GW-028

2016
AGWMR
Part 1 of 8

2017

HOLLYFRONTIER.

February 28, 2017

Mr. John E. Kieling, Chief
Hazardous Waste Bureau
New Mexico Environmental Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Mr. Carl Chavez
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: ***2016 Annual Groundwater Report* Submittal, HollyFrontier Navajo Refining LLC, Artesia Refinery**
RCRA Permit No. NMD048918817
Discharge Permit GW-028

Dear Mr. Kieling and Mr. Chavez:

Please find enclosed paper and electronic copies of the *2016 Annual Groundwater Report*, which fulfills requirements 4.7.6.b of the Post Closure Care Permit and 2.G of Discharge Permit GW-028.

If you have any questions or comments regarding this report, please feel free to contact me at 575-746-5487 or Robert Combs at 575-746-5382.

Sincerely,

Scott M. Denton
Environmental Manager
HollyFrontier Navajo Refining LLC

cc: Robert Combs, HollyFrontier Navajo Refining LLC, Artesia, New Mexico
Julie Speer, TRC, Austin, Texas
Catriona Smith, TRC, Austin, Texas

2016 Annual Groundwater Monitoring Report

NMD048918817 and DP GW-028

HollyFrontier Navajo Refining LLC
Artesia Refinery
Artesia, New Mexico

February 2017

Prepared for:

HOLLYFRONTIER
HollyFrontier Navajo Refining LLC
Artesia, New Mexico

Prepared by:

TRC
TRC Environmental Corporation
Austin, Texas

2016 Annual Groundwater Monitoring Report

NMD048918817 and DP GW-028

HollyFrontier Navajo Refining LLC
Artesia Refinery
Artesia, New Mexico

Prepared for:

HOLLYFRONTIER

HollyFrontier Navajo Refining LLC
Artesia, New Mexico

Prepared by:

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TRC Project No. 249545

February 2017

TRC Principal Lead
Julie Speer, Project Manager

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Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Scott M. Denton

Environmental Manager, HollyFrontier Navajo Refining LLC

EXECUTIVE SUMMARY

This *2016 Annual Groundwater Monitoring Report* documents groundwater monitoring and recovery activities conducted at the HollyFrontier Navajo Refining LLC (Navajo) Artesia Refinery (refinery) located at 501 East Main Street in Artesia, New Mexico. The refinery is subject to (1) a Post-Closure Care Permit (PCC Permit) issued by the New Mexico Environment Department (NMED) in October 2003 and later modified in December 2010; and (2) the renewed Discharge Permit GW-028, dated August 22, 2012, issued by New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD). Both the PCC Permit and Discharge Permit require Navajo to conduct facility wide groundwater monitoring to evaluate the presence, nature, and extent of groundwater impacts; and to remediate impacted groundwater. This report provides the results of all groundwater monitoring and remedial activities that were conducted to satisfy both the NMED PCC Permit and the OCD Discharge Permit.

The groundwater monitoring program consists of semiannual well gauging and groundwater sampling in accordance with the *2015 Revised Facility Wide Groundwater Monitoring Workplan* (2015 Revised FWGMWP) that was submitted to the NMED and OCD in December 2015 and approved with modification on February 19, 2016. Remedial activities consist of recovery of phase-separated hydrocarbons (PSH) and impacted groundwater. The groundwater monitoring and remediation program covers the following refinery areas:

- The closed Tetra Ethyl Lead (TEL) Impoundment;
- The closed North Colony Landfarm (NCL);
- The inactive Evaporation Ponds (EPs)
- Three Mile Ditch (TMD); and
- The impacted vadose zone located beneath the refinery in the following other areas: Field East of Refinery, North Refinery, South Refinery, Reverse Osmosis (RO) Reject Fields, Cross-gradient, and Up-gradient.

The 2016 groundwater monitoring results indicate physical and chemical groundwater conditions are generally consistent with historical data. Groundwater predominantly flows to the east beneath the refinery towards the Pecos River, and to the southeast beneath the EPs. Measurable PSH was present in wells located at or near the EPs, Field East of Refinery, North Refinery, and South Refinery areas in 2016, with a maximum measured thickness of 1.11 feet during the first semiannual event and 0.55 feet during the second semiannual event. The presence and distribution of PSH in 2016 was generally consistent with historical data and measured PSH thicknesses are stable to decreasing over time. The following constituents of concern (COCs) were detected in groundwater at concentrations in exceedance of critical groundwater screening levels (CGWSLs): total petroleum hydrocarbons (TPH) diesel range organics (DRO); select volatile

organic compounds (VOCs) including target COCs benzene, toluene, ethylbenzene, xylenes, MTBE, and naphthalene; select total metals including target COC arsenic; and water quality parameters chloride, fluoride, sulfate, total dissolved solids (TDS), and nitrate/nitrite. COC concentrations in groundwater are generally stable to decreasing over time with the exception of occasional fluctuations. DRO concentrations have exhibited increasing overall trends in some wells since approximately 2011, but DRO concentrations in a majority of these wells have exhibited stabilizing trends over the three to five most recent sampling events.

PSH and impacted groundwater were continually recovered at the refinery from a system of recovery trenches and recovery wells throughout 2016. An estimated 7,968,010 gallons of groundwater and an estimated 33,958 gallons of PSH were recovered through operation of the automated recovery system in 2016.

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LIST OF ACRONYMS AND ABBREVIATIONS

1,2,4-TMB	1,2,4-Trimethylbenzene
1,3,5-TMB	1,3,5-Trimethylbenzene
cis-1,2,-DCE	cis-1,2,-Dicholoroethene
AOC	Area of Concern
CGWSL	Critical Groundwater Screening Level
COC(s)	Constituent(s) of Concern
DO	Dissolved Oxygen
DRO	Diesel Range Organics
GRO	Gsoline Range Organics
EP(s)	Evaporation Pond(s)
ESC	ESC Lab Sciences
FWGMWP	Facility Wide Groundwater Monitoring Workplan
GRO	Gasoline Range Organics
HMI	Hydrologic Monitoring, LLC
HWB	Hazardous Waste Bureau
Navajo	HollyFrontier Navajo Refining LLC
MCL	Maximum Contaminant Level
MTBE	Methyl Tert-Butyl Ether
NCL	North Colony Landfarm
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NWS	National Weather Service
O&M	Operation and Maintenance
OCD	New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division
ORP	Oxidation-Reduction Potential
PCC Permit	Post-Closure Care Permit
PSH	Phase-Separated Hydrocarbons
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RO	Reverse Osmosis

SWMU	Solid Waste Management Units
TDS	Total Dissolved Solids
TEL	Tetra Ethyl Lead
TMD	Three Mile Ditch
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WQCC	Water Quality Control Commission

1.0 INTRODUCTION

On behalf of HollyFrontier Navajo Refining LLC (Navajo), TRC Environmental Corporation (TRC) prepared this *2016 Annual Groundwater Monitoring Report* (report) to summarize the results of groundwater monitoring and recovery activities conducted in 2016 at the Navajo Artesia Refinery (refinery) located at 501 East Main Street in Artesia, New Mexico. The location of the refinery is shown on Figure 1. The Refinery has been in operation since the 1920s and processes crude oil into asphalt, fuel oil, gasoline, diesel, jet fuel, and liquefied petroleum gas.

The refinery is regulated under the Resource Conservation and Recovery Act (RCRA). In October 2003, the Secretary of the New Mexico Environment Department (NMED) issued a Post-Closure Care Permit (PCC Permit) to Navajo for the Artesia Refinery Facility (United States Environmental Protection Agency [US EPA] ID number NMD048918817). The PCC Permit was modified and reissued in December 2010 (NMED 2010). The PCC Permit authorizes and requires Navajo (the Permittee) to conduct post-closure care at the closed tetra ethyl lead (TEL) surface impoundment and the North Colony Landfarm (NCL) and to take appropriate actions to achieve RCRA closure of the inactive Evaporation Ponds (EPs). These areas and the locations of all existing monitoring and recovery wells are shown on Figure 2.

The PCC Permit requires Navajo to maintain a groundwater monitoring program to evaluate the effectiveness of the corrective action program for groundwater and to meet the requirements of New Mexico Administrative Code (NMAC) 20.4.1.500 (incorporating 40 Code of Federal Regulations Part 264, Subpart F) during the post-closure care period. The PCC Permit also requires Navajo to recover phase-separated hydrocarbons (PSHs), where present, from the shallow groundwater.

The refinery is also regulated by the New Mexico Energy, Minerals and Natural Resources Department – Oil Conservation Division (OCD). The OCD issued a renewal to Discharge Permit GW-028 (OCD 2012) dated August 22, 2012. Among other requirements, the Discharge Permit requires semiannual facility-wide groundwater monitoring and submittal of an annual report summarizing the groundwater monitoring and remediation conducted throughout each year.

This report provides the results of all groundwater monitoring and remedial activities that were conducted to satisfy both the NMED PCC Permit and the OCD Discharge Permit. The format of this report follows specifications in Appendix E.4 of the PCC Permit.

Groundwater monitoring activities conducted in 2016 consisted of semiannual well gauging and groundwater sampling performed in accordance with the *2015 Revised Facility Wide Groundwater Monitoring Workplan* (2015 Revised FWGMWP; Arcadis 2015c) that was submitted to the NMED and OCD in December 2015 and approved with modification on February 19, 2016. Remedial activities conducted in 2016 consisted of recovery of PSH and impacted

groundwater and periodic gauging. The groundwater monitoring and remediation activities were performed in the following areas of interest:

- The closed TEL Impoundment;
- The closed NCL;
- The inactive EPs
- Three Mile Ditch (TMD); and
- The impacted vadose zone located beneath the refinery in the following other areas:
    - Field East of Refinery,
    - North Refinery,
    - South Refinery,
    - Reverse Osmosis (RO) Reject Fields (North and South),
    - Cross-gradient, and
    - Up-gradient.

2.0 SCOPE OF SERVICES

Groundwater monitoring, remedial, and other associated activities performed in 2016 are summarized in this section. The first semiannual groundwater monitoring event was conducted from April 26 to April 29, 2016. The second semiannual groundwater sampling event was conducted from October 4 to October 5, 2016. Routine remedial activities were conducted throughout 2016.

2.1 Monitoring Well Installation, Maintenance, and Repairs

No wells were installed or abandoned in 2016. The following well maintenance and repairs were performed in 2016:

- The protective surface casing of monitoring well MW-39 was repaired and the locking cap was replaced in 2016.
- Locking J-plugs and locks were replaced on various monitoring wells as required throughout 2016.
- PSH absorbent socks were installed and maintained in wells MW-7, MW-64, MW-65, MW-85, MW-86, and KWB-8.
- Monitoring well NCL-32 was re-developed on October 4, 2016 to remove silt that had accumulated in the well. The well was developed by surging and purging techniques with a peristaltic pump. Field documentation of the redevelopment of NCL-32 is provided in Appendix A.

2.2 Phase-Separated Hydrocarbon and Water Level Measurements

Synoptic fluid gauging was conducted by Hydrologic Monitoring, LLC (HMI) at the beginning of each semiannual monitoring event in accordance with the 2015 Revised FWGMWP. Wells were gauged to determine the groundwater elevation, flow direction, and gradient, the presence or absence of PSH, and apparent PSH thickness. A decontaminated oil-water interface probe was used to measure depth to PSH (if present), depth to water, and total depth in the monitoring and recovery wells. All measurements were recorded to the nearest 0.01-foot from the surveyed datum marking on each well casing. If the survey datum mark was not visible, measurements were obtained from the northern side of each well riser. Measurements were recorded on the field data sheets for each event.

The first semiannual gauging event was conducted on April 26, 2016. No rainfall was recorded at the refinery, or at a National Weather Service (NWS) gauging station located approximately 6 miles south of the refinery, during the day gauging occurred. A total of 0.53 inches of rainfall was recorded at the NWS gauging station during the month of April 2016. A copy of the NWS data for April 2016 is provided in Appendix A.

The second semiannual gauging event was conducted on October 4, 2016. No rainfall was recorded at the refinery or the NWS gauging station during the day gauging occurred. A total of 1.42 inches of rainfall was recorded at the NWS gauging station during the month of October 2016, all of which occurred after completion of gauging and sampling activities. A copy of the NWS data for October 2016 is provided in Appendix A.

Results of the 2016 semiannual gauging events are summarized in Table 1. Potentiometric surface maps of the shallow saturated zone and valley fill zone are provided as Figures 4 through 7. PSH thickness maps are provided as Figures 8 and 9.

2.3 Groundwater Sample Collection and Handling

Semiannual groundwater sampling was conducted by HMI in accordance with the 2015 Revised FWGMWP. No sample was collected from a well containing PSH with a measured thickness greater than or equal to 0.03 feet. The following wells were not sampled during each 2016 semiannual event due to the presence of PSH with a thickness greater than or equal to 0.03 feet:

- First semiannual event: MW-85, MW-86, MW-97, MW-112, MW-132, MW-133, KWB-4, KWB-8, RW-8, RW-14R, RW-#15C, RW-19, RW-22, RW-20A, and RW-20B
- Second semiannual event: MW-85, MW-86, MW-97, MW-112, MW-132, MW-133, and KWB-4

Groundwater was purged and sampled from monitoring and recovery wells with a peristaltic pump and dedicated tubing using low-flow methods in accordance with the NMED Hazardous Waste Bureau (HWB) Position Paper "Use of Low-Flow and Other Non-Traditional Sampling Techniques for Compliance Groundwater Monitoring" (NMED 2001). Groundwater was purged and sampled from irrigation wells by attaching a decontaminated or dedicated hose barb to the available spigot. The spigot was located at a point before the water supply is introduced into any storage tanks or treatment units. The method by which each well was purged and sampled is provided in Table 2.

