03	250
102	6.00E+05	6.06E+05	10.6	33,557	8.46	1,026	18,218	32.1	4.23E-05	0.009	9.34E-05	12,067	0.020	0.280	0.075	4.95E-03	266
108	6.40E+05	6.46E+05	10.6	33,579	8.44	1,026	18,230	32.1	4.23E-05	0.010	9.17E-05	12,048	0.020	0.280	0.075	4.95E-03	280
115	6.80E+05	6.86E+05	10.6	33,599	8.43	1,026	18,240	32.1	4.23E-05	0.010	9.04E-05	12,031	0.020	0.280	0.075	4.96E-03	292
122	7.20E+05	7.26E+05	10.6	33,616	8.43	1,026	18,248	32.1	4.23E-05	0.010	8.92E-05	12,016	0.020	0.280	0.075	4.96E-03	304
129	7.60E+05	7.66E+05	10.6	33,630	8.42	1,026	18,256	32.2	4.24E-05	0.010	8.82E-05	12,003	0.020	0.280	0.076	4.96E-03	314
136	8.00E+05	8.06E+05	10.5	33,639	8.41	1,026	18,264	32.2	4.24E-05	0.010	8.74E-05	11,991	0.020	0.280	0.076	4.96E-03	322
142	8.40E+05	8.46E+05	10.5	33,645	8.41	1,026	18,270	32.2	4.24E-05	0.011	8.67E-05	11,980	0.020	0.280	0.076	4.96E-03	331
149	8.80E+05	8.86E+05	10.5	33,650	8.40	1,026	18,276	32.2	4.24E-05	0.011	8.60E-05	11,970	0.020	0.280	0.076	4.97E-03	338
156	9.20E+05	9.26E+05	10.5	33,652	8.39	1,026	18,281	32.2	4.24E-05	0.011	8.55E-05	11,961	0.020	0.281	0.076	4.97E-03	345
163	9.60E+05	9.66E+05	10.5	33,655	8.39	1,026	18,286	32.2	4.24E-05	0.011	8.50E-05	11,953	0.020	0.281	0.076	4.97E-03	351
169	1.00E+06	1.01E+06	10.5	33,662	8.39	1,026	18,291	32.2	4.24E-05	0.011	8.45E-05	11,945	0.020	0.281	0.076	4.97E-03	357
186	1.10E+06	1.11E+06	10.5	33,677	8.38	1,026	18,301	32.2	4.25E-05	0.011	8.35E-05	11,928	0.020	0.281	0.076	4.97E-03	369
507	2.99E+06	3.00E+06	10.5	33,697	8.31	1,026	18,363	32.3	4.26E-05	0.013	7.84E-05	11,822	0.020	0.282	0.076	4.99E-03	448
827	4.88E+06	4.89E+06	8.87	33,686	8.30	1,026	18,378	32.4	4.26E-05	0.040	7.68E-05	11,798	0.020	0.282	0.076	4.99E-03	459
1147	6.77E+06	6.78E+06	8.37	33,694	8.28	1,026	18,384	32.4	4.27E-05	0.040	2.51E-05	11,788	0.020	0.282	0.076	5.00E-03	460
1468	8.66E+06	8.67E+06	8.21	33,700	8.28	1,026	18,387	32.4	4.27E-05	0.040	1.75E-05	11,782	0.020	0.282	0.076	5.00E-03	460
1788	1.06E+07	1.06E+07	8.13	33,703	8.27	1,026	18,390	32.4	4.27E-05	0.040	1.45E-05	11,778	0.020	0.282	0.076	5.00E-03	460
2108	1.24E+07	1.24E+07	8.08	33,705	8.27	1,026	18,391	32.4	4.27E-05	0.040	1.30E-05	11,775	0.020	0.282	0.076	5.00E-03	460
2429	1.43E+07	1.43E+07	8.04	33,707	8.27	1,026	18,392	32.4	4.27E-05	0.040	1.20E-05	11,773	0.020	0.282	0.076	5.00E-03	460
2749	1.62E+07	1.62E+07	8.02	33,708	8.26	1,026	18,393	32.4	4.27E-05	0.040	1.13E-05	11,772	0.020	0.282	0.076	5.00E-03	460
3069	1.81E+07	1.81E+07	8.00	33,709	8.26	1,026	18,394	32.4	4.27E-05	0.040	1.08E-05	11,770	0.020	0.282	0.076	5.00E-03	460
3390	2.00E+07	2.00E+07	7.98	33,710	8.26	1,026	18,395	32.4	4.27E-05	0.040	1.05E-05	11,769	0.020	0.282	0.076	5.00E-03	460

Dilution Ratio	K(+1)	Hg(+2)	Fe(+2)	F(-1)	Cu(+2)	Cr(+6)	Cr(+3)	Co(+2)	Cd(+2)	Ca(+2)	Br(-1)	Be(+2)	Ba(+2)	As(+5)	Al(+3)	Zn(+2)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	255	2.71E-07	0.012	1.93	1.44E-03	9.78E-05	1.80E-07	3.19E-03	2.61E-05	63.8	40.1	0.0039	0.0039	0.0033	0.116	0.005
7	288	3.05E-07	0.013	2.18	1.62E-03	1.10E-04	5.35E-08	3.59E-03	2.95E-05	173	45.3	0.0044	0.0044	0.0038	0.131	0.006
10	301	3.19E-07	0.014	2.28	1.69E-03	1.15E-04	2.58E-08	3.75E-03	3.08E-05	180	47.3	0.0046	0.0046	0.0039	0.137	0.006
14	307	3.26E-07	0.014	2.33	1.73E-03	1.18E-04	1.51E-08	3.84E-03	3.15E-05	184	48.3	0.0047	0.0047	0.0040	0.140	0.006
17	312	3.31E-07	0.014	2.36	1.76E-03	1.19E-04	9.81E-09	3.89E-03	3.19E-05	186	49.0	0.0047	0.0047	0.0041	0.142	0.006
34	320	3.40E-07	0.012	2.43	1.81E-03	1.23E-04	2.06E-09	4.00E-03	3.28E-05	191	50.4	0.0049	0.0049	0.0042	0.146	0.006
41	322	3.42E-07	0.008	2.44	1.81E-03	1.23E-04	1.21E-09	4.02E-03	3.30E-05	192	50.6	0.0049	0.0049	0.0042	0.146	0.006
47	323	3.43E-07	0.015	2.45	4.27E-04	1.24E-04	8.09E-10	4.01E-03	3.31E-05	193	50.8	0.0049	0.0049	0.0042	0.147	0.006
54	324	3.44E-07	0.015	2.45	2.09E-04	1.24E-04	8.06E-10	3.99E-03	3.32E-05	194	50.9	0.0049	0.0049	0.0042	0.140	0.006
61	325	3.44E-07	0.015	2.46	1.66E-04	1.24E-04	8.13E-10	3.97E-03	3.32E-05	194	51.1	0.0045	0.0049	0.0042	0.109	0.006
68	325	3.45E-07	0.015	2.46	1.47E-04	1.25E-04	8.19E-10	3.97E-03	3.33E-05	194	51.1	0.0042	0.0049	0.0042	0.095	0.006
75	326	3.45E-07	0.015	2.47	1.35E-04	1.25E-04	8.23E-10	3.97E-03	3.33E-05	195	51.2	0.0042	0.0049	0.0042	0.086	0.006
81	326	3.46E-07	0.015	2.47	1.28E-04	1.25E-04	8.49E-10	3.76E-03	3.34E-05	195	51.3	0.0042	0.0049	0.0042	0.081	0.006
88	326	3.46E-07	0.015	2.47	1.23E-04	1.25E-04	8.90E-10	3.44E-03	3.34E-05	195	51.3	0.0042	0.0049	0.0043	0.077	0.006
95	327	3.46E-07	0.015	2.47	1.19E-04	1.25E-04	9.23E-10	3.21E-03	3.34E-05	195	51.4	0.0042	0.0049	0.0043	0.074	0.006
102	327	3.47E-07	0.015	2.48	1.16E-04	1.25E-04	9.51E-10	3.04E-03	3.35E-05	196	51.4	0.0042	0.0050	0.0043	0.072	0.006
108	327	3.47E-07	0.015	2.48	1.13E-04	1.25E-04	9.75E-10	2.90E-03	3.35E-05	196	51.4	0.0042	0.0050	0.0043	0.070	0.006
115	327	3.47E-07	0.015	2.48	1.11E-04	1.25E-04	9.96E-10	2.79E-03	3.35E-05	196	51.4	0.0042	0.0050	0.0043	0.068	0.006
122	327	3.47E-07	0.015	2.48	1.10E-04	1.25E-04	1.01E-09	2.70E-03	3.35E-05	196	51.5	0.0042	0.0050	0.0043	0.067	0.006
129	327	3.47E-07	0.015	2.48	1.08E-04	1.26E-04	1.03E-09	2.63E-03	3.35E-05	196	51.5	0.0043	0.0050	0.0043	0.066	0.006
136	328	3.47E-07	0.015	2.48	1.07E-04	1.26E-04	1.04E-09	2.56E-03	3.35E-05	196	51.5	0.0043	0.0050	0.0043	0.065	0.006
142	328	3.48E-07	0.015	2.48	1.06E-04	1.26E-04	1.06E-09	2.51E-03	3.36E-05	196	51.5	0.0043	0.0050	0.0043	0.064	0.006
149	328	3.48E-07	0.015	2.48	1.05E-04	1.26E-04	1.07E-09	2.46E-03	3.36E-05	196	51.5	0.0043	0.0050	0.0043	0.063	0.006
156	328	3.48E-07	0.015	2.48	1.04E-04	1.26E-04	1.08E-09	2.42E-03	3.36E-05	196	51.6	0.0043	0.0050	0.0043	0.062	0.006
163	328	3.48E-07	0.015	2.48	1.03E-04	1.26E-04	1.09E-09	2.38E-03	3.36E-05	196	51.6	0.0043	0.0050	0.0043	0.062	0.006
169	328	3.48E-07	0.015	2.49	1.03E-04	1.26E-04	1.09E-09	2.35E-03	3.36E-05	197	51.6	0.0043	0.0050	0.0043	0.061	0.006
186	328	3.48E-07	0.015	2.49	1.01E-04	1.26E-04	1.11E-09	2.28E-03	3.36E-05	197	51.6	0.0044	0.0050	0.0043	0.060	0.006
507	329	3.49E-07	0.015	2.50	9.42E-05	1.26E-04	1.22E-09	1.93E-03	3.37E-05	197	51.8	0.0046	0.0050	0.0043	0.054	0.006
827	330	3.50E-07	0.015	2.50	7.71E-04	1.26E-04	3.12E-08	4.04E-03	3.38E-05	211	51.8	0.0050	0.0050	0.0043	0.001	0.006
1147	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	1.83E-07	4.09E-03	3.38E-05	236	51.9	0.0050	0.0050	0.0043	0.000	0.006
1468	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	3.42E-07	4.10E-03	3.38E-05	250	51.9	0.0050	0.0050	0.0043	0.000	0.006
1788	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	4.88E-07	4.10E-03	3.38E-05	259	51.9	0.0050	0.0050	0.0043	0.000	0.006
2108	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	6.15E-07	4.11E-03	3.38E-05	265	51.9	0.0050	0.0050	0.0043	0.000	0.006
2429	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	7.24E-07	4.11E-03	3.38E-05	270	51.9	0.0050	0.0050	0.0043	0.000	0.006
2749	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	8.19E-07	4.11E-03	3.38E-05	273	51.9	0.0050	0.0050	0.0043	0.000	0.006
3069	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	9.01E-07	4.11E-03	3.38E-05	276	51.9	0.0050	0.0050	0.0043	0.000	0.006
3390	330	3.50E-07	0.015	2.50	1.86E-03	1.26E-04	9.73E-07	4.11E-03	3.38E-05	278	51.9	0.0050	0.0050	0.0043	0.000	0.006

Dilution Ratio	Si(+4)	Se(+4)	Sb(+5)	S(+6)	NiCr2O4	NaAlCO3(OH)2 (Dawsonite)	Mg3Si2O5(OH)4 (Poor-crystalline Antigorite)	Mg(OH)2 (Brucite)	Fe(OH)2 (Amakinite)	CuO	CoCr2O4	Co3(PO4) 2.8H2O	CaCO3 (Calcite)	Ca3(PO4)2	Ca(OH)2 (Portlandite)	Be2(OH)2 CO3	Al(OH)3 (Gibbsite)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0.506	0.001	0.008	625	0.0011	0.0	0	853	0	0	0.0026	0	177	0.064	179	0	0
7	0.571	0.001	0.009	704	0.0012	0.0	0	962	0	0	0.0030	0	221	0.163	0	0	0
10	0.370	0.001	0.009	736	0.0013	0.0	1.11	1,005	0	0	0.0031	0	232	0.174	0	0	0
14	0.197	0.001	0.009	752	0.0013	0.0	2.04	1,027	0	0	0.0032	0	238	0.180	0	0	0
17	0.118	0.001	0.009	763	0.0013	0.0	2.47	1,041	0	0	0.0032	0	242	0.183	0	0	0
34	0.016	0.001	0.010	784	0.0014	0.0	3.06	1,070	3.55E-03	0	0.0033	0	249	0.189	0	0	0
41	0.006	0.001	0.010	788	0.0014	0.0	3.12	1,074	0.010	0	0.0033	0	251	0.190	0	0	0
47	0.001	0.001	0.010	791	0.0013	0.0	3.16	1,040	0	0.0017	0.0034	0	251	0.183	0	0	0
54	0.000	0.001	0.010	793	0.0012	0.0	3.17	910	0	0.0020	0.0036	0	252	0.173	0	0	0.020
61	0.000	0.001	0.010	795	0.0011	0.0	3.17	803	0	0.0021	0.0036	0	252	0.167	0	0.0028	0.111
68	0.000	0.001	0.010	796	0.0010	0.0	3.18	716	0	0.0021	0.0037	0	252	0.163	0	0.0042	0.153
75	0.000	0.001	0.010	797	0.0010	0.0	3.18	645	0	0.0021	0.0037	0	253	0.159	0	0.0047	0.178
81	0.000	0.001	0.010	798	0.0010	0.0	3.19	585	0	0.0021	0.0037	0.0006	253	0.156	0	0.0049	0.194
88	0.000	0.001	0.010	799	0.0010	0.0	3.19	534	0	0.0021	0.0037	0.0015	253	0.154	0	0.0049	0.206
95	0.000	0.001	0.010	799	0.0010	0.0	3.19	491	0	0.0022	0.0037	0.0022	253	0.152	0	0.0048	0.215
102	0.000	0.001	0.010	800	0.0010	0.0	3.20	453	0	0.0022	0.0037	0.0027	253	0.150	0	0.0048	0.223
108	0.000	0.001	0.010	800	0.0010	0.0	3.20	420	0	0.0022	0.0037	0.0031	253	0.148	0	0.0047	0.228
115	0.000	0.001	0.010	801	0.0011	0.0	3.20	390	0	0.0022	0.0037	0.0035	253	0.147	0	0.0046	0.233
122	0.000	0.001	0.010	801	0.0011	0.0	3.20	364	0	0.0022	0.0037	0.0037	253	0.146	0	0.0045	0.237
129	0.000	0.001	0.010	801	0.0011	0.0	3.20	341	0	0.0022	0.0037	0.0040	254	0.145	0	0.0044	0.240
136	0.000	0.001	0.010	802	0.0011	0.0	3.20	320	0	0.0022	0.0037	0.0042	254	0.144	0	0.0043	0.243
142	0.000	0.001	0.010	802	0.0011	0.0	3.20	301	0	0.0022	0.0037	0.0043	254	0.143	0	0.0042	0.246
149	0.000	0.001	0.010	802	0.0011	0.0	3.21	283	0	0.0022	0.0037	0.0045	254	0.142	0	0.0041	0.248
156	0.000	0.001	0.010	803	0.0011	0.0	3.21	268	0	0.0022	0.0037	0.0046	254	0.142	0	0.0040	0.250
163	0.000	0.001	0.010	803	0.0011	0.0	3.21	253	0	0.0022	0.0037	0.0047	254	0.141	0	0.0040	0.252
169	0.000	0.001	0.010	803	0.0011	0.0	3.21	240	0	0.0022	0.0037	0.0048	254	0.140	0	0.0039	0.254
186	0.000	0.001	0.010	803	0.0011	0.0	3.21	210	0	0.0022	0.0037	0.0050	254	0.139	0	0.0038	0.257
507	0.000	0.001	0.010	806	0.0011	0.0	3.22	25	0	0.0022	0.0037	0.0061	255	0.132	0	0.0027	0.275
827	0.654	0.001	0.010	807	0.0011	0.0	0	0	0	0.0014	0.0037	0	222	0	0	0	0.429
1147	0.654	0.001	0.010	807	0.0013	0.798	0	0	0	0	0.0035	0	160	0	0	0	0
1468	0.654	0.001	0.010	807	0.0013	0.799	0	0	0	0	0.0034	0	125	0	0	0	0
1788	0.654	0.001	0.010	807	0.0014	0.799	0	0	0	0	0.0034	0	102	0	0	0	0
2108	0.654	0.001	0.010	807	0.0014	0.799	0	0	0	0	0.0034	0	86.7	0	0	0	0
2429	0.654	0.001	0.010	807	0.0014	0.800	0	0	0	0	0.0034	0	75.3	0	0	0	0
2749	0.654	0.001	0.010	807	0.0014	0.800	0	0	0	0	0.0034	0	66.6	0	0	0	0
3069	0.654	0.001	0.010	808	0.0014	0.800	0	0	0	0	0.0034	0	59.7	0	0	0	0
3390	0.654	0.001	0.010	808	0.0014	0.800	0	0	0	0	0.0034	0	54.2	0	0	0	0

SCENARIO 2A

Dilution Ratio	Volume PoPA	Volume - Total	pH	Total Dissolved Solids	Temperature	Density - Total	Cl(-1)	Salinity	Si(+4)	S(+6)	Ni(+2)	Na(+1)	Mg(+2)	K(+1)	Fe(+3)	Cr(+3)	Co(+2)	Ca(+2)	Br(-1)	Al(+3)	Ti(+4)	TiO2 (Rutile)	SiO2 (lechatelierite)	NiFe2O4 (Trevorite)	NiCr2O4	NaAlCO3(OH)2 (Dawsonite)	CaCO3 (Calcite)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	5,900	2.26	28,755	30	1,020	22,041	39.0	53.6	0	18.1	0	7,379	0	2.43	0.05	0.853	138	0	1.13	0.002	0.098906	131	0	0	0	0
8	50,000	55,894	6.53	33,419	10.5	1,025	18,787	33.1	12.7	723	1.78	10,520	1,190	295	4.29E-08	1.07E-05	0.095	283	46.4	0.0099	0.001	8.41E-03	0	0.5379	0.016	1.300	0
17	1.00E+05	105,893	6.92	33,640	9.46	1,025	18,604	32.8	7.01	763	0.94	11,106	846	312	1.25E-08	1.28E-06	0.052	291	49.0	0.0008	0.001	3.31E-03	0	0.2839	0.011	1.088	0
25	1.50E+05	1.56E+05	7.12	33,500	9.07	1,025	18,539	32.7	4.97	777	0.64	11,315	722	318	7.48E-09	4.55E-07	0.037	294	49.9	0.0002	0.001	1.48E-03	0	0.1929	0.009	0.997	0
34	2.00E+05	2.06E+05	7.24	33,646	8.87	1,026	18,505	32.6	3.92	785	0.48	11,423	658	321	5.59E-09	2.37E-07	0.029	295	50.4	0.0001	0.001	5.36E-04	0	0.1460	0.008	0.950	0
42	2.50E+05	2.56E+05	7.34	33,735	8.75	1,026	18,485	32.6	3.29	789	0.39	11,489	620	322	4.63E-09	1.51E-07	0.025	296	50.7	7.60E-05	0.001	0	0	0.1175	0.007	0.921	0
51	3.00E+05	3.06E+05	7.40	33,794	8.67	1,026	18,471	32.5	2.86	792	0.32	11,533	593	324	4.07E-09	1.08E-07	0.021	297	50.9	5.95E-05	0.001	0	0	0.0983	0.007	0.901	0
59	3.50E+05	3.56E+05	7.46	33,837	8.61	1,026	18,461	32.5	2.55	794	0.28	11,565	575	325	3.71E-09	8.44E-08	0.019	297	51.0	5.16E-05	0.001	0	0	0.0845	0.007	0.887	0
68	4.00E+05	4.06E+05	7.50	33,870	8.56	1,026	18,453	32.5	2.31	796	0.24	11,589	561	325	3.47E-09	6.96E-08	0.017	298	51.1	4.75E-05	8.92E-04	0	0	0.0741	0.006	0.876	0
76	4.50E+05	4.56E+05	7.54	33,895	8.53	1,026	18,447	32.5	2.13	797	0.22	11,608	550	326	3.30E-09	5.98E-08	0.016	298	51.2	4.55E-05	7.94E-04	0	0	0.0660	0.006	0.868	0
85	5.00E+05	5.06E+05	7.57	33,884	8.50	1,026	18,443	32.5	1.99	798	0.20	11,623	541	326	3.17E-09	5.29E-08	0.015	298	51.3	4.44E-05	7.16E-04	0	0	0.0594	0.006	0.861	0
93	5.50E+05	5.56E+05	7.59	33,871	8.48	1,026	18,439	32.5	1.87	799	0.18	11,635	533	327	3.09E-09	4.80E-08	0.014	298	51.3	4.40E-05	6.52E-04	0	0	0.0541	0.006	0.856	0
102	6.00E+05	6.06E+05	7.62	33,861	8.46	1,026	18,436	32.5	1.77	800	0.16	11,646	527	327	3.02E-09	4.43E-08	0.013	298	51.4	4.39E-05	5.98E-04	0	0	0.0496	0.006	0.851	0
110	6.50E+05	6.56E+05	7.64	33,851	8.44	1,026	18,433	32.5	1.68	801	0.15	11,654	522	327	2.97E-09	4.15E-08	0.013	299	51.4	4.40E-05	5.52E-04	0	0	0.0458	0.006	0.847	0
119	7.00E+05	7.06E+05	7.65	33,849	8.43	1,026	18,431	32.5	1.61	801	0.14	11,662	518	327	2.94E-09	3.93E-08	0.012	299	51.5	4.43E-05	5.13E-04	0	0	0.0426	0.006	0.844	0
127	7.50E+05	7.56E+05	7.67	33,851	8.42	1,026	18,429	32.5	1.55	801	0.13	11,668	514	327	2.92E-09	3.76E-08	0.012	299	51.5	4.46E-05	4.79E-04	0	0	0.0398	0.006	0.841	0
136	8.00E+05	8.06E+05	7.68	33,853	8.41	1,026	18,427	32.5	1.49	802	0.12	11,674	511	328	2.90E-09	3.62E-08	0.011	299	51.5	4.49E-05	4.49E-04	0	0	0.0373	0.006	0.839	0
144	8.50E+05	8.56E+05	7.69	33,825	8.40	1,026	18,425	32.5	1.44	802	0.12	11,679	508	328	2.89E-09	3.50E-08	0.011	299	51.5	4.53E-05	4.23E-04	0	0	0.0351	0.006	0.836	0
153	9.00E+05	9.06E+05	7.70	33,856	8.39	1,026	18,424	32.5	1.40	803	0.11	11,684	505	328	2.89E-09	3.41E-08	0.011	299	51.6	4.56E-05	4.00E-04	0	0	0.0332	0.005	0.834	0
161	9.50E+05	9.56E+05	7.71	33,858	8.38	1,026	18,423	32.5	1.36	803	0.10	11,688	503	328	2.89E-09	3.33E-08	0.010	299	51.6	4.60E-05	3.79E-04	0	0	0.0315	0.005	0.833	0
169	1.00E+06	1.01E+06	7.72	33,813	8.38	1,026	18,422	32.4	1.32	803	0.10	11,691	501	328	2.89E-09	3.27E-08	0.010	299	51.6	4.64E-05	3.60E-04	0	0	0.0299	0.005	0.831	0
254	1.50E+06	1.51E+06	7.78	33,789	8.33	1,026	18,414	32.4	1.10	805	0.07	11,714	487	329	3.03E-09	3.02E-08	0.008	299	51.7	4.94E-05	2.40E-04	0	0	0.0200	0.005	0.821	0
330	1.95E+06	1.96E+06	7.81	33,777	8.32	1,026	18,411	32.4	1.00	805	0.05	11,725	481	329	3.21E-09	3.03E-08	0.008	300	51.7	5.12E-05	1.85E-04	0	0	0.0154	0.005	0.816	0
407	2.40E+06	2.41E+06	7.82	33,874	8.30	1,026	18,409	32.4	0.93	806	0.04	11,731	477	329	3.40E-09	3.11E-08	0.007	300	51.8	5.24E-05	1.51E-04	0	0	0.0125	0.005	0.813	0
483	2.85E+06	2.86E+06	7.84	33,876	8.29	1,026	18,408	32.4	0.89	806	0.03	11,736	474	329	3.60E-09	3.21E-08	0.007	300	51.8	5.33E-05	1.27E-04	0	0	0.0105	0.005	0.811	0
559	3.30E+06	3.31E+06	7.84	33,877	8.29	1,026	18,407	32.4	0.86	806	0.03	11,739	472	329	3.79E-09	3.33E-08	0.007	300	51.8	5.40E-05	1.10E-04	0	0	0.0091	0.005	0.810	0
636	3.75E+06	3.76E+06	7.85	33,878	8.28	1,026	18,406	32.4	0.83	807	0.03	11,742	471	329	3.98E-09	3.45E-08	0.006	300	51.8	5.45E-05	9.64E-05	0	0	0.0080	0.005	0.808	0
712	4.20E+06	4.21E+06	7.85	33,878	8.28	1,026	18,405	32.4	0.81	807	0.02	11,744	470	330	4.20E-09	3.64E-08	0.006	300	51.8	5.46E-05	8.61E-05	0	0	0.0071	0.005	0.808	0.096
788	4.65E+06	4.66E+06	7.85	33,879	8.28	1,026	18,405	32.4	0.80	807	0.02	11,745	469	330	4.43E-09	3.84E-08	0.006	300	51.8	5.46E-05	7.78E-05	0	0	0.0065	0.005	0.807	0.191
864	5.10E+06	5.11E+06	7.85	33,879	8.28	1,026	18,404	32.4	0.79	807	0.02	11,746	468	330	4.65E-09	4.03E-08	0.006	300	51.8	5.46E-05	7.09E-05	0	0	0.0059	0.005	0.806	0.269
941	5.55E+06	5.56E+06	7.85	33,880	8.27	1,026	18,404	32.4	0.78	807	0.02	11,748	467	330	4.85E-09	4.21E-08	0.006	300	51.8	5.46E-05	6.52E-05	0	0	0.0054	0.005	0.806	0.334
1017	6.00E+06	6.01E+06	7.85	33,880	8.27	1,026	18,404	32.4	0.77	807	0.02	11,749	467	330	5.06E-09	4.38E-08	0.006	300	51.8	5.46E-05	6.03E-05	0	0	0.0050	0.005	0.805	0.390
1102	6.50E+06	6.51E+06	7.85	33,881	8.27	1,026	18,403	32.4	0.76	807	0.01	11,749	466	330	5.27E-09	4.57E-08	0.006	300	51.9	5.46E-05	5.57E-05	0	0	0.0046	0.005	0.805	0.443

