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ENVIRONMENTAL CONTROL TECHNOLOGY CENTER
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LIST OF COMMON ABBREVIATIONS

A-S-H.....	Allen Sherman Hoff
BES	Bulk Entrainment Separator
CRG.....	Clean Raw Gas
CLS	Clear Liquor Scrubbing
DBA.....	Di-Basic Acid
DRG.....	Dirty Raw Gas
ECTC	Environmental Control Technology Center
EDR	Electrodialysis Reversal Membrane Unit
ESP.....	Electrostatic Precipator
FF	Fabric Filter
FGD	Flue Gas Desulfurization
FLRT	First Loop Reaction Tank
FRP	Fiberglass Reinforced Plastic
G/C.....	Gilbert/Commonwealth Inc.
GEESI.....	General Electric Environmental Services Inc.
HME.....	Horizontal Mist Eliminator
HSSD.....	High Sulfur Spray Dryer
HYPAS.....	Hybrid Pollution Abatement System
ID	Induced Draft
L/G	Liquid to Gas Ratio, (gal/1000ft ³)
MFT.....	Master Fuel Trip
MRT.....	Main Reaction Tank
NTU.....	Number of Transfer Units
NYSEG.....	New York State Gas & Electric
O&M.....	Operations & Maintenance
PJFF	Pulse Jet Fabric Filter
RTD.....	Resistance Temperature Detector
RWST.....	Recycle Water Storage Tank
SCBA.....	Scott Air Packs
SDA.....	Spray Dry Absorber
UMIST.....	Univ. of Manchester Inst. of Science & Technology
VME.....	Vertical Mist Eliminator
VSD.....	Variable Speed Drive
WDPF	Westinghouse Distributed Process Control System

EXECUTIVE SUMMARY

Operations and maintenance continued this month at the Electric Power Research Institute's Environmental Control Technology Center. Testing on the 4.0 MW Pilot Wet FGD unit continued with the Pilot High Velocity FGD (PHV) and the Trace Element Removal (TER) test blocks. In the High Velocity test block, SO_2 removal and mist eliminator carryover rates were investigated while operating the absorber unit with various spray nozzle types and vertical mist eliminator sections. During the Trace Element Removal test block, the mercury measurement and control studies involving the EPA Method 29 continued with testing of several impinger capture solutions, and the use of activated carbon injection across the Pulse-Jet Fabric Filter (PJFF) unit.

The 4.0 MW Spray Dryer Absorber System was utilized this month in the TER test configuration to inject and transfer activated carbon to the PJFF bags for downstream mercury capture. Work also began in December to prepare the 0.4 MW Mini-Pilot Absorber system for receipt of the B&W Condensing Heat Exchanger (CHX) unit to be used in the 1996 DOE/PRDA testing. The 1.0 MW Cold-Side Selective Catalytic Reduction (SCR) unit remained in cold-standby this month.

PILOT TESTING HIGHLIGHTS

Pilot High-Velocity Scrubbing

Phase I of the Pilot High Velocity (PHV) test block was completed in September 1994. Phase II of the PHV testing began in January 1995 and continued through February; testing in this research area was then suspended as it was realized that facility modifications were necessary to test gas flows velocities greater than 15 ft/s. As these modifications were completed (June 1995), Phase II of the PHV testing resumed (October 1995) and was completed this month. A total of 11 PHV tests were completed on the ECTC's 4.0 MW pilot wet FGD system in December. The tests in December were performed with low-pressure (LP) spiral nozzles in the absorber at the following set points:

- 140 mM Ca^{++}
- 85 mM Mg^{++}
- 94% limestone utilization
- 2000 ppm inlet SO_2
- Forced oxidation

The basic operating conditions for the 1995 tests differ from those studied in 1994 in that feed forward control for reagent addition was used instead of pH control to maintain approximately 94% limestone utilization. The intent of the 1995 testing with a constant limestone utilization (94%) is to minimize variability in SO_2

removal due to utilization changes. Also, during the 1994 tests, the highest gas velocity achievable was 15 ft/s. The facility modifications made in 1995 have made it possible to operate at gas velocities of 20 ft/s during the Fall test schedule.

Trace Element Removal Tests

The Pilot Trace Elements Removal (TER) test block continued in December as part of EPRI's overall program to develop control technology options for trace element emissions. This experimental program investigates mercury removal and mercury speciation under different operating conditions. In 1995, a six-month program was performed on the 4.0 MW wet FGD pilot unit at EPRI's Environmental Control Technology Center (ECTC).

Wet FGD systems have the ability to remove solid-phase and vapor-phase trace elements present in flue gas streams. With only a limited amount of test data to quantify mercury removal efficiencies across full-scale FGD systems, additional research is needed to better understand the removal mechanisms that may aid in the development of processes to increase the mercury removal efficiencies. Several test programs investigating trace elements removal have been conducted. The most important results from full-scale and pilot-scale testing for trace elements control by wet FGD systems are:

- Mercury is the primary vapor-phase trace element of interest to coal-fired power plants. Preliminary data show that the chemical form of the mercury can greatly affect the removal efficiency. Mercuric chloride is effectively removed by FGD systems, while elemental mercury is not.
- Mercury removal data collected at the ECTC and elsewhere are difficult to interpret because the currently available mercury speciation methods, especially when used at the FGD inlet location, do not yield successful speciation under all conditions.
- Solid-phase trace elements removal can be approximated by the bulk particulate removal efficiency for the FGD system as long as the mass of condensed sulfuric acid and scrubber carryover are considered.

Measured bulk particulate removal efficiencies across full-scale FGD systems are generally greater than 50% and are usually greater than theoretical efficiencies. These higher-than-predicted removal efficiencies may be a result of an electrical charge on the inlet particles that causes an attraction to the slurry droplets, thereby improving particulate removal efficiency for the scrubber.

SECTION I FACILITY STATUS

GENERAL

The NYSEG Kintigh Station provided flue gas to the Center 100% of the time during this performance period. As the Kintigh Station operated with a variety of coals, fluctuations in the Center's inlet SO₂ concentrations were experienced. The ECTC was off-line this month during two scheduled outage periods. The first outage occurred from 12/11 through 12/15 to reconfigure the facility gas flow path from the PHV testing to the baseline configuration for TER testing; this involved the installation of additional blanking plates in the ductwork to allow the ESP and Fabric Filter Fans to operate in parallel rather than in series. The second outage occurred from 12/21/95 through 1/2/96 to conduct preventive maintenance and to prepare for the 1996 scheduled testing.

Safety training for the month was conducted by the O&M Superintendent, Maintenance Supervisor and Shift Supervisors. The training for the month included a review of the chemical hazards at the ECTC. Inspections of the ECTC Facility and safety equipment (SCR air-packs, fire extinguishers, etc.) were completed and recorded this month. All systems were found to be in good condition. By continuing to emphasize safe work habits at the Center, we have raised the total number of days without a lost time injury to 1305 as of 12/31/95.

The monthly safety meeting with the NYSEG Kintigh Station was postponed this month due to scheduling conflicts; a new meeting date will be scheduled in January. In December, the annual eight-hour refresher training course for the OSHA Incident Commander certification was held at the Station. Included in this training was a review of hazardous materials (HazMat) training, and American Red Cross (ARC) certified programs in CPR and First Aid.

PILOT WET FGD SYSTEM

The equivalent and actual availabilities for the ECTC 4.0 MW Pilot Wet FGD System testing this month were both 37% during this period. The Pilot Wet FGD System did not operate during the following periods this month:

- December 4 for 6 hours to replace the packing in DMP-21 (Pilot inlet damper).
- December 12 - 31 for 460 hours to reconfigure the unit for Trace Element Removal (TER) testing with the SDA/PJFF unit, and to conduct regular preventive maintenance.

The Pilot High Velocity (PHV) testing continued this month with the following tests: PHV-293; PHV-294; PHV-297; PHV-298; PHV-299; PHV-300; PHV-303; PHV-304; PHV-305; and PHV-306. These tests consisted of a series of 4-hour and 24-hour investigations to evaluate SO₂ removal, mist eliminator performance (using the Munters or Koch VME) and spray nozzle performance (using Baseline, Low

Pressure, Very Low Pressure, and Tangential nozzles). The operational parameters for the Pilot Wet Scrubber during this test block included: gas flows of 19,900 scfm, 14,900 scfm, and 10,000 scfm; 2000 ppm inlet SO₂; recycle slurry flows of 650 gpm, 1300 gpm , and 1700 gpm; 550 scfm of oxidation air; and an absorber inlet gas temperature of 315°F.

A portion of the Trace Element Removal (TER) test block was conducted simultaneously with the PHV testing this month. During these PHV/TER tests, the operational parameters were similar to those for the PHV testing; however, additional mercury measurement and control studies were conducted using the EPA Method 29 for testing several impinger capture solutions while either elemental mercury (Hg⁰) or mercuric chloride (Hg⁺²) were injected into the facility gas stream. The following PHV/TER tests were conducted this month: T30-IY*2; T26-CY; T27-CY; T28-E; T29-IY*; and T30-IY*.

The following maintenance work was completed on the Pilot Wet Scrubber unit during this performance period:

- Several components in the Pilot booster fan variable speed drive (VSD) were replaced to allow operation of the fan.
- The packing was replaced in DMP-21 (Pilot inlet damper).

PILOT SPRAY DRYER ABSORBER (SDA)/PJFF SYSTEM

The equivalent and actual availabilities for the ECTC 4.0 MW Pilot Spray Dryer Absorber /Pulse-Jet Fabric Filter System testing this month were both 98% during this period. The SDA/PJFF System did not operate during the following periods this month:

- December 18 for 3 hours to install an additional blanking plate.

At the end of December, an additional phase of TER testing was initiated to investigate the effects of activated carbon as a capture media for mercury, and as a catalyst for converting elemental mercury to oxidized mercury. To accomplish this testing, the facility flue gas flow was directed through the ESP and to the SDA where activated carbon was injected. The carbon-rich flue gas was then routed to the PJFF for carbon collection (no pulse-clean cycles in operation). As the flue gas passed through the PJFF, a filter cake of carbon accumulated on the filter bags.

Using EPA Method 29, mercury measurement and control studies were conducted across the PJFF to determine the effect of the activated carbon on mercury speciation, and to determine mercury removal efficiencies for the system as either elemental mercury (Hg^0) or mercuric chloride (Hg^{+2}) were injected. The following SDA/PJFF tests were conducted this month: T32-PJFF, T33-PJFF, T34-PJFF, and T35-PJFF. The operational parameters for the SDA/PJFF configuration during this test block included: a gas flow of 5,000 scfm; no SO_2 spiking; injection of activated carbon (Darco FGD or CaCl_2 impregnated carbon) at a 10,000:1 carbon-to-mercury injection ratio; a 4:1 air-to-cloth ratio; and a PJFF inlet temperature of 300°F.

ECTC OUTAGE ACTIVITIES

The following list highlights the major maintenance work completed during the scheduled outages in this performance period:

ESP

- All compartments, rappers and rapper insulators, and hotdeck areas were inspected.
- The inlet and outlet plenums were inspected and cleaned of normal ash buildup.
- A blanking plate leak was sealed between the ESP and Fabric Filter Fan ductwork.

MINI PILOT FGD SYSTEM

- The FRP absorber spools and HME assembly were removed.
- Several flue gas dampers (DMP-24, DMP- 25, DMP- 26, DMP- 28, DMP- 29 and a manual isolation damper) were removed and reconditioned.
- The booster fan motor was removed to replace the motor bearings.
- The booster fan wheel bearings were inspected and the lubricant was replaced.

ECTC OUTAGE ACTIVITIES (cont.)

PILOT FGD SYSTEM

- The HME first stage position bracket was repaired.
- The inlet FRP was reinforced with added layers of fiberglass and resin due to wear from the quench /gas interface.

ELECTRICAL SUB -STATION

- The ECTC transformer (1AX2T7) was found to have heat stress marks on the insulation. This unit was recently overhauled and is under warranty. The vendor was contacted to set up a scheduled inspection.
- Several breakers were identified for reconditioning work during the next scheduled outage.
- Electric Room 1 (ER-1) was cleaned and all motor control centers (MCCs) and isolation transformers were inspected and cleaned.

MISCELLANEOUS

The Ball Mill operation was normal this month during the preparation of Beachville limestone. The limestone grind prepared for ECTC operations was 90% passing 325 mesh screen.

The P-5A demonstration project with Watson Process systems and Environmental Systems Corporation (ESC) was suspended this month due to the severe corrosion and material wear that was discovered in November. Recall that a thorough inspection of the P-5A unit last month revealed corrosion and wear to components which could not be repaired or replaced on-site. Therefore, the P-5A was shipped to the manufacturer (ESC) for inspection and repair. The unit is currently on schedule for repair and is expected to be returned to the ECTC for testing in January 1996.

The following general maintenance work was completed at the ECTC during this performance period:

- A power supply was replaced in DPU-3 of the data collection network.
- The reactor and test equipment from the combined SOx/NOx removal project was disassembled and transferred to the upper warehouse for storage.
- The annual hydrostatic pressure test for the ECTC Fire System was completed.

FINANCIAL REPORT

The Financial Report for the four Operations and Maintenance contract tasks are summarized below for the month of December 1995, the year to date, and the contract total. All expenses reported below are expressed in terms of U. S. currency dollars.

Task Definitions:

Task 100: Operations and Maintenance Labor

Task 200: Purchased Materials

Task 300: Engineering Support

Task 400: Training

Table i.
Monthly Operating Costs by Task

	December	Year to Date	Contract Total
Task 100	\$ 114,540	\$ 1,258,775	\$ 13,671,467
Task 200	\$ 88,908	\$ 528,243	\$ 7,971,124
Task 300	\$ 7,785	\$ 68,867	\$ 1,138,903
Task 400	\$ 1,589	\$ 16,871	\$ 51,675
TOTAL*	\$ 212,822	\$ 1,872,756	\$ 22,833,169

* Includes \$168,455 unbudgeted, contracted cost of Pilot High Velocity modifications in 6/95

The attached graph illustrates the budgeted and actual expenses for ECTC O&M activities through December 1995.

Figure i.
1995 Operation & Maintenance Costs

SECTION II PILOT AND MINI-PILOT TEST ACTIVITY

PILOT

Overview

The following progress report discusses the results from the test programs performed in December at EPRI's Environmental Control Technology Center (ECTC). The Pilot High Velocity (PHV) test block was completed in December and the Trace Elements Removal (TER) test block was continued.

Pilot High-Velocity Scrubbing

Phase I of the Pilot High Velocity (PHV) test block was completed in September 1994. Phase II of the PHV testing began in January 1995 and continued through February; testing in this research area was then suspended as it was realized that facility modifications were necessary to test gas flows velocities greater than 15 ft/s. As these modifications were completed (June 1995), Phase II of the PHV testing resumed (October 1995) and was completed this month. A total of 11 PHV tests were completed on the ECTC's 4.0 MW pilot wet FGD system in December. The tests in December were performed with low-pressure (LP) spiral nozzles in the absorber at the following set points:

- 140 mM Ca^{++} ;
- 85 mM Mg^{++} ;
- 94% limestone utilization;
- 2000 ppm inlet SO_2 ; and
- Forced oxidation.

The basic operating conditions for the 1995 tests differ from those studied in 1994 in that feed forward control for reagent addition was used instead of pH control to maintain approximately 94% limestone utilization. The intent of the 1995 testing with a constant limestone utilization (94%) is to minimize variability in SO_2 removal due to utilization changes. Also, during the 1994 tests, the highest gas velocity achievable was 15 ft/s. The facility modifications made in 1995 have made it possible to operate at gas velocities of 20 ft/s during the Fall test schedule.

Background

Operating FGD systems with higher gas velocities through the scrubber has potential benefits for electric utilities planning their Clean Air Act compliance strategy. For new system designs, operating at a higher gas velocity reduces the scrubber diameter and the corresponding capital costs. In some existing systems operating with gas bypass or with an adjacent uncontrolled unit, SO_2 emissions could be reduced with

relatively low capital expenditures by scrubbing additional gas in the existing scrubber. To provide utilities information about FGD system performance at high gas velocities (>10 ft/s), EPRI sponsored the Pilot High Velocity (PHV) test program on the 4.0 MW pilot wet FGD system at the ECTC.

The objectives of EPRI's PHV test program have been:

- To determine the effect of flue gas velocity on SO₂ removal efficiency and other FGD performance parameters for a countercurrent spray tower operating at velocities up to 20 ft/s;
- To determine the effect of absorber spray nozzle type on SO₂ removal efficiency at velocities up to 20 ft/s;
- To determine the gas velocity at which significant mist eliminator breakthrough occurs for two different chevron-type mist eliminators; and
- To provide data for FGDPRISM to further evaluate the predictive capabilities of the model at high gas velocities.

The PHV data have provided a wide variety of conditions to evaluate the predictive capabilities of FGDPRISM at high flue gas velocities. During this test block, the 4.0 MW wet FGD pilot system has operated as a countercurrent spray tower with variations in the gas rate, liquid rate, nozzle type, and internal configuration (open tower vs. tray).

The PHV Phase I test block produced some interesting results. At a constant liquid rate, SO₂ removal efficiency remained nearly constant as the absorber gas velocity was increased from 12 to 15 ft/s. In addition, increasing the Sauter mean diameter (SMD) droplet size from 1500 μ m to 1900 μ m using spiral nozzles, and to 3500 μ m using tangential flow nozzles, did not significantly affect SO₂ removal. Finally, at velocities up to 17 ft/s through the mist eliminators (15 ft/s through the absorber), no significant slurry carryover was observed.

The PHV Phase I test results indicated that operating at higher flue gas velocities has many potential benefits, and further evaluation of the FGD performance at even higher gas velocities is warranted. Unfortunately, due to the limitations in the pilot booster fan capacity at that time, absorber velocities higher than 15 ft/s could not be tested. Operating at velocities higher than 15 ft/s was of interest to determine the effect on SO₂ removal efficiency and to determine the velocity at which significant carryover occurred across the mist eliminator system. Testing lower pressure nozzles with a larger droplet size was also of interest.

Based on the evaluation of the 1994 PHV Phase I test results, EPRI decided to conduct a second phase of PHV testing and to evaluate scrubber and mist eliminator performance at even higher velocities (up to 20 ft/s) by making modifications to the

pilot plant. The predictive capabilities of FGDPRISM model were also to be evaluated with data at these higher velocities.

The goal of Phase II of the PHV test program was to provide further information about FGD performance at high gas velocity conditions in a countercurrent spray tower, and to repeat specific test conditions which yielded inconsistent results during Phase I. SO₂ removal efficiency and mist eliminator performance were evaluated over a range of flue gas velocities and liquid rates. Different nozzle types were also tested, including a very low-pressure spiral nozzle.

Summary of Operations

A detailed summary of operations for December is presented in Table 1. It was discovered in early January 1995 that the fans were not capable of operation at gas flow rates greater than 15 ft/s without major facility modifications. As a result, some tests with gas rates of 15 ft/s or lower were performed initially and the tests with higher gas rates were started in October, after facility modifications had been completed (June 1995).

Figure 1 shows a simplified process flow diagram for the pilot unit, as configured for the PHV testing and the high velocity testing during the TER test block. During the PHV testing, different recirculation rates required use of all three absorber spray headers (flow to Header #1 was either zero or 650 gpm, flow to header #3 was always set at 650 gpm, and flow to header #5 had either zero or 400 gpm). A total of 11 tests were completed in December and all tests used the low pressure spiral nozzles (BETE FST96XPN) in headers #1 and #3. These nozzles have a 90° full spray cone, a 9 psi nozzle ΔP , and a droplet Sauter mean diameter of 1900 μm . The nozzles on header #5 were always the baseline spiral nozzles (BETE FST88XPN).

The number of tests conducted during December were required to obtain data at 94% limestone utilization. With only 5% allowable error in reagent feed flows and the normal error in SO₂ measurements at the inlet and outlet of the pilot unit, setting and maintaining the reagent flow for 94% limestone utilization prior to the test proved to be a difficult task. To compensate for this, each PHV test in December was conducted for 24 hours. The reagent feed flow for each test was changed every eight hours to yield three utilization values; one of these reagent flow values was calculated to meet the 94% limestone utilization requirement. This approach was also necessary because the PHV testing was conducted concurrently with the Trace Element Removal (TER) test block on the pilot wet FGD unit.

On December 1, problems with the logic control for the pilot booster fan variable speed drive (VSD) required the fan to be taken off-line. Without this fan in the gas flow configuration, the maximum gas velocity achievable after December 1st was 15 ft/s. As the scheduled PHV tests requiring gas velocities of 15 ft/s (or less) were completed, Phase II of the PHV test block was ended.

Summary of Results

The test conditions and results from the Phase II PHV tests (October to December) are summarized in Table 2. The analytical data tables and process data summary reports for the tests completed in December are appended to this report.

One of the main objectives of the PHV Phase II test block was to determine how high-velocity scrubbing affects process performance results, such as SO₂ removal. The SO₂ removal results in this report have been expressed as the number of transfer units (NTU) and are presented in the following subsections; these subsections compare the 1995 results with the 1994 data and discuss the effect of nozzle type.

Comparison with 1994 Results

The effect of absorber gas velocity on SO₂ removal is illustrated in Figures 2, 3, and 4 for both the 1994 tests and the 1995 tests performed with the low pressure nozzles. In each figure, the limestone utilization during each test has been shown if it was measured. Recall that limestone utilization was not measured during all of the 1994 tests since the PHV process at that time was controlled by pH and not limestone utilization.

The test results from the use of the low pressure spiral nozzles are presented in Figures 2, 3, and 4 for liquid recirculation rates of 1700 gpm, 1300 gpm and 650 gpm, respectively. At liquid recirculation rates of 1700 and 1300 gpm, the 1995 results show lower SO₂ removals than the 1994 results. This trend was observed with the three other nozzle types as well. If the greater gas velocity studied in 1995 did not affect the mass transfer coefficient or droplet hold up, then it would be expected that the NTU at 17 ft/s would be approximately 60% of the NTU value at 10 ft/s (due to the change in L/G ratio). However, at 1700 gpm, the NTU value decreased from 2.05 at 10 ft/s to 1.83 at 17 ft/s (89% of the NTU value at 10 ft/s). At 1300 and 650 gpm, there also appears to be some gas velocity effect on the mass transfer coefficient or droplet holdup. While this effect may not be as significant as the 1994 results indicated, in general, higher velocity scrubbing appears to have a beneficial effect on the mass transfer characteristics in the absorber.

Effect of Nozzle Type

Another main objective of the PHV test block was to determine the effect of nozzle type on process performance at high flue gas velocities. The nozzle types for this testing were chosen to compare the effects of pressure drop, droplet size, and spray pattern on FGD performance. Specific nozzle process information for the liquid flow rates used during this test block (obtained from BETE) was included in the October progress report.

Through November, three different nozzles had been evaluated: a baseline spiral nozzle (normally used on the pilot scrubber), a very low-pressure spiral nozzle, and

a tangential flow nozzle. Low pressure (LP) spiral nozzle tests were conducted in December; the results from these tests are shown with the November results in Figures 5, 6, and 7. These figures compare the results from each type of nozzle studied in the PHV test block to date at liquid rates of 1700 gpm, 1300 gpm, and 650 gpm, respectively. In general, the low pressure (LP) spiral nozzles gave SO₂ removal results similar to the very low pressure spiral nozzles over the range 10 to 15 ft/s. The baseline spiral nozzles exhibited better performance, and the tangential nozzles performed the best out of the nozzle types tested. Note from these figures that an apparent increase in SO₂ removal occurred between 17 and 20 ft/s with slurry flow rates of 1300 and 1700 gpm. This effect is most likely due to the enhanced gas/slurry contact in the mist eliminator produced by absorber flooding at a gas velocity of 20 ft/s.

Trace Element Removal Tests

The Pilot Trace Elements Removal (TER) test block continued in December as part of EPRI's overall program to develop control technology options for trace element emissions. This experimental program investigates mercury removal and mercury speciation under different operating conditions. In 1995, a six-month program was performed on the 4.0 MW wet FGD pilot unit at EPRI's Environmental Control Technology Center (ECTC).

Background

Wet FGD systems have the ability to remove solid-phase and vapor-phase trace elements present in flue gas streams. With only a limited amount of test data to quantify mercury removal efficiencies across full-scale FGD systems, additional research is needed to better understand the removal mechanisms that may aid in the development of processes to increase the mercury removal efficiencies. Several test programs investigating trace elements removal have been conducted. The most important results from full-scale and pilot-scale testing for trace elements control by wet FGD systems are:

- Mercury is the primary vapor-phase trace element of interest to coal-fired power plants. Preliminary data show that the chemical form of the mercury can greatly affect the removal efficiency. Mercuric chloride is effectively removed by FGD systems, while elemental mercury is not.
- Mercury removal data collected at the ECTC and elsewhere are difficult to interpret because the currently available mercury speciation methods, especially when used at the FGD inlet location, do not yield successful speciation under all conditions.

- Solid-phase trace elements removal can be approximated by the bulk particulate removal efficiency for the FGD system as long as the mass of condensed sulfuric acid and scrubber carryover are considered.
- Measured bulk particulate removal efficiencies across full-scale FGD systems are generally greater than 50% and are usually greater than theoretical efficiencies. These higher-than-predicted removal efficiencies may be a result of an electrical charge on the inlet particles that causes an attraction to the slurry droplets, thereby improving particulate removal efficiency for the scrubber.

Test Block Objectives

The 1995 Trace Elements Removal (TER) test block focused on four research:

- Mercury speciation methods;
- Effect of FGD system operating variables on mercury removal;
- Novel methods for elemental mercury control; and
- Catalytic methods for converting elemental mercury to oxidized mercury.

Testing in December included:

- Measurement of mercury removal across a FGD system operating under high velocity conditions;
- An examination of the speciation capability of impinger solutions using tris(hydroxymethyl)aminomethane (Tris), Tris with EDTA, and peroxide/nitric impingers; and
- Measurement of mercury removal following carbon and CaCl_2 /carbon deposition on the bags of the PJFF.

The results from testing in December are described in the following sections.

Summary of Operations

A detailed summary of operations for December is presented in Table 1. A simplified flow diagram of the wet FGD toxics gas path used during the December testing is shown in Figure 8. During December, one mercury injector was used for the gas stream injection (elemental mercury or mercuric chloride). The injector and its controls were moved to the desired injection location as needed. This relocation of the mercury injector was necessary due to safety concerns (mercury injection is always performed on a negative pressure duct to prevent any release of mercury vapor into the ambient air). During the TER testing under high velocity wet scrubber conditions, mercury was injected into the Dirty Raw Gas (DRG) upstream of the ESP because the original injection location at the inlet to the pilot booster fan

(Clean Raw Gas - CRG) was at a positive pressure under this configuration. The TER testing through December 12 involved mercury injection at the DRG.

For several of the TER tests in December, the first three gas sampling trains were prepared so that a pH greater than 6.5 was maintained in the first Tris impinger. The fourth sample train was prepared so that enough flue gas was collected to result in a pH of 6.5 or less in the first Tris impinger. This data was collected to investigate the effect on mercury speciation caused by exceeding the buffer capacity of the first Tris impinger. Several additional tests were also conducted this month using ethylenediaminetetraacetic acid (EDTA) as a chelating agent in the Tris impinger solutions to achieve better speciation of mercury.

In the TER tests involving the Pulse-Jet Fabric Filter (PJFF), the gas path was reconfigured to allow gas to flow from the DRG to the ESP, ESP to the CRG, CRG to the SDA, SDA to the PJFF, and PJFF to the TGR and the NYSEG stack. A simple flow diagram for the gas path used with the PJFF tests is shown in Figure 9.

The PJFF was equipped with 68 Ryton (high temperature) bags to give an air-to-cloth ratio of 4.0 at 5000 scfm during these tests. Before the PJFF testing with Darco carbon injection, the PJFF pulse-cleaned off-line and then on-line. Once clean, activated carbon was injected/deposited onto the PJFF bags via a screw feeder over a two hour period; gas sampling began within one hour of depositing the carbon. The PJFF cleaning mode was disabled once carbon deposition began so that a carbon filter cake would remain on the bags. The second day of gas sampling consisted of two tests: the first test investigated the effect of the carbon which had been deposited on the PJFF bags the previous day; the second test examined the effect of an additional 25 pounds of carbon injection/deposition onto the PJFF bags. After these tests were completed, the PJFF was pulse-cleaned every hour for 15 minutes until the next morning. During a second series of PJFF tests this month, a CaCl_2 -carbon slurry was fed through the SDA atomizer and was deposited onto the PJFF bags before gas sampling.

Summary of Results

The test conditions for the TER tests performed in December are summarized in Table 3. A summary of the alternate impinger solution testing is presented in Table 4. The analytical data tables and process data summary reports for the tests completed in December are appended to this report.

Pilot High Velocity Toxics

Results from the TER tests performed around the pilot absorber during high velocity conditions (T-24N - 20 ft/s, L/G = 55) are shown in Figure 10. In this figure, the high velocity tests are compared to baseline wet scrubber tests performed in September and October 1994. As shown in Figure 10, during pilot high velocity absorber testing, approximately 90% of the "oxidized" mercury was removed across the scrubber while about 97% was removed under baseline FGD conditions. As

expected, the oxidized mercury removal efficiency is relatively close to the gas-film SO_2 mass transfer limit under both conditions.

An unexpected result from some of the TER testing under high velocity conditions occurred this month as elemental mercury was injected into the duct (test T-24-E). The data from this testing indicated that the scrubber achieved 66% total vapor phase mercury removal, while the absorber operating at baseline conditions removed only 30% (1994 results). In the TER high velocity tests, elemental mercury was injected upstream of the ESP rather than downstream because the upstream location had the only available port under negative pressure conditions. (Mercury is spiked only into negative pressure ducts at the ECTC as a safety precaution.) The greater mercury removal found under high velocity conditions was most likely due to the oxidation of the elemental mercury spike in the high ash gas streams and/or across the ESP and pilot heater. The direct measurement of oxidation by impinger solution speciation was somewhat suspect in these tests since the results are based on Method 29 measurements (recall Hg^0 shows enhanced solubility in the peroxide impingers). However, the wet scrubber removal results indicated that significant Hg^0 oxidation was occurring when Hg^0 was injected into the duct with high particulate concentration. Additionally, the total Hg^0 spike in test T24-E was approximately $42 \mu\text{g}/\text{Nm}^3$ while the permanganate catch (Hg^0 fraction) at the wet scrubber outlet was only $15 \mu\text{g}/\text{Nm}^3$. These results indicate that oxidation likely occurred because the permanganate impinger catch at the wet scrubber outlet is normally close to the value of the elemental spike (e.g., 21 versus $22 \mu\text{g}/\text{Nm}^3$, respectively in 1994 baseline scrubber tests). The oxidation of elemental mercury when injected upstream of the ESP will be explored further in January 1996.

Tris and Peroxide Agreement

Table 5 shows a comparison between the Tris, the Tris/EDTA, and the peroxide solutions used in Method 29* gas sampling trains. While the Tris and peroxide impingers agree closely in total mercury captured in test T28-EY (elemental mercury spiking) and test T26-CY (mercuric chloride spiking), total mercury capture was 17% greater in the Tris impingers when EDTA was included. This difference in total mercury capture may be partially due to the high mercury capture in the Tris/EDTA impingers in the first gas sampling test. The effect of EDTA and Tris will be investigated further in January.

Aqueous Mercury Spike and Tris Impinger Solution

The migration of an aqueous mercury spike (Hg^{2+}) through the Tris impinger solutions was explored in tests T25-NY and T31-NX. The results of these tests are shown in Figure 11. When a 1.0 M Tris solution was used as the other impinger (impinger 1 and 2) in the Method 29* gas sampling train, a capture recovery of -3% of the $4 \mu\text{g}$ Hg^{2+} spike was achieved in the first Tris impinger. This shows that the aqueous mercury spike was volatilized from the first impinger (the mercury spike in this test was eventually captured in the permanganate impingers). However, when $4 \mu\text{g}$ of aqueous Hg^{2+} was spiked into the other impinger of Tris with 1.0 mM

EDTA, 91% of the aqueous spike was captured in the first Tris/EDTA impinger, indicating that the Tris/EDTA combination is needed to effectively retain an aqueous mercury spike.

Mercuric Chloride Spike and Tris Impinger Solution

The ability of Tris and Tris/EDTA impinger solutions to capture oxidized mercury was tested during mercuric chloride spiking in the duct in tests T26-CY and T27-CY. The results of these tests are shown in Figure 12. The mercuric chloride spike in each test was captured in the first impinger, indicating that either Tris or Tris/EDTA speciates mercuric chloride as expected.

Elemental Mercury Spike and Tris Impinger Solution

Tests T28-EY and T31-IX (shown in Figure 13) show the effect of elemental mercury spiking in the duct and intratrain spiking on speciation by Tris and Tris/EDTA impinger solutions. The effect of elemental mercury injection location is also illustrated in test T28-EY (spiking in DRG duct). Test T31-IX shows that the elemental mercury intratrain spike was not captured by Tris or Tris/EDTA impingers and is successfully captured by the permanganate impingers. However, when elemental mercury was injected into the DRG (high ash gas) upstream of the ESP (test T28-EY), 85% of the mercury was captured in the first Tris impinger, indicating that the elemental mercury was oxidized in the DRG. This oxidation of mercury in the high ash gas streams and the effect of the ESP on oxidation will be explored further in January.

pH Effect

During the December testing, the last gas sampling train (sampling gas with mercuric chloride spiking) was operated longer to collect an amount of flue gas that would exceed the theoretical buffer capacity of the Tris or Tris/EDTA solution. The effect of decreasing pH (by increasing the collected flue gas volume) on mercury concentration in Tris and Tris/EDTA is seen in Figures 14 and 15, respectively. With the Tris impinger solution, the decrease in pH in impinger #1 corresponds to a decreasing amount of mercury captured. This decrease in mercury captured results from the conversion of Hg^{2+} to Hg^0 in the presence of sulfurous acid:

The conversion to elemental mercury can also be monitored in the increase in the mercury concentration in the permanganate impingers. Tris with 1.0 mM EDTA does not show the same severe decrease in mercury concentration, nor is there any increase in the permanganate mercury concentration as the pH decreases to 6.4. These results show that with EDTA, the Tris solution keeps any converted mercury in solution. For subsequent tests, the Tris/EDTA solution will be used and a gas volume will be sampled so that the pH of the first impinger remains greater than 7.0

Solution Effects (Enhanced Solubility)

Tests T29-IY* and T30-IY* were conducted to evaluate the effect of enhanced solubility of elemental mercury in the peroxide impingers of a Method 29 sampling train when sampling flue gas. Figure 16 shows the results of sampling with a constant intratrain mercury spike and increasing flue gas sample volume. The results plotted in Figure 16 (test T29-IY*) show that the elemental mercury removal efficiency increased in each of the four peroxide impingers with increasing amount of flue gas sampled. This demonstrates that the flue gas component which causes enhanced elemental mercury solubility in the peroxide impingers apparently increases in concentration and in effect with increased flue gas volume sampled.

Figure 17 shows the results of an increasing intratrain mercury spike with constant flue gas sample volume. The results plotted in Figure 17 (test T30-IY*) show no effect on elemental mercury removal efficiency in the peroxide impingers when the amount of flue gas sampled is held constant and the mercury spike is increased. Again, these results show that some component in the flue gas must be increased in the peroxide impingers to achieve an increased elemental mercury removal efficiency. At this time, the component in flue gas which causes this increased solubility effect in peroxide impingers has not been identified.

Mercury Removal with PJFF

The results from several tests which investigated the removal/conversion of elemental mercury across the PJFF with different catalysts are shown in Figure 18. Testing was done with Darco carbon and a calcium chloride/Darco carbon mixture. Elemental mercury was spiked into the flue gas upstream of the ESP. As discussed in the operations summary, the flue gas was first passed through the ESP to remove the fly ash and then routed through the SDA/PJFF. About one hour prior to mercury measurements, 25 pounds of Darco FGD carbon was injected into the flue gas and collected on the PJFF bags. The carbon-to-mercury ratio at the completion of the first set of samples was about 10,000:1. This carbon was retained on the bags overnight and mercury samples were again collected 24 hours later. The C:Hg ratio at this time had decreased to about 3,000:1. Following this sampling, an additional 25 pounds of carbon were injected onto the PJFF bags and another set of flue gas mercury samples were taken. Finally, after a thorough cleaning of the bags, a slurry containing 25 pounds of carbon and 1.25 pounds of CaCl_2 (dissolved in water) was injected into the flue gas and the resulting solids were collected on the PJFF. After waiting for an hour, flue gas mercury samples were collected.

These tests were performed to determine the effects that carbon and a CaCl_2 /carbon mixture would have on elemental mercury oxidation. Unfortunately, because the Hg^0 had to be spiked into the high dust gas, greater than 90% of the Hg^0 was oxidized prior to reaching the PJFF. As a result, the Hg^0 concentration at the PJFF inlet was only about $1 \mu\text{g}/\text{Nm}^3$. (These tests will be repeated after modifications have been made to spike downstream of the ESP in this flow configuration.)

Figure 18 shows the results of these tests as the combined elemental mercury removal and conversion (the amount of elemental mercury converted cannot be separated from the amount removed in these tests). Total vapor phase elemental mercury removal/conversion was approximately 90% for all tests in which the sampling was conducted immediately after depositing the catalyst onto the PJFF bags. In test T33-PJFF, the carbon catalyst from the previous day was tested; the results in Figure 18 (C-24 hours) show that 50% of the elemental mercury converted to oxidized mercury across the PJFF. After 24 hours, the total vapor-phase mercury removal efficiency had decreased to essentially 0%, so the reduction in elemental mercury across the PJFF can be attributed entirely to oxidation. Test T33-PJFF is the only test in Figure 18 that can identify conversion because there was no removal occurring simultaneously. From these data, it appears that carbon may be an effective catalyst for oxidation of Hg^0 to Hg^{+2} . However, additional tests with higher Hg^0 concentrations and greater exposure times will be necessary to confirm this.

Future Tests

The Trace Elements Removal (TER) test block will continue with testing of potential catalysts on the filters of the gas sampling trains as well as additional tests with catalyst deposition on the PJFF bags. Tests exploring the mercury oxidation effect of the high ash gas stream and the ESP will be performed in January. Tris/EDTA alternate impinger tests will also be continued in January.

Table 1. December Process Operating Conditions Summary

Date		Process Summary	Gas Summary
Fri. 12/1	PHV-291 20 ft/sec L/G= 72 12 ft. Reaction Tank Low pressure nozzles	Problem with the pilot fan VSD resulted in shutting down the pilot fan. 15 ft/sec is the greatest velocity attainable with the two operating fans (fabric filter and ESP fans).	The mercuric chloride probe liner was broken. Therefore, the remaining hot box will be used for all mercury injections until a new probe/hot box injection unit is built.
Sat. 12/2	PHV-293 15 ft/sec L/G= 96 Low pressure nozzles	Mini-pilot absorber taken down and put in storage. Space needed for B&W tests	
Sun. 12/3	PHV-294 10 ft/sec L/G= 144 Low pressure nozzles		
Mon. 12/4	PHV-298 10 ft/sec L/G= 110 Low pressure nozzles	Pilot taken off-line after sampling to put new packing in damper 21. Unit back on-line at 16:00. Ball mill slurry to the P-RSST and the ORWST.	T25-NY Tris comparison at the WS inlet with aqueous mercury spike in the comparison train. Gas sample times were 20, 26, 32, and 40 minutes to explore Tris buffer capacity and effect on mercury capture in the impinger solution. pH measured in the 1st and 2nd Tris impingers after sampling. Peroxide and nitric acid added to the Tris impingers at the sampling location.
Tue. 12/5	PHV-297 15 ft/sec L/G= 74 Low pressure nozzles		Installed the mercuric chloride injection system at the DRG duct because the pilot inlet location is now positive pressure (pilot fan down).
Wed. 12/6	PHV-300 15 ft/sec L/G= 37 Low pressure nozzles	Limestone delivery	T26-CY Tris comparison at the WS inlet and the DRG (pre-spike location) with mercuric chloride injection. Using Method 29* at WS inlet. Gas sampling times were 20, 25, 30, and 40 minutes.

Table 1. December Process Operating Conditions Summary

Date	Process Summary		Gas Summary
Thurs. 2/7	PHV-299 10 ft/sec L/G = 55 Low pressure nozzles		T27-CY Gas sampling at the DRG and the WS inlet using Tris with 1mM EDTA in the first two impingers with Method 29*, HgCl ₂ spiking. At the end of the testing, the elemental mercury spiking system was installed.
Fri. 12/8	PHV-303 10 ft/sec L/G = 144	Reagent feed from the P-RSST (31.4 wt%)	T28-EY Tris comparison using Method 29* at the WS inlet with elemental mercury spiking in the DRG.
Sat. 12/9	PHV-304 15 ft/sec L/G = 96		
Sun. 12/10	PHV-305 15 ft/sec L/G = 74	Switched to mini-pilot RSST and 32.4 wt% reagent feed.	
Mon. 12/11	PHV-306 10 ft/sec L/G = 110	During air compressor maintenance, the oxidation air to the P-FLRT was lowered from 550 to 300 scfm for two hours.	T29-IY* Method 29 sampling to examine solution effects of mercury speciation in the peroxide impingers with intratrain spiking at the inlet to the first impinger. 20, 40, 60, and 75 dscf flue gas sampled while the amount of mercury spiked was held constant.
Tue. 12/12		After gas sampling, the pilot unit was taken off-line to configure facility to operate with the spray dryer and PJFF with the following gas path: DRG to ESP to CRG to SDA to PJFF to TGR.	T30-IY* Method 29 sampling to examine solution effects of mercury speciation in the peroxide impingers with intratrain spiking at the inlet to the first impinger. The amount of sampled flue gas was held constant while the amount of element mercury spiked was varied over the four runs.