A multi-parameter water quality meter with flow-through cell and hand-held turbidity meter were used during the purging process of monitoring and recovery wells to monitor for field water quality parameters (pH, temperature, specific conductance, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity) and demonstrate stabilization. Water quality parameters were recorded approximately every three minutes during purging on a groundwater sampling form. The water quality parameters, depth to water (in non-irrigation wells only), and a qualitative description of the water quality (e.g., turbidity, sheen, odor) were also recorded during the purging process. Copies of the groundwater sampling forms are provided in Appendix A.

Irrigation wells were purged and sampled from a sampling point (i.e., tap or spigot) located at or near the well head or pump house and before the water supply is introduced into any storage tank or treatment unit. The wells were purged at the sample point to remove any standing water from the well casing and surface piping. Grab readings of geochemical parameters including pH, temperature, conductivity, ORP, DO, and turbidity were also collected during the purging process.

The purging process was considered complete and groundwater sampling commenced when at least four of the purge parameters had stabilized. The specified stabilization criteria was +/- 0.2 standard unit for pH, +/- 0.2 degree Celsius for temperature, +/- 0.2 milligram per liter (mg/L) for DO, +/- 0.02 Siemen per meter for specific conductance, and +/- 20 millivolts for ORP. The final stabilized water quality parameters measured at each well are summarized in Table 2. In addition, other observations of relative water quality (color and odor) are included in Table 2.

Groundwater samples were collected directly from the dedicated tubing or irrigation sampling point into laboratory-provided sample containers. Care was taken to not overflow the containers and potentially remove preservatives from pre-preserved containers. Samples that were to be analyzed for dissolved metals were field-filtered by attaching a disposable 0.45 micron filter to the tubing and directing the flow through the filter into the sample container.

Sample labels were placed on each container and included the well name, sample name, date and time, sampler's initials, and analytical method(s) to be performed. Glass sample containers were placed in padded packing sleeves to prevent breakage. All samples were placed on wet ice in a shipping container. All groundwater samples collected during the 2016 semiannual events were submitted to ESC Lab Sciences (ESC) in Mount Juliet, Tennessee under appropriate chain-of-custody documentation for laboratory analyses specified in the 2015 Revised FWGMWP. Shipping containers were sent overnight to ESC via Federal Express. Copies of the chain-of-custody forms are included in Appendix B with the analytical data reports.

2.4 Equipment Decontamination Procedures

The oil-water interface probes used to gauge the PSH and water levels were the only equipment that was placed within multiple wells. This equipment was decontaminated between uses at each well to prevent cross-contamination between wells. The probe and the attached measuring tape were washed in a mixture of water and non-phosphate detergent (Alconox™). The equipment was then rinsed with water. Distilled water purchased from a local store was used for washing and rinsing the equipment.

The flow-through cell and probes of the water quality meters used for low-flow purging was also decontaminated between uses at each well. Decontamination of this equipment included submersing the flow-through cell in a mixture of water and non-phosphate detergent (Alconox™), washing the cell with a soft brush, submersing the probe end of the meters in the soapy water

mixture, and brushing the end of the probe with a soft brush. The equipment was then rinsed with distilled water purchased from a local store.

Dedicated tubing was used for sample collection from each well; therefore, decontamination of sample collection tubing was not required. The dedicated tubing was left in the well between sampling events, with the upper portion coiled to ensure that the lower portion did not remain in the water column. At the beginning of each sampling event, the tubing was inspected and replaced if staining or mold was observed.

2.5 Investigation-Derived Waste

All purge water and decontamination liquids were temporarily contained in a portable tank in the sampling truck trailer. The liquids were disposed of daily in the refinery process wastewater system upstream of the oil/water separator, by releasing the liquids into a sump designated by refinery personnel (either the sump adjacent to the Main Gate Entrance or the sump adjacent to the North Bundle Cleaning Pad). The volumes of purge water collected at each well were recorded on the HMI groundwater sampling forms and copies of these forms are provided in Appendix A.

Solid wastes generated during sampling activities included disposable gloves, paper towels, plastic bags, and tubing. All solid waste was contained in plastic bags and placed in the refinery trash receptacles for later disposal.

2.6 Exceptions to Groundwater Monitoring Work Plan

The following exceptions to the 2015 Revised FWGMWP occurred during the first semiannual monitoring event conducted from April 26 to April 29, 2016:

- Wells KWB-3AR and KWB-9 were not gauged or sampled, and RA-1227 was not sampled because access was denied by the landowner (Jack Joy). The landowner has not granted Navajo access to these wells since 2011.
- Well RW-11 was not sampled because it was dry.

The following exception to the 2015 Revised FWGMWP occurred during the second semiannual monitoring event conducted from October 4 to October 5, 2016:

- Wells KWB-3AR and KWB-9 were not gauged or sampled, and RA-1227 was not sampled because access was denied by the landowner (Jack Joy). The landowner has not granted Navajo access to these wells since 2011.

3.0 REGULATORY CRITERIA

Regulatory standards used to evaluate the data collected for the groundwater monitoring program are based on the presumption that the shallow groundwater might be used as a source of drinking water. Use of these standards are conservative because the shallow groundwater is not a documented source of drinking water. The screening level value used for each COC is the lower value of either the New Mexico Water Quality Control Commission (WQCC) standards from 20.6.2.3103 NMAC or the Maximum Contaminant Level (MCL) from the USEPA Regional Screening Levels (USPEA 2015). For COCs where neither a WQCC standard or MCL exists, the screening level value used is the NMED Tap Water Standard listed in the Risk Assessment Guidance for Site Investigations and Remediation (NMED 2015). If no NMED Tap Water value is available, then the screening level value used is the USEPA Tap Water value (USEPA 2015).

NMED does not currently have screening guidelines established for total petroleum hydrocarbons (TPH) in groundwater, as TPH screening guidelines were not included in the 2015 update to the risk assessment guidance document (NMED 2015). To be consistent with historical screening methods used at the refinery, the TPH screening value for potable groundwater for "unknown oil" included in Table 6-2 of the 2012 guidance document (NMED 2012), in accordance with NMED comments, was used for all areas except the EPs. The screening value for potable groundwater for "Diesel #2/New Crankcase Oil" (Table 6-2, NMED 2012) is used for the EP area in accordance with the approved investigation report for the EPs (Arcadis 2015a).

Available regulatory screening levels and the applicable Critical Groundwater Screening Level (CGWSL) for each COC is presented in Table 3. The CGWSL for each COC is also provided for comparison in the analytical data summary tables, as discussed later in this report.

An evaluation of background groundwater quality was conducted between July 2014 and June 2015 for the purpose of determining the concentrations of COCs that may be present in the background. The evaluation was performed according to an approved work plan (Arcadis 2014) and a report summarizing the evaluation was submitted to NMED and OCD in September 2015 (Arcadis 2015b). The background groundwater investigation included statistical evaluation of COCs and calculation of upper tolerance limits, where a statistically valid set of data was available. Navajo requested to use the background groundwater evaluation to develop alternative screening standards for specific COCs where the background data set demonstrates that the COCs are present above the WQCC standards or MCLs. The alternative standards have not been included in this report because the NMED has not approved background groundwater investigation report. However, it should be noted that concentrations of manganese, chloride, fluoride, sulfate, nitrate/nitrite and TDS that exceed the screening levels using the WQCC standards or USEPA MCLs may not exceed background concentrations

.

4.0 MONITORING RESULTS

Results of the 2016 semiannual groundwater monitoring events are summarized in this section.

4.1 Groundwater Gauging Results

Well gauging was conducted on April 26, 2016 and October 4, 2016. Depth to water measurements, depth to PSH (if present) measurements, and groundwater elevations are presented in Table 1. For wells with PSH present, the groundwater elevation was corrected for the presence of PSH (with a specific gravity of 0.8). Groundwater potentiometric surface maps based on the 2016 semiannual gauging results for the shallow saturated zone and the valley fill zone are presented in Figures 4 through 9.

The 2016 gauging results indicate groundwater predominantly flows beneath the refinery eastward towards the Pecos River, with localized variations, in both the shallow saturated zone and the valley fill zone. The groundwater flow direction beneath the EPs is generally to the southeast. The 2016 gauging results are consistent with historical results.

Groundwater mounding, related with the discharge of RO reject water to the RO reject fields, occurred around MW-114 and MW-115 during both semiannual gauging events. Localized groundwater sinks were present around various recovery wells during both semiannual gauging events due to active groundwater pumping at those recovery wells.

4.2 Phase-Separated Hydrocarbons

The presence of PSH and measured PSH thicknesses are shown on Figures 8 and 9 for the 2016 first and second semiannual events, respectively. Consistent with previous results, PSH is present in four areas at the refinery: two isolated areas in the northern portion of the refinery (NCL and North Refinery Area), one segmented area in the southeastern portion of the refinery (South Refinery Area) extending east through the field east of the refinery to Bolton Road, and one isolated area on the western end of the EPs near the former discharge point into Pond 1. Plots presenting PSH thicknesses and groundwater elevations over time for all wells that have historically contained measurable PSH are provided in Appendix C. PSH thicknesses across all areas of interest are stable to declining over time. PSH thicknesses also appear to be inversely affected by fluctuations in groundwater elevations, which have generally increased since March 2014.

The presence of PSH within each area of interest are discussed in the following subsections. PSH recovery activities and results are provided in Section 6.

4.2.1 North Colony Landfarm – PSH Gauging Results

No measurable PSH was present in any of the wells in the vicinity of the NCL during the 2016 semiannual events. PSH was historically present in monitoring well MW-94, but measured thicknesses steadily declined from a maximum thickness of 12.4 feet in September 2010 to not measureable in October 2015.

4.2.2 Tetra Ethyl Lead Surface Impoundment – PSH Gauging Results

No measurable PSH was present in any TEL wells during either 2016 semiannual event.

4.2.3 Evaporation Ponds– PSH Gauging Results

PSH was measured in EP wells MW-85 and MW-86 at thicknesses of 0.54 and 0.04 feet, respectively in April 2016; and 0.45 and 0.07 feet, respectively in October 2016. These wells are located near the original discharge point in EP 1. PSH thicknesses in these two wells have overall decreased over time, despite minor fluctuations between the gauging events.

4.2.4 Three Mile Ditch – PSH Gauging Results

No measurable PSH was present in any wells along the TMD during either 2016 semiannual event.

4.2.5 North Refinery Area – PSH Gauging Results

PSH was measured in wells MW-97 and RW-8 in April 2016 with reported thickness of 0.08 foot and 0.26 feet, respectively. In October 2016, PSH was measured in MW-92, MW-97, and RW-8 with reported thicknesses ranging from 0.01 feet in MW-92 to 0.08 feet in RW-8.

PSH thicknesses in these three wells have overall decreased over time, despite minor fluctuations between the gauging events. The fluctuations of PSH thickness in these wells are likely due to fluctuations in groundwater elevation and the influence of active PSH recovery. PSH and groundwater is routinely removed from this plume by automated pumping from RW-1R, RW-2R, RW-7R, and RW-8R. Measurable PSH was recovered from recovery wells RW-2R and RW-8R in 2016. The recovered PSH is pumped to Tank 49 within the refinery and then to crude tanks for processing.

4.2.6 South Refinery Area – PSH Gauging Results

PSH was measured in wells KWB-4, RW-5R, RW-6, RW-15C, and RW-19 in April 2016 with thicknesses ranging from 0.01 feet in RW-6 to 0.08 feet in RW-19. PSH was measured in wells KWB-4, MW-65, RW-5R, and RW-19 in October 2016 with thicknesses ranging from 0.08 feet in RW-5R to 0.55 feet in KWB-4. PSH has intermittently been present at measurable thicknesses in wells KWB-4, MW-65, RW-5R, RW-15C, and RW-19 over time.

Although PSH thicknesses in these area wells have fluctuated intermittently, PSH thicknesses in these wells continue to overall decrease over time. The fluctuations of PSH

thickness in these area wells are likely due to fluctuations of groundwater elevation and the influence of active PSH recovery. Groundwater and PSH is routinely removed from this plume by automated pumping from RW-4R, RW-5R, RW-6R, RW-15, and RW-19. Measureable PSH was recovered from all of these recovery wells in 2016 with the exception of RW-5R. The recovered PSH is pumped to Tank 49 within the refinery and then to crude tank for processing.

4.2.7 Field East of Refinery – PSH Gauging Results

PSH was measured in wells KWB-7, KWB-8, MW-112, MW-129, MW-132, MW-133, RW-14R, RW-20A, RW-20B, and RW-22 in April 2016, with thicknesses ranging from 0.01 feet in KWB-7 and MW-129 to 1.1 feet in KWB-8. PSH was measured in wells KWB-7, KWB-10R, MW-112, MW-132, MW-133, RW-12R, RW-13R, RW-14R, RW-20A, and RW-20B in October 2016, with thicknesses ranging from 0.01 feet in KWB-7 to 0.54 feet in RW-13R.

PSH thicknesses generally decreased over time in most of these area wells. PSH thicknesses fluctuate in the wells with active PSH recovery. PSH is routinely removed from this plume by automated pumping from RW-12R, RW-13R, RW-14R, RW-20, and RW-22. Measureable PSH was recovered from all of these recovery wells in 2016 with the exception of RW-12R. The recovered PSH is pumped to Tank 49 within the refinery and then to crude tank for processing.

4.2.8 Cross-Gradient and Up-Gradient Areas – PSH Gauging Results

No measurable PSH was present in any wells located up-gradient or cross-gradient of the refinery during either 2016 semiannual event.

4.2.9 RO Reject Discharge Fields – PSH Gauging Results

No measurable PSH was present in any wells located within the North or South RO Reject Fields during either 2016 semiannual event.