SCENARIO 2B

Dilution Ratio	Volume - Reconcile_PoPA_WO	Volume - Total	pH	Total Dissolved Solids	Temperature	Density - Total	Cl(-1)	Salinity	Si(+4)	Se(+4)	S(+6)	Pb(+2)	P(+5)	Ni(+2)	Na(+1)	N(-3)	Mo(+6)	Mg(+2)	K(+1)	Hg(+2)	Co(+2)	Zn(+2)	Cd(+2)	Ca(+2)	Br(-1)	As(+5)	NiCr2O4	NaAlCO3(OH)2 (Dawsonite)	CoCr2O4	CaF2 (Fluorite)	CaCO3 (Calcite)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	5,901	8.10	39,282	30.0	1,028	25,165	44.2	0	0.0192	0	2.50E-03	0	1.00E-03	107	0	1.00E-04	198	0	2.00E-03	3.00E-04	3.00E-04	2.00E-04	13,805	0	0.100	0	0	0	0	463
8	50,000	55,892	7.18	34,511	10.5	1,026	19,117	33.7	0.585	0.0027	723	3.02E-04	0.036	2.02E-06	10,532	0.018	1.06E-05	432	295	2.11E-04	3.89E-03	5.76E-03	5.14E-05	1,718	46.4	0.014	0.0017	0.72	0.0024	0.09	67.1
17	#######	105,891	7.36	34,217	9.45	1,026	18,779	33.1	0.618	0.0018	763	1.80E-04	0.038	2.80E-06	11,112	0.019	5.57E-06	445	312	1.12E-04	3.98E-03	6.06E-03	4.31E-05	1,047	49.0	0.010	0.0015	0.76	0.0029	0	38.9
25	#######	#######	7.46	33,567	9.06	1,026	18,657	32.9	0.630	0.0015	777	1.36E-04	0.038	3.40E-06	11,320	0.019	3.78E-06	450	318	7.60E-05	4.02E-03	6.17E-03	4.01E-05	807	49.9	0.008	0.0015	0.77	0.0031	0	27.8
34	#######	#######	7.52	34,056	8.87	1,026	18,595	32.8	0.636	0.0013	785	1.13E-04	0.039	3.88E-06	11,427	0.020	2.87E-06	453	321	5.77E-05	4.04E-03	6.23E-03	3.86E-05	684	50.4	0.007	0.0015	0.78	0.0032	0	21.9
42	#######	#######	7.57	34,023	8.75	1,026	18,557	32.7	0.639	0.0012	789	9.94E-05	0.039	4.26E-06	11,492	0.020	2.31E-06	454	322	4.65E-05	4.06E-03	6.26E-03	3.76E-05	608	50.7	0.007	0.0015	0.78	0.0032	0	18.1
51	#######	#######	7.60	34,000	8.67	1,026	18,531	32.6	0.642	0.0011	792	9.01E-05	0.039	4.58E-06	11,536	0.020	1.93E-06	455	324	3.89E-05	4.07E-03	6.28E-03	3.70E-05	558	50.9	0.006	0.0014	0.78	0.0032	0	15.6
59	#######	#######	7.63	33,984	8.61	1,026	18,513	32.6	0.644	0.0011	794	8.34E-05	0.039	4.84E-06	11,567	0.020	1.66E-06	456	325	3.35E-05	4.07E-03	6.30E-03	3.66E-05	522	51.0	0.006	0.0014	0.79	0.0033	0	13.7
68	#######	#######	7.65	33,972	8.56	1,026	18,499	32.6	0.645	0.0011	796	7.84E-05	0.039	5.07E-06	11,591	0.020	1.45E-06	456	325	2.94E-05	4.08E-03	6.31E-03	3.62E-05	494	51.1	0.006	0.0014	0.79	0.0033	0	12.2
76	#######	#######	7.67	33,962	8.53	1,026	18,488	32.6	0.646	0.0010	797	7.45E-05	0.039	5.26E-06	11,610	0.020	1.29E-06	457	326	2.62E-05	4.08E-03	6.32E-03	3.60E-05	473	51.2	0.006	0.0014	0.79	0.0033	0	11.1
85	#######	#######	7.68	33,955	8.50	1,026	18,479	32.5	0.647	9.98E-04	798	7.14E-05	0.040	5.43E-06	11,624	0.020	1.17E-06	457	326	2.37E-05	4.09E-03	6.33E-03	3.57E-05	456	51.3	0.005	0.0014	0.79	0.0033	0	10.2
93	#######	#######	7.70	33,948	8.48	1,026	18,472	32.5	0.647	9.78E-04	799	6.88E-05	0.040	5.58E-06	11,637	0.020	1.06E-06	457	327	2.16E-05	4.09E-03	6.34E-03	3.56E-05	442	51.4	0.005	0.0014	0.79	0.0033	0	9.38
102	#######	#######	7.71	33,943	8.46	1,026	18,466	32.5	0.648	9.62E-04	800	6.66E-05	0.040	5.71E-06	11,647	0.020	9.74E-07	457	327	1.98E-05	4.09E-03	6.34E-03	3.54E-05	430	51.4	0.005	0.0014	0.79	0.0033	0	8.73
110	#######	#######	7.72	33,939	8.44	1,026	18,461	32.5	0.649	9.49E-04	801	6.48E-05	0.040	5.82E-06	11,655	0.020	8.99E-07	458	327	1.83E-05	4.09E-03	6.35E-03	3.53E-05	420	51.4	0.005	0.0014	0.79	0.0033	0	8.18
119	#######	#######	7.72	33,935	8.43	1,026	18,457	32.5	0.649	9.37E-04	801	6.32E-05	0.040	5.93E-06	11,663	0.020	8.36E-07	458	327	1.71E-05	4.09E-03	6.35E-03	3.52E-05	411	51.5	0.005	0.0014	0.79	0.0033	0	7.70
127	#######	#######	7.73	33,932	8.42	1,026	18,453	32.5	0.649	9.27E-04	802	6.19E-05	0.040	6.02E-06	11,669	0.020	7.80E-07	458	327	1.60E-05	4.10E-03	6.35E-03	3.51E-05	404	51.5	0.005	0.0014	0.79	0.0033	0	7.28
136	#######	#######	7.74	33,929	8.41	1,026	18,450	32.5	0.650	9.18E-04	802	6.07E-05	0.040	6.11E-06	11,675	0.020	7.32E-07	458	328	1.50E-05	4.10E-03	6.36E-03	3.50E-05	397	51.5	0.005	0.0014	0.79	0.0033	0	6.92
144	#######	#######	7.74	33,926	8.40	1,026	18,447	32.5	0.650	9.10E-04	802	5.96E-05	0.040	6.19E-06	11,680	0.020	6.89E-07	458	328	1.41E-05	4.10E-03	6.36E-03	3.49E-05	392	51.5	0.005	0.0014	0.79	0.0034	0	6.59
153	#######	#######	7.75	33,924	8.39	1,026	18,444	32.5	0.650	9.03E-04	803	5.87E-05	0.040	6.26E-06	11,684	0.020	6.51E-07	458	328	1.34E-05	4.10E-03	6.36E-03	3.49E-05	387	51.6	0.005	0.0014	0.80	0.0034	0	6.30
161	#######	#######	7.75	33,922	8.38	1,026	18,442	32.5	0.650	8.97E-04	803	5.79E-05	0.040	6.32E-06	11,688	0.020	6.17E-07	458	328	1.27E-05	4.10E-03	6.36E-03	3.48E-05	382	51.6	0.005	0.0014	0.80	0.0034	0	6.04
169	#######	#######	7.76	33,920	8.38	1,026	18,440	32.5	0.651	8.91E-04	803	5.71E-05	0.040	6.38E-06	11,692	0.020	5.86E-07	458	328	1.21E-05	4.10E-03	6.36E-03	3.48E-05	378	51.6	0.005	0.0014	0.80	0.0034	0	5.80
254	#######	#######	7.79	33,908	8.33	1,026	18,427	32.5	0.652	8.55E-04	805	5.23E-05	0.040	6.80E-06	11,714	0.020	3.92E-07	459	329	8.18E-06	4.10E-03	6.38E-03	3.45E-05	352	51.7	0.005	0.0014	0.80	0.0034	0	4.27
330	#######	#######	7.80	33,903	8.31	1,026	18,421	32.4	0.652	8.38E-04	805	5.01E-05	0.040	7.01E-06	11,725	0.020	3.02E-07	459	329	6.38E-06	4.11E-03	6.38E-03	3.43E-05	340	51.7	0.005	0.0014	0.80	0.0034	0	3.56
407	#######	#######	7.81	33,899	8.30	1,026	18,417	32.4	0.653	8.28E-04	806	4.87E-05	0.040	7.15E-06	11,732	0.020	2.45E-07	459	329	5.25E-06	4.11E-03	6.39E-03	3.42E-05	332	51.8	0.005	0.0014	0.80	0.0034	0	3.10
483	#######	#######	7.82	33,897	8.29	1,026	18,414	32.4	0.653	8.21E-04	806	4.78E-05	0.040	7.25E-06	11,736	0.020	2.07E-07	459	329	4.48E-06	4.11E-03	6.39E-03	3.41E-05	327	51.8	0.005	0.0014	0.80	0.0034	0	2.79
559	#######	#######	7.82	33,895	8.29	1,026	18,412	32.4	0.653	8.16E-04	806	4.71E-05	0.040	7.33E-06	11,739	0.020	1.78E-07	460	329	3.92E-06	4.11E-03	6.39E-03	3.41E-05	323	51.8	0.004	0.0014	0.80	0.0034	0	2.56
635	#######	#######	7.83	33,894	8.28	1,026	18,411	32.4	0.653	8.12E-04	807	4.66E-05	0.040	7.39E-06	11,742	0.020	1.57E-07	460	329	3.49E-06	4.11E-03	6.39E-03	3.41E-05	321	51.8	0.004	0.0014	0.80	0.0034	0	2.38
712	#######	#######	7.83	33,893	8.28	1,026	18,410	32.4	0.653	8.09E-04	807	4.61E-05	0.040	7.43E-06	11,744	0.020	1.40E-07	460	330	3.16E-06	4.11E-03	6.39E-03	3.40E-05	318	51.8	0.004	0.0014	0.80	0.0034	0	2.24
788	#######	#######	7.83	33,892	8.28	1,026	18,409	32.4	0.654	8.06E-04	807	4.58E-05	0.040	7.47E-06	11,745	0.020	1.27E-07	460	330	2.88E-06	4.11E-03	6.39E-03	3.40E-05	316	51.8	0.004	0.0014	0.80	0.0034	0	2.13
864	#######	#######	7.83	33,891	8.27	1,026	18,408	32.4	0.654	8.04E-04	807	4.55E-05	0.040	7.50E-06	11,747	0.020	1.16E-07	460	330	2.66E-06	4.11E-03	6.39E-03	3.40E-05	315	51.8	0.004	0.0014	0.80	0.0034	0	2.04
941	#######	#######	7.83	33,891	8.27	1,026	18,407	32.4	0.654	8.02E-04	807	4.53E-05	0.040	7.53E-06	11,748	0.020	1.06E-07	460	330	2.47E-06	4.11E-03	6.39E-03	3.40E-05	314	51.8	0.004	0.0014	0.80	0.0034	0	1.96
1017	#######	#######	7.84	33,890	8.27	1,026	18,407	32.4	0.654	8.01E-04	807	4.51E-05	0.040	7.55E-06	11,749	0.020	9.82E-08	460	330	2.31E-06	4.11E-03	6.39E-03	3.40E-05	313	51.8	0.004	0.0014	0.80	0.0034	0	1.90
1102	#######	#######	7.84	33,890	8.27	1,026	18,406	32.4	0.654	7.99E-04	807	4.49E-05	0.040	7.57E-06	11,750	0.020	9.07E-08	460	330	2.16E-06	4.11E-03	6.39E-03	3.40E-05	312	51.9	0.004	0.0014	0.80	0.0034	0	1.83
2158	#######	#######	7.85	33,887	8.26	1,026	18,403	32.4	0.654	7.91E-04	807	4.38E-05	0.040	7.71E-06	11,755	0.020	4.63E-08	460	330	1.28E-06	4.11E-03	6.40E-03	3.39E-05	306	51.9	0.004	0.0014	0.80	0.0034	0	1.46
3214	#######	#######	7.85	33,886	8.26	1,026	18,402	32.4	0.654	7.89E-04	808	4.35E-05	0.040	7.75E-06	11,756	0.020	3.11E-08	460	330	9.72E-07	4.11E-03	6.40E-03	3.39E-05	304	51.9	0.004	0.0014	0.80	0.0034	0	1.34
4270	#######	#######	7.85	33,886	8.26	1,026	18,402	32.4	0.654	7.87E-04	808	4.33E-05	0.040	7.78E-06	11,757	0.020	2.34E-08	460	330	8.18E-07	4.11E-03	6.40E-03	3.38E-05	303	51.9	0.004	0.0014	0.80	0.0034	0	1.27
5327	#######	#######	7.85	33,886	8.25	1,026	18,401	32.4	0.654	7.86E-04	808	4.32E-05	0.040	7.79E-06	11,758	0.020	1.88E-08	460	330	7.25E-07	4.11E-03	6.40E-03	3.38E-05	302	51.9	0.004	0.0014	0.80	0.0034	0	1.23
6383	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.86E-04	808	4.31E-05	0.040	7.80E-06	11,758	0.020	0	460	330	6.63E-07	4.11E-03	6.40E-03	3.38E-05	302	51.9	0.004	0.0014	0.80	0.0034	0	1.21
7439	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.85E-04	808	4.30E-05	0.040	7.81E-06	11,758	0.020	0	460	330	6.19E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.19
8496	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.85E-04	808	4.30E-05	0.040	7.81E-06	11,759	0.020	0	460	330	5.85E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.17
9552	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.85E-04	808	4.30E-05	0.040	7.82E-06	11,759	0.020	0	460	330	5.59E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.16
10608	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.85E-04	808	4.29E-05	0.040	7.82E-06	11,759	0.020	0	460	330	5.38E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.15
11665	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.84E-04	808	4.29E-05	0.040	7.82E-06	11,759	0.020	0	460	330	5.21E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.15
12721	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.84E-04	808	4.29E-05	0.040	7.82E-06	11,759	0.020	0	460	330	5.07E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.14
13777	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.84E-04	808	4.29E-05	0.040	7.83E-06	11,759	0.020	0	460	330	4.95E-07	4.11E-03	6.40E-03	3.38E-05	301	51.9	0.004	0.0014	0.80	0.0034	0	1.14
14834	#######	#######	7.85	33,885	8.25	1,026	18,401	32.4	0.654	7.84E-04	808	4.29E-05	0.040	7.83E-06	11,759	0.020	0	460	330	4.85E-07	4.11E-03	6.40E-03	3.38E-05	300	51.9	0.004	0.0014	0.80	0.0034	0	1.13
15890	#######	#######	7.85	33,885	8.25	1,026	18,400	32.4	0.654	7.84E-04	808	4.29E-05	0.040	7.83E-06	11,759	0.020	0	460	330	4.76E-07	4.11E-03	6.40E-03	3.38E-05	300	51.9	0.004	0.0014	0.80	0.0034	0	1.13
16946	#######	#######	7.85	33,885	8.25	1,026	18,400	32.4	0.654	7.84E-04	808	4.28E-05	0.040	7.83E-06	11,759	0.020	0	460	330	4.68E-07	4.11E-03	6.40E-03	3.38E-05	300	51.9	0.004	0.0014	0.80	0.0034	0	1.12

SCENARIO 3

Dilution Ratio	Volume - PoPA	Volume - Total	pH	Total Dissolved Solids	Temperature	Density - Total	Cl(-1)	Salinity	Si(+4)	Se(+4)	Sb(+5)	S(+6)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L
0	0	27,001	7.10	55,069	17.0	1,042	31,372	54.4	0	7.83E-04	0	1,643
0.4	10,000	36,995	7.24	49,219	14.6	1,037	27,870	48.5	0.18	7.83E-04	0.003	1,417
0.7	20,000	46,992	7.33	45,859	13.3	1,035	25,857	45.1	0.28	7.83E-04	0.004	1,288
1.1	30,000	56,990	7.39	43,681	12.4	1,033	24,549	42.9	0.34	7.83E-04	0.005	1,204
1.5	40,000	66,989	7.44	42,157	11.8	1,032	23,632	41.4	0.39	7.83E-04	0.006	1,145
1.9	50,000	76,987	7.48	41,032	11.3	1,031	22,952	40.2	0.43	7.83E-04	0.006	1,101
2.2	60,000	86,987	7.51	40,463	10.9	1,031	22,429	39.3	0.45	7.83E-04	0.007	1,067
2.6	70,000	96,986	7.54	39,785	10.7	1,030	22,014	38.6	0.47	7.83E-04	0.007	1,040
3.0	80,000	1.07E+05	7.56	39,234	10.4	1,030	21,676	38.0	0.49	7.83E-04	0.007	1,019
3.3	90,000	1.17E+05	7.58	38,777	10.3	1,029	21,396	37.5	0.50	7.83E-04	0.008	1,001
3.7	1.00E+05	1.27E+05	7.60	38,392	10.1	1,029	21,160	37.1	0.52	7.83E-04	0.008	985
7	2.00E+05	2.27E+05	7.70	36,406	9.28	1,028	19,945	35.1	0.58	7.83E-04	0.009	907
44	1.18E+06	1.21E+06	7.82	34,359	8.44	1,026	18,691	32.9	0.64	7.83E-04	0.010	826
80	2.16E+06	2.19E+06	7.83	34,146	8.36	1,026	18,560	32.7	0.65	7.83E-04	0.010	818
116	3.14E+06	3.17E+06	7.84	34,065	8.32	1,026	18,511	32.6	0.65	7.83E-04	0.010	815
153	4.12E+06	4.15E+06	7.84	34,022	8.31	1,026	18,485	32.6	0.65	7.83E-04	0.010	813
189	5.10E+06	5.13E+06	7.85	33,996	8.30	1,026	18,468	32.5	0.65	7.83E-04	0.010	812
225	6.08E+06	6.11E+06	7.85	33,978	8.29	1,026	18,457	32.5	0.65	7.83E-04	0.010	811
261	7.06E+06	7.09E+06	7.85	33,965	8.28	1,026	18,450	32.5	0.65	7.83E-04	0.010	811
298	8.04E+06	8.07E+06	7.85	33,955	8.28	1,026	18,444	32.5	0.65	7.83E-04	0.010	811
334	9.02E+06	9.05E+06	7.85	33,948	8.28	1,026	18,439	32.5	0.65	7.83E-04	0.010	810
370	1.00E+07	1.00E+07	7.85	33,941	8.27	1,026	18,435	32.5	0.65	7.83E-04	0.010	810
37	1.00E+06	1.03E+06	7.81	34,442	8.48	1,026	18,741	33.0	0.64	7.83E-04	0.010	830
404	1.09E+07	1.09E+07	7.85	33,937	8.27	1,026	18,432	32.5	0.65	7.83E-04	0.010	810
770	2.08E+07	2.08E+07	7.85	33,912	8.26	1,026	18,417	32.4	0.65	7.83E-04	0.010	809
1137	3.07E+07	3.07E+07	7.85	33,903	8.26	1,026	18,411	32.4	0.65	7.83E-04	0.010	809
1504	4.06E+07	4.06E+07	7.85	33,898	8.26	1,026	18,409	32.4	0.65	7.83E-04	0.010	808
1870	5.05E+07	5.05E+07	7.85	33,896	8.25	1,026	18,407	32.4	0.65	7.83E-04	0.010	808
2237	6.04E+07	6.04E+07	7.85	33,894	8.25	1,026	18,406	32.4	0.65	7.83E-04	0.010	808
2604	7.03E+07	7.03E+07	7.85	33,893	8.25	1,026	18,405	32.4	0.65	7.83E-04	0.010	808
2970	8.02E+07	8.02E+07	7.85	33,892	8.25	1,026	18,404	32.4	0.65	7.83E-04	0.010	808
3337	9.01E+07	9.01E+07	7.85	33,891	8.25	1,026	18,404	32.4	0.65	7.83E-04	0.010	808
3704	1.00E+08	1.00E+08	7.85	33,890	8.25	1,026	18,404	32.4	0.65	7.83E-04	0.010	808