Table 1. December Process Operating Conditions Summary

Date	Process Summary	Gas Summary
Wed. 12/13 to Sun. 12/17	Facility modifications continued. The duct between the FF fan and the ESP fan was cut and a slip-blank plate was installed. Several blanking plates were installed to configure the desired gas path. Repair of hole in duct at PJFF outlet.	
Mon. 12/18	Cleaning PJFF with 20 minutes off-line pulsing and 10 minutes of on-line pulsing.	<p>T31-IX Tris comparison using Method 29* at the CRG with intratrain elemental mercury spiking. This test was a check on the mercury speciation capability of the Tris impinger solution.</p> <p>T31-NX Testing speciation capability of Tris with 1 mM EDTA as first two impingers with aqueous mercury spike before gas sampling.</p>
Tue. 12/19	5000 scfm PJFF gas inlet temp. = 300°F 4:1 air: cloth ratio approx. 10,000:1 C:Hg ratio	<p>PJFF cleaning mode was on until carbon deposition was started. The initial 25 deposition of carbon increased the PJFF ΔP from 0.7 to 3.5 inches H₂O.</p> <p>T32-PJFF Testing mercury removal/conversion across the PJFF with Darco carbon deposited on the bags. The carbon was deposited just before gas sampling started. 68 Ryton bags (high temp are installed in the PJFF.</p>
Wed. 12/20	The additional 25 lbs. deposition of carbon increased the PJFF ΔP from 3.6 to 5.1 inches H ₂ O. After testing, started PJFF cleaning with 15 minute on-line pulsing, on the hour, from 16:00 to 04:00 next morning when CaCl ₂ -impregnated carbon was deposited.	<p>T33-PJFF Testing mercury removal/conversion across the PJFF with Darco carbon deposited on the bags. The carbon was deposited 24 hours before gas sampling started. (i.e. same carbon from yesterday's testing).</p> <p>T34-PJFF Testing mercury removal/conversion across the PJFF with Darco carbon deposited on the bags. Additional carbon was deposited just before gas sampling started to achieve approx. 20,000:1 C:Hg ratio.</p>

Table 1. December Process Operating Conditions Summary

Date	Process Summary	Gas Summary
Thurs. 12/21		T35-PJFF Testing mercury removal/conversion across the PJFF with CaCl_2 - carbon material deposited on the bags. The carbon was deposited as a slurry injected through the SDA atomizer just before gas sampling was started to achieve approx. 10,000:1 C:Hg ratio.
Fri. 12/22 to Sun. 12/31	Facility Outage Repair work on the pilot absorber and HME. Preparation for January testing.	

Table 2

Summary of Pilot High Velocity Phase II Test Conditions and Results

Test ID	Absorber Gas Velocity (ft/s)	Slurry Reclrc. Rate (gpm)	L/G (gal/macf)	FLRT pH	Absorber pH	Reaction Tank Slurry wt. %	Liquid Calcium (mM)	DBA Conc. (ppm)	SO2 Rem'l (%)	SO2 Rem'l (NTU)	VME ΔP (ln H2O)	Absorber ΔP (ln H2O)	Direct Carryover Rate (gpm/ft2)	HMEC Tank Level Carryover Rate (gpm/ft2)	LS Loading (g/L)	LS Util. (%)	Reagent Feed Rate (gpm)
<i>Baseline Spiral Nozzles</i>																	
PHV-200	20.0	1700	72	5.59	4.20	11.98	142	-	86.7	2.02	1.10	13.8	-	-	4.7	93.9	2.28
PHV-201	17.5	1700	83	5.54	4.16	12.19	-	-	82.3	1.73	0.40	10.0	-	-	3.4	95.6	1.85
PHV-201R	17.5	1700	83	5.61	4.67	10.67	-	-	85.9	1.96	0.30	9.9	-	-	4.4	95.6	2.25
PHV-202	15.1	1700	96	5.55	4.50	12.78	-	-	82.1	1.72	0.20	7.7	-	-	3.4	95.9	1.55
PHV-203	10.1	1700	144	5.78	4.94	12.50	-	-	90.0	2.30	0.10	4.7	-	-	4.9	94.0	1.14
PHV-204	20.2	1300	55	4.45	3.46	13.03	154	-	67.1	1.11	1.10	11.8	-	-	3.3	96.0	1.53
PHV-205	17.5	1300	63	4.82	3.66	12.41	-	-	74.9	1.38	0.43	8.7	-	-	4.4	94.5	1.63
PHV-205R	17.6	1300	63	5.22	4.53	13.16	-	-	74.0	1.35	0.40	16.5	-	-	4.1	95.0	1.58
PHV-206	15.0	1300	73	5.15	3.77	12.02	-	-	76.8	1.46	0.20	6.6	-	-	4.6	94.0	1.38
PHV-207	10.0	1300	110	5.36	4.33	11.73	120	-	83.9	1.83	0.10	4.0	-	-	4.8	93.5	1.06
PHV-208	20.1	650	27	5.59	4.25	12.40	-	-	39.5	0.50	0.80	8.1	-	-	3.0	96.2	1.09
PHV-208R	20.0	650	28	5.48	4.08	11.41	-	-	35.9	0.44	0.70	8.2	-	-	2.0	97.2	1.10
PHV-209	17.5	650	32	5.84	4.44	10.76	-	-	44.8	0.59	0.30	5.8	-	-	4.2	93.8	1.10
PHV-210	15.0	650	37	5.25	4.00	12.12	-	-	35.7	0.44	0.20	4.5	-	-	1.7	97.8	0.79
PHV-211	10.0	650	55	5.12	3.92	11.05	-	-	42.7	0.56	0.10	2.5	-	-	1.2	98.3	0.63
<i>Carryover Tests using Munters Vertical Mist Eliminators and Baseline Spiral Nozzles</i>																	
PHV-214	15.1	1700	96	5.75	5.25	12.93	141	-	87.7	2.09	0.20	8.0	0.00023	0.00020	4.9	94.2	1.91
PHV-213	17.5	1700	83	5.76	4.66	12.68	141	-	87.9	2.12	0.36	10.5	0.00024	0.00025	5.2	93.7	2.20
PHV-212	20.1	1700	72	5.56	4.81	12.64	137	-	88.0	2.12	1.14	14.8	0.00316	0.00271	4.7	94.2	2.45
PHV-215	20.1	1300	55	5.36	4.40	11.16	132	-	78.2	1.52	1.13	13.0	0.00312	0.00303	4.6	93.5	2.11
<i>Baseline Spiral Nozzles</i>																	
PHV-264	13.5	1300	81	4.95	4.42	11.89	-	-	76.3	1.44	0.15	6.2	-	-	4.6	94.0	1.43
PHV-211R	10.1	650	55	4.99	4.21	11.22	-	-	50.9	0.71	0.09	2.7	-	-	4.3	94.0	0.67
PHV-210R	15.0	650	37	4.81	3.92	11.37	-	-	41.0	0.53	0.19	5.2	-	-	2.6	96.4	0.78
PHV-265	11.5	1300	96	4.79	4.11	12.65	-	-	80.1	1.61	0.11	5.2	-	-	3.0	96.3	1.24
PHV-208RR	20.1	650	27	4.65	3.97	13.38	145	-	44.4	0.59	0.72	10.6	-	-	5.0	94.1	1.25
PHV-210RR	15.0	650	37	5.00	4.01	12.02	-	-	46.5	0.62	0.19	5.7	-	-	4.6	94.1	0.80
PHV-206R	15.0	1300	74	4.97	3.92	12.62	-	-	74.7	1.37	0.19	8.1	-	-	3.4	95.8	1.41
PHV-265R	11.5	1300	96	5.18	3.99	12.50	-	-	84.4	1.86	0.11	5.5	-	-	3.4	95.8	1.29
PHV-204R	20.0	1300	55	5.34	4.53	13.47	136	-	79.0	1.56	1.08	16.5	-	-	5.0	94.3	2.10
PHV-205RR	17.4	1300	63	5.47	4.52	12.91	-	-	78.7	1.55	0.33	11.2	-	-	5.0	94.0	1.85

Table 2

Summary of Pilot High Velocity Phase II Test Conditions and Results

Test ID	Absorber Gas Velocity (ft/s)	Slurry Recirc. Rate (gpm)	L/G (gal/macf)	FLRT pH	Absorber pH	Reaction Tank Slurry wt. %	Liquid Calcium (mM)	DBA Conc. (ppm)	SO ₂ Rem'l (%)	SO ₂ Rem'l (NTU)	VME ΔP (in H ₂ O)	Absorber ΔP (in H ₂ O)	Direct Carryover Rate (gpm/ft ²)	HMEC Tank Level Carryover Rate (gpm/ft ²)	LS Loading (g/L)	LS Util. (%)	Reagent Feed Rate (gpm)
Baseline Spiral Nozzles with DBA Additive																	
PHV-221	10.0	650	55	5.40	5.04	11.78	159	5506	92.3	2.57	0.10	3.2	-	-	4.5	94.0	1.28
PHV-220	15.1	650	36	5.00	5.00	12.63	-	5519	93.1	2.67	0.19	8.6	-	-	4.2	94.8	2.39
PHV-218	20.1	650	27	4.94	4.73	12.96	-	5263	90.4	2.34	0.74	15.3	-	-	5.4	93.5	2.79
Tangential Nozzles with DBA Additive																	
PHV-266	10.0	650	55	5.40	5.28	12.56	178	5307	94.3	2.87	0.12	2.6	-	-	4.7	94.2	1.25
PHV-267	15.1	650	37	5.06	4.97	14.30	149	5755	91.4	2.45	0.25	5.1	-	-	3.5	96.3	1.83
PHV-268	20.2	650	27	4.85	4.61	13.62	-	-	90.5	2.35	0.62	9.9	-	-	4.4	95.0	2.50
PHV-269	17.6	650	31	4.94	4.74	13.68	-	-	91.1	2.42	0.37	7.3	-	-	4.5	94.9	2.20
PHV-270	20.2	1300	55	4.77	4.66	12.93	-	-	98.1	4.01	0.86	15.2	-	-	5.2	93.7	2.70
PHV-271	20.3	1700	71	4.92	4.88	12.05	145	5461	99.8	6.41	0.85	19.4	-	-	4.8	93.8	2.79
PHV-268R	20.2	650	27	4.86	4.64	13.20	-	-	88.9	2.21	0.60	15.7	-	-	4.8	94.4	2.55
PHV-267R	15.1	650	37	4.86	4.26	12.42	-	5303	90.3	2.33	0.23	7.2	-	-	2.9	96.3	2.15
Tangential Nozzles																	
PHV-245	17.7	1300	63	5.11	3.96	12.34	212	-	61.4	0.95	0.37	15.6	-	-	2.8	94.7	1.68
PHV-244	20.2	1300	55	4.97	3.91	13.77	-	-	58.1	0.87	0.80	11.8	-	-	1.2	98.6	1.75
PHV-246	15.0	1300	74	4.39	3.74	13.47	-	-	59.3	0.90	0.25	10.9	-	-	2.1	99.2	1.33
PHV-247	10.0	1300	110	5.32	4.60	13.74	-	-	83.5	1.80	0.12	5.2	-	-	1.2	98.3	1.25
PHV-245R	17.6	1300	63	5.25	4.19	13.64	198	-	71.0	1.24	0.38	16.4	-	-	2.1	96.6	1.90
PHV-249	17.6	650	31	5.64	4.15	11.79	-	-	41.0	0.53	0.36	12.7	-	-	2.0	96.9	1.13
PHV-248	20.1	650	27	5.80	4.27	12.77	-	-	42.1	0.55	0.57	18.8	-	-	2.1	96.1	1.33
PHV-250	15.0	650	37	5.96	4.46	12.38	-	-	45.9	0.61	0.24	10.7	-	-	2.0	95.6	1.11
PHV-251	10.0	650	55	6.11	5.02	12.79	-	-	56.0	0.82	0.10	4.7	-	-	2.7	94.6	0.90
PHV-248R	20.0	650	28	5.92	4.58	12.90	181	-	48.7	0.67	0.59	8.3	-	-	2.9	94.3	1.50
PHV-240	20.1	1700	72	5.49	4.82	14.28	-	-	83.4	1.80	0.86	15.2	-	-	2.7	95.2	2.35
PHV-241	17.4	1700	83	5.58	4.72	13.49	157	-	84.0	1.83	0.38	11.1	-	-	3.8	95.6	2.19
PHV-242	14.9	1700	97	5.74	4.98	13.00	-	-	86.1	1.98	0.25	8.5	-	-	4.0	95.2	1.80
PHV-243	10.1	1700	143	5.89	5.22	13.05	-	-	91.8	2.51	0.11	4.7	-	-	4.1	95.1	1.24
PHV-240R	20.1	1700	72	5.67	4.83	13.92	-	-	85.2	1.91	0.86	15.2	-	-	4.5	95.1	2.30
PHV-244R	20.1	1300	55	5.72	4.73	12.04	140	-	78.5	1.54	0.89	14.1	-	-	4.3	94.2	2.23
PHV-246R	15.1	1300	73	5.98	4.98	12.43	-	-	82.7	1.76	0.25	7.9	-	-	5.7	92.9	1.80
PHV-247R	10.1	1300	110	5.97	5.29	12.70	-	-	89.1	2.22	0.11	4.4	-	-	5.4	93.4	1.18
PHV-249R	17.6	650	31	6.02	4.83	11.10	-	-	49.0	0.67	0.37	7.4	-	-	3.9	94.5	1.20
PHV-250R	15.1	650	37	6.13	4.96	11.34	-	-	51.1	0.71	0.26	5.6	-	-	4.4	94.0	1.12
PHV-245RR	17.6	1300	63	5.78	4.83	12.44	-	-	76.6	1.45	0.39	10.6	-	-	3.7	95.3	1.80

Table 2

Summary of Pilot High Velocity Phase II Test Conditions and Results

Test ID	Absorber Gas Velocity (ft/s)	Slurry Reclrc. Rate (gpm)	L/G (gal/macf)	FLRT pH	Absorber pH	Reaction Tank Slurry wt. %	Liquid Calcium (mM)	DBA Conc. (ppm)	SO ₂ Rem'l (%)	SO ₂ Rem'l (NTU)	VME ΔP (in H ₂ O)	Absorber ΔP (in H ₂ O)	Direct Carryover Rate (gpm/ft ²)	HMEC Tank Level Carryover Rate (gpm/ft ²)	LS Loading (g/L)	LS Util. (%)	Reagent Feed Rate (gpm)
<i>Carryover Tests using Koch Vertical Mist Eliminators and Baseline Nozzles</i>																	
PHV-224	15.0	1700	97	5.87	5.02	12.16	127	-	84.1	1.84	0.26	8.9	0.00054	0.00064	4.8	93.8	1.80
PHV-223	17.6	1700	82	5.68	4.98	12.01	137	-	85.5	1.94	0.43	18.1	0.00021	0.00019	4.3	94.5	2.09
PHV-222	20.3	1700	71	5.66	4.73	12.15	141	-	86.2	1.98	0.94	12.1	0.00655	0.00609	3.9	95.0	2.76
PHV-225	20.2	1300	55	5.67	4.74	11.30	146	-	74.3	1.36	0.94	20.3	0.00692	0.00717	4.1	94.3	2.40
PHV-224R	15.1	1700	96	5.78	4.84	12.41	142	-	84.0	1.83	0.30	12.0	0.00042	0.00047	4.7	94.1	2.06
<i>Baseline Spiral Nozzles</i>																	
PHV-272	15.1	1300	73	5.83	4.82	11.79	-	-	72.5	1.29	0.30	11.0	-	-	4.3	94.2	1.78
PHV-273	20.2	1300	55	5.68	4.91	12.27	-	-	73.6	1.33	0.96	20.5	-	-	3.9	94.9	2.40
PHV-274	17.5	1300	63	5.41	4.41	12.13	-	-	62.7	0.99	0.50	14.4	-	-	1.6	97.9	2.25
PHV-275	11.5	1300	96	5.83	4.85	11.55	-	-	78.8	1.55	0.17	5.9	-	-	3.8	94.9	1.60
PHV-276	10.1	1300	110	5.93	5.33	11.55	141	-	80.8	1.65	0.15	4.6	-	-	4.5	93.9	1.36
<i>Very Low Pressure Nozzles</i>																	
PHV-232	20.3	1300	54	5.81	5.04	11.42	-	-	78.9	1.56	0.93	19.4	-	-	5.4	92.6	2.70
PHV-233	17.5	1300	63	5.90	5.01	14.66	136	-	72.1	1.28	0.44	13.5	-	-	8.3	91.5	1.89
PHV-234	14.9	1300	74	6.04	4.83	12.86	-	-	72.8	1.30	0.30	8.8	-	-	9.0	89.4	1.67
PHV-235	9.9	1300	111	6.06	4.72	11.54	-	-	80.3	1.63	0.13	3.9	-	-	8.0	89.4	1.20
PHV-233R	17.6	1300	63	5.73	4.91	12.48	-	-	70.0	1.20	0.45	13.3	-	-	5.6	93.0	1.69
PHV-238	15.1	650	37	5.93	4.78	10.61	-	-	45.3	0.60	0.31	7.5	-	-	4.8	92.9	0.96
PHV-236	20.2	650	27	5.81	4.91	11.89	-	-	41.2	0.53	0.68	16.2	-	-	4.8	93.8	1.06
PHV-237	17.6	650	31	5.78	4.72	12.59	-	-	40.0	0.51	0.44	12.7	-	-	4.3	94.6	0.93
PHV-239	10.0	650	55	5.86	4.89	10.67	-	-	51.3	0.72	0.14	3.2	-	-	3.2	95.2	0.74
PHV-236R	20.2	650	27	5.85	4.79	11.27	-	-	43.7	0.57	0.69	16.5	-	-	4.8	93.4	1.26
PHV-228	20.3	1700	71	5.58	5.21	13.19	-	-	83.2	1.78	0.89	21.9	-	-	5.6	93.5	2.62
PHV-229	17.6	1700	82	5.76	5.32	13.19	-	-	85.2	1.91	0.50	15.0	-	-	7.4	91.4	2.33
PHV-230	15.1	1700	96	5.84	6.15	15.20	-	-	81.8	1.71	0.33	10.6	-	-	9.8	90.3	1.93
PHV-231	10.0	1700	144	5.93	6.21	14.53	-	-	87.6	2.09	0.14	4.8	-	-	10.7	89.1	1.35
PHV-228R	20.1	1700	72	5.80	5.98	12.91	-	-	90.5	2.36	0.95	22.0	-	-	9.8	88.5	2.79
PHV-277	15.0	1300	74	5.87	5.27	12.09	139	-	73.7	1.33	0.32	9.5	-	-	8.8	88.9	1.70
PHV-278	10.1	1300	110	5.95	4.80	12.61	-	-	82.9	1.77	0.15	4.3	-	-	7.9	90.3	1.18
PHV-279	20.2	1300	55	5.59	5.75	11.76	-	-	73.0	1.31	0.97	18.3	-	-	4.9	93.5	2.00
PHV-280	15.1	1300	73	5.77	5.26	12.01	-	-	69.9	1.20	0.38	8.9	-	-	5.9	92.4	1.58
PHV-281	10.1	1300	110	5.83	4.60	11.75	-	-	80.4	1.63	0.14	4.0	-	-	5.7	92.4	1.16
PHV-282	10.0	1700	144	5.83	6.32	14.72	-	-	88.4	2.16	0.14	4.7	-	-	7.4	92.3	1.30
PHV-283	15.1	1700	96	5.77	6.31	13.19	-	-	80.8	1.65	0.33	9.8	-	-	5.3	93.8	1.59
PHV-284	20.2	1700	71	5.58	5.97	12.60	-	-	83.6	1.81	0.93	20.7	-	-	5.0	93.8	2.37
PHV-285	17.6	1700	82	5.57	5.98	14.20	-	-	82.0	1.72	0.52	15.3	-	-	5.2	94.4	2.00

Table 2

Summary of Pilot High Velocity Phase II Test Conditions and Results

Test ID	Absorber Gas Velocity (ft/s)	Slurry Recirc. Rate (gpm)	L/G (gal/macf)	FLRT pH	Absorber pH	Reaction Tank Slurry wt. %	Liquid Calcium (mM)	DBA Conc. (ppm)	SO ₂ Rem'l (%)	SO ₂ Rem'l (NTU)	VME ΔP (in H ₂ O)	Absorber ΔP (in H ₂ O)	Direct Carryover Rate (gpm/ft ²)	HMEC Tank Level Carryover Rate (gpm/ft ²)	LS Loading (g/L)	LS Util. (%)	Reagent Feed Rate (gpm)
<i>Very Low Pressure Nozzles</i>																	
PHV-286	10.1	1700	143	5.67	6.07	15.02	-	-	86.0	1.97	0.15	4.8	-	-	4.7	95.1	1.21
PHV-287	10.1	1300	110	5.65	4.47	15.14	-	-	76.3	1.44	0.15	4.1	-	-	5.4	94.6	1.03
PHV-288	15.1	1300	73	5.58	4.73	11.34	148	-	60.9	0.94	0.33	8.8	-	-	2.4	96.6	1.25
PHV-289	10.0	1300	110	5.94	5.23	12.67	-	-	79.2	1.57	0.14	4.5	-	-	4.9	94.0	1.20
PHV-290	15.1	1300	73	5.67	5.21	12.65	-	-	63.0	1.00	0.33	9.1	-	-	3.4	95.8	1.18
<i>Low Pressure Nozzles</i>																	
PHV-291	17.4	1700	83	5.58	4.72	14.34	135	-	84.0	1.83	0.38	17.4	-	-	6.2	93.8	2.19
PHV-298	10.1	1300	110	5.77	4.32	11.97	151	-	77.5	1.49	0.14	3.8	-	-	3.9	94.9	1.26
PHV-297	15.1	1300	73	5.80	4.55	12.16	-	-	68.7	1.16	0.31	7.4	-	-	4.0	94.9	1.65
PHV-300	15.1	650	37	5.92	4.89	11.50	138	-	43.7	0.58	0.26	6.0	-	-	4.0	94.6	1.06
PHV-299	10.1	650	55	5.93	4.61	12.00	-	-	54.1	0.78	0.08	3.0	-	-	4.8	93.7	0.93
PHV-303	10.1	1700	143	5.78	5.20	13.46	150	-	87.1	2.05	0.08	4.8	-	-	5.5	93.7	1.33
PHV-304	15.2	1700	95	5.76	5.44	11.81	-	-	80.8	1.65	0.29	9.1	-	-	5.8	92.4	1.93
PHV-305	15.2	1300	73	5.78	4.98	12.29	-	-	68.2	1.15	0.29	7.9	-	-	5.1	93.6	1.64
PHV-306	10.0	1300	111	5.81	5.30	10.76	144	-	78.1	1.52	0.10	3.9	-	-	4.9	92.9	1.17

Table 3

Trace Element Removal Impinger Test Conditions

Test ID	Test Description	Gas Sample Source	Spiking Conditions		Sampling Methods		
			Species Spiked	Spike Location	Method 29 Used?	Method 29* Used?	Sol'n of Extra Imp.
T24-N	No spiking; High velocity scrubber conditions, forced oxidation	3 Locations	NA	NA	Yes	No	NA
T24-E	Elemental mercury spiking; High velocity scrubber conditions, forced oxidation	3 Locations	Hg(0)	Duct Injection	Yes	No	NA
T24-C	Mercuric chloride spiking; High velocity scrubber conditions, forced oxidation	3 Locations	HgCl ₂	Duct Injection	Yes	No	NA
T25-NY	Aqueous mercury spike; Tris comparison at the Pilot inlet	WS inlet	Aq. Hg Std.	Before 1st impinger	No	Yes	Tris
T26-C	Mercuric chloride spike; Tris comparison at the Pilot inlet	3 Locations	HgCl ₂	Duct Injection	No	Yes	Tris
T27-C	Mercuric chloride spike; Tris comparison at the Pilot inlet	3 Locations	HgCl ₂	Duct Injection	No	Yes	Tris/EDTA
T28-E	Elemental mercury spiking; Tris comparison at the Pilot inlet	3 Locations	Hg(0)	Duct Injection	No	Yes	Tris
T29-IY*	Flue gas constituents effect in peroxide/nitric acid impinger solution with different gas sampling amounts.	WS inlet	Hg(0)	Before 1st impinger	No	Yes	NA
T30-IY*	Flue gas constituents effect in peroxide/nitric acid impinger solution with different spiking amounts	WS inlet	Hg(0)	Before 1st impinger	No	Yes	NA
T31-IX	Tris solution evaluation with intratrain elemental mercury spiking.	CRG	Hg(0)	Before 1st impinger	No	Yes	Tris and Tris/EDTA
T31-NX	Tris solution evaluation with aqueous mercury spike.	CRG	Aq. Hg Std.	Before 1st impinger	No	Yes	Tris/EDTA
T32-PJFF	Mercury conversion and removal across PJFF with Darco carbon on bags. (Approx. 10000:1 C:Hg)	SDA outlet and PJFF outlet	Hg(0)	Duct Injection	Yes	No	NA
T33-PJFF	Mercury conversion and removal across PJFF with Darco carbon on bags.	SDA outlet and PJFF outlet	Hg(0)	Duct Injection	Yes	No	NA
T34-PJFF	Mercury conversion and removal across PJFF with Darco carbon on bags. (Approx. 20000:1 C:Hg)	SDA outlet and PJFF outlet	Hg(0)	Duct Injection	Yes	No	NA
T35-PJFF	Mercury conversion and removal across PJFF with CaCl ₂ -impregnated carbon on bags.	SDA outlet and PJFF outlet	Hg(0)	Duct Injection	Yes	No	NA

Table 4

Alternate Impinger Solutions Summary

Test ID	Alternate Impinger Solution	Solution Composition	Sampling Time (min)	Spiking Conditions		Sample Recovery
				Species Spiked	Spike Location	
T25-NY	Tris	1 M Tris	20	Aq. Hg Std.	4 µg Hg(II) added to 1st impinger before run.	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T25-NY	Tris	1 M Tris	25	Aq. Hg Std.	4 µg Hg(II) added to 1st impinger before run.	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T25-NY	Tris	1 M Tris	30	Aq. Hg Std.	4 µg Hg(II) added to 1st impinger before run.	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T25-NY	Tris	1 M Tris	40	Aq. Hg Std.	4 µg Hg(II) added to 1st impinger before run.	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T26-C	Tris	1 M Tris	20	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T26-C	Tris	1 M Tris	25	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T26-C	Tris	1 M Tris	30	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T26-C	Tris	1 M Tris	38	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T27-C	Tris	1 M Tris	20	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T27-C	Tris/EDTA	1mM EDTA in 1 M Tris	30	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.

Table 4

Alternate Impinger Solutions Summary

Test ID	Alternate Impinger Solution	Solution Composition	Sampling Time (min)	Spiking Conditions		Sample Recovery
				Species Spiked	Spike Location	
T27-C	Tris/EDTA	1mM EDTA in 1 M Tris	37	HgCl ₂	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T28-E	Tris	1 M Tris	20	Hg(0)	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T28-E	Tris	1 M Tris	25	Hg(0)	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T28-E	Tris	1 M Tris	35	Hg(0)	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T28-E	Tris	1 M Tris	43	Hg(0)	Duct injection	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T31-IX	Tris	1 M Tris	30	Hg(0)	Intratrain spike before the 1st impinger	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T31-IX	Tris/EDTA	1mM EDTA in 1M Tris	30	Hg(0)	Intratrain spike before the 1st impinger	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T31-NX	Tris/EDTA	1mM EDTA in 1M Tris	30	Aq. Hg Std.	4 µg Hg(II) added to 1st impinger before run.	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.
T31-NX	Tris/EDTA	1mM EDTA in 1M Tris	40	Aq. Hg Std.	4 µg Hg(II) added to 1st impinger before run.	25 ml of 30% peroxide and 20 ml of nitric acid added to 1st and 2nd Tris impinger solutions.

Table 5

**Comparison of Tris and Peroxide Gas Sampling Trains with
Elemental Mercury and Mercuric Chloride Spiking**

		Impinger Mercury Concentration (µg/Nm³)				Diff. From Peroxide (% of Total)
		1 & 2	3 & 4	5 & 6		
Test ID	Contents	(Tris or Per.)	(Peroxide)	(KMnO4)	Total	
Elemental Mercury Spiking						
T28-EY	Peroxide	24.39	1.15	1.09	26.63	
	Tris	19.12	0.97	4.58	24.67	-7
Mercuric Chloride Spiking						
T26-CY	Peroxide	17.39	0.60	0.30	18.29	
	Tris	13.70	0.93	2.57	17.20	-6
T27-CY	Peroxide	21.83	0.46	0.27	22.56	
	Tris/EDTA	23.04	1.26	2.05	26.35	17

Figure 1. Wet FGD Process Flow Diagram for PHV and TER Tests

**Figure 2. Effect of Absorber Gas Velocity on SO_2 Removal
(Low Pressure Spiral Nozzles, 1700 gpm)**

**Figure 3. Effect of Absorber Gas Velocity on SO₂ Removal
(Low Pressure Spiral Nozzles, 1300 gpm)**

Figure 4. Effect of Absorber Gas Velocity on SO_2 Removal (Low Pressure Spiral Nozzles, 650 gpm)

Figure 5. Effect of Absorber Gas Velocity on SO₂ Removal With Four Nozzle Types (1700 gpm)

Figure 6. Effect of Absorber Gas Velocity on SO₂ Removal With Four Different Nozzles (1300 gpm)

Figure 7. Effect of Absorber Gas Velocity on SO_2 Removal With Four Different Nozzles (650 gpm)

Figure 8. EPRI ECTC Pilot Wet FGD Toxics Gas Path

Figure 9. Simplified Process Flow Diagram for the "PJFF" Configuration for Toxics Testing

Figure 10. Comparison of Oxidized Vapor-Phase Mercury Removal Between Wet Scrubber Baseline and Pilot High Velocity Conditions

Figure 11. Aqueous Mercury Spike Capture of Tris versus Tris/EDTA using Method 29*

Figure 12. Mercuric Chloride Spike Capture of Tris versus Tris/EDTA using Method 29*

Figure 13. Elemental Mercury Spike Capture of Tris and Tris/EDTA using Method 29*

Figure 14. Mercury Concentration of the Tris and Permanganate Impingers versus the pH of the First Tris Impinger after Mercuric Chloride Spiking

Figure 15. Mercury Concentration of Tris/EDTA and Permanganate Impingers versus the pH of the first Tris/EDTA Impinger after Gas Sampling with Mercuric Chloride Spiking

Figure 16. Elemental Mercury Spike Removal Efficiency by Individual Impinger using Method 29* and Varying Gas Sample Volumes

Figure 17. Elemental Mercury Spike Removal Efficiency by Individual Impinger using Method 29* and Varying Mercury Spike Amount)

Figure 18. Total Vapor Phase Elemental Mercury Removal/Conversion Across the PJFF with Various Catalysts on Bags

APPENDIX A
TEST SCHEDULES

EPRI ENVIRONMENTAL CONTROL TECHNOLOGY CENTER TEST CALENDAR

December 1995 (Updated Dec. 27)

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
					1 High Velocity Phase II PHV-291, 293 Various Rates Low Pressure Nozzles	2 High Velocity Phase II PHV-293 15 ft/sec, 1700 gpm Low Pressure Nozzles
3 High Velocity Phase II PHV-294 10 ft/sec, 1700 gpm Low Pressure Nozzles	4 High Velocity Phase II PHV-298 ----- Trace Element Rem. T25-NY Tris Comp. at WS In. Aqueous Hg Spike	5 High Velocity Phase II PHV-297 15 ft/sec, 1300 gpm Low Pressure Nozzles	6 High Velocity Phase II PHV-300 ----- Trace Element Rem. T26-C Tris Comp. at WS In. HgCl ₂ Spiking	7 High Velocity Phase II PHV-299 ----- Trace Element Rem. T27-C Tris/EDTA at WS In. HgCl ₂ Spiking	8 High Velocity Phase II PHV-303 ----- Trace Element Rem. T28-E Tris Comp. at WS In. Hg(0) Spiking	9 High Velocity Phase II PHV-304 15 ft/sec, 1700 gpm Low Pressure Nozzles
10 High Velocity Phase II PHV-305 15 ft/sec, 1300 gpm Low Pressure Nozzles	11 High Velocity Phase II PHV-306 ----- Trace Element Rem. T29-IY* Enhanced Solubility Intratraining Spiking	12 Trace Element Rem. T30-IY* Enhanced Solubility Intratraining Spiking	13 Trace Element Rem. Gas Path modifications to change from High Velocity configuration to PJFF Testing	14 Trace Element Rem. Gas Path modifications to change from High Velocity configuration to PJFF Testing	15 Trace Element Rem. Gas Path modifications to change from High Velocity configuration to PJFF Testing	16 Trace Element Rem.
17 Trace Element Rem.	18 Trace Element Rem. T31-IX Tris Imping. at WS In. Intratraining Hg(0) Spiking	19 Trace Element Rem. T32-PJFF Darco Carbon on PJFF 10000:1 C:Hg	20 Trace Element Rem. T33-PJFF, T34-PJFF Darco Carbon on PJFF Time Effect and 20000:1 C:Hg	21 Trace Element Rem. T35-PJFF CaCl ₂ /Carbon on PJFF 10000:1 C:Hg	22 ECTC Outage	23 ECTC Outage
24 ECTC Outage	25 ECTC Outage	26 ECTC Outage	27 ECTC Outage	28 ECTC Outage	29 ECTC Outage	30 ECTC Outage
31 ECTC Outage						

EPRI ENVIRONMENTAL CONTROL TECHNOLOGY CENTER TEST CALENDAR

January 1996 (Updated Jan. 18, 1996)

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1 Trace Element Rem.	2 Trace Element Rem. Pilot Absorber Start-Up Install Hg(0) Injection at Pilot Fan Inlet	3 Trace Element Rem. T36-EY Darco Carbon Cat. 2000:1 and 10000:1 Hg(0) Spiking	4 Trace Element Rem. T37-EY Ground Coal Cat. 2000:1 and 10000:1 Hg(0) Spiking	5 Trace Element Rem. T38-EY Sodium Sulfide 2000:1 and 10000:1 Hg(0) Spiking	6 Trace Element Rem.
7 Trace Element Rem.	8 Trace Element Rem.	9 Trace Element Rem. T39-EY Ferric Chloride 2000:1 and 10000:1 Hg(0) Spiking	10 Trace Element Rem. T56-EY Fly Ash 2000:1 and 10000:1 Hg(0) Spiking	11 Trace Element Rem. T40-EY Postassium Chromate 2000:1 and 10000:1 Hg(0) Spiking	12 Trace Element Rem. T41-E Tris/EDTA - KMnO4 Impinger Train Hg(0) Spiking	13 Trace Element Rem.
14 Trace Element Rem.	15 Trace Element Rem. T42-N Tris/EDTA Confirmation Test No Spiking	16 Trace Element Rem. T43-E Tris/EDTA Confirmation Test Hg(0) Spiking	17 Trace Element Rem. T44-C Tris/EDTA Confirmation Test HgCl2 Spiking	18 Trace Element Rem. T45-E ESP Effect Hg(0) inj. after the ESP (Inlet to the ESP Fan)	19 Trace Element Rem. Sample Analysis Injection System Removed from Duct	20 Trace Element Rem.
21 Trace Element Rem.	22 Trace Element Rem. Hg(0) Injection System Installed	23 Trace Element Rem. T46-E ESP Effect Hg(0) Inj. at DRG	24 Trace Element Rem. T47-E Residence Time Eff. Hg(0) Inj. at DRG 11000 scfm	25 Trace Element Rem. T48-E Residence Time Eff. Hg(0) Inj. at DRG 13000 scfm	26 Trace Element Rem. T49-E Electric Field Eff. Hg(0) Inj. at DRG 1 ESP Field	27 Trace Element Rem.
28 Trace Element Rem.	29 Trace Element Rem.	30 Trace Element Rem. T50-E Electric Field Eff. Hg(0) Inj. at DRG 5 ESP Fields	31 Trace Element Rem. T56-E Pilot Heater Effect Hg(0) Inj. at DRG			

PILOT

MINI-PILOT

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
UNIT DOWN		SUNCOR	High Velocity Scrubbing	TECO High Vel. Packing	High Velocity Scrubbing (B&W tray testing)	Air Toxics Tests	Outage	Air Toxics Tests			
Limestone CLS Phase II (cont.)	Redox Sulfur testing	LCLS Phase II (cont.)	UNIT DOWN	SUNCOR II	UNIT DOWN						

PILOT

MINI-PILOT

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
High-Velocity FGD Testing	Lime/DBA Gypsum tests	Carbon injection	Wet FGD Toxics Testing					Carbon injection	Wet FGD Toxics Testing- Pet coke	Outage	Carbon injection	High-Velocity FGD Testing	Wet FGD Toxics Testing
				Lime/DBA Gypsum tests									
				UNIT DOWN									
								UNIT DOWN					

PILOT

MINI-PILOT

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Wet FGD Toxics Testing		PRDA - Mercury and HAPs Control			Wet FGD Toxics Testing				PRDA - Clear Liquor FGD Testing		
UNIT DOWN		PRDA - Condensing Heat Exchanger (CHX) Testing									

ECTC Pilot-scale Testing Schedule ('94-'96)

APPENDIX B

PILOT TESTING PROCESS SUMMARY REPORTS

PHV-291 Process Summary Report
12/1/95 06:00:00 to 12/1/95 10:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	84.0	84.4	83.6	0.4	3
SO2 Removal (NTU)	1.83	1.86	1.81	0.02	3
L/G Ratio (gal/macf)	83	83	83	0	3
Reaction Tank pH	5.58	5.63	5.50	0.06	3
Absorber pH	4.72	4.78	4.68	0.04	3
Flue Gas Flow Rate (scfm)	17401	17403	17400	1	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	400	400	400	0	3
Blowdown to Sump Rate (gpm)	2.00	2.00	2.00	0.00	3
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	10.80	12.00	8.39	1.70	3
Reagent Feed to FLRT (gpm)	2.19	2.20	2.18	0.01	3
Facility Inlet SO2 Conc. (ppm)	1485	1526	1459	29	3
Inlet SO2 Concentration (ppm)	2000	2001	1999	1	3
Outlet SO2 Concentration (ppm)	300	307	291	7	3
Inlet O2 Concentration (%)	6.82	7.05	6.52	0.22	3
Outlet O2 Concentration (%)	6.60	6.81	6.33	0.20	3
Absorber Gas Velocity (ft/sec)	17.41	17.44	17.38	0.03	3
Inlet Gas Temperature (F)	323	325	319	3	3
Outlet Gas Temperature (F)	125	125	124	0	3
SO2 Absorbed (mmole/L)	5.44	5.47	5.41	0.02	3
Solids Residence Time (hrs)	7.6	7.6	7.6	0.0	3
Slurry Residence Time (min)	3.36	3.36	3.36	0.00	3
Absorber Pressure Drop (in H2O)	11.08	11.21	10.96	0.10	3
Spray Zone Pressure Drop (in H2O)	5.25	5.32	5.18	0.06	3
VME Pressure Drop (in H2O)	0.38	0.38	0.37	0.00	3
Oxidation Air to Rxn Tank (acfm)	440	441	439	1	3
NYSEG Load (MW)	623	668	591	33	3

PHV-293 Process Summary Report
12/02/95 21:00:00 to 12/03/95 00:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	76.9	76.9	76.9	0.0	3
SO2 Removal (NTU)	1.47	1.47	1.46	0.00	3
L/G Ratio (gal/macf)	96	97	95	1	3
Reaction Tank pH	5.56	5.57	5.55	0.01	3
Absorber pH	3.96	3.98	3.94	0.02	3
Flue Gas Flow Rate (scfm)	14907	15063	14806	112	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	400	400	400	0	3
Blowdown to Sump Rate (gpm)	0.52	0.52	0.52	0.0	3
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	9.88	10.00	9.63	0.18	3
Reagent Feed to FLRT (gpm)	1.71	1.71	1.70	0.00	3
Facility Inlet SO2 Conc. (ppm)	1299	1308	1284	10	3
Inlet SO2 Concentration (ppm)	2001	2005	1999	3	3
Outlet SO2 Concentration (ppm)	434	434	433	1	3
Inlet O2 Concentration (%)	9.08	9.18	8.94	0.10	3
Outlet O2 Concentration (%)	8.44	8.52	8.33	0.08	3
Absorber Gas Velocity (ft/sec)	15.0	15.2	14.9	0.1	3
Inlet Gas Temperature (F)	311	313	308	2	3
Outlet Gas Temperature (F)	120	121	120	0	3
SO2 Absorbed (mmole/L)	4.27	4.32	4.24	0.04	3
Solids Residence Time (hrs)	9.9	9.9	9.7	0.1	3
Slurry Residence Time (min)	3.36	3.36	3.36	0.00	3
Absorber Pressure Drop (in H2O)	8.88	9.09	8.75	0.15	3
Spray Zone Pressure Drop (in H2O)	3.25	3.30	3.22	0.03	3
VME Pressure Drop (in H2O)	0.31	0.32	0.30	0.01	3
Oxidation Air to Rxn Tank (acfm)	550	551	549	1	3
NYSEG Load (MW)	397	409	374	16	3

PHV-294 Process Summary Report
12/03/95 21:00:00 to 12/04/95 00:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	81.9	82.2	81.6	0.3	3
SO2 Removal (NTU)	1.71	1.73	1.69	0.01	3
L/G Ratio (gal/macf)	143	143	142	0	3
Reaction Tank pH	5.58	5.62	5.54	0.03	3
Absorber pH	3.94	3.98	3.90	0.03	3
Flue Gas Flow Rate (scfm)	10004	10019	9991	12	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	400	400	400	0	3
Blowdown to Sump Rate (gpm)	0.52	0.52	0.52	0.0	3
Vacuum Belt Feed Rate					
Centrifuge Feed Rate (gpm)	6.59	7.00	5.77	0.58	3
Reagent Feed to FLRT (gpm)	1.24	1.24	1.24	0.00	3
Facility Inlet SO2 Conc. (ppm)	1339	1356	1326	12	3
Inlet SO2 Concentration (ppm)	1999	2003	1993	4	3
Outlet SO2 Concentration (ppm)	341	348	334	6	3
Inlet O2 Concentration (%)	7.75	7.84	7.65	0.08	3
Outlet O2 Concentration (%)	7.26	7.34	7.16	0.08	3
Absorber Gas Velocity (ft/sec)	10.1	10.1	10.1	0.0	3
Inlet Gas Temperature (F)	301	305	295	4	3
Outlet Gas Temperature (F)	121	121	120	0	3
SO2 Absorbed (mmole/L)	3.05	3.06	3.03	0.01	3
Solids Residence Time (hrs)	13.8	13.9	13.8	0.0	3
Slurry Residence Time (min)	3.36	3.36	3.36	0.00	3
Absorber Pressure Drop (in H2O)	4.56	4.58	4.54	0.02	3
Spray Zone Pressure Drop (in H2O)	2.17	2.18	2.17	0.01	3
VME Pressure Drop (in H2O)	0.13	0.13	0.12	0.00	3
Oxidation Air to Rxn Tank (acfm)	550	551	550	0	3
NYSEG Load (MW)	640	678	592	36	3