5.0 CHEMICAL ANALYTICAL DATA

The chemical laboratory analyses and results of groundwater samples collected at the refinery in 2016 are summarized in this section

5.1 Sample Laboratory Analyses

Groundwater samples collected during the 2016 semiannual sampling events were submitted for laboratory analysis of one or more of the following COCs by the associated analytical methods in accordance with the 2015 Revised FWGMWP:

- TPH diesel range organics (DRO) by Method 8015 Modified
- TPH gasoline range organics (GRO) by Method 8015 Modified
- Volatile organic compounds (VOCs) by Method 8260
- Metals by Methods 6020 and 7470 (arsenic, barium, chromium, iron, lead, manganese, and selenium in all wells that were analyzed for metals; boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium were additionally analyzed in select wells)
    - Total metals were analyzed during both the first and second semiannual events.
    - Dissolved metals were analyzed during the first semiannual event (for the same list of metals as the total metal list).
- Cyanide by Method 4500
- Major cations and anions by Methods 6020 and 300 (calcium, chloride, fluoride, potassium, sodium, and sulfate)
- Nitrates/nitrites (as nitrogen) by Method 300
- Total dissolved solids (TDS) by Method 2540

The specific analytical suite for each groundwater sample was accordance with Table 1 of the approved 2015 Revised FWGMWP. Laboratory analytical reports are provided in Appendix B.

5.2 Data Validation

Laboratory analytical results were reviewed and validated following the guidelines of the PCC Permit. The data validation and a discussion of any data quality exceptions are provided in Appendix D. Data qualifier flags were added to the data based on the data validation results and are summarized in tabulated form in Appendix B.

Although some data quality exceptions were noted, the analytical results are generally usable for the intended purpose.

5.3 Laboratory Analytical Results

Laboratory analytical results of all wells sampled in 2016, and during at least the three previous sampling events, are summarized in Tables 4A through 4C, as follows:

- Table 4A – GRO, DRO, and select VOCs (VOCs that have had at least one detected value reported above the CGWSL in more than one well in 2016)
- Table 4B – Total Metals
- Table 4 C – Water quality parameters (TDS, nitrate/nitrite, major cations, major anions) and Cyanide

Analytical results of the current monitoring event and the three prior sampling events are included in the tables as required by the PCC Permit. The timeframe required to provide data for three prior sampling events varies by well because wells are sampled either semiannually, annually, or biennially. Wells that are sampled on a biennial basis are sampled during odd calendar years and therefore were not sampled during 2016. For consistency of the timeframe summarized in the analytical results tables, no data prior to 2013 is included for the wells that are sampled biennially or were not sampled during this timeframe for whatever reason (e.g., PSH present at a thickness greater than or equal to 0.3 feet, lack of well access, etc.). Analytical results in Tables 4A through 4C are organized by the major area of interest in which each well is located. The applicable CGWSL is provided at the top of each data table and exceedances of the CGWSL are highlighted in yellow. Analytical results of all detected COCs are summarized in tables organized by well in numeric order that are included in Appendix B.

Plots of historical concentrations of target COCs that have consistently been detected in groundwater across the refinery in exceedance of CGWSLs are provided for wells with historical exceedances in Appendix C. These plots are organized by well within major areas of interest and include concentration plots for the following target COCs: GRO, DRO, benzene, ethylbenzene, toluene, total xylenes, methyl tert-butyl ether (MTBE), naphthalene, and arsenic.

Figures 10 through 19 present the extent of CGWSL exceedance areas of the following target COCs for both the first and second semiannual 2016 sampling events: DRO, arsenic, benzene, naphthalene, and MTBE.

Figures 20 through 29 depict the extent of CGWSL exceedance areas of the following water quality parameters for both the first and second semiannual 2016 events in accordance with the Discharge Permit requirements: chloride, fluoride, sulfate, nitrate/nitrite, and TDS.

The 2016 analytical results in each major area of interest are summarized in the following subsections.

5.3.1 North Colony Landfarm – Analytical Results

Groundwater monitoring is ongoing beneath and near the closed NCL. Analytical results of groundwater samples collected from wells located in and near the NCL in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, NCL

In 2016, groundwater samples were collected from the following wells located in and near the NCL during each semiannual event for analysis of DRO:

- First Semiannual Event (13 wells): MW-18, MW-45, MW-53, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.
- Second Semiannual Event (11 wells): MW-45, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.

DRO was detected at concentrations in exceedance of the CGWSL in all wells sampled except for MW-49 during both 2016 semiannual events, as highlighted in Table 4A. DRO concentrations in wells MW-18, MW-54A, MW-54B, MW-55, MW-56, MW-108, NCL-31, NCL-23, NCL-33, NCL-34A, and NCL-44 have overall increased since 2011 as shown in the COC concentration plots included in Appendix C. DRO concentrations in these wells will be watched closely during future monitoring events.

Total Petroleum Hydrocarbons – Gasoline Range Organics, NCL

Groundwater samples collected from well MW-55 were analyzed for GRO during both 2016 semiannual events. GRO was not detected above the detection limit in either sample collected from MW-55 in 2016, which is consistent with historical results.

Volatile Organic Compounds, NCL

In 2016, groundwater samples were collected from the following wells located in and near the NCL during each semiannual event for analysis of VOCs:

- First Semiannual Event (13 wells): MW-18, MW-45, MW-53, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.
- Second Semiannual Event (11 wells): MW-45, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.

Benzene and 1,2,4-trimethylbenzene (1,2,4-TMB) were detected at concentrations in exceedance of their respective CGWSLs in wells MW-108 and NCL-34A during both 2016 semiannual events, as highlighted in Table 4A. No other VOC was detected above its respective CGWSL during either semiannual event.

The 2016 VOC results in groundwater beneath and near the NCL were consistent with historical results. Concentrations of target VOCs in wells located in and near the NCL are overall stable to declining, as shown in the COC concentration plots included in Appendix C.

Total Metals, NCL

Groundwater samples were collected from the following wells located in and near the NCL during each 2016 semiannual event for analysis of the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium):

- First Semiannual Event (13 wells): MW-18, MW-45, MW-53, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.
- Second Semiannual Event (11 wells): MW-45, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.

In addition, groundwater samples collected from wells MW-18, MW-45, and MW-55 were analyzed for the expanded total metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium).

Barium, cadmium, cobalt, mercury, nickel, selenium, and vanadium were not detected above their respective CGWSLs in any of the wells sampled during either 2016 semiannual event. Arsenic, boron, chromium, iron, lead, manganese, and uranium were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in two of 13 wells sampled (NCL-32 and NCL-44) during the first 2016 semiannual event; and wells three of 11 wells sampled (MW-108, NCL-31, and NCL-44) during the second 2016 semiannual event.
- Boron exceeded the CGWSL in two of 13 wells sampled (MW-18 and MW-55) during the first 2016 semiannual event; and in one of 11 wells sampled (MW-55) during the second 2016 semiannual event.
- Chromium exceeded the CGWSL one of 13 wells sampled (NCL-32) during the first 2016 semiannual event; and in no wells during the second 2016 semiannual event.

- Iron exceeded the CGWSL in three of 13 wells sampled (MW-45, NCL-32, and NCL-44) during the first 2016 semiannual event; and in four of 11 wells sampled (MW-108, NCL-31, NCL-33, and NCL-44) during the second 2016 semiannual event.
- Lead exceeded the CGWSL in one of 13 wells sampled (NCL-32) during the first 2016 semiannual event; and in no wells during the second 2016 semiannual event.
- Manganese exceeded the CGWSL in seven of 13 wells sampled during the first 2016 semiannual event; and in six of 11 wells sampled during the second 2016 semiannual event.
- Uranium exceeded the CGWSL in wells MW-18 and MW-55 during the first 2016 semiannual event; and in well MW-55 during the second 2016 semiannual event.

The total metals results in groundwater beneath and near the NCL were generally consistent with historical results, with the following exceptions:

- The boron and uranium results cannot be compared to historical results because they were first included in the groundwater monitoring program in 2016.
- Chromium increased in well NCL-32 from 0.028 mg/L from the second 2015 semiannual event to 0.0660 mg/L in the 2016 first semiannual event, which is the first exceedance of the CGWSL of 0.050 mg/L during the previous three sampling events. However, the chromium concentration decreased to 0.00312 mg/L in the second 2016 semiannual event, which is less than CGWSL.
- Iron concentrations increased in well NC-32 over each of the 2015 semiannual events (1.39 mg/L in April 2015 and 4.57 mg/L in October 2015) to a maximum concentration of 9.75 mg/L in the first 2016 semiannual event. However, the iron concentration decreased to 0.407 mg/L in the second 2016 semiannual event.

Concentrations of target COC arsenic in wells located in and near the NCL are overall stable to declining, as shown in the COC concentration plots included in Appendix C.

Cyanide, NCL

Groundwater samples collected from wells MW-18, MW-45, and MW-55 in and near the NCL were analyzed for cyanide. Cyanide was not detected above the CGWSL in groundwater samples collected from these wells.

Water Quality Parameters, NCL

In 2016, groundwater samples were collected from the following wells located in and near the NCL during each semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (13 wells): MW-18, MW-45, MW-53, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.
- Second Semiannual Event (11 wells): MW-45, MW-54A, MW-55, MW-56, MW-108, NCL-31, NCL-32, NCL-33, NCL-34A, NCL-44, and NCL-49.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from various wells in and near the NCL, as highlighted in Table 4C. The reported concentrations of these constituents exhibit an overall stable trend, with some seasonal fluctuations between the first and second historical semiannual events.

5.3.2 Tetra Ethyl Lead Surface Impoundment – Analytical Results

Groundwater monitoring beneath the closed TEL surface impoundment is ongoing. Groundwater samples were collected from the four TEL wells (TEL-1, TEL-2, TEL-3, and TEL-4) and MW-49 during both 2016 semiannual events. Groundwater samples collected from these TEL area wells were all analyzed for GRO, DRO, the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium), and water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite). In addition, groundwater samples collected from MW-49 were analyzed for the expanded total metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium) and cyanide.

Analytical results of groundwater samples collected from TEL wells in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, TEL

DRO was detected in all TEL area wells sampled (TEL-1, TEL-2, TEL-3, TEL-4, and MW-49) at concentrations in exceedance of the CGWSL during both 2016 semiannual events, as highlighted in Table 4A. DRO concentrations in TEL area wells have exhibited a stable trend over the six most recent sampling events, as shown in the COC concentration plots included in Appendix C, with the exception in TEL-3 during the first 2016 semiannual sevent. DRO concentrations in TEL-3 increased from 5.86 mg/L in the second 2015 semiannual event (October 2015) to a historical maximum of 14.1 mg/L in the first 2016 semiannual event. However, DRO concentrations in TEL-3 decreased to 4.22 mg/L in the second 2016 semiannual event.

Total Petroleum Hydrocarbons – Gasoline Range Organics, TEL

GRO was detected in all TEL area wells sampled (TEL-1, TEL-2, TEL-3, TEL-4, and MW-49) during both 2016 semiannual events. GRO concentrations in TEL area wells are overall stable over time despite occasional fluctuations between sampling events, as shown in the COC concentration plots included in Appendix C. There is no applicable CGWSL for GRO, but

previous NMED guidance (NMED 2012) required analysis of VOCs when GRO is present for comparison to applicable individual VOC screening levels. VOC results are discussed in the following subsection.

Volatile Organic Compounds, TEL

Benzene and 1,2,4-TMB were detected at concentrations in exceedance of their respective CGWSLs in wells MW-49, TEL-2, and TEL-4 during both 2016 semiannual events, as highlighted in Table 4A. 1,2,4-TMB was detected in exceedance of the CGWSL in TEL-3 during the second 2016 semiannual event only, but 1,2,4-TMB has fluctuated above and below the CGWSL historically in this well. During both 2016 semiannual events, benzene was detected in exceedance of the CGWSL in TEL-3. No other VOC was detected above its respective CGWSL in TEL area wells during either 2016 semiannual event.

The 2016 VOC results of groundwater in TEL area wells were consistent with historical results. Concentrations of target VOCs in TEL area wells are overall stable to declining over time with occasional fluctuations, as shown in the COC concentration plots included in Appendix C.

Total Metals, TEL

Barium, boron, cadmium, cobalt, lead, mercury, nickel, selenium, uranium, and vanadium were not detected above their respective CGWSLs in any of the TEL area wells sampled during either 2016 semiannual event. Arsenic, chromium, iron, and manganese were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in TEL-2 during both 2016 semiannual events.
- Chromium exceeded the CGWSL in TEL-4 during both 2016 semiannual events; and in TEL-3 during the second 2016 semiannual event.
- Iron exceeded the CGWSL in TEL-4 during the second 2016 semiannual event.
- Manganese exceeded the CGWSL in wells TEL-4 and MW-49 during both 2016 semiannual events; and in TEL-1 during the second 2016 semiannual event.

The 2016 total metals results in groundwater in and near the NCL were generally consistent with historical results, with the exceptions of chromium in TEL-3 and manganese in TEL-1 during the second 2016 semiannual event which both exceeded their respective CGWSL for the first time in these wells over the six most recent sampling events. COC concentrations in these wells will be watched closely during 2017 monitoring events. Groundwater concentrations of target COC arsenic in all TEL area wells have declined since historical maximum concentrations reported in October 2012, as shown in the COC concentration plots included in Appendix C.

Cyanide, TEL

Groundwater samples collected from MW-49 were analyzed for cyanide. Cyanide was not detected above the CGWSL in groundwater samples collected from this well during both 2016 semiannual events.

Water Quality Parameters, TEL

Chloride, fluoride, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from various TEL area wells, as highlighted in Table 4C. The reported concentrations of these constituents in 2016 were overall consistent with historical results, with some apparent seasonal fluctuations between the first and second historical semiannual events (particularly chloride in TEL-3 and fluoride in TEL-4). Nitrate/nitrite was not detected above the CGWSL in any TEL area well, which is consistent with historical results.