Dilution Ratio	Pb(+2)	P(+5)	Ni(+2)	Na(+1)	N(-3)	N(+5)	N(+3)	Mn(+2)	Mg(+2)	Zn(+2)	K(+1)	Hg(+2)	Fe(+2)	F(-1)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.003	0	1.26E-07	12,500	0	0	0	0	4,631	0.001	0	6.50E-08	0	0
0.4	0.002	0.011	4.22E-06	12,302	0.005	0.076	0.021	0.001	3,504	0.003	89.2	1.42E-07	0.004	0.68
0.7	0.001	0.017	5.05E-06	12,187	0.009	0.120	0.032	0.002	2,857	0.004	140	1.86E-07	0.006	1.06
1.1	0.001	0.021	5.40E-06	12,113	0.011	0.149	0.040	0.003	2,436	0.004	174	2.15E-07	0.008	1.32
1.5	0.001	0.024	5.63E-06	12,060	0.012	0.169	0.045	0.003	2,141	0.004	197	2.35E-07	0.009	1.49
1.9	9.05E-04	0.026	5.79E-06	12,022	0.013	0.183	0.049	0.003	1,923	0.005	214	2.50E-07	0.010	1.62
2.2	8.05E-04	0.028	5.92E-06	11,992	0.014	0.195	0.053	0.003	1,755	0.005	228	2.62E-07	0.010	1.72
2.6	7.27E-04	0.029	6.04E-06	11,968	0.015	0.204	0.055	0.004	1,621	0.005	238	2.71E-07	0.011	1.80
3.0	6.63E-04	0.030	6.13E-06	11,948	0.015	0.211	0.057	0.004	1,513	0.005	247	2.78E-07	0.011	1.87
3.3	6.10E-04	0.031	6.22E-06	11,932	0.016	0.217	0.059	0.004	1,423	0.005	254	2.84E-07	0.012	1.92
3.7	5.65E-04	0.031	6.29E-06	11,919	0.016	0.222	0.060	0.004	1,347	0.005	260	2.89E-07	0.012	1.97
7	3.35E-04	0.035	6.78E-06	11,849	0.018	0.249	0.067	0.004	956	0.006	291	3.16E-07	0.013	2.20
44	9.77E-05	0.039	7.58E-06	11,777	0.020	0.276	0.074	0.005	553	0.006	323	3.44E-07	0.015	2.44
80	7.30E-05	0.040	7.70E-06	11,769	0.020	0.279	0.075	0.005	511	0.006	326	3.46E-07	0.015	2.47
116	6.36E-05	0.040	7.74E-06	11,766	0.020	0.280	0.075	0.005	496	0.006	327	3.48E-07	0.015	2.48
153	5.87E-05	0.040	7.77E-06	11,765	0.020	0.281	0.076	0.005	487	0.006	328	3.48E-07	0.015	2.48
189	5.56E-05	0.040	7.78E-06	11,764	0.020	0.281	0.076	0.005	482	0.006	328	3.49E-07	0.015	2.49
225	5.36E-05	0.040	7.79E-06	11,763	0.020	0.281	0.076	0.005	478	0.006	329	3.49E-07	0.015	2.49
261	5.21E-05	0.040	7.80E-06	11,763	0.020	0.281	0.076	0.005	476	0.006	329	3.49E-07	0.015	2.49
298	5.09E-05	0.040	7.81E-06	11,763	0.020	0.281	0.076	0.005	474	0.006	329	3.49E-07	0.015	2.49
334	5.00E-05	0.040	7.81E-06	11,762	0.020	0.282	0.076	0.005	472	0.006	329	3.49E-07	0.015	2.49
370	4.93E-05	0.040	7.81E-06	11,762	0.020	0.282	0.076	0.005	471	0.006	329	3.49E-07	0.015	2.49
37	1.07E-04	0.039	7.54E-06	11,780	0.020	0.275	0.074	0.005	570	0.006	321	3.43E-07	0.015	2.43
404	4.88E-05	0.040	7.82E-06	11,762	0.020	0.282	0.076	0.005	470	0.006	329	3.49E-07	0.015	2.49
770	4.59E-05	0.040	7.83E-06	11,761	0.020	0.282	0.076	0.005	465	0.006	330	3.50E-07	0.015	2.50
1137	4.49E-05	0.040	7.84E-06	11,761	0.020	0.282	0.076	0.005	464	0.006	330	3.50E-07	0.015	2.50
1504	4.43E-05	0.040	7.84E-06	11,761	0.020	0.282	0.076	0.005	463	0.006	330	3.50E-07	0.015	2.50
1870	4.40E-05	0.040	7.84E-06	11,760	0.020	0.282	0.076	0.005	462	0.006	330	3.50E-07	0.015	2.50
2237	4.38E-05	0.040	7.84E-06	11,760	0.020	0.282	0.076	0.005	462	0.006	330	3.50E-07	0.015	2.50
2604	4.36E-05	0.040	7.84E-06	11,760	0.020	0.282	0.076	0.005	462	0.006	330	3.50E-07	0.015	2.50
2970	4.35E-05	0.040	7.84E-06	11,760	0.020	0.282	0.076	0.005	461	0.006	330	3.50E-07	0.015	2.50
3337	4.34E-05	0.040	7.84E-06	11,760	0.020	0.282	0.076	0.005	461	0.006	330	3.50E-07	0.015	2.50
3704	4.34E-05	0.040	7.85E-06	11,760	0.020	0.282	0.076	0.005	461	0.006	330	3.50E-07	0.015	2.50

Dilution Ratio	Cu(+2)	Cr(+6)	Cr(+3)	Co(+2)	Cd(+2)	Ca(+2)	Br(-1)	Be(+2)	Ba(+2)	As(+5)	Al(+3)	NiCr2O4	NaAlCO3(OH)2 (Dawsonite)	CoCr2O4	CaCO3 (Calcite)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	3.74E-04	2.69E-04	7.82E-04	0	7.79E-05	1,328	53.0	0	0	3.26E-03	0	0.003	0	0	54.9
0.4	7.76E-04	2.30E-04	6.36E-05	0.0008	6.60E-05	1,050	52.7	0.0014	0.0014	0.0035	3.84E-05	0.003	0.216	0.0020	39.7
0.7	0.0010	2.08E-04	3.53E-05	0.0015	5.91E-05	891	52.5	0.0021	0.0021	0.0037	3.82E-05	0.002	0.341	0.0024	31.3
1.1	0.0012	1.94E-04	2.39E-05	0.0020	5.47E-05	787	52.4	0.0026	0.0026	0.0038	3.84E-05	0.002	0.421	0.0026	25.9
1.5	0.0013	1.84E-04	1.79E-05	0.0023	5.16E-05	714	52.4	0.0030	0.0030	0.0039	3.89E-05	0.002	0.478	0.0027	22.1
1.9	0.0013	1.76E-04	1.43E-05	0.0025	4.93E-05	661	52.3	0.0032	0.0032	0.0039	3.94E-05	0.002	0.520	0.0028	19.4
2.2	0.0014	1.71E-04	1.19E-05	0.0027	4.75E-05	619	52.2	0.0034	0.0034	0.0040	4.00E-05	0.002	0.552	0.0029	17.3
2.6	0.0014	1.66E-04	1.02E-05	0.0029	4.61E-05	586	52.2	0.0036	0.0036	0.0040	4.05E-05	0.002	0.578	0.0029	15.6
3.0	0.0015	1.62E-04	9.00E-06	0.0030	4.49E-05	559	52.2	0.0037	0.0037	0.0040	4.10E-05	0.002	0.598	0.0030	14.3
3.3	0.0015	1.59E-04	8.07E-06	0.0031	4.40E-05	537	52.2	0.0038	0.0038	0.0041	4.15E-05	0.002	0.616	0.0030	13.1
3.7	0.0015	1.57E-04	7.35E-06	0.0031	4.32E-05	518	52.1	0.0039	0.0039	0.0041	4.20E-05	0.002	0.630	0.0030	12.2
7	0.0017	1.43E-04	4.36E-06	0.0036	3.90E-05	422	52.0	0.0044	0.0044	0.0042	4.55E-05	0.002	0.705	0.0032	7.32
44	0.0018	1.30E-04	2.31E-06	0.0040	3.48E-05	323	51.9	0.0049	0.0049	0.0043	5.22E-05	0.001	0.782	0.0034	2.26
80	0.0018	1.28E-04	2.14E-06	0.0041	3.43E-05	312	51.9	0.0049	0.0049	0.0043	5.31E-05	0.001	0.790	0.0034	1.73
116	0.0018	1.28E-04	2.08E-06	0.0041	3.42E-05	308	51.9	0.0050	0.0050	0.0043	5.35E-05	0.001	0.793	0.0034	1.53
153	0.0019	1.27E-04	2.05E-06	0.0041	3.41E-05	306	51.9	0.0050	0.0050	0.0043	5.38E-05	0.001	0.795	0.0034	1.42
189	0.0019	1.27E-04	2.03E-06	0.0041	3.40E-05	305	51.9	0.0050	0.0050	0.0043	5.39E-05	0.001	0.796	0.0034	1.35
225	0.0019	1.27E-04	2.02E-06	0.0041	3.40E-05	304	51.9	0.0050	0.0050	0.0043	5.40E-05	0.001	0.797	0.0034	1.31
261	0.0019	1.27E-04	2.01E-06	0.0041	3.40E-05	303	51.9	0.0050	0.0050	0.0043	5.40E-05	0.001	0.797	0.0034	1.28
298	0.0019	1.27E-04	2.00E-06	0.0041	3.39E-05	303	51.9	0.0050	0.0050	0.0043	5.41E-05	0.001	0.798	0.0034	1.25
334	0.0019	1.27E-04	2.00E-06	0.0041	3.39E-05	303	51.9	0.0050	0.0050	0.0043	5.41E-05	0.001	0.798	0.0034	1.23
370	0.0019	1.27E-04	1.99E-06	0.0041	3.39E-05	302	51.9	0.0050	0.0050	0.0043	5.42E-05	0.001	0.798	0.0034	1.22
37	0.0018	1.30E-04	2.37E-06	0.0040	3.50E-05	327	51.9	0.0049	0.0049	0.0043	5.18E-05	0.001	0.779	0.0034	2.47
404	0.0019	1.27E-04	1.99E-06	0.0041	3.39E-05	302	51.9	0.0050	0.0050	0.0043	5.42E-05	0.001	0.798	0.0034	1.21
770	0.0019	1.27E-04	1.97E-06	0.0041	3.39E-05	301	51.9	0.0050	0.0050	0.0043	5.43E-05	0.001	0.799	0.0034	1.14
1137	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.12
1504	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.11
1870	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.10
2237	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.10
2604	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.09
2970	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.09
3337	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.09
3704	0.0019	1.27E-04	1.96E-06	0.0041	3.38E-05	300	51.9	0.0050	0.0050	0.0043	5.44E-05	0.001	0.800	0.0034	1.09

SCENARIO 4A

Dilution Ratio	Volume - PoPA	Volume - Total	pH	Total Dissolved Solid	Temperature	Density - Total	Cl(-1) Liq1	Salinity	Zn(+2) Liq1	Ti(+4) Liq1	Si(+4) Liq1	Se(+4) Liq1	Sb(+5) Liq1	S(+6) Liq1	Pb(+2) Liq1
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	32,900	6.40	50,390	19.3	1,038	29,699	51.7	0.0	1.43E-03	20.1064	0	#######	1,348	0.002
2	50,000	82,883	6.92	40,246	12.6	1,031	22,889	40.1	0.00	1.43E-03	8.564	0	6.03E-03	1,023	0.001
3	#######	#######	7.14	37,717	11.0	1,029	21,200	37.2	0.01	1.44E-03	5.588	0	7.53E-03	942	0.001
5	#######	#######	7.28	36,875	10.2	1,028	20,435	35.9	0.01	1.44E-03	4.239	0	8.20E-03	905	0.000
6	#######	#######	7.37	36,233	9.80	1,027	19,998	35.2	0.01	1.44E-03	3.469	0	8.59E-03	884	0.000
8	#######	#######	7.44	35,591	9.53	1,027	19,716	34.7	0.01	1.28E-03	2.972	0	8.84E-03	871	0.000
9	#######	#######	7.49	35,528	9.34	1,027	19,518	34.3	0.01	1.09E-03	2.624	0	9.01E-03	861	0.000
11	#######	#######	7.54	35,313	9.19	1,027	19,372	34.1	0.01	9.46E-04	2.367	0	9.14E-03	854	0.000
12	#######	#######	7.57	35,148	9.08	1,027	19,260	33.9	0.01	8.37E-04	2.169	0	9.24E-03	849	0.000
14	#######	#######	7.60	35,018	9.00	1,027	19,171	33.7	0.01	7.50E-04	2.012	0	9.32E-03	845	0.000
15	#######	#######	7.62	34,678	8.93	1,026	19,099	33.6	0.01	6.80E-04	1.885	0	9.38E-03	841	0.000
17	#######	#######	7.64	34,628	8.87	1,026	19,039	33.5	0.01	6.21E-04	1.779	0	9.44E-03	838	0.000
18	#######	#######	7.66	34,587	8.82	1,026	18,988	33.4	0.01	5.72E-04	1.690	0	9.48E-03	836	0.000
20	#######	#######	7.68	34,551	8.78	1,026	18,945	33.4	0.01	5.30E-04	1.614	0	9.52E-03	834	0.000
21	#######	#######	7.69	34,520	8.74	1,026	18,908	33.3	0.01	4.94E-04	1.549	0	9.55E-03	832	0.000
23	#######	#######	7.70	34,493	8.71	1,026	18,875	33.2	0.01	4.63E-04	1.492	0	9.58E-03	831	0.000
24	#######	#######	7.71	34,470	8.68	1,026	18,847	33.2	0.01	4.35E-04	1.442	0	9.60E-03	829	0.000
26	#######	#######	7.72	34,449	8.66	1,026	18,822	33.1	0.01	4.10E-04	1.397	0	9.63E-03	828	0.000
27	#######	#######	7.73	34,471	8.64	1,026	18,799	33.1	0.01	3.88E-04	1.357	0	9.65E-03	827	0.000
29	#######	#######	7.74	34,414	8.62	1,026	18,779	33.1	0.01	3.68E-04	1.321	0	9.67E-03	826	0.000
30	#######	#######	7.75	34,398	8.60	1,026	18,760	33.0	0.01	3.51E-04	1.289	0	9.68E-03	825	0.000
46	#######	#######	7.79	34,301	8.49	1,026	18,643	32.8	0.01	2.36E-04	1.082	0	9.79E-03	819	0.000
59	#######	#######	7.82	34,191	8.43	1,026	18,588	32.7	0.01	1.83E-04	0.985	0	9.83E-03	817	0.000
73	#######	#######	7.83	34,109	8.40	1,026	18,553	32.7	0.01	1.49E-04	0.924	0	9.86E-03	815	0.000
87	#######	#######	7.84	34,074	8.38	1,026	18,529	32.6	0.01	1.26E-04	0.882	0	9.89E-03	814	0.000
100	#######	#######	7.84	34,049	8.36	1,026	18,512	32.6	0.01	1.09E-04	0.851	0	9.90E-03	813	0.000
114	#######	#######	7.84	34,029	8.35	1,026	18,498	32.6	0.01	9.57E-05	0.828	0	9.91E-03	813	0.000
128	#######	#######	7.84	34,014	8.34	1,026	18,488	32.6	0.01	8.56E-05	0.809	0	9.92E-03	812	0.000
141	#######	#######	7.84	34,001	8.33	1,026	18,480	32.5	0.01	7.73E-05	0.794	0	9.93E-03	812	0.000
155	#######	#######	7.84	33,991	8.32	1,026	18,473	32.5	0.01	7.06E-05	0.782	0	9.94E-03	811	0.000
169	#######	#######	7.84	33,982	8.31	1,026	18,467	32.5	0.01	6.49E-05	0.772	0	9.94E-03	811	0.000
182	#######	#######	7.85	33,975	8.31	1,026	18,462	32.5	0.01	6.00E-05	0.763	0	9.95E-03	811	0.000
198	#######	#######	7.85	33,968	8.31	1,026	18,457	32.5	0.01	5.54E-05	0.755	0	9.95E-03	811	0.000
482	#######	#######	7.85	33,919	8.27	1,026	18,423	32.5	0.01	2.28E-05	0.696	0	9.98E-03	809	0.000
766	#######	#######	7.85	33,906	8.26	1,026	18,415	32.4	0.01	1.44E-05	0.680	0	9.99E-03	809	0.000
1050	#######	#######	7.85	33,900	8.26	1,026	18,411	32.4	0.01	1.05E-05	0.673	0	9.99E-03	808	0.000
1334	#######	#######	7.85	33,897	8.26	1,026	18,409	32.4	0.01	8.24E-06	0.669	0	9.99E-03	808	0.000
1619	#######	#######	7.85	33,895	8.26	1,026	18,407	32.4	0.01	6.80E-06	0.667	0	9.99E-03	808	0.000
1903	#######	#######	7.85	33,893	8.26	1,026	18,406	32.4	0.01	5.78E-06	0.665	0	9.99E-03	808	0.000
2187	#######	#######	7.85	33,892	8.26	1,026	18,405	32.4	0.01	5.03E-06	0.664	0	9.99E-03	808	0.000
2471	#######	#######	7.85	33,891	8.25	1,026	18,405	32.4	0.01	4.45E-06	0.662	0	1.00E-02	808	0.000
2755	#######	#######	7.85	33,890	8.25	1,026	18,404	32.4	0.01	3.99E-06	0.662	0	1.00E-02	808	0.000
3040	#######	#######	7.85	33,890	8.25	1,026	18,404	32.4	0.01	3.62E-06	0.661	0	1.00E-02	808	0.000

Dilution Ratio	P(+5) Liq1	Ni(+2) Liq1	Na(+1) Liq1	N(-3) Liq1	N(+5) Liq1	N(+3) Liq1	Mn(+2) Liq1	Mg(+2) Liq1	K(+1) Liq1	Hg(+2) Liq1	Fe(+3) Liq1	Fe(+2) Liq1	F(-1) Liq1	Cu(+2) Liq1
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	3.01722	10,258	0	0	0	0.000	5123.84	0	5.33E-08	6.88E-08	0	0	3.07E-04
2	0	1.197	11,166	0.012	0.170	0	0.003	2,311	199	2.32E-07	1.28E-08	0.009	1.51	0.0012
3	0	0.746	11,390	0.015	0.213	0	0.004	1,615	248	2.77E-07	7.03E-09	0.011	1.88	0.0015
5	0	0.542	11,491	0.017	0.232	0	0.004	1,299	271	2.97E-07	5.12E-09	0.012	2.05	0.0016
6	0	0.426	11,549	0.017	0.243	0	0.004	1,119	283	3.08E-07	4.22E-09	0.013	2.15	0.0016
8	0	0.350	11,586	0.018	0.250	0	0.004	1,002	292	3.16E-07	3.71E-09	0.013	2.21	0.0017
9	0	0.297	11,613	0.018	0.254	0	0.005	921	297	3.21E-07	3.40E-09	0.014	2.25	0.0017
11	0	0.258	11,632	0.018	0.258	0	0.005	861	302	3.25E-07	3.19E-09	0.014	2.29	0.0017
12	0	0.229	11,647	0.019	0.261	0	0.005	814	305	3.27E-07	3.05E-09	0.014	2.31	0.0017
14	0	0.205	11,658	0.019	0.263	0	0.005	778	308	3.30E-07	2.95E-09	0.014	2.33	0.0018
15	0	0.185	11,668	0.019	0.265	0	0.005	748	310	3.32E-07	2.88E-09	0.014	2.35	0.0018
17	0	0.169	11,676	0.019	0.266	0	0.005	723	311	3.33E-07	2.84E-09	0.014	2.36	0.0018
18	0	0.156	11,682	0.019	0.268	0	0.005	702	313	3.35E-07	2.80E-09	0.014	2.37	0.0018
20	0	0.145	11,688	0.019	0.269	0	0.005	685	314	3.36E-07	2.78E-09	0.014	2.38	0.0018
21	0	0.135	11,693	0.019	0.270	0	0.005	669	315	3.37E-07	2.77E-09	0.014	2.39	0.0018
23	0	0.126	11,697	0.019	0.271	0	0.005	656	316	3.38E-07	2.76E-09	0.014	2.40	0.0018
24	0	0.118	11,701	0.019	0.271	0	0.005	644	317	3.38E-07	2.76E-09	0.014	2.40	0.0018
26	0	0.112	11,704	0.019	0.272	0	0.005	634	318	3.39E-07	2.76E-09	0.014	2.41	0.0018
27	0	0.106	11,707	0.019	0.272	0	0.005	624	318	3.40E-07	2.77E-09	0.014	2.41	0.0018
29	0	0.100	11,710	0.020	0.273	0	0.005	616	319	3.40E-07	2.78E-09	0.014	2.42	0.0018
30	0	0.095	11,713	0.020	0.273	0	0.005	609	319	3.41E-07	2.79E-09	0.015	2.42	0.0018
46	0	0.064	11,728	0.020	0.276	0	0.005	560	323	3.44E-07	2.97E-09	0.015	2.45	0.0018
59	0	0.049	11,735	0.020	0.278	0	0.005	537	325	3.45E-07	3.17E-09	0.015	2.46	0.0018
73	0	0.040	11,740	0.020	0.279	0	0.005	523	326	3.46E-07	3.37E-09	0.015	2.47	0.0018
87	0	0.034	11,743	0.020	0.279	0	0.005	513	326	3.47E-07	3.63E-09	0.015	2.47	0.0018
100	0	0.029	11,745	0.020	0.280	0	0.005	506	327	3.47E-07	3.88E-09	0.015	2.48	0.0018
114	0	0.025	11,747	0.020	0.280	0	0.005	501	327	3.47E-07	4.12E-09	0.015	2.48	0.0018
128	0	0.023	11,748	0.020	0.280	0	0.005	496	327	3.48E-07	4.35E-09	0.015	2.48	0.0018
141	0	0.020	11,750	0.020	0.280	0	0.005	493	328	3.48E-07	4.57E-09	0.015	2.48	0.0018
155	0	0.018	11,751	0.020	0.281	0	0.005	490	328	3.48E-07	4.78E-09	0.015	2.48	0.0019
169	0	0.017	11,751	0.020	0.281	0	0.005	487	328	3.48E-07	4.98E-09	0.015	2.49	0.0019
182	0	0.016	11,752	0.020	0.281	0	0.005	485	328	3.48E-07	5.18E-09	0.015	2.49	0.0019
198	0	0.014	11,753	0.020	0.281	0	0.005	483	328	3.49E-07	5.39E-09	0.015	2.49	0.0019
482	0	0.005	11,757	0.020	0.282	0	0.005	470	329	3.49E-07	8.67E-09	0.015	2.49	0.0019
766	0	0.003	11,758	0.020	0.282	0	0.005	466	330	3.50E-07	1.15E-08	0.015	2.50	0.0019
1050	0	0.002	11,759	0.020	0.282	0	0.005	464	330	3.50E-07	1.42E-08	0.015	2.50	0.0019
1334	0	0.001	11,759	0.020	0.282	0	0.005	463	330	3.50E-07	1.70E-08	0.015	2.50	0.0019
1619	0	0.001	11,759	0.020	0.282	0	0.005	463	330	3.50E-07	2.01E-08	0.015	2.50	0.0019
1903	0	0.001	11,759	0.020	0.282	0	0.005	462	330	3.50E-07	2.37E-08	0.015	2.50	0.0019
2187	0	0.001	11,759	0.020	0.282	0	0.005	462	330	3.50E-07	2.81E-08	0.015	2.50	0.0019
2471	0	0.000	11,759	0.020	0.282	0	0.005	462	330	3.50E-07	3.39E-08	0.015	2.50	0.0019
2755	0	0.000	11,760	0.020	0.282	0	0.005	462	330	3.50E-07	4.25E-08	0.015	2.50	0.0019
3040	0	0.000	11,760	0.020	0.282	0	0.005	462	330	3.50E-07	5.81E-08	0.015	2.50	0.0019