PHV-298 Process Summary Report
12/4/95 23:00:00 to 12/5/95 00:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	77.5	78.4	77.1	0.4	12
SO2 Removal (NTU)	1.49	1.53	1.47	0.02	12
L/G Ratio (gal/macf)	110	110	109	0	12
Reaction Tank pH	5.77	5.78	5.75	0.01	12
Absorber pH	4.32	4.33	4.30	0.01	12
Flue Gas Flow Rate (scfm)	10020	10038	9997	14	12
Header 1 Flow (gpm)	650	650	650	0	12
Header 3 Flow (gpm)	650	650	650	0	12
Header 5 Flow (gpm)	0	0	0	0	12
Blowdown to Sump Rate (gpm)	0.43	1.59	0.07	0.59	12
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	6.50	6.51	6.49	0.00	12
Reagent Feed to FLRT (gpm)	1.26	1.27	1.25	0.01	12
Facility Inlet SO2 Conc. (ppm)	1416	1440	1370	19	12
Inlet SO2 Concentration (ppm)	2000	2008	1986	7	12
Outlet SO2 Concentration (ppm)	424	432	406	8	12
Inlet O2 Concentration (%)	8.46	8.72	8.28	0.16	12
Outlet O2 Concentration (%)	7.96	8.21	7.77	0.14	12
Absorber Gas Velocity (ft/sec)	10.05	10.08	10.01	0.02	12
Inlet Gas Temperature (F)	291	292	289	1	12
Outlet Gas Temperature (F)	118	119	118	0	12
SO2 Absorbed (mmole/L)	3.78	3.83	3.75	0.02	12
Solids Residence Time (hrs)	14.0	14.1	13.8	0.1	12
Slurry Residence Time (min)	4.39	4.40	4.39	0.00	12
Absorber Pressure Drop (in H2O)	3.77	3.81	3.74	0.02	12
Spray Zone Pressure Drop (in H2O)	1.62	1.64	1.61	0.01	12
VME Pressure Drop (in H2O)	0.14	0.20	0.13	0.02	12
Oxidation Air to Rxn Tank (acfm)	550	561	533	10	12
NYSEG Load (MW)	554	594	498	26	12

PHV-297 Process Summary Report
12/5/95 21:00:00 to 12/6/95 00:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	68.7	69.1	68.4	0.3	3
SO2 Removal (NTU)	1.16	1.17	1.15	0.01	3
L/G Ratio (gal/macf)	73	73	73	0	3
Reaction Tank pH	5.80	5.82	5.79	0.01	3
Absorber pH	4.55	4.58	4.51	0.03	3
Flue Gas Flow Rate (scfm)	14991	15046	14897	67	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	0	0	0	0	3
Blowdown to Sump Rate (gpm)	0.55	0.55	0.55	0.00	3
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	7.79	8.11	7.50	0.25	3
Reagent Feed to FLRT (gpm)	1.65	1.70	1.61	0.04	3
Facility Inlet SO2 Conc. (ppm)	1363	1372	1348	11	3
Inlet SO2 Concentration (ppm)	2000	2003	1998	2	3
Outlet SO2 Concentration (ppm)	587	594	579	6	3
Inlet O2 Concentration (%)	7.77	7.88	7.68	0.08	3
Outlet O2 Concentration (%)	7.16	7.27	7.08	0.08	3
Absorber Gas Velocity (ft/sec)	15.12	15.17	15.03	0.06	3
Inlet Gas Temperature (F)	315	316	314	1	3
Outlet Gas Temperature (F)	121	122	121	0	3
SO2 Absorbed (mmole/L)	5.01	5.03	5.01	0.01	3
Solids Residence Time (hrs)	10.8	10.8	10.8	0.0	3
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	3
Absorber Pressure Drop (in H2O)	7.37	7.42	7.28	0.06	3
Spray Zone Pressure Drop (in H2O)	2.41	2.43	2.39	0.02	3
VME Pressure Drop (in H2O)	0.31	0.32	0.31	0.01	3
Oxidation Air to Rxn Tank (acfm)	550	550	550	0	3
NYSEG Load (MW)	649	699	612	37	3

PHV-300 Process Summary Report
12/6/95 07:00:00 to 12/6/95 14:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	43.7	44.4	43.0	0.6	7
SO2 Removal (NTU)	0.58	0.59	0.56	0.01	7
L/G Ratio (gal/macf)	37	37	37	0	7
Reaction Tank pH	5.92	5.95	5.89	0.02	7
Absorber pH	4.89	4.96	4.72	0.07	7
Flue Gas Flow Rate (scfm)	14944	15007	14887	37	7
Header 1 Flow (gpm)	0	0	0	0	7
Header 3 Flow (gpm)	650	650	650	0	7
Header 5 Flow (gpm)	0	0	0	0	7
Blowdown to Sump Rate (gpm)	0.55	0.55	0.55	0.00	7
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	4.79	5.50	4.00	0.60	7
Reagent Feed to FLRT (gpm)	1.06	1.09	1.03	0.03	7
Facility Inlet SO2 Conc. (ppm)	1524	1570	1482	30	7
Inlet SO2 Concentration (ppm)	2000	2007	1996	3	7
Outlet SO2 Concentration (ppm)	1055	1067	1042	11	7
Inlet O2 Concentration (%)	6.92	7.21	6.53	0.23	7
Outlet O2 Concentration (%)	6.37	6.63	6.02	0.20	7
Absorber Gas Velocity (ft/sec)	15.06	15.11	15.01	0.03	7
Inlet Gas Temperature (F)	312	314	310	2	7
Outlet Gas Temperature (F)	121	121	120	0	7
SO2 Absorbed (mmole/L)	6.37	6.49	6.24	0.09	7
Solids Residence Time (hrs)	17.0	17.3	16.7	0.2	7
Slurry Residence Time (min)	8.79	8.79	8.79	0.00	7
Absorber Pressure Drop (in H2O)	5.95	6.04	5.89	0.05	7
Spray Zone Pressure Drop (in H2O)	1.06	1.08	1.05	0.01	7
VME Pressure Drop (in H2O)	0.26	0.31	0.22	0.03	7
Oxidation Air to Rxn Tank (acfm)	550	551	549	1	7
NYSEG Load (MW)	661	682	645	14	7

PHV-299 Process Summary Report
12/07/95 19:30:00 to 12/07/95 20:30:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	54.1	54.4	53.8	0.2	12
SO2 Removal (NTU)	0.78	0.79	0.77	0.00	12
L/G Ratio (gal/macf)	55	55	54	0	12
Reaction Tank pH	5.93	5.94	5.91	0.01	12
Absorber pH	4.61	4.61	4.61	0.00	12
Flue Gas Flow Rate (scfm)	10115	10138	10101	10	12
Header 1 Flow (gpm)	0	0	0	0	12
Header 3 Flow (gpm)	650	650	650	0	12
Header 5 Flow (gpm)	0	0	0	0	12
Blowdown to Sump Rate (gpm)	0.55	1.59	0.08	0.65	12
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	4.00	4.00	4.00	0.00	12
Reagent Feed to FLRT (gpm)	0.93	1.00	0.90	0.04	12
Facility Inlet SO2 Conc. (ppm)	1545	1589	1520	23	12
Inlet SO2 Concentration (ppm)	2001	2013	1979	11	12
Outlet SO2 Concentration (ppm)	868	879	858	6	12
Inlet O2 Concentration (%)	8.24	8.39	7.94	0.14	12
Outlet O2 Concentration (%)	7.67	7.82	7.38	0.15	12
Absorber Gas Velocity (ft/sec)	10.12	10.14	10.09	0.02	12
Inlet Gas Temperature (F)	285	289	282	2	12
Outlet Gas Temperature (F)	117	118	116	1	12
SO2 Absorbed (mmole/L)	5.33	5.37	5.25	0.04	12
Solids Residence Time (hrs)	20.3	20.6	20.1	0.1	12
Slurry Residence Time (min)	8.79	8.79	8.79	0.00	12
Absorber Pressure Drop (in H2O)	2.95	2.98	2.92	0.01	12
Spray Zone Pressure Drop (in H2O)	0.72	0.73	0.71	0.01	12
VME Pressure Drop (in H2O)	0.08	0.09	0.08	0.00	12
Oxidation Air to Rxn Tank (acfm)	550	560	536	9	12
NYSEG Load (MW)	679	684	675	2	12

PHV-303 Process Summary Report
12/8/95 06:00:00 to 12/8/95 10:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	87.1	87.3	87.0	0.1	4
SO2 Removal (NTU)	2.05	2.06	2.04	0.01	4
L/G Ratio (gal/macf)	143	144	142	1	4
Reaction Tank pH	5.78	5.79	5.77	0.01	4
Absorber pH	5.20	5.26	5.11	0.07	4
Flue Gas Flow Rate (scfm)	10033	10094	9967	45	4
Header 1 Flow (gpm)	650	650	650	0	4
Header 3 Flow (gpm)	650	650	650	0	4
Header 5 Flow (gpm)	400	400	400	0	4
Blowdown to Sump Rate (gpm)	0.55	0.55	0.55	0.00	4
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	6.06	6.57	5.50	0.48	4
Reagent Feed to FLRT (gpm)	1.33	1.39	1.31	0.04	4
Facility Inlet SO2 Conc. (ppm)	1579	1598	1550	19	4
Inlet SO2 Concentration (ppm)	1999	2002	1997	2	4
Outlet SO2 Concentration (ppm)	243	245	241	2	4
Inlet O2 Concentration (%)	7.73	7.85	7.62	0.11	4
Outlet O2 Concentration (%)	7.21	7.34	7.12	0.10	4
Absorber Gas Velocity (ft/sec)	10.07	10.13	10.02	0.04	4
Inlet Gas Temperature (F)	288	292	281	4	4
Outlet Gas Temperature (F)	119	120	119	0	4
SO2 Absorbed (mmole/L)	3.25	3.27	3.24	0.01	4
Solids Residence Time (hrs)	12.7	12.8	12.6	0.0	4
Slurry Residence Time (min)	3.36	3.36	3.36	0.00	4
Absorber Pressure Drop (in H2O)	4.79	4.84	4.76	0.03	4
Spray Zone Pressure Drop (in H2O)	2.20	2.21	2.19	0.01	4
VME Pressure Drop (in H2O)	0.08	0.09	0.07	0.01	4
Oxidation Air to Rxn Tank (acfm)	550	552	549	1	4
NYSEG Load (MW)	657	687	633	23	4

PHV-304 Process Summary Report
12/9/95 21:00:00 to 12/10/95 00:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	80.8	81.2	80.5	0.3	3
SO2 Removal (NTU)	1.65	1.67	1.63	0.01	3
L/G Ratio (gal/macf)	95	95	94	0	3
Reaction Tank pH	5.76	5.76	5.75	0.01	3
Absorber pH	5.44	5.44	5.42	0.01	3
Flue Gas Flow Rate (scfm)	15066	15171	14975	80	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	400	400	400	0	3
Blowdown to Sump Rate (gpm)	0.52	0.52	0.52	0.00	3
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	8.91	9.49	8.48	0.42	3
Reagent Feed to FLRT (gpm)	1.93	1.93	1.93	0.00	3
Facility Inlet SO2 Conc. (ppm)	1329	1361	1306	24	3
Inlet SO2 Concentration (ppm)	1998	2001	1992	4	3
Outlet SO2 Concentration (ppm)	359	367	353	5	3
Inlet O2 Concentration (%)	7.14	7.33	6.79	0.25	3
Outlet O2 Concentration (%)	6.58	6.75	6.26	0.23	3
Absorber Gas Velocity (ft/sec)	15.21	15.30	15.12	0.07	3
Inlet Gas Temperature (F)	313	314	311	1	3
Outlet Gas Temperature (F)	122	122	122	0	3
SO2 Absorbed (mmole/L)	4.53	4.55	4.49	0.03	3
Solids Residence Time (hrs)	9.0	9.1	9.0	0.1	3
Slurry Residence Time (min)	3.36	3.36	3.36	0.00	3
Absorber Pressure Drop (in H2O)	9.09	9.23	8.98	0.11	3
Spray Zone Pressure Drop (in H2O)	3.29	3.33	3.26	0.03	3
VME Pressure Drop (in H2O)	0.29	0.29	0.28	0.00	3
Oxidation Air to Rxn Tank (acfm)	550	551	550	0	3
NYSEG Load (MW)	625	679	590	39	3

PHV-305 Process Summary Report
12/10/95 21:00:00 to 12/11/95 00:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	68.2	68.5	67.9	0.2	3
SO2 Removal (NTU)	1.15	1.16	1.14	0.01	3
L/G Ratio (gal/macf)	73	73	72	0	3
Reaction Tank pH	5.78	5.79	5.78	0.00	3
Absorber pH	4.98	4.99	4.96	0.01	3
Flue Gas Flow Rate (scfm)	15004	15080	14925	63	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	0	0	0	0	3
Blowdown to Sump Rate (gpm)	0.52	0.52	0.52	0.00	3
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	8.41	8.41	8.41	0.00	3
Reagent Feed to FLRT (gpm)	1.64	1.65	1.62	0.01	3
Facility Inlet SO2 Conc. (ppm)	1339	1369	1317	22	3
Inlet SO2 Concentration (ppm)	2000	2002	1996	3	3
Outlet SO2 Concentration (ppm)	596	602	591	5	3
Inlet O2 Concentration (%)	7.19	7.44	6.87	0.24	3
Outlet O2 Concentration (%)	6.60	6.82	6.30	0.22	3
Absorber Gas Velocity (ft/sec)	15.15	15.23	15.08	0.06	3
Inlet Gas Temperature (F)	316	317	314	1	3
Outlet Gas Temperature (F)	121	121	121	0	3
SO2 Absorbed (mmole/L)	4.98	5.00	4.97	0.01	3
Solids Residence Time (hrs)	10.9	10.9	10.8	0.0	3
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	3
Absorber Pressure Drop (in H2O)	7.90	7.99	7.83	0.07	3
Spray Zone Pressure Drop (in H2O)	2.40	2.42	2.37	0.02	3
VME Pressure Drop (in H2O)	0.29	0.29	0.29	0.00	3
Oxidation Air to Rxn Tank (acfm)	550	551	550	0	3
NYSEG Load (MW)	626	682	586	41	3

PHV-306 Process Summary Report
12/11/95 14:00:00 to 12/11/95 18:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	78.1	78.4	77.8	0.2	4
SO2 Removal (NTU)	1.52	1.53	1.51	0.01	4
L/G Ratio (gal/macf)	111	111	110	0	4
Reaction Tank pH	5.81	5.83	5.79	0.01	4
Absorber pH	5.30	5.31	5.29	0.01	4
Flue Gas Flow Rate (scfm)	9997	10005	9991	5	4
Header 1 Flow (gpm)	650	650	650	0	4
Header 3 Flow (gpm)	650	650	650	0	4
Header 5 Flow (gpm)	0	0	0	0	4
Blowdown to Sump Rate (gpm)	0.99	0.99	0.99	0.00	4
Vacuum Belt Feed Rate	-	-	-	-	-
Centrifuge Feed Rate (gpm)	6.55	7.50	6.09	0.56	4
Reagent Feed to FLRT (gpm)	1.17	1.20	1.16	0.01	4
Facility Inlet SO2 Conc. (ppm)	1600	1636	1552	36	4
Inlet SO2 Concentration (ppm)	1999	2000	1998	0	4
Outlet SO2 Concentration (ppm)	414	420	408	5	4
Inlet O2 Concentration (%)	7.98	8.41	7.68	0.30	4
Outlet O2 Concentration (%)	7.51	7.95	7.21	0.31	4
Absorber Gas Velocity (ft/sec)	9.97	10.00	9.93	0.03	4
Inlet Gas Temperature (F)	280	284	275	4	4
Outlet Gas Temperature (F)	117	117	116	1	4
SO2 Absorbed (mmole/L)	3.80	3.82	3.79	0.01	4
Solids Residence Time (hrs)	14.2	14.3	14.2	0.1	4
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	4
Absorber Pressure Drop (in H2O)	3.86	3.88	3.84	0.01	4
Spray Zone Pressure Drop (in H2O)	1.60	1.60	1.60	0.00	4
VME Pressure Drop (in H2O)	0.10	0.10	0.10	0.00	4
Oxidation Air to Rxn Tank (acfm)	490	550	318	99	4
NYSEG Load (MW)	678	703	648	20	4

T24-NX (Run 1) Process Summary Report
(11/28/95 07:00:00 to 11/28/95 09:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	79.4	80.0	78.8	0.6	2
SO2 Removal (NTU)	1.58	1.61	1.55	0.03	2
L/G Ratio (gal/macf)	55	55	55	0	2
Reaction Tank pH	5.19	5.24	5.13	0.06	2
Absorber pH	5.81	5.85	5.77	0.04	2
Flue Gas Flow Rate (scfm)	19953	20002	19903	50	2
Header 1 Flow (gpm)	650	650	650	0	2
Header 3 Flow (gpm)	650	651	650	0	2
Header 5 Flow (gpm)	0	0	0	0	2
Blowdown to Sump Rate (gpm)	0.07	0.08	0.07	0.00	2
Centrifuge Feed Rate (gpm)	10.06	10.06	10.05	0.00	2
Reagent Feed to FLRT (gpm)	3.24	3.40	3.08	0.16	2
Facility Inlet SO2 Conc. (ppm)	1645	1747	1544	101	2
Inlet SO2 Concentration (ppm)	1620	1673	1568	53	2
Outlet SO2 Concentration (ppm)	311	331	292	20	2
Inlet O2 Concentration (%)	7.00	7.71	6.29	0.71	2
Outlet O2 Concentration (%)	6.40	7.05	5.75	0.65	2
Absorber Gas Velocity (ft/sec)	20.23	20.25	20.21	0.02	2
Inlet Gas Temperature (F)	341	343	340	2	2
Outlet Gas Temperature (F)	125	126	124	1	2
SO2 Absorbed (mmole/L)	6.25	6.39	6.10	0.14	2
Solids Residence Time (hrs)	8.2	8.4	8.1	0.2	2
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	2
Absorber Pressure Drop (in H2O)	16.33	16.42	16.25	0.09	2
Spray Zone Pressure Drop (in H2O)	3.67	3.69	3.65	0.02	2
ME Pressure Drop (in H2O)	0.82	0.82	0.81	0.01	2
Oxidation Air to Rxn Tank (scfm)	441	442	440	1	2
NYSEG Load (MW)	559	620	499	60	2

T24-N (Runs 2, 3) Process Summary Report
(11/28/95 14:00:00 to 11/28/95 17:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	83.1	83.7	82.4	0.5	3
SO2 Removal (NTU)	1.78	1.81	1.74	0.03	3
L/G Ratio (gal/macf)	55	55	55	0	3
Reaction Tank pH	4.87	4.91	4.84	0.03	3
Absorber pH	4.51	4.52	4.50	0.01	3
Flue Gas Flow Rate (scfm)	19898	19900	19897	1	3
Header 1 Flow (gpm)	650	650	650	0	3
Header 3 Flow (gpm)	650	650	650	0	3
Header 5 Flow (gpm)	0	0	0	0	3
Blowdown to Sump Rate (gpm)	0.19	0.24	0.09	0.07	3
Centrifuge Feed Rate (gpm)	11.41	12.02	10.28	0.80	3
Reagent Feed to FLRT (gpm)	3.01	3.11	2.83	0.13	3
Facility Inlet SO2 Conc. (ppm)	1494	1683	1330	145	3
Inlet SO2 Concentration (ppm)	1615	1638	1600	16	3
Outlet SO2 Concentration (ppm)	254	269	243	11	3
Inlet O2 Concentration (%)	8.56	9.75	7.20	1.05	3
Outlet O2 Concentration (%)	7.88	8.99	6.61	0.98	3
Absorber Gas Velocity (ft/sec)	20.07	20.12	20.01	0.05	3
Inlet Gas Temperature (F)	335	338	331	3	3
Outlet Gas Temperature (F)	122	124	121	1	3
SO2 Absorbed (mmole/L)	6.50	6.54	6.48	0.02	3
Solids Residence Time (hrs)	7.9	7.9	7.9	0.0	3
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	3
Absorber Pressure Drop (in H2O)	16.01	16.19	15.79	0.17	3
Spray Zone Pressure Drop (in H2O)	4.39	4.40	4.35	0.02	3
ME Pressure Drop (in H2O)	0.74	0.76	0.71	0.02	3
Oxidation Air to Rxn Tank (scfm)	473	533	440	43	3
NYSEG Load (MW)	395	582	266	136	3

T24-E Process Summary Report
(11/29/95 08:00:00 to 11/29/95 12:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	74.5	77.5	73.2	1.8	4
SO2 Removal (NTU)	1.37	1.49	1.32	0.07	4
L/G Ratio (gal/macf)	55	55	55	0	4
Reaction Tank pH	5.53	5.63	5.50	0.05	4
Absorber pH	4.71	4.84	4.58	0.10	4
Flue Gas Flow Rate (scfm)	19898	19903	19892	4	4
Header 1 Flow (gpm)	650	650	650	0	4
Header 3 Flow (gpm)	650	650	650	0	4
Header 5 Flow (gpm)	0	0	0	0	4
Blowdown to Sump Rate (gpm)	0.00	0.00	0.00	0.00	4
Centrifuge Feed Rate (gpm)	9.44	9.50	9.27	0.10	4
Reagent Feed to FLRT (gpm)	1.61	1.75	1.43	0.13	4
Facility Inlet SO2 Conc. (ppm)	1656	1702	1602	44	4
Inlet SO2 Concentration (ppm)	1602	1632	1587	18	4
Outlet SO2 Concentration (ppm)	380	406	332	28	4
Inlet O2 Concentration (%)	7.32	7.61	6.97	0.24	4
Outlet O2 Concentration (%)	6.71	6.99	6.38	0.22	4
Absorber Gas Velocity (ft/sec)	20.18	20.20	20.15	0.02	4
Inlet Gas Temperature (F)	344	346	340	2	4
Outlet Gas Temperature (F)	125	125	124	0	4
SO2 Absorbed (mmole/L)	5.78	5.96	5.66	0.12	4
Solids Residence Time (hrs)	9.4	9.6	9.1	0.2	4
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	4
Absorber Pressure Drop (in H2O)	16.35	16.36	16.30	0.02	4
Spray Zone Pressure Drop (in H2O)	4.55	4.55	4.54	0.01	4
ME Pressure Drop (in H2O)	0.81	0.82	0.80	0.01	4
Oxidation Air to Rxn Tank (scfm)	550	550	549	0	4
NYSEG Load (MW)	567	599	538	23	4

T24-C Process Summary Report
(11/30/95 08:00:00 to 11/30/95 12:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
SO2 Removal (%)	69.8	70.9	68.4	0.9	4
SO2 Removal (NTU)	1.20	1.24	1.15	0.03	4
L/G Ratio (gal/macf)	55	55	55	0	4
Reaction Tank pH	5.50	5.50	5.49	0.00	4
Absorber pH	4.50	4.54	4.45	0.03	4
Flue Gas Flow Rate (scfm)	19899	19904	19894	3	4
Header 1 Flow (gpm)	650	650	650	0	4
Header 3 Flow (gpm)	650	650	650	0	4
Header 5 Flow (gpm)	0	0	0	0	4
Blowdown to Sump Rate (gpm)	0.16	0.27	0.00	0.11	4
Centrifuge Feed Rate (gpm)	8.23	8.50	7.50	0.42	4
Reagent Feed to FLRT (gpm)	1.64	1.69	1.60	0.03	4
Facility Inlet SO2 Conc. (ppm)	1675	1924	1401	211	4
Inlet SO2 Concentration (ppm)	1682	1744	1600	61	4
Outlet SO2 Concentration (ppm)	473	512	432	31	4
Inlet O2 Concentration (%)	6.35	6.53	6.18	0.13	4
Outlet O2 Concentration (%)	5.77	5.94	5.61	0.12	4
Absorber Gas Velocity (ft/sec)	20.21	20.24	20.17	0.03	4
Inlet Gas Temperature (F)	346	350	340	4	4
Outlet Gas Temperature (F)	125	126	125	0	4
SO2 Absorbed (mmole/L)	5.68	5.85	5.50	0.14	4
Solids Residence Time (hrs)	9.5	9.8	9.2	0.2	4
Slurry Residence Time (min)	4.39	4.39	4.39	0.00	4
Absorber Pressure Drop (in H2O)	16.09	16.16	16.02	0.05	4
Spray Zone Pressure Drop (in H2O)	4.52	4.55	4.49	0.02	4
ME Pressure Drop (in H2O)	0.83	0.83	0.82	0.00	4
Oxidation Air to Rxn Tank (scfm)	549	551	549	1	4
NYSEG Load (MW)	663	683	642	17	4

T34-PJFF Process Summary Report
12/20/95 12:00:00 to 12/20/95 14:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
Flue Gas Flow Rate (scfm)	4994	4996	4992	2	2
Facility Inlet SO2 Conc. (ppm)	1468	1471	1466	3	2
Facility Outlet SO2 Conc. (ppm)	1282	1292	1273	10	2
SDA Inlet SO2 Concentration (ppm)	1410	1415	1406	4	2
SDA Outlet SO2 Concentration (ppm)	1389	1396	1382	7	2
TGR/PJFF Outlet SO2 Conc. (ppm)	1276	1285	1267	9	2
SDA Inlet O2 Concentration (%)	7.79	7.79	7.78	0.00	2
SDA Outlet O2 Concentration (%)	7.79	7.81	7.78	0.02	2
Treated Gas Return O2 Conc. (%)	8.55	8.61	8.49	0.06	2
SDA Inlet Temperature (F)	333	333	333	0	2
SDA Outlet Temperature (F)	313	313	313	0	2
ESP Outlet Temperature (F)	275	275	274	0	2
PJFF Inlet Temp.(PGF) (F)	302	302	301	0	2
PJFF Outlet Temperature (F)	263	263	262	0	2
PJFF Air/Cloth Ratio	4	4	4	0	1
PJFF Cleaning Pulses/Hour	0	0	0	0	6
PJFF Delta P (in H2O)	5.18	5.19	5.17	0.01	2
NYSEG Load (MW)	701	702	701	1	2

T35-PJFF Process Summary Report
12/21/95 08:00:00 to 12/21/95 12:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
Flue Gas Flow Rate (scfm)	4990	4996	4983	4	4
Facility Inlet SO2 Conc. (ppm)	1529	1555	1507	20	4
Facility Outlet SO2 Conc. (ppm)	1292	1315	1265	22	4
SDA Inlet SO2 Concentration (ppm)	1419	1446	1395	23	4
SDA Outlet SO2 Concentration (ppm)	1394	1416	1369	20	4
TGR/PJFF Outlet SO2 Conc. (ppm)	1288	1313	1259	25	4
SDA Inlet O2 Concentration (%)	7.61	7.88	7.32	0.24	4
SDA Outlet O2 Concentration (%)	7.65	7.93	7.39	0.24	4
Treated Gas Return O2 Conc. (%)	8.33	8.70	8.02	0.30	4
SDA Inlet Temperature (F)	332	332	332	0	4
SDA Outlet Temperature (F)	312	313	310	1	4
ESP Outlet Temperature (F)	277	280	276	2	4
PJFF Inlet Temp.(PGF) (F)	300	301	297	1	4
PJFF Outlet Temperature (F)	260	263	256	3	4
PJFF Air/Cloth Ratio	4	4	4	0	4
PJFF Cleaning Pulses/Hour	0	0	0	0	6
PJFF Delta P (in H2O)	2.33	2.35	2.30	0.02	4
NYSEG Load (MW)	701	702	700	1	4

T32-PJFF Process Summary Report
12/19/95 08:00:00 to 12/19/95 14:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
Flue Gas Flow Rate (scfm)	4995	5006	4986	6	6
Facility Inlet SO2 Conc. (ppm)	1453	1526	1415	40	6
Facility Outlet SO2 Conc. (ppm)	1198	1267	1160	38	6
SDA Inlet SO2 Concentration (ppm)	1343	1414	1301	38	6
SDA Outlet SO2 Concentration (ppm)	1333	1403	1288	41	6
TGR/PJFF Outlet SO2 Conc. (ppm)	1210	1280	1165	40	6
SDA Inlet O2 Concentration (%)	7.96	8.21	7.69	0.21	6
SDA Outlet O2 Concentration (%)	8.01	8.25	7.75	0.21	6
Treated Gas Return O2 Conc. (%)	8.83	9.08	8.52	0.23	6
SDA Inlet Temperature (F)	336	336	336	0	6
SDA Outlet Temperature (F)	315	315	315	0	6
ESP Outlet Temperature (F)	291	318	277	15	6
PJFF Inlet Temp.(PGF) (F)	301	302	301	0	6
PJFF Outlet Temperature (F)	264	265	262	1	6
PJFF Air/Cloth Ratio	4.1	4.1	4.1	0.0	6
PJFF Cleaning Pulses/Hour	0	0	0	0	6
PJFF Delta P (in H2O)	3.54	3.56	3.53	0.01	6
NYSEG Load (MW)	655	684	613	30	6

T33-PJFF Process Summary Report
12/20/95 08:00:00 to 12/20/95 11:00:00)

Process Variable	Average	Max	Min	Std.Dev.	Points
Flue Gas Flow Rate (scfm)	4973	4995	4933	29	3
Facility Inlet SO2 Conc. (ppm)	1455	1488	1390	46	3
Facility Outlet SO2 Conc. (ppm)	1242	1273	1194	35	3
SDA Inlet SO2 Concentration (ppm)	1393	1426	1336	40	3
SDA Outlet SO2 Concentration (ppm)	1370	1402	1317	38	3
TGR/PJFF Outlet SO2 Conc. (ppm)	1259	1287	1215	32	3
SDA Inlet O2 Concentration (%)	7.82	8.37	7.53	0.39	3
SDA Outlet O2 Concentration (%)	7.84	8.37	7.55	0.38	3
Treated Gas Return O2 Conc. (%)	8.61	9.21	8.28	0.43	3
SDA Inlet Temperature (F)	333	333	333	0	3
SDA Outlet Temperature (F)	312	312	312	0	3
ESP Outlet Temperature (F)	272	273	269	2	3
PJFF Inlet Temp.(PGF) (F)	300	300	300	0	3
PJFF Outlet Temperature (F)	262	262	262	0	3
PJFF Air/Cloth Ratio	4	4	4	0	0
PJFF Cleaning Pulses/Hour	0	0	0	0	6
PJFF Delta P (in H2O)	3.74	3.96	3.63	0.16	3
NYSEG Load (MW)	699	702	695	3	3

APPENDIX C
PILOT HIGH VELOCITY ANALYTICAL SUMMARY

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L=Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>Baseline, 20 ft/s, 1700 gpm</i>																							
PHV-200X*	Tue 10/24	12:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200X*	Wed 10/25	07:19	3.92	3.15	136.26	131.39	13.93	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.19
PHV-200X	Wed 10/25	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
PHV-200X	Wed 10/25	14:00	4.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200X	Thu 10/26	07:40	4.36	3.13	131.09	123.32	14.19	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.43
Averages			4.32	3.13	131.09	123.32	14.19	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	3.22
<i>Baseline, 10 ft/s, 650 gpm</i>																							
PHV-211X	Thu 10/26	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211X	Thu 10/26	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 ft/s, 1300 gpm</i>																							
PHV-204*	Thu 10/26	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	14:10	4.24	3.20	154.19	132.50	15.81	40.17	23.89	0.00	20.08	506.28	2.35	0.00	16.50	-	-	-	-	0.00	1.00	0.00	6.60
PHV-204*	Thu 10/26	15:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	16:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204	Thu 10/26	17:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204	Thu 10/26	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204	Thu 10/26	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 17.5 ft/s, 1300 gpm</i>																							
PHV-205	Thu 10/26	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205	Fri 10/27	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 15 ft/s, 1300 gpm</i>																							
PHV-206	Fri 10/27	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-206	Fri 10/27	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 10 ft/s, 1300 gpm</i>																							
PHV-207	Fri 10/27	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-207	Fri 10/27	07:59	5.34	4.75	142.23	119.63	14.42	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.58
PHV-207	Fri 10/27	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.34	4.75	142.23	119.63	14.42	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.58
<i>Baseline, 17.5 ft/s, 1300 gpm</i>																							
PHV-205R	Fri 10/27	09:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	VME Wash pH
<i>Baseline, 10 fl/s, 1700 gpm</i>																						
PHV-203*	Fri 10/27	14:06	5.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203*	Fri 10/27	15:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	18:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 15 fl/s, 1700 gpm</i>																						
PHV-202	Fri 10/27	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-202	Sat 10/28	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 17.5 fl/s, 1700 gpm</i>																						
PHV-201	Sat 10/28	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201	Sat 10/28	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 fl/s, 1700 gpm</i>																						
PHV-200	Sat 10/28	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200	Sat 10/28	07:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200	Sat 10/28	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 17.5 fl/s, 1700 gpm</i>																						
PHV-201R	Sat 10/28	08:25	5.74	4.78	141.98	115.57	14.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	10:00	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.96
PHV-201R	Sat 10/28	12:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.74	4.78	141.98	115.57	14.93	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	6.96
<i>Baseline, 17.5 fl/s, 650 gpm</i>																						
PHV-209	Sat 10/28	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-209	Sat 10/28	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 fl/s, 650 gpm</i>																						
PHV-208	Sat 10/28	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208	Sat 10/28	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 15 fl/s, 650 gpm</i>																						
PHV-210	Sat 10/28	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210	Sun 10/29	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 10 fl/s, 650 gpm</i>																						
PHV-211	Sun 10/29	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211	Sun 10/29	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 fl/s, 650 gpm</i>																						
PHV-208R	Sun 10/29	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208R	Sun 10/29	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Carryover, Munsters, 15 fl/s, 1700

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L=Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH	
PHV-214*	Sun 10/29	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214*	Sun 10/29	10:45	5.24	-	138.78	115.61	16.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214*	Sun 10/29	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214*	Sun 10/29	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214*	Sun 10/29	13:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214*	Sun 10/29	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Sun 10/29	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Sun 10/29	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Sun 10/29	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Sun 10/29	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	07:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	08:00	5.80	4.96	140.53	112.73	16.74	-	-	-	-	-	-	0.03	-	-	-	-	-	-	-	-	7.00	
PHV-214	Mon 10/30	09:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-214	Mon 10/30	10:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			5.80	4.96	140.53	112.73	16.74	-	-	-	-	-	-	0.03	-	-	-	-	-	-	-	-	7.00	
Carryover, M, 17.5 fps, 1700																								
PHV-213*	Mon 10/30	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213*	Mon 10/30	13:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213*	Mon 10/30	13:55	5.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213*	Mon 10/30	15:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.01	
PHV-213	Mon 10/30	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213	Mon 10/30	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213	Mon 10/30	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213	Tue 10/31	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213	Tue 10/31	06:30	5.77	-	141.17	109.39	17.31	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	7.01	
PHV-213	Tue 10/31	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213	Tue 10/31	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-213	Tue 10/31	12:00	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-	
Averages			5.77	-	141.17	109.39	17.31	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	7.01	
Carryover, M, 20 fps, 1700 gpm																								
PHV-212*	Tue 10/31	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-212*	Tue 10/31	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-212	Tue 10/31	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-212	Wed 11/01	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-212	Wed 11/01	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-212	Wed 11/01	07:40	5.57	4.53	136.79	101.48	17.42	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.90	
Averages			5.57	4.53	136.79	101.48	17.42	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.90	
Carryover, M, 20 fps, 1300 gpm																								
PHV-215*	Wed 11/01	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215*	Wed 11/01	14:00	5.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215*	Wed 11/01	15:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215*	Wed 11/01	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215*	Wed 11/01	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215	Thu 11/02	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215	Thu 11/02	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215	Thu 11/02	07:20	5.22	4.33	132.14	96.80	17.43	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.60	
PHV-215	Thu 11/02	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-215	Thu 11/02	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
Averages			5.22	4.33	132.14	96.80	17.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.60
<i>Baseline, 13.5 ft/sec, 1300 gpm</i>																							
PHV-264	Thu 11/02	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-264	Thu 11/02	13:40	4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			4.92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 10 ft/sec, 650 gpm</i>																							
PHV-211R	Thu 11/02	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	15:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	17:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 15 ft/sec, 650 gpm</i>																							
PHV-210R	Thu 11/02	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210R	Fri 11/03	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 11.5 ft/sec, 1300 gpm</i>																							
PHV-265	Fri 11/03	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265	Fri 11/03	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 ft/sec, 650 gpm</i>																							
PHV-208RR*	Fri 11/03	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR*	Fri 11/03	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	09:00	4.66	3.94	145.18	95.54	20.38	38.79	23.15	0.13	24.73	432.94	2.76	0.00	15.03	-	-	-	-	0.00	0.97	0.00	6.44
PHV-208RR	Fri 11/03	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	10:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			4.66	3.94	145.18	95.54	20.38	38.79	23.15	0.13	24.73	432.94	2.76	0.00	15.03	-	-	-	-	0.00	0.97	0.00	6.44

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>Baseline, 15 ft/sec, 650 gpm</i>																							
PHV-210RR*	Fri 11/03	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	14:00	4.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR	Fri 11/03	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR	Fri 11/03	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 15 ft/sec, 1300 gpm</i>																							
PHV-206R	Fri 11/03	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-206R	Sat 11/04	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 11.5 ft/sec, 1300 gpm</i>																							
PHV-265R	Sat 11/04	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265R	Sat 11/04	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265R	Sat 11/04	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 ft/sec, 1300 gpm</i>																							
PHV-204R	Sat 11/04	07:22	5.16	4.32	136.23	77.52	17.03	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.59
PHV-204R	Sat 11/04	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204R	Sat 11/04	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204R	Sat 11/04	11:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.16	4.32	136.23	77.52	17.03	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.59
<i>Baseline, 17.5 ft/sec, 1300 gpm</i>																							
PHV-205RR	Sat 11/04	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR	Sat 11/04	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sat 11/04	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sat 11/04	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sat 11/04	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>DBA, 10 ft/sec, 650 gpm</i>																							
PHV-221*	Sun 11/05	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	10:10	4.27	4.21	157.78	79.55	17.44	-	-	-	-	-	-	-	-	6039	5.76	30.92	9.46	-	-	-	-
PHV-221*	Sun 11/05	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	5660	5.49	28.96	8.78	-	-	-	-
PHV-221	Sun 11/05	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Sun 11/05	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Sun 11/05	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	07:10	5.30	5.09	159.18	74.42	16.10	-	-	-	-	-	0.35	-	-	5442	5.21	27.66	8.73	-	-	-	5.57
PHV-221	Mon 11/06	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	10:50	-	-	-	-	-	-	-	-	-	-	-	-	-	5571	5.24	28.28	9.09	-	-	-	-
PHV-221	Mon 11/06	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.30	5.09	159.18	74.42	16.10	-	-	-	-	-	0.35	-	-	5506	5.23	27.97	8.91	-	-	-	5.57
<i>DBA, 15 ft/sec, 650 gpm</i>																							
PHV-220*	Mon 11/06	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220*	Mon 11/06	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220*	Mon 11/06	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220*	Mon 11/06	15:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220	Mon 11/06	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220	Mon 11/06	16:50	-	-	-	-	-	-	-	-	-	-	-	-	-	5519	5.46	27.03	9.78	-	-	-	-
PHV-220	Mon 11/06	17:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	5519	5.46	27.03	9.78	-	-	-	-
<i>DBA, 20 ft/sec, 650 gpm</i>																							
PHV-218	Mon 11/06	17:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218	Mon 11/06	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218	Mon 11/06	19:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218*	Mon 11/06	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218*	Mon 11/06	21:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218*	Mon 11/06	21:30	-	-	-	-	-	-	-	-	-	-	-	-	-	5263	5.08	25.77	9.49	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	5263	5.08	25.77	9.49	-	-	-	-
<i>DBA, Tan., 10 ft/sec, 650 gpm</i>																							
PHV-266*	Thu 11/09	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266*	Thu 11/09	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	06:30	5.38	5.19	178.11	89.76	18.32	-	-	-	-	-	0.05	-	-	5307	4.68	24.64	11.62	-	-	-	5.78
PHV-266	Thu 11/09	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	09:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	10:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.38	5.19	178.11	89.76	18.32	-	-	-	-	-	0.05	-	-	5307	4.68	24.64	11.62	-	-	-	5.78
<i>DBA, Tan., 15 ft/sec, 650 gpm</i>																							
PHV-267	Thu 11/09	14:00	5.05	-	149.33	75.10	15.35	-	-	-	-	-	-	-	-	5755	4.64	27.34	12.45	-	-	-	-
PHV-267	Thu 11/09	15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267	Thu 11/09	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267	Thu 11/09	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
Averages			5.05	-	149.33	75.10	15.35	-	-	-	-	-	-	-	-	5755	4.64	27.34	12.45	-	-	-	-
<i>DBA, Tan., 20 ft/sec, 650 gpm</i>																							
PHV-268	Thu 11/09	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-268	Thu 11/09	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>DBA, Tan., 17.5 ft/sec, 650 gpm</i>																							
PHV-269	Thu 11/09	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-269	Fri 11/10	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>DBA, Tan., 20 ft/sec, 1300 gpm</i>																							
PHV-270	Fri 11/10	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-270	Fri 11/10	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>DBA, Tan., 20 ft/sec, 1700 gpm</i>																							
PHV-271	Fri 11/10	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-271	Fri 11/10	07:55	4.90	4.88	144.56	70.39	14.02	26.22	8.14	0.00	48.94	270.47	4.58	2.04	17.43	5461	4.24	26.42	11.48	1.09	1.16	0.01	5.01
PHV-271	Fri 11/10	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			4.90	4.88	144.56	70.39	14.02	26.22	8.14	0.00	48.94	270.47	4.58	2.04	17.43	5461	4.24	26.42	11.48	1.09	1.16	0.01	5.01
<i>DBA, Tan., 20 ft/sec, 650 gpm</i>																							
PHV-268R	Fri 11/10	09:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-268R	Fri 11/10	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-268R	Fri 11/10	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>DBA, Tan., 15 ft/sec, 650 gpm</i>																							
PHV-267R	Fri 11/10	13:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	16:07	-	-	-	-	-	-	-	-	-	-	-	-	-	5303	4.69	24.25	12.01	-	-	-	-
PHV-267R	Fri 11/10	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	5303	4.69	24.25	12.01	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L=Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																							
PHV-245*	Sat 11/11	07:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	08:05	5.50	4.55	212.03	118.08	22.52	-	-	-	-	-	-	0.11	-	-	-	-	-	-	-	-	7.53
PHV-245*	Sat 11/11	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	11:15	-	4.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 1300 gpm</i>																							
PHV-244	Sat 11/11	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-244	Sun 11/12	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 1300 gpm</i>																							
PHV-246	Sun 11/12	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246	Sun 11/12	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1300 gpm</i>																							
PHV-247	Sun 11/12	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247	Sun 11/12	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																							
PHV-245R	Sun 11/12	10:23	5.32	4.12	198.06	125.79	23.85	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.70
PHV-245R	Sun 11/12	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.32	4.12	198.06	125.79	23.85	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.70
<i>Tan., 17.5 ft/sec, 650 gpm</i>																							
PHV-249	Sun 11/12	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249	Sun 11/12	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249	Sun 11/12	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 650 gpm</i>																							
PHV-248	Sun 11/12	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-248	Sun 11/12	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 650 gpm</i>																							
PHV-250	Sun 11/12	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-250	Mon 11/13	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L=Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>Tan., 10 ft/sec, 650 gpm</i>																							
PHV-251	Mon 11/13	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-251	Mon 11/13	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 650 gpm</i>																							
PHV-248R	Mon 11/13	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-248R	Mon 11/13	06:40	5.88	4.86	180.63	111.00	21.26	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	7.10
PHV-248R	Mon 11/13	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.88	4.86	180.63	111.00	21.26	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	7.10
<i>Tan., 20 ft/sec, 1700 gpm</i>																							
PHV-240	Mon 11/13	09:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240	Mon 11/13	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240	Mon 11/13	11:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240	Mon 11/13	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1700 gpm</i>																							
PHV-241	Mon 11/13	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-241	Mon 11/13	13:50	5.55	-	157.38	98.83	19.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-241	Mon 11/13	14:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-241	Mon 11/13	16:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.55	-	157.38	98.83	19.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 1700 gpm</i>																							
PHV-242	Mon 11/13	16:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-242	Mon 11/13	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-242	Mon 11/13	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1700 gpm</i>																							
PHV-243	Mon 11/13	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-243	Tue 11/14	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 1700 gpm</i>																							
PHV-240R	Tue 11/14	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240R	Tue 11/14	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 1300 gpm</i>																							
PHV-244R	Tue 11/14	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-244R	Tue 11/14	07:50	5.66	4.89	139.56	85.97	15.59	-	-	-	-	-	-	0.22	-	-	-	-	-	-	-	-	7.00
PHV-244R	Tue 11/14	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.66	4.89	139.56	85.97	15.59	-	-	-	-	-	-	0.22	-	-	-	-	-	-	-	-	7.00