No CGWSLs are applicable for calcium, potassium, or sodium. Analytical results of these analytes in all TEL area wells were consistent with historical results.

5.3.3 Evaporation Ponds Analytical – Results

Groundwater monitoring is ongoing beneath the inactive EPs. Analytical results of groundwater samples collected from EP wells in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, EPs

In 2016, groundwater samples were collected from the following EP wells during each semiannual event for analysis of DRO:

- First Semiannual Event (41 wells): MW-1R, MW-2A, MW-3, MW-4A, MW-5A, MW-6A, MW-7A, MW-10, MW-11A, MW-15, MW-18A, MW-22A, MW-70, MW-72, MW-73, MW-74, MW-75, MW-76, MW-77, MW-78, MW-79, MW-80, MW-81, MW-82, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.
- Second Semiannual Event (31 wells): MW-2A, MW-3, MW-4A, MW-5A, MW-7A, MW-10, MW-18A, MW-22A, MW-70, MW-74, MW-75, MW-76, MW-77, MW-79, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.

DRO was detected at concentrations in exceedance of the CGWSL in 31 of the 41 EP wells sampled during the first 2016 semiannual event and in 24 of the 31 EP wells samples sampled during the second 2016 semiannual event, as highlighted in Table 4A. As shown in the COC

concentration plots included in Appendix C, DRO concentrations in EP wells MW-3, MW-4A, MW-5C, MW-6A, MW-6B, MW-10, MW-22B, MW-73 through MW-78, MW-81, and MW-83 have exhibited an overall increasing trend over time. However, in a majority of these wells, the DRO concentrations have exhibited a stable trend over the most recent four to six sampling events. DRO concentrations in these wells will be watched closely during future sampling events.

Total Petroleum Hydrocarbons – Gasoline Range Organics, EPs

In 2016, groundwater samples were collected from the following EP wells during each semiannual event for analysis of GRO:

- First Semiannual Event (39 wells): MW-2A, MW-3, MW-4A, MW-5A, MW-6A, MW-7A, MW-10, MW-11A, MW-15, MW-22A, MW-70, MW-72, MW-73, MW-74, MW-75, MW-76, MW-77, MW-78, MW-79, MW-80, MW-81, MW-82, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.
- Second Semiannual Event (30 wells): MW-2A, MW-3, MW-4A, MW-5A, MW-7A, MW-10, MW-22A, MW-70, MW-74, MW-75, MW-76, MW-77, MW-79, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.

GRO was detected above the method detection limit in 24 of the 39 EP wells sampled during the first 2016 semiannual event and in 25 of the 30 EP wells sampled during the second 2016 semiannual event. As shown in the COC concentration plots included in Appendix C, GRO concentrations in EP wells are overall stable over time despite occasional fluctuations. There is no applicable CGWSL for GRO, but previous NMED guidance (NMED 2012) required analysis of VOCs when GRO is present for comparison to applicable individual VOC screening levels. VOC results are discussed in the following subsection.

Volatile Organic Compounds, EPs

No VOCs were detected at concentrations above CGWSLs in any EP wells sampled during either 2016 semiannual events. Concentrations of target VOCs in EP wells are stable to declining over time, as shown in the COC concentration plots included in Appendix C.

Total Metals, EPs

In 2016, groundwater samples were collected from the following EP wells during each semiannual event for analysis of the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium):

- First Semiannual Event (41 wells): MW-1R, MW-2A, MW-3, MW-4A, MW-5A, MW-6A, MW-7A, MW-10, MW-11A, MW-15, MW-18A, MW-22A, MW-70, MW-72,

MW-73, MW-74, MW-75, MW-76, MW-77, MW-78, MW-79, MW-80, MW-81, MW-82, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.

- Second Semiannual Event (31 wells): MW-2A, MW-3, MW-4A, MW-5A, MW-7A, MW-10, MW-18A, MW-22A, MW-70, MW-74, MW-75, MW-76, MW-77, MW-79, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.

In addition, groundwater samples collected from wells MW-18A and OCD-8A were analyzed for the expanded total metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium).

Barium, cadmium, cobalt, lead, mercury, nickel, and vanadium were not detected above their respective CGWSLs in any of the EP wells sampled during either 2016 semiannual event. Arsenic, boron, chromium, iron, manganese, selenium, and uranium were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in 29 of 41 EP wells sampled during the first 2016 semiannual event; and in 20 of 31 wells sampled during the second 2016 semiannual event.
- Boron exceeded the CGWSL in both EP wells sampled (MW-18A and OCD-8A) sampled for this analyte during both 2016 semiannual events.
- Chromium exceeded the CGWSL in two of 41 EP wells (MW-78 and OCD-1R) sampled during the first 2016 semiannual event; and in no EP wells during the second 2016 semiannual event.
- Iron exceeded the CGWSL in 26 of 41 EP wells sampled during the first 2016 semiannual event; and in 22 of 31 EP wells sampled during the second 2016 semiannual event.
- Manganese exceeded the CGWSL in 38 of 41 EP wells (all wells except MW-81, OCD-3, and OCD-4) sampled during the first 2016 semiannual event; and in 30 of 31 EP wells (all wells except MW-74) sampled during the second 2016 semiannual event.
- Selenium exceeded the CGWSL in no EP wells sampled during the first 2016 semiannual event; and in one of 31 EP wells (MW-74) sampled during the second 2016 semiannual event.

- Uranium exceeded the CGWSL in well MW-18A during both 2016 semiannual events, which is one of the only two EP wells sampled for this analyte.

The 2016 analytical results of total metals in groundwater samples collected from EP wells were generally consistent with historical results, with the following exceptions:

- Chromium concentrations increased in well OCD-1R from not detected above the method detection limit in both 2015 semiannual events to 0.105 mg/L in the first 2016 semiannual event, which is above the CGWSL of 0.050 mg/L. However, chromium decreased to a concentration of 0.00312 mg/L during the second 2016 semiannual event, which is below the CGWSL and consistent with historical concentrations.
- Iron concentrations have exhibited an increasing trend in wells MW-1R, MW-3, MW-70, MW-78, MW-79, OCD-1R, and OCD-5 over at least the past 3 sampling events. Iron concentrations have fluctuated in a majority of EP wells over time.
- Boron and uranium results cannot be compared to historical results because they were first included in the groundwater monitoring program in 2016.

Concentrations of target COC arsenic in EP wells are overall stable despite occasional fluctuations, as shown in the COC concentration plots included in Appendix C.

Cyanide, EPs

Groundwater samples collected from EP wells MW-18A and OCD-8A during both 2016 semiannual events were analyzed for cyanide. Cyanide was not detected above the CGWSL in groundwater samples collected from these wells.

Water Quality Parameters, EPs

In 2016, groundwater samples were collected from the following EP wells during each semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (41 wells): MW-1R, MW-2A, MW-3, MW-4A, MW-5A, MW-6A, MW-7A, MW-10, MW-11A, MW-15, MW-18A, MW-22A, MW-70, MW-72, MW-73, MW-74, MW-75, MW-76, MW-77, MW-78, MW-79, MW-80, MW-81, MW-82, MW-83, MW-84, MW-87, MW-88, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-2A, OCD-3, OCD-4, OCD-5, OCD-6, OCD-7AR, and OCD-8A.
- Second Semiannual Event (26 wells): MW-2A, MW-3, MW-4A, MW-5A, MW-7A, MW-10, MW-11A, MW-18A, MW-22A, MW-74, MW-75, MW-76, MW-77, MW-79,

MW-83, MW-84, MW-120, MW-121, MW-122, MW-123, MW-124, OCD-1R, OCD-5, OCD-6, OCD-7AR, and OCD-8A.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from various EP wells, as highlighted in Table 4C. The reported concentrations of these constituents in 2016 were overall consistent with historical results, with the exception of chloride, sulfate, and TDS results in MW-3 which approximately doubled during the first 2016 semiannual event compared the previous sampling event. However, concentrations of chloride, sulfate, and TDS decreased in MW-3 during the second 2016 semiannual event to concentrations consistent with historical results.

5.3.4 Three Mile Ditch – Analytical Results

Groundwater monitoring is ongoing along the inactive, backfilled TMD. Analytical results of groundwater samples collected from TMD wells in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, TMD

In 2016, groundwater samples were collected from the following TMD wells during each semiannual event for analysis of DRO:

- First Semiannual Event (10 wells): MW-8, MW-20, MW-21, MW-25, MW-26, MW-27, MW-46R, MW-68, MW-71, and MW-89.
- Second Semiannual Event (two wells): MW-21 and MW-46R.

DRO was detected at concentrations in exceedance of the CGWSL in TMD wells MW-8, MW-25, and MW-89 during the first 2016 semiannual event, as highlighted in Table 4A. DRO concentrations in TMD wells are stable overtime, with the exception of an increasing trend in MW-20, MW-25, MW-26, MW-68, and MW-89 over the three most recent sampling events, as shown in the COC concentration plots included in Appendix C. DRO concentrations in wells MW-29, MW-26, and MW-68 remain below the CGWSL. DRO concentrations in wells with increasing trends will be watched closely during future monitoring events.

Total Petroleum Hydrocarbons – Gasoline Range Organics, TMD

Groundwater samples collected from MW-8 during the first 2016 semiannual event and from MW-21 during both 2016 semiannual events were analyzed for GRO. GRO was not detected above the detection limit in any sample collected from MW-8 and MW-21 in 2016, which is consistent with historical results.

Volatile Organic Compounds, TMD

In 2016, groundwater samples collected from the following TMD wells during each semiannual event were analyzed for VOCs:

- First Semiannual Event (11 wells): MW-8, MW-20, MW-21, MW-25, MW-26, MW-27, MW-46R, MW-68, MW-71, MW-89, and NP-1.
- Second Semiannual Event (three wells): MW-21, MW-46R, and NP-1.

MTBE was detected at concentrations in exceedance of its CGWSLs in TMD well NP-1 during both 2016 semiannual events, as highlighted in Table 4A. No other VOC was detected above its respective CGWSL during either semiannual event. The 2016 VOC results for groundwater samples collected from TMD wells were consistent with historical results. Concentrations of target VOCs in TMD wells are overall stable, as shown in the COC concentration plots included in Appendix C.

Total Metals, TMD

In 2016, groundwater samples were collected from the following TMD wells during each semiannual event for analysis of the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium):

- First Semiannual Event (10 wells): MW-8, MW-20, MW-21, MW-25, MW-26, MW-27, MW-46R, MW-68, MW-71, and MW-89.
- Second Semiannual Event (two wells): MW-21 and MW-46R.

In addition, the groundwater sample collected from TMD well MW-71 during the first 2016 semiannual event was analyzed for the expanded total metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium).

Arsenic, barium, boron, cadmium, cobalt, iron, lead, mercury, nickel, selenium, uranium, and vanadium were not detected above their respective CGWSLs in any of the TMD wells sampled during either 2016 semiannual event. Chromium and manganese were detected at concentrations in exceedance of their respective CGWSLs in at least one TMD well, as highlighted in Table 4B and described below:

- Chromium exceeded the CGWSL in well MW-8 during the first 2016 semiannual event; and in no wells during the second 2016 semiannual event.
- Manganese exceeded the CGWSL in wells MW-8, MW-21, MW-25, and MW-26 during the first 2016 semiannual event; and in well MW-21 during the second semiannual event.

The 2016 analytical results of total metals in groundwater samples collected from TMD wells were generally consistent with historical results. Concentrations of target COC arsenic in TMD wells are overall stable, as shown in the COC concentration plots included in Appendix C.

Cyanide, TMD

Cyanide was not detected above the method detection limit in the groundwater sample collected from TMD well MW-71 during the first 2016 semiannual event.

Water Quality Parameters, TMD

In 2016, groundwater samples were collected from the following TMD wells during each semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (11 wells): MW-8, MW-20, MW-21, MW-25, MW-26, MW-27, MW-46R, MW-68, MW-71, MW-89, and NP-1.
- Second Semiannual Event (two wells): MW-21 and MW-46R.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from TMD wells, as highlighted in Table 4C. The reported concentrations of these constituents in 2016 were consistent with historical results.

5.3.5 North Refinery Area – Analytical Results

Groundwater monitoring is ongoing in the northern portion of the active refinery (i.e., North Refinery Area). Analytical results of groundwater samples collected from wells located within the North Refinery Area in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, North Refinery Area

Groundwater samples were collected from the following North Refinery Area wells during each 2016 semiannual event for analysis of DRO:

- First Semiannual Event (29 wells): MW-23, MW-29, MW-39, MW-40, MW-41, MW-42, MW-43, MW-59, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-95, MW-96, MW-98, MW-137, MW-138, RW-1R, RW-2R, RW-7R, RW-9, RW-10, RW-16, and RW-17.

- Second Semiannual Event (17 wells): MW-23, MW-29, MW-39, MW-43, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-96, MW-98, MW-137, and MW-138.

DRO was detected at concentrations in exceedance of the CGWSL in all 29 North Refinery Area wells sampled during the first 2016 semiannual event and in all 17 North Refinery Area wells samples sampled during the second 2016 semiannual event, as highlighted in Table 4A. As shown in the COC concentration plots included in Appendix C, DRO concentrations in North Refinery Area wells MW-39, MW-40, MW-59, MW-67, MW-92, and MW-95 have exhibited an overall fluctuating to increasing trend over time. DRO concentrations in the remaining North Refinery Area wells were overall stable over time.

Total Petroleum Hydrocarbons – Gasoline Range Organics, North Refinery Area

Groundwater samples were collected from the following North Refinery Area wells during each 2016 semiannual event for analysis of GRO:

- First Semiannual Event (28 wells): MW-23, MW-29, MW-39, MW-40, MW-41, MW-42, MW-43, MW-59, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-95, MW-96, MW-98, MW-137, MW-138, RW-1R, RW-2R, RW-7R, RW-9, RW-10, and RW-17.