Dilution Ratio	Cr(+6) Liq1	Cr(+3) Liq1	Co(+2) Liq1	Cd(+2) Liq1	Ca(+2) Liq1	Br(-1) Liq1	Be(+2) Liq1	Ba(+2) Liq1	As(+5) Liq1	Al(+3) Liq1	TiO2 (Rutile)	NiFe2O4 (Trevorite)	NiCr2O4	NaAlSi2.3O 6.6.4H2O (sodium aluminosili	NaAlCO3(OH)2 (Dawsonite)	CaCO3 (Calcite)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	2.21E-04	1.21E-05	0.153	0	1,133	43.5	0.0	0	2.68E-03	0.005	0.016	0.914	0.024	2.141	0.00	0
2	1.64E-04	9.05E-07	0.064	0	631	48.6	0.0	0.0030	0.0037	0.0004	4.90E-03	3.63E-01	0.012	0.0	0.91	0
3	1.50E-04	3.03E-07	0.042	0	506	49.8	0.0	0.0038	0.0039	0.0001	2.15E-03	2.26E-01	0.010	0.0	0.87	0
5	1.43E-04	1.59E-07	0.032	0	450	50.4	0.0	0.0041	0.0040	0.0001	9.08E-04	1.64E-01	0.008	0.0	0.85	0
6	1.40E-04	1.04E-07	0.026	0	418	50.7	0.0	0.0043	0.0041	0.0001	1.98E-04	1.29E-01	0.007	0.0	0.84	0
8	1.37E-04	7.70E-08	0.022	0	397	50.9	0.0	0.0044	0.0041	0.0000	#######	0.10629	0.007	0.0	0.83	0
9	1.36E-04	6.18E-08	0.020	0	382	51.1	0.0	0.0045	0.0041	0.0000	#######	0.09032	0.007	0.0	0.83	0
11	1.35E-04	5.24E-08	0.018	0	372	51.2	0.0	0.0046	0.0042	0.0000	#######	0.07853	0.006	0.0	0.82	0
12	1.34E-04	4.62E-08	0.016	0	363	51.3	0.0	0.0046	0.0042	0.0000	#######	0.06946	0.006	0.0	0.82	0
14	1.33E-04	4.18E-08	0.015	0	357	51.3	0.0	0.0047	0.0042	0.0000	#######	0.06227	0.006	0.0	0.82	0
15	1.32E-04	3.87E-08	0.014	0	351	51.4	0.0	0.0047	0.0042	0.0000	#######	0.05642	0.006	0.0	0.82	0
17	1.32E-04	3.63E-08	0.013	0	347	51.4	0.0	0.0047	0.0042	0.0000	#######	0.05158	0.006	0.0	0.82	0
18	1.31E-04	3.45E-08	0.013	0	343	51.5	0.0	0.0047	0.0042	0.0000	#######	0.04751	0.006	0.0	0.81	0
20	1.31E-04	3.31E-08	0.012	0	340	51.5	0.0	0.0048	0.0042	0.0000	#######	0.04403	0.006	0.0	0.81	0
21	1.31E-04	3.20E-08	0.012	0	337	51.5	0.0	0.0048	0.0042	0.0000	#######	0.04103	0.006	0.0	0.81	0
23	1.30E-04	3.12E-08	0.011	0	335	51.5	0.0	0.0048	0.0042	0.0000	#######	0.03841	0.006	0.0	0.81	0
24	1.30E-04	3.05E-08	0.011	0	333	51.6	0.0	0.0048	0.0042	0.0000	#######	0.0361	0.006	0.0	0.81	0
26	1.30E-04	2.99E-08	0.011	0	331	51.6	0.0	0.0048	0.0042	0.0000	#######	0.03406	0.006	0.0	0.81	0
27	1.30E-04	2.95E-08	0.010	0	329	51.6	0.0	0.0048	0.0042	0.0000	#######	0.03223	0.005	0.0	0.81	0
29	1.30E-04	2.91E-08	0.010	0	328	51.6	0.0	0.0048	0.0042	0.0000	#######	0.03059	0.005	0.0	0.81	0
30	1.30E-04	2.88E-08	0.010	0	327	51.6	0.0	0.0048	0.0043	0.0000	#######	0.02911	0.005	0.0	0.81	0
46	1.29E-04	2.81E-08	0.008	0	318	51.7	0.0	0.0049	0.0043	0.0001	#######	0.01961	0.005	0.0	0.81	0
59	1.28E-04	2.88E-08	0.007	0	314	51.8	0.0	0.0049	0.0043	0.0001	#######	0.01516	0.005	0.0	0.80	0
73	1.28E-04	2.99E-08	0.007	0	311	51.8	0.0	0.0049	0.0043	0.0001	#######	0.01236	0.005	0.0	0.80	0
87	1.28E-04	3.20E-08	0.007	0	309	51.8	0.0	0.0049	0.0043	0.0001	#######	0.01043	0.005	0.0	0.80	0.15
100	1.27E-04	3.42E-08	0.006	0	308	51.8	0.0	0.0050	0.0043	0.0001	#######	9.02E-03	0.005	0.0	0.80	0.27
114	1.27E-04	3.62E-08	0.006	0	307	51.8	0.0	0.0050	0.0043	0.0001	#######	7.95E-03	0.005	0.0	0.80	0.37
128	1.27E-04	3.82E-08	0.006	0	306	51.8	0.0	0.0050	0.0043	0.0001	#######	7.10E-03	0.005	0.0	0.80	0.44
141	1.27E-04	4.00E-08	0.006	0	306	51.8	0.0	0.0050	0.0043	0.0001	#######	6.42E-03	0.005	0.0	0.80	0.50
155	1.27E-04	4.18E-08	0.006	0	305	51.8	0.0	0.0050	0.0043	0.0001	#######	5.86E-03	0.005	0.0	0.80	0.55
169	1.27E-04	4.36E-08	0.006	0	305	51.9	0.0	0.0050	0.0043	0.0001	#######	5.39E-03	0.005	0.0	0.80	0.60
182	1.27E-04	4.53E-08	0.006	0	304	51.9	0.0	0.0050	0.0043	0.0001	#######	4.98E-03	0.005	0.0	0.80	0.63
198	1.27E-04	4.71E-08	0.006	0	304	51.9	0.0	0.0050	0.0043	0.0001	#######	4.60E-03	0.005	0.0	0.80	0.67
482	1.27E-04	7.55E-08	0.005	0	301	51.9	0.0	0.0050	0.0043	0.0001	#######	1.89E-03	0.005	0.0	0.80	0.91
766	1.27E-04	9.96E-08	0.005	0	301	51.9	0.0	0.0050	0.0043	0.0001	#######	1.19E-03	0.005	0.0	0.80	0.97
1050	1.27E-04	1.23E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	8.69E-04	0.005	0.0	0.80	1.00
1334	1.27E-04	1.48E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	6.84E-04	0.005	0.0	0.80	1.01
1619	1.27E-04	1.75E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	5.64E-04	0.005	0.0	0.80	1.03
1903	1.27E-04	2.06E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	4.80E-04	0.005	0.0	0.80	1.03
2187	1.27E-04	2.44E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	4.18E-04	0.005	0.0	0.80	1.04
2471	1.27E-04	2.95E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	3.70E-04	0.005	0.0	0.80	1.04
2755	1.27E-04	3.69E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	3.31E-04	0.005	0.0	0.80	1.05
3040	1.27E-04	5.05E-07	0.005	0	300	51.9	0.0	0.0050	0.0043	0.0001	#######	3.00E-04	0.005	0.0	0.80	1.05

SCENARIO 4B

Dilution Ratio	Volume - Reconcile _PoPA_WQ	Volume - Total	pH	Total Dissolved Solids, Rigorous	Temperature	Density - Total	Cl(-1) Liq1	Salinity	Si(+4) Liq1	Se(+4) Liq1	S(+6) Liq1	Pb(+2) Liq1	P(+5) Liq1	Ni(+2) Liq1	Na(+1) Liq1	N(-3) Liq1	Mo(+6) Liq1	Mg(+2) Liq1	K(+1) Liq1	Hg(+2) Liq1	Co(+2) Liq1	Zn(+2) Liq1	Cd(+2) Liq1	Ca(+2) Liq1	Br(-1) Liq1	As(+5) Liq1	NiCr2O4 - Sol	NaAlCO3(OH)2 (Dawsonite) - Sol	CoCr2O4 - Sol	CaSO4.2H2O (Gypsum)	CaCO3 (Calcite) - Sol
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	32,905	6.81	50,547	19.3	1,039	30,269	52.6	0	0.0041	1,141	2.50E-03	0	1.05E-05	10,281	0	1.79E-05	3,837	0	3.59E-04	0.0000	0.0012	9.98E-05	3,301	43.5	0.0206	0.0032	0	0.0001	1,114	145
2	50,000	82,883	7.16	40,487	12.6	1,031	23,112	40.5	0.395	0.0021	1,023	1.02E-03	0.024	3.06E-06	11,174	0.0122	7.12E-06	1,800	199	1.43E-04	0.0025	0.0043	6.00E-05	1,591	48.6	0.0108	0.0021	0.48	0.0021	0	63.2
3	1.00E+05	1.33E+05	7.31	38,455	11.0	1,029	21,340	37.5	0.492	0.0016	942	6.51E-04	0.030	3.46E-06	11,395	0.0152	4.44E-06	1,296	248	8.91E-05	0.0031	0.0051	5.01E-05	1,105	49.8	0.0083	0.0019	0.60	0.0026	0	41.5
5	1.50E+05	1.83E+05	7.40	37,206	10.2	1,028	20,536	36.1	0.537	0.0014	905	4.85E-04	0.033	3.84E-06	11,495	0.0166	3.23E-06	1,067	271	6.48E-05	0.0034	0.0055	4.57E-05	884	50.4	0.0072	0.0017	0.66	0.0029	0	31.2
6	2.00E+05	2.33E+05	7.46	36,043	9.80	1,028	20,078	35.3	0.562	0.0012	884	3.90E-04	0.034	4.16E-06	11,552	0.0173	2.53E-06	937	283	5.10E-05	0.0035	0.0057	4.31E-05	759	50.7	0.0066	0.0017	0.69	0.0030	0	25.2
8	2.50E+05	2.83E+05	7.51	36,033	9.53	1,027	19,781	34.8	0.578	0.0012	871	3.29E-04	0.035	4.44E-06	11,589	0.0178	2.09E-06	853	292	4.20E-05	0.0036	0.0058	4.15E-05	677	50.9	0.0062	0.0016	0.71	0.0031	0	21.2
9	3.00E+05	3.33E+05	7.55	35,710	9.33	1,027	19,574	34.4	0.590	0.0011	861	2.86E-04	0.036	4.68E-06	11,615	0.0182	1.77E-06	794	297	3.58E-05	0.0037	0.0059	4.03E-05	620	51.1	0.0059	0.0016	0.72	0.0031	0	18.4
11	3.50E+05	3.83E+05	7.58	35,023	9.19	1,027	19,420	34.2	0.598	0.0011	854	2.54E-04	0.037	4.89E-06	11,634	0.0185	1.54E-06	750	302	3.11E-05	0.0038	0.0060	3.95E-05	579	51.2	0.0057	0.0016	0.73	0.0032	0	16.3
12	4.00E+05	4.33E+05	7.60	35,289	9.08	1,027	19,303	34.0	0.605	0.0010	849	2.29E-04	0.037	5.08E-06	11,648	0.0187	1.36E-06	717	305	2.76E-05	0.0038	0.0060	3.88E-05	546	51.3	0.0055	0.0015	0.74	0.0032	0	14.6
14	4.50E+05	4.83E+05	7.62	35,143	9.00	1,027	19,209	33.8	0.610	0.0010	845	2.10E-04	0.037	5.24E-06	11,660	0.0188	1.22E-06	690	308	2.48E-05	0.0038	0.0060	3.83E-05	521	51.3	0.0054	0.0015	0.75	0.0032	0	13.3
15	5.00E+05	5.33E+05	7.64	35,025	8.93	1,027	19,133	33.7	0.614	0.0010	841	1.94E-04	0.038	5.38E-06	11,669	0.0189	1.11E-06	668	310	2.25E-05	0.0039	0.0061	3.79E-05	500	51.4	0.0053	0.0015	0.75	0.0032	0	12.2
17	5.50E+05	5.83E+05	7.65	34,927	8.87	1,026	19,070	33.6	0.618	0.0010	838	1.81E-04	0.038	5.51E-06	11,677	0.0191	1.01E-06	651	311	2.06E-05	0.0039	0.0061	3.75E-05	483	51.4	0.0052	0.0015	0.76	0.0032	0	11.3
18	6.00E+05	6.33E+05	7.67	34,845	8.82	1,026	19,017	33.5	0.620	0.0010	836	1.70E-04	0.038	5.63E-06	11,684	0.0191	9.32E-07	636	313	1.90E-05	0.0039	0.0061	3.72E-05	468	51.5	0.0052	0.0015	0.76	0.0033	0	10.5
20	6.50E+05	6.83E+05	7.68	34,775	8.78	1,026	18,972	33.4	0.623	0.0009	834	1.61E-04	0.038	5.74E-06	11,689	0.0192	8.64E-07	623	314	1.76E-05	0.0039	0.0061	3.70E-05	456	51.5	0.0051	0.0015	0.76	0.0033	0	9.87
21	7.00E+05	7.33E+05	7.69	34,714	8.74	1,026	18,933	33.3	0.625	0.0009	832	1.53E-04	0.038	5.83E-06	11,694	0.0193	8.05E-07	612	315	1.64E-05	0.0039	0.0062	3.68E-05	445	51.5	0.0050	0.0015	0.76	0.0033	0	9.30
23	7.50E+05	7.83E+05	7.70	34,661	8.71	1,026	18,899	33.3	0.627	0.0009	831	1.46E-04	0.038	5.92E-06	11,698	0.0193	7.53E-07	602	316	1.54E-05	0.0039	0.0062	3.66E-05	436	51.5	0.0050	0.0015	0.77	0.0033	0	8.80
24	8.00E+05	8.33E+05	7.70	34,614	8.68	1,026	18,869	33.2	0.629	0.0009	829	1.40E-04	0.038	6.00E-06	11,702	0.0194	7.08E-07	593	317	1.45E-05	0.0039	0.0062	3.64E-05	428	51.6	0.0049	0.0015	0.77	0.0033	0	8.35
26	8.50E+05	8.83E+05	7.71	34,573	8.66	1,026	18,843	33.2	0.630	0.0009	828	1.34E-04	0.039	6.08E-06	11,705	0.0194	6.68E-07	586	318	1.37E-05	0.0040	0.0062	3.63E-05	420	51.6	0.0049	0.0015	0.77	0.0033	0	7.96
27	9.00E+05	9.33E+05	7.72	34,536	8.64	1,026	18,819	33.1	0.631	0.0009	827	1.29E-04	0.039	6.14E-06	11,708	0.0195	6.32E-07	579	318	1.30E-05	0.0040	0.0062	3.61E-05	414	51.6	0.0049	0.0015	0.77	0.0033	0	7.61
29	9.50E+05	9.83E+05	7.72	34,503	8.62	1,026	18,798	33.1	0.633	0.0009	826	1.25E-04	0.039	6.21E-06	11,711	0.0195	6.00E-07	573	319	1.23E-05	0.0040	0.0062	3.60E-05	408	51.6	0.0048	0.0015	0.77	0.0033	0	7.29
30	1.00E+06	1.03E+06	7.73	34,473	8.60	1,026	18,778	33.1	0.634	0.0009	825	1.21E-04	0.039	6.27E-06	11,713	0.0195	5.71E-07	568	319	1.18E-05	0.0040	0.0062	3.59E-05	403	51.6	0.0048	0.0014	0.77	0.0033	0	7.00
46	1.50E+06	1.53E+06	7.77	34,281	8.49	1,026	18,655	32.9	0.640	0.0009	819	9.54E-05	0.039	6.68E-06	11,728	0.0198	3.85E-07	532	323	8.04E-06	0.0040	0.0063	3.52E-05	369	51.7	0.0047	0.0014	0.78	0.0033	0	5.12
59	1.95E+06	1.98E+06	7.78	34,191	8.43	1,026	18,597	32.8	0.644	0.0008	817	8.35E-05	0.039	6.91E-06	11,736	0.0199	2.97E-07	516	325	6.30E-06	0.0040	0.0063	3.49E-05	353	51.8	0.0046	0.0014	0.79	0.0034	0	4.22
73	2.40E+06	2.43E+06	7.80	34,134	8.40	1,026	18,561	32.7	0.646	0.0008	815	7.59E-05	0.039	7.06E-06	11,740	0.0199	2.42E-07	506	326	5.20E-06	0.0041	0.0063	3.47E-05	343	51.8	0.0045	0.0014	0.79	0.0034	0	3.65
87	2.85E+06	2.88E+06	7.80	34,095	8.38	1,026	18,536	32.6	0.647	0.0008	814	7.07E-05	0.040	7.17E-06	11,743	0.0200	2.05E-07	499	326	4.44E-06	0.0041	0.0063	3.46E-05	337	51.8	0.0045	0.0014	0.79	0.0034	0	3.26
100	3.30E+06	3.33E+06	7.81	34,067	8.36	1,026	18,517	32.6	0.648	0.0008	813	6.70E-05	0.040	7.25E-06	11,746	0.0200	1.77E-07	493	327	3.89E-06	0.0041	0.0063	3.45E-05	332	51.8	0.0045	0.0014	0.79	0.0034	0	2.97
114	3.75E+06	3.78E+06	7.82	34,045	8.35	1,026	18,503	32.6	0.649	0.0008	813	6.41E-05	0.040	7.32E-06	11,747	0.0200	1.56E-07	489	327	3.47E-06	0.0041	0.0064	3.44E-05	328	51.8	0.0044	0.0014	0.79	0.0034	0	2.74
128	4.20E+06	4.23E+06	7.82	34,028	8.34	1,026	18,492	32.6	0.649	0.0008	812	6.18E-05	0.040	7.37E-06	11,749	0.0200	1.39E-07	486	327	3.14E-06	0.0041	0.0064	3.43E-05	325	51.8	0.0044	0.0014	0.79	0.0034	0	2.57
141	4.65E+06	4.68E+06	7.82	34,014	8.33	1,026	18,483	32.6	0.650	0.0008	812	6.00E-05	0.040	7.41E-06	11,750	0.0200	1.26E-07	484	328	2.87E-06	0.0041	0.0064	3.43E-05	322	51.8	0.0044	0.0014	0.79	0.0034	0	2.43
155	5.10E+06	5.13E+06	7.83	34,003	8.32	1,026	18,476	32.5	0.650	0.0008	811	5.85E-05	0.040	7.45E-06	11,751	0.0201	1.15E-07	482	328	2.65E-06	0.0041	0.0064	3.42E-05	320	51.8	0.0044	0.0014	0.80	0.0034	0	2.31
169	5.55E+06	5.58E+06	7.83	33,993	8.31	1,026	18,470	32.5	0.651	0.0008	811	5.72E-05	0.040	7.48E-06	11,751	0.0201	1.06E-07	480	328	2.46E-06	0.0041	0.0064	3.42E-05	319	51.9	0.0044	0.0014	0.80	0.0034	0	2.21
182	6.00E+06	6.03E+06	7.83	33,985	8.31	1,026	18,465	32.5	0.651	0.0008	811	5.61E-05	0.040	7.50E-06	11,752	0.0201	9.78E-08	478	328	2.30E-06	0.0041	0.0064	3.42E-05	317	51.9	0.0044	0.0014	0.80	0.0034	0	2.13
198	6.50E+06	6.53E+06	7.83	33,978	8.31	1,026	18,460	32.5	0.651	0.0008	811	5.51E-05	0.040	7.53E-06	11,753	0.0201	9.03E-08	477	328	2.15E-06	0.0041	0.0064	3.41E-05	316	51.9	0.0044	0.0014	0.80	0.0034	0	2.05
482	1.59E+07	1.59E+07	7.84	33,923	8.27	1,026	18,425	32.5	0.653	0.0008	809	4.78E-05	0.040	7.71E-06	11,757	0.0201	3.71E-08	467	329	1.09E-06	0.0041	0.0064	3.39E-05	306	51.9	0.0043	0.0014	0.80	0.0034	0	1.48
766	2.52E+07	2.52E+07	7.85	33,909	8.26	1,026	18,416	32.4	0.654	0.0008	809	4.59E-05	0.040	7.76E-06	11,758	0.0202	2.34E-08	464	330	8.17E-07	0.0041	0.0064	3.39E-05	304	51.9	0.0043	0.0014	0.80	0.0034	0	1.33
1050	3.46E+07	3.46E+07	7.85	33,902	8.26	1,026	18,411	32.4	0.654	0.0008	808	4.50E-05	0.040	7.79E-06	11,759	0.0202	1.71E-08	463	330	6.91E-07	0.0041	0.0064	3.39E-05	303	51.9	0.0043	0.0014	0.80	0.0034	0	1.26
1334	4.39E+07	4.39E+07	7.85	33,898	8.26	1,026	18,409	32.4	0.654	0.0008	808	4.45E-05	0.040	7.80E-06	11,759	0.0202	0	463	330	6.18E-07	0.0041	0.0064	3.38E-05	302	51.9	0.0043	0.0014	0.80	0.0034	0	1.22
1618	5.33E+07	5.33E+07	7.85	33,896	8.26	1,026	18,407	32.4	0.654	0.0008	808	4.42E-05	0.040	7.81E-06	11,759	0.0202	0	462	330	5.71E-07	0.0041	0.0064	3.38E-05	302	51.9	0.0043	0.0014	0.80	0.0034	0	1.19
1902	6.26E+07	6.26E+07	7.85	33,894	8.26	1,026	18,406	32.4	0.654	0.0008	808	4.40E-05	0.040	7.81E-06	11,759	0.0202	0	462	330	5.38E-07	0.0041	0.0064	3.38E-05	301	51.9	0.0043	0.0014	0.80	0.0034	0	1.18
2187	7.20E+07	7.20E+07	7.85	33,893	8.26	1,026	18,405	32.4	0.654	0.0008	808	4.38E-05	0.040	7.82E-06	11,759	0.0202	0	462	330	5.14E-07	0.0041	0.0064	3.38E-05	301	51.9	0.0043	0.0014	0.80	0.0034	0	1.16
2471	8.13E+07	8.13E+07	7.85	33,892	8.25	1,026	18,405	32.4	0.654	0.0008	808	4.37E-05	0.040	7.82E-06	11,759	0.0202	0	461	330	4.95E-07	0.0041	0.0064	3.38E-05	301	51.9	0.0043	0.0014	0.80	0.0034	0	1.15
2755	9.07E+07	9.07E+07	7.85	33,891	8.25	1,026	18,404	32.4	0.654	0.0008	808	4.36E-05	0.040	7.82E-06	11,760	0.0202	0	461	330	4.80E-07	0.0041	0.0064	3.38E-05	301	51.9	0.0043	0.0014	0.80	0.0034	0	1.14
3039	1.00E+08	1.00E+08	7.85	33,890	8.25	1,026	18,404	32.4	0.654	0.0008	808	4.35E-05	0.040	7.83E-06	11,760	0.0202	0	461	330	4.68E-07	0.0041	0.0064	3.38E-05	301	51.9	0.0043	0.0014	0.80	0.0034	0	1.14