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>Tan., 15 ft/sec, 1300 gpm</i>																							
PHV-246R	Tue 11/14	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246R	Tue 11/14	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246R	Tue 11/14	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1300 gpm</i>																							
PHV-247R*	Tue 11/14	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	15:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 650 gpm</i>																							
PHV-249R	Tue 11/14	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249R	Tue 11/14	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249R	Tue 11/14	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 650 gpm</i>																							
PHV-250R	Tue 11/14	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-250R	Wed 11/15	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																							
PHV-245RR	Wed 11/15	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245RR	Wed 11/15	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carryover, 15 ft/s, 1700 gpm</i>																							
PHV-224	Thu 11/16	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	08:00	5.90	5.04	112.03	76.54	15.14	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	7.14
PHV-224	Thu 11/16	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	14:15	-	-	135.19	79.87	17.78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	16:50	-	-	135.07	80.93	18.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.90	5.04	127.43	79.11	16.99	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	7.14
<i>Carryover, 17.5 ft/s, 1700 gpm</i>																							
PHV-223*	Thu 11/16	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	08:25	5.62	5.05	135.46	86.37	19.38	24.97	0.74	0.00	25.18	403.93	2.65	0.07	15.14	-	-	-	-	-	-	-	7.00
PHV-223	Fri 11/17	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	14:09	5.74	-	139.16	90.87	20.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.68	5.05	137.31	88.62	20.16	24.97	0.74	0.00	25.18	403.93	2.65	0.07	15.14	-	-	-	-	-	-	-	7.00
<i>Carryover, 20 ft/s, 1700 gpm</i>																							
PHV-222	Fri 11/17	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	07:40	5.58	4.62	141.84	92.24	20.90	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

			FLRT	ABS	L-Ca++	L-Mg++	L-Na+	L-K+	L=Al	L-Fe	L-Mn	L-Cl-	L-CO3=	L-SO3=	L-SO4=	ICE	ICE	ICE	ICE	CaSO3	CaSO4	CaCO3	VME	
Test	Date	Time	pH	pH	(mM)	(mM)	(mM)	(ppm)	(ppm)	(ppm)	(ppm)	(mM)	(mM)	(mM)	(mM)	DBA	Adipic	Glutaric	Succinic	RS	RS	RS	Wash	
PHV-222	Sat 11/18	10:30	-	-	140.22	91.80	21.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-222	Sat 11/18	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			5.58	4.62	141.03	92.02	21.01	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	-	
Carryover, 20 ft/s, 1300 gpm																								
PHV-225	Sat 11/18	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	11:12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	12:00	-	-	145.58	96.37	21.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	14:00	-	-	146.02	94.90	21.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-225	Sun 11/19	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	145.80	95.64	21.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Carryover, 15 ft/s, 1700 gpm																								
PHV-224R	Sun 11/19	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-224R	Mon 11/20	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-224R	Mon 11/20	08:00	-	-	143.71	93.65	21.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-224R	Mon 11/20	10:30	-	-	139.97	96.04	22.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-224R	Mon 11/20	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	141.84	94.85	21.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 15 ft/sec, 1300 gpm																								
PHV-272	Mon 11/20	13:04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-272	Mon 11/20	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-272	Mon 11/20	14:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-272	Mon 11/20	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 20 ft/sec, 1300 gpm																								
PHV-273	Mon 11/20	17:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-273	Mon 11/20	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-273*	Mon 11/20	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 17.5 ft/sec, 1300 gpm																								
PHV-274	Mon 11/20	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-274	Tue 11/21	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>Baseline, 11.5 ft/sec, 1300 gpm</i>																							
PHV-275*	Tue 11/21	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-275*	Tue 11/21	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-275	Tue 11/21	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 10 ft/sec, 1300 gpm</i>																							
PHV-276	Tue 11/21	07:15	5.85	5.21	141.25	97.55	21.88	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	-	-
PHV-276	Tue 11/21	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-276*	Tue 11/21	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.85	5.21	141.25	97.55	21.88	-	-	-	-	-	-	0.06	-	-	-	-	-	-	-	-	-
<i>VLP, 20 ft/sec, 1300 gpm</i>																							
PHV-232*	Tue 11/21	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232*	Tue 11/21	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232	Tue 11/21	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232*	Tue 11/21	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1300 gpm</i>																							
PHV-233	Tue 11/21	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233	Wed 11/22	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-234	Wed 11/22	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-234	Wed 11/22	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-235	Wed 11/22	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-235	Wed 11/22	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1300 gpm</i>																							
PHV-233R*	Wed 11/22	08:50	5.74	4.85	135.94	95.45	21.24	31.81	0.64	0.00	45.04	-	-	0.00	-	-	-	-	-	-	-	-	6.95
PHV-233R	Wed 11/22	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 650 gpm</i>																							
PHV-238	Wed 11/22	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	15:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>VLP, 20 ft/sec, 650 gpm</i>																							
PHV-236	Wed 11/22	17:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236	Wed 11/22	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236	Wed 11/22	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 650 gpm</i>																							
PHV-237	Wed 11/22	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-237	Thu 11/23	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 650 gpm</i>																							
PHV-239	Thu 11/23	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-239	Thu 11/23	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 20 ft/sec, 650 gpm</i>																							
PHV-236R	Thu 11/23	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236R	Thu 11/23	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 20 ft/sec, 1700 gpm</i>																							
PHV-228	Thu 11/23	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-228	Thu 11/23	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1700 gpm</i>																							
PHV-229	Thu 11/23	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-229	Thu 11/23	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1700 gpm</i>																							
PHV-230	Thu 11/23	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-230	Thu 11/23	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1700 gpm</i>																							
PHV-231	Thu 11/23	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-231	Fri 11/24	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 20 ft/sec, 1700 gpm</i>																							
PHV-228R	Fri 11/24	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-228R	Fri 11/24	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-277	Fri 11/24	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-277	Fri 11/24	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-277	Fri 11/24	08:03	5.91	5.38	138.74	82.99	20.26	-	-	-	-	-	-	0.08	-	-	-	-	-	-	-	-	6.95
Averages			5.91	5.38	138.74	82.99	20.26	-	-	-	-	-	-	0.08	-	-	-	-	-	-	-	-	6.95
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-278	Fri 11/24	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-278	Fri 11/24	10:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-278	Fri 11/24	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>VLP, 20 f/sec, 1300 gpm</i>																							
PHV-279*	Fri 11/24	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-279*	Fri 11/24	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-279	Fri 11/24	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-279	Fri 11/24	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 f/sec, 1300 gpm</i>																							
PHV-280	Fri 11/24	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-280*	Sat 11/25	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 f/sec, 1300 gpm</i>																							
PHV-281	Sat 11/25	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-281	Sat 11/25	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 f/sec, 1700 gpm</i>																							
PHV-282	Sat 11/25	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-282	Sat 11/25	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 f/sec, 1700 gpm</i>																							
PHV-283*	Sat 11/25	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-283	Sat 11/25	11:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-283	Sat 11/25	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 20 f/sec, 1700 gpm</i>																							
PHV-284*	Sat 11/25	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284*	Sat 11/25	14:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284	Sat 11/25	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284	Sat 11/25	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284	Sat 11/25	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 f/sec, 1700 gpm</i>																							
PHV-285	Sat 11/25	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-285	Sun 11/26	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>VLP, 10 ft/sec, 1700 gpm</i>																							
PHV-286	Sun 11/26	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-286	Sun 11/26	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-287	Sun 11/26	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-287*	Sun 11/26	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-288*	Sun 11/26	10:00	5.52	4.52	147.70	82.11	19.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.91
PHV-288*	Sun 11/26	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288	Sun 11/26	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288	Sun 11/26	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-289*	Sun 11/26	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289*	Sun 11/26	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289	Sun 11/26	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289	Mon 11/27	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-290	Mon 11/27	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-290*	Mon 11/27	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 20 ft/sec, 1700 gpm</i>																							
PHV-291*	Thu 11/30	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	07:55	5.60	4.86	134.52	90.61	21.03	-	-	-	-	-	-	0.16	-	-	-	-	-	-	-	-	6.89
PHV-291	Fri 12/01	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	14:00	5.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.60	4.86	134.52	90.61	21.03	-	-	-	-	-	-	0.16	-	-	-	-	-	-	-	-	6.89

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L=Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>LP, 15 ft/sec, 1700 gpm</i>																							
PHV-293	Fri 12/01	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-293	Sun 12/03	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 10 ft/sec, 1700 gpm</i>																							
PHV-294	Sun 12/03	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-294	Mon 12/04	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 10 ft/sec, 1300 gpm</i>																							
PHV-298*	Mon 12/04	08:10	4.75	3.50	151.49	99.00	20.84	-	-	-	-	-	-	0.25	-	-	-	-	-	-	-	-	6.81
PHV-298*	Mon 12/04	11:20	5.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-298	Tue 12/05	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 15 ft/sec, 1300 gpm</i>																							
PHV-297*	Tue 12/05	08:00	5.38	4.44	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	-	-	-	-	6.86
PHV-297*	Tue 12/05	14:25	5.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-297	Tue 12/05	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-297	Wed 12/06	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 15 ft/sec, 650 gpm</i>																							
PHV-300	Wed 12/06	07:40	5.88	4.93	137.97	89.41	19.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.97
PHV-300	Wed 12/06	14:05	5.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.86	4.93	137.97	89.41	19.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.97
<i>LP, 10 ft/sec, 650 gpm</i>																							
PHV-299*	Thu 12/07	08:30	5.63	4.67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.99
PHV-299*	Thu 12/07	13:45	5.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-299	Thu 12/07	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-299*	Fri 12/08	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 10 ft/sec, 1700 gpm</i>																							
PHV-303	Fri 12/08	07:44	5.78	5.27	150.35	80.29	18.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.01
PHV-303*	Fri 12/08	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			5.78	5.27	150.35	80.29	18.86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.01
<i>LP, 15 ft/sec, 1700 gpm</i>																							
PHV-304*	Sat 12/09	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-304	Sun 12/10	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Liquid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT pH	ABS pH	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-K+ (ppm)	L-Al (ppm)	L-Fe (ppm)	L-Mn (ppm)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	ICE DBA (ppm)	ICE Adipic (mM)	ICE Glutaric (mM)	ICE Succinic (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Wash pH
<i>LP, 15 ft/sec, 1300 gpm</i>																							
PHV-305*	Sun 12/10	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-305*	Sun 12/10	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-305	Mon 12/11	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>LP, 10 ft/sec, 1300 gpm</i>																							
PHV-306*	Mon 12/11	09:42	5.87	5.25	171.37	82.41	20.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.04
PHV-306	Mon 12/11	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306	Mon 12/11	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	08:25	5.91	5.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.12
PHV-306*	Tue 12/12	13:45	5.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	17:10	-	-	143.84	73.06	17.12	25.43	0.25	0.00	41.60	388.74	2.61	-	14.43	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3			CaSO4			VME Carryover			HME Collection (VME Carryover)		
											RS	RS	RS	RS	Wt% Solids	Wt% Solids	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)		
Baseline, 20 f/s, 1700 gpm																						
PHV-200X*	Tue 10/24	12:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-200X*	Wed 10/25	07:19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-200X	Wed 10/25	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-200X	Wed 10/25	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-200X	Thu 10/26	07:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 10 f/s, 650 gpm																						
PHV-211X	Thu 10/26	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-211X	Thu 10/26	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 20 f/s, 1300 gpm																						
PHV-204*	Thu 10/26	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204*	Thu 10/26	14:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204*	Thu 10/26	15:10	0.01	36.69	31.52	4.52	110.93	-	0.00	7.22	-	-	-	-	-	-	0.04	85.40	78.67	9.08	-	
PHV-204*	Thu 10/26	16:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204*	Thu 10/26	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204	Thu 10/26	17:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204	Thu 10/26	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204	Thu 10/26	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 17.5 f/s, 1300 gpm																						
PHV-205	Thu 10/26	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205	Fri 10/27	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 15 f/s, 1300 gpm																						
PHV-206	Fri 10/27	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-206	Fri 10/27	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 10 f/s, 1300 gpm																						
PHV-207	Fri 10/27	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-207	Fri 10/27	07:59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-207	Fri 10/27	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 17.5 f/s, 1300 gpm																						
PHV-205R	Fri 10/27	09:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	61.65	55.91	6.49	-	-	
PHV-205R	Fri 10/27	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	61.65	55.91	6.49	-	-	
PHV-205R	Fri 10/27	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205R	Fri 10/27	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205R	Fri 10/27	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
Baseline, 10 ft/s, 1700 gpm																	
PHV-203*	Fri 10/27	14:06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203*	Fri 10/27	15:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	18:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 15 ft/s, 1700 gpm																	
PHV-202	Fri 10/27	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-202	Sat 10/28	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 17.5 ft/s, 1700 gpm																	
PHV-201	Sat 10/28	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201	Sat 10/28	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20 ft/s, 1700 gpm																	
PHV-200	Sat 10/28	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200	Sat 10/28	07:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200	Sat 10/28	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 17.5 ft/s, 1700 gpm																	
PHV-201R	Sat 10/28	08:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	12:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 17.5 ft/s, 650 gpm																	
PHV-209	Sat 10/28	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-209	Sat 10/28	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20 ft/s, 650 gpm																	
PHV-208	Sat 10/28	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208	Sat 10/28	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 15 ft/s, 650 gpm																	
PHV-210	Sat 10/28	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210	Sun 10/29	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 10 ft/s, 650 gpm																	
PHV-211	Sun 10/29	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211	Sun 10/29	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20 ft/s, 650 gpm																	
PHV-208R	Sun 10/29	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208R	Sun 10/29	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Carryover, Munters, 15 fps, 1700

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
PHV-214*	Sun 10/29	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214*	Sun 10/29	10:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214*	Sun 10/29	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214*	Sun 10/29	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214*	Sun 10/29	13:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214*	Sun 10/29	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Sun 10/29	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Sun 10/29	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Sun 10/29	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Sun 10/29	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	07:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	08:00	-	66.14	50.21	7.56	-	-	-	-	-	-	-	0.00	13.80	11.54	1.53
PHV-214	Mon 10/30	09:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	10:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	66.14	50.21	7.56	-	-	-	-	-	-	-	0.00	13.80	11.54	1.53
Carryover, M, 17.5 fps, 1700																	
PHV-213*	Mon 10/30	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213*	Mon 10/30	13:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213*	Mon 10/30	13:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213*	Mon 10/30	15:40	-	66.40	52.53	8.08	-	-	-	-	-	-	-	-	20.21	11.64	1.69
PHV-213	Mon 10/30	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213	Mon 10/30	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213	Mon 10/30	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213	Tue 10/31	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213	Tue 10/31	06:30	0.01	68.88	50.28	7.97	-	-	-	-	-	-	-	0.00	20.92	13.98	2.25
PHV-213	Tue 10/31	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213	Tue 10/31	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213	Tue 10/31	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			0.01	68.88	50.28	7.97	-	-	-	-	-	-	-	0.00	20.92	13.98	2.25
Carryover, M, 20 fps, 1700 gpm																	
PHV-212*	Tue 10/31	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212*	Tue 10/31	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212	Tue 10/31	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212	Wed 11/01	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212	Wed 11/01	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212	Wed 11/01	07:40	0.02	69.11	45.20	8.14	-	-	-	-	-	-	-	0.08	83.02	62.38	10.43
Averages			0.02	69.11	45.20	8.14	-	-	-	-	-	-	-	0.08	83.02	62.38	10.43
Carryover, M, 20 fps, 1300 gpm																	
PHV-215*	Wed 11/01	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215*	Wed 11/01	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215*	Wed 11/01	15:45	-	64.91	46.96	7.81	-	-	-	-	-	-	-	-	86.58	71.00	11.61
PHV-215*	Wed 11/01	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215*	Wed 11/01	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215	Thu 11/02	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215	Thu 11/02	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215	Thu 11/02	07:20	-	64.91	44.38	8.14	-	-	-	-	-	-	-	3.25	78.44	66.13	11.80
PHV-215	Thu 11/02	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-215	Thu 11/02	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
Averages			-	64.91	44.38	8.14	-	-	-	-	-	-	-	3.25	78.44	66.13	11.80
Baseline, 13.5 ft/sec, 1300 gpm																	
PHV-264	Thu 11/02	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-264	Thu 11/02	13:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 10ft/sec, 650 gpm																	
PHV-211R	Thu 11/02	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	15:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	17:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 15ft/sec, 650 gpm																	
PHV-210R	Thu 11/02	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210R	Fri 11/03	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 11.5ft/sec, 1300 gpm																	
PHV-265	Fri 11/03	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265	Fri 11/03	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20ft/sec, 650 gpm																	
PHV-208RR*	Fri 11/03	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR*	Fri 11/03	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	09:00	0.01	61.77	37.71	7.95	168.14	1.49	0.00	8.78	0.00	0.51	0.75	0.02	39.60	25.29	5.08
PHV-208RR	Fri 11/03	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	10:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			0.01	61.77	37.71	7.95	168.14	1.49	0.00	8.78	0.00	0.51	0.75	0.02	39.60	25.29	5.08

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
Baseline, 15 ft/sec, 650 gpm																	
PHV-210RR*	Fri 11/03	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR*	Fri 11/03	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR	Fri 11/03	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210RR	Fri 11/03	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 15 ft/sec, 1300 gpm																	
PHV-206R	Fri 11/03	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-206R	Sat 11/04	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 11.5 ft/sec, 1300 gpm																	
PHV-265R	Sat 11/04	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265R	Sat 11/04	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265R	Sat 11/04	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20 ft/sec, 1300 gpm																	
PHV-204R	Sat 11/04	07:22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204R	Sat 11/04	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204R	Sat 11/04	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204R	Sat 11/04	11:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 17.5 ft/sec, 1300 gpm																	
PHV-205RR	Sat 11/04	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR	Sat 11/04	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sat 11/04	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sat 11/04	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sat 11/04	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205RR*	Sun 11/05	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
DBA, 10 ft/sec, 650 gpm																	
PHV-221*	Sun 11/05	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	10:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221*	Sun 11/05	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Sun 11/05	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Sun 11/05	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Sun 11/05	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	07:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	10:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-221	Mon 11/06	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, 15 ft/sec, 650 gpm																	
PHV-220*	Mon 11/06	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220*	Mon 11/06	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220*	Mon 11/06	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220*	Mon 11/06	15:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220	Mon 11/06	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220	Mon 11/06	16:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-220	Mon 11/06	17:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, 20 ft/sec, 650 gpm																	
PHV-218	Mon 11/06	17:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218	Mon 11/06	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218	Mon 11/06	19:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218*	Mon 11/06	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218*	Mon 11/06	21:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-218*	Mon 11/06	21:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 10 ft/sec, 650 gpm																	
PHV-266*	Thu 11/09	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266*	Thu 11/09	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	06:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	09:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	10:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-266	Thu 11/09	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 15 ft/sec, 650 gpm																	
PHV-267	Thu 11/09	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267	Thu 11/09	15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267	Thu 11/09	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267	Thu 11/09	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 20 ft/sec, 650 gpm																	
PHV-268	Thu 11/09	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-268	Thu 11/09	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 17.5 ft/sec, 650 gpm																	
PHV-269	Thu 11/09	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-269	Fri 11/10	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 20 ft/sec, 1300 gpm																	
PHV-270	Fri 11/10	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-270	Fri 11/10	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 20 ft/sec, 1700 gpm																	
PHV-271	Fri 11/10	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-271	Fri 11/10	07:55	0.01	69.49	32.59	7.05	126.45	1.54	0.22	10.98	-	-	-	0.10	100.49	47.93	9.56
PHV-271	Fri 11/10	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			0.01	69.49	32.59	7.05	126.45	1.54	0.22	10.98	-	-	-	0.10	100.49	47.93	9.56
DBA, Tan., 20 ft/sec, 650 gpm																	
PHV-268R	Fri 11/10	09:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-268R	Fri 11/10	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-268R	Fri 11/10	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DBA, Tan., 15 ft/sec, 650 gpm																	
PHV-267R	Fri 11/10	13:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	16:07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-267R	Fri 11/10	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
														VME Carryover			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																	
PHV-245*	Sat 11/11	07:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	08:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	11:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245*	Sat 11/11	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245	Sat 11/11	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 1300 gpm</i>																	
PHV-244	Sat 11/11	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-244	Sun 11/12	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 1300 gpm</i>																	
PHV-246	Sun 11/12	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246	Sun 11/12	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1300 gpm</i>																	
PHV-247	Sun 11/12	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247	Sun 11/12	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																	
PHV-245R	Sun 11/12	10:23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245R	Sun 11/12	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 650 gpm</i>																	
PHV-249	Sun 11/12	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249	Sun 11/12	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249	Sun 11/12	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 650 gpm</i>																	
PHV-248	Sun 11/12	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-248	Sun 11/12	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 650 gpm</i>																	
PHV-250	Sun 11/12	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-250	Mon 11/13	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
														VME Carryover			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
Tan., 10 ft/sec, 650 gpm																	
PHV-251	Mon 11/13	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-251	Mon 11/13	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 20 ft/sec, 650 gpm																	
PHV-248R	Mon 11/13	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-248R	Mon 11/13	06:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-248R	Mon 11/13	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 20 ft/sec, 1700 gpm																	
PHV-240	Mon 11/13	09:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240	Mon 11/13	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240	Mon 11/13	11:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240	Mon 11/13	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 17.5 ft/sec, 1700 gpm																	
PHV-241	Mon 11/13	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-241	Mon 11/13	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-241	Mon 11/13	14:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-241	Mon 11/13	16:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 15 ft/sec, 1700 gpm																	
PHV-242	Mon 11/13	16:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-242	Mon 11/13	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-242	Mon 11/13	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 10 ft/sec, 1700 gpm																	
PHV-243	Mon 11/13	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-243	Tue 11/14	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 20 ft/sec, 1700 gpm																	
PHV-240R	Tue 11/14	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-240R	Tue 11/14	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 20 ft/sec, 1300 gpm																	
PHV-244R	Tue 11/14	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-244R	Tue 11/14	07:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-244R	Tue 11/14	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
														VME Carryover			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
Tan., 15 ft/sec, 1300 gpm																	
PHV-246R	Tue 11/14	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246R	Tue 11/14	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246R	Tue 11/14	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 10 ft/sec, 1300 gpm																	
PHV-247R*	Tue 11/14	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	15:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 17.5 ft/sec, 650 gpm																	
PHV-249R	Tue 11/14	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249R	Tue 11/14	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249R	Tue 11/14	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 15 ft/sec, 650 gpm																	
PHV-250R	Tue 11/14	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-250R	Wed 11/15	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tan., 17.5 ft/sec, 1300 gpm																	
PHV-245RR	Wed 11/15	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245RR	Wed 11/15	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carryover, 15 ft/s, 1700 gpm																	
PHV-224	Thu 11/16	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	08:00	-	56.28	34.94	6.98	-	-	-	-	-	-	-	-	39.14	26.38	5.16
PHV-224	Thu 11/16	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	14:15	-	57.02	33.80	7.50	-	-	-	-	-	-	-	-	37.7	21.24	4.63
PHV-224	Thu 11/16	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	16:50	-	58.37	34.40	7.87	-	-	-	-	-	-	-	-	42.78	27.16	6.01
Averages			-	57.22	34.38	7.45	-	-	-	-	-	-	-	-	39.87	24.93	5.27
Carryover, 17.5 ft/s, 1700 gpm																	
PHV-223*	Thu 11/16	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	08:25	-	62.20	37.50	8.66	-	-	-	-	-	-	-	-	26.37	16.41	3.79
PHV-223	Fri 11/17	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	14:09	-	63.93	39.76	9.03	-	-	-	-	-	-	-	-	25.59	10.93	2.56
PHV-223	Fri 11/17	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	63.07	38.63	8.85	-	-	-	-	-	-	-	-	25.98	13.67	3.18
Carryover, 20 ft/s, 1700 gpm																	
PHV-222	Fri 11/17	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	07:40	-	68.81	43.18	10.07	-	-	-	-	-	-	-	-	106.66	75.55	16.94
PHV-222	Sat 11/18	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt%	L-Ca++	L-Mg++	L-Na+	L-Cl-	L-CO3=	L-SO3=	L-SO4=	CaSO3	CaSO4	CaCO3	VME Carryover	L-Ca++	L-Mg++	L-Na+
			Solids	(mM)	(mM)	(mM)	(mM)	(mM)	(mM)	(mM)	RS	RS	RS	Wt% Solids	(mM)	(mM)	(mM)
PHV-222	Sat 11/18	10:30	-	66.67	41.06	9.58	-	-	-	-	-	-	-	-	101.98	66.19	15.48
PHV-222	Sat 11/18	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	67.74	42.12	9.83	-	-	-	-	-	-	-	-	104.32	70.87	16.21
<i>Carryover, 20 ft/s, 1300 gpm</i>																	
PHV-225	Sat 11/18	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	11:12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	12:00	-	69.99	44.33	10.25	-	-	-	-	-	-	-	-	106.10	71.54	16.25
PHV-225	Sun 11/19	14:00	-	66.52	42.22	9.63	-	-	-	-	-	-	-	-	120.63	83.52	18.67
PHV-225	Sun 11/19	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	68.26	43.28	9.94	-	-	-	-	-	-	-	-	113.37	77.53	17.46
<i>Carryover, 15 ft/s, 1700 gpm</i>																	
PHV-224R	Sun 11/19	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224R	Mon 11/20	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224R	Mon 11/20	08:00	-	67.93	42.41	9.78	-	-	-	-	-	-	-	-	34.15	21.93	4.73
PHV-224R	Mon 11/20	10:30	-	64.06	41.45	9.72	-	-	-	-	-	-	-	-	35.24	26.49	5.80
PHV-224R	Mon 11/20	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	66.00	41.93	9.75	-	-	-	-	-	-	-	-	34.70	24.21	5.26
<i>Baseline, 15 ft/sec, 1300 gpm</i>																	
PHV-272	Mon 11/20	13:04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-272	Mon 11/20	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-272	Mon 11/20	14:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-272	Mon 11/20	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 ft/sec, 1300 gpm</i>																	
PHV-273	Mon 11/20	17:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-273	Mon 11/20	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-273*	Mon 11/20	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 17.5 ft/sec, 1300 gpm</i>																	
PHV-274	Mon 11/20	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-274	Tue 11/21	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
														VME Carryover			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
<i>Baseline, 11.5 ft/sec, 1300 gpm</i>																	
PHV-275*	Tue 11/21	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-275*	Tue 11/21	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-275	Tue 11/21	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 10 ft/sec, 1300 gpm</i>																	
PHV-276	Tue 11/21	07:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-276	Tue 11/21	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-276*	Tue 11/21	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 20 ft/sec, 1300 gpm</i>																	
PHV-232*	Tue 11/21	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232*	Tue 11/21	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232	Tue 11/21	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232*	Tue 11/21	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1300 gpm</i>																	
PHV-233	Tue 11/21	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233	Wed 11/22	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																	
PHV-234	Wed 11/22	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-234	Wed 11/22	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																	
PHV-235	Wed 11/22	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-235	Wed 11/22	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1300 gpm</i>																	
PHV-233R*	Wed 11/22	08:50	0.00	61.20	40.45	9.14	-	-	0.00	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 650 gpm</i>																	
PHV-238	Wed 11/22	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	15:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**HME Collection
(VME Carryover)**

Test	Date	Time	Wt%	L-Ca++	L-Mg++	L-Na+	L-Cl-	L-CO3=	L-SO3=	L-SO4=	CaSO3	CaSO4	CaCO3	VME	L-Ca++	L-Mg++	L-Na+
			Solids	(mM)	(mM)	(mM)	(mM)	(mM)	(mM)	(mM)	(mM)	RS	RS	RS	Carryover	(mM)	(mM)
VLP, 20 ft/sec, 650 gpm																	
PHV-236	Wed 11/22	17:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236	Wed 11/22	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236	Wed 11/22	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 650 gpm																	
PHV-237	Wed 11/22	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-237	Thu 11/23	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 650 gpm																	
PHV-239	Thu 11/23	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-239	Thu 11/23	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 650 gpm																	
PHV-236R	Thu 11/23	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236R	Thu 11/23	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 1700 gpm																	
PHV-228	Thu 11/23	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-228	Thu 11/23	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 1700 gpm																	
PHV-229	Thu 11/23	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-229	Thu 11/23	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1700 gpm																	
PHV-230	Thu 11/23	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-230	Thu 11/23	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1700 gpm																	
PHV-231	Thu 11/23	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-231	Fri 11/24	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 1700 gpm																	
PHV-228R	Fri 11/24	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-228R	Fri 11/24	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-277	Fri 11/24	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-277	Fri 11/24	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-277	Fri 11/24	08:03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-278	Fri 11/24	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-278	Fri 11/24	10:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-278	Fri 11/24	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
														VME Carryover			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
VLP, 20 ft/sec, 1300 gpm																	
PHV-279*	Fri 11/24	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-279*	Fri 11/24	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-279	Fri 11/24	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-279	Fri 11/24	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-280	Fri 11/24	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-280*	Sat 11/25	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-281	Sat 11/25	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-281	Sat 11/25	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1700 gpm																	
PHV-282	Sat 11/25	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-282	Sat 11/25	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1700 gpm																	
PHV-283*	Sat 11/25	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-283	Sat 11/25	11:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-283	Sat 11/25	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 1700 gpm																	
PHV-284*	Sat 11/25	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284*	Sat 11/25	14:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284	Sat 11/25	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284	Sat 11/25	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-284	Sat 11/25	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 1700 gpm																	
PHV-285	Sat 11/25	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-285	Sun 11/26	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
VLP, 10 ft/sec, 1700 gpm																	
PHV-286	Sun 11/26	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-286	Sun 11/26	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-287	Sun 11/26	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-287*	Sun 11/26	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-288*	Sun 11/26	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288*	Sun 11/26	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288	Sun 11/26	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288	Sun 11/26	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-289*	Sun 11/26	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289*	Sun 11/26	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289	Sun 11/26	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289	Mon 11/27	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-290	Mon 11/27	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-290*	Mon 11/27	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 20 ft/sec, 1700 gpm																	
PHV-291*	Thu 11/30	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	07:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	VME Carryover	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
														Wt% Solids			
LP, 15 ft/sec, 1700 gpm																	
PHV-293	Fri 12/01	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-293	Sun 12/03	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 10 ft/sec, 1700 gpm																	
PHV-294	Sun 12/03	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-294	Mon 12/04	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 10 ft/sec, 1300 gpm																	
PHV-298*	Mon 12/04	08:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-298*	Mon 12/04	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-298	Tue 12/05	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 15 ft/sec, 1300 gpm																	
PHV-297*	Tue 12/05	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-297*	Tue 12/05	14:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-297	Tue 12/05	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-297	Wed 12/06	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 15 ft/sec, 650 gpm																	
PHV-300	Wed 12/06	07:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-300	Wed 12/06	14:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 10 ft/sec, 650 gpm																	
PHV-299*	Thu 12/07	08:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-299*	Thu 12/07	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-299	Thu 12/07	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-299*	Fri 12/08	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 10 ft/sec, 1700 gpm																	
PHV-303	Fri 12/08	07:44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-303*	Fri 12/08	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 15 ft/sec, 1700 gpm																	
PHV-304*	Sat 12/09	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-304	Sun 12/10	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot VME Wash Water Analytical Summary:
PHV Phase II Test Block**

														HME Collection (VME Carryover)			
														VME Carryover			
Test	Date	Time	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)	L-Cl- (mM)	L-CO3= (mM)	L-SO3= (mM)	L-SO4= (mM)	CaSO3 RS	CaSO4 RS	CaCO3 RS	Wt% Solids	L-Ca++ (mM)	L-Mg++ (mM)	L-Na+ (mM)
LP, 15 ft/sec, 1300 gpm																	
PHV-305*	Sun 12/10	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-305*	Sun 12/10	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-305	Mon 12/11	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 10 ft/sec, 1300 gpm																	
PHV-306*	Mon 12/11	09:42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306	Mon 12/11	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306	Mon 12/11	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	08:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	17:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

			FLRT						Wt	Mol					CO3-			Thickener		Form			
			Wt%	Ca	Mg	SO3	SO4	CO3	Solids	Solids	Solids		IR	Est.	L.S.			Unit		Final	Filtration	Filter	
Test	Date	Time	Solids	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	Inerts	Closure	Closure	Ox.	Util.	Ox.	Util.	Util.	Loading	CP/FC	(ft2/tpd)	Wt%	Wt%	Rate	Cake
									(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%			lb/hr*sqft	Wt%	
Baseline, 20 ft/s, 1700 gpm																							
PHV-200X*	Tue 10/24	12:35	7.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-200X*	Wed 10/25	07:19	14.99	-	-	-	-	0.06	-	-	-	-	-	-	-	99.0	1.0	83.74	-	-	-	-	
PHV-200X	Wed 10/25	13:45	13.31	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.5	-	-	-	-	-	
PHV-200X	Wed 10/25	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-200X	Thu 10/26	07:40	10.00	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	1.9	83.96	-	-	-	-	
Averages			11.66	-	-	-	-	0.21	-	-	-	-	-	-	-	96.4	2.72	83.96	-	-	-	-	
Baseline, 10 ft/s, 650 gpm																							
PHV-211X	Thu 10/26	10:00	9.64	-	-	-	-	0.12	-	-	-	-	-	-	-	97.9	1.2	-	-	-	-	-	
PHV-211X	Thu 10/26	12:00	9.93	-	-	-	-	0.07	-	-	-	-	-	-	-	98.8	0.7	-	-	-	-	-	
Averages			9.79	-	-	-	-	0.10	-	-	-	-	-	-	-	98.4	1.0	-	-	-	-	-	
Baseline, 20 ft/s, 1300 gpm																							
PHV-204*	Thu 10/26	14:00	12.20	-	-	-	-	0.09	-	-	-	-	-	-	-	98.4	1.2	-	-	-	-	-	
PHV-204*	Thu 10/26	14:10	12.23	6.94	0.02	0.42	6.25	0.09	1.30	1.5	15.8	93.7	98.7	-	-	98.4	1.2	83.97	0.81	12.23	66.08	1504	86
PHV-204*	Thu 10/26	15:10	13.35	-	-	-	-	0.11	-	-	-	-	-	-	-	98.1	1.6	-	-	-	-	-	
PHV-204*	Thu 10/26	16:05	13.41	-	-	-	-	0.15	-	-	-	-	-	-	-	97.4	2.2	-	-	-	-	-	
PHV-204*	Thu 10/26	17:00	-	-	-	-	-	0.16	-	-	-	-	-	-	-	97.3	-	-	-	-	-	-	
PHV-204	Thu 10/26	17:40	-	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	-	-	-	-	-	-	
PHV-204	Thu 10/26	18:00	12.85	-	-	-	-	0.21	-	-	-	-	-	-	-	96.4	3.0	-	-	-	-	-	
PHV-204	Thu 10/26	20:00	13.20	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.6	-	-	-	-	-	
Averages			13.03	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.3	-	-	-	-	-	
Baseline, 17.5 ft/s, 1300 gpm																							
PHV-205	Thu 10/26	22:00	12.47	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.9	-	-	-	-	-	
PHV-205	Fri 10/27	00:01	12.34	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.8	-	-	-	-	-	
Averages			12.41	-	-	-	-	0.33	-	-	-	-	-	-	-	94.5	4.4	-	-	-	-	-	
Baseline, 15 ft/s, 1300 gpm																							
PHV-206	Fri 10/27	02:00	12.11	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.6	-	-	-	-	-	
PHV-206	Fri 10/27	04:00	11.92	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.7	-	-	-	-	-	
Averages			12.02	-	-	-	-	0.36	-	-	-	-	-	-	-	94.0	4.6	-	-	-	-	-	
Baseline, 10 ft/s, 1300 gpm																							
PHV-207	Fri 10/27	06:00	11.46	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.3	-	-	-	-	-	
PHV-207	Fri 10/27	07:59	11.78	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	-	82.52	-	-	-	-	
PHV-207	Fri 10/27	08:00	11.94	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	5.2	-	-	-	-	-	
Averages			11.73	-	-	-	-	0.38	-	-	-	-	-	-	-	93.5	4.8	82.52	-	-	-	-	
Baseline, 17.5 ft/s, 1300 gpm																							
PHV-205R	Fri 10/27	09:00	12.86	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.8	-	-	-	-	-	
PHV-205R	Fri 10/27	10:00	13.26	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.4	-	-	-	-	-	
PHV-205R	Fri 10/27	10:30	13.45	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.6	-	-	-	-	-	
PHV-205R	Fri 10/27	11:20	13.12	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	4.0	-	-	-	-	-	
PHV-205R	Fri 10/27	12:00	13.13	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.6	-	-	-	-	-	
Averages			13.24	-	-	-	-	0.30	-	-	-	-	-	-	-	95.0	4.1	-	-	-	-	-	