- Second Semiannual Event (17 wells): MW-23, MW-29, MW-39, MW-43, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-96, MW-98, MW-137, and MW-138.

GRO was detected above the method detection limit in 24 of the 28 North Refinery Area wells sampled during the first 2016 semiannual event and in 15 of the 17 North Refinery Area wells sampled during the second 2016 semiannual event. GRO analytical results in groundwater samples collected from North Refinery Area wells in 2016 were overall consistent with historical results, as shown in the COC concentration plots included in Appendix C, with the exception of increasing trends in MW-40 and MW-59 over the three most recent sampling events. There is no applicable CGWSL for GRO, but previous NMED guidance (NMED 2012) required analysis of VOCs when GRO is present for comparison to applicable individual VOC screening levels. VOC results are discussed in the following subsection.

Volatile Organic Compounds, North Refinery Area

Groundwater samples were collected from the following North Refinery Area wells during each 2016 semiannual event for analysis of VOCs:

- First Semiannual Event (29 wells): MW-23, MW-29, MW-39, MW-40, MW-41, MW-42, MW-43, MW-59, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92,

MW-93, MW-94, MW-95, MW-96, MW-98, MW-137, MW-138, RW-1R, RW-2R, RW-7R, RW-9, RW-10, RW-16, and RW-17.

- Second Semiannual Event (17 wells): MW-23, MW-29, MW-39, MW-43, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-96, MW-98, MW-137, and MW-138.

Benzene, ethylbenzene, toluene, o-xylenes, total xylenes, MTBE, naphthalene, 1,2,4-TMB, 1,3,5,-trimethylbenzene (1,3,5-TMB), and cis-1,2,-dichoroethene (cis-1,2-DCE) were detected at concentrations in exceedance of their respective CGWSLs in at least one North Refinery Area well, as highlighted in Table 4A and described below:

- Benzene exceeded the CGWSL in 19 of 29 wells sampled during the first 2016 semiannual event; and in 13 of 17 wells sampled during the second 2016 semiannual event.
- Ethylbenzene exceeded the CGWSL in three of 29 wells sampled (MW-43, MW-91, and MW-137) during the first 2016 semiannual event; and in three of 17 wells sampled (MW-43, MW-91, and MW-137) during the second 2016 semiannual event.
- Toluene exceeded the CGWSL in three of 29 wells sampled (MW-43, MW-91, and MW-137) during the first 2016 semiannual event; and in two of 17 wells sampled (MW-91 and MW-137) during the second 2016 semiannual event.
- o-Xylene exceeded the CGWSL in four of 29 wells sampled during the first 2016 semiannual event; and in four of 17 wells sampled during the second 2016 semiannual event. Results of o-xylene in North Refinery Area wells during 2016 were consistent with historical results, with the exception of increasing trends in MW-43 and MW-91 since 2014. These wells will be watched closely during future monitoring events.
- Total xylenes exceeded the CGWSL in five of 29 wells sampled during the first 2016 semiannual event; and in five of 17 wells sampled during the second 2016 semiannual event. Results of total xylenes in North Refinery Area wells during 2016 were overall consistent with historical results.
- MTBE exceeded the CGWSL in four of 29 wells sampled during the first 2016 semiannual event and in three of 17 wells sampled during the second 2016 semiannual event.
- Naphthalene exceeded the CGWSL in eight of 29 wells sampled during the first 2016 semiannual event; and in six of 17 wells sampled during the second 2016 semiannual event.

- 1,2,4-TMB exceeded the CGWSL in 13 of 29 wells sampled during the first 2016 semiannual event; and in 10 of 17 wells sampled during the second 2016 semiannual event. Results of 1,2,4-TMB in North Refinery Area wells during 2016 were consistent with historical results with the exception in RW-9, which exceeded the CGWSL for the first time over the four most recent sampling events.

- 1,3,5-TMB did not exceed the CGWSL in any of the wells sampled during the first semiannual event, but exceeded the CGWSL in one of 17 wells sampled (MW-62) during the second semiannual event. Detected concentrations of 1,3,5-TMB in this well has fluctuated above and below the CGWSL over time.

- cis-1,2,-DCE exceeded the CGWSL in two of 29 wells sampled (RW-1R and RW-2R) during the first 2016 semiannual event; and in one of 17 wells sampled (MW-92) during the second 2016 semiannual event. There is limited historical data available for these wells to interpret stability of concentrations of this VOC over time.

The 2016 analytical results of target VOCs in groundwater samples collected from North Refinery Area wells were generally consistent with historical results. As shown in the COC concentration plots included in Appendix C, concentrations of target VOCs in North Refinery Area wells have exhibited an overall stable to fluctuating trend over time, with the following exception:

- Ethylbenzene concentrations exhibited increasing trends in MW-43 and MW-91 over the most recent six sampling events. However, the 2016 ethylbenzene concentrations in each of these wells are consistent with historical maximum concentrations in each well. These wells will be watched closely during future monitoring events.

Total Metals, North Refinery Area

In 2016, groundwater samples were collected from the following North Refinery Area wells during each semiannual event for analysis of the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium):

- First Semiannual Event (29 wells): MW-23, MW-29, MW-39, MW-40, MW-41, MW-42, MW-43, MW-59, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-95, MW-96, MW-98, MW-137, MW-138, RW-1R, RW-2R, RW-7R, RW-9, RW-10, RW-16, and RW-17.

- Second Semiannual Event (17 wells): MW-23, MW-29, MW-39, MW-43, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-96, MW-98, MW-137, and MW-138.

In addition, groundwater samples collected from North Refinery Area wells MW-43, MW-60, MW-67, MW-137, and MW-138 were analyzed for the expanded metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium) during both 2016 semiannual events.

Cadmium, cobalt, chromium, mercury, nickel, uranium, and vanadium were not detected above their respective CGWSLs in any of the North Refinery Area wells sampled during either 2016 semiannual event. Arsenic, barium, boron, iron, lead, manganese, and selenium were detected at concentrations in exceedance of their respective CGWSLs in at least one North Refinery Area well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in 13 of 29 wells sampled during the first 2016 semiannual event; and in six of 17 wells sampled during the second 2016 semiannual event.
- Barium exceeded the CGWSL in two wells sampled (MW-23 and MW-92) during both 2016 semiannual events.
- Boron exceeded the CGWSL in three of five wells sampled (MW-43, MW-137, and MW-138) during both 2016 semiannual events.
- Iron exceeded the CGWSL in five of 29 wells sampled during the first 2016 semiannual event; and in two of 17 wells sampled (MW-23 and MW-93) during the second 2016 semiannual event.
- Lead exceeded the CGWSL in three of 29 wells sampled (MW-23, RW-2R, and RW-17) during the first 2016 semiannual event; and in one of 17 wells sampled (MW-23) during the second 2016 semiannual event
- Manganese exceeded the CGWSL in 11 of 29 wells sampled during the first 2016 semiannual event; and in four of 17 wells sampled during the second 2016 semiannual event.
- Selenium exceeded the CGWSL in three of 29 wells sampled (MW-43, MW-90, and RW-17) during the first 2016 semiannual event; and in one of 17 wells (MW-90) sampled during the second 2016 semiannual event.

The 2016 analytical results of total metals in groundwater samples collected from North Refinery Area wells were generally consistent with historical results, with the following exceptions:

- Arsenic results have fluctuated above and below the CGWSL in various North Refinery Area wells over time, including in wells MW-23, MW-39, MW-42, MW-43, MW-60, MW-62, MW-67, and MW-93.

- Iron and lead concentrations have exhibited an increasing trend in well MW-23 over at least the three most recent sampling events. Since at least 2014 in well MW-23, iron concentrations exceeded the CGWSL for the first time during both 2016 sampling events and lead concentrations exceeded the CGWSL for the first time during the second 2016 semiannual event. Iron and lead concentrations in this well will be watched closely during future sampling events.
- Selenium results increased in wells MW-90 and RW-17 during the second 2016 semiannual event, which were the first exceedance of the CGWSL in these wells over at least the four most recent sampling events. Selenium results have fluctuated above and below the CGWSL in various North Refinery Area wells over time
- Boron and uranium results cannot be compared to historical results because they were first included in the groundwater monitoring program in 2016.

Concentrations of target COC arsenic in North Refinery Area wells are overall stable to declining, despite occasional fluctuating, as shown in the COC concentration plots included in Appendix C. Arsenic concentrations have fluctuated above and below the CGWSL over time in wells MW-23, MW-29, MW-41, MW-43, MW-60, MW-62, MW-67, MW-90, MW-91, MW-93, and RW-1.

Cyanide, North Refinery Area

Groundwater samples collected from North Refinery Area wells MW-43, MW-60, MW-67, MW-137, and MW-138 during both 2016 semiannual events were analyzed for cyanide. Cyanide was not detected above the CGWSL in groundwater samples collected from these wells, with the exception in MW-137 in the first 2016 semiannual event. However, cyanide concentrations in this well decreased to below the method detection limit and the CGWSL in the second 2016 semiannual event of 2016.

Water Quality Parameters, North Refinery Area

In 2016, groundwater samples were collected from the following North Refinery Area wells during each semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (29 wells): MW-23, MW-29, MW-39, MW-40, MW-41, MW-42, MW-43, MW-59, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-95, MW-96, MW-98, MW-137, MW-138, RW-1R, RW-2R, RW-7R, RW-9, RW-10, RW-16, and RW-17.

- Second Semiannual Event (17 wells): MW-23, MW-29, MW-39, MW-43, MW-60, MW-61, MW-62, MW-67, MW-90, MW-91, MW-92, MW-93, MW-94, MW-96, MW-98, MW-137, and MW-138.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from various North Refinery Area wells as highlighted in Table 4C. The reported concentrations of these constituents were generally consistent with historical results. Fluoride concentrations in wells MW-43 and MW-61 have exhibited an overall increasing trend since 2014.

5.3.6 South Refinery Area – Analytical Results

Groundwater monitoring is ongoing in the southern portion of the active refinery (i.e., South Refinery Area). Analytical results of groundwater samples collected from wells located within the South Refinery Area in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, South Refinery Area

Groundwater samples were collected from the following South Refinery Area wells during each 2016 semiannual event for analysis of DRO:

- First Semiannual Event (23 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107, MW-109, MW-110, RW-4R, RW-5R, and RW-6R.

- Second Semiannual Event (19 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-104, MW-105, MW-106, MW-107, MW-109, and MW-110.

DRO was detected at concentrations in exceedance of the CGWSL in all 23 South Refinery Area wells sampled during the first 2016 semiannual event and in all 19 wells samples sampled during the second 2016 semiannual event, as highlighted in Table 4A. As shown in the COC concentration plots included in Appendix C, DRO concentrations in South Refinery Area wells MW-28, MW-48, MW-50, MW-52, MW-65, and MW-104 have exhibited an overall fluctuating to increasing trend over time. However, DRO concentrations have stabilized in a majority of these wells over the three to four most recent sampling events. DRO concentrations in these wells will be watched closely during future sampling events.

Total Petroleum Hydrocarbons – Gasoline Range Organics, South Refinery Area

Groundwater samples were collected from the following South Refinery Area wells during each 2016 semiannual event for analysis of GRO:

- First Semiannual Event (15 wells): MW-28, MW-48, MW-50, MW-52, MW-66, MW-99, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107, MW-109, and MW-110.
- Second Semiannual Event (14 wells): MW-28, MW-48, MW-50, MW-52, MW-66, MW-99, MW-101, MW-102, MW-104, MW-105, MW-106, MW-107, MW-109, and MW-110.

GRO was detected above the method detection limit in 14 of the 15 South Refinery Area wells sampled during the first 2016 semiannual event (all wells sampled except MW-50) and in 13 of the 14 South Refinery Area wells sampled during the second 2016 semiannual event (all wells sampled except MW-50). GRO analytical results in groundwater samples collected from South Refinery Area wells in 2016 were overall consistent with historical results, as shown in the COC concentration plots included in Appendix C, with the exception of increases in MW-48 during the 2016 semiannual events. However, GRO concentrations have fluctuated by an order of magnitude in various wells across the South Refinery Area over time. There is no applicable CGWSL for GRO, but previous NMED guidance (NMED 2012) required analysis of VOCs when GRO is present for comparison to applicable individual VOC screening levels. VOC results are discussed in the following subsection.

Volatile Organic Compounds, South Refinery Area

Groundwater samples were collected from the following South Refinery Area wells during each 2016 semiannual event for analysis of VOCs:

- First Semiannual Event (24 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107, MW-109, MW-110, RA-313, RW-4R, RW-5R, and RW-6R.
- Second Semiannual Event (19 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-104, MW-105, MW-106, MW-107, MW-109, and MW-110.

Benzene, ethylbenzene, toluene, o-xylenes, total xylenes, MTBE, naphthalene, 1,2,4-TMB, and 1,3,5-TMB, were detected at concentrations in exceedance of their respective CGWSLs in at least one South Refinery Area well, as highlighted in Table 4A and described below:

- Benzene exceeded the CGWSL in 21 of 24 wells sampled during the first 2016 semiannual event; and in 15 of 19 wells sampled during the second 2016 semiannual event.
- Ethylbenzene exceeded the CGWSL in six of 24 wells sampled during the first 2016 semiannual event; and in three of 19 wells sampled during the second 2016 semiannual event.
- Toluene exceeded the CGWSL in two of 24 wells sampled during the first 2016 semiannual event (MW-64 and RW-5R); and in one of 19 wells sampled during the second 2016 semiannual event (MW-64).
- o-Xylene exceeded the CGWSL in three of 24 wells sampled during the first 2016 semiannual event (KWB-6, MW-64, RW-5R); and in one of 19 wells sampled during the second 2016 semiannual event (MW-64).
- Total xylenes exceeded the CGWSL in five of 24 wells sampled during the first 2016 semiannual event; and in four of 19 wells sampled during the second 2016 semiannual event.
- MTBE exceeded the CGWSL in 12 of 24 wells sampled during the first 2016 semiannual event; and in nine of 19 wells sampled during the second 2016 semiannual event.
- Naphthalene exceeded the CGWSL in nine of 24 wells sampled during the first 2016 semiannual event; and in 11 of 17 wells sampled during the second 2016 semiannual event.
- 1,2,4-TMB exceeded the CGWSL in 11 of 24 wells sampled during the first 2016 semiannual event; and in nine of 17 wells sampled during the second 2016 semiannual event. Results of 1,2,4-TMB in South Refinery Area wells during 2016 were consistent with historical results.
- 1,3,5-TMB exceeded the CGWSL in two of the 24 wells sampled (KWB-6 and MW-64) during the first 2016 semiannual event, but did not exceed the CGWSL in these two wells or any other well sampled during the second 2016 semiannual event. Results of 1,3,5-TMB in South Refinery Area wells during 2016 were consistent with historical results.