SCENARIO 5A

Dilution Ratio	Volume - PoPA	Volume - Total	pH	Total Dissolved Solids	Temperature	Density	Cl(-1)	Salinity	Ti(+4)	Si(+4)	Se(+4)	Sb(+5)	S(+6)	Pb(+2)	P(+5)	Ni(+2)	Na(+1)	N(-3)	N(+5)	N(+3)	Mn(+2)	Mg(+2)	Zn(+2)	K(+1)	Hg(+2)	Fe(+3)	Fe(+2)	F(-1)	Cu(+2)	Cr(+6)	Cr(+3)	Co(+2)	Cd(+2)	Ca(+2)	Br(-1)	Be(+2)	Ba(+2)	As(+5)	Al(+3)	NiTiO3	NiFe2O4 (Trevorite)	NiCr2O4	Ni(OH)2 (Theophrastite)	NaAlCO3(OH)2 (Dawsonite)	Mg3Si2O5(OH)4 (Poor crystalline Antigorite)	Mg(OH)2 (Brucite)	CuO	Co3(PO4)2.8H2O	CaCO3 (Calcite)	Ca3(PO4)2	Be2(OH)2CO3	Al(OH)3 (Gibbsite)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	g/Kg	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	39,036	9.84	45,209	20.4	1,037	25,119	43.8	5.58E-05	3.78E-04	5.43E-04	0	1,140	1.74E-03	0.0002	0.0096	15,268	0	0	0	0	895	0.0010	0	4.51E-08	7.38E-10	0	0	7.81E-05	1.87E-04	5.10E-10	0.0722	5.41E-05	853	36.8	0	0	0.00	0.04	0.03	0.77	0.02	4.00	0	85.9	8,197	0.0002	0.1654	263	0	0	0.37
1	50,000	89,018	10.2	42,750	13.6	1,031	21,345	37.4	5.51E-05	1.98E-04	6.78E-04	0.006	954	7.84E-04	0.0053	0.0059	13,298	0.0114	0.1589	0.0428	0.0028	670	0.0040	186	2.17E-07	4.13E-10	0.0084	1.41	7.88E-05	1.53E-04	2.87E-10	0.0039	4.27E-05	484	45.3	0.0028	0.0028	0.0034	0.0465	0.0130	0.3383	0.0115	1.75	0	39.4	3,540	0.0014	0.1604	260	0.033	0.000	0.33
3	1.00E+05	1.39E+05	10.3	37,123	11.7	1,029	20,286	35.6	5.49E-05	1.66E-04	7.16E-04	0.007	901	5.17E-04	0.0066	0.0051	12,745	0.0145	0.2033	0.0548	0.0036	606	0.0049	238	2.65E-07	3.52E-10	0.0108	1.80	8.18E-05	1.43E-04	2.42E-10	0.0031	3.95E-05	381	47.7	0.0036	0.0036	0.0037	0.0480	0.0082	0.2165	0.0091	1.12	0	26.4	2,236	0.0017	0.1063	259	0.075	0.000	0.31
4	1.50E+05	1.89E+05	10.3	36,307	10.8	1,028	19,787	34.8	5.47E-05	1.54E-04	7.34E-04	0.008	876	3.91E-04	0.0076	0.0047	12,485	0.0160	0.2243	0.0605	0.0040	577	0.0053	262	2.87E-07	3.27E-10	0.0119	1.99	8.37E-05	1.39E-04	2.23E-10	0.0027	3.80E-05	332	48.8	0.0038	0.0040	0.0039	0.0488	0.0060	0.1592	0.0080	0.82	0	20.2	1,622	0.0018	0.0806	258	0.093	0.001	0.31
5	2.00E+05	2.39E+05	10.3	35,807	10.2	1,028	19,497	34.3	5.47E-05	1.47E-04	7.44E-04	0.008	862	3.18E-04	0.0084	0.0046	12,333	0.0169	0.2364	0.0637	0.0042	559	0.0055	276	3.00E-07	3.14E-10	0.0126	2.09	8.50E-05	1.36E-04	2.13E-10	0.0025	3.71E-05	304	49.4	0.0040	0.0042	0.0040	0.0494	0.0047	0.1259	0.0073	0.65	0	16.7	1,265	0.0019	0.0657	257	0.102	0.001	0.30
6	2.50E+05	2.89E+05	10.4	35,439	9.90	1,027	19,307	34.0	5.46E-05	1.42E-04	7.51E-04	0.009	853	2.71E-04	0.0090	0.0044	12,234	0.0175	0.2444	0.0659	0.0043	548	0.0057	286	3.09E-07	3.05E-10	0.0130	2.16	8.59E-05	1.35E-04	2.07E-10	0.0024	3.65E-05	286	49.9	0.0041	0.0043	0.0040	0.0497	0.0039	0.1041	0.0069	0.53	0	14.4	1,031	0.0020	0.0560	257	0.108	0.002	0.30
8	3.00E+05	3.39E+05	10.4	35,179	9.66	1,027	19,173	33.7	5.46E-05	1.39E-04	7.55E-04	0.009	846	2.37E-04	0.0094	0.0044	12,164	0.0179	0.2500	0.0674	0.0044	540	0.0058	292	3.15E-07	2.99E-10	0.0133	2.21	8.65E-05	1.33E-04	2.02E-10	0.0023	3.61E-05	273	50.2	0.0041	0.0044	0.0041	0.0500	0.0033	0.0887	0.0066	0.45	0	12.7	867	0.0020	0.0491	257	0.112	0.002	0.30
9	3.50E+05	3.89E+05	10.4	34,986	9.49	1,027	19,074	33.6	5.46E-05	1.37E-04	7.59E-04	0.009	841	2.12E-04	0.0098	0.0043	12,112	0.0182	0.2542	0.0685	0.0045	534	0.0059	297	3.20E-07	2.95E-10	0.0135	2.25	8.70E-05	1.33E-04	1.99E-10	0.0022	3.58E-05	263	50.4	0.0042	0.0045	0.0041	0.0502	0.0028	0.0773	0.0063	0.39	0	11.5	745	0.0020	0.0440	257	0.115	0.002	0.29
10	4.00E+05	4.39E+05	10.4	34,837	9.35	1,027	18,997	33.4	5.45E-05	1.36E-04	7.62E-04	0.009	837	1.93E-04	0.0101	0.0043	12,072	0.0184	0.2574	0.0694	0.0046	530	0.0059	301	3.23E-07	2.92E-10	0.0137	2.28	8.74E-05	1.32E-04	1.96E-10	0.0022	3.56E-05	256	50.6	0.0042	0.0046	0.0041	0.0503	0.0025	0.0685	0.0062	0.35	0	10.6	650	0.0020	0.0400	256	0.116	0.002	0.29
12	4.50E+05	4.89E+05	10.4	34,719	9.24	1,027	18,936	33.3	5.45E-05	1.34E-04	7.64E-04	0.009	834	1.77E-04	0.0104	0.0042	12,040	0.0186	0.2599	0.0701	0.0046	526	0.0060	304	3.26E-07	2.89E-10	0.0138	2.30	8.78E-05	1.31E-04	1.94E-10	0.0021	3.54E-05	250	50.7	0.0043	0.0046	0.0041	0.0505	0.0022	0.0615	0.0060	0.31	0	9.80	575	0.0021	0.0369	256	0.118	0.002	0.29
13	5.00E+05	5.39E+05	10.4	34,622	9.15	1,026	18,886	33.2	5.45E-05	1.33E-04	7.66E-04	0.009	832	1.65E-04	0.0106	0.0042	12,014	0.0187	0.2620	0.0706	0.0046	523	0.0060	306	3.28E-07	2.87E-10	0.0139	2.32	8.80E-05	1.31E-04	1.93E-10	0.0021	3.53E-05	245	50.8	0.0043	0.0046	0.0042	0.0506	0.0020	0.0558	0.0059	0.28	0	9.19	514	0.0021	0.0343	256	0.119	0.002	0.29
14	5.50E+05	5.89E+05	10.4	34,542	9.08	1,026	18,845	33.2	5.45E-05	1.33E-04	7.67E-04	0.009	830	1.55E-04	0.0108	0.0042	11,993	0.0189	0.2637	0.0711	0.0047	521	0.0060	308	3.30E-07	2.85E-10	0.0140	2.34	8.83E-05	1.30E-04	1.91E-10	0.0021	3.51E-05	241	50.9	0.0043	0.0047	0.0042	0.0507	0.0018	0.0511	0.0058	0.26	0	8.69	463	0.0021	0.0322	256	0.120	0.002	0.29
15	6.00E+05	6.39E+05	10.4	34,474	9.01	1,026	18,810	33.1	5.45E-05	1.32E-04	7.68E-04	0.009	828	1.46E-04	0.0110	0.0041	11,975	0.0190	0.2652	0.0715	0.0047	518	0.0061	310	3.31E-07	2.84E-10	0.0141	2.35	8.84E-05	1.30E-04	1.90E-10	0.0021	3.50E-05	238	51.0	0.0044	0.0047	0.0042	0.0507	0.0017	0.0471	0.0057	0.24	0	8.26	420	0.0021	0.0304	256	0.121	0.002	0.29
17	6.50E+05	6.89E+05	10.4	34,416	8.96	1,026	18,781	33.1	5.45E-05	1.31E-04	7.69E-04	0.009	827	1.38E-04	0.0112	0.0041	11,959	0.0190	0.2664	0.0718	0.0047	517	0.0061	311	3.33E-07	2.83E-10	0.0142	2.36	8.86E-05	1.30E-04	1.89E-10	0.0020	3.49E-05	235	51.0	0.0044	0.0047	0.0042	0.0508	0.0015	0.0436	0.0057	0.22	0	7.89	384	0.0021	0.0289	256	0.121	0.002	0.29
18	7.00E+05	7.39E+05	10.4	34,367	8.91	1,026	18,755	33.0	5.45E-05	1.31E-04	7.70E-04	0.009	825	1.32E-04	0.0113	0.0041	11,946	0.0191	0.2675	0.0721	0.0047	515	0.0061	313	3.34E-07	2.82E-10	0.0142	2.37	8.88E-05	1.30E-04	1.89E-10	0.0020	3.49E-05	232	51.1	0.0044	0.0047	0.0042	0.0509	0.0014	0.0407	0.0056	0.20	0	7.58	352	0.0021	0.0276	256	0.122	0.002	0.29
19	7.50E+05	7.89E+05	10.4	34,323	8.87	1,026	18,732	33.0	5.45E-05	1.30E-04	7.71E-04	0.010	824	1.26E-04	0.0114	0.0041	11,934	0.0192	0.2685	0.0724	0.0048	514	0.0061	314	3.35E-07	2.81E-10	0.0143	2.38	8.89E-05	1.29E-04	1.88E-10	0.0020	3.48E-05	230	51.2	0.0044	0.0048	0.0042	0.0509	0.0013	0.0381	0.0056	0.19	0	7.30	325	0.0021	0.0264	256	0.122	0.002	0.29
20	8.00E+05	8.39E+05	10.4	34,284	8.84	1,026	18,713	32.9	5.45E-05	1.30E-04	7.72E-04	0.010	823	1.21E-04	0.0116	0.0041	11,923	0.0193	0.2693	0.0726	0.0048	513	0.0061	315	3.36E-07	2.80E-10	0.0143	2.38	8.90E-05	1.29E-04	1.87E-10	0.0020	3.47E-05	228	51.2	0.0044	0.0048	0.0042	0.0510	0.0012	0.0358	0.0055	0.18	0	7.06	300	0.0021	0.0254	256	0.122	0.002	0.29
22	8.50E+05	8.89E+05	10.4	34,250	8.81	1,026	18,695	32.9	5.45E-05	1.29E-04	7.72E-04	0.010	822	1.17E-04	0.0117	0.0041	11,914	0.0193	0.2700	0.0728	0.0048	512	0.0062	316	3.37E-07	2.79E-10	0.0143	2.39	8.91E-05	1.29E-04	1.87E-10	0.0020	3.47E-05	226	51.2	0.0044	0.0048	0.0042	0.0510	0.0011	0.0338	0.0055	0.17	0	6.84	279	0.0021	0.0245	256	0.123	0.002	0.29
23	9.00E+05	9.39E+05	10.4	34,220	8.78	1,026	18,679	32.9	5.45E-05	1.29E-04	7.73E-04	0.010	822	1.13E-04	0.0117	0.0041	11,906	0.0194	0.2707	0.0730	0.0048	511	0.0062	316	3.37E-07	2.79E-10	0.0144	2.40	8.92E-05	1.29E-04	1.86E-10	0.0020	3.47E-05	225	51.3	0.0044	0.0048	0.0042	0.0510	0.0011	0.0320	0.0054	0.16	0	6.65	259	0.0021	0.0237	256	0.123	0.002	0.29
24	9.50E+05	9.89E+05	10.4	34,192	8.75	1,026	18,665	32.9	5.45E-05	1.29E-04	7.73E-04	0.010	821	1.09E-04	0.0118	0.0041	11,899	0.0194	0.2713	0.0731	0.0048	510	0.0062	317	3.38E-07	2.78E-10	0.0144	2.40	8.93E-05	1.29E-04	1.86E-10	0.0020	3.46E-05	223	51.3	0.0045	0.0048	0.0042	0.0511	0.0010	0.0304	0.0054	0.15	0	6.48	242	0.0021	0.0229	256	0.123	0.002	0.29
26	1.00E+06	1.04E+06	10.4	34,168	8.73	1,026	18,652	32.8	5.45E-05	1.29E-04	7.74E-04	0.010	820	1.06E-04	0.0119	0.0041	11,892	0.0194	0.2718	0.0733	0.0048	509	0.0062	318	3.39E-07	2.78E-10	0.0144	2.41	8.94E-05	1.29E-04	1.85E-10	0.0019	3.46E-05	222	51.3	0.0045	0.0048	0.0042	0.0511	0.0009	0.0289	0.0054	0.14	0	6.32	226	0.0021	0.0223	256	0.123	0.002	0.29
38	1.50E+06	1.54E+06	10.4	34,009	8.58	1,026	18,570	32.7	5.44E-05	1.27E-04	7.77E-04	0.010	816	8.55E-05	0.0124	0.0040	11,849	0.0197	0.2752	0.0742	0.0049	504	0.0063	322	3.42E-07	2.74E-10	0.0146	2.44	8.98E-05	1.28E-04	1.83E-10	0.0019	3.43E-05	214	51.5	0.0045	0.0049	0.0043	0.0513	0.0006	0.0195	0.0052	0.09	0	5.32	126	0.0022	0.0181	255	0.125	0.002	0.29
43	1.68E+06	1.72E+06	10.4	33,974	8.55	1,026	18,553	32.7	5.44E-05	1.27E-04	7.77E-04	0.010	815	8.10E-05	0.0125	0.0040	11,840	0.0197	0.2760	0.0744	0.0049	503	0.0063	323	3.43E-07	2.74E-10	0.0147	2.44	9.00E-05	1.28E-04	1.82E-10	0.0019	3.43E-05	213	51.6	0.0045	0.0049	0.0043	0.0513	0.0005	0.0175	0.0051	0.08	0	5.10	104	0.0022	0.0172	255	0.125	0.002	0.29
48	1.86E+06	1.90E+06	10.4	33,946	8.53	1,026	18,538	32.6	5.44E-05	1.26E-04	7.78E-04	0.010	815	7.74E-05	0.0126	0.0040	11,832	0.0198	0.2766	0.0746	0.0049	502	0.0063	323	3.44E-07	2.73E-10	0.0147	2.45	9.00E-05	1.28E-04	1.82E-10	0.0019	3.42E-05	211	51.6	0.0046	0.0049	0.0043	0.0514	0.0004	0.0158	0.0051	0.07	0	4.92	85.9	0.0022	0.0164	255	0.125	0.002	0.29
52	2.04E+06	2.08E+06	10.4	33,923	8.50	1,026	18,526	32.6	5.44E-05	1.26E-04	7.78E-04	0.010	814	7.44E-05	0.0127	0.0040	11,826	0.0198	0.2771	0.0747	0.0049	502	0.0063	324	3.44E-07	2.73E-10	0.0147	2.45	9.01E-05	1.28E-04	1.81E-10	0.0019	3.42E-05	210	51.6	0.0046	0.0049	0.0043	0.0514	0.0004	0.0145	0.0051	0.07	0	4.77	71.2	0.0022	0.0158	255	0.125	0.002	0.29
57	2.22E+06	2.26E+06	10.4	33,903	8.49	1,026	18,516	32.6	5.44E-05	1.26E-04	7.79E-04	0.010	814	7.18E-05	0.0128	0.0040	11,821	0.0198	0.2775	0.0748	0.0049	501	0.0063	324	3.45E-07	2.72E-10	0.0147	2.46	9.02E-05	1.28E-04	1.81E-10	0.0019	3.41E-05	209	51.6	0.0046	0.0049	0.0043	0.0514	0.0003	0.0133	0.0051	0.06	0	4.65	58.9	0.0022	0.0153	255	0.125	0.002	0.29
61	2.40E+06	2.44E+06	10.4	33,887	8.47	1,026	18,508	32.6	5.44E-05	1.26E-04	7.79E-04	0.010	813	6.97E-05	0.0129	0.0040	11,816	0.0199	0.2779	0.0749	0.0049	500	0.0063	325	3.45E-07	2.72E-10	0.0148	2.46	9.02E-05	1.27E-04	1.81E-10	0.0018	3.41E-05	208	51.7	0.0046	0.0049	0.0043	0.0514	0.0003	0.0123	0.0050	0.06	0	4.55	48.3	0.0022	0.0148	255	0.125	0.002	0.29
66	2.58E+06	2.62E+06	10.4	33,872	8.46	1,026	18,500	32.6	5.44E-05	1.26E-04	7.79E-04	0.010	813	6.78E-05	0.0129	0.0040	11,813	0.0199	0.2782	0.0750	0.0049	500	0.0063	325	3.45E-07	2.72E-10	0.0148	2.46	9.03E-05	1.27E-04	1.81E-10	0.0018	3.41E-05	208	51.7	0.0046	0.0049	0.0043	0.0515	0.0003	0.0115	0.0050	0.05	0	4.46	39.3	0.0022	0.0145	255	0.125	0.002	0.29
71	2.76E+06	2.80E+06	10.4	33,860	8.45	1,026	18,494	32.6	5.44E-05	1.26E-04	7.79E-04	0.010	812	6.62E-05	0.0130	0.0040	11,809	0.0199	0.2785	0.0751	0.0049	500	0.0063	325	3.46E-07	2.71E-10	0.0148	2.47	9.03E-05	1.27E-04	1.81E-10	0.0018	3.41E-05	207	51.7	0.0046	0.0049	0.0043	0.0515	0.0002	0.0107	0.0050	0.05	0	4.38	31.4	0.0022	0.0141	255	0.125	0.002	0.29
75	2.94E+06	2.98E+06	10.4	33,849	8.44	1,026	18,488	32.6	5.44E-05	1.25E-04	7.80E-04	0.010	812	6.48E-05	0.0130	0.0040	11,806	0.0199	0.2787	0.0751	0.0049	499	0.0063	326	3.46E-07	2.71E-10	0.0148	2.47	9.04E-05	1.27E-04	1.80E-10	0.0018	3.41E-05	206	51.7	0.0046	0.0049	0.0043	0.0515	0.0002	0.0101	0.0050	0.04	0	4.31	24.4	0.0022	0.0138	255	0.126	0.002	0.29