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	Util.	CO3-	L.S.	CPAFC	Thickener	Initial	Final	Filtration	Filter
			Wt%							Solids	Closure						Solids	Est.		Loading				
				(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%	
Baseline, 10 ft/s, 1700 gpm																								
PHV-203*	Fri 10/27	14:06	12.16	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.4	-	-	-	-	-	-	
PHV-203*	Fri 10/27	15:55	12.36	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	5.7	-	-	-	-	-	-	
PHV-203	Fri 10/27	16:00	12.38	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	5.8	-	-	-	-	-	-	
PHV-203	Fri 10/27	18:00	12.94	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.4	-	-	-	-	-	-	
PHV-203	Fri 10/27	18:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-203	Fri 10/27	20:00	12.18	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.4	-	-	-	-	-	-	
	Averages		12.40	-	-	-	-	0.36	-	-	-	-	-	-	-	94.0	4.9	-	-	-	-	-	-	
Baseline, 15 ft/s, 1700 gpm																								
PHV-202	Fri 10/27	22:00	12.86	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.5	-	-	-	-	-	-	
PHV-202	Sat 10/28	00:01	12.70	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.2	-	-	-	-	-	-	
	Averages		12.78	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.4	-	-	-	-	-	-	
Baseline, 17.5 ft/s, 1700 gpm																								
PHV-201	Sat 10/28	02:00	12.25	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.3	-	-	-	-	-	-	
PHV-201	Sat 10/28	04:00	12.12	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	3.6	-	-	-	-	-	-	
	Averages		12.19	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.4	-	-	-	-	-	-	
Baseline, 20 ft/s, 1700 gpm																								
PHV-200	Sat 10/28	06:00	12.24	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.1	-	-	-	-	-	-	
PHV-200	Sat 10/28	07:30	12.32	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.6	82.27	-	-	-	-	-	
PHV-200	Sat 10/28	08:00	11.63	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	4.8	-	-	-	-	-	-	
	Averages		12.06	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.5	82.27	-	-	-	-	-	
Baseline, 17.5 ft/s, 1700 gpm																								
PHV-201R	Sat 10/28	08:25	11.74	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.2	-	-	-	-	-	-	
PHV-201R	Sat 10/28	10:00	10.67	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	4.4	89.94	-	-	-	-	-	
PHV-201R	Sat 10/28	12:00	-	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	-	-	-	-	-	-	-	
PHV-201R	Sat 10/28	12:15	-	-	-	-	-	0.45	-	-	-	-	-	-	-	92.4	-	-	-	-	-	-	-	
	Averages		11.21	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	4.8	89.94	-	-	-	-	-	
Baseline, 17.5 ft/s, 650 gpm																								
PHV-209	Sat 10/28	14:00	10.19	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	4.4	-	-	-	-	-	-	
PHV-209	Sat 10/28	16:00	11.32	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.0	-	-	-	-	-	-	
	Averages		10.76	-	-	-	-	0.37	-	-	-	-	-	-	-	93.8	4.2	-	-	-	-	-	-	
Baseline, 20 ft/s, 650 gpm																								
PHV-208	Sat 10/28	18:00	13.47	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	4.0	-	-	-	-	-	-	
PHV-208	Sat 10/28	20:00	11.39	-	-	-	-	0.17	-	-	-	-	-	-	-	97.1	2.1	-	-	-	-	-	-	
	Averages		12.43	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	3.0	-	-	-	-	-	-	
Baseline, 15 ft/s, 650 gpm																								
PHV-210	Sat 10/28	22:00	11.17	-	-	-	-	0.13	-	-	-	-	-	-	-	97.8	1.6	-	-	-	-	-	-	
PHV-210	Sun 10/29	00:01	13.06	-	-	-	-	0.13	-	-	-	-	-	-	-	97.8	1.9	-	-	-	-	-	-	
	Averages		12.12	-	-	-	-	0.13	-	-	-	-	-	-	-	97.8	1.7	-	-	-	-	-	-	
Baseline, 10 ft/s, 650 gpm																								
PHV-211	Sun 10/29	02:00	10.71	-	-	-	-	0.09	-	-	-	-	-	-	-	98.4	1.0	-	-	-	-	-	-	
PHV-211	Sun 10/29	04:00	11.39	-	-	-	-	0.11	-	-	-	-	-	-	-	98.1	1.4	-	-	-	-	-	-	
	Averages		11.05	-	-	-	-	0.10	-	-	-	-	-	-	-	98.3	1.2	-	-	-	-	-	-	
Baseline, 20 ft/s, 650 gpm																								
PHV-208R	Sun 10/29	06:00	11.39	-	-	-	-	0.17	-	-	-	-	-	-	-	97.1	2.1	-	-	-	-	-	-	
PHV-208R	Sun 10/29	08:00	11.43	-	-	-	-	0.16	-	-	-	-	-	-	-	97.3	2.0	-	-	-	-	-	-	
	Averages		11.41	-	-	-	-	0.17	-	-	-	-	-	-	-	97.2	2.0	-	-	-	-	-	-	

Carryover, Munters, 15 fps, 1700

Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	CO3-	L.S.	CPAFC	Thickener	Initial	Final	Form	Filter
			Wt%							Solids	Closure					Closure			Ox.				
				(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%
PHV-214*	Sun 10/29	10:00	12.56	-	-	-	-	0.17	-	-	-	-	-	-	-	97.1	2.3	-	-	-	-	-	-
PHV-214*	Sun 10/29	10:45	12.89	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	2.5	83.57	-	-	-	-	-
PHV-214*	Sun 10/29	12:00	12.79	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	2.5	-	-	-	-	-	-
PHV-214*	Sun 10/29	12:00	-	-	-	-	-	0.23	-	-	-	-	-	-	-	96.0	-	-	-	-	-	-	-
PHV-214*	Sun 10/29	13:25	12.95	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	3.1	-	-	-	-	-	-
PHV-214*	Sun 10/29	14:00	12.70	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.3	-	-	-	-	-	-
PHV-214	Sun 10/29	16:00	12.83	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.2	-	-	-	-	-	-
PHV-214	Sun 10/29	18:00	12.82	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.6	-	-	-	-	-	-
PHV-214	Sun 10/29	20:00	13.52	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	5.0	-	-	-	-	-	-
PHV-214	Sun 10/29	22:00	12.82	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.9	-	-	-	-	-	-
PHV-214	Mon 10/30	00:01	12.42	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.9	-	-	-	-	-	-
PHV-214	Mon 10/30	02:00	15.73	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	7.0	-	-	-	-	-	-
PHV-214	Mon 10/30	04:00	12.53	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.1	-	-	-	-	-	-
PHV-214	Mon 10/30	06:00	12.68	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.3	-	-	-	-	-	-
PHV-214	Mon 10/30	07:45	12.72	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	5.4	83.24	-	-	-	-	-
PHV-214	Mon 10/30	08:00	12.82	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	5.6	-	-	-	-	-	-
PHV-214	Mon 10/30	09:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-214	Mon 10/30	10:00	12.22	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.8	-	-	-	-	-	-
PHV-214	Mon 10/30	10:35	12.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			12.93	-	-	-	-	0.36	-	-	-	-	-	-	-	94.2	4.9	83.2	-	-	-	-	-
Carryover, M, 17.5 fps, 1700																							
PHV-213*	Mon 10/30	12:00	12.23	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	-	-	-	-	-	-	-
PHV-213*	Mon 10/30	13:10	12.20	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	3.6	-	-	-	-	-	-
PHV-213*	Mon 10/30	13:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-213*	Mon 10/30	15:40	12.90	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	-	-	-	-	-	-	-
PHV-213	Mon 10/30	16:00	12.18	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.0	-	-	-	-	-	-
PHV-213	Mon 10/30	20:00	12.22	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.7	-	-	-	-	-	-
PHV-213	Mon 10/30	00:01	12.84	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.3	-	-	-	-	-	-
PHV-213	Tue 10/31	04:00	12.69	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.7	-	-	-	-	-	-
PHV-213	Tue 10/31	06:30	12.72	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.7	-	-	-	-	-	-
PHV-213	Tue 10/31	08:00	12.90	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	5.9	82.22	-	-	-	-	-
PHV-213	Tue 10/31	11:00	13.17	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	5.6	-	-	-	-	-	-
PHV-213	Tue 10/31	12:00	12.72	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.4	-	-	-	-	-	-
Averages			12.68	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.2	82.22	-	-	-	-	-
Carryover, M, 20 fps, 1700 gpm																							
PHV-212*	Tue 10/31	14:00	13.03	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.1	-	-	-	-	-	-
PHV-212*	Tue 10/31	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212	Tue 10/31	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-212	Wed 11/01	00:01	12.75	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.9	-	-	-	-	-	-
PHV-212	Wed 11/01	04:00	12.79	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	5.0	-	-	-	-	-	-
PHV-212	Wed 11/01	07:40	11.99	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.7	84.91	-	-	-	-	-
Averages			12.64	-	-	-	-	0.34	-	-	-	-	-	-	-	94.24	4.68	84.91	-	-	-	-	-
Carryover, M, 20 fps, 1300 gpm																							
PHV-215*	Wed 11/01	12:00	12.91	-	-	-	-	0.44	-	-	-	-	-	-	-	92.6	6.2	-	-	-	-	-	-
PHV-215*	Wed 11/01	14:00	11.83	-	-	-	-	0.46	-	-	-	-	-	-	-	92.2	6.0	-	-	-	-	-	-
PHV-215*	Wed 11/01	15:45	11.48	-	-	-	-	0.44	-	-	-	-	-	-	-	92.6	5.5	-	-	-	-	-	-
PHV-215*	Wed 11/01	16:00	11.60	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	5.4	-	-	-	-	-	-
PHV-215*	Wed 11/01	20:00	11.26	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.0	-	-	-	-	-	-
PHV-215	Thu 11/02	00:01	10.92	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.2	-	-	-	-	-	-
PHV-215	Thu 11/02	04:00	10.83	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.2	-	-	-	-	-	-
PHV-215	Thu 11/02	07:20	10.97	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	4.6	84.88	-	-	-	-	-
PHV-215	Thu 11/02	08:00	12.01	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	5.1	-	-	-	-	-	-
PHV-215	Thu 11/02	09:30	11.06	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	5.0	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	CO3- Est.	L.S. Loading	CP/FC	Thickener		Final Settled	Filtration Rate	Filter Cake
			Wt% Solids							Solids Closure	Solids Closure								Unit Area	Initial Wt%			
		Averages	11.16	-	-	-	-	0.38	-	-	-	-	-	-	-	93.5	4.6	-	-	-	-	-	-
<i>Baseline, 13.5 ft/sec, 1300 gpm</i>																							
PHV-264	Thu 11/02	12:00	11.71	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.3	-	-	-	-	-	-
PHV-264	Thu 11/02	13:40	12.02	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.7	-	-	-	-	-	-
		Averages	11.87	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.5	-	-	-	-	-	-
<i>Baseline, 10 ft/sec, 650 gpm</i>																							
PHV-211R	Thu 11/02	15:15	11.93	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.8	-	-	-	-	-	-
PHV-211R	Thu 11/02	15:45	11.53	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.6	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:00	11.31	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.6	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:30	11.02	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.3	-	-	-	-	-	-
PHV-211R	Thu 11/02	17:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	18:00	10.86	-	-	-	-	0.33	-	-	-	-	-	-	-	94.3	3.9	-	-	-	-	-	-
PHV-211R	Thu 11/02	20:00	10.69	-	-	-	-	0.31	-	-	-	-	-	-	-	94.8	3.5	-	-	-	-	-	-
		Averages	11.22	-	-	-	-	0.35	-	-	-	-	-	-	-	94.0	4.3	-	-	-	-	-	-
<i>Baseline, 15 ft/sec, 650 gpm</i>																							
PHV-210R	Thu 11/02	22:00	11.20	-	-	-	-	0.23	-	-	-	-	-	-	-	96.0	2.8	-	-	-	-	-	-
PHV-210R	Fri 11/03	00:01	11.53	-	-	-	-	0.19	-	-	-	-	-	-	-	96.8	2.3	-	-	-	-	-	-
		Averages	11.37	-	-	-	-	0.21	-	-	-	-	-	-	-	96.4	2.6	-	-	-	-	-	-
<i>Baseline, 11.5 ft/sec, 1300 gpm</i>																							
PHV-265	Fri 11/03	02:00	12.49	-	-	-	-	0.19	-	-	-	-	-	-	-	96.7	2.6	-	-	-	-	-	-
PHV-265	Fri 11/03	04:00	12.80	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.3	-	-	-	-	-	-
		Averages	12.65	-	-	-	-	0.22	-	-	-	-	-	-	-	96.3	3.0	-	-	-	-	-	-
<i>Baseline, 20 ft/sec, 650 gpm</i>																							
PHV-208RR*	Fri 11/03	06:00	11.87	-	-	-	-	0.25	-	-	-	-	-	-	-	95.8	3.2	-	-	-	-	-	-
PHV-208RR*	Fri 11/03	08:00	12.79	-	-	-	-	0.25	-	-	-	-	-	-	-	95.8	3.5	-	-	-	-	-	-
PHV-208RR	Fri 11/03	09:00	13.76	6.48	0.04	0.00	6.06	0.29	2.2	1.3	10.0	100.0	95.5	-	-	95.1	4.4	82.97	-	-	-	-	-
PHV-208RR	Fri 11/03	10:00	13.58	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.6	-	-	-	-	-	-
PHV-208RR	Fri 11/03	10:05	13.25	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.4	-	-	-	-	-	-
PHV-208RR	Fri 11/03	11:30	14.08	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.7	-	-	-	-	-	-
PHV-208RR	Fri 11/03	12:00	12.25	-	-	-	-	0.46	-	-	-	-	-	-	-	92.3	6.1	-	-	-	-	-	-
		Averages	13.38	6.48	0.04	0.00	6.06	0.35	2.2	1.3	10.0	100.0	95.5	-	-	94.1	5.0	82.97	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	CO3- Est.	L.S. Loading	CPAFC	Thickener		Final Settled	Filtration Rate	Filter Cake
			Wt% Solids							Solids Closure	Solids Closure								Unit Area	Initial Wt%			
Baseline, 15 ft/sec, 650 gpm																							
PHV-210RR*	Fri 11/03	13:00	12.28	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	5.8	-	-	-	-	-	
PHV-210RR*	Fri 11/03	14:00	11.83	-	-	-	-	0.55	-	-	-	-	-	-	-	90.8	7.1	-	-	-	-	-	
PHV-210RR*	Fri 11/03	15:15	12.10	-	-	-	-	0.54	-	-	-	-	-	-	-	91.0	7.1	-	-	-	-	-	
PHV-210RR*	Fri 11/03	16:00	12.22	-	-	-	-	0.58	-	-	-	-	-	-	-	90.3	7.7	-	-	-	-	-	
PHV-210RR*	Fri 11/03	16:30	12.04	-	-	-	-	0.54	-	-	-	-	-	-	-	91.0	7.1	-	-	-	-	-	
PHV-210RR	Fri 11/03	18:00	12.19	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.4	-	-	-	-	-	
PHV-210RR	Fri 11/03	20:00	11.84	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.7	-	-	-	-	-	
Averages			12.02	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.6	-	-	-	-	-	
Baseline, 15 ft/sec, 1300 gpm																							
PHV-206R	Fri 11/03	22:00	12.57	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.6	-	-	-	-	-	
PHV-206R	Sat 11/04	00:01	12.66	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.2	-	-	-	-	-	
Averages			12.62	-	-	-	-	0.25	-	-	-	-	-	-	-	95.8	3.4	-	-	-	-	-	
Baseline, 11.5 ft/sec, 1300 gpm																							
PHV-265R	Sat 11/04	02:00	12.33	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.2	-	-	-	-	-	
PHV-265R	Sat 11/04	04:00	12.80	-	-	-	-	0.25	-	-	-	-	-	-	-	95.8	3.5	-	-	-	-	-	
PHV-265R	Sat 11/04	06:00	12.38	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.4	-	-	-	-	-	
Averages			12.50	-	-	-	-	0.25	-	-	-	-	-	-	-	95.8	3.4	-	-	-	-	-	
Baseline, 20 ft/sec, 1300 gpm																							
PHV-204R	Sat 11/04	07:22	12.99	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.1	83.07	-	-	-	-	
PHV-204R	Sat 11/04	08:00	12.75	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.3	-	-	-	-	-	
PHV-204R	Sat 11/04	10:00	13.50	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	5.3	-	-	-	-	-	
PHV-204R	Sat 11/04	11:50	14.65	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	6.2	-	-	-	-	-	
Averages			13.47	-	-	-	-	0.33	-	-	-	-	-	-	-	94.3	5.0	83.07	-	-	-	-	
Baseline, 17.5 ft/sec, 1300 gpm																							
PHV-205RR	Sat 11/04	14:00	13.26	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	5.1	-	-	-	-	-	
PHV-205RR	Sat 11/04	16:00	12.56	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.9	-	-	-	-	-	
PHV-205RR*	Sat 11/04	18:00	12.01	-	-	-	-	0.21	-	-	-	-	-	-	-	96.4	2.7	-	-	-	-	-	
PHV-205RR*	Sat 11/04	20:00	11.75	-	-	-	-	0.05	-	-	-	-	-	-	-	99.1	0.6	-	-	-	-	-	
PHV-205RR*	Sat 11/04	22:00	11.47	-	-	-	-	0.04	-	-	-	-	-	-	-	99.3	0.5	-	-	-	-	-	
PHV-205RR*	Sun 11/05	00:00	12.13	-	-	-	-	0.15	-	-	-	-	-	-	-	97.4	2.0	-	-	-	-	-	
PHV-205RR*	Sun 11/05	02:00	12.41	-	-	-	-	0.20	-	-	-	-	-	-	-	96.6	2.7	-	-	-	-	-	
PHV-205RR*	Sun 11/05	04:00	13.03	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.3	-	-	-	-	-	
PHV-205RR*	Sun 11/05	06:00	12.87	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	3.1	-	-	-	-	-	
Averages			12.91	-	-	-	-	0.36	-	-	-	-	-	-	-	94.0	5.0	-	-	-	-	-	

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

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Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	Util.	CO3-	L.S.	CP/FC	Thickener		Final	Filtration	Filter
			Wt%							Solids	Closure						Closure			Est.	Loading			
				(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%	
DBA, 10 ft/sec, 650 gpm																								
PHV-221*	Sun 11/05	08:00	12.12	-	-	-	-	0.05	-	-	-	-	-	-	-	-	99.1	0.7	-	-	-	-	-	
PHV-221*	Sun 11/05	10:10	12.02	-	-	-	-	0.05	-	-	-	-	-	-	-	-	99.1	0.7	82.69	-	-	-	-	
PHV-221*	Sun 11/05	11:30	11.95	-	-	-	-	0.04	-	-	-	-	-	-	-	-	99.3	0.5	-	-	-	-	-	
PHV-221*	Sun 11/05	14:00	12.49	-	-	-	-	0.06	-	-	-	-	-	-	-	-	99.0	0.8	-	-	-	-	-	
PHV-221*	Sun 11/05	16:00	12.24	-	-	-	-	0.16	-	-	-	-	-	-	-	-	97.3	2.1	-	-	-	-	-	
PHV-221	Sun 11/05	18:00	12.31	-	-	-	-	0.27	-	-	-	-	-	-	-	-	95.4	3.6	-	-	-	-	-	
PHV-221	Sun 11/05	20:00	12.94	-	-	-	-	0.36	-	-	-	-	-	-	-	-	93.9	5.1	-	-	-	-	-	
PHV-221	Sun 11/05	22:00	11.80	-	-	-	-	0.40	-	-	-	-	-	-	-	-	93.2	5.1	-	-	-	-	-	
PHV-221	Mon 11/06	00:00	12.70	-	-	-	-	0.40	-	-	-	-	-	-	-	-	93.2	5.6	-	-	-	-	-	
PHV-221	Mon 11/06	02:00	10.65	-	-	-	-	0.39	-	-	-	-	-	-	-	-	93.4	4.5	-	-	-	-	-	
PHV-221	Mon 11/06	04:00	10.49	-	-	-	-	0.39	-	-	-	-	-	-	-	-	93.4	4.4	-	-	-	-	-	
PHV-221	Mon 11/06	06:00	11.52	-	-	-	-	0.33	-	-	-	-	-	-	-	-	94.4	4.1	-	-	-	-	-	
PHV-221	Mon 11/06	07:10	10.98	-	-	-	-	0.31	-	-	-	-	-	-	-	-	94.7	3.7	85.67	-	-	-	-	
PHV-221	Mon 11/06	08:00	11.67	-	-	-	-	0.39	-	-	-	-	-	-	-	-	93.4	4.9	-	-	-	-	-	
PHV-221	Mon 11/06	10:00	11.66	-	-	-	-	0.35	-	-	-	-	-	-	-	-	94.1	4.4	-	-	-	-	-	
PHV-221	Mon 11/06	10:50	11.54	-	-	-	-	0.34	-	-	-	-	-	-	-	-	94.2	4.3	-	-	-	-	-	
PHV-221	Mon 11/06	12:00	13.06	-	-	-	-	0.29	-	-	-	-	-	-	-	-	95.1	4.1	-	-	-	-	-	
Averages			11.78	-	-	-	-	0.35	-	-	-	-	-	-	-	-	94.0	4.5	85.67	-	-	-	-	
DBA, 15 ft/sec, 650 gpm																								
PHV-220*	Mon 11/06	12:45	12.06	-	-	-	-	0.23	-	-	-	-	-	-	-	-	96.1	3.0	-	-	-	-	-	
PHV-220*	Mon 11/06	14:00	13.02	-	-	-	-	0.18	-	-	-	-	-	-	-	-	96.9	2.6	-	-	-	-	-	
PHV-220*	Mon 11/06	14:15	12.96	-	-	-	-	0.18	-	-	-	-	-	-	-	-	97.0	2.5	-	-	-	-	-	
PHV-220*	Mon 11/06	15:35	12.58	-	-	-	-	0.19	-	-	-	-	-	-	-	-	96.7	2.6	-	-	-	-	-	
PHV-220	Mon 11/06	16:00	12.67	-	-	-	-	0.21	-	-	-	-	-	-	-	-	96.5	2.9	-	-	-	-	-	
PHV-220	Mon 11/06	16:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-220	Mon 11/06	17:30	12.58	-	-	-	-	0.41	-	-	-	-	-	-	-	-	93.1	5.6	-	-	-	-	-	
Averages			12.63	-	-	-	-	0.31	-	-	-	-	-	-	-	-	94.8	4.2	-	-	-	-	-	
DBA, 20 ft/sec, 650 gpm																								
PHV-218	Mon 11/06	17:50	12.74	-	-	-	-	0.39	-	-	-	-	-	-	-	-	93.4	5.5	-	-	-	-	-	
PHV-218	Mon 11/06	18:00	12.82	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.6	5.3	-	-	-	-	-	
PHV-218	Mon 11/06	19:10	13.33	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.6	5.5	-	-	-	-	-	
PHV-218*	Mon 11/06	20:00	13.07	-	-	-	-	0.48	-	-	-	-	-	-	-	-	92.0	6.8	-	-	-	-	-	
PHV-218*	Mon 11/06	21:00	13.23	-	-	-	-	0.64	-	-	-	-	-	-	-	-	89.4	9.3	-	-	-	-	-	
PHV-218*	Mon 11/06	21:30	13.68	-	-	-	-	0.76	-	-	-	-	-	-	-	-	87.5	11.4	-	-	-	-	-	
Averages			12.96	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.5	5.4	-	-	-	-	-	
DBA, Tan., 10 ft/sec, 650 gpm																								
PHV-266*	Thu 11/09	00:01	13.32	-	-	-	-	0.53	-	-	-	-	-	-	-	-	91.1	7.7	-	-	-	-	-	
PHV-266*	Thu 11/09	02:00	12.88	-	-	-	-	0.44	-	-	-	-	-	-	-	-	92.6	6.2	-	-	-	-	-	
PHV-266	Thu 11/09	04:00	12.84	-	-	-	-	0.40	-	-	-	-	-	-	-	-	93.2	5.6	-	-	-	-	-	
PHV-266	Thu 11/09	06:00	12.53	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.6	5.2	-	-	-	-	-	
PHV-266	Thu 11/09	06:30	12.36	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.6	5.1	-	-	-	-	-	
PHV-266	Thu 11/09	08:00	12.55	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.5	5.3	81.89	-	-	-	-	
PHV-266	Thu 11/09	09:45	12.44	-	-	-	-	0.33	-	-	-	-	-	-	-	-	94.4	4.5	-	-	-	-	-	
PHV-266	Thu 11/09	10:00	12.64	-	-	-	-	0.31	-	-	-	-	-	-	-	-	94.7	4.3	-	-	-	-	-	
PHV-266	Thu 11/09	10:45	12.59	-	-	-	-	0.29	-	-	-	-	-	-	-	-	95.1	4.0	-	-	-	-	-	
PHV-266	Thu 11/09	12:00	12.51	-	-	-	-	0.26	-	-	-	-	-	-	-	-	95.6	3.5	-	-	-	-	-	
Averages			12.56	-	-	-	-	0.34	-	-	-	-	-	-	-	-	94.2	4.7	81.89	-	-	-	-	
DBA, Tan., 15 ft/sec, 650 gpm																								
PHV-267	Thu 11/09	14:00	14.68	-	-	-	-	0.25	-	-	-	-	-	-	-	-	95.7	4.1	-	-	-	-	-	
PHV-267	Thu 11/09	15:00	13.06	-	-	-	-	0.21	-	-	-	-	-	-	-	-	96.4	3.0	-	-	-	-	-	
PHV-267	Thu 11/09	16:00	13.07	-	-	-	-	0.18	-	-	-	-	-	-	-	-	96.9	2.6	-	-	-	-	-	
PHV-267	Thu 11/09	17:00	16.39	-	-	-	-	0.23	-	-	-	-	-	-	-	-	96.1	4.2	-	-	-	-	-	

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

			FLRT						Wt	Mol					CO3-			Thickener			Form	
			Wt%	Ca	Mg	SO3	SO4	CO3	Solids	Solids		Solids		IR	Est.	L.S.		Unit		Final	Filtration	
Test	Date	Time	Solids	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	Inerts	Closure	Closure	Ox.	Util.	Ox.	Util.	Util.	Loading	CPMFC	(ft2/tpd)	Wt%	Settled	Rate
									(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%			lb/hr*sqft	Filter
																						Cake
Averages			14.30	-	-	-	-	0.22	-	-	-	-	-	-	-	96.3	3.5	-	-	-	-	-
DBA, Tan., 20 ft/sec, 650 gpm																						
PHV-268	Thu 11/09	18:00	13.60	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	4.2	-	-	-	-	-
PHV-268	Thu 11/09	20:00	13.64	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.6	-	-	-	-	-
Averages			13.62	-	-	-	-	0.30	-	-	-	-	-	-	-	95.0	4.4	-	-	-	-	-
DBA, Tan., 17.5 ft/sec, 650 gpm																						
PHV-269	Thu 11/09	22:00	14.87	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	5.1	-	-	-	-	-
PHV-269	Fri 11/10	00:05	12.48	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.9	-	-	-	-	-
Averages			13.68	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.5	-	-	-	-	-
DBA, Tan., 20 ft/sec, 1300 gpm																						
PHV-270	Fri 11/10	02:00	13.38	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.6	-	-	-	-	-
PHV-270	Fri 11/10	04:00	12.47	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.9	-	-	-	-	-
Averages			12.93	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.2	-	-	-	-	-
DBA, Tan., 20 ft/sec, 1700 gpm																						
PHV-271	Fri 11/10	06:00	13.61	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	5.1	-	-	-	-	-
PHV-271	Fri 11/10	07:55	13.43	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.6	82.60	-	-	-	-
PHV-271	Fri 11/10	08:00	9.12	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	3.6	-	-	-	-	-
Averages			12.05	-	-	-	-	0.36	-	-	-	-	-	-	-	93.8	4.8	82.60	-	-	-	-
DBA, Tan., 20 ft/sec, 650 gpm																						
PHV-268R	Fri 11/10	09:50	12.53	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.8	-	-	-	-	-
PHV-268R	Fri 11/10	11:00	13.61	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.8	-	-	-	-	-
PHV-268R	Fri 11/10	12:00	13.46	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.7	-	-	-	-	-
Averages			13.20	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.8	-	-	-	-	-
DBA, Tan., 15 ft/sec, 650 gpm																						
PHV-267R	Fri 11/10	13:10	12.46	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	3.0	-	-	-	-	-
PHV-267R	Fri 11/10	14:00	12.22	-	-	-	-	0.20	-	-	-	-	-	-	-	96.6	2.7	-	-	-	-	-
PHV-267R	Fri 11/10	15:00	12.46	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	3.0	-	-	-	-	-
PHV-267R	Fri 11/10	16:07	12.55	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.2	-	-	-	-	-
PHV-267R	Fri 11/10	17:00	14.47	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	4.5	-	-	-	-	-
Averages			12.83	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.3	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	Util.	CO3-	L.S.	CPAFC	Thickener		Final	Filtration	Filter	
			Wt%							Solids	Solids						Est.	Loading		Unit	Initial				Settled
			Solids	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%	
Tan., 17.5 ft/sec, 1300 gpm																									
PHV-245*	Sat 11/11	07:30	-	-	-	-	-	0.76	-	-	-	-	-	-	-	-	87.5	-	-	-	-	-	-	-	
PHV-245*	Sat 11/11	08:05	3.39	-	-	-	-	0.57	-	-	-	-	-	-	-	-	90.5	2.0	-	-	-	-	-	-	
PHV-245*	Sat 11/11	10:00	5.96	-	-	-	-	0.36	-	-	-	-	-	-	-	-	93.9	2.2	-	-	-	-	-	-	
PHV-245*	Sat 11/11	11:15	7.92	-	-	-	-	0.28	-	-	-	-	-	-	-	-	95.2	2.4	-	-	-	-	-	-	
PHV-245*	Sat 11/11	12:00	8.98	-	-	-	-	0.27	-	-	-	-	-	-	-	-	95.4	2.6	-	-	-	-	-	-	
PHV-245	Sat 11/11	14:00	12.16	-	-	-	-	0.27	-	-	-	-	-	-	-	-	95.4	3.6	-	-	-	-	-	-	
PHV-245	Sat 11/11	16:00	12.06	-	-	-	-	0.14	-	-	-	-	-	-	-	-	97.6	1.8	-	-	-	-	-	-	
PHV-245	Sat 11/11	18:00	11.94	-	-	-	-	0.12	-	-	-	-	-	-	-	-	97.9	1.6	-	-	-	-	-	-	
PHV-245	Sat 11/11	20:00	13.23	-	-	-	-	0.09	-	-	-	-	-	-	-	-	98.4	1.3	-	-	-	-	-	-	
Averages			12.35	-	-	-	-	0.16	-	-	-	-	-	-	-	-	97.3	2.1	-	-	-	-	-	-	
Tan., 20 ft/sec, 1300 gpm																									
PHV-244	Sat 11/11	22:00	13.43	-	-	-	-	0.09	-	-	-	-	-	-	-	-	98.4	1.3	-	-	-	-	-	-	
PHV-244	Sun 11/12	00:05	14.10	-	-	-	-	0.07	-	-	-	-	-	-	-	-	98.8	1.1	-	-	-	-	-	-	
Averages			13.77	-	-	-	-	0.08	-	-	-	-	-	-	-	-	98.6	1.2	-	-	-	-	-	-	
Tan., 15 ft/sec, 1300 gpm																									
PHV-246	Sun 11/12	02:00	13.85	-	-	-	-	0.05	-	-	-	-	-	-	-	-	99.1	0.8	-	-	-	-	-	-	
PHV-246	Sun 11/12	04:00	13.08	-	-	-	-	0.04	-	-	-	-	-	-	-	-	99.3	0.6	-	-	-	-	-	-	
Averages			13.47	-	-	-	-	0.05	-	-	-	-	-	-	-	-	99.2	0.7	-	-	-	-	-	-	
Tan., 10 ft/sec, 1300 gpm																									
PHV-247	Sun 11/12	04:00	12.11	-	-	-	-	0.04	-	-	-	-	-	-	-	-	99.3	0.5	-	-	-	-	-	-	
PHV-247	Sun 11/12	08:00	15.37	-	-	-	-	0.16	-	-	-	-	-	-	-	-	97.3	2.7	-	-	-	-	-	-	
Averages			13.74	-	-	-	-	0.10	-	-	-	-	-	-	-	-	98.3	1.6	-	-	-	-	-	-	
Tan., 17.5 ft/sec, 1300 gpm																									
PHV-245R	Sun 11/12	10:23	12.98	-	-	-	-	0.19	-	-	-	-	-	-	-	-	96.7	2.7	84.86	-	-	-	-	-	
PHV-245R	Sun 11/12	12:00	14.29	-	-	-	-	0.21	-	-	-	-	-	-	-	-	96.4	3.3	-	-	-	-	-	-	
Averages			13.64	-	-	-	-	0.20	-	-	-	-	-	-	-	-	96.6	3.0	84.86	-	-	-	-	-	
Tan., 17.5 ft/sec, 650 gpm																									
PHV-249	Sun 11/12	12:45	12.02	-	-	-	-	0.17	-	-	-	-	-	-	-	-	97.1	2.2	-	-	-	-	-	-	
PHV-249	Sun 11/12	14:00	11.69	-	-	-	-	0.18	-	-	-	-	-	-	-	-	96.9	2.3	-	-	-	-	-	-	
PHV-249	Sun 11/12	16:00	11.65	-	-	-	-	0.19	-	-	-	-	-	-	-	-	96.8	2.4	-	-	-	-	-	-	
Averages			11.79	-	-	-	-	0.18	-	-	-	-	-	-	-	-	96.9	2.3	-	-	-	-	-	-	
Tan., 20 ft/sec, 650 gpm																									
PHV-248	Sun 11/12	18:00	12.59	-	-	-	-	0.22	-	-	-	-	-	-	-	-	96.2	3.0	-	-	-	-	-	-	
PHV-248	Sun 11/12	20:00	12.94	-	-	-	-	0.23	-	-	-	-	-	-	-	-	96.0	3.3	-	-	-	-	-	-	
Averages			12.77	-	-	-	-	0.23	-	-	-	-	-	-	-	-	96.1	3.2	-	-	-	-	-	-	
Tan., 15 ft/sec, 650 gpm																									
PHV-250	Sun 11/12	22:00	12.11	-	-	-	-	0.24	-	-	-	-	-	-	-	-	95.9	3.2	-	-	-	-	-	-	
PHV-250	Mon 11/13	00:05	12.64	-	-	-	-	0.28	-	-	-	-	-	-	-	-	95.2	3.9	-	-	-	-	-	-	
Averages			12.38	-	-	-	-	0.26	-	-	-	-	-	-	-	-	95.6	3.5	-	-	-	-	-	-	