The 2016 analytical results of target VOCs in groundwater samples collected from South Refinery Area wells were generally consistent with historical results. As shown in the COC concentration plots included in Appendix C, concentrations of target VOCs in South Refinery Area wells have exhibited an overall stable to fluctuating trend over time, with the following exception:

- Benzene concentrations have exhibited recent increasing trends in wells MW-28, MW-48, and MW-105. Benzene concentrations increased in MW-28 across the six most recent sampling events, but the relative increase between each sampling event has diminished over the four most recent sampling events indicating benzene concentrations are stabilizing in this well. Benzene concentrations increased in MW-48 from the 2015 semiannual events (3.90 mg/L in April 2015 and 2.97 mg/L in October 2015) to the 2016 semiannual events (15.3 mg/L in April 2016 and 7.81 mg/L in October 2016). Benzene concentrations increased in MW-105 from the 2015 semiannual events (1.71 mg/L in April 2015 and 0.580 mg/L in October 2015) to the 2016 semiannual events (13.5 mg/L in April 2016 and 18.2 mg/L in October 2016). Benzene concentrations in these wells will be watching closely during future monitoring events.

- Ethylbenzene concentrations increased in MW-105 from the 2015 semiannual events (0.545 mg/L in April 2015 and 0.188 mg/L in October 2015) to the 2016 semiannual events (2.02 mg/L in April 2016 and 2.77 mg/L in October 2016), which is the historical maximum concentration observed in this well. This well will be watched closely during future monitoring events.

- Toluene concentrations have exhibited an overall increasing trend in MW-64. However, there is limited recent data for this well because it has not been sampled since the first 2013 semiannual event (March 2013) due to the presence of PSH at thicknesses of 0.03 or greater. This well will be watched closely during future monitoring events.

- Total xylene concentrations have overall increased in MW-48 over the six most recent sampling events to a historical maximum detected concentration during the first 2016 semiannual event. This well will be watched closely during future monitoring events.

- MTBE concentrations have overall increased over time in wells MW-48, MW-99, MW-102, and RW-4/RW-4R. However, MTBE concentrations over the five most recent sampling events have exhibited a stable trend in all of these wells except RW-4/RW-4R.

- Naphthalene concentrations have fluctuated above and below the CGWSL over time in wells MW-28, MW-48, MW-103, MW-105, MW-107, KWB-2R, KWB-5, and RW-5/RW-5R.

Total Metals, South Refinery Area

In 2016, groundwater samples were collected from the following South Refinery Area wells during each semiannual event for analysis of the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium):

- First Semiannual Event (23 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107, MW-109, MW-110, RW-4R, RW-5R, and RW-6R.
- Second Semiannual Event (19 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-104, MW-105, MW-106, MW-107, MW-109, and MW-110.

In addition, groundwater samples collected from South Refinery Area wells MW-28, MW-52, and MW-66 were also analyzed for the expanded metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium) during both 2016 semiannual events.

Cadmium, cobalt, chromium, mercury, and nickel were not detected above their respective CGWSLs in any of the South Refinery Area wells sampled during either 2016 semiannual event. Arsenic, barium, boron, iron, lead, manganese, selenium, uranium, and vanadium were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in 15 of 23 wells sampled during the first 2016 semiannual event; and in 11 of 19 wells sampled during the second 2016 semiannual event.
- Barium exceeded the CGWSL in nine of 23 wells sampled during the first 2016 semiannual event; and in eight of 19 wells sampled during the second 2016 semiannual event.
- Boron exceeded the CGWSL in well MW-28 during both 2016 semiannual events.
- Iron exceeded the CGWSL in eight of 23 wells sampled during the first 2016 semiannual event; and in three of 19 wells sampled during the second 2016 semiannual event.
- Lead exceeded the CGWSL in two of 23 wells sampled (MW-28 and MW-99) during the first 2016 semiannual event; and in one of 19 wells sampled (MW-28) during the second 2016 semiannual event.
- Manganese exceeded the CGWSL in 14 of 23 wells sampled during the first 2016 semiannual event; and in 11 of 19 wells sampled during the second 2016 semiannual event.
- Selenium exceeded the CGWSL in well MW-48 during both 2016 semiannual events.

- Uranium and vanadium exceeded the CGWSL in well MW-52 during the first 2016 semiannual event, but did not exceed the CGWSL in this well or any other well during the second 2016 semiannual event.

The total metals results in groundwater in South Refinery Area wells were generally consistent with historical results, with the following exceptions:

- Barium concentrations increased in wells MW-48, MW-99, MW-103, and MW-105over the four most recent sampling events. Barium concentrations exceeded the CGWSL in wells MW-48, MW-99, and MW-105 in during both 2016 semiannual events for the first time since at least 2014. However, barium results have fluctuated above and below the CGWSL in various South Refinery Area wells over time. Regardless, barium concentrations in these wells will be watched closely during future sampling events.
- Lead concentrations increased in well MW-28 from the 2015 semiannual events (0.011 mg/L in April 2015 and 0.0136 mg/L in October 2015) to the 2016 semiannual events (0.0520 mg/L in April 2016 and 0.0168 mg/L in October 2016), which exceeded the CGWSL of 0.015 mg/L for the first time since at least 2014. Lead concentrations have exceeded the CGWSL intermittently in various South Refinery Area wells over time. This well will be watched closely during future sampling events.
- Selenium results increased in well MW-50 from the 2015 semiannual events (<0.00038 mg/L in April 2015 and 0.000495 mg/L in October 2015) to the 2016 semiannual events (0.0994 mg/L in April 2016 and 0.0704 mg/L in October 2016), which exceeded the CGWSL of 0.050 mg/L for the first time since at least 2014. Selenium concentrations in this well will be watched closely during future sampling events.
- Boron, uranium, and vanadium results cannot be compared to historical results because they were first included in the groundwater monitoring program in 2016.

Concentrations of target COC arsenic in South Refinery Area wells are overall stable to fluctuating, as shown in the COC concentration plots included in Appendix C. Arsenic concentrations have fluctuated above and below the CGWSL over time in wells MW-28, MW-48, MW-52, MW-66, MW-99, MW-104 through MW-107, and MW-109.

Cyanide, South Refinery Area

Groundwater samples collected from South Refinery Area wells MW-28, MW-52, and MW-66 were analyzed for cyanide during both 2016 semiannual events. Cyanide was not detected above the CGWSL in groundwater samples collected from these wells.

Water Quality Parameters, South Refinery Area

In 2016, groundwater samples were collected from the following South Refinery Area wells during each semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (24 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-103, MW-104, MW-105, MW-106, MW-107, MW-109, MW-110, RA-313, RW-4R, RW-5R, and RW-6R.
- Second Semiannual Event (19 wells): KWB-2R, KWB-5, KWB-6, MW-28, MW-48, MW-50, MW-52, MW-64, MW-65, MW-66, MW-99, MW-101, MW-102, MW-104, MW-105, MW-106, MW-107, MW-109, and MW-110.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from at least one South Refinery Area wells as highlighted in Table 4C. The reported concentrations of these constituents exhibit an overall stable trend across the South Refinery Area, with the following exceptions:

- Chloride, fluoride, sulfate, and TDS increased in well MW-50 from the 2015 semiannual events to both of the 2016 semiannual events. Nitrite/nitrate was detected at a concentration of 150 mg/L during the first 2016 semiannual event, which is anomalous compared to historical results (2.61 mg/L or less from April 2014 to October 2015) and the second 2016 semiannual event (0.594 mg/L). Concentrations of these analytes in MW-50 will be watched closely during future events.
- Chloride and TDS concentrations have increased between each of the four most recent sampling events in MW-103. Concentrations of these analytes in MW-103 will be watched closely during future events.

5.3.7 Field East of Refinery – Analytical Results

Groundwater monitoring is ongoing in the field east of the refinery located between refinery and the EPs. Analytical results of groundwater samples collected from wells located within the field east of the refinery in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, Field East of Refinery

Groundwater samples were collected from the following wells located within the field east of the refinery during each 2016 semiannual event for analysis of DRO:

- First Semiannual Event (23 wells): KWB-1A, KWB-7, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, MW-135, RW-12R, and RW-13R.
- Second Semiannual Event (22 wells): KWB-1A, KWB-7, KWB-8, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, and MW-135.

DRO was detected at concentrations in exceedance of the CGWSL in 14 of 23 wells sampled during the first 2016 semiannual event and in 14 of 22 wells samples sampled during the second 2016 semiannual event, as highlighted in Table 4A. As shown in the COC concentration plots included in Appendix C-7, DRO concentrations in wells KWB-7, KWB-11A, and MW-58, have exhibited an overall fluctuating to increasing trend over time. However, DRO concentrations have stabilized in these wells over the five most recent sampling events. DRO concentrations in these wells will be watched closely during future sampling events.

Total Petroleum Hydrocarbons – Gasoline Range Organics, Field East of Refinery

Groundwater samples were collected from the following 17 wells located within the field east of the refinery during both 2016 semiannual events for analysis of GRO: KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, and MW-135.

GRO was detected above the method detection limit in 9 of the 17 wells sampled during the first 2016 semiannual event and in 15 of the 17 wells sampled during the second 2016 semiannual event. GRO analytical results in groundwater samples collected from wells located in the field east of the refinery in 2016 were overall consistent with historical results, as shown in the COC concentration plots included in Appendix C. There is no applicable CGWSL for GRO, but previous NMED guidance (NMED 2012) required analysis of VOCs when GRO is present for comparison to applicable individual VOC screening levels. VOC results are discussed in the following subsection.

Volatile Organic Compounds, Field East of Refinery

Groundwater samples were collected from the following wells located in the field east of the refinery during each 2016 semiannual event for analysis of VOCs:

- First Semiannual Event (26 wells): KWB-1A, KWB-7, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-

126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, MW-135, RA-4196, RA-4798, RW-12R, RW-13R, and RW-18.

- Second Semiannual Event (24 wells): KWB-1A, KWB-7, KWB-8, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, MW-135, RA-4196, and RA-4798.

Benzene, ethylbenzene, toluene, o-xylenes, total xylenes, MTBE, naphthalene, and 1,2,4-TMB, were detected at concentrations in exceedance of their respective CGWSLs in at least one well located in the field east of the refinery, as highlighted in Table 4A and described below:

- Benzene exceeded the CGWSL in 11 of 26 wells sampled during the first 2016 semiannual event; and in 12 of 24 wells sampled during the second 2016 semiannual event.
- Ethylbenzene exceeded the CGWSL in one of 26 wells sampled (MW-58) during the first 2016 semiannual event; and in two of 24 wells sampled (KWB-8 and MW-58) and during the second 2016 semiannual event.
- Toluene did not exceed the CGWSL in any of the 26 wells sampled during the first 2016 semiannual event; and in one of 24 wells sampled during the second 2016 semiannual event (KWB-8).
- o-Xylene e did not exceed the CGWSL in any of the 26 wells sampled during the first 2016 semiannual event; and in one of 24 wells sampled during the second 2016 semiannual event (KWB-10R).
- Total xylenes exceeded the CGWSL in two of 26 wells sampled (KWB-10R and MW-58) during the first 2016 semiannual event; and in three of 24 wells sampled (KWB-8, KWB-10R, and MW-58) during the second 2016 semiannual event.
- MTBE exceeded the CGWSL in seven of 26 wells sampled during the first 2016 semiannual event; and in six of 24 wells sampled during the second 2016 semiannual event.
- Naphthalene exceeded the CGWSL in four of 26 wells sampled during the first 2016 semiannual event; and in two of 24 wells sampled (KWB-10R and MW-58) during the second 2016 semiannual event.
- 1,2,4-TMB exceeded the CGWSL in seven of 26 wells sampled during the first 2016 semiannual event; and in five of 24 wells sampled during the second 2016 semiannual

event. Results of 1,2,4-TMB in wells sampled in the field east of the refinery during 2016 were consistent with historical results.

The 2016 analytical results of target VOCs in groundwater samples collected from wells located in the field east of the refinery were generally consistent with historical results. As shown in the COC concentration plots included in Appendix C, concentrations of target VOCs in wells located in the field east of the refinery have exhibited an overall stable to decreasing trend over time, with the exception of benzene, ethylbenzene, total xylenes, and naphthalene concentrations in MW-58 which have overall increased in well MW-58 since 2011. However, concentrations of these VOCs in MW-58 have overall reduced over the five most recent sampling events.

Total Metals, Field East of Refinery

In 2016, groundwater samples were collected from the following wells located in the field east of the refinery during each 2016 semiannual event for analysis of the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium):

- First Semiannual Event (24 wells): KWB-1A, KWB-7, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, MW-135, RW-12R, RW-13R, and RW-18.
- Second Semiannual Event (22 wells): KWB-1A, KWB-7, KWB-8, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, and MW-135.