80	3.12E+06	3.16E+06	10.4	33,839	8.43	1,026	18,483	32.6	5.44E-05	1.25E-04	7.80E-04	0.010	812	6.35E-05	0.0130	0.0040	11,804	0.0199	0.2789	0.0752	0.0049	499	0.0063	326	3.46E-07	2.71E-10	0.0148	2.47	9.04E-05	1.27E-04	1.80E-10	0.0018	3.41E-05	206	51.7	0.0046	0.0049	0.0043	0.0515	0.0002	0.0095	0.0050	0.04	0	4.25	18.2	0.0022	0.0136	255	0.126	0.002	0.29
85	3.30E+06	3.34E+06	10.4	33,830	8.42	1,026	18,479	32.5	5.44E-05	1.25E-04	7.80E-04	0.010	812	6.24E-05	0.0131	0.0040	11,801	0.0200	0.2791	0.0752	0.0049	499	0.0063	326	3.46E-07	2.71E-10	0.0148	2.47	9.04E-05	1.27E-04	1.80E-10	0.0018	3.40E-05	205	51.7	0.0046	0.0049	0.0043	0.0515	0.0002	0.0090	0.0050	0.04	0	4.19	12.8	0.0022	0.0134	255	0.126	0.002	0.29
89	3.48E+06	3.52E+06	10.4	33,823	8.41	1,026	18,475	32.5	5.44E-05	1.25E-04	7.80E-04	0.010	811	6.14E-05	0.0131	0.0040	11,799	0.0200	0.2793	0.0753	0.0049	498	0.0063	326	3.47E-07	2.71E-10	0.0148	2.47	9.04E-05	1.27E-04	1.80E-10	0.0018	3.40E-05	205	51.7	0.0046	0.0049	0.0043	0.0515	0.0002	0.0085	0.0050	0.04	0	4.14	7.82	0.0022	0.0131	255	0.126	0.002	0.29
94	3.66E+06	3.70E+06	10.4	33,816	8.41	1,026	18,471	32.5	5.44E-05	1.25E-04	7.80E-04	0.010	811	6.05E-05	0.0131	0.0040	11,797	0.0200	0.2794	0.0753	0.0049	498	0.0063	327	3.47E-07	2.70E-10	0.0148	2.47	9.05E-05	1.27E-04	1.80E-10	0.0018	3.40E-05	205	51.7	0.0046	0.0049	0.0043	0.0515	0.0001	0.0081	0.0050	0.03	0	4.10	3.36	0.0022	0.0130	255	0.126	0.002	0.29
98	3.84E+06	3.88E+06	10.4	33,809	8.40	1,026	18,468	32.5	5.44E-05	1.64E-04	7.80E-04	0.010	811	5.97E-05	0.0145	0.0047	11,796	0.0200	0.2795	0.0754	0.0049	498	0.0063	327	3.47E-07	2.43E-10	0.0148	2.47	8.31E-05	1.27E-04	1.80E-10	0.0015	3.40E-05	204	51.7	0.0049	0.0049	0.0043	0.0455	0.0001	0.0078	0.0049	0.03	0	4.06	0	0.0022	0.0138	255	0.118	0.000	0.30
103	4.02E+06	4.06E+06	9.95	33,800	8.39	1,026	18,465	32.5	5.44E-05	0.002	7.80E-04	0.010	811	5.89E-05	0.0348	0.0231	11,794	0.0200	0.2797	0.0754	0.0050	496	0.0063	327	3.47E-07	1.09E-10	0.0149	2.48	6.35E-05	1.27E-04	1.78E-10	0.0004	3.40E-05	205	51.8	0.0050	0.0050	0.0043	0.0162	0.0001	0.0074	0.0049	6.64E-04	0	4.01	0	0.0022	0.0166	253	0.015	0.000	0.39
108	4.20E+06	4.24E+06	9.41	33,796	8.39	1,026	18,462	32.5	8.54E-05	0.039	7.81E-04	0.010	811	5.82E-05	0.0381	0.0226	11,793	0.0200	0.2798	0.0754	0.0050	495	0.0064	327	3.47E-07	1.70E-10	0.0149	2.48	1.54E-04	1.27E-04	5.41E-10	0.0011	3.40E-05	207	51.8	0.0050	0.0050	0.0043	0.0047	0.0000	0.0071	0.0049	0	0	3.80	0	0.0021	0.0145	246	0	0	0.42
112	4.38E+06	4.42E+06	9.15	33,793	8.38	1,026	18,459	32.5	8.20E-05	0.207	7.81E-04	0.010	811	5.76E-05	0.0387	0.0216	11,791	0.0200	0.2799	0.0754	0.0050	493	0.0064	327	3.47E-07	2.57E-10	0.0149	2.48	3.17E-04	1.27E-04	9.91E-10	0.0028	3.40E-05	210	51.8	0.0050	0.0050	0.0043	0.0026	0.0000	0.0068	0.0049	0	0	2.93	0	0.0019	0.0096	238	0	0	0.43
117	4.56E+06	4.60E+06	9.01	33,791	8.38	1,026	18,457	32.5	7.88E-05	0.507	7.81E-04	0.010	811	5.70E-05	0.0393	0.0207	11,790	0.0200	0.2800	0.0755	0.0050	492	0.0064	327	3.47E-07	3.33E-10	0.0149	2.48	4.82E-04	1.27E-04	1.38E-09	0.0045	3.40E-05	213	51.8	0.0050	0.0050	0.0043	0.0019	0.0000	0.0065	0.0049	0	0	1.43	0	0.0017	0.0043	232	0	0	0.43
121	4.74E+06	4.78E+06	8.91	33,788	8.37	1,026	18,455	32.5	7.58E-05	0.791	7.81E-04	0.010	811	5.65E-05	0.0398	0.0199	11,789	0.0200	0.2801	0.0755	0.0050	492	0.0064	327	3.48E-07	4.08E-10	0.0149	2.48	6.60E-04	1.27E-04	1.76E-09	0.0060	3.40E-05	215	51.8	0.0050	0.0050	0.0043	0.0015	0.0000	0.0063	0.0049	0	0	0	0	0.0015	0	226	0	0	0.43
126	4.92E+06	4.96E+06	8.80	33,787	8.37	1,026	18,453	32.5	7.30E-05	0.786	7.81E-04	0.010	810	5.60E-05	0.0398	0.0191	11,788	0.0200	0.2802	0.0755	0.0050	490	0.0064	327	3.48E-07	5.15E-10	0.0149	2.48	9.52E-04	1.27E-04	2.31E-09	0.0060	3.40E-05	218	51.8	0.0050	0.0050	0.0043	0.0012	0.0000	0.0061	0.0049	0	0	0	0	0.0011	0	218	0	0	0.43
131	5.10E+06	5.14E+06	8.72	33,785	8.36	1,026	18,451	32.5	7.05E-05	0.781	7.81E-04	0.010	810	5.55E-05	0.0399	0.0184	11,787	0.0200	0.2802	0.0755	0.0050	489	0.0064	328	3.48E-07	6.22E-10	0.0149	2.48	1.27E-03	1.27E-04	2.86E-09	0.0059	3.40E-05	221	51.8	0.0050	0.0050	0.0043	0.0010	0.0000	0.0059	0.0049	0	0	0	0	0.0007	0	210	0	0	0.43
135	5.28E+06	5.32E+06	8.65	33,784	8.36	1,026	18,449	32.5	6.81E-05	0.777	7.81E-04	0.010	810	5.51E-05	0.0399	0.0178	11,786	0.0200	0.2803	0.0756	0.0050	488	0.0064	328	3.48E-07	7.29E-10	0.0149	2.48	1.61E-03	1.27E-04	3.43E-09	0.0059	3.39E-05	224	51.8	0.0050	0.0050	0.0043	0.0008	0.0000	0.0057	0.0049	0	0	0	0	0.0003	0	203	0	0	0.43
140	5.46E+06	5.50E+06	8.59	33,782	8.36	1,026	18,448	32.5	6.59E-05	0.773	7.81E-04	0.010	810	5.47E-05	0.0399	0.0172	11,785	0.0200	0.2804	0.0756	0.0050	487	0.0064	328	3.48E-07	8.36E-10	0.0149	2.48	1.85E-03	1.27E-04	3.99E-09	0.0059	3.39E-05	226	51.8	0.0050	0.0050	0.0043	0.0007	0.0000	0.0055	0.0049	0	0	0	0	0	0	196	0	0	0.43
144	5.64E+06	5.68E+06	8.55	33,781	8.35	1,026	18,446	32.5	6.38E-05	0.769	7.81E-04	0.010	810	5.43E-05	0.0399	0.0166	11,784	0.0201	0.2804	0.0756	0.0050	487	0.0064	328	3.48E-07	9.42E-10	0.0149	2.48	1.85E-03	1.27E-04	4.56E-09	0.0059	3.39E-05	228	51.8	0.0050	0.0050	0.0043	0.0007	0.0000	0.0053	0.0049	0	0	0	0	0	0	190	0	0	0.43
149	5.82E+06	5.86E+06	8.51	33,780	8.35	1,026	18,445	32.5	6.18E-05	0.766	7.81E-04	0.010	810	5.39E-05	0.0399	0.0161	11,784	0.0201	0.2805	0.0756	0.0050	486	0.0064	328	3.48E-07	1.05E-09	0.0149	2.48	1.85E-03	1.27E-04	5.13E-09	0.0058	3.39E-05	231	51.8	0.0050	0.0050	0.0043	0.0006	0.0000	0.0051	0.0049	0	0	0	0	0	0	184	0	0	0.43
154	6.00E+06	6.04E+06	8.47	33,778	8.35	1,026	18,444	32.5	6.00E-05	0.762	7.81E-04	0.010	810	5.36E-05	0.0399	0.0156	11,783	0.0201	0.2806	0.0756	0.0050	485	0.0064	328	3.48E-07	1.15E-09	0.0149	2.48	1.85E-03	1.27E-04	5.70E-09	0.0058	3.39E-05	233	51.8	0.0050	0.0050	0.0043	0.0006	0.0000	0.0050	0.0049	0	0	0	0	0	0	179	0	0	0.43
167	6.50E+06	6.54E+06	8.39	33,776	8.34	1,026	18,440	32.5	5.54E-05	0.754	7.81E-04	0.010	810	5.28E-05	0.0399	0.0143	11,781	0.0201	0.2807	0.0757	0.0050	483	0.0064	328	3.48E-07	1.43E-09	0.0149	2.49	1.85E-03	1.27E-04	7.26E-09	0.0057	3.39E-05	238	51.8	0.0050	0.0050	0.0043	0.0005	0.0000	0.0046	0.0049	0	0.799	0	0	0	0	165	0	0	0
326	1.27E+07	1.28E+07	8.07	33,758	8.30	1,026	18,421	32.4	2.84E-05	0.705	7.82E-04	0.010	809	4.79E-05	0.0399	0.0069	11,771	0.0201	0.2815	0.0759	0.0050	472	0.0064	329	3.49E-07	4.41E-09	0.0150	2.49	1.86E-03	1.27E-04	2.77E-08	0.0054	3.39E-05	268	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0024	0.0048	0	0.800	0	0	0	0	84.3	0	0	0
486	1.90E+07	1.90E+07	7.99	33,752	8.28	1,026	18,414	32.4	1.91E-05	0.689	7.82E-04	0.010	808	4.62E-05	0.0400	0.0043	11,767	0.0201	0.2818	0.0760	0.0050	468	0.0064	329	3.49E-07	6.76E-09	0.0150	2.49	1.86E-03	1.27E-04	4.68E-08	0.0053	3.38E-05	279	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0016	0.0048	0	0.800	0	0	0	0	56.8	0	0	0
646	2.52E+07	2.52E+07	7.95	33,749	8.27	1,026	18,410	32.4	1.43E-05	0.680	7.82E-04	0.010	808	4.53E-05	0.0400	0.0031	11,766	0.0202	0.2819	0.0760	0.0050	466	0.0064	329	3.50E-07	8.83E-09	0.0150	2.50	1.86E-03	1.27E-04	6.45E-08	0.0052	3.38E-05	284	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0012	0.0048	0	0.800	0	0	0	0	43.0	0	0	0
805	3.14E+07	3.15E+07	7.93	33,747	8.27	1,026	18,408	32.4	1.15E-05	0.675	7.82E-04	0.010	808	4.48E-05	0.0400	0.0023	11,764	0.0202	0.2820	0.0760	0.0050	465	0.0064	330	3.50E-07	1.08E-08	0.0150	2.50	1.86E-03	1.27E-04	8.15E-08	0.0052	3.38E-05	287	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0010	0.0048	0	0.800	0	0	0	0	34.7	0	0	0
965	3.77E+07	3.77E+07	7.92	33,746	8.27	1,026	18,407	32.4	9.61E-06	0.672	7.83E-04	0.010	808	4.44E-05	0.0400	0.0018	11,764	0.0202	0.2821	0.0760	0.0050	464	0.0064	330	3.50E-07	1.27E-08	0.0150	2.50	1.86E-03	1.27E-04	9.82E-08	0.0051	3.38E-05	289	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0008	0.0048	0	0.800	0	0	0	0	29.1	0	0	0
1125	4.39E+07	4.39E+07	7.91	33,745	8.26	1,026	18,406	32.4	8.24E-06	0.669	7.83E-04	0.010	808	4.42E-05	0.0400	0.0014	11,763	0.0202	0.2821	0.0760	0.0050	463	0.0064	330	3.50E-07	1.47E-08	0.0150	2.50	1.86E-03	1.27E-04	1.15E-07	0.0051	3.38E-05	291	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0007	0.0048	0	0.800	0	0	0	0	25.1	0	0	0
1284	5.01E+07	5.02E+07	7.90	33,744	8.26	1,026	18,405	32.4	7.22E-06	0.667	7.83E-04	0.010	808	4.40E-05	0.0400	0.0011	11,763	0.0202	0.2822	0.0761	0.0050	463	0.0064	330	3.50E-07	1.68E-08	0.0150	2.50	1.86E-03	1.27E-04	1.33E-07	0.0051	3.38E-05	292	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0006	0.0048	0	0.800	0	0	0	0	22.1	0	0	0
1444	5.64E+07	5.64E+07	7.90	33,744	8.26	1,026	18,405	32.4	6.42E-06	0.666	7.83E-04	0.010	808	4.39E-05	0.0400	0.0009	11,762	0.0202	0.2822	0.0761	0.0050	463	0.0064	330	3.50E-07	1.90E-08	0.0150	2.50	1.86E-03	1.27E-04	1.52E-07	0.0051	3.38E-05	293	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0005	0.0048	0	0.800	0	0	0	0	19.8	0	0	0
1604	6.26E+07	6.26E+07	7.89	33,743	8.26	1,026	18,404	32.4	5.78E-06	0.665	7.83E-04	0.010	808	4.38E-05	0.0400	0.0007	11,762	0.0202	0.2822	0.0761	0.0050	462	0.0064	330	3.50E-07	2.14E-08	0.0150	2.50	1.86E-03	1.27E-04	1.73E-07	0.0051	3.38E-05	293	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0005	0.0048	0	0.800	0	0	0	0	17.9	0	0	0
1763	6.88E+07	6.89E+07	7.89	33,743	8.26	1,026	18,404	32.4	5.26E-06	0.664	7.83E-04	0.010	808	4.37E-05	0.0400	0.0006	11,762	0.0202	0.2822	0.0761	0.0050	462	0.0064	330	3.50E-07	2.42E-08	0.0150	2.50	1.86E-03	1.27E-04	1.97E-07	0.0051	3.38E-05	294	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0004	0.0048	0	0.800	0	0	0	0	16.4	0	0	0
1923	7.51E+07	7.51E+07	7.89	33,743	8.26	1,026	18,404	32.4	4.82E-06	0.663	7.83E-04	0.010	808	4.36E-05	0.0400	0.0004	11,762	0.0202	0.2822	0.0761	0.0050	462	0.0064	330	3.50E-07	2.74E-08	0.0150	2.50	1.86E-03	1.27E-04	2.25E-07	0.0051	3.38E-05	294	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0004	0.0048	0	0.800	0	0	0	0	15.1	0	0	0
2083	8.13E+07	8.13E+07	7.88	33,894	8.26	1,026	18,403	32.4	4.45E-06	0.662	7.83E-04	0.010	808	4.35E-05	0.0400	0.0003	11,762	0.0202	0.2822	0.0761	0.0050	462	0.0064	330	3.50E-07	3.14E-08	0.0150	2.50	1.86E-03	1.27E-04	2.58E-07	0.0051	3.38E-05	295	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0004	0.0048	0	0.800	0	0	0	0	14.0	0	0	0
2242	8.75E+07	8.76E+07	7.88	33,742	8.26	1,026	18,403	32.4	4.14E-06	0.662	7.83E-04	0.010	808	4.35E-05	0.0400	0.0003	11,762	0.0202	0.2822	0.0761	0.0050	462	0.0064	330	3.50E-07	3.65E-08	0.0150	2.50	1.86E-03	1.27E-04	3.01E-07	0.0051	3.38E-05	295	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0003	0.0048	0	0.800	0	0	0	0	13.1	0	0	0
2402	9.38E+07	9.38E+07	7.88	33,893	8.26	1,026	18,403	32.4	3.86E-06	0.661	7.83E-04	0.010	808	4.34E-05	0.0400	0.0002	11,762	0.0202	0.2823	0.0761	0.0050	462	0.0064	330	3.50E-07	4.35E-08	0.0150	2.50	1.86E-03	1.27E-04	3.60E-07	0.0051	3.38E-05	295	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0003	0.0048	0	0.800	0	0	0	0	12.3	0	0	0
2562	1.00E+08	1.00E+08	7.88	33,893	8.26	1,026	18,403	32.4	3.62E-06	0.661	7.83E-04	0.010	808	4.34E-05	0.0400	0.0001	11,761	0.0202	0.2823	0.0761	0.0050	462	0.0064	330	3.50E-07	5.46E-08	0.0150	2.50	1.86E-03	1.27E-04	4.53E-07	0.0050	3.38E-05	296	51.9	0.0050	0.0050	0.0043	0.0001	0.0000	0.0003	0.0048	0	0.800	0	0	0	0	11.6	0	0	0