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	CO3- Est.	L.S. Loading	CPAFC	Thickener		Initial	Form	
			Wt% Solids							Solids Closure	Solids Closure								Unit Area	Wt%	Settled	Filtration Rate	Filter Cake
				(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%
<i>Tan., 10 ft/sec, 650 gpm</i>																							
PHV-251	Mon 11/13	02:00	12.46	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.9	-	-	-	-	-	-
PHV-251	Mon 11/13	04:00	13.12	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.9	-	-	-	-	-	-
Averages			12.79	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.4	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 650 gpm</i>																							
PHV-248R	Mon 11/13	06:00	12.47	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.5	-	-	-	-	-	-
PHV-248R	Mon 11/13	06:40	13.32	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.8	84.34	-	-	-	-	-
PHV-248R	Mon 11/13	08:00	12.92	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.8	-	-	-	-	-	-
Averages			12.90	-	-	-	-	0.33	-	-	-	-	-	-	-	94.3	4.7	84.34	-	-	-	-	-
<i>Tan., 20 ft/sec, 1700 gpm</i>																							
PHV-240	Mon 11/13	09:40	15.24	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	5.2	-	-	-	-	-	-
PHV-240	Mon 11/13	10:00	14.32	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	5.1	-	-	-	-	-	-
PHV-240	Mon 11/13	11:15	13.86	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	4.0	-	-	-	-	-	-
PHV-240	Mon 11/13	12:00	13.71	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.6	-	-	-	-	-	-
Averages			14.28	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	4.5	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1700 gpm</i>																							
PHV-241	Mon 11/13	13:00	13.23	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.5	-	-	-	-	-	-
PHV-241	Mon 11/13	13:50	13.97	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.8	-	-	-	-	-	-
PHV-241	Mon 11/13	14:40	13.83	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	4.1	-	-	-	-	-	-
PHV-241	Mon 11/13	16:05	12.91	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	3.8	-	-	-	-	-	-
Averages			13.49	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.8	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 1700 gpm</i>																							
PHV-242	Mon 11/13	16:35	12.75	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	3.8	-	-	-	-	-	-
PHV-242	Mon 11/13	18:00	12.61	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.0	-	-	-	-	-	-
PHV-242	Mon 11/13	20:00	13.64	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.3	-	-	-	-	-	-
Averages			13.00	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	4.0	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1700 gpm</i>																							
PHV-243	Mon 11/13	22:00	12.92	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.4	-	-	-	-	-	-
PHV-243	Tue 11/14	00:00	13.18	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.8	-	-	-	-	-	-
Averages			13.05	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.1	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 1700 gpm</i>																							
PHV-240R	Tue 11/14	02:00	14.58	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.8	-	-	-	-	-	-
PHV-240R	Tue 11/14	04:00	13.25	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	4.1	-	-	-	-	-	-
Averages			13.92	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.5	-	-	-	-	-	-
<i>Tan., 20 ft/sec, 1300 gpm</i>																							
PHV-244R	Tue 11/14	06:00	11.59	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	3.8	-	-	-	-	-	-
PHV-244R	Tue 11/14	07:50	12.49	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.9	82.79	-	-	-	-	-
PHV-244R	Tue 11/14	08:00	-	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	-	-	-	-	-	-	-
Averages			12.04	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.3	82.79	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT Wt% Solids	Ca (mmol/g)	Mg (mmol/g)	SO3 (mmol/g)	SO4 (mmol/g)	CO3 (mmol/g)	Inerts (wt%)	Wt Solids Closure (%)	Mol Solids Closure (%)	Solids Ox. (%)	Util. (%)	IR Ox. (%)	Util. (%)	CO3- Est. Util. (%)	L.S. Loading (g/L)	CPAFC Wt%	Thickener Unit Area (ft2/tpd)	Initial Wt%	Final Settled Wt%	Filtration Rate lb/hr*sqft	Filter Cake Wt%
<i>Tan., 15 ft/sec, 1300 gpm</i>																							
PHV-246R	Tue 11/14	10:00	12.48	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	5.3	-	-	-	-	-	-
PHV-246R	Tue 11/14	10:30	12.37	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	5.8	-	-	-	-	-	-
PHV-246R	Tue 11/14	12:00	12.43	-	-	-	-	0.45	-	-	-	-	-	-	-	92.4	6.1	-	-	-	-	-	-
Averages			12.43	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	5.7	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1300 gpm</i>																							
PHV-247R*	Tue 11/14	12:45	12.72	-	-	-	-	0.46	-	-	-	-	-	-	-	92.3	6.4	-	-	-	-	-	-
PHV-247R	Tue 11/14	13:50	12.95	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	6.0	-	-	-	-	-	-
PHV-247R	Tue 11/14	14:00	12.97	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	6.0	-	-	-	-	-	-
PHV-247R	Tue 11/14	15:25	12.51	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.2	-	-	-	-	-	-
PHV-247R	Tue 11/14	16:00	12.37	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.6	-	-	-	-	-	-
Averages			12.70	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	5.4	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 650 gpm</i>																							
PHV-249R	Tue 11/14	17:00	11.40	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.0	-	-	-	-	-	-
PHV-249R	Tue 11/14	18:00	10.76	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	3.8	-	-	-	-	-	-
PHV-249R	Tue 11/14	20:00	11.15	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	3.9	-	-	-	-	-	-
Averages			11.10	-	-	-	-	0.32	-	-	-	-	-	-	-	94.5	3.9	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 650 gpm</i>																							
PHV-250R	Tue 11/14	22:00	10.98	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.0	-	-	-	-	-	-
PHV-250R	Wed 11/15	00:00	11.69	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.7	-	-	-	-	-	-
Averages			11.34	-	-	-	-	0.36	-	-	-	-	-	-	-	94.0	4.4	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																							
PHV-245RR	Wed 11/15	02:00	12.40	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.1	-	-	-	-	-	-
PHV-245RR	Wed 11/15	04:00	12.48	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.4	-	-	-	-	-	-
Averages			12.44	-	-	-	-	0.28	-	-	-	-	-	-	-	95.3	3.7	-	-	-	-	-	-
<i>Carryover, 15 ft/s, 1700 gpm</i>																							
PHV-224	Thu 11/16	00:00	11.62	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.3	-	-	-	-	-	-
PHV-224	Thu 11/16	04:00	12.22	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.8	-	-	-	-	-	-
PHV-224	Thu 11/16	08:00	12.37	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.9	83.20	-	-	-	-	-
PHV-224	Thu 11/16	12:00	12.78	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.3	-	-	-	-	-	-
PHV-224	Thu 11/16	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	16:00	11.81	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	4.9	-	-	-	-	-	-
PHV-224	Thu 11/16	16:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			12.16	-	-	-	-	0.36	-	-	-	-	-	-	-	93.8	4.8	83.20	-	-	-	-	-
<i>Carryover, 17.5 ft/s, 1700 gpm</i>																							
PHV-223*	Thu 11/16	20:00	11.44	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	5.0	-	-	-	-	-	-
PHV-223	Fri 11/17	00:00	11.84	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	4.0	-	-	-	-	-	-
PHV-223	Fri 11/17	04:00	13.02	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.8	-	-	-	-	-	-
PHV-223	Fri 11/17	08:25	10.81	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.4	81.67	-	-	-	-	-
PHV-223	Fri 11/17	11:20	12.27	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.5	-	-	-	-	-	-
PHV-223	Fri 11/17	12:00	12.36	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.6	-	-	-	-	-	-
PHV-223	Fri 11/17	14:09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	16:00	11.73	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.3	-	-	-	-	-	-
Averages			12.01	-	-	-	-	0.33	-	-	-	-	-	-	-	94.5	4.3	81.67	-	-	-	-	-
<i>Carryover, 20 ft/s, 1700 gpm</i>																							
PHV-222	Fri 11/17	20:00	11.97	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	3.6	-	-	-	-	-	-
PHV-222	Sat 11/18	00:00	11.98	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	3.5	-	-	-	-	-	-
PHV-222	Sat 11/18	04:00	12.07	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.4	-	-	-	-	-	-
PHV-222	Sat 11/18	07:40	11.9	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.8	83.54	-	-	-	-	-
PHV-222	Sat 11/18	08:00	12.21	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.0	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids	Ox.	Util.	IR	CO3-	L.S.	CPAFC	Thickener	Initial	Final	Filtration	Filter
			Wt% Solids							Solids Closure	Solids Closure								Unit Area				
			(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%
PHV-222	Sat 11/18	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	16:00	12.78	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.2	-	-	-	-	-	-
	Averages		12.15	-	-	-	-	0.30	-	-	-	-	-	-	-	95.0	3.9	83.54	-	-	-	-	-
<i>Carryover, 20 ft/s, 1300 gpm</i>																							
PHV-225	Sat 11/18	20:00	11.28	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.2	-	-	-	-	-	-
PHV-225	Sun 11/19	00:00	11.74	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.6	-	-	-	-	-	-
PHV-225	Sun 11/19	04:00	10.86	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	3.9	-	-	-	-	-	-
PHV-225	Sun 11/19	08:00	10.80	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	3.7	-	-	-	-	-	-
PHV-225	Sun 11/19	11:12	11.02	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	3.9	-	-	-	-	-	-
PHV-225	Sun 11/19	12:00	12.38	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.6	-	-	-	-	-	-
PHV-225	Sun 11/19	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	16:00	11.00	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.2	-	-	-	-	-	-
	Averages		11.30	-	-	-	-	0.34	-	-	-	-	-	-	-	94.3	4.1	-	-	-	-	-	-
<i>Carryover, 15 ft/s, 1700 gpm</i>																							
PHV-224R	Sun 11/19	20:00	12.27	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.1	-	-	-	-	-	-
PHV-224R	Mon 11/20	00:00	12.25	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.7	-	-	-	-	-	-
PHV-224R	Mon 11/20	08:00	12.24	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.7	-	-	-	-	-	-
PHV-224R	Mon 11/20	10:30	12.82	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.8	-	-	-	-	-	-
PHV-224R	Mon 11/20	12:00	12.49	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.5	-	-	-	-	-	-
	Averages		12.41	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.7	-	-	-	-	-	-
<i>Baseline, 15 ft/sec, 1300 gpm</i>																							
PHV-272	Mon 11/20	13:04	11.21	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.5	-	-	-	-	-	-
PHV-272	Mon 11/20	14:00	12.05	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.3	-	-	-	-	-	-
PHV-272	Mon 11/20	14:30	11.38	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.1	-	-	-	-	-	-
PHV-272	Mon 11/20	16:00	12.52	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.5	-	-	-	-	-	-
	Averages		11.79	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.3	-	-	-	-	-	-
<i>Baseline, 20 ft/sec, 1300 gpm</i>																							
PHV-273	Mon 11/20	17:30	12.48	-	-	-	-	0.32	-	-	-	-	-	-	-	94.9	3.9	-	-	-	-	-	-
PHV-273	Mon 11/20	18:00	12.06	-	-	-	-	0.30	-	-	-	-	-	-	-	96.1	2.9	-	-	-	-	-	-
PHV-273*	Mon 11/20	20:00	11.64	-	-	-	-	0.23	-	-	-	-	-	-	-	94.9	3.9	-	-	-	-	-	-
	Averages		12.27	-	-	-	-	0.31	-	-	-	-	-	-	-	94.9	3.9	-	-	-	-	-	-
<i>Baseline, 17.5 ft/sec, 1300 gpm</i>																							
PHV-274	Mon 11/20	22:00	11.66	-	-	-	-	0.13	-	-	-	-	-	-	-	97.8	1.6	-	-	-	-	-	-
PHV-274	Tue 11/21	00:00	12.59	-	-	-	-	0.11	-	-	-	-	-	-	-	98.1	1.5	-	-	-	-	-	-
	Averages		12.13	-	-	-	-	0.12	-	-	-	-	-	-	-	97.9	1.6	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT Wt% Solids	Ca (mmol/g)	Mg (mmol/g)	SO3 (mmol/g)	SO4 (mmol/g)	CO3 (mmol/g)	Inerts (wt%)	Wt Solids Closure (%)	Mol Solids Closure (%)	Solids Ox. (%)	Util. (%)	IR Ox. (%)	Util. (%)	CO3- Est. Util. (%)	L.S. Loading (g/L)	CPAFC Wt%	Thickener Unit Area (ft2/tpd)	Initial Wt%	Final Settled Wt%	Filtration Rate lb/hr*sqft	Form Filter Cake Wt%
<i>Baseline, 11.5 ft/sec, 1300 gpm</i>																							
PHV-275*	Tue 11/21	02:00	14.01	-	-	-	-	0.07	-	-	-	-	-	-	-	98.8	1.1	-	-	-	-	-	-
PHV-275*	Tue 11/21	04:00	12.13	-	-	-	-	0.15	-	-	-	-	-	-	-	97.4	2.0	-	-	-	-	-	-
PHV-275	Tue 11/21	06:00	11.55	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	3.8	82.10	-	-	-	-	-
Averages			11.55	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	3.8	82.10	-	-	-	-	-
<i>Baseline, 10 ft/sec, 1300 gpm</i>																							
PHV-276	Tue 11/21	07:15	11.66	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.4	-	-	-	-	-	-
PHV-276	Tue 11/21	08:00	11.44	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.6	-	-	-	-	-	-
PHV-276*	Tue 11/21	10:00	11.10	-	-	-	-	0.44	-	-	-	-	-	-	-	92.6	5.3	-	-	-	-	-	-
Averages			11.55	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.5	-	-	-	-	-	-
<i>VLP, 20 ft/sec, 1300 gpm</i>																							
PHV-232*	Tue 11/21	14:00	12.6	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	3.2	-	-	-	-	-	-
PHV-232*	Tue 11/21	14:15	13.07	-	-	-	-	0.24	-	-	-	-	-	-	-	95.9	3.4	-	-	-	-	-	-
PHV-232	Tue 11/21	16:00	11.42	-	-	-	-	0.44	-	-	-	-	-	-	-	92.6	5.4	-	-	-	-	-	-
PHV-232*	Tue 11/21	20:00	13.26	-	-	-	-	0.46	-	-	-	-	-	-	-	92.3	6.7	-	-	-	-	-	-
Averages			11.42	-	-	-	-	0.44	-	-	-	-	-	-	-	92.6	5.4	-	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1300 gpm</i>																							
PHV-233	Tue 11/21	22:00	13.35	-	-	-	-	0.47	-	-	-	-	-	-	-	92.1	6.9	-	-	-	-	-	-
PHV-233	Wed 11/22	00:00	15.97	-	-	-	-	0.54	-	-	-	-	-	-	-	91.0	9.6	-	-	-	-	-	-
Averages			14.66	-	-	-	-	0.51	-	-	-	-	-	-	-	91.5	8.3	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-234	Wed 11/22	02:00	12.81	-	-	-	-	0.63	-	-	-	-	-	-	-	89.5	8.8	-	-	-	-	-	-
PHV-234	Wed 11/22	04:00	12.90	-	-	-	-	0.65	-	-	-	-	-	-	-	89.2	9.2	-	-	-	-	-	-
Averages			12.86	-	-	-	-	0.64	-	-	-	-	-	-	-	89.4	9.0	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-235	Wed 11/22	06:00	11.55	-	-	-	-	0.65	-	-	-	-	-	-	-	89.2	8.1	-	-	-	-	-	-
PHV-235	Wed 11/22	08:00	11.52	-	-	-	-	0.63	-	-	-	-	-	-	-	89.5	7.9	84.10	-	-	-	-	-
Averages			11.54	-	-	-	-	0.64	-	-	-	-	-	-	-	89.4	8.0	84.10	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1300 gpm</i>																							
PHV-233R*	Wed 11/22	08:50	12.13	-	-	-	-	0.48	-	-	-	-	-	-	-	91.9	6.3	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:00	12.31	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	5.4	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:15	12.37	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	5.8	-	-	-	-	-	-
PHV-233R	Wed 11/22	12:00	12.75	-	-	-	-	0.41	-	-	-	-	-	-	-	93.1	5.7	-	-	-	-	-	-
Averages			12.48	-	-	-	-	0.41	-	-	-	-	-	-	-	93.0	5.6	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 650 gpm</i>																							
PHV-238	Wed 11/22	13:45	10.50	-	-	-	-	0.45	-	-	-	-	-	-	-	92.3	5.2	-	-	-	-	-	-
PHV-238	Wed 11/22	14:00	10.50	-	-	-	-	0.46	-	-	-	-	-	-	-	92.9	4.8	-	-	-	-	-	-
PHV-238	Wed 11/22	15:05	10.62	-	-	-	-	0.42	-	-	-	-	-	-	-	93.6	4.4	-	-	-	-	-	-
PHV-238	Wed 11/22	16:00	10.81	-	-	-	-	0.38	-	-	-	-	-	-	-	92.9	4.8	-	-	-	-	-	-
Averages			10.61	-	-	-	-	0.43	-	-	-	-	-	-	-	92.9	4.8	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT Wt% Solids	Ca (mmol/g)	Mg (mmol/g)	SO3 (mmol/g)	SO4 (mmol/g)	CO3 (mmol/g)	Inerts (wt%)	Wt Solids Closure (%)	Mol Solids Closure (%)	Solids Ox. Util. (%)	IR Ox. Util. (%)	CO3- Est. Util. (%)	L.S. Loading (g/L)	Thickener Unit Area (ft2/tpd)	Initial Wt%	Final Settled Wt%	Form Filtration Rate lb/hr*sqft	Filter Cake Wt%
<i>VLP, 20 ft/sec, 650 gpm</i>																				
PHV-236	Wed 11/22	17:35	13.74	-	-	-	-	0.43	-	-	-	-	-	92.8	6.5	-	-	-	-	-
PHV-236	Wed 11/22	18:00	11.16	-	-	-	-	0.38	-	-	-	-	-	93.6	4.6	-	-	-	-	-
PHV-236	Wed 11/22	20:00	10.76	-	-	-	-	0.28	-	-	-	-	-	95.2	3.3	-	-	-	-	-
Averages			11.89	-	-	-	-	0.36	-	-	-	-	-	93.8	4.8	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 650 gpm</i>																				
PHV-237	Wed 11/22	22:00	13.00	-	-	-	-	0.34	-	-	-	-	-	94.2	4.8	-	-	-	-	-
PHV-237	Thu 11/23	00:00	12.17	-	-	-	-	0.29	-	-	-	-	-	95.1	3.8	-	-	-	-	-
Averages			12.59	-	-	-	-	0.32	-	-	-	-	-	94.6	4.3	-	-	-	-	-
<i>VLP, 10 ft/sec, 650 gpm</i>																				
PHV-239	Thu 11/23	02:00	10.69	-	-	-	-	0.29	-	-	-	-	-	95.1	3.3	-	-	-	-	-
PHV-239	Thu 11/23	04:00	10.64	-	-	-	-	0.27	-	-	-	-	-	95.4	3.1	-	-	-	-	-
Averages			10.67	-	-	-	-	0.28	-	-	-	-	-	95.2	3.2	-	-	-	-	-
<i>VLP, 20 ft/sec, 650 gpm</i>																				
PHV-236R	Thu 11/23	06:00	11.41	-	-	-	-	0.37	-	-	-	-	-	93.7	4.6	-	-	-	-	-
PHV-236R	Thu 11/23	08:00	11.12	-	-	-	-	0.41	-	-	-	-	-	93.1	4.9	-	-	-	-	-
Averages			11.27	-	-	-	-	0.39	-	-	-	-	-	93.4	4.8	-	-	-	-	-
<i>VLP, 20 ft/sec, 1700 gpm</i>																				
PHV-228	Thu 11/23	10:00	13.37	-	-	-	-	0.35	-	-	-	-	-	94.1	5.1	-	-	-	-	-
PHV-228	Thu 11/23	12:00	13.01	-	-	-	-	0.42	-	-	-	-	-	92.9	6.0	-	-	-	-	-
Averages			13.19	-	-	-	-	0.39	-	-	-	-	-	93.5	5.6	-	-	-	-	-
<i>VLP, 17.5 ft/sec, 1700 gpm</i>																				
PHV-229	Thu 11/23	14:00	12.35	-	-	-	-	0.49	-	-	-	-	-	91.8	6.6	-	-	-	-	-
PHV-229	Thu 11/23	16:00	14.03	-	-	-	-	0.53	-	-	-	-	-	91.1	8.2	-	-	-	-	-
Averages			13.19	-	-	-	-	0.51	-	-	-	-	-	91.4	7.4	-	-	-	-	-
<i>VLP, 15 ft/sec, 1700 gpm</i>																				
PHV-230	Thu 11/23	18:00	15.10	-	-	-	-	0.56	-	-	-	-	-	90.6	9.4	-	-	-	-	-
PHV-230	Thu 11/23	20:00	15.29	-	-	-	-	0.60	-	-	-	-	-	90.0	10.2	-	-	-	-	-
Averages			15.20	-	-	-	-	0.58	-	-	-	-	-	90.3	9.8	-	-	-	-	-
<i>VLP, 10 ft/sec, 1700 gpm</i>																				
PHV-231	Thu 11/23	22:00	12.66	-	-	-	-	0.61	-	-	-	-	-	89.8	8.4	-	-	-	-	-
PHV-231	Fri 11/24	00:00	16.40	-	-	-	-	0.71	-	-	-	-	-	88.3	13.0	-	-	-	-	-
Averages			14.53	-	-	-	-	0.66	-	-	-	-	-	89.1	10.7	-	-	-	-	-
<i>VLP, 20 ft/sec, 1700 gpm</i>																				
PHV-228R	Fri 11/24	02:00	13.38	-	-	-	-	0.68	-	-	-	-	-	88.7	10.0	-	-	-	-	-
PHV-228R	Fri 11/24	04:00	12.43	-	-	-	-	0.71	-	-	-	-	-	88.3	9.6	-	-	-	-	-
Averages			12.91	-	-	-	-	0.69	-	-	-	-	-	88.5	9.8	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																				
PHV-277	Fri 11/24	06:00	12.90	-	-	-	-	0.67	-	-	-	-	-	88.9	9.5	-	-	-	-	-
PHV-277	Fri 11/24	08:00	11.64	-	-	-	-	0.67	-	-	-	-	-	88.9	8.5	-	-	-	-	-
PHV-277	Fri 11/24	08:03	11.74	-	-	-	-	0.67	-	-	-	-	-	88.9	8.6	82.42	-	-	-	-
Averages			12.09	-	-	-	-	0.67	-	-	-	-	-	88.9	8.8	82.42	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																				
PHV-278	Fri 11/24	10:00	11.12	-	-	-	-	0.66	-	-	-	-	-	89.1	7.9	-	-	-	-	-
PHV-278	Fri 11/24	10:35	15.04	-	-	-	-	0.50	-	-	-	-	-	91.6	8.3	-	-	-	-	-
PHV-278	Fri 11/24	12:00	11.66	-	-	-	-	0.58	-	-	-	-	-	90.3	7.3	-	-	-	-	-
Averages			12.61	-	-	-	-	0.58	-	-	-	-	-	90.3	7.9	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

			FLRT						Wt	Mol			IR	CO3-	L.S.	Thickener			Form				
			Wt%	Ca	Mg	SO3	SO4	CO3	Inerts	Solids Closure	Solids Closure	Solids Ox.	Solids Util.	IR Ox.	IR Util.	CO3- Est. Util.	L.S. Loading	CPAFC	Unit Area	Initial	Final Settled	Filtration Rate	Filter Cake
Test	Date	Time	Solids	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%
VLP, 20 ft/sec, 1300 gpm																							
PHV-279*	Fri 11/24	14:00	12.11	-	-	-	-	0.66	-	-	-	-	-	-	-	89.1	8.7	-	-	-	-	-	-
PHV-279*	Fri 11/24	16:00	12.87	-	-	-	-	0.54	-	-	-	-	-	-	-	91.0	7.6	-	-	-	-	-	-
PHV-279	Fri 11/24	18:00	12.07	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	5.6	-	-	-	-	-	-
PHV-279	Fri 11/24	20:00	11.44	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.2	-	-	-	-	-	-
Averages			11.76	-	-	-	-	0.39	-	-	-	-	-	-	-	93.5	4.9	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																							
PHV-280	Fri 11/24	22:00	12.39	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	5.7	-	-	-	-	-	-
PHV-280*	Sat 11/25	00:00	11.63	-	-	-	-	0.48	-	-	-	-	-	-	-	91.9	6.1	-	-	-	-	-	-
Averages			12.01	-	-	-	-	0.45	-	-	-	-	-	-	-	92.4	5.9	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																							
PHV-281	Sat 11/25	02:00	11.47	-	-	-	-	0.48	-	-	-	-	-	-	-	91.9	6.0	-	-	-	-	-	-
PHV-281	Sat 11/25	04:00	12.02	-	-	-	-	0.42	-	-	-	-	-	-	-	92.9	5.5	-	-	-	-	-	-
Averages			11.75	-	-	-	-	0.45	-	-	-	-	-	-	-	92.4	5.7	-	-	-	-	-	-
VLP, 10 ft/sec, 1700 gpm																							
PHV-282	Sat 11/25	06:00	16.85	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	8.1	-	-	-	-	-	-
PHV-282	Sat 11/25	08:00	12.59	-	-	-	-	0.49	-	-	-	-	-	-	-	91.8	6.7	-	-	-	-	-	-
Averages			14.72	-	-	-	-	0.46	-	-	-	-	-	-	-	92.3	7.4	-	-	-	-	-	-
VLP, 15 ft/sec, 1700 gpm																							
PHV-283*	Sat 11/25	10:00	12.99	-	-	-	-	0.48	-	-	-	-	-	-	-	91.9	6.8	-	-	-	-	-	-
PHV-283	Sat 11/25	11:45	13.37	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.6	-	-	-	-	-	-
PHV-283	Sat 11/25	12:00	13.00	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	5.0	-	-	-	-	-	-
Averages			13.19	-	-	-	-	0.37	-	-	-	-	-	-	-	93.8	5.3	-	-	-	-	-	-
VLP, 20 ft/sec, 1700 gpm																							
PHV-284*	Sat 11/25	14:00	12.51	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.4	-	-	-	-	-	-
PHV-284*	Sat 11/25	14:10	13.31	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	5.7	-	-	-	-	-	-
PHV-284	Sat 11/25	16:00	12.76	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.3	-	-	-	-	-	-
PHV-284	Sat 11/25	18:00	12.29	-	-	-	-	0.36	-	-	-	-	-	-	-	93.9	4.8	-	-	-	-	-	-
PHV-284	Sat 11/25	20:00	12.75	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.9	-	-	-	-	-	-
Averages			12.60	-	-	-	-	0.36	-	-	-	-	-	-	-	93.8	5.0	-	-	-	-	-	-
VLP, 17.5 ft/sec, 1700 gpm																							
PHV-285	Sat 11/25	22:00	12.65	-	-	-	-	0.34	-	-	-	-	-	-	-	94.2	4.7	-	-	-	-	-	-
PHV-285	Sun 11/26	00:00	15.74	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	5.6	-	-	-	-	-	-
Averages			14.20	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	5.2	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT Wt% Solids	Ca (mmol/g)	Mg (mmol/g)	SO3 (mmol/g)	SO4 (mmol/g)	CO3 (mmol/g)	Inerts (wt%)	Wt Solids Closure (%)	Mol Solids Closure (%)	Solids Ox. (%)	Util. (%)	IR Ox. (%)	Util. (%)	CO3- Est. Util. (%)	L.S. Loading (g/L)	CPAFC Wt%	Thickener Unit Area (ft2/tpd)	Initial Wt%	Final Settled Wt%	Filtration Rate lb/hr*sqft	Filter Cake Wt%
<i>VLP, 10 ft/sec, 1700 gpm</i>																							
PHV-286	Sun 11/26	02:00	16.24	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	5.1	-	-	-	-	-	-
PHV-286	Sun 11/26	04:00	13.79	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.4	-	-	-	-	-	-
Averages			15.02	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	4.7	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-287	Sun 11/26	06:00	15.14	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	5.4	-	-	-	-	-	-
PHV-287*	Sun 11/26	08:00	11.83	-	-	-	-	0.22	-	-	-	-	-	-	-	96.2	2.8	-	-	-	-	-	-
Averages			15.14	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	5.4	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-288*	Sun 11/26	10:00	11.4	-	-	-	-	0.17	-	-	-	-	-	-	-	97.1	2.1	82.60	-	-	-	-	-
PHV-288*	Sun 11/26	12:00	10.97	-	-	-	-	0.23	-	-	-	-	-	-	-	96.1	2.7	-	-	-	-	-	-
PHV-288	Sun 11/26	14:00	11.02	-	-	-	-	0.20	-	-	-	-	-	-	-	96.6	2.4	-	-	-	-	-	-
PHV-288	Sun 11/26	16:00	11.65	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	2.3	-	-	-	-	-	-
Averages			11.34	-	-	-	-	0.19	-	-	-	-	-	-	-	96.6	2.4	-	-	-	-	-	-
<i>VLP, 10 ft/sec, 1300 gpm</i>																							
PHV-289*	Sun 11/26	18:00	13.77	-	-	-	-	0.19	-	-	-	-	-	-	-	96.7	2.9	-	-	-	-	-	-
PHV-289*	Sun 11/26	20:00	11.97	-	-	-	-	0.26	-	-	-	-	-	-	-	95.6	3.4	-	-	-	-	-	-
PHV-289	Sun 11/26	22:00	12.60	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.5	-	-	-	-	-	-
PHV-289	Mon 11/27	00:00	12.73	-	-	-	-	0.38	-	-	-	-	-	-	-	93.6	5.3	-	-	-	-	-	-
Averages			12.67	-	-	-	-	0.36	-	-	-	-	-	-	-	94.0	4.9	-	-	-	-	-	-
<i>VLP, 15 ft/sec, 1300 gpm</i>																							
PHV-290	Mon 11/27	02:00	12.65	-	-	-	-	0.24	-	-	-	-	-	-	-	95.8	3.4	-	-	-	-	-	-
PHV-290*	Mon 11/27	04:00	11.92	-	-	-	-	0.14	-	-	-	-	-	-	-	97.6	1.8	-	-	-	-	-	-
Averages			12.65	-	-	-	-	0.24	-	-	-	-	-	-	-	95.8	3.4	-	-	-	-	-	-
<i>LP, 20 ft/sec, 1700 gpm</i>																							
PHV-291*	Thu 11/30	22:00	-	-	-	-	-	0.78	-	-	-	-	-	-	-	87.2	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	00:01	-	-	-	-	-	0.68	-	-	-	-	-	-	-	88.7	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	02:00	-	-	-	-	-	0.54	-	-	-	-	-	-	-	91.0	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	04:00	-	-	-	-	-	0.48	-	-	-	-	-	-	-	91.9	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	06:00	-	-	-	-	-	0.43	-	-	-	-	-	-	-	92.8	-	-	-	-	-	-	-
PHV-291	Fri 12/01	07:55	14.34	-	-	-	-	0.39	-	-	-	-	-	-	-	93.4	6.2	82.68	-	-	-	-	-
PHV-291	Fri 12/01	08:00	-	-	-	-	-	0.40	-	-	-	-	-	-	-	93.2	-	-	-	-	-	-	-
PHV-291	Fri 12/01	10:00	-	-	-	-	-	0.31	-	-	-	-	-	-	-	94.7	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	12:00	-	-	-	-	-	0.28	-	-	-	-	-	-	-	95.2	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	14:00	13.08	-	-	-	-	0.19	-	-	-	-	-	-	-	96.7	2.7	-	-	-	-	-	-
Averages			14.34	-	-	-	-	0.37	-	-	-	-	-	-	-	93.8	6.2	82.68	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

			FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt Solids Closure	Mol Solids Closure	Solids Ox.	Util.	IR Ox.	Util.	CO3-Est. Util.	L.S. Loading	CPVC	Thickener Unit Area	Initial Wt%	Final Settled Wt%	Form Filtration Rate	Filter Cake
Test	Date	Time	Wt% Solids	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%
LP, 15 ft/sec, 1700 gpm																							
PHV-293	Fri 12/01	16:00	12.40	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	2.4	-	-	-	-	-	-
PHV-293	Sun 12/03	00:01	12.53	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	2.5	-	-	-	-	-	-
	Averages		12.47	-	-	-	-	0.18	-	-	-	-	-	-	-	96.9	2.4	-	-	-	-	-	-
LP, 10 ft/sec, 1700 gpm																							
PHV-294	Sun 12/03	16:00	12.07	-	-	-	-	0.12	-	-	-	-	-	-	-	97.3	2.1	-	-	-	-	-	-
PHV-294	Mon 12/04	00:01	12.31	-	-	-	-	0.16	-	-	-	-	-	-	-	97.6	1.9	-	-	-	-	-	-
	Averages		12.19	-	-	-	-	0.14	-	-	-	-	-	-	-	97.4	2.0	-	-	-	-	-	-
LP, 10 ft/sec, 1300 gpm																							
PHV-298*	Mon 12/04	08:10	-	-	-	-	-	0.05	-	-	-	-	-	-	-	99.1	-	83.48	-	-	-	-	-
PHV-298*	Mon 12/04	11:20	11.30	-	-	-	-	0.20	-	-	-	-	-	-	-	96.6	2.4	-	-	-	-	-	-
PHV-298	Tue 12/05	00:01	11.97	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	3.9	-	-	-	-	-	-
	Averages		11.97	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	3.9	-	-	-	-	-	-
LP, 15 ft/sec, 1300 gpm																							
PHV-297*	Tue 12/05	08:00	11.98	-	-	-	-	0.17	-	-	-	-	-	-	-	97.1	2.2	82.13	-	-	-	-	-
PHV-297*	Tue 12/05	14:25	12.65	-	-	-	-	0.19	-	-	-	-	-	-	-	96.7	2.6	-	-	-	-	-	-
PHV-297	Tue 12/05	20:00	12.11	-	-	-	-	0.27	-	-	-	-	-	-	-	95.4	3.6	-	-	-	-	-	-
PHV-297	Wed 12/06	00:01	12.20	-	-	-	-	0.33	-	-	-	-	-	-	-	94.4	4.4	-	-	-	-	-	-
	Averages		12.16	-	-	-	-	0.30	-	-	-	-	-	-	-	94.9	4.0	-	-	-	-	-	-
LP, 15 ft/sec, 650 gpm																							
PHV-300	Wed 12/06	07:40	11.05	-	-	-	-	0.29	-	-	-	-	-	-	-	95.1	3.5	82.09	-	-	-	-	-
PHV-300	Wed 12/06	14:05	11.95	-	-	-	-	0.35	-	-	-	-	-	-	-	94.1	4.5	-	-	-	-	-	-
	Averages		11.50	-	-	-	-	0.32	-	-	-	-	-	-	-	94.6	4.0	82.09	-	-	-	-	-
LP, 10 ft/sec, 650 gpm																							
PHV-299*	Thu 12/07	08:30	11.24	-	-	-	-	0.17	-	-	-	-	-	-	-	97.1	2.1	85.48	-	-	-	-	-
PHV-299*	Thu 12/07	13:45	11.18	-	-	-	-	0.25	-	-	-	-	-	-	-	95.7	3.0	-	-	-	-	-	-
PHV-299	Thu 12/07	20:00	12.00	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.8	-	-	-	-	-	-
PHV-299*	Fri 12/08	00:01	12.24	-	-	-	-	0.50	-	-	-	-	-	-	-	91.6	6.7	-	-	-	-	-	-
	Averages		12.00	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	4.8	-	-	-	-	-	-
LP, 10 ft/sec, 1700 gpm																							
PHV-303	Fri 12/08	07:44	13.46	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.5	84.43	-	-	-	-	-
PHV-303*	Fri 12/08	13:50	12.47	-	-	-	-	0.46	-	-	-	-	-	-	-	92.3	6.3	-	-	-	-	-	-
	Averages		13.46	-	-	-	-	0.37	-	-	-	-	-	-	-	93.7	5.5	84.43	-	-	-	-	-
LP, 15 ft/sec, 1700 gpm																							
PHV-304*	Sat 12/09	08:00	12.07	-	-	-	-	0.56	-	-	-	-	-	-	-	90.6	7.4	-	-	-	-	-	-
PHV-304	Sun 12/10	00:01	11.81	-	-	-	-	0.45	-	-	-	-	-	-	-	92.4	5.8	-	-	-	-	-	-
	Averages		11.81	-	-	-	-	0.45	-	-	-	-	-	-	-	92.4	5.8	-	-	-	-	-	-

**Pilot FLRT Solid Analytical Summary:
PHV Phase II Test Block**

Test	Date	Time	FLRT	Ca	Mg	SO3	SO4	CO3	Inerts	Wt	Mol	Solids		IR	CO3-		L.S.	Thickener		Initial	Final	Form	
			Wt% Solids							Solids Closure	Solids Closure	Ox.	Util.		Ox.	Util.	Util.	Loading	CP/FC	Area	Settled	Rate	Filter
			(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(mmol/g)	(wt%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(g/L)	Wt%	(ft2/tpd)	Wt%	Wt%	lb/hr*sqft	Wt%
<i>LP, 15 ft/sec, 1300 gpm</i>																							
PHV-305*	Sun 12/10	08:00	12.00	-	-	-	-	0.41	-	-	-	-	-	-	-	-	93.1	5.4	-	-	-	-	-
PHV-305*	Sun 12/10	16:00	-	-	-	-	-	0.50	-	-	-	-	-	-	-	-	91.7	-	-	-	-	-	-
PHV-305	Mon 12/11	00:01	12.29	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.6	5.1	-	-	-	-	-
Averages			12.29	-	-	-	-	0.38	-	-	-	-	-	-	-	-	93.6	5.1	-	-	-	-	-
<i>LP, 10 ft/sec, 1300 gpm</i>																							
PHV-306*	Mon 12/11	09:42	11.26	-	-	-	-	0.47	-	-	-	-	-	-	-	-	92.1	5.7	82.76	-	-	-	-
PHV-306	Mon 12/11	14:00	10.75	-	-	-	-	0.44	-	-	-	-	-	-	-	-	92.6	5.1	-	-	-	-	-
PHV-306	Mon 12/11	16:00	10.76	-	-	-	-	0.40	-	-	-	-	-	-	-	-	93.3	4.6	-	-	-	-	-
PHV-306*	Tue 12/12	08:25	12.43	-	-	-	-	0.45	-	-	-	-	-	-	-	-	92.4	6.1	82.80	-	-	-	-
PHV-306*	Tue 12/12	13:45	12.49	-	-	-	-	0.63	-	-	-	-	-	-	-	-	89.5	8.6	-	-	-	-	-
PHV-306*	Tue 12/12	17:10	12.39	-	-	-	-	0.63	-	-	-	-	-	-	-	-	89.5	8.5	-	-	-	-	-
PHV-306*	Tue 12/12	19:00	-	-	-	-	-	0.57	-	-	-	-	-	-	-	-	90.5	-	-	-	-	-	-
PHV-306*	Tue 12/12	20:00	-	-	-	-	-	0.53	-	-	-	-	-	-	-	-	91.1	-	-	-	-	-	-
Averages			10.76	-	-	-	-	0.42	-	-	-	-	-	-	-	-	92.9	4.9	-	-	-	-	-

VME Carryover Measurement Summary: PHV Phase II Test Block

Estimated Carryover Rates																	
Overall HME Collection							Wash Water Fractions			FLRT Fractions			Using Wash Fractions		Using FLRT Fract.		
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Direct	Total	Direct	Hourly
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									HMEC Rate	Tank Rate	HMEC Rate	Tank Rate
Baseline, 20 ft/s, 1700 gpm																	
PHV-200X*	Tue 10/24	12:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200X*	Wed 10/25	07:19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200X	Wed 10/25	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200X	Wed 10/25	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200X	Thu 10/26	07:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 10 ft/s, 650 gpm																	
PHV-211X	Thu 10/26	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211X	Thu 10/26	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20 ft/s, 1300 gpm																	
PHV-204*	Thu 10/26	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	14:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	15:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	16:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204*	Thu 10/26	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204	Thu 10/26	17:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204	Thu 10/26	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-204	Thu 10/26	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 17.5 ft/s, 1300 gpm																	
PHV-205	Thu 10/26	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205	Fri 10/27	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 15 ft/s, 1300 gpm																	
PHV-206	Fri 10/27	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-206	Fri 10/27	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 10 ft/s, 1300 gpm																	
PHV-207	Fri 10/27	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-207	Fri 10/27	07:59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-207	Fri 10/27	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 17.5 ft/s, 1300 gpm																	
PHV-205R	Fri 10/27	09:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-205R	Fri 10/27	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**VME Carryover Measurement Summary:
PHV Phase II Test Block**

Overall HME Collection										Wash Water Fractions				FLRT Fractions			Estimated Carryover Rates						
Test	Date	Time	Direct		St. Dev.	Total	Number	Coeff.	of Data	Decrm.	R2	Mg	Na	Average	Mg	Na	Average	Direct	Total	Using Wash Fractions	Direct	Hourly	
			HMEC	Rate																			Rate
Baseline, 10 f/s, 1700 gpm																							
PHV-203*	Fri 10/27	14:06	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203*	Fri 10/27	15:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	18:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-203	Fri 10/27	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 15 f/s, 1700 gpm																							
PHV-202	Fri 10/27	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-202	Sat 10/28	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 17.5 f/s, 1700 gpm																							
PHV-201	Sat 10/28	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201	Sat 10/28	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 20 f/s, 1700 gpm																							
PHV-200	Sat 10/28	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200	Sat 10/28	07:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-200	Sat 10/28	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 17.5 f/s, 1700 gpm																							
PHV-201R	Sat 10/28	08:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-201R	Sat 10/28	12:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 17.5 f/s, 650 gpm																							
PHV-209	Sat 10/28	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-209	Sat 10/28	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 20 f/s, 650 gpm																							
PHV-208	Sat 10/28	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208	Sat 10/28	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 15 f/s, 650 gpm																							
PHV-210	Sat 10/28	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210	Sun 10/29	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 10 f/s, 650 gpm																							
PHV-211	Sun 10/29	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211	Sun 10/29	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							
Baseline, 20 f/s, 650 gpm																							
PHV-208R	Sun 10/29	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208R	Sun 10/29	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																							

Carryover, Muniers, 15 f/s, 1700

Estimated Carryover Rates

[illegible]

**VME Carryover Measurement Summary:
PHV Phase II Test Block**

			Overall HME Collection					Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct HMEC Rate	St. Dev. Direct Rate	Total Tank Rate	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
			(gpm)	(gpm)	(gpm)										Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate
Averages			.0814	.0161	.0790	23	.9981	149	145	147	68	68	68	67.52	65.53	31.24	30.32
Baseline, 13.5 ft/sec, 1300 gpm																	
PHV-264	Thu 11/02	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-264	Thu 11/02	13:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 10ft/sec, 650 gpm																	
PHV-211R	Thu 11/02	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	15:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	17:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-211R	Thu 11/02	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 15ft/sec, 650 gpm																	
PHV-210R	Thu 11/02	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-210R	Fri 11/03	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 11.5ft/sec, 1300 gpm																	
PHV-265	Fri 11/03	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-265	Fri 11/03	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 20ft/sec, 650 gpm																	
PHV-208RR*	Fri 11/03	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR*	Fri 11/03	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	09:00	.0385	.0121	-	-	-	67	64	65	26	25	26	14.23	-	5.58	-
PHV-208RR	Fri 11/03	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	10:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-208RR	Fri 11/03	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			.0385	.0121	-	-	-	67	64	65	26	25	26	14.23	-	5.58	-

VME Carryover Measurement Summary: PHV Phase II Test Block

Estimated Carryover Rates																		
Overall HME Collection									Wash Water Fractions			FLRT Fractions			Using Wash Fractions		Using FLRT Fract.	
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Direct	Total	Direct	Hourly	
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									HMEC Rate	Tank Rate	HMEC Rate	Tank Rate	
/----- (gpm/ft2) E4 -----\																		
Baseline, 15 ft/sec, 650 gpm																		
PHV-210RR*	Fri 11/03	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-210RR*	Fri 11/03	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-210RR*	Fri 11/03	15:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-210RR*	Fri 11/03	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-210RR*	Fri 11/03	16:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-210RR	Fri 11/03	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-210RR	Fri 11/03	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 15 ft/sec, 1300 gpm																		
PHV-206R	Fri 11/03	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-206R	Sat 11/04	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 11.5 ft/sec, 1300 gpm																		
PHV-265R	Sat 11/04	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-265R	Sat 11/04	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-265R	Sat 11/04	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 20ft/sec, 1300 gpm																		
PHV-204R	Sat 11/04	07:22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204R	Sat 11/04	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204R	Sat 11/04	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-204R	Sat 11/04	11:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baseline, 17.5ft/sec, 1300 gpm																		
PHV-205RR	Sat 11/04	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR	Sat 11/04	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sat 11/04	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sat 11/04	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sat 11/04	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sun 11/05	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sun 11/05	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sun 11/05	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-205RR*	Sun 11/05	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**VME Carryover Measurement Summary:
PHV Phase II Test Block**

Overall HME Collection																		Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.											
			HMEC	Direct	Tank									Direct	Total	Direct	Hourly										
			Rate	Rate	Rate									HMEC	Tank	HMEC	Tank										
----- (gpm/ft2) E4 -----\																											
DBA, 10 ft/sec, 650 gpm																											
PHV-221*	Sun 11/05	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221*	Sun 11/05	10:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221*	Sun 11/05	11:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221*	Sun 11/05	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221*	Sun 11/05	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Sun 11/05	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Sun 11/05	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Sun 11/05	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	07:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	10:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-221	Mon 11/06	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
DBA, 15 ft/sec, 650 gpm																											
PHV-220*	Mon 11/06	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-220*	Mon 11/06	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-220*	Mon 11/06	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-220*	Mon 11/06	15:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-220	Mon 11/06	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-220	Mon 11/06	16:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-220	Mon 11/06	17:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
DBA, 20 ft/sec, 650 gpm																											
PHV-218	Mon 11/06	17:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-218	Mon 11/06	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-218	Mon 11/06	19:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-218*	Mon 11/06	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-218*	Mon 11/06	21:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-218*	Mon 11/06	21:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
DBA, Tan., 10 ft/sec, 650 gpm																											
PHV-266*	Thu 11/09	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266*	Thu 11/09	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	06:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	09:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	10:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-266	Thu 11/09	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
DBA, Tan., 15 ft/sec, 650 gpm																											
PHV-267	Thu 11/09	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-267	Thu 11/09	15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-267	Thu 11/09	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
PHV-267	Thu 11/09	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										

VME Carryover Measurement Summary: PHV Phase II Test Block

Overall HME Collection														Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct	St. Dev.	Total	Number	Coeff.	Mg	Na	Average	Mg	Na	Average	Using Wash Fractions		Using FLRT Fract.							
			HMEC	Direct	Tank									of Data	of Determ.	Na/Mg	Na/Mg	Na/Mg	Direct	Hourly			
			Rate	Rate	Rate	Points	R2	(%)	(%)	(%)	(%)	(%)	(%)	Rate	Total	Rate	Tank						
			(gpm)	(gpm)	(gpm)									Rate	Rate	Rate	Rate						
/----- (gpm/ft2) E4 -----\																							
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
DBA, Tan., 20 ft/sec, 650 gpm																							
PHV-268	Thu 11/09	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-268	Thu 11/09	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
DBA, Tan., 17.5 ft/sec, 650 gpm																							
PHV-269	Thu 11/09	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-269	Fri 11/10	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
DBA, Tan., 20 ft/sec, 1300 gpm																							
PHV-270	Fri 11/10	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-270	Fri 11/10	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
DBA, Tan., 20 ft/sec, 1700 gpm																							
PHV-271	Fri 11/10	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-271	Fri 11/10	07:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-271	Fri 11/10	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
DBA, Tan., 20 ft/sec, 650 gpm																							
PHV-268R	Fri 11/10	09:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-268R	Fri 11/10	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-268R	Fri 11/10	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
DBA, Tan., 15 ft/sec, 650 gpm																							
PHV-267R	Fri 11/10	13:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-267R	Fri 11/10	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-267R	Fri 11/10	15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-267R	Fri 11/10	16:07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
PHV-267R	Fri 11/10	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						

VME Carryover Measurement Summary: PHV Phase II Test Block

Overall HME Collection																		Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates	
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.									
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate	Hourly Tank Rate								
																		/----- (gpm/ft2) E4 -----\							
Tan., 17.5 ft/sec, 1300 gpm																									
PHV-245*	Sat 11/11	07:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245*	Sat 11/11	08:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245*	Sat 11/11	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245*	Sat 11/11	11:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245*	Sat 11/11	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245	Sat 11/11	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245	Sat 11/11	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245	Sat 11/11	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245	Sat 11/11	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 20 ft/sec, 1300 gpm																									
PHV-244	Sat 11/11	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-244	Sun 11/12	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 15 ft/sec, 1300 gpm																									
PHV-246	Sun 11/12	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-246	Sun 11/12	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 10 ft/sec, 1300 gpm																									
PHV-247	Sun 11/12	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-247	Sun 11/12	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 17.5 ft/sec, 1300 gpm																									
PHV-245R	Sun 11/12	10:23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-245R	Sun 11/12	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 17.5 ft/sec, 650 gpm																									
PHV-249	Sun 11/12	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-249	Sun 11/12	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-249	Sun 11/12	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 20 ft/sec, 650 gpm																									
PHV-248	Sun 11/12	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-248	Sun 11/12	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Tan., 15 ft/sec, 650 gpm																									
PHV-250	Sun 11/12	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
PHV-250	Mon 11/13	00:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								

VME Carryover Measurement Summary: PHV Phase II Test Block

Overall HME Collection										Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.			
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate	Hourly Tank Rate		
/----- (gpm/ft2) E4 -----\																			
Tan., 10 ft/sec, 650 gpm																			
PHV-251	Mon 11/13	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-251	Mon 11/13	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 20 ft/sec, 650 gpm																			
PHV-248R	Mon 11/13	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-248R	Mon 11/13	06:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-248R	Mon 11/13	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 20 ft/sec, 1700 gpm																			
PHV-240	Mon 11/13	09:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-240	Mon 11/13	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-240	Mon 11/13	11:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-240	Mon 11/13	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 17.5 ft/sec, 1700 gpm																			
PHV-241	Mon 11/13	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-241	Mon 11/13	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-241	Mon 11/13	14:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-241	Mon 11/13	16:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 15 ft/sec, 1700 gpm																			
PHV-242	Mon 11/13	16:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-242	Mon 11/13	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-242	Mon 11/13	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 10 ft/sec, 1700 gpm																			
PHV-243	Mon 11/13	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-243	Tue 11/14	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 20 ft/sec, 1700 gpm																			
PHV-240R	Tue 11/14	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-240R	Tue 11/14	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tan., 20 ft/sec, 1300 gpm																			
PHV-244R	Tue 11/14	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-244R	Tue 11/14	07:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-244R	Tue 11/14	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

VME Carryover Measurement Summary: PHV Phase II Test Block

														Estimated Carryover Rates			
														Using Wash Fractions		Using FLRT Fract.	
														Direct	Total	Direct	Hourly
														HMEC	Tank	HMEC	Tank
														Rate	Rate	Rate	Rate
														/----- (gpm/ft2) E4 -----\			
Test	Date	Time	Direct HMEC Rate (gpm)	St. Dev. Direct Rate (gpm)	Total Tank Rate (gpm)	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)				
<i>Tan., 15 ft/sec, 1300 gpm</i>																	
PHV-246R	Tue 11/14	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246R	Tue 11/14	10:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-246R	Tue 11/14	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 10 ft/sec, 1300 gpm</i>																	
PHV-247R*	Tue 11/14	12:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	15:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-247R	Tue 11/14	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 650 gpm</i>																	
PHV-249R	Tue 11/14	17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249R	Tue 11/14	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-249R	Tue 11/14	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 15 ft/sec, 650 gpm</i>																	
PHV-250R	Tue 11/14	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-250R	Wed 11/15	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tan., 17.5 ft/sec, 1300 gpm</i>																	
PHV-245RR	Wed 11/15	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-245RR	Wed 11/15	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Carryover, 15 ft/s, 1700 gpm</i>																	
PHV-224	Thu 11/16	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	08:00	.0317	.0022	-	-	-	76	74	75	34	34	34	13.37	-	6.13	-
PHV-224	Thu 11/16	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	14:15	.0305	.0038	-	-	-	63	62	62	27	26	26	10.72	-	4.53	-
PHV-224	Thu 11/16	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224	Thu 11/16	16:50	.0291	.0023	.0339	22	.9481	79	76	78	34	33	33	12.75	14.86	5.49	6.40
Averages			.0304	.0028	.0339	22	.9481	72	71	72	32	31	31	12.28	14.86	5.38	6.40
<i>Carryover, 17.5 ft/s, 1700 gpm</i>																	
PHV-223*	Thu 11/16	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	08:25	.0253	.0016	-	-	-	44	44	44	19	20	19	6.25	-	2.75	-
PHV-223	Fri 11/17	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-223	Fri 11/17	14:09	.0210	.0049	.0278	23	.9580	27	28	28	12	12	12	3.31	4.38	1.44	1.90
PHV-223	Fri 11/17	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			.0232	.0033	.0278	23	.9580	36	36	36	16	16	16	4.78	4.38	2.09	1.90
<i>Carryover, 20 ft/s, 1700 gpm</i>																	
PHV-222	Fri 11/17	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-222	Sat 11/18	07:40	.1556	.0898	-	-	-	175	168	172	82	81	81	150.68	-	71.55	-
PHV-222	Sat 11/18	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