In addition, groundwater samples collected from wells KWB-1A, KWB-7, KWB-11A, KWB-11B, KWB-12A, KWB-12B, and MW-58 during both 2016 semiannual events; and well KWB-8 during the second 2016 semiannual events were analyzed for the expanded metals list (boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium).

Boron, cadmium, cobalt, chromium, lead, mercury, nickel, and vanadium were not detected above their respective CGWSLs in any of the wells sampled in the field east of the refinery during either 2016 semiannual event. Arsenic, barium, iron, manganese, selenium, and uranium were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in eight of 24 wells sampled during the first 2016 semiannual event; and in five of 22 wells sampled during the second 2016 semiannual event.

- Barium exceeded the CGWSL in two of 24 wells sampled (KWB-10R and MW-131) during the first 2016 semiannual event; and in one of 22 wells sampled (MW-131) during the second 2016 semiannual event.
- Iron exceeded the CGWSL in eight of 24 wells sampled during the first 2016 semiannual event; and in seven of 22 wells sampled during the second 2016 semiannual event.
- Manganese exceeded the CGWSL in 15 of 24 wells sampled during the first 2016 semiannual event; and in 11 of 22 wells sampled during the second 2016 semiannual event.
- Selenium exceeded the CGWSL in well MW-135 during the first 2016 semiannual event; and in none of the wells sampled during the second 2016 semiannual event.
- Uranium exceeded the CGWSL in three of the seven wells sampled (KWB-11A, KWB-12A, KWB-12B) during the first 2016 semiannual event, but did not exceed the CGWSL in these wells or any other well during the second 2016 semiannual event.

The 2016 groundwater analytical results of total metals in wells located in the field east of the refinery were generally consistent with historical results, with the following exceptions:

- Arsenic, iron, and manganese concentrations increased in well MW-128 during the first 2016 semiannual event by an order of magnitude compared to historical results, but decreased to concentrations consistent with historical results during the second 2016 semiannual event.
- Arsenic results increased in well MW-135 from the 2015 semiannual events (0.00871 J mg/L in April 2015 and 0.00442 mg/L in October 2015) to the first 2016 semiannual event (0.0216 mg/L in April 2016), which exceeded the CGWSL of 0.010 mg/L for the first time in this well. However, arsenic concentrations reduced to 0.00394 mg/L during the second 2016 semiannual event, which is consistent with historical concentrations and less than the CGWSL.
- Selenium results increased in well MW-135 from the 2015 semiannual events (<0.00038 mg/L in April 2015 and 0.000495 mg/L in October 2015) to the first 2016 semiannual event (0.128 mg/L in April 2016), which exceeded the CGWSL of 0.050 mg/L for the first time since at least 2014. However, selenium concentrations reduced to 0.0368 mg/L during the second 2016 semiannual event, which is consistent with historical concentrations and less than the CGWSL.
- Uranium results cannot be compared to historical results because they were first included in the groundwater monitoring program in 2016.

Concentrations of target COC arsenic in wells located in the field east of the refinery are overall stable to fluctuating, as shown in the COC concentration plots included in Appendix C. Arsenic concentrations have fluctuated above and below the CGWSL over time in wells KWB-1A, KWB-1C, KWB-7, and RW-18.

Cyanide, Field East of Refinery

Groundwater samples collected from wells KWB-1A, KWB-7, KWB-11A, KWB-11B, KWB-12A, KWB-12B, and MW-58 during both 2016 semiannual events; and well KWB-8 during the second 2016 semiannual events were analyzed for cyanide. Cyanide was not detected above the CGWSL in groundwater samples collected from these wells during either semiannual event.

Water Quality Parameters, Field East of Refinery

In 2016, groundwater samples were collected from the following wells located in the field east of the refinery during each 2016 semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (26 wells): KWB-1A, KWB-7, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, MW-135, RA-4196, RA-4798, RW-12R, RW-13R, and RW-18.
- Second Semiannual Event (24 wells): KWB-1A, KWB-7, KWB-8, KWB-10R, KWB-11A, KWB-11B, KWB-12A, KWB-12B, MW-57, MW-58, MW-111, MW-113, MW-125, MW-126A, MW-126B, MW-127, MW-128, MW-129, MW-130, MW-131, MW-134, MW-135, RA-4196, and RA-4798.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from at least one well within the field east of the refinery as highlighted in Table 4C. The reported concentrations of these constituents exhibit an overall stable trend, with some seasonal fluctuations between the first and second historical semiannual events.

5.3.8 Cross-Gradient and Up-Gradient Areas – Analytical Results

Groundwater monitoring is ongoing in areas both cross-gradient and up-gradient from the refinery. Cross-gradient wells KWB-13 (located south of the refinery), RA-3156 (located across southeast of the refinery), and MW-136 (located north of the refinery) were sampled during both 2016 semiannual events. Up-gradient wells UG-1, UG-2, and UG-3R, which all are located to the west of the refinery, were sampled during the first semiannual event. Analytical results of groundwater samples collected from cross-gradient and up-gradient wells in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, Cross-gradient and Up-gradient Areas

In 2016, groundwater samples were collected from the following cross-gradient and up-gradient wells during each semiannual event for analysis of DRO:

- First Semiannual Event (six wells): KWB-13, MW-136, UG-1, UG-2, UG-3R, and UG-4.
- Second Semiannual Event (one well): MW-136

DRO was not detected at concentrations in exceedance of the CGWSL in any of the cross-gradient or up-gradient wells sampled during both 2016 semiannual events, as shown in Table 4A. DRO concentrations in cross-gradient and up-gradient wells are stable overtime.

Total Petroleum Hydrocarbons – Gasoline Range Organics, Cross-Gradient and Up-Gradient Areas

In 2016, groundwater samples were collected from the following cross-gradient and up-gradient wells during each semiannual event for analysis of GRO:

- First Semiannual Event (five wells): MW-136, UG-1, UG-2, UG-3R, and UG-4.
- Second Semiannual Event (one well): MW-136

GRO was not detected above the method detection limit in any sample collected from the up-gradient and cross-gradient wells during either 2016 semiannual event.

Volatile Organic Compounds, Cross-Gradient and Up-Gradient Areas

In 2016, groundwater samples collected from the following cross-gradient and up-gradient wells during each semiannual event were analyzed for VOCs:

- First Semiannual Event (seven wells): KWB-13, RA-3156, MW-136, UG-1, UG-2, UG-3R, and UG-4.
- Second Semiannual Event (one well): MW-136.

No VOCs were detected above the method detection limits or their respective CGWSL during either 2016 semiannual event, as shown in Table 4A. The 2016 VOC results for groundwater samples collected from cross-gradient and up-gradient wells were consistent with historical results.

Total Metals, Cross-Gradient and Up-Gradient Areas

In 2016, groundwater samples were collected from the following cross-gradient and up-gradient wells during each semiannual event for analysis of the standard total metals list (arsenic,

barium, chromium, iron, lead, manganese, and selenium) and the expanded total metals list boron, cadmium, cobalt, mercury, nickel, uranium, and vanadium):

- First Semiannual Event (six wells): KWB-13, MW-136, UG-1, UG-2, UG-3R, and UG-4.
- Second Semiannual Event (one well): MW-136

Arsenic, barium, cadmium, cobalt, chromium, lead, manganese, mercury, nickel, selenium, and vanadium were not detected above their respective CGWSLs in any of the cross-gradient or up-gradient wells sampled during either 2016 semiannual event. Iron and uranium were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Iron exceeded the CGWSL in well KWB-13 during the first 2016 semiannual event; and in no wells during the second 2016 semiannual event.
- Uranium exceeded the CGWSL in wells MW-136 and UG-4 during the first 2016 semiannual event; and in well MW-136 during the second 2016 semiannual event.

The 2016 analytical results of total metals in groundwater samples collected from cross-gradient and up-gradient wells were generally consistent with historical results, however uranium results cannot be compared to historical results because it was first included in the groundwater monitoring program in 2016. Concentrations of target COC arsenic in cross-gradient and up-gradient wells are overall stable, as shown in the COC concentration plots included in Appendix C.

Cyanide, Cross-Gradient and Up-Gradient Areas

Cyanide was not detected above the CGWSL in groundwater samples collected from cross-gradient and up-gradient wells KWB-13, MW-136, UG-1, UG-2, UG-3R, and UG-4 during either 2016 semiannual events.

Water Quality Parameters, Cross-Gradient and Up-Gradient Areas

In 2016, groundwater samples were collected from the following cross-gradient and up-gradient wells during each semiannual event for analysis of water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite [as nitrogen]):

- First Semiannual Event (11 wells): MW-8, MW-20, MW-21, MW-25, MW-26, MW-27, MW-46R, MW-68, MW-71, MW-89, and NP-1.
- Second Semiannual Event (2 wells): MW-21 and MW-46R.

No CGWSLs are applicable for calcium, potassium, or sodium. Chloride, fluoride, nitrate/nitrite, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples from cross-gradient and up-gradient wells, as highlighted in Table 4C. The reported concentrations of these constituents in 2016 were generally consistent with historical results.

5.3.9 RO Reject Discharge Fields – Analytical Results

The reject water from Navajo's RO system is discharged to agricultural fields located north of the refinery in accordance with the Discharge Permit. These areas are referred to as the North and South RO Reject Fields. Groundwater samples were collected from the three North RO Reject Field wells (MW-117, MW-118, and MW-119) and three South RO Reject Field wells (MW-114, MW-115, and MW-116) during both 2016 semiannual events. Groundwater samples collected from these wells were all analyzed for GRO, DRO, the standard total metals list (arsenic, barium, chromium, iron, lead, manganese, and selenium), and water quality parameters (calcium, chloride, fluoride, potassium, sodium, sulfate, TDS, and nitrate/nitrite).

Analytical results of groundwater samples collected from RO Reject Field wells in 2016 indicate COCs are present in groundwater in excess of their respective CGWSLs, as highlighted in Tables 4A through 4C and discussed in the following subsections.

Total Petroleum Hydrocarbons – Diesel Range Organics, RO Reject Discharge Fields

DRO was not detected at concentrations in exceedance of the CGWSL in any of the six RO Reject Field wells sampled during either 2016 semiannual event, as shown in Table 4A. DRO 2016 results in RO Reject Field wells are consistent with historical results.

Total Petroleum Hydrocarbons – Gasoline Range Organics, RO Reject Discharge Fields

GRO was not detected above the method detection limit in the six RO Reject Field wells sampled during either 2016 semiannual event, with the exception in MW-119 during the second 2016 semiannual event (0.0557 J). However, GRO was also detected in the associated laboratory method blank and the detection in MW-119 may be attributed to laboratory contamination. The 2016 GRO results in RO Reject Field wells are consistent with historical results, with the exception of the detection in MW-119 during the second 2016 semiannual event.

Volatile Organic Compounds, RO Reject Discharge Fields

VOCs were not detected above the method detection limit or their respective CGWSLs in the six RO Reject Field wells sampled during either 2016 semiannual event, with the exception of j-flagged concentrations of 1,2,4-TMB and benzene in MW-119 during the second 2016 semiannual event. The 2016 VOC results in RO Reject Field wells are consistent with historical

results, with the exception of the j-flagged detections of 1,2,4-TMB and benzene in MW-119 during the second 2016 semiannual event.

Total Metals, RO Reject Discharge Fields

Barium, chromium, lead, mercury, nickel, and selenium were not detected above their respective CGWSLs in any of the RO Reject Field wells sampled during either 2016 semiannual event. Arsenic, iron, and manganese were detected at concentrations in exceedance of their respective CGWSLs in at least one well, as highlighted in Table 4B and described below:

- Arsenic exceeded the CGWSL in wells MW-115 and MW-118 during the first 2016 semiannual event; and in well MW-118 during the second 2016 semiannual event.
- Iron exceeded the CGWSL in well MW-117 during the second 2016 semiannual event, but not in any wells during the first 2016 semiannual event. Iron has fluctuated above and below the CGWSL in this well.
- Manganese exceeded the CGWSL in well MW-115 during the first 2016 semiannual event; and in no wells during the second 2016 semiannual event.

The 2016 analytical results of total metals in groundwater samples collected from RO Reject Field wells were generally consistent with historical results, with the exception of arsenic and manganese in MW-115 during the first 2016 semiannual event which exceeded their respective CGWSL for the first time since at least 2014. However, arsenic and manganese concentrations in MW-115 decreased to concentrations less than their respective CGWSL and consistent with historical concentrations during the second 2016 semiannual event.

Cyanide, RO Reject Discharge Fields

Groundwater samples collected from RO Reject Field wells in 2016 were not analyzed for cyanide.

Water Quality Parameters, RO Reject Discharge Fields

Chloride, fluoride, sulfate, and TDS were detected at concentrations in exceedance of their respective CGWSLs in groundwater samples collected from some RO Reject Field wells, as highlighted in Table 4C. The reported concentrations of these constituents in 2016 were generally consistent with historical results, with the following exceptions:

- Chloride concentrations increased in wells MW-117 and MW-119 during the second 2016 semiannual event to concentrations that exceeded the CGWSL for the first time since at least 2014. However, chloride concentrations have historically fluctuated above and below the CGWSL in RO Reject Field wells and other wells located across the refinery.

- Chloride concentrations increased in well MW-116 during the first 2016 semiannual event to a concentration that exceeded the CGWSL for the first time since at least 2014. However, chloride concentrations decreased to less than the CGWSL and consistent with historical concentrations during the second 2016 semiannual event.

No CGWSLs are applicable for calcium, potassium, or sodium. The 2016 results of these analytes were consistent with historical results.

6.0 REMEDIATION SYSTEM MONITORING

The PCC Permit and Discharge Permit both require recovery of PSH present in the shallow groundwater within and adjacent to the refinery. PSH and impacted groundwater are recovered at the refinery from a system of recovery trenches and recovery wells. A summary of the recovery system and recovery results are summarized in this section.