SCENARIO 5B

Dilution Ratio	Volume - PoPA	Volume - Total	pH	Total Dissolved Solids	Temperature	Density	Cl(-1)	Zn(+2)	Si(+4)	Se(+4)	Sb(+5)	S(+6)	Pb(+2)	P(+5)	Ni(+2)	Na(+1)	N(-3)	N(+5)	N(+3)	Mo(+6)	Mn(+2)	Mg(+2)	K(+1)	Hg(+2)	Fe(+2)	F(-1)	Cu(+2)	Cr(+6)	Cr(+3)	Co(+2)	Cd(+2)	Ca(+2)	Br(-1)	Be(+2)	Ba(+2)	As(+5)	Al(+3)	NiCr2O4	NaAlCO3(OH)2 (Dawsonite)	Mg3Si2O5(OH)4 (Poor-crystalline Antigorite)	Mg(OH)2 (Brucite)	CuO	CoCr2O4	Co3(PO4)2.8H2O	CaSO4.2H2O (Gypsum)	CaCO3 (Calcite)	Ca3(PO4)2	Be2(OH)2CO3	Al(OH)3 (Gibbsite)
	L/hr	L/hr		mg/L	°C	kg/m3	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0	39,029	12.1	46,456	20.4	1,038	25,607	0.001	0.000	0.003	0.000	877	2.12E-03	0	8.08E-16	15,293	0	0	0	1.52E-05	0.0000	0.04	0	3.04E-04	0	0	2.60E-04	1.87E-04	1.94E-04	1.58E-12	8.45E-05	2,596	36.8	0	0	0.017	0.000	2.73E-03	0	0.00	7,789	0	1.75E-04	0	1,417	336	0	0	0
1	50,000	89,017	10.5	39,242	13.6	1,031	21,553	0.004	0.000	0.002	0.006	954	9.49E-04	0.0005	7.51E-05	13,306	0.0114	0.1589	0.0428	6.64E-06	0.0028	188	186	1.33E-04	0.0084	1.41	1.21E-04	1.53E-04	1.61E-09	2.19E-03	5.60E-05	1,390	45.3	0.0028	0.0028	0.0101	0.084	1.70E-03	0	1.81	3,577	0.0013	0.0025	0	0	293	0.110	0	0
3	1.00E+05	1.39E+05	10.4	37,206	11.7	1,029	20,419	0.005	0.000	0.002	0.007	901	6.23E-04	0.0010	1.12E-04	12,750	0.0145	0.2033	0.0548	4.25E-06	0.0036	298	238	8.52E-05	0.0108	1.80	1.04E-04	1.43E-04	1.26E-09	2.82E-03	4.80E-05	960	47.7	0.0036	0.0036	0.0080	0.068	1.35E-03	0	2.32	2,259	0.0016	0.0030	0	0	281	0.139	0	0.114
4	1.50E+05	1.89E+05	10.4	38,354	10.8	1,028	19,885	0.005	0.000	0.001	0.008	876	4.69E-04	0.0016	1.28E-04	12,488	0.0160	0.2243	0.0605	3.12E-06	0.0040	350	262	6.28E-05	0.0119	1.99	9.95E-05	1.39E-04	1.14E-09	3.12E-03	4.42E-05	758	48.8	0.0036	0.0040	0.0070	0.063	1.19E-03	0	2.56	1,639	0.0018	0.0033	0	0	275	0.151	0.0026	0.163
5	2.00E+05	2.39E+05	10.4	35,880	10.2	1,028	19,574	0.006	0.000	0.001	0.008	862	3.80E-04	0.0021	1.38E-04	12,336	0.0169	0.2364	0.0637	2.47E-06	0.0042	380	276	4.97E-05	0.0126	2.09	9.72E-05	1.36E-04	1.07E-09	3.29E-03	4.20E-05	641	49.4	0.0036	0.0042	0.0064	0.060	1.10E-03	0	2.70	1,278	0.0019	0.0035	0	0	271	0.157	0.0038	0.190
6	2.50E+05	2.89E+05	10.4	35,555	9.90	1,027	19,371	0.006	0.000	0.001	0.009	853	3.22E-04	0.0026	1.43E-04	12,236	0.0175	0.2444	0.0659	2.04E-06	0.0043	400	286	4.12E-05	0.0130	2.16	9.59E-05	1.35E-04	1.03E-09	3.41E-03	4.06E-05	564	49.9	0.0036	0.0043	0.0061	0.058	1.04E-03	0	2.79	1,043	0.0019	0.0036	0	0	269	0.160	0.0045	0.207
8	3.00E+05	3.39E+05	10.4	35,278	9.66	1,027	19,228	0.006	0.000	0.001	0.009	846	2.81E-04	0.0031	1.48E-04	12,166	0.0179	0.2500	0.0674	1.74E-06	0.0044	414	292	3.51E-05	0.0133	2.21	9.50E-05	1.33E-04	9.98E-10	3.49E-03	3.96E-05	510	50.2	0.0037	0.0044	0.0058	0.057	9.95E-04	0	2.86	876	0.0020	0.0036	0	0	267	0.162	0.0048	0.219
9	3.50E+05	3.89E+05	10.4	35,072	9.48	1,027	19,121	0.006	0.000	0.001	0.009	841	2.50E-04	0.0035	1.51E-04	12,114	0.0182	0.2542	0.0685	1.52E-06	0.0045	424	297	3.07E-05	0.0135	2.25	9.44E-05	1.33E-04	9.78E-10	3.55E-03	3.89E-05	469	50.4	0.0037	0.0045	0.0056	0.056	9.64E-04	0	2.91	753	0.0020	0.0037	0	0	266	0.163	0.0049	0.227
10	4.00E+05	4.39E+05	10.4	34,913	9.34	1,027	19,039	0.006	0.000	0.001	0.009	837	2.26E-04	0.0039	1.53E-04	12,074	0.0184	0.2574	0.0694	1.34E-06	0.0046	432	301	2.72E-05	0.0137	2.28	9.40E-05	1.32E-04	9.63E-10	3.59E-03	3.83E-05	438	50.6	0.0038	0.0046	0.0055	0.056	9.40E-04	0	2.94	658	0.0020	0.0037	0	0	265	0.163	0.0050	0.234
12	4.50E+05	4.89E+05	10.4	34,787	9.24	1,027	18,974	0.006	0.000	0.001	0.009	834	2.08E-04	0.0043	1.55E-04	12,042	0.0186	0.2599	0.0701	1.21E-06	0.0046	438	304	2.45E-05	0.0138	2.30	9.36E-05	1.31E-04	9.51E-10	3.63E-03	3.78E-05	414	50.7	0.0038	0.0046	0.0053	0.055	9.22E-04	0	2.97	582	0.0021	0.0038	0	0	264	0.163	0.0050	0.239
13	5.00E+05	5.39E+05	10.4	34,684	9.15	1,027	18,921	0.006	0.000	0.001	0.009	832	1.92E-04	0.0047	1.56E-04	12,016	0.0187	0.2620	0.0706	1.09E-06	0.0046	444	306	2.22E-05	0.0139	2.32	9.33E-05	1.31E-04	9.41E-10	3.66E-03	3.75E-05	394	50.8	0.0038	0.0046	0.0053	0.055	9.06E-04	0	2.99	520	0.0021	0.0038	0	0	263	0.162	0.0050	0.244
14	5.50E+05	5.89E+05	10.4	34,599	9.07	1,026	18,877	0.006	0.000	0.001	0.009	830	1.80E-04	0.0050	1.57E-04	11,994	0.0189	0.2637	0.0711	1.00E-06	0.0047	448	308	2.04E-05	0.0140	2.34	9.31E-05	1.30E-04	9.34E-10	3.68E-03	3.71E-05	377	50.9	0.0039	0.0047	0.0052	0.055	8.94E-04	0	3.01	469	0.0021	0.0038	7.97E-06	0	263	0.162	0.0050	0.247
15	6.00E+05	6.39E+05	10.4	34,527	9.01	1,026	18,839	0.006	0.000	0.001	0.009	828	1.69E-04	0.0053	1.50E-04	11,976	0.0190	0.2652	0.0715	9.23E-07	0.0047	451	310	1.88E-05	0.0141	2.35	9.29E-05	1.30E-04	9.51E-10	3.52E-03	3.69E-05	363	51.0	0.0039	0.0047	0.0051	0.054	9.14E-04	0	3.03	426	0.0021	0.0038	0.0006	0	262	0.161	0.0049	0.250
17	6.50E+05	6.89E+05	10.4	34,465	8.96	1,026	18,807	0.006	0.000	0.001	0.009	827	1.60E-04	0.0056	1.45E-04	11,960	0.0190	0.2664	0.0718	8.56E-07	0.0047	455	311	1.75E-05	0.0142	2.36	9.27E-05	1.30E-04	9.67E-10	3.38E-03	3.67E-05	351	51.1	0.0039	0.0047	0.0050	0.054	9.30E-04	0	3.05	389	0.0021	0.0038	0.0010	0	262	0.160	0.0048	0.253
18	7.00E+05	7.39E+05	10.4	34,412	8.91	1,026	18,780	0.006	0.000	0.001	0.009	825	1.52E-04	0.0059	1.40E-04	11,946	0.0191	0.2675	0.0721	7.98E-07	0.0047	457	313	1.63E-05	0.0142	2.37	9.26E-05	1.30E-04	9.81E-10	3.26E-03	3.65E-05	341	51.1	0.0040	0.0047	0.0050	0.054	9.44E-04	0	3.06	357	0.0021	0.0038	0.0014	0	261	0.159	0.0048	0.255
19	7.50E+05	7.89E+05	10.4	34,365	8.87	1,026	18,756	0.006	0.000	0.001	0.010	824	1.45E-04	0.0061	1.35E-04	11,935	0.0192	0.2685	0.0724	7.48E-07	0.0048	460	314	1.53E-05	0.0143	2.38	9.25E-05	1.29E-04	9.94E-10	3.16E-03	3.63E-05	331	51.2	0.0040	0.0048	0.0050	0.054	9.56E-04	0	3.07	329	0.0021	0.0038	0.0018	0	261	0.159	0.0047	0.257
20	8.00E+05	8.39E+05	10.4	34,324	8.84	1,026	18,735	0.006	0.000	0.001	0.010	823	1.39E-04	0.0064	1.32E-04	11,924	0.0193	0.2693	0.0726	7.03E-07	0.0048	462	315	1.44E-05	0.0143	2.38	9.24E-05	1.29E-04	1.01E-09	3.07E-03	3.61E-05	323	51.2	0.0040	0.0048	0.0049	0.054	9.67E-04	0	3.08	304	0.0021	0.0038	0.0021	0	261	0.158	0.0047	0.258
22	8.50E+05	8.89E+05	10.4	34,288	8.80	1,026	18,716	0.006	0.000	0.001	0.010	822	1.33E-04	0.0066	1.28E-04	11,915	0.0193	0.2700	0.0728	6.64E-07	0.0048	463	316	1.36E-05	0.0143	2.39	9.23E-05	1.29E-04	1.02E-09	3.00E-03	3.60E-05	316	51.2	0.0040	0.0048	0.0049	0.054	9.76E-04	0	3.09	282	0.0021	0.0038	0.0023	0	261	0.157	0.0046	0.260
23	9.00E+05	9.39E+05	10.4	34,255	8.78	1,026	18,699	0.006	0.000	0.001	0.010	822	1.29E-04	0.0068	1.25E-04	11,907	0.0194	0.2707	0.0730	6.28E-07	0.0048	465	316	1.29E-05	0.0144	2.40	9.22E-05	1.29E-04	1.03E-09	2.93E-03	3.59E-05	310	51.3	0.0041	0.0048	0.0048	0.053	9.85E-04	0	3.09	263	0.0021	0.0038	0.0026	0	260	0.156	0.0045	0.261
24	9.50E+05	9.89E+05	10.4	34,226	8.75	1,026	18,684	0.006	0.000	0.001	0.010	821	1.24E-04	0.0070	1.23E-04	11,899	0.0194	0.2713	0.0731	5.97E-07	0.0048	467	317	1.23E-05	0.0144	2.40	9.21E-05	1.29E-04	1.04E-09	2.87E-03	3.58E-05	304	51.3	0.0041	0.0048	0.0048	0.053	9.92E-04	0	3.10	245	0.0021	0.0037	0.0028	0	260	0.156	0.0045	0.262
26	1.00E+06	1.04E+06	10.4	34,200	8.73	1,026	18,670	0.006	0.000	0.001	0.010	820	1.20E-04	0.0072	1.20E-04	11,893	0.0194	0.2718	0.0733	5.68E-07	0.0048	468	318	1.17E-05	0.0144	2.41	9.21E-05	1.29E-04	1.04E-09	2.81E-03	3.57E-05	299	51.3	0.0041	0.0048	0.0048	0.053	9.99E-04	0	3.11	229	0.0021	0.0037	0.0030	0	260	0.155	0.0044	0.263
38	1.50E+06	1.54E+06	10.5	34,030	8.58	1,026	18,582	0.006	0.000	0.001	0.010	816	9.51E-05	0.0086	1.05E-04	11,850	0.0197	0.2752	0.0742	3.83E-07	0.0049	476	322	8.01E-06	0.0146	2.44	9.17E-05	1.28E-04	1.10E-09	2.46E-03	3.51E-05	266	51.5	0.0042	0.0049	0.0046	0.053	0.001	0	3.15	128	0.0022	0.0037	0.0042	0	258	0.149	0.0039	0.270
43	1.68E+06	1.72E+06	10.5	33,993	8.55	1,026	18,563	0.006	0.000	0.001	0.010	815	8.96E-05	0.0090	1.02E-04	11,840	0.0197	0.2760	0.0744	3.43E-07	0.0049	478	323	7.21E-06	0.0147	2.44	9.16E-05	1.28E-04	1.12E-09	2.39E-03	3.49E-05	259	51.6	0.0043	0.0049	0.0046	0.053	0.001	0	3.15	106	0.0022	0.0037	0.0044	0	258	0.148	0.0038	0.272
48	1.86E+06	1.90E+06	10.5	33,963	8.52	1,026	18,548	0.006	0.000	0.001	0.010	815	8.51E-05	0.0093	9.97E-05	11,833	0.0198	0.2766	0.0746	3.11E-07	0.0049	480	323	6.56E-06	0.0147	2.45	9.15E-05	1.28E-04	1.13E-09	2.33E-03	3.48E-05	253	51.6	0.0043	0.0049	0.0046	0.053	0.001	0	3.16	88	0.0022	0.0037	0.0046	0	258	0.147	0.0037	0.273
52	2.04E+06	2.08E+06	10.5	33,939	8.50	1,026	18,535	0.006	0.000	0.001	0.010	814	8.15E-05	0.0096	9.76E-05	11,826	0.0198	0.2771	0.0747	2.84E-07	0.0049	481	324	6.02E-06	0.0147	2.45	9.15E-05	1.28E-04	1.14E-09	2.28E-03	3.47E-05	248	51.6	0.0043	0.0049	0.0045	0.052	0.001	0	3.17	73	0.0022	0.0037	0.0048	0	258	0.145	0.0036	0.274
57	2.22E+06	2.26E+06	10.5	33,918	8.49	1,026	18,524	0.006	0.000	0.001	0.010	814	7.84E-05	0.0099	9.58E-05	11,821	0.0198	0.2775	0.0748	2.61E-07	0.0049	482	324	5.57E-06	0.0147	2.46	9.14E-05	1.28E-04	1.15E-09	2.24E-03	3.47E-05	244	51.6	0.0044	0.0049	0.0045	0.052	0.001	0	3.17	60	0.0022	0.0037	0.0050	0	257	0.144	0.0035	0.275
61	2.40E+06	2.44E+06	10.5	33,900	8.47	1,026	18,515	0.006	0.000	0.001	0.010	813	7.57E-05	0.0101	9.43E-05	11,817	0.0199	0.2779	0.0749	2.42E-07	0.0049	483	325	5.18E-06	0.0148	2.46	9.14E-05	1.27E-04	1.16E-09	2.20E-03	3.46E-05	241	51.7	0.0044	0.0049	0.0045	0.052	0.001	0	3.18	50	0.0022	0.0037	0.0051	0	257	0.144	0.0034	0.275
66	2.58E+06	2.62E+06	10.5	33,885	8.46	1,026	18,507	0.006	0.000	0.001	0.010	813	7.35E-05	0.0103	9.30E-05	11,813	0.0199	0.2782	0.0750	2.25E-07	0.0049	484	325	4.85E-06	0.0148	2.46	9.13E-05	1.27E-04	1.17E-09	2.17E-03	3.46E-05	238	51.7	0.0044	0.0049	0.0045	0.052	0.001	0	3.18	40	0.0022	0.0037	0.0052	0	257	0.143	0.0033	0.276
71	2.76E+06	2.80E+06	10.5	33,872	8.45	1,026	18,500	0.006	0.000	0.001	0.010	812	7.15E-05	0.0105	9.19E-05	11,809	0.0199	0.2785	0.0751	2.11E-07	0.0049	484	325	4.56E-06	0.0148	2.47	9.13E-05	1.27E-04	1.17E-09	2.15E-03	3.45E-05	235	51.7	0.0044	0.0049	0.0045	0.052	0.001	0	3.18	33	0.0022	0.0037	0.0053	0	257	0.142	0.0033	0.277
75	2.94E+06	2.98E+06	10.5	33,860	8.44	1,026	18,494	0.006	0.000	0.001	0.010	812	6.98E-05	0.0106	9.09E-05	11,806	0.0199	0.2787	0.0751	1.98E-07	0.0049	485	326	4.31E-06	0.0148	2.47	9.13E-05	1.27E-04	1.18E-09	2.12E-03	3.45E-05	233	51.7	0.0044	0.0049	0.0045	0.052	0.001	0	3.19	25	0.0022	0.0037	0.0053	0	257	0.141	0.0032	0.277
80	3.12E+06	3.16E+06	10.5	33,850	8.43	1,026	18,489	0.006	0.000	0.001	0.010	812	6.82E-05	0.0108	9.01E-05	11,804	0.0199	0.2789	0.0752	1.87E-07	0.0049	485	326	4.08E-06	0.0148	2.47	9.13E-05	1.27E-04	1.18E-09	2.10E-03	3.44E-05	231	51.7	0.0044	0.0049	0.0045	0.052	0.001	0	3.19	19	0.0022	0.0037	0.0054	0	257	0.141	0.0031	0.277
85	3.30E+06	3.34E+06	10.5	33,840	8.42	1,026	18,484	0.006	0.000	0.001	0.010	812	6.68E-05	0.0109	8.93E-05	11,801	0.0200	0.2791	0.0752	1.77E-07	0.0049	486	326	3.88E-06	0.0148	2.47	9.12E-05	1.27E-04	1.19E-09	2.08E-03	3.44E-05	229	51.7	0.0044	0.0049	0.0045	0.052	0.001	0	3.19	14	0.0022	0.0037	0.0055	0	257	0.140	0.0031	0.278
89	3.48E+06	3.52E+06	10.5	33,832	8.41	1,026	18,480	0.006	0.000	0.001	0.010	811	6.56E-05	0.0110	8.86E-05	11,799	0.0200	0.2793	0.0753	1.68E-07	0.0049	486	326	3.70E-06	0.0148	2.47	9.12E-05	1.27E-04	1.19E-09	2.07E-03	3.44E-05	228	51.7	0.0045	0.0049	0.0044	0.052	0.001	0	3.19	8.72361	0.0022	0.0037	0.0055	0	257	0.140	0.0031	0.278
94	3.66E+06	3.70E+06	10.5	33,825	8.41	1,026	18,476	0.006	0.000	0.001	0.010	811	6.45E-05	0.0111	8.80E-05	11,797	0.0200	0.2794	0.0753	1.59E-07	0.0049	487	327	3.54E-06	0.0148	2.47	9.12E-05	1.27E-04	1.20E-09	2.05E-03	3.43E-05	226	51.7	0.0045	0.0049	0.0044	0.052	0.001	0	3.19	4.22478	0.0022	0.0037	0.0056	0	256	0.139	0.0030	0.278
98	3.84E+06	3.88E+06	10.5	33,818	8.40	1,026	18,473	0.006	0.000	0.001	0.010	811	6.35E-05	0.0112	8.74E-05	11,796	0.0200	0.2795	0.0754	1.52E-07	0.0049	487	327	3.39E-06	0.0148	2.47	9.12E-05	1.27E-04	1.20E-09	2.04E-03	3.43E-05	225	51.7	0.0045	0.0049	0.0044	0.052	0.001	0	3.20	0.14352	0.0022	0.0037	0.0056	0	256	0.139	0.0030	0.279
103	4.02E+06	4.06E+06	10.1	33,809	8.39	1,026	18,469	0.006	0.001	0.001	0.010	811	6.26E-05	0.0235	5.56E-05	11,794	0.0200	0.2797	0.0754	1.45E-07	0.0050	486	327	3.25E-06	0.0149	2.48	6.20E-05	1.27E-04	2.89E-09	5.67E-04	3.43E-05	224	51.8	0.0050	0.0050	0.0044	0.022	0.001	0	3.19	0	0.0022	0.0036	0.0100	0	255	0.075	0	0.367
108	4.20E+06	4.24E+06	9.49	33,803	8.39	1,026	18,466	0.006	0.025	0.001	0.010	811	6.17E-05	0.0385	6.54E-05	11,793	0.0200	0.2798	0.0754	1.39E-07	0.0050	485	327	3.13E-06	0.0149	2.48	1.27E-04	1.27E-04	8.54E-09	8.97E-04	3.43E-05	225	51.8	0.0050	0.0050	0.0044	0.006	0.001	0	3.07	0	0.0022	0.0036	0.0090	0	250	0	0	0.413
112	4.38E+06	4.42E+06	9.17	33,800	8.38	1,026	18,464	0.006	0.182	0.001	0.010	811	6.09E-05	0.0391	9.75E-05	11,791	0.0200	0.2799	0.0754	1.33E-07	0.0050	484	327	3.02E-06	0.0149	2.48	2.89E-04	1.27E-04	1.40E-08	2.55E-03	3.42E-05	228	51.8	0.0050	0.0050	0.0044	0.003	0.001	0	2.30	0	0.0019	0.0037	0.0041	0	241	0	0	0.422
117	4.56E+06	4.60E+06	9.02	33,797	8.38	1,026	18,461	0.006	0.488	0.001	0.010	811	6.02E-05	0.0397	1.09E-04	11,790	0.0200	0.2800	0.0755	1.28E-07	0.0050	483	327	2.91E-06	0.0149	2.48	4.56E-04	1.27E-04	1.86E-08	3.98E-03	3.42E-05	229	51.8	0.0050	0.0050	0.0044	0.002	0.001	0	0.79	0	0.0017	0.0038	0	0	235	0	0	0.424
121	4.74E+06	4.78E+06	8.89	33,795	8.37	1,026	18,459	0.006	0.649	0.001	0.010	811	5.96E-05	0.0397	8.21E-05	11,789	0.0200	0.2801	0.0755	1.23E-07	0.0050	483	327	2.82E-06	0.0149	2.48	6.81E-04	1.27E-04	2.85E-08	4.00E-03	3.42E-05	231	51.8	0.0050	0.0050	0.0044	0.001	0.001	0	0	0	0.0015	0.0037	0	0	228	0	0	0.426
126	4.92E+06	4.96E+06	8.78	33,793	8.37	1,026	18,457	0.006	0.649	0.001	0.010	810	5.90E-05	0.0397	6.39E-05	11,788	0.0200	0.2802	0.0755	1.19E-07	0.0050	482	327	2.73E-06	0.0149	2.48	9.89E-04	1.27E-04	4.18E-08	4.02E-03	3.42E-05	234	51.8	0.0050	0.0050	0.0044	0.001	0.001	0	0	0	0.0011	0.0036	0	0	220	0	0	0.427
131	5.10E+06	5.14E+06	8.70	33,791	8.36	1,026	18,455	0.006	0.649	0.001	0.010	810	5.84E-05	0.0397	5.27E-05	11,787	0.0200	0.2802	0.0755	1.15E-07	0.0050	481	328	2.64E-06	0.0149	2.48	1.33E-03	1.27E-04	5.62E-08	4.04E-03	3.42E-05	236	51.8	0.0050	0.0050	0.0044	9.29E-04	0.001	0	0	0	0.0007	0.0036	0	0	212	0	0	0.428
135	5.28E+06	5.32E+06	8.63	33,789	8.36	1,026	18,453	0.006	0.650	0.001	0.010	810	5.79E-05	0.0397	4.52E-05	11,786	0.0200	0.2803	0.0756	1.11E-07	0.0050	480	328	2.57E-06	0.0149	2.48	1.69E-03	1.27E-04	7.13E-08	4.04E-03	3.42E-05	238	51.8	0.0050	0.0050	0.0044	7.98E-04	0.001	0	0	0	0.0002	0.0035	0	0	205	0	0	0.428
140	5.46E+06	5.50E+06	8.57	33,788	8.36	1,026	18,451	0.006	0.650	0.001	0.010	810	5.74E-05	0.0397	3.98E-05	11,785	0.0200	0.2804	0.0756	1.07E-07	0.0050	480	328	2.49E-06	0.0149	2.48	1.85E-03	1.27E-04	8.70E-08	4.05E-03	3.42E-05	240	51.8	0.0050	0.0050	0.0044	7.04E-04	0.001	0	0	0	0	3.52E-03	0	0	198	0	0	0.429
145	5.64E+06	5.68E+06	8.53	33,786	8.35	1,026	18,450	0.006	0.650	0.001	0.010	810	5.69E-05	0.0397	3.58E-05	11,784	0.0201	0.2804	0.0756	1.04E-07	0.0050	479	328	2.43E-06	0.0149	2.48	1.85E-03	1.27E-04	1.03E-07	4.06E-03	3.41E-05	242	51.8	0.0050	0.0050	0.0044	6.34E-04	0.001	0	0	0	0	3.50E-03	0	0	192	0	0	0.429
149	5.82E+06	5.86E+06	8.49	33,785	8.35	1,026	18,448	0.006	0.650	0.001	0.010	810	5.65E-05	0.0397	3.26E-05	11,784	0.0201	0.2805	0.0756	1.01E-07	0.0050	478	328	2.36E-06	0.0149	2.48	1.85E-03	1.27E-04	1.19E-07	4.06E-03	3.41E-05	244	51.8	0.0050	0.0050	0.0044	5.79E-04	0.001	0	0	0	0	3.49E-03	0	0	186	0	0	0.429
154	6.00E+06	6.04E+06	8.45	33,784	8.35	1,026	18,447	0.006	0.650	0.001	0.010	810	5.60E-05	0.0397	3.01E-05	11,783	0.0201	0.2806	0.0756	9.77E-08	0.0050	478	328	2.30E-06	0.0149	2.48	1.85E-03	1.27E-04	1.36E-07	4.06E-03	3.41E-05	246	51.8	0.0050	0.0050	0.0044	5.35E-04	0.001	0	0	0	0	3.48E-03	0	0	180	0	0	0.429
167	6.50E+06	6.54E+06	8.37	33,780	8.34	1,026	18,443	0.006	0.651	0.001	0.010	810	5.50E-05	0.0398	2.54E-05	11,781	0.0201	0.2807	0.0757	9.02E-08	0.0050	477	328	2.15E-06	0.0149	2.49	1.85E-03	1.27E-04	1.81E-07	4.07E-03	3.41E-05	250	51.8	0.0050	0.0050	0.0044	4.43E-04	0.001	0.7934	0	0	0	3.47E-03	0	0	166	0	0	0
326	1.27E+07	1.28E+07	8.06	33,761	8.30	1,026	18,422	0.006	0.652	0.001	0.010	809	4.90E-05	0.0399	1.24E-05	11,771	0.0201	0.2815	0.0759	4.62E-08	0.0050	468	329	1.27E-06	0.0150	2.49	1.86E-03	1.27E-04	6.74E-07	4.10E-03	3.40E-05	274	51.9	0.0050	0.0050	0.0043	1.20E-04	0.001	0.79745	0	0	0	3.42E-03	0	0	85	0	0	0
486	1.90E+07	1.90E+07	7.98	33,754	8.28	1,026	18,415	0.006	0.653	0.001	0.010	808	4.69E-05	0.0399	1.05E-05	11,767	0.0201	0.2818	0.0760	3.10E-08	0.0050	466	329	9.70E-07	0.0150	2.49	1.86E-03	1.27E-04	9.75E-07	4.10E-03	3.39E-05	283	51.9	0.0050	0.0050	0.0043	8.88E-05	0.001	0.79841	0	0	0	3.42E-03	0	0	57	0	0	0
646	2.52E+07	2.52E+07	7.95	33,750	8.27	1,026	18,411	0.006	0.653	0.001	0.010	808	4.59E-05	0.0399	9.69E-06	11,766	0.0202	0.2819	0.0760	2.34E-08	0.0050	464	329	8.17E-07	0.0150	2.50	1.86E-03	1.27E-04	1.17E-06	4.11E-03	3.39E-05	287	51.9	0.0050	0.0050	0.0043	7.76E-05	0.001	0.79888	0	0	0	3.42E-03	0	0	43	0	0	0
805	3.14E+07	3.15E+07	7.93	33,748	8.27	1,026	18,409	0.006	0.654	0.001	0.010	808	4.53E-05	0.0400	9.27E-06	11,764	0.0202	0.2820	0.0760	1.87E-08	0.0050	463	330	7.25E-07	0.0150	2.50	1.86E-03	1.27E-04	1.30E-06	4.11E-03	3.39E-05	289	51.9	0.0050	0.0050	0.0043	7.19E-05	0.001	0.79915	0	0	0	3.41E-03	0	0	35	0	0	0
965	3.77E+07	3.77E+07	7.92	33,747	8.27	1,026	18,408	0.006	0.654	0.001	0.010	808	4.48E-05	0.0400	9.00E-06	11,764	0.0202	0.2821	0.0760	0.00E+00	0.0050	463	330	6.63E-07	0.0150	2.50	1.86E-03	1.27E-04	1.39E-06	4.11E-03	3.39E-05	291	51.9	0.0050	0.0050	0.0043	6.84E-05	0.001	0.79933	0	0	0	3.41E-03	0	0	29	0	0	0
1125	4.39E+07	4.39E+07	7.91	33,746	8.26	1,026	18,406	0.006	0.654	0.001	0.010	808	4.45E-05	0.0400	8.82E-06	11,763	0.0202	0.2821	0.0760	0.00E+00	0.0050	462	330	6.18E-07	0.0150	2.50	1.86E-03	1.27E-04	1.46E-06	4.11E-03	3.38E-05	292	51.9	0.0050	0.0050	0.0043	6.61E-05	0.001	0.79946	0	0	0	3.41E-03	0	0	25	0	0	0
1285	5.01E+07	5.02E+07	7.90	33,745	8.26	1,026	18,406	0.006	0.654	0.001	0.010	808	4.43E-05	0.0400	8.69E-06	11,763	0.0202	0.2822	0.0761	0.00E+00	0.0050	462	330	5.85E-07	0.0150	2.50	1.86E-03	1.27E-04	1.51E-06	4.11E-03	3.38E-05	293	51.9	0.0050	0.0050	0.0043	6.44E-05	0.001	0.79956	0	0	0	3.41E-03	0	0	22	0	0	0
1444	5.64E+07	5.64E+07	7.89	33,744	8.26	1,026	18,405	0.006	0.654	0.001	0.010	808	4.41E-05	0.0400	8.59E-06	11,763	0.0202	0.2822	0.0761	0.00E+00	0.0050	462	330	5.59E-07	0.0150	2.50	1.86E-03	1.27E-04	1.56E-06	4.11E-03	3.38E-05	294	51.9	0.0050	0.0050	0.0043	6.32E-05	0.001	0.79963	0	0	0	3.41E-03	0	0	20	0	0	0
1604	6.26E+07	6.26E+07	7.89	33,744	8.26	1,026	18,405	0.006	0.654	0.001	0.010	808	4.40E-05	0.0400	8.51E-06	11,762	0.0202	0.2822	0.0761	0.00E+00	0.0050	462	330	5.38E-07	0.0150	2.50	1.86E-03	1.27E-04	1.59E-06	4.11E-03	3.38E-05	294	51.9	0.0050	0.0050	0.0043	6.22E-05	0.001	0.79969	0	0	0	3.41E-03	0	0	18	0	0	0
1764	6.88E+07	6.89E+07	7.89	33,744	8.26	1,026	18,404	0.006	0.654	0.001	0.010	808	4.39E-05	0.0400	8.44E-06	11,762	0.0202	0.2822	0.0761	0.00E+00	0.0050	462	330	5.21E-07	0.0150	2.50	1.86E-03	1.27E-04	1.62E-06	4.11E-03	3.38E-05	295	51.9	0.0050	0.0050	0.0043	6.14E-05	0.001	0.79974	0	0	0	3.41E-03	0	0	17	0	0	0
1923	7.51E+07	7.51E+07	7.88	33,743	8.26	1,026	18,404	0.006	0.654	0.001	0.010	808	4.38E-05	0.0400	8.39E-06	11,762	0.0202	0.2822	0.0761	0.00E+00	0.0050	461	330	5.07E-07	0.0150	2.50	1.86E-03	1.27E-04	1.65E-06	4.11E-03	3.38E-05	295	51.9	0.0050	0.0050	0.0043	6.08E-05	0.001	0.79978	0	0	0	3.41E-03	0	0	15	0	0	0
2083	8.13E+07	8.13E+07	7.88	33,743	8.26	1,026	18,404	0.006	0.654	0.001	0.010	808	4.37E-05	0.0400	8.35E-06	11,762	0.0202	0.2822	0.0761	0.00E+00	0.0050	461	330	4.95E-07	0.0150	2.50	1.86E-03	1.27E-04	1.67E-06	4.11E-03	3.38E-05	296	51.9	0.0050	0.0050	0.0043	6.03E-05	0.001	0.79982	0	0	0	3.41E-03	0	0	14	0	0	0
2243	8.75E+07	8.76E+07	7.88	33,743	8.26	1,026	18,403	0.006	0.654	0.001	0.010	808	4.36E-05	0.0400	8.31E-06	11,762	0.0202	0.2822	0.0761	0.00E+00	0.0050	461	330	4.85E-07	0.0150	2.50	1.86E-03	1.27E-04	1.69E-06	4.11E-03	3.38E-05	296	51.9	0.0050	0.0050	0.0043	5.98E-05	0.001	0.79985	0	0	0	3.41E-03	0	0	13	0	0	0
2402	9.38E+07	9.38E+07	7.88	33,742	8.26	1,026	18,403	0.006	0.654	0.001	0.010	808	4.36E-05	0.0400	8.28E-06	11,762	0.0202	0.2823	0.0761	0.00E+00	0.0050	461	330	4.76E-07	0.0150	2.50	1.86E-03	1.27E-04	1.71E-06	4.11E-03	3.38E-05	296	51.9	0.0050	0.0050	0.0043	5.94E-05	0.001	0.79987	0	0	0	3.41E-03	0	0	12	0	0	0
2562	1.00E+08	1.00E+08	7.88	33,893	8.26	1,026	18,403	0.006	0.654	0.001	0.010	808	4.35E-05	0.0400	8.25E-06	11,761	0.0202	0.2823	0.0761	0.00E+00	0.0050	461	330	4.68E-07	0.0150	2.50	1.86E-03	1.27E-04	1.72E-06	4.11E-03	3.38E-05	296	51.9	0.0050	0.0050	0.0043	5.91E-05	0.001	0.7999	0	0	0	3.41E-03	0	0	12	0	0	0