VME Carryover Measurement Summary: PHV Phase II Test Block

			Overall HME Collection					Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
			Direct HMEC Rate (gpm)	St. Dev. Direct Rate (gpm)	Total Tank Rate (gpm)	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
Test	Date	Time												Direct HMEC Rate (gpm)	Total Tank Rate (gpm)	Direct HMEC Rate (gpm)	Hourly Tank Rate (gpm)
PHV-222	Sat 11/18	10:30	.1450	.0401	.1240	23	.9770	161	162	161	72	73	73	132.07	112.94	59.49	50.87
PHV-222	Sat 11/18	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			.1503	.0650	.1240	23	.9770	168	165	166	77	77	77	141.37	112.94	65.52	50.87
<i>Carryover, 20 ft/s, 1300 gpm</i>																	
PHV-225	Sat 11/18	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	11:12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-225	Sun 11/19	12:00	.1874	.0973	-	-	-	161	159	160	74	74	74	136.49	-	63.24	-
PHV-225	Sun 11/19	14:00	.1512	.0414	.1443	23	.9916	198	194	196	88	88	88	167.11	159.48	75.17	71.74
PHV-225	Sun 11/19	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			.1693	.0694	.1443	23	.9916	180	176	178	81	81	81	151.80	159.48	69.21	71.74
<i>Carryover, 15 ft/s, 1700 gpm</i>																	
PHV-224R	Sun 11/19	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224R	Mon 11/20	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-224R	Mon 11/20	08:00	.0299	.0017	-	-	-	52	48	50	23	22	23	8.44	-	3.86	-
PHV-224R	Mon 11/20	10:30	.0308	.0028	.0315	16	.9686	64	60	62	28	26	27	10.74	10.98	4.63	4.73
PHV-224R	Mon 11/20	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			.0304	.0023	.0315	16	.9686	58	54	56	25	24	25	9.59	10.98	4.24	4.73
<i>Baseline, 15 ft/sec, 1300 gpm</i>																	
PHV-272	Mon 11/20	13:04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-272	Mon 11/20	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-272	Mon 11/20	14:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-272	Mon 11/20	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 20 ft/sec, 1300 gpm</i>																	
PHV-273	Mon 11/20	17:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-273	Mon 11/20	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-273*	Mon 11/20	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Baseline, 17.5 ft/sec, 1300 gpm</i>																	
PHV-274	Mon 11/20	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-274	Tue 11/21	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

VME Carryover Measurement Summary: PHV Phase II Test Block

Overall HME Collection								Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate	Hourly Tank Rate
/----- (gpm/ft2) E4 -----\																	
Baseline, 11.5 ft/sec, 1300 gpm																	
PHV-275*	Tue 11/21	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-275*	Tue 11/21	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-275	Tue 11/21	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baseline, 10 ft/sec, 1300 gpm																	
PHV-276	Tue 11/21	07:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-276	Tue 11/21	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-276*	Tue 11/21	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 1300 gpm																	
PHV-232*	Tue 11/21	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232*	Tue 11/21	14:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232	Tue 11/21	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-232*	Tue 11/21	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 1300 gpm																	
PHV-233	Tue 11/21	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233	Wed 11/22	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-234	Wed 11/22	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-234	Wed 11/22	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-235	Wed 11/22	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-235	Wed 11/22	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 1300 gpm																	
PHV-233R*	Wed 11/22	08:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	10:15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-233R	Wed 11/22	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 650 gpm																	
PHV-238	Wed 11/22	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	15:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-238	Wed 11/22	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

VME Carryover Measurement Summary: PHV Phase II Test Block

PHV Phase II Test Results																	
Overall HME Collection							Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates				
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate	Hourly Tank Rate
/----- (gpm/ft2) E4 -----\																	
VLP, 20 ft/sec, 650 gpm																	
PHV-236	Wed 11/22	17:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236	Wed 11/22	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236	Wed 11/22	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 650 gpm																	
PHV-237	Wed 11/22	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-237	Thu 11/23	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 650 gpm																	
PHV-239	Thu 11/23	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-239	Thu 11/23	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 650 gpm																	
PHV-236R	Thu 11/23	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-236R	Thu 11/23	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 1700 gpm																	
PHV-228	Thu 11/23	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-228	Thu 11/23	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 17.5 ft/sec, 1700 gpm																	
PHV-229	Thu 11/23	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-229	Thu 11/23	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1700 gpm																	
PHV-230	Thu 11/23	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-230	Thu 11/23	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1700 gpm																	
PHV-231	Thu 11/23	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-231	Fri 11/24	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 20 ft/sec, 1700 gpm																	
PHV-228R	Fri 11/24	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-228R	Fri 11/24	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-277	Fri 11/24	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-277	Fri 11/24	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-277	Fri 11/24	08:03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-278	Fri 11/24	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-278	Fri 11/24	10:35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-278	Fri 11/24	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**VME Carryover Measurement Summary:
PHV Phase II Test Block**

			Overall HME Collection					Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
			HMEC	Direct	Tank									Direct	Total	Direct	Hourly
			Rate	Rate	Rate									HMEC	Tank	HMEC	Tank
			(gpm)	(gpm)	(gpm)									Rate	Rate	Rate	Rate
/----- (gpm/ft2) E4 -----\																	
VLP, 20 ft/sec, 1300 gpm																	
PHV-279*	Fri 11/24	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-279*	Fri 11/24	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-279	Fri 11/24	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-279	Fri 11/24	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VLP, 15 ft/sec, 1300 gpm																	
PHV-280	Fri 11/24	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-280*	Sat 11/25	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VLP, 10 ft/sec, 1300 gpm																	
PHV-281	Sat 11/25	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-281	Sat 11/25	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VLP, 10 ft/sec, 1700 gpm																	
PHV-282	Sat 11/25	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-282	Sat 11/25	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VLP, 15 ft/sec, 1700 gpm																	
PHV-283*	Sat 11/25	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-283	Sat 11/25	11:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-283	Sat 11/25	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VLP, 20 ft/sec, 1700 gpm																	
PHV-284*	Sat 11/25	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-284*	Sat 11/25	14:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-284	Sat 11/25	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-284	Sat 11/25	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-284	Sat 11/25	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
VLP, 17.5 ft/sec, 1700 gpm																	
PHV-285	Sat 11/25	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-285	Sun 11/26	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	

VME Carryover Measurement Summary: PHV Phase II Test Block

			Overall HME Collection				Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates				
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate	Hourly Tank Rate
/----- (gpm/ft2) E4 -----\																	
VLP, 10 ft/sec, 1700 gpm																	
PHV-286	Sun 11/26	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-286	Sun 11/26	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-287	Sun 11/26	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-287*	Sun 11/26	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-288*	Sun 11/26	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288*	Sun 11/26	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288	Sun 11/26	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-288	Sun 11/26	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 10 ft/sec, 1300 gpm																	
PHV-289*	Sun 11/26	18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289*	Sun 11/26	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289	Sun 11/26	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-289	Mon 11/27	00:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VLP, 15 ft/sec, 1300 gpm																	
PHV-290	Mon 11/27	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-290*	Mon 11/27	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 20 ft/sec, 1700 gpm																	
PHV-291*	Thu 11/30	22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	06:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	07:55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291	Fri 12/01	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-291*	Fri 12/01	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**VME Carryover Measurement Summary:
PHV Phase II Test Block**

Overall HME Collection								Wash Water Fractions			FLRT Fractions			Estimated Carryover Rates			
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Using Wash Fractions		Using FLRT Fract.	
			HMEC Rate (gpm)	Direct Rate (gpm)	Tank Rate (gpm)									Direct HMEC Rate	Total Tank Rate	Direct HMEC Rate	Hourly Tank Rate
----- (gpm/ft2) E4 -----\																	
LP, 15 ft/sec, 1700 gpm																	
PHV-293	Fri 12/01	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-293	Sun 12/03	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 10 ft/sec, 1700 gpm																	
PHV-294	Sun 12/03	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-294	Mon 12/04	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 10 ft/sec, 1300 gpm																	
PHV-298*	Mon 12/04	08:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-298*	Mon 12/04	11:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-298	Tue 12/05	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 15 ft/sec, 1300 gpm																	
PHV-297*	Tue 12/05	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-297*	Tue 12/05	14:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-297	Tue 12/05	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-297	Wed 12/06	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 15 ft/sec, 650 gpm																	
PHV-300	Wed 12/06	07:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-300	Wed 12/06	14:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 10 ft/sec, 650 gpm																	
PHV-299*	Thu 12/07	08:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-299*	Thu 12/07	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-299	Thu 12/07	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-299*	Fri 12/08	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 10 ft/sec, 1700 gpm																	
PHV-303	Fri 12/08	07:44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-303*	Fri 12/08	13:50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LP, 15 ft/sec, 1700 gpm																	
PHV-304*	Sat 12/09	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PHV-304	Sun 12/10	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**VME Carryover Measurement Summary:
PHV Phase II Test Block**

													Estimated Carryover Rates				
Overall HME Collection								Wash Water Fractions			FLRT Fractions			Using Wash Fractions		Using FLRT Fract.	
Test	Date	Time	Direct	St. Dev.	Total	Number of Data Points	Coeff. of Determ. R2	Mg (%)	Na (%)	Average Na/Mg (%)	Mg (%)	Na (%)	Average Na/Mg (%)	Direct	Total	Direct	Hourly
			HMEC Rate (gpm)	Rate (gpm)	Tank Rate (gpm)									HMEC Rate (gpm)	Tank Rate (gpm)	HMEC Rate (gpm)	Tank Rate (gpm)
/----- (gpm/ft2) E4 -----\																	
LP, 15 ft/sec, 1300 gpm																	
PHV-305*	Sun 12/10	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-305*	Sun 12/10	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-305	Mon 12/11	00:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LP, 10 ft/sec, 1300 gpm																	
PHV-306*	Mon 12/11	09:42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306	Mon 12/11	14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306	Mon 12/11	16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	08:25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	13:45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	17:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	19:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PHV-306*	Tue 12/12	20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX D

TRACE ELEMENT REMOVAL ANALYTICAL SUMMARY

ECTC Pilot Trace Elements Removal Testing

Mercury Gas Sampling Results

Pilot Pre-Spiking Inlet Location

(DRG)

Test ID	Date	Start Time	Other Imp. Cont.	ID	Gas Volume (dscf)	Moisture (% H ₂ O)	Other Sample [Hg] (ng/ml)	Other Sample [Hg] (ng/ml)	H ₂ O ₂ Sample [Hg] (ng/ml)	H ₂ O ₂ Sample [Hg] (ng/ml)	KMnO ₄ Sample [Hg] (ng/ml)	Other Sample Mass (g)	Other Sample Mass (g)	H ₂ O ₂ Sample Mass (g)	H ₂ O ₂ Sample Mass (g)	KMnO ₄ Sample Mass (g)	Other [Hg] In Gas (µg/Nm ³)	Other [Hg] In Gas (µg/Nm ³)	H ₂ O ₂ [Hg] In Gas (µg/Nm ³)	H ₂ O ₂ [Hg] In Gas (µg/Nm ³)	KMnO ₄ [Hg] In Gas (µg/Nm ³)	Total [Hg] In Gas (µg/Nm ³)
PHV, 20 fps, 1300 gpm																	DRG	DRG	DRG	DRG	DRG	DRG
T24-N	Tue-11/28	08:00	H	U365	22.58	6.87	16.50	2.73	1.07	0.60	1.23	225.6	216.8	206.9	219.8	457.6	6.25	0.99	0.37	0.22	0.94	8.77
T24-N	Tue-11/28	14:00	H	U368	46.12	6.03	32.20	3.71	1.30	0.82	1.45	242.7	223.4	236.3	218.4	452.6	6.42	0.68	0.25	0.15	0.54	8.04
T24-N	Tue-11/28	16:00	H	U371	44.38	6.89	35.20	4.46	1.65	0.94	1.37	257.3	227.7	220.8	228.0	471.4	7.73	0.87	0.31	0.18	0.55	9.64
Averages																	6.8	0.8	0.3	0.2	0.7	8.8
PHV, 20 fps, 1300 gpm, Hg spk																	DRG	DRG	DRG	DRG	DRG	DRG
T24-E	Wed-11/29	08:00	H	U374	56.10	6.84	32.90	6.77	3.85	2.34	3.03	276.9	232.9	213.2	216.6	400.0	6.15	1.06	0.55	0.34	0.82	8.93
T24-E	Wed-11/29	09:30	H	U377	54.85	7.07	35.20	7.59	3.61	2.32	2.90	272.4	225.5	242.1	236.2	477.8	6.62	1.18	0.60	0.38	0.96	9.74
T24-E	Wed-11/29	11:00	H	U380	45.24	7.30	35.20	6.19	3.57	2.01	2.71	261.6	235.7	201.4	232.2	455.0	7.71	1.22	0.60	0.39	1.03	10.96
Averages																	6.8	1.2	0.6	0.4	0.9	9.9
PHV, 20 fps, 1300 gpm, HgCl₂ spk																	DRG	DRG	DRG	DRG	DRG	DRG
T24-C	Thu-11/30	08:00	H	U383	53.47	7.60	32.20	8.50	5.01	2.93	3.36	270.6	216.3	211.0	232.9	444.0	6.17	1.30	0.75	0.48	1.06	9.76
T24-C	Thu-11/30	09:30	H	U386	57.60	7.69	39.30	8.72	4.47	3.07	3.79	270.9	232.9	218.1	216.4	458.5	7.00	1.34	0.64	0.44	1.14	10.56
T24-C	Thu-11/30	11:00	H	U389	38.13	7.93	32.40	4.96	2.05	1.33	2.05	242.8	207.1	198.4	176.2	444.2	7.81	1.02	0.40	0.23	0.90	10.38
Averages																	7.0	1.2	0.5	0.3	1.0	10.5
Tris 4 ug/spk Comp @ WS In																	-	-	-	-	-	-
T25-NY	Mon-12/4	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	09:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	09:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	10:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	10:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	11:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T25-NY	Mon-12/4	11:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	-	-	-	-	-	-
Tris, HgCl₂ spk, M29* @ WS In Comp																	DRG	DRG	DRG	DRG	DRG	DRG
T26-C	Wed-12/6	08:00	Tris	U401	19.53	7.39	7.15	1.13	1.14	0.70	3.69	301.0	237.9	206.4	215.5	510.0	4.17	0.52	0.46	0.29	3.65	9.09
T26-C	Wed-12/6	08:30	Tris	U403	24.13	7.31	10.80	0.85	0.87	0.89	4.03	290.2	279.6	225.4	194.3	493.7	4.92	0.37	0.31	0.27	3.12	8.99
T26-C	Wed-12/6	09:30	Tris	U405	28.52	7.47	11.90	0.98	1.11	0.59	3.89	301.3	300.2	257.2	240.9	591.8	4.76	0.39	0.38	0.19	3.06	8.78
T26-C	Wed-12/6	10:30	Tris	U407	35.00	7.50	16.40	1.97	0.89	0.60	4.57	292.4	273.4	208.4	210.5	471.7	5.19P	0.58P	0.20P	0.14P	2.33P	8.44P
T26-C	Wed-12/6	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T26-C	Wed-12/6	09:30	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	4.6	0.4	0.4	0.3	3.3	9.0
Tris w/EDTA(1mM), HgCl₂ spk, M29* @ WS In Comp																	DRG	DRG	DRG	DRG	DRG	DRG
T27-C	Thu-12/7	08:00	TE	U411	20.69	6.43	9.39	0.46	0.32	0.45	2.99	300.1	252.3	219.3	222.3	459.5	5.16	0.21	0.13	0.18	2.52	8.20
T27-C	Thu-12/7	08:30	TE	U413	24.36	6.65	13.20	0.85	0.63	0.58	2.85	278.3	287.2	230.6	236.5	502.2	5.71	0.38	0.23	0.21	2.23	8.76
T27-C	Thu-12/7	09:30	TE	U415	26.27	6.42	12.80	1.01	0.80	0.47	2.87	283.6	246.4	219.0	200.0	498.9	5.24	0.36	0.25	0.14	2.06	8.05
T27-C	Thu-12/7	10:30	TE	U417	34.38	6.50	18.00	1.37	0.44	0.55	3.65	271.3	259.9	185.9	192.6	467.3	5.38P	0.39P	0.09P	0.12P	1.88P	7.86P
T27-C	Thu-12/7	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T27-C	Thu-12/7	09:30	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	5.4	0.3	0.2	0.2	2.3	8.3

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=pH only test for Tris.

ECTC Pilot Trace Elements Removal Testing
Mercury Gas Sampling Results
Pilot Pre-Spiking Inlet Location
(DRG)

Test ID	Date	Start Time	Other Imp. Cont.	ID	Gas Volume (dscf)	Moisture (% H2O)	Other Sample [Hg] (ng/ml)	Other Sample [Hg] (ng/ml)	H2O2 Sample [Hg] (ng/ml)	H2O2 Sample [Hg] (ng/ml)	KMnO4 Sample [Hg] (ng/ml)	Other Sample Mass (g)	Other Sample Mass (g)	H2O2 Sample Mass (g)	H2O2 Sample Mass (g)	KMnO4 Sample Mass (g)	Other [Hg] In Gas (µg/Nm3)	Other [Hg] In Gas (µg/Nm3)	H2O2 [Hg] In Gas (µg/Nm3)	H2O2 [Hg] In Gas (µg/Nm3)	KMnO4 [Hg] In Gas (µg/Nm3)	Total [Hg] In Gas (µg/Nm3)
<i>Tris, Hg spk, M29* @WS In Comp</i>																	DRG	DRG	DRG	DRG	DRG	DRG
T28-E	Fri-12/8	08:00	Tris	U422	19.11	7.39	8.03	0.81	0.56	0.46	5.10	273.7	266.7	213.3	203.7	397.1	4.36	0.43	0.24	0.19	4.02	9.23
T28-E	Fri-12/8	08:30	Tris	U424	25.25	11.00	12.00	1.16	0.72	0.56	6.24	269.5	234.2	187.2	191.3	393.3	4.85	0.41	0.20	0.16	3.68	9.30
T28-E	Fri-12/8	09:30	Tris	U426	29.60	10.40	14.50	1.26	0.17	0.14	6.70	273.1	256.8	182.3	199.4	418.5	5.07	0.41	0.04	0.03	3.59	9.14
T28-E	Fri-12/8	10:30	Tris	U428	33.76	10.20	16.70	1.24	0.93	0.39	4.70	290.2	255.1	220.1	191.8	521.8	5.44P	0.35P	0.23P	0.08P	2.75P	8.86P
T28-E	Fri-12/8	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T28-E	Fri-12/8	09:30	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	4.8	0.4	0.2	0.1	3.8	9.2
<i>Enhanced Solubility (Solution Effects)</i>																						
T29-IY*	Mon-12/11	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	-	-	-	-	-	-
<i>Enhanced Solubility (Solution Effects)</i>																						
T30-IY*	Tue-12/12	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	-	-	-	-	-	-
<i>Tris Hg spk Intratrail</i>																						
T31-IX	Mon-12/18	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	09:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	09:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	10:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	10:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tris/EDTA 4 ug/spk Comp @ WS In</i>																						
T31-NX	Mon-12/18	11:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-NX	Mon-12/18	11:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-NX	Mon-12/18	12:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-NX	Mon-12/18	12:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	-	-	-	-	-	-

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide, Tris=Tris Buffer, TE=Tris and 1mM EDTA, P=pl only test for Tris.

ECTC Pilot Trace Elements Removal Testing
Mercury Gas Sampling Results
Pilot Pre-Spiking Inlet Location
(DRG)

Test ID	Date	Start Time	Other Imp. Cont.	ID	Gas Volume (dscf)	Moisture (% H2O)	Other	Other	H2O2	H2O2	KMnO4	Other	Other	H2O2	H2O2	KMnO4	Other	Other	H2O2	H2O2	KMnO4	Total
							Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)
Darco Carbon, 10,000:1																						
T32-PJFF	Tue-12/19	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T32-PJFF	Tue-12/19	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T32-PJFF	Tue-12/19	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T32-PJFF	Tue-12/19	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																						
Darco Carbon, Time Effect																						
T33-PJFF	Wed-12/20	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T33-PJFF	Wed-12/20	10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Darco Carbon, 20,000:1																						
T34-PJFF	Wed-12/20	12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T34-PJFF	Wed-12/20	13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
CaCl2/Carbon																						
T35-PJFF	Thu-12/21	08:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T35-PJFF	Thu-12/21	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T35-PJFF	Thu-12/21	09:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T35-PJFF	Thu-12/21	11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=PH only test for Tris.

ECTC Pilot Trace Elements Removal Testing

Mercury Gas Sampling Results
Pilot Post-Spiking Inlet Location
(WS Inlet)

					Gas	Inlet	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Total																									
Test ID	Date	Start Time	Other Imp. Cont.	ID	Volume (dscf)	Moisture (% H2O)	O2 (%)	Sample [Hg] (ppm)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)																								
PHV, 20 fps, 1300 gpm																																																		
T24-N	Tue-11/28	08:00	H	U372	-	-	7.71	-	<0.05	<0.05	<0.05	<0.05	<0.05	-	210.5	208.3	195.9	206.7	449.4	-	-	-	-	-	-	-																								
T24-N	Tue-11/28	14:00	H	U366	46.70	5.63	9.75	-	30.20	3.23	0.70	0.29	0.43	-	245.8	218.9	209.3	221.6	519.0	-	6.02	0.57	0.12	0.05	0.18	6.95																								
T24-N	Tue-11/28	16:00	H	U369	47.64	6.41	7.20	-	33.60	3.81	1.38	0.83	0.98	-	272.6	223.0	231.4	224.7	475.7	-	7.28	0.68	0.25	0.15	0.37	8.73																								
Averages																																								6.7	0.6	0.2	0.1	0.3	7.8					
PHV, 20 fps, 1300 gpm, Hg spk																																																		
T24-E	Wed-11/29	08:00	H	U375	57.44	6.32	7.61	-	185.20	26.10	17.00	11.20	10.50	-	271.4	226.6	212.4	189.0	443.2	-	33.15	3.90	2.38	1.40	3.07	43.89																								
T24-E	Wed-11/29	09:30	H	U378	61.16	6.62	7.44	-	212.10	28.60	17.80	11.50	12.00	-	260.9	235.3	229.3	205.9	432.1	-	34.28	4.17	2.53	1.47	3.21	45.65																								
T24-E	Wed-11/29	11:00	H	U381	62.11	6.48	7.27	-	211.30	26.30	19.10	11.30	13.60	-	275.1	269.6	248.8	242.5	431.2	-	35.46	4.32	2.90	1.67	3.58	47.93																								
Averages																																										34.3	4.1	2.6	1.5	3.3	45.8			
PHV, 20 fps, 1300 gpm, HgCl2 spk																																																		
T24-C	Thu-11/30	08:00	H	U384	57.11	6.64	6.53	-	36.50	5.50	2.45	1.61	1.34	-	286.3	238.2	223.1	194.6	422.5	-	6.93	0.87	0.36	0.21	0.38	8.75																								
T24-C	Thu-11/30	09:30	H	U387	56.22	6.87	6.24	-	36.50	5.91	2.43	1.24	1.67	-	278.8	233.0	232.0	242.6	469.5	-	6.86	0.93	0.38	0.20	0.53	8.90																								
T24-C	Thu-11/30	11:00	H	U390	53.80	7.11	6.39	-	60.05	9.00	5.08	1.73	2.67	-	260.1	217.7	221.8	199.6	457.5	-	11.00	1.38	0.79	0.24	0.86	14.27																								
Averages																																													8.3	1.1	0.5	0.2	0.6	10.6
Tris 4 ug/spk Comp @ WS In																																																		
T25-NY	Mon-12/4	08:00	Tris	U393	20.49	7.66	7.54	-	11.90	1.01	<0.05	0.25	1.03	-	270.1	262.7	215.9	231.6	457.1	-	5.94	0.49	<0.02	0.11	0.87	7.43																								
T25-NY	Mon-12/4	08:00	Tris	U394	20.56	11.12	7.54	-	9.82	0.92	0.39	0.47	6.23	-	309.7	288.4	250.5	245.9	514.3	-	5.60	0.49	0.18	0.21	5.90	12.39																								
T25-NY	Mon-12/4	09:00	Tris	U395	25.43	-	7.85	-	11.80	1.40	0.88	0.79	1.09	-	282.3	289.4	236.7	235.7	501.2	-	4.96	0.60	0.31	0.28	0.81	6.97																								
T25-NY	Mon-12/4	09:00	Tris	U396	26.05	-	7.85	-	10.60	0.90	0.10	0.53	11.45	-	304.6	303.0	248.1	193.5	487.8	-	4.70	0.40	0.04	0.15	8.12	13.40																								
T25-NY	Mon-12/4	10:00	Tris	U397	31.09	8.41	7.60	-	14.40	1.73	0.82	0.38	1.42	-	314.9	295.2	233.0	205.0	483.8	-	5.52	0.62	0.23	0.09	0.84	7.31																								
T25-NY	Mon-12/4	10:00	Tris	U398	32.11	-	7.60	-	13.00	2.23	0.85	0.38	11.90	-	356.6	314.8	227.5	229.5	470.2	-	5.47	0.83	0.23	0.10	6.60	13.23																								
T25-NY	Mon-12/4	11:00	Tris	U399	29.81	7.30	7.88	-	13.70	1.98	0.58	0.37	2.14	-	292.7	268.9	221.8	237.0	471.5	-	5.10	0.68	0.16	0.11	1.28	7.33																								
T25-NY	Mon-12/4	11:00	Tris	U400	40.01	11.40	7.88	-	16.90	1.72	1.91	0.86	12.05	-	331.5	265.4	194.1	196.6	463.7	-	5.30	0.43	0.35	0.16	5.29	11.54																								
Averages																																																		
Tris, HgCl2 spk, M29* @WS In Comp																																																		
T26-C	Wed-12/6	08:00	Tris	U402	20.87	6.43	7.16	-	21.70	2.37	1.23	0.95	2.08	-	284.3	279.6	212.5	218.5	485.1	-	11.20	1.20	0.47	0.38	1.83	15.08																								
T26-C	Wed-12/6	08:30	Tris	U404	25.18	6.26	7.21	-	23.00	2.45	1.54	1.28	3.24	-	301.3	294.8	218.0	225.1	492.7	-	10.43	1.09	0.51	0.43	2.40	14.85																								
T26-C	Wed-12/6	09:30	Tris	U406	32.81	6.42	7.06	-	32.60	3.48	1.72	0.85	4.02	-	280.6	279.7	224.0	195.9	527.4	-	10.56	1.12	0.44	0.19	2.45	14.77																								
T26-C	Wed-12/6	10:30	Tris	U408	38.28	6.60	6.94	-	23.40	3.91	3.22	1.51	12.70	-	302.6	264.8	214.4	198.8	449.6	-	7.01P	1.02P	0.68P	0.30P	5.65P	14.66P																								
T26-C	Wed-12/6	08:00	H	U409	55.71	6.35	7.16	-	75.60	6.35	3.04	1.11	0.86	-	269.9	259.7	206.4	224.0	482.7	-	13.87	1.12	0.43	0.17	0.28	15.87																								
T26-C	Wed-12/6	09:30	H	U410	100.76	6.43	7.06	-	127.00	11.35	3.31	1.90	1.30	-	296.7	243.0	232.1	209.5	458.3	-	14.17	1.04	0.29	0.15	0.22	15.87																								
Averages																																							Tris only	10.7	1.1	0.5	0.3	2.2	14.9					
Tris w/EDTA(1mM), HgCl2 spk, M29*																																																		
T27-C	Thu-12/7	08:00	TE	U412	21.99	6.28	8.59	-	35.30	2.06	1.18	1.04	1.56	-	303.1	304.2	225.8	212.5	527.4	-	18.43	1.08	0.46	0.38	1.42	21.77																								
T27-C	Thu-12/7	08:30	TE	U414	29.89	5.83	8.50	-	42.60	3.80	2.08	2.23	3.07	-	296.2	297.2	216.7	213.2	514.7	-	16.00	1.43	0.57	0.60	2.00	20.60																								
T27-C	Thu-12/7	09:30	TE	U416	31.12	6.10	8.38	-	46.50	5.53	2.55	1.05	2.27	-	269.5	271.0	220.7	198.6	505.5	-	15.26	1.82	0.69	0.25	1.40	19.42																								
T27-C	Thu-12/7	10:30	TE	U418	36.69	4.52	8.93	-	49.90	5.41	3.74	1.87	2.54	-	283.3	246.5	208.5	200.1	469.4	-	14.60P	1.38P	0.81P	0.39P	1.23P	18.40P																								
T27-C	Thu-12/7	08:00	H	U419	68.99	5.84	8.59	-	108.00	9.62	2.08	0.56	0.71	-	273.3	231.2	217.5	219.6	478.1	-	16.21	1.22	0.25	0.07	0.19	17.93																								
T27-C	Thu-12/7	09:30	H	U420	83.41	5.82	8.38	-	132.00	10.50	2.58	1.57	1.08	-	260.8	226.8	218.9	209.2	469.9	-	15.63	1.08	0.26	0.15	0.23	17.35																								
Averages																																							Tris only	16.6	1.4	0.6	0.4	1.6	20.6					

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer, TE=Tris and 1mM EDTA. P=PH only test for Tris.

ECTC Pilot Trace Elements Removal Testing
Mercury Gas Sampling Results
Pilot Post-Spiking Inlet Location
(WS Inlet)

					Gas	Inlet	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Total								
Test	Date	Start	Other	ID	Volume	Moisture	O2	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	[Hg]	[Hg]	[Hg]	[Hg]	[Hg]	[Hg]	[Hg]							
ID		Time	Imp.		(dscf)	(% H2O)	(%)	(ppm)	(ng/ml)	(ng/ml)	(ng/ml)	(ng/ml)	(ng/ml)	(g)	(g)	(g)	(g)	(g)	(g)	(ug/Nm3)	(ug/Nm3)	(ug/Nm3)	(ug/Nm3)	(ug/Nm3)	(ug/Nm3)	(ug/Nm3)							
Tris, Hg spk, M29* @WS In Comp																																	
T28-E	Fri-12/8	08:00	Tris	U421	21.52	6.42	7.63	-	32.95	3.21	1.19	0.83	4.24	-	273.4	284.7	206.2	200.9	418.1	-	15.86	1.61	0.43	0.29	3.12	21.31							
T28-E	Fri-12/8	08:30	Tris	U423	24.85	9.86	7.62	-	30.10	3.82	1.77	0.98	6.47	-	261.8	258.0	200.7	194.1	445.2	-	12.01	1.50	0.54	0.29	4.39	18.74							
T28-E	Fri-12/8	09:30	Tris	U425	33.57	9.06	7.83	-	50.10	4.37	2.96	1.10	8.70	-	273.2	256.4	191.1	191.0	399.3	-	15.45	1.26	0.64	0.24	3.92	21.50							
T28-E	Fri-12/8	10:30	Tris	U427	42.67	8.23	8.17	-	31.90	6.49	1.94	1.53	22.90	-	289.2	256.4	219.6	185.0	440.1	-	8.19P	1.48P	0.38P	0.25P	8.95P	19.25P							
T28-E	Fri-12/8	08:00	H	U429	50.73	6.25	7.63	-	89.05	11.10	3.71	1.93	2.96	-	266.2	210.0	211.7	213.6	420.6	-	17.70	1.74	0.59	0.31	0.93	21.27							
T28-E	Fri-12/8	09:30	H	U430	95.81	6.45	7.83	-	174.00	20.60	8.11	4.39	4.64	-	279.3	219.0	200.6	206.7	482.4	-	19.22	1.78	0.64	0.36	0.88	22.89							
Averages																				Tris only								14.4	1.5	0.5	0.3	3.8	20.5
Enhanced Solubility (Solution Effects)																																	
T29-IY*	Mon-12/11	08:00	H	U431	22.30	6.71	8.21	-	15.60	2.19	0.56	0.27	0.36	-	241.1	229.9	216.5	223.5	491.7	-	6.39	0.85	0.21	0.10	0.30	7.85							
T29-IY*	Mon-12/11	08:00	H	U432	19.78	7.09	8.21	-	22.50	8.35	0.59	4.51	16.00	-	228.8	214.9	207.7	195.1	442.5	-	9.86	3.44	0.23	1.69	13.56	28.77							
T29-IY*	Mon-12/11	09:00	H	U433	37.81	6.23	8.18	-	28.30	3.51	0.92	0.50	0.52	-	234.2	208.2	199.4	197.4	431.1	-	6.64	0.73	0.18	0.10	0.22	7.88							
T29-IY*	Mon-12/11	09:00	H	U434	38.88	6.60	8.18	-	31.20	9.41	5.08	4.38	12.20	-	269.3	239.1	259.0	255.9	488.5	-	8.19	2.19	1.28	1.09	5.81	18.56							
T29-IY*	Mon-12/11	10:00	H	U435	56.52	6.25	7.89	-	44.50	5.08	1.67	0.72	0.62	-	239.1	199.0	197.7	197.2	445.3	-	7.13	0.68	0.22	0.10	0.18	8.31							
T29-IY*	Mon-12/11	10:00	H	U436	57.85	6.25	7.89	-	49.20	11.30	6.09	4.57	11.40	-	258.0	240.4	231.9	206.4	425.1	-	8.31	1.78	0.92	0.62	3.17	14.81							
T29-IY*	Mon-12/11	11:00	H	U437	75.84	6.13	8.20	-	51.90	5.14	1.36	0.62	0.78	-	268.1	229.7	213.1	215.9	507.3	-	6.95	0.59	0.14	0.07	0.20	7.95							
T29-IY*	Mon-12/11	11:00	H	U438	76.98	6.20	8.20	-	64.30	12.80	8.69	6.06	9.13	-	255.0	216.9	193.3	188.6	453.4	-	8.07	1.37	0.83	0.56	2.04	12.86							
Averages																																	
Enhanced Solubility (Solution Effects)																																	
T30-IY*	Tue-12/12	08:00	H	U439	45.43	6.34	7.62	-	33.40	3.87	0.97	0.47	0.50	-	244.5	220.6	218.5	213.2	422.9	-	6.81	0.71	<0.18	0.08	0.18	7.96							
T30-IY*	Tue-12/12	08:00	H	U440	43.07	6.59	7.62	-	36.10	7.22	4.73	3.07	6.56	-	242.3	225.6	218.0	224.7	504.6	-	7.69	1.43	0.91	0.61	2.91	13.55							
T30-IY*	Tue-12/12	09:00	H	U441	38.98	6.51	8.04	-	27.50	3.16	0.90	0.46	0.45	-	252.3	222.0	210.2	221.7	521.4	-	6.74	0.68	0.18	0.10	0.23	7.94							
T30-IY*	Tue-12/12	09:00	H	U442	40.86	6.35	8.04	-	37.90	11.70	6.78	5.67	12.90	-	239.7	232.9	240.3	222.6	471.4	-	8.42	2.53	1.51	1.17	5.64	19.27							
T30-IY*	Tue-12/12	10:00	H	U443	37.44	6.51	7.87	-	27.40	2.63	0.93	0.43	0.45	-	254.6	236.0	207.8	238.4	518.2	-	7.06	0.63	0.20	0.10	0.24	8.22							
T30-IY*	Tue-12/12	10:00	H	U444	41.10	5.93	7.87	-	42.60	16.00	9.31	6.95	19.70	-	230.7	201.2	214.1	197.0	466.0	-	9.06	2.97	1.84	1.26	8.46	23.58							
T30-IY*	Tue-12/12	11:00	H	U445	38.85	6.36	7.76	-	34.00	2.88	0.80	0.37	0.40	-	229.0	222.5	202.2	196.7	488.4	-	7.59	0.62	0.16	0.07	0.19	8.64							
T30-IY*	Tue-12/12	11:00	H	U446	40.62	6.78	7.76	-	57.30	17.00	13.50	9.10	20.60	-	237.9	217.8	211.6	213.1	519.3	-	12.72	3.45	2.66	1.81	9.98	30.62							
Averages																																	
Tris Hg spk Intratrain																																	
T31-IX	Mon-12/18	08:00	Tris	U447	28.36	7.34	4.68	-	11.90	1.15	0.59	0.44	1.29	-	284.5	252.4	214.8	200.6	466.6	CRG	CRG	CRG	CRG	CRG	CRG	CRG							
T31-IX	Mon-12/18	08:00	Tris	U448	28.94	6.40	4.68	-	8.11	1.27	0.65	0.37	13.60	-	271.6	276.3	212.5	226.1	551.0	-	2.88	0.46	0.18	0.11	9.81	13.44							
T31-IX	Mon-12/18	09:00	Tris	U449	34.26	7.18	4.87	-	14.10	1.54	0.55	0.50	1.69	-	286.4	286.3	227.4	208.4	510.7	-	4.47	0.49	0.14	0.11	0.95	6.16							
T31-IX	Mon-12/18	09:00	Tris	U450	33.59	6.72	4.87	-	11.90	1.36	0.66	0.42	13.90	-	268.8	279.8	225.5	243.3	482.5	-	3.61	0.43	0.17	0.11	7.56	11.88							
T31-IX	Mon-12/18	10:00	TE	U451	31.50	7.46	4.74	-	14.20	1.48	0.81	0.35	0.93	-	289.6	254.7	205.7	193.8	442.6	-	4.95	0.45	0.20	0.08	0.50	6.18							
T31-IX	Mon-12/18	10:00	TE	U452	31.22	7.04	4.74	-	15.40	1.43	0.87	0.26	13.20	-	279.1	283.2	192.4	231.9	487.3	-	5.21	0.49	0.20	0.07	7.80	13.79							
Averages																																	
Tris/EDTA 4 ug/spk Comp @ WS In																																	
T31-NX	Mon-12/18	11:00	TE	U453	29.01	7.81	4.61	-	13.00	1.41	0.45	0.26	0.77	-	296.8	275.3	207.4	228.2	503.9	CRG	CRG	CRG	CRG	CRG	CRG	CRG							
T31-NX	Mon-12/18	11:00	TE	U454	29.06	7.27	4.61	-	24.20	1.54	0.64	0.32	0.98	-	309.2	265.0	231.2	213.3	489.9	-	9.75	0.53	0.19	0.09	0.63	11.19							
T31-NX	Mon-12/18	12:00	TE	U455	41.91	7.02	4.61	-	16.80	2.25	0.56	0.23	1.38	-	302.3	272.0	218.8	215.3	473.7	-	4.59	0.55	0.11	0.05	0.59	5.89							
T31-NX	Mon-12/18	12:00	TE	U456	41.44	6.95	4.61	-	28.80	1.63	0.10	0.24	1.82	-	302.3	288.3	204.9	210.5	482.6	-	7.96	0.43	0.02	0.05	0.80	9.26							
Averages																																	

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Penxide, Tris=Tris Buffer, TE=Tris and 1mM EDTA, P=H only test for Tris.

ECTC Pilot Trace Elements Removal Testing
Mercury Gas Sampling Results
Pilot Post-Spiking Inlet Location
(WS Inlet)

					Gas	Inlet	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Total	
Test		Start	Other		Volume	Moisture	O2	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	Sample	[Hg]	[Hg]	[Hg]	[Hg]	[Hg]	[Hg]	[Hg]	
ID	Date	Time	Imp.	ID	(dscf)	(% H2O)	(%)	(ppm)	(ng/ml)	(ng/ml)	(ng/ml)	(ng/ml)	(ng/ml)	(g)	(g)	(g)	(g)	(g)	In Gas	In Gas	In Gas	In Gas	In Gas	In Gas	In Gas	
			Cont.																(μg/Nm3)	(μg/Nm3)	(μg/Nm3)	(μg/Nm3)	(μg/Nm3)	(μg/Nm3)	(μg/Nm3)	
Darco Carbon, 10,000:1																										
T32-PJFF	Tue-12/19	08:00	-	U458	46.10	6.32	7.78	-	-	-	76.96	5.92	2.02	-	-	-	236.10	240.17	426.80	-	-	-	14.93	1.17	0.71	16.81
T32-PJFF	Tue-12/19	09:30	-	U460	45.35	6.02	8.15	-	-	-	73.22	6.60	2.27	-	-	-	241.00	231.09	449.30	-	-	-	14.74	1.27	0.85	16.87
T32-PJFF	Tue-12/19	09:30	-	U462	81.29	5.75	8.25	-	-	-	119.88	9.80	4.24	-	-	-	263.03	250.41	470.80	-	-	-	14.69	1.14	0.93	16.77
T32-PJFF	Tue-12/19	11:00	-	U464	83.44	5.69	7.91	-	-	-	115.44	10.76	3.75	-	-	-	284.49	237.80	485.60	-	-	-	14.91	1.16	0.83	16.90
Averages																							14.8	1.2	0.8	16.8
Darco Carbon, Time Effect																										
T33-PJFF	Wed-12/20	08:00	-	U466	49.64	6.32	7.59	-	-	-	93.09	9.10	3.13	-	-	-	254.90	199.50	501.10	-	-	-	18.11	1.39	1.20	20.69
T33-PJFF	Wed-12/20	10:00	-	U468	47.76	6.30	7.55	-	-	-	83.38	8.59	2.93	-	-	-	268.10	236.70	521.60	-	-	-	17.73	1.61	1.21	20.56
Averages																							17.9	1.5	1.2	20.6
Darco Carbon, 20,000:1																										
T34-PJFF	Wed-12/20	12:00	-	U470	60.71	6.12	7.81	-	-	-	98.26	9.72	3.86	-	-	-	265.80	221.60	441.40	-	-	-	16.30	1.34	1.06	18.70
T34-PJFF	Wed-12/20	13:00	-	U472	63.01	6.24	7.78	-	-	-	101.97	9.38	3.78	-	-	-	269.50	241.20	461.40	-	-	-	16.52	1.36	1.05	18.93
Averages																							16.4	1.4	1.1	18.8
CaCl2/Carbon																										
T35-PJFF	Thu-12/21	08:00	-	U474	58.94	6.27	7.84	-	-	-	95.97	8.03	2.58	-	-	-	274.40	239.10	504.30	-	-	-	16.93	1.23	0.84	19.00
T35-PJFF	Thu-12/21	09:30	-	U476	43.66	6.10	7.93	-	-	-	65.96	7.09	2.30	-	-	-	282.40	232.70	522.20	-	-	-	16.16	1.43	1.04	18.64
T35-PJFF	Thu-12/21	09:30	-	U478	58.20	6.45	7.39	-	-	-	76.13	7.65	2.66	-	-	-	270.80	237.80	464.90	-	-	-	13.42	1.18	0.81	15.41
T35-PJFF	Thu-12/21	11:00	-	U480	49.53	5.74	7.45	-	-	-	85.76	8.66	2.74	-	-	-	258.10	213.40	449.40	-	-	-	16.93	1.41	0.94	19.28
Averages																							15.9	1.3	0.9	18.1

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=pH only test for Tris.

[illegible]

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer, TE=Tris and 1mM EDTA. P=H only test for Tris.

ECTC Pilot Trace Elements Removal Testing
Mercury Gas Sampling Results
Pilot Outlet Location
(WS Outlet)

Test ID	Date	Start Time	Other Imp. Cont.	ID	Gas Volume (dscf)	Moisture (% H ₂ O)	Out O ₂ (%)	Solid Hg Sample [Hg] (ppm)	Other Sample [Hg] (ng/ml)	Other Sample [Hg] (ng/ml)	H ₂ O ₂ Sample [Hg] (ng/ml)	H ₂ O ₂ Sample [Hg] (ng/ml)	KMnO ₄ Sample [Hg] (ng/ml)	Solid Hg Sample Mass (g)	Other Sample Mass (g)	Other Sample Mass (g)	H ₂ O ₂ Sample Mass (g)	H ₂ O ₂ Sample Mass (g)	KMnO ₄ Sample Mass (g)	Solid Hg [Hg] In Gas (µg/Nm ³)	Other [Hg] In Gas (µg/Nm ³)	Other [Hg] In Gas (µg/Nm ³)	H ₂ O ₂ [Hg] In Gas (µg/Nm ³)	H ₂ O ₂ [Hg] In Gas (µg/Nm ³)	KMnO ₄ [Hg] In Gas (µg/Nm ³)	Total [Hg] In Gas (µg/Nm ³)
<i>Tris, Hg spk, M29* @WS In Comp</i>																										
T28-E	Fri-12/8	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T28-E	Fri-12/8	08:30	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T28-E	Fri-12/8	09:30	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T28-E	Fri-12/8	10:30	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T28-E	Fri-12/8	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T28-E	Fri-12/8	09:30	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																										
<i>Enhanced Solubility (Solution Effects)</i>																										
T29-IY*	Mon-12/11	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T29-IY*	Mon-12/11	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																										
<i>Enhanced Solubility (Solution Effects)</i>																										
T30-IY*	Tue-12/12	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	09:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	10:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T30-IY*	Tue-12/12	11:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																										
<i>Tris Hg spk Intratrailn</i>																										
T31-IX	Mon-12/18	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	08:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	09:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	09:00	Tris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	10:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-IX	Mon-12/18	10:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tris/EDTA 4 ug/spk Comp @ WS In</i>																										
T31-NX	Mon-12/18	11:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-NX	Mon-12/18	11:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-NX	Mon-12/18	12:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T31-NX	Mon-12/18	12:00	TE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Averages																										

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=pH only test for Tris.

ECTC Pilot Trace Elements Removal Testing
Mercury Gas Sampling Results
Pilot Outlet Location
(WS Outlet)

Test ID	Date	Start Time	Other Imp. Cont.	Other ID	Gas Volume (dscf)	Moisture (% H2O)	Out O2 (%)	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Solid Hg	Other	Other	H2O2	H2O2	KMnO4	Total																			
								Sample [Hg] (ppm)	Sample [Hg] (ng/ml)	Sample [Hg] (ng/ml)	Sample [H2] (ng/ml)	Sample [H2] (ng/ml)	Sample [H2] (ng/ml)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	Sample Mass (g)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[Hg] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)	[H2] In Gas (µg/Nm3)															
Darco Carbon, 10,000:1																																													
T32-PJFF	Tue-12/19	08:00	-	U457	42.84	5.46	8.72	-	-	-	5.74	0.30	0.51	-	-	-	231.67	217.43	468.70	-	-	-	1.18	0.06	0.21	1.45																			
T32-PJFF	Tue-12/19	09:30	-	U459	48.03	5.30	9.02	-	-	-	6.36	0.35	0.30	-	-	-	233.73	246.22	491.10	-	-	-	1.17	0.07	0.12	1.36																			
T32-PJFF	Tue-12/19	09:30	-	U461	66.40	5.22	9.08	-	-	-	8.63	0.48	0.24	-	-	-	270.87	244.85	520.70	-	-	-	1.33	0.07	0.07	1.47																			
T32-PJFF	Tue-12/19	11:00	-	U463	79.84	5.30	8.59	-	-	-	16.41	1.11	0.17	-	-	-	257.91	219.18	487.80	-	-	-	2.01	0.12	0.04	2.16																			
Averages																																													
Darco Carbon, Time Effect																																													
T33-PJFF	Wed-12/20	08:00	-	U465	48.11	5.31	8.33	-	-	-	63.46	1.60	-	-	-	-	432.70	450.90	-	-	-	-	21.62	0.57	22.19																				
T33-PJFF	Wed-12/20	10:00	-	U467	45.95	5.38	8.28	-	-	-	96.41	4.47	1.18	-	-	-	259.70	254.90	528.70	-	-	-	20.64	0.94	0.52	22.10																			
Averages																																													
Darco Carbon, 20,000:1																																													
T34-PJFF	Wed-12/20	12:00	-	U469	60.50	5.47	8.61	-	-	-	15.50	0.79	1.27	-	-	-	261.00	232.90	542.70	-	-	-	2.53	0.12	0.43	3.08																			
T34-PJFF	Wed-12/20	13:00	-	U471	59.72	5.56	8.49	-	-	-	13.62	0.53	0.88	-	-	-	234.20	224.40	540.10	-	-	-	2.02	0.08	0.30	2.40																			
Averages																																													
CaCl2/Carbon																																													
T35-PJFF	Thu-12/21	08:00	-	U473	59.79	5.52	8.57	-	-	-	12.26	0.64	0.55	-	-	-	216.10	234.00	551.20	-	-	-	1.68	0.09	0.19	1.97																			
T35-PJFF	Thu-12/21	09:30	-	U475	53.44	5.86	8.70	-	-	-	13.98	0.71	0.30	-	-	-	256.70	252.40	490.00	-	-	-	2.54	0.13	0.10	2.78																			
T35-PJFF	Thu-12/21	09:30	-	U477	48.10	5.06	8.02	-	-	-	8.41	0.45	0.37	-	-	-	248.20	215.50	451.60	-	-	-	1.64	0.08	0.13	1.85																			
T35-PJFF	Thu-12/21	11:00	-	U479	49.53	5.74	8.04	-	-	-	16.61	1.02	0.26	-	-	-	237.90	221.00	496.20	-	-	-	3.02	0.17	0.10	3.29																			
Averages																																													

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=pl only test for Tris.

ECTC Pilot Trace Elements Testing
Mercury Gas Sampling Results
 Removal Summary
 (Normalized to 5% O₂)

Test ID	Date	Start Time	Other Imp.	Other					H2O2					KMnO4					Total Vapor				
				Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Total Hg Spiked	Hg Removal
				(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(%)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(%)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(%)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(µg/Nm ³)	(%)
PHV, 20 fps, 1300 gpm				DRG					DRG					DRG					DRG				
T24-N	Tue-11/28	08:00	H	8.71	-	0.35	-	-	0.71	-	0.03	-	-	1.14	-	1.73	-	-	10.56	-	2.11	-	-
T24-N	Tue-11/28	14:00	H	10.10	9.38	0.32	-	96.5	0.36	0.24	<0.01	-	94.8	0.98	0.26	1.16	-	-348.0	11.44	9.88	1.50	-	84.8
T24-N	Tue-11/28	16:00	H	9.97	9.23	0.65	-	93.0	0.36	0.47	0.07	-	85.5	0.85	0.43	1.54	-	-257.6	11.18	10.13	2.25	-	77.8
Averages				9.6	9.3	0.4	-	94.8	0.5	0.4	0.0	-	90.2	1.0	0.3	1.5	-	-302.8	11.1	10.0	2.0	-	81.3
PHV, 20 fps, 1300 gpm, Hg spk				DRG					DRG					DRG					DRG				
T24-E	Wed-11/29	08:00	H	8.62	44.25	2.42	35.63	94.5	1.07	4.51	0.19	3.44	95.9	0.98	3.67	14.10	2.69	-284.7	10.67	52.43	16.71	41.76	68.1
T24-E	Wed-11/29	09:30	H	9.21	45.36	3.60	36.15	92.1	0.71	4.71	0.28	4.00	94.0	1.58	3.79	14.64	2.21	-286.3	11.50	53.86	18.52	42.37	65.6
T24-E	Wed-11/29	11:00	H	10.41	46.35	3.71	35.94	92.0	0.70	5.33	1.76	4.62	66.9	1.66	4.17	14.98	2.51	-259.3	12.77	55.85	20.45	43.08	63.4
Averages				9.4	45.3	3.2	35.9	92.9	0.8	4.9	0.7	4.0	85.6	1.4	3.9	14.6	2.5	-276.8	11.6	54.0	18.6	42.4	65.7
PHV, 20 fps, 1300 gpm, HgCl₂ spk				DRG					DRG					DRG					DRG				
T24-C	Thu-11/30	08:00	H	8.26	8.62	1.22	0.36	85.9	1.36	0.63	0.22	-0.73	65.8	1.17	0.42	3.67	-0.75	-783.5	10.79	9.67	5.10	-	47.3
T24-C	Thu-11/30	09:30	H	9.04	8.44	1.51	-0.60	82.1	0.70	0.63	0.33	-0.06	47.1	1.71	0.57	3.31	-1.14	-477.7	11.45	9.64	5.15	-	46.6
T24-C	Thu-11/30	11:00	H	9.68	13.56	1.54	3.88	88.6	0.44	1.13	0.25	0.69	78.0	1.25	0.94	5.02	-0.30	-432.7	11.36	15.63	6.81	4.27	56.4
Averages				9.0	10.2	1.4	1.2	85.5	0.8	0.8	0.3	0.0	63.6	1.4	0.6	4.0	-0.7	-564.7	11.2	11.6	5.7	4.3	50.1
Tris 4 ug/spk Comp @ WS In																							
T25-NY	Mon-12/4	08:00	Tris	-	7.65	-	-	-	-	0.15	-	-	-	-	1.03	-	-	-	-	8.82	-	-	-
T25-NY	Mon-12/4	08:00	Tris	-	7.24	-	-0.41	-	-	0.47	-	0.32	-	-	7.02	-	5.99	-	-	14.72	-	5.90	-
T25-NY	Mon-12/4	09:00	Tris	-	6.78	-	-	-	-	0.71	-	-	-	-	0.99	-	-	-	-	8.48	-	-	-
T25-NY	Mon-12/4	09:00	Tris	-	6.20	-	-0.58	-	-	0.23	-	-0.49	-	-	9.89	-	8.90	-	-	16.31	-	7.83	-
T25-NY	Mon-12/4	10:00	Tris	-	7.34	-	-	-	-	0.39	-	-	-	-	1.00	-	-	-	-	8.73	-	-	-
T25-NY	Mon-12/4	10:00	Tris	-	7.52	-	0.18	-	-	0.40	-	0.01	-	-	7.88	-	6.88	-	-	15.80	-	7.07	-
T25-NY	Mon-12/4	11:00	Tris	-	7.04	-	-	-	-	0.33	-	-	-	-	1.56	-	-	-	-	8.94	-	-	-
T25-NY	Mon-12/4	11:00	Tris	-	7.00	-	-0.04	-	-	0.62	-	0.29	-	-	6.45	-	4.89	-	-	14.07	-	5.13	-
Averages																							
Tris, HgCl₂ spk, M29* @ WS In Comp				DRG					DRG					DRG					DRG				
T26-C	Wed-12/6	08:00	Tris	5.42	14.33	-	8.91	-	0.87	0.98	-	0.12	-	4.22	2.12	-	-2.10	-	10.51	17.43	-	6.92	-
T26-C	Wed-12/6	08:30	Tris	6.14	13.36	-	7.22	-	0.67	1.09	-	0.42	-	3.62	2.79	-	-0.84	-	10.43	17.23	-	6.80	-
T26-C	Wed-12/6	09:30	Tris	5.92	13.42	-	7.50	-	0.65	0.73	-	0.08	-	3.51	2.81	-	-0.70	-	10.08	16.96	-	6.88	-
T26-C	Wed-12/6	10:30	Tris	6.57P	9.14P	-	2.57P	-	0.38P	1.12P	-	0.73P	-	2.65P	6.43P	-	3.77P	-	9.60P	16.68P	-	7.08P	-
T26-C	Wed-12/6	08:00	H	-	17.33	-	-	-	-	0.69	-	-	-	-	0.33	-	-	-	-	18.35	-	-	-
T26-C	Wed-12/6	09:30	H	-	17.45	-	-	-	-	0.50	-	-	-	-	0.26	-	-	-	-	18.21	-	-	-
Averages				5.8	13.7	-	7.9	-	0.7	0.9	-	0.2	-	3.8	2.6	-	-1.2	-	10.3	17.2	-	6.9	-
Tris w/EDTA(1mM), HgCl₂ spk, M29*				DRG					DRG					DRG					DRG				
T27-C	Thu-12/7	08:00	TE	6.93	25.16	-	18.23	-	0.40	1.08	-	0.68	-	3.24	1.83	-	-1.42	-	10.57	28.07	-	17.50	-
T27-C	Thu-12/7	08:30	TE	7.80	22.31	-	14.51	-	0.56	1.50	-	0.94	-	2.85	2.56	-	-0.28	-	11.21	26.37	-	15.16	-
T27-C	Thu-12/7	09:30	TE	7.09	21.66	-	14.56	-	0.49	1.19	-	0.70	-	2.62	1.77	-	-0.85	-	10.20	24.62	-	14.42	-
T27-C	Thu-12/7	10:30	TE	7.65P	21.17P	-	13.52P	-	0.27P	1.58P	-	1.31P	-	2.49P	1.63P	-	-0.86P	-	10.41P	24.38P	-	13.96P	-
T27-C	Thu-12/7	08:00	H	-	22.47	-	-	-	-	0.41	-	-	-	-	0.24	-	-	-	-	23.12	-	-	-
T27-C	Thu-12/7	09:30	H	-	21.19	-	-	-	-	0.51	-	-	-	-	0.29	-	-	-	-	22.00	-	-	-
Averages				7.3	23.0	-	15.8	-	0.5	1.3	-	0.8	-	2.9	2.1	-	-0.8	-	10.7	26.4	-	15.7	-

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=pH only test for Tris.

ECTC Pilot Trace Elements Testing
Mercury Gas Sampling Results
Removal Summary
(Normalized to 5% O2)

				Other					H2O2					KMnO4					Total Vapor				
Test ID	Date	Start Time	Other Imp. Cont.	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal (%)	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal (%)	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal (%)	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Total Hg Spiked	Hg Removal (%)
				(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(%)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(%)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(%)	(µg/Nm3)	(µg/Nm3)
Tris, Hg spk, M29* @WS In Comp				DRG					DRG					DRG					DRG				
T28-E	Fri-12/8	08:00	Tris	5.73	20.90	-	15.17	-	0.51	0.87	-	0.36	-	4.80	3.73	-	-1.07	-	11.04	25.50	-	14.46	-
T28-E	Fri-12/8	08:30	Tris	6.29	16.16	-	9.87	-	0.43	0.99	-	0.56	-	4.40	5.25	-	0.85	-	11.13	22.40	-	11.28	-
T28-E	Fri-12/8	09:30	Tris	6.66	20.31	-	13.64	-	0.09	1.06	-	0.97	-	4.36	4.76	-	0.40	-	11.11	26.13	-	15.02	-
T28-E	Fri-12/8	10:30	Tris	7.22P	12.06P	-	4.83P	-	0.39P	0.79P	-	0.39P	-	3.43P	11.16P	-	7.73P	-	11.04P	24.00P	-	12.96P	-
T28-E	Fri-12/8	08:00	H	-	23.26	-	-	-	-	1.07	-	-	-	-	1.11	-	-	-	-	25.44	-	-	-
T28-E	Fri-12/8	09:30	H	-	25.52	-	-	-	-	1.22	-	-	-	-	1.07	-	-	-	-	27.81	-	-	-
Averages				6.2	19.1	-	12.9	-	0.3	1.0	-	0.6	-	4.5	4.6	-	0.1	-	11.1	24.7	-	13.6	-
Enhanced Solubility (Solution Effects)																							
T29-1Y*	Mon-12/11	08:00	H	-	9.06	-	-	-	-	0.38	-	-	-	-	0.38	-	-	-	-	9.82	-	-	-
T29-1Y*	Mon-12/11	08:00	H	-	16.63	-	7.57	-	-	2.40	-	2.02	-	-	16.96	-	16.58	-	-	35.98	-	26.17	-
T29-1Y*	Mon-12/11	09:00	H	-	9.20	-	-	-	-	0.35	-	-	-	-	0.28	-	-	-	-	9.83	-	-	-
T29-1Y*	Mon-12/11	09:00	H	-	12.95	-	3.75	-	-	2.96	-	2.61	-	-	7.25	-	6.97	-	-	23.16	-	13.33	-
T29-1Y*	Mon-12/11	10:00	H	-	9.53	-	-	-	-	0.39	-	-	-	-	0.23	-	-	-	-	10.14	-	-	-
T29-1Y*	Mon-12/11	10:00	H	-	12.32	-	2.79	-	-	1.88	-	1.50	-	-	3.87	-	3.65	-	-	18.07	-	7.93	-
T29-1Y*	Mon-12/11	11:00	H	-	9.42	-	-	-	-	0.26	-	-	-	-	0.25	-	-	-	-	9.94	-	-	-
T29-1Y*	Mon-12/11	11:00	H	-	11.79	-	2.37	-	-	1.74	-	1.47	-	-	2.55	-	2.30	-	-	16.07	-	6.14	-
Averages																							
Enhanced Solubility (Solution Effects)																							
T30-1Y*	Tue-12/12	08:00	H	-	9.00	-	-	-	-	0.31	-	-	-	-	0.21	-	-	-	-	9.52	-	-	-
T30-1Y*	Tue-12/12	08:00	H	-	10.92	-	1.92	-	-	1.81	-	1.50	-	-	3.48	-	3.27	-	-	16.21	-	6.69	-
T30-1Y*	Tue-12/12	09:00	H	-	9.16	-	-	-	-	0.35	-	-	-	-	0.28	-	-	-	-	9.79	-	-	-
T30-1Y*	Tue-12/12	09:00	H	-	13.51	-	4.35	-	-	3.31	-	2.96	-	-	6.96	-	6.67	-	-	23.78	-	13.99	-
T30-1Y*	Tue-12/12	10:00	H	-	9.36	-	-	-	-	0.37	-	-	-	-	0.29	-	-	-	-	10.02	-	-	-
T30-1Y*	Tue-12/12	10:00	H	-	14.65	-	5.29	-	-	3.78	-	3.41	-	-	10.31	-	10.02	-	-	28.74	-	18.72	-
T30-1Y*	Tue-12/12	11:00	H	-	9.93	-	-	-	-	0.28	-	-	-	-	0.23	-	-	-	-	10.44	-	-	-
T30-1Y*	Tue-12/12	11:00	H	-	19.53	-	9.61	-	-	5.40	-	5.13	-	-	12.06	-	11.82	-	-	36.99	-	26.55	-
Averages																							
Tris Hg spk Intratrailn				CRG					CRG					CRG					CRG				
T31-1X	Mon-12/18	08:00	Tris	-	4.81	-	-	-	-	0.28	-	-	-	-	0.79	-	-	-	-	5.88	-	-	-
T31-1X	Mon-12/18	08:00	Tris	-	3.28	-	-1.54	-	-	0.28	-	0.00	-	-	9.62	-	8.83	-	-	13.18	-	7.30	-
T31-1X	Mon-12/18	09:00	Tris	-	4.91	-	-	-	-	0.25	-	-	-	-	0.95	-	-	-	-	6.11	-	-	-
T31-1X	Mon-12/18	09:00	Tris	-	4.00	-	-0.91	-	-	0.28	-	0.03	-	-	7.50	-	6.56	-	-	11.79	-	5.68	-
T31-1X	Mon-12/18	10:00	TE	-	5.31	-	-	-	-	0.28	-	-	-	-	<0.49	-	-	-	-	6.08	-	-	-
T31-1X	Mon-12/18	10:00	TE	-	5.61	-	0.30	-	-	0.27	-	-0.01	-	-	7.68	-	7.19	-	-	13.56	-	7.49	-
Tris/EDTA 4 ug/spk Comp @ WS In				CRG					CRG					CRG					CRG				
T31-NX	Mon-12/18	11:00	TE	-	5.41	-	-	-	-	0.19	-	-	-	-	0.49	-	-	-	-	6.10	-	-	-
T31-NX	Mon-12/18	11:00	TE	-	10.04	-	4.63	-	-	0.27	-	0.08	-	-	0.61	-	0.12	-	-	10.92	-	4.82	-
T31-NX	Mon-12/18	12:00	TE	-	5.02	-	-	-	-	0.15	-	-	-	-	0.58	-	-	-	-	5.75	-	-	-
T31-NX	Mon-12/18	12:00	TE	-	8.19	-	3.17	-	-	0.06	-	-0.09	-	-	0.78	-	0.21	-	-	9.03	-	3.28	-
Averages																							

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=H only test for Tris.

ECTC Pilot Trace Elements Testing
Mercury Gas Sampling Results
Removal Summary
 (Normalized to 5% O₂)

		Other							H2O2						KMnO4						Total Vapor				
Test ID	Date	Start Time	Other Imp. Cont.	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal (%)	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal (%)	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Hg Spiked	Hg Removal (%)	Pre-Spike Inlet	Post-Spike Inlet	Outlet [Hg]	Total Hg Spiked	Hg Removal (%)		
				(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)		(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	(µg/Nm3)	
Darco Carbon, 10,000:1																									
T32-PJFF	Tue-12/19	08:00	-	-	-	-	-	-	-	SDA	PJFF	-	91.7	-	0.86	0.28	-	67.8	-	20.34	1.88	-	90.7		
T32-PJFF	Tue-12/19	09:30	-	-	-	-	-	-	-	19.94	1.66	-	91.7	-	1.06	0.16	-	85.2	-	21.00	1.81	-	91.4		
T32-PJFF	Tue-12/19	09:30	-	-	-	-	-	-	-	19.88	1.88	-	90.5	-	1.17	0.09	-	91.9	-	21.04	1.97	-	90.6		
T32-PJFF	Tue-12/19	11:00	-	-	-	-	-	-	-	19.64	2.74	-	86.1	-	1.01	0.05	-	94.9	-	20.65	2.79	-	86.5		
Averages				-	-	-	-	-	-	19.7	2.0	-	90.0	-	1.0	0.1	-	84.9	-	20.8	2.1	-	89.8		
Darco Carbon, Time Effect																									
T33-PJFF	Wed-12/20	08:00	-	-	-	-	-	-	-	23.26	27.31	-	-17.4	-	1.43	0.72	-	49.9	-	24.69	28.02	-	-13.5		
T33-PJFF	Wed-12/20	10:00	-	-	-	-	-	-	-	23.02	27.14	-	-17.9	-	1.44	0.65	-	55.1	-	24.46	27.79	-	-13.6		
Averages				-	-	-	-	-	-	23.1	27.2	-	-17.7	-	1.4	0.7	-	52.5	-	24.6	27.9	-	-13.6		
Darco Carbon, 20,000:1																									
T34-PJFF	Wed-12/20	12:00	-	-	-	-	-	-	-	21.40	3.42	-	84.0	-	1.29	0.56	-	56.7	-	22.69	3.98	-	82.5		
T34-PJFF	Wed-12/20	13:00	-	-	-	-	-	-	-	21.64	2.68	-	87.6	-	1.27	0.39	-	69.6	-	22.90	3.07	-	86.6		
Averages				-	-	-	-	-	-	21.5	3.1	-	85.8	-	1.3	0.5	-	63.2	-	22.8	3.5	-	84.5		
CaCl2/Carbon																									
T35-PJFF	Thu-12/21	08:00	-	-	-	-	-	-	-	22.08	2.28	-	89.7	-	1.02	0.25	-	75.6	-	23.10	2.53	-	89.0		
T35-PJFF	Thu-12/21	09:30	-	-	-	-	-	-	-	21.54	3.47	-	83.9	-	1.28	0.14	-	89.3	-	22.82	3.61	-	84.2		
T35-PJFF	Thu-12/21	09:30	-	-	-	-	-	-	-	17.17	2.12	-	87.6	-	0.95	0.16	-	83.0	-	18.11	2.28	-	87.4		
T35-PJFF	Thu-12/21	11:00	-	-	-	-	-	-	-	21.66	3.94	-	81.8	-	1.11	0.12	-	89.1	-	22.77	4.07	-	82.1		
Averages				-	-	-	-	-	-	20.6	3.0	-	85.7	-	1.1	0.2	-	84.3	-	21.7	3.1	-	85.7		

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=PI only test for Tris.

Test ID		Date	Start Time	Other Imp. Cont.	Spike Recovery			Spike Capture (By Impinger)					Spiked Mercury Removal Efficiency (By Impinger)					Total Hg Capture (CRG) (By Impinger)					Total Hg Capture (WS Inlet) (By Impinger)					Total Hg Capture (WS Outlet) (By Impinger)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
					Actual Spiked	Spiked Theo Hg	Percent Spike Rec	Other [Hg]	Other [Hg]	H2O2 [Hg]	H2O2 [Hg]	KMnO4 [Hg]	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	KMnO4 (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	KMnO4 (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	KMnO4 (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
					(µg/Nm3)	(µg/Nm3)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
PHV, 20 fps, 1300 gpm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
T24-N	Tue-11/28	08:00	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=only test for Tris.

[illegible]

*B=Baseline. Shaded areas indicate sampling problems. Individualized areas indicate mercury values below low standard. TE=Trits and mM EDTA. P=PII only test for Trits.

		Spike Recovery					Spike Capture (By Impinger)					Spiked Mercury Removal Efficiency (By Impinger)					Total Hg Capture (CRG) (By Impinger)					Total Hg Capture (WS Inlet) (By Impinger)					Total Hg Capture (WS Outlet) (By Impinger)				
Test ID	Date	Start Time	Other Imp. Cont.	Actual Spiked (µg/Nm3)	Spiked Theo Hg (µg/Nm3)	Percent Spike Rec (%)	Other [Hg] (%)	Other [Hg] (%)	H2O2 [Hg] (%)	H2O2 [Hg] (%)	KMnO4 [Hg] (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	KMnO4 (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	KMnO4 (%)	Other (%)	Other (%)	H2O2 (%)	H2O2 (%)	KMnO4 (%)	
Darco Carbon, 10,000:1																															
T32-PJFF	Tue-12/19	08:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88.8	7.0	4.2	-	-	81.3	4.0	14.6
T32-PJFF	Tue-12/19	09:30	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.4	7.6	5.0	-	-	86.4	5.0	8.7
T32-PJFF	Tue-12/19	09:30	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.6	6.8	5.5	-	-	90.7	4.5	4.8
T32-PJFF	Tue-12/19	11:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88.2	6.9	4.9	-	-	92.8	5.3	1.9
Averages				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	88.0	7.1	4.9	-	-	87.8	4.7	7.5
Darco Carbon, Time Effect																															
T33-PJFF	Wed-12/20	08:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.5	6.7	5.8	-	-	97.4	2.6	
T33-PJFF	Wed-12/20	10:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86.3	7.8	5.9	-	-	93.4	4.3	2.3
Averages				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86.9	7.3	5.8	-	-	93.4	50.8	2.4
Darco Carbon, 20,000:1																															
T34-PJFF	Wed-12/20	12:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.1	7.2	5.7	-	-	82.2	3.7	14.0
T34-PJFF	Wed-12/20	13:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.3	7.2	5.5	-	-	84.3	3.1	12.5
Averages				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.2	7.2	5.6	-	-	83.3	3.4	13.3
CaCl2/Carbon																															
T35-PJFF	Thu-12/21	08:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	89.1	6.5	4.4	-	-	85.4	4.8	9.8
T35-PJFF	Thu-12/21	09:30	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86.7	7.7	5.6	-	-	91.7	4.6	3.8
T35-PJFF	Thu-12/21	09:30	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.1	7.7	5.2	-	-	88.8	4.1	7.1
T35-PJFF	Thu-12/21	11:00	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.8	7.3	4.9	-	-	91.8	5.2	3.0
Averages				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.7	7.3	5.0	-	-	89.4	4.7	5.9

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Permoxid, Tris=Tris Buffer, TE=Tris and 1mM EDTA, P=PH only test for Tris.

Hg Gas Phase Spike Recovery

Test ID	Date	Start Time	Other Imp. Cont.	Hg	Hg	Hg	Hg	Hg	Injection Time (min)	Spiked Theo Hg (ppmv)	Spiked Theo Hg (ng/mL)	Gas Vol During Spk (DSCF)	Tris #1 pH	Tris #2 pH
				Vessel Temp i (°C)	Vessel Temp f (°C)	Rot. Setting	Rot. Flow (mLPM)							
PHV, 20 fps, 1300 gpm														
T24-N	Tue-11/28	08:00	H											
T24-N	Tue-11/28	14:00	H											
T24-N	Tue-11/28	16:00	H											
Averages														
PHV, 20 fps, 1300 gpm, Hg spk														
T24-E	Wed-11/29	08:00	H											
T24-E	Wed-11/29	09:30	H											
T24-E	Wed-11/29	11:00	H											
Averages														
PHV, 20 fps, 1300 gpm, HgCl2 spk														
T24-C	Thu-11/30	08:00	H											
T24-C	Thu-11/30	09:30	H											
T24-C	Thu-11/30	11:00	H											
Averages														
Tris 4 ug/spk Comp @ WS In														
T25-NY	Mon-12/4	08:00	Tris										7.55	8.60
T25-NY	Mon-12/4	08:00	Tris											
T25-NY	Mon-12/4	09:00	Tris										7.30	8.63
T25-NY	Mon-12/4	09:00	Tris											
T25-NY	Mon-12/4	10:00	Tris										6.89	8.55
T25-NY	Mon-12/4	10:00	Tris											
T25-NY	Mon-12/4	11:00	Tris										6.40	8.66
T25-NY	Mon-12/4	11:00	Tris											
Averages														
Tris, HgCl2 spk, M29* @ WS In Comp														
T26-C	Wed-12/6	08:00	Tris											
T26-C	Wed-12/6	08:30	Tris											
T26-C	Wed-12/6	09:30	Tris											
T26-C	Wed-12/6	10:30	Tris											
T26-C	Wed-12/6	08:00	H											
T26-C	Wed-12/6	09:30	H											
Averages														
Tris w/EDTA(1mM), HgCl2 spk, M29*														
T27-C	Thu-12/7	08:00	TE											
T27-C	Thu-12/7	08:30	TE											
T27-C	Thu-12/7	09:30	TE											
T27-C	Thu-12/7	10:30	TE											
T27-C	Thu-12/7	08:00	H											
T27-C	Thu-12/7	09:30	H											
Averages														

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=pH only test for Tris.

Hg Gas Phase Spike Recovery

Test ID	Date	Start Time	Imp. Cont.	Other Vessel Temp (°C)	Hg Vessel Temp (°C)	Rot. Flow (mLPM)	Hg Flow (min)	Injection Time (min)	Spiked Theo Hg (ppmv)	Spiked Theo Hg (ng/mL)	Gas Vol During Spk (DSCF)	Tris #1 pH	Tris #2 pH
Tris, Hg spk, M29* @ WS In Comp													
T28-E	Fri-12/8	08:00	Tris										
T28-E	Fri-12/8	08:30	Tris										
T28-E	Fri-12/8	09:30	Tris										
T28-E	Fri-12/8	10:30	Tris										
T28-E	Fri-12/8	08:00	H										
T28-E	Fri-12/8	09:30	H										
Averages													
Enhanced Solubility (Solution Effects,													
T29-IY*	Mon-12/11	08:00	H	3.0	3.0	60.0	100.0	41.0	0.33	2.97	-		
T29-IY*	Mon-12/11	08:00	H										
T29-IY*	Mon-12/11	09:00	H	1.0	1.0	60.0	100.0	42.0	0.28	2.46	-		
T29-IY*	Mon-12/11	10:00	H	1.0	1.0	60.0	100.0	45.0	0.28	2.46	-		
T29-IY*	Mon-12/11	10:00	H	1.0	1.0	60.0	100.0	45.0	0.28	2.46	-		
T29-IY*	Mon-12/11	11:00	H	1.0	1.0	60.0	100.0	51.0	0.28	2.46	-		
T29-IY*	Mon-12/11	11:00	H	1.0	1.0	60.0	100.0	51.0	0.28	2.46	-		
Averages													
Enhanced Solubility (Solution Effects,													
T30-IY*	Tue-12/12	08:00	H	4.0	3.0	60.0	100.0	20.0	0.35	3.11	-		
T30-IY*	Tue-12/12	08:00	H										
T30-IY*	Tue-12/12	09:00	H	1.0	1.0	60.0	100.0	42.0	0.28	2.46	-		
T30-IY*	Tue-12/12	10:00	H	1.0	1.0	60.0	100.0	68.0	0.28	2.46	-		
T30-IY*	Tue-12/12	10:00	H	1.0	1.0	60.0	100.0	68.0	0.28	2.46	-		
T30-IY*	Tue-12/12	11:00	H	1.0	1.0	60.0	100.0	86.0	0.28	2.46	-		
T30-IY*	Tue-12/12	11:00	H	1.0	1.0	60.0	100.0	86.0	0.28	2.46	-		
Averages													
Tris Hg spk IntraTrain													
T31-IX	Mon-12/18	08:00	Tris										
T31-IX	Mon-12/18	08:00	Tris	0.0	0.0	60.0	100.0	30.2	0.25	2.23	-		
T31-IX	Mon-12/18	09:00	Tris										
T31-IX	Mon-12/18	09:00	Tris	0.0	0.0	60.0	100.0	35.0	0.25	2.23	-		
T31-IX	Mon-12/18	10:00	TE										
T31-IX	Mon-12/18	10:00	TE	0.0	0.0	60.0	100.0	31.0	0.25	2.23	-		
Tris/EDTA 4 ug/spk Comp @ WS In													
T31-NX	Mon-12/18	11:00	TE										
T31-NX	Mon-12/18	11:00	TE										
T31-NX	Mon-12/18	12:00	TE										
T31-NX	Mon-12/18	12:00	TE										
Averages													

*B=Baseline. Shaded areas indicate sampling problems. Indicated areas indicate mercury values below low standard II-Pentast. Tris=Tris Buffer, TE=Tris and InM EDTA, P-pH only test for Tris

Hg Gas Phase Spike Recovery

Test ID	Date	Start Time	Other Imp. Cont.	Hg	Hg	Hg	Hg	Hg	Spiked Theo Hg (ppmv)	Spiked Theo Hg (ng/mL)	Gas Vol During Spk (DSCF)	Tris #1 pH	Tris #2 pH
				Vessel Temp	Vessel Temp f	Rot. Settling	Rot. Flow (mLPM)	Injection Time (min)					
Darco Carbon, 10,000:1													
T32-PJFF	Tue-12/19	08:00	-										
T32-PJFF	Tue-12/19	09:30	-										
T32-PJFF	Tue-12/19	09:30	-										
T32-PJFF	Tue-12/19	11:00	-										
Averages													
Darco Carbon, Time Effect													
T33-PJFF	Wed-12/20	08:00	-										
T33-PJFF	Wed-12/20	10:00	-										
Averages													
Darco Carbon, 20,000:1													
T34-PJFF	Wed-12/20	12:00	-										
T34-PJFF	Wed-12/20	13:00	-										
Averages													
CaCl2/Carbon													
T35-PJFF	Thu-12/21	08:00	-										
T35-PJFF	Thu-12/21	09:30	-										
T35-PJFF	Thu-12/21	09:30	-										
T35-PJFF	Thu-12/21	11:00	-										
Averages													

*B=Baseline. Shaded areas indicate sampling problems. Italicized areas indicate mercury values below low standard. H=Peroxide. Tris=Tris Buffer. TE=Tris and 1mM EDTA. P=ph only test for Tris.

APPENDIX E
QA/QC REPORT SUMMARY

WET SCRUBBER QA/QC SUMMARY

November/December 1995

The objective of the wet scrubber QA/QC program is to ensure the accuracy of key process instrumentation equipment associated with pilot, mini-pilot, and spray dryer system testing. Flow control valve flow meters, pump flow meters, tank level monitors, and flue gas flow rates are checked approximately once per month. Errors greater than 5% generally indicate that the instrument in question should be recalibrated or cleaned. The continuous emissions monitors (CEMs), used to measure inlet and outlet SO₂ and O₂ levels for the pilot, mini-pilot, and spray dryer systems, are checked and calibrated frequently (daily for pilot and mini-pilot; weekly for spray dryer). During these calibration checks, span errors greater than 5% on any CEM system require an adjustment of the respective span potentiometer. During additive testing, chemical addition rates are checked daily, with adjustments made if the flow rates are outside of the test parameter. A status update for each QA/QC point found out of calibration is presented below. A complete record of the process QA/QC for November and December is presented at the end of this section.

Pilot Blowdown to Sump

A flow check was performed on the Blowdown to Sump on November 3. Actual flow rates were low by 22.77% and 26.50%. The ECTC I&C department was notified and the flow meter was recalibrated. Also, as the NYSEG Station experienced an outage at the beginning of November (11/9), the flow meter was rechecked. This flow meter had previously been disassembled, cleaned and inspected in October. It will be re-examined in the future if the problem persists.

During the month of December, the majority of testing involved gas sampling with evaluations of impinger solutions. The last day of this scheduled test block was December 21. Throughout all the testing in December, there were no key process instruments requiring calibration.

ECTC Laboratory Quality Control/Quality Assurance

During the second quarter of 1995, the ICAPES developed communication problems between the controlling computer and the unit. Normally, the analysis can be performed with the unit, but occasionally the analyst has to restart the analytical procedure because of the software miscommunication. The manufacturer was consulted and suggested that the power supplied to the unit be investigated for signal noise. We have conducted some brief investigations into the ICAPES computer power supply and the electrical power supplies to the ICAPES unit. No abnormalities have been found to date; however, longer term tests need to be conducted to correlate them with the communications problems. This problem still continues but has not reduced the quality of the data provided while using the unit.

The Flow-Injection Mercury System (FIMS) has been operating reliably throughout the quarter. The new software BIOS installed into the controlling computer has solved the problems experienced earlier. The FIMS computer problem was reported in earlier 1995 Lab QA/QC reports.

All other laboratory instrumentation is in good operating condition. The QA/QC data continue to be compiled, graphed, and submitted to the program manager in a quarterly memorandum. In general, the QA/QC data indicate very good data quality. Those samples which fail the QA/QC criteria are typically rerun as necessary.

EPRI ECTC WET PROCESS QA/QC RECORD
NOVEMBER 1995

	Date	Actual	Instrument Reading	% Error	Actual	Instrument Reading	% Error	Point ID
PILOT								
DBA to P-FLRT (ml/min)	11/1	121.80	120.47	-1.09	#####	112.08	-1.68	PAI014
DBA to P-FLRT (ml/min)	11/1	259.60	259.91	0.12				PAI014
Velocity Traverse (scfm)	11/2	13502	13402	-0.74				
Reagent Feed Pump 16 (gpm)	11/2	2.13	2.05	-3.80	1.20	1.18	-1.42	PAI020
Reagent Feed Pump 16 (gpm)	11/2	0.86	0.8	-6.98				PAI020
Blowdown to Sump (gpm)	11/3	2.06	2.53	22.77	0.80	1.01	26.50	PAI039
VME Wash Header #1 (gpm)	11/6	38.00	39.00	2.63				PAI022
VME Wash Header #2 (gpm)	11/6	38.80	39.00	0.52				PAI023
Quench (gpm)	11/6	2.49	2.53	1.61	2.98	3.00	0.67	PAI003
Blowdown to Sump	11/9	0.59	0.70	18.64	0.85	1.00	17.65	PAI039
Centrifuge Blowdown (Pump 14)	11/13	4.20	4.00	-4.81	12.23	11.99	-1.94	PAI012
Service Water to RWST (gpm)	11/14	4.16	3.95	-5.07				PAI004
Recycle Water to RWST (gpm)	11/14	1.09	1.07	-2.11				PAI021
Regent Feed Pump (Pump 16)	11/14	1.29	1.25	-2.95				PAI020
P-RSST Level (ft.)	11/14	11.83	11.70	-1.11				PAI049
ME-RWWT Level (ft.)	11/14	4.13	4.06	-1.58				PAI024
P-RWST Level (ft.)	11/14	4.42	4.22	-4.57				PAI035
P-FLRT Level (ft.)	11/14	11.25	11.45	1.77				PAI045
Velocity Traverse (scfm)	11/22	17029	17394	2.14	14903	14777	-0.85	
Reagent Feed Pump	11/28	2.98	3.02	1.34				PAI020

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