Attachment D: Reasonable Potential Analysis Spreadsheet Calculations-Temperature

Marine Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)--(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines. The Water Quality temperature guidance document may be found at: http://www.ecy.wa.gov/biblio/0610100.html

INPUT	May-Sep	Oct-Apr
1. Chronic Dilution Factor at Mixing Zone Boundary	195.0	195.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.4 °C	10.0 °C
3. 1DADMax Effluent Temperature (95th percentile)	30.0 °C	30.0 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C	16.0 °C
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	11.50 °C	10.10 °C
6. Incremental Temperature Increase or decrease:	0.10 °C	0.10 °C
7. Incremental Temperature Increase 12/(T-2) if T≤ crit:	1.28 °C	1.50 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	12.68 °C	11.50 °C
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	NO	NO
10. Temp increase allowed at mixing zone boundary, if required:	---	---
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp. range?	NO	NO
12. Temp increase allowed at mixing zone boundary, if required:	---	---
C. If ambient temp is cooler than (WQ criterion-0.3) but within 12/(T_{amb}-2) of the criterion		
13. Does temp fall within this Incremental temp. range?	NO	NO
14. Temp increase allowed at mixing zone boundary, if required:	---	---
D. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))		
15. Does temp fall within this Incremental temp. range?	YES	YES
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT	NO LIMIT
RESULTS		
17. Do any of the above cells show a temp increase?	**NO**	**NO**
18. Temperature Limit if Required?	**NO LIMIT**	**NO LIMIT**

Notes:

Attachment E: Tier II Criteria Analysis Statement of Compliance

Aziz Mahar, PE
South Puget Sound Basin – Industrial Permit Manager
Washington State Department of Ecology
Water Quality Program
PO Box 47775
Olympia, WA 98504-7775

Re: Project Macoma LLC's NPDES/SWD Permit Application; Statement of Compliance with WAC 173-201A-320, Tier II Criteria

Dear Mr. Mahar,

Project Macoma, LLC, proposes to operate a marine carbon dioxide removal (mCDR) pilot project (pilot project or Project Macoma). The pilot project would build upon public-private research undertaken with Pacific Northwest National Laboratory-Sequim (PNNL-Sequim); National Oceanic and Atmospheric Administration's (NOAA's) Pacific Marine Environmental Laboratory (PMEL); the University of Washington (UW) Cooperative Institute for Climate, Ocean and Ecosystem Studies (CICOES); and the Salish Sea Modeling Center (SSMC) and would operate for less than two years at the Port of Port Angeles. Project Macoma would remove up to 1,000 net tonnes of carbon dioxide (CO2) pollution from the atmosphere while reducing ocean acidification (OA) in local receiving waters in Port Angeles Harbor.

Project Macoma will not discharge a waste byproduct, but rather seawater that Project Macoma has pumped from Port Angeles Harbor and deacidified. Project Macoma will discharge this alkaline-enhanced seawater to de-acidify local receiving waters, temporarily restoring the pH of receiving waters in Port Angeles Harbor closer to pre-anthropogenic conditions and drawing down CO2 pollution. Project Macoma will closely monitor the impacts of its discharge and will stop and adjust its operations if adverse impacts to the marine environment occur.

Although Project Macoma is discharging a treatment technology and not polluted wastewater, Project Macoma, LLC, has developed an application for a National Pollutant Discharge Elimination System / State Waste Discharge (NPDES/SWD) permit under Section 402 of the Clean Water Act and Chapter 90.48 Revised Code of Washington. This application consists of the following components:

- Engineering Report
- Port Angeles Mixing Analysis Technical Memorandum
- Statement of Compliance with WAC 173-201A-320, Tier II Criteria (the remainder of this correspondence).

Statement of Compliance with **WAC 173-201A-320, Tier II**

We understand that the Washington State Department of Ecology plans to seek early public comments on one aspect of Project Macoma LLC's NPDES/SWD permit application under WAC 173-201-320(2): Public involvement will inform Ecology's Tier II determination about whether the temporary change that Project Macoma will have on the pH of local receiving waters in Port Angeles Harbor is necessary and in the overriding public interest. We provide the following statement of compliance in support of that process and Ecology's forthcoming determination.

A. Background: Ocean Acidification Impacts the Salish Sea

Human activities, especially fossil fuel combustion and land use changes, have caused global atmospheric CO2 to increase by more than 50% since the pre-industrial era. Atmospheric CO2 has risen from approximately 278 parts per million (ppm) to 425 ppm, which is higher than at any other time during the last 800,000 years. Over the last 12 years, since Governor Gregoire first convened the Washington State Blue Ribbon Panel on Ocean Acidification, atmospheric CO2 has risen approximately 30 ppm. There is scientific consensus that so much CO2 is now in the atmosphere that reaching net-zero emissions by 2050 cannot alone keep global warming to below 1.5°C above pre-industrial levels. The Intergovernmental Panel on Climate Change has concluded that carbon dioxide removal (CDR) is "unavoidable." *See generally*, IPCC, Summary for Policymakers, in Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change 1, 40 (P.R. Shukla et al. eds, 2022).

The level of CO2 in the atmosphere would be higher but for the ocean, which naturally equilibrates with the atmosphere. The ocean has absorbed approximately 30% of the total CO2 released and continues to do so. As a result, the natural pH of the upper ocean has decreased (acidified) by approximately 0.1 units globally; average global ocean surface pH has decreased from 8.2 to 8.1. Surface ocean pH is expected to decline (become more acidic) by another 0.3–0.4 pH units by the end of the century. Feely, R.A., T. Klinger, J.A. Newton, and M. Chadsey (2012): Scientific Summary of Ocean Acidification in Washington State Marine Waters. NOAA OAR Special Report, at 6 (22). The ocean is unfortunately acidifying at such a fast rate that "the natural processes that ultimately will restore the oceanic pH and carbonate chemistry balance cannot compensate rapidly enough, since full ocean circulation and dissolution of carbonate sediments require tens to hundreds of thousands of years to reach equilibrium." *Id.* at 9 (25). We as a global society have outpaced "the natural capacity of the ocean to buffer the excess CO2 levels[.]" *Id.*

Washington State's waters are particularly vulnerable to acidification because of location and regional oceanography, and local waters have and will experience a particularly significant and rapid decline in quality. Coastal acidification impacts both marine calcifiers, which are limited in carbonate ion availability for shell and skeleton building and may experience dissolution in lowered seawater pH, and the trophic levels that depend on them. Washington's shellfish industry suffers the consequences of too-acidic waters.

Port Angeles Harbor is an example of a relatively enclosed area that is highly vulnerable to acidification. A pH reading of 7.8 was taken in the Harbor in September 2023, and pH levels as low as 7.4 have been recorded in nearby Hood Canal. *See* University of Washington and Washington Sea Grant, Ocean Acidification in Washington State, available at Ocean Acidification in Washington State.

B. Overview of Project Macoma and Ebb Carbon's Marine Carbon Dioxide Removal Technology
Project Macoma, LLC, a wholly owned subsidiary of Ebb Carbon, proposes a temporary pilot-scale project to permanently remove CO2 from the atmosphere while reducing seawater acidity locally. Project Macoma proposes to deploy and study an mCDR pilot project sited at Terminal 7 of the Port of Port Angeles.

Project Macoma, LLC, would utilize mCDR technology developed by Ebb Carbon. Ebb Carbon's mCDR technology removes acid from seawater, generating alkaline-enhanced seawater. The alkaline-enhanced seawater is returned to the ocean, which enables the ocean to draw down and store additional CO2 from the atmosphere. Since June 2022, Ebb Carbon has undertaken a joint research effort to study the effects of its mCDR technology in partnership with the PNNL-Sequim; NOAA's PMEL; the UW Cooperative Institute for Climate, Ocean and Ecosystem Studies (CICOES); and the SSMC. The scope of this research includes: directly measuring changes in seawater chemistry resulting from Ebb Carbon's electrochemical acid sequestration process, simulating the effects of ocean alkalinity enhancement using oceanographic modeling tools, and conducting biological studies to better understand potential impacts of alkalinity.

Project Macoma will build on the body of research at PNNL-Sequim. The pilot project intends to safely advance critical and rigorous environmental research to evaluate the effectiveness of Ebb Carbon's mCDR technology for solving the global-scale environmental risks of climate change and coastal acidification. Project Macoma proposes to intake seawater from Port Angeles Harbor, treat it to create alkaline-enhanced seawater, and return the alkaline-enhanced seawater to increase the pH of receiving waters—both to enhance marine carbon capture and to mitigate coastal acidification in the Harbor. Scientific monitoring would occur in the receiving waters throughout operations. For example, water quality sensors would be attached to existing piers to collect regular measurements. Project Macoma would use these measurements to adaptively manage operations, if needed, and to monitor environmental health and potential benefits.

Project Macoma has begun outreach and engagement about the pilot project's potential impacts and benefits, particularly with potentially impacted or interested Indian Tribes, the Northwest Indian Fisheries Commission, the scientific community, local government, and environmental nonprofits. This engagement work will continue throughout the pilot project.

C. Compliance with Tier II Criteria

Project Macoma will not discharge a waste byproduct, but rather seawater made more alkaline to improve pH levels and reduce atmospheric carbon. Project Macoma has a restorative purpose. Project Macoma, LLC, has conservatively applied for an individual NPDES/SWD permit under Section 402 of the Clean Water Act and Chapter 90.48 Revised Code of Washington.

Project Macoma has prepared a draft mixing zone technical memorandum, this letter, and other documentation in support of its permit application. The results of the mixing zone analysis demonstrate that discharging alkaline-enhanced seawater is likely to result in a measurable change in pH of the receiving waters at the boundary of the chronic mixing zone by more than 0.1 standard units (SU) during operations—as intended to increase the pH of local waters in Port Angeles Harbor closer to pre-anthropogenic conditions. Receiving waters will re-acidify shortly after the pilot project ends.

Every measurable change in water quality, whether beneficial or harmful, temporary or permanent, must be found to be necessary and in the overriding public interest. *See* WAC 173-201A-320. The following is a summary response, or applicability determination, (in bold) of each subsection of WAC 173-201A-320.

i. Checklist Demonstrating Necessity and Public Interest

(4) Necessary and overriding public interest determinations. Once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest. Information to conduct the

analysis must be provided by the applicant seeking the authorization, or by the department in developing a general permit or pollution control program, and must include:

(a) A statement of the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is in the overriding public interest. Examples of information that can assist in this determination include:

(i) Economic benefits such as creating or expanding employment, increasing median family income, or increasing the community tax base; **The pilot project will be a first-of-its-kind deployment in the burgeoning mCDR industry. As such, the pilot project will conduct cutting-edge scientific studies to assess and determine the effectiveness of Ebb Carbon's mCDR technology, which will enable future evaluations of the economic and societal benefits of the technology (e.g., on fisheries and shellfish harvesting) and could accelerate the growth of the mCDR industry in Washington's rural coastal communities. The pilot project will produce temporary localized employment opportunities in the Port Angeles Harbor community.**

(ii) Providing or contributing to necessary social services; **This section is not applicable.**

(iii) The use and demonstration of innovative pollution control and management approaches that would allow a significant improvement in AKART for a particular industry or category of action; **The pilot project is cutting-edge and state of the art technology that establishes AKART in the context of mCDR. The pilot project will implement a robust monitoring and reporting regime to reduce the likelihood of adverse impacts to water quality and species listed as threatened or endangered under the Endangered Species Act, as described in Project Macoma's Ecological Safety Methodology shared with Ecology on March 5, 2024.**

(iv) The prevention or remediation of environmental or public health threats; **As detailed in this letter, the pilot project is designed to address the global societal challenges of OA, which has only worsened in Washington's coastal and Puget Sound waters since the 2012 Blue Ribbon Panel was convened, and global climate change, the effects of which are also worsening for Washington communities. The pilot study is required to safely assess and advance the effectiveness of Ebb Carbon's mCDR technology (and the field in general) to ultimately remediate the environmental and public health threats associated with OA and global climate change.**

(v) The societal and economic benefits of better health protection; **As detailed in this letter, the pilot project addresses the global societal challenges of global warming and OA. The pilot study is required to advance the effectiveness of the mCDR technology to more accurately determine its potential societal and economic benefits, including for public health.**

(vi) The preservation of assimilative capacity for future industry and development; and **Project Macoma is not releasing a waste product and will control the pH of its discharge. Project Macoma LLC will publish its findings about the impact of its**

discharges, setting a standard for compliance and enabling others in the field to benefit from the pilot project's learnings.

(vii) The benefits associated with high water quality for uses such as fishing, recreation, and tourism. **The pilot project expects to temporarily raise the pH of receiving waters to conditions more similar to pre-anthropogenic conditions, as described in this letter and the Port Angeles Mixing Analysis Technical Memorandum. Given the limited duration of the pilot project, any benefits of less acidic waters to these uses would be short-lived; however, the pilot project, including its community engagement activities, will inform future deployments of the mCDR technology and how co-benefits for communities can be realized.**

(b) Information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is necessary. Examples that may be considered as alternatives include:

(i) Pollution prevention measures (such as changes in plant processes, source reduction, and substitution with less toxic substances); **Project Macoma LLC intends to improve, not lower, water quality in Port Angeles Harbor. Project Macoma will draw down excess CO2 pollution from the atmosphere and will de-acidify seawater locally during operations. No pollutants will be added to the alkaline-enhanced seawater. The pilot study will result in intentional changes to pH under a range of operational conditions to allow for robust but safe scientific evaluation of the mCDR technology.**

(ii) Recycle/reuse of waste by-products or production materials and fluids; **No waste is discharged to the Harbor as a result of the pilot study. Waste product generated in the uplands will be properly disposed of on land.**

(iii) Application of water conservation methods; **Not applicable**

(iv) Alternative or enhanced treatment technology; **Not applicable**

(v) Improved operation and maintenance of existing treatment systems; **Not applicable**

(vi) Seasonal or controlled discharge options to avoid critical conditions of water quality; **Project Macoma will slowly ramp up its operations and conduct in-water monitoring to validate the results from the Port Angeles Mixing Analysis Technical Memorandum before discharging for the pilot project. Operational controls built into the mCDR system include the ability to pause or stop operations within seconds, so operations can be adjusted and any critical conditions of water quality can be avoided or adaptively managed. The pilot project will also conduct limited durations of discharges to avoid critical conditions such as tidal reflux.**

(vii) Establishing buffer areas with effective limits on activities; **A mixing zone evaluation has been conducted to evaluate chronic boundaries under various types and frequencies of discharge. This evaluation informs Project Macoma's proposed operations as described further in the Port Angeles Mixing Analysis Technical**

Memorandum and Ecological Safety Methodology. As discussed herein, it is anticipated that the pH change greater than 0.1 SU will result beyond the chronic mixing zone boundary; however, this change is not considered a risk to human health or the environment as the resulting pH is more similar to pre-anthropogenic conditions rather than current conditions due to OA, and because the pilot project is undergoing an assessment of effects under the State Environmental Policy Act and the Endangered Species Act, and Project Macoma, LLC, will comply with all applicable permit terms and conditions.

(viii) Land application or infiltration to capture pollutants and reduce surface runoff, on-site treatment, or alternative discharge locations; **Not applicable; Project Macoma will not interfere with the Port of Port Angeles's stormwater infrastructure.**

(ix) Water quality offsets as described in WAC 173-201A-450. **Not applicable**

ii. The State Has Already Determined that Research like Project Macoma's is Necessary and in the Overriding Public Interest.

Moreover, the State Legislature, Blue Ribbon Panel, and Marine Resources Advisory Council (MRAC), established by the Legislature to maintain a sustained and coordinated state strategy on OA, have stated that deploying mCDR in the State is in the public's best interest. When enacting the Climate Commitment Act, the Legislature found climate change presents environmental and health risks and Washington should lead on efforts to reduce greenhouse gases:

> (1) The legislature finds that climate change is one of the greatest challenges facing our state and the world today, an existential crisis with major negative impacts on environmental and human health. Washington is experiencing environmental and community impacts due to climate change through increasingly devastating wildfires, flooding, droughts, rising temperatures and sea levels, and ocean acidification. Greenhouse gas emissions already in the atmosphere will increase impacts for some period of time. Actions to increase resilience of our communities, natural resource lands, and ecosystems can prevent and reduce impacts to communities and our environment and improve their ability to recover.
> ...
> (6) The legislature further finds that by exercising a leadership role in addressing climate change, Washington will position its economy, technology centers, financial institutions, and manufacturers to benefit from national and international efforts that must occur to reduce greenhouse gases.

Senate Bill 5126 (2021). The Legislature has also called for a statewide Integrated Climate Change Response Strategy under RCW 70A.05 to better enable the State to prepare for, address, and adapt to the impacts of climate change, including to OA.

In 2012, the Blue Ribbon Panel on OA wrote, "Washington State will need to respond vigorously to [OA] if we are going to avoid significant and possibly irreversible losses to our marine environment and all it supports, including shellfish farming and wild harvest of shellfish and other commercially and culturally important marine species." Washington State Blue Ribbon Panel on Ocean Acidification (2012): Ocean Acidification: From Knowledge to Action, Washington State's Strategic Response. H. Adelsman and L. Whitely Binder (eds). Washington Department of Ecology, Olympia, Washington. Publication no. 12-01-015. Addressing this conclusion, MRAC developed a comprehensive strategy for addressing OA in Washington's marine waters. The strategy involves six focus areas, four of which are incorporated into Project Macoma's pilot project:

(1) increasing the State's ability to remediate the impacts of ocean acidification;
(2) reducing carbon emissions;
(3) informing, educating, and engaging stakeholders, the public, and decision makers; and
(4) investing in related monitoring and scientific investigations.

See Washington Marine Resources Advisory Council (2017): 2017 Addendum to Ocean Acidification: From Knowledge to Action, Washington State's Strategic Response. EnviroIssues (eds), 8. Seattle, Washington. Furthermore, MRAC recommends "supporting research and implementation of activities to increase the marine ecosystem's ability to … capture and store additional carbon from atmospheric sources (Action 6.1.4) and "coordinat[ing] lab and field efforts for mutual benefit" (Action 7.5.2). *See id.* at 27, 29.

Project Macoma will continue demonstrating Washington's strong leadership on innovative efforts to mitigate and adapt to climate change while fostering a justice transition, particularly for rural coastal communities. Project Macoma also will implement MRAC's recommendations by building upon public-private research at PNNL-Sequim. By safely studying Port Angeles Harbor's ability to capture and store carbon from the atmosphere and its response to alkalinity enhancement, the pilot project will help ensure future, larger-scale deployments of mCDR are also safe, responsible, and in the public interest.

D. Conclusion

The drawdown of atmospheric CO2 that will be effectuated by Ebb's technology is necessary and in the public interest. Permanently removing CO2 from the atmosphere is necessary to keep global warming below 1.5°C or 2.0°C above pre-industrial levels to avert the worst consequences of climate change for all. Developing this technology in Washington State will help the State to meet its greenhouse gas reduction goals, combat the impacts of OA, and continue leading on the development and deployment of innovative negative emissions technologies.

We respectfully request that Ecology's Water Quality Program determine Project Macoma is necessary and in the public interest under WAC 173-201A-320 because Project Macoma is designed to address two urgent and interrelated global challenges: climate change and OA. Project Macoma has developed monitoring and operational protocols to protect the marine environment from unintended consequences, and Project Macoma will comply with all permit terms and conditions.

Sincerely,

Todd Pelman
Manager - Project Macoma, LLC., Co-Founder and COO - Ebb Carbon, Inc.