As reported in 2014 and 2015, the Office of the State Engineer (OSE) required Navajo turn the water pumps off due to diversion of shallow groundwater without water rights. Navajo submitted an Application for Permit to Change an Existing Water Right under the Water-Use Leasing Act to the OSE on March 9, 2016. In a letter on March 17, 2016, the OSE granted Navajo provisional and temporary approval of the application and groundwater pumping resumed for the remainder of 2016.

6.1 Recovery System

The recovery system consists of automated pumping of PSH and groundwater from recovery wells using dedicated groundwater and PSH pumps (both types of fluid pumps installed in each well). Pumps are installed, operated, and removed from each well based on PSH thicknesses and observed recovery during operation and maintenance (O&M) activities. The pumps are typically operated automatically, with remote data sensing and recording. Recovered PSH is pumped into centralized holding tanks, then pumped to Tank 49, associated with the wastewater treatment system, which then transfers the product to crude tank(s) (Tank 1225 or 437) for processing within the refinery. Recovered groundwater is pumped to the nearest process wastewater sump and directed to the process wastewater treatment system. Thus, recovered PSH is recycled into the refinery process while groundwater is treated to remove residual hydrocarbons.

O&M of the recovery system was conducted throughout 2016 on an approximate weekly basis. O&M activities included gauging wells recovery wells RW-1R, RW-2R, RW-4R, RW-5R, RW-6R, RW-7R, RW-8R, RW-12R, RW-13R, RW-14R, RW-15, RW-19, RW-20, and RW-22 in order to assess the effectiveness of the recovery system and to determine in which wells to install and operate PSH and groundwater pumps. Measurable PSH was not observed in RW-1R during 2016.

6.2 Estimated Volume of Fluids Recovered

Volumes of groundwater and PSH recovered by the recovery system during 2016 are summarized in Table 5 and additional recovery details are provided in Appendix E. An estimated 7,968,010 gallons of groundwater and an estimated 33,958 gallons of PSH were recovered through operation of the automated recovery system in 2016. The majority of the recovered PSH during 2016 was recovered from RW-2R, RW-13R, RW-15, RW-19, RW-20, and RW-22. The greatest

volume of PSH was recovered during the third quarter (primarily July and August) and the fourth quarter (primarily October), which correlated with the timeframe of increased PSH thicknesses measured in the recovery wells, likely due to reduced groundwater levels.

7.0 CONCLUSIONS

Conclusions based on the results of groundwater monitoring and remedial activities conducted during 2016 and comparison to historical results are discussed below.

Groundwater flow direction was generally consistent with that measured during previous monitoring events. Discharge of the RO reject water to the RO reject fields creates localized mounding beneath the South RO reject field. Localized groundwater sinks are occasionally observed around various recovery wells due to active pumping of groundwater.

The presence and distribution of PSH were generally consistent with previous monitoring results, with minor fluctuations based on the intermittent presence of PSH in select wells over time. PSH thicknesses across all areas of interest are stable to declining over time. PSH thicknesses are inversely affected by fluctuations in groundwater elevations, which have generally increased since March 2014.

Concentrations of COCs in groundwater have generally remained stable over time, although increasing trends were noted in select wells in specific areas of interest. During 2016 and previous years, the following COCs were detected in groundwater at concentrations in exceedance of their respective CGWSL:

- DRO;
- Select VOCs including target COCs benzene, toluene, ethylbenzene, xylenes, MTBE, and naphthalene;
- Select total metals including target COC arsenic; and
- Water quality parameters chloride, fluoride, sulfate, TDS, and nitrate/nitrite.

It should be noted, that many of the concentrations of inorganic COCs (manganese, chloride, fluoride, nitrate/nitrite, sulfate, TDS) depicted as “exceedances” in this report may actually be similar to and reflective of background groundwater concentrations, as detailed in the background evaluation that was submitted to NMED and OCD in September 2015 (Arcadis 2015b).

The PSH and groundwater recovery system operated throughout 2016. Diminishing PSH recovery was observed in each successive quarter in 2015 correlating with declining PSH thickness measured in the subsurface, likely due to elevated groundwater levels.

According to the requirements of the updated PCC Permit, an updated FWGMWP will be submitted in June 2017.

8.0 References

Arcadis 2013. SWMU/AOC Group 2 Additional Corrective Action Investigation Report, RCRA Permit NMD048918817. April 2013.

Arcadis 2014. Background Groundwater Evaluation Work Plan, NMD048918817 and DP GW-028. July 2014.

Arcadis 2015a. Evaporation Ponds Phase IV Corrective Action Investigation Report - Revised, NMD048918817. May 2015.

Arcadis 2015b. Background Groundwater Investigation Report, RCRA Permit NMD048918817, OCD Discharge Permit GW-028. September 2015.

Arcadis 2015c. 2015 Facility Wide Groundwater Monitoring Workplan - Revised, NMD048918817 and DP GW-028. December 2015.

OCD 2012. Discharge Permit (GW-028), Navajo Refining Company - Artesia Refinery. August 2012.

NMED 2010. Navajo Refining Company, Artesia Refinery, Post-Closure Care Permit. December 2010.

NMED 2012. Risk Assessment Guidance for Site Investigations and Remediation. February 2012.

NMED 2014a. Approval with Modification, Update on the Investigation of Potential Sources of the Phase Separated Hydrocarbons in Monitoring Well NCL-34, Navajo Refining Company, Artesia Refinery, EPA ID No. NMD048918817, HWB-NRC-13-001. March 5, 2014.

NMED 2015. Risk Assessment Guidance for Site Investigations and Remediation. July 2015.

USEPA 2015. Regional Screening Level (RSL) Summary Table. November 2015.

Appendices (all on compact disc)

Appendix A Field Sampling Notes and Well Re-Development

A.1 First Semiannual Event Rainfall Data and Field Notes

A.2 Second Semiannual Event Rainfall Data and Field Notes

Appendix B Groundwater Laboratory Reports and Tabulated Data

Tables*:*

B.1 Groundwater Analytical Data: Total Petroleum Hydrocarbons

B.2 Groundwater Analytical Data: Total Metals

B.3 Groundwater Analytical Data: Dissolved Metals

B.4 Groundwater Analytical Data: Volatile Organic Compounds

B.5 Groundwater Analytical Data: Water Quality Parameters

2016 Analytical Data Reports

Appendix C Trend Plots of COC Concentrations, Groundwater Elevations, and PSH Thickness

Appendix D Data Validation Reports

Appendix E Recovery System Records

Appendix F Refinery Discharges Laboratory Reports

Table 1 - Well Information and Gauging Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
Cross-Gradient	KWB-13	Shallow	669077.00	524892.42	3366.02	3365.67	Unknown	Unknown	4/26/2016	--	25.00	3,340.67	--
									10/4/2016	--	21.19	3,344.48	--
	NP-5	Shallow	675512.24	524698.19	3,346.31	3,349.29	3,336.06	10.25 to 20	4/26/2016	--	12.00	3,337.29	--
									10/4/2016	--	11.35	3,337.94	--
	MW-136	Shallow	675343.45	522975.40	3,358.62	3,360.83	3,348.62	10 to 25	4/26/2016	--	10.90	3,349.93	--
									10/4/2016	--	9.62	3,351.21	--
Evaporation Ponds	MW-1R	Shallow	675135.17	538636.78	3,311.58	3,313.28	3,303.58	8 to 23	4/26/2016	--	10.68	3,302.60	--
									10/4/2016	--	10.26	3,303.02	--
	MW-2A	Shallow	675979.09	540803.91	3,310.55	3,312.97	Unknown	Unknown	4/26/2016	--	10.62	3,302.35	--
									10/4/2016	--	10.19	3,302.78	--
	MW-2B	Valley Fill	675969.73	540801.44	3,309.94	3,312.49	3,271.44	38.5 to 48	4/26/2016	--	10.35	3,302.14	--
									10/4/2016	--	9.98	3,302.51	--
	MW-3	Shallow	674443.34	540503.24	3,309.07	3,310.32	Unknown	Unknown	4/26/2016	--	8.73	3,301.59	--
									10/4/2016	--	8.44	3,301.88	--
	MW-4A	Shallow	674083.00	540529.44	3,308.64	3,312.71	Unknown	Unknown	4/26/2016	--	11.29	3,301.42	--
									10/4/2016	--	10.98	3,301.73	--
	MW-4B	Valley Fill	674089.71	540541.34	3,308.73	3,312.01	3,248.48	60.25 to 70	4/26/2016	--	10.54	3,301.47	--
									10/4/2016	--	10.25	3,301.76	--
	MW-5A	Shallow	674272.84	541759.78	3,306.59	3,308.62	Unknown	Unknown	4/26/2016	--	7.96	3,300.66	--
									10/4/2016	--	7.20	3,301.42	--
	MW-5B	Valley Fill	674272.33	541739.12	3,306.71	3,308.95	3,265.21	41.5 to 50.5	4/26/2016	--	8.06	3,300.89	--
									10/4/2016	--	7.66	3,301.29	--
	MW-5C	Valley Fill	674279.57	541728.80	3,306.55	3,309.28	3,247.30	59.25 to 68.75	4/26/2016	--	8.25	3,301.03	--
									10/4/2016	--	7.86	3,301.42	--
	MW-6A	Shallow	674427.07	539833.47	3,310.40	3,313.46	Unknown	Unknown	4/26/2016	--	11.88	3,301.58	--
									10/4/2016	--	11.69	3,301.77	--
	MW-6B	Valley Fill	674418.57	539834.04	3,310.09	3,313.35	3,270.59	39.5 to 49	4/26/2016	--	11.79	3,301.56	--
									10/4/2016	--	11.55	3,301.80	--
	MW-7A	Shallow	674447.64	542716.01	3,306.04	3,309.24	Unknown	Unknown	4/26/2016	--	7.34	3,301.90	--
									10/4/2016	--	6.87	3,302.37	--
	MW-7B	Valley Fill	674455.63	542715.61	3,306.05	3,307.87	3,266.55	39.5 to 49	4/26/2016	--	8.59	3,299.28	--
									10/4/2016	--	8.15	3,299.72	--
	MW-10	Shallow	672121.15	541540.05	3,304.14	3,304.76	3,304.14	0 to 19.4	4/26/2016	--	4.81	3,299.95	--
									10/4/2016	--	4.48	3,300.28	--
	MW-11A	Shallow	677317.73	543675.36	3,308.42	3,310.76	3,302.92	5.5 to 20	4/26/2016	--	9.49	3,301.27	--
									10/4/2016	--	8.75	3,302.01	--

Table 1 - Well Information and Gauging Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
Evaporation Ponds	MW-11B	Valley Fill	677305.72	543685.50	3,308.34	3,310.76	3,272.84	35.5 to 45	4/26/2016	--	9.45	3,301.31	--
									10/4/2016	--	8.78	3,301.98	--
	MW-12	Shallow	676952.63	541505.50	3,310.37	3,312.73	3,303.87	6.5 to 16	4/26/2016	--	10.66	3,302.07	--
									10/4/2016	--	10.26	3,302.47	--
	MW-13	Shallow	674951.80	539762.62	3,311.95	3,314.24	3,302.45	9.5 to 19	4/26/2016	--	12.11	3,302.13	--
									10/4/2016	--	11.69	3,302.55	--
	MW-14	Shallow	676122.48	543280.49	3,309.44	3,311.84	3,303.94	5.5 to 20	4/26/2016	--	11.71	3,300.13	--
									10/4/2016	--	11.36	3,300.48	--
	MW-15	Shallow	674731.39	539003.75	3,310.97	3,313.72	3,301.97	9 to 19	4/26/2016	--	11.57	3,302.15	--
									10/4/2016	--	11.24	3,302.48	--
	MW-18A	Shallow	672548.16	543447.78	3,306.33	3,308.58	3,296.33	10 to 20	4/26/2016	--	10.03	3,298.55	--
									10/4/2016	--	9.62	3,298.96	--
	MW-18B	Valley Fill	672557.96	543458.22	3,306.23	3,308.74	3,269.23	37 to 47	4/26/2016	--	10.01	3,298.73	--
									10/4/2016	--	9.61	3,299.13	--
	MW-18T	Valley Fill	672559.79	543449.75	3,306.30	3,308.55	3,269.30	37 to 47	4/26/2016	--	9.80	3,298.75	--
									10/4/2016	--	9.40	3,299.15	--
	MW-22A	Shallow	672866.82	541801.63	3,305.24	3,307.62	3,299.74	5.5 to 20.5	4/26/2016	--	7.38	3,300.24	--
									10/4/2016	--	7.06	3,300.56	--
	MW-22B	Valley Fill	672866.58	541786.97	3,305.08	3,307.63	3,262.78	42.3 to 52	4/26/2016	--	7.26	3,300.37	--
									10/4/2016	--	6.95	3,300.68	--
	MW-24	Shallow	676498.23	544101.56	3,310.33	3,312.85	3,295.33	15 to 20	4/26/2016	--	12.28	3,300.57	--
									10/4/2016	--	11.88	3,300.97	--
	MW-69	Shallow	675962.29	540401.29	3,311.40	3,313.86	3,306.40	5 to 20	4/26/2016	--	11.39	3,302.47	--
									10/4/2016	--	10.93	3,302.93	--
	MW-70	Shallow	670892.66	542787.60	3,303.84	3,306.30	3,298.84	5 to 20	4/26/2016	--	7.71	3,298.59	--
									10/4/2016	--	7.31	3,298.99	--
	MW-72	Shallow	676691.27	542662.31	3,306.40	3,308.45	3,304.40	2 to 12	4/26/2016	--	7.09	3,301.36	--
									10/4/2016	--	6.59	3,301.86	--
	MW-73	Shallow	675910.20	542130.56	3,308.02	3,310.18	3,306.02	2 to 17	4/26/2016	--	9.20	3,300.98	--
									10/4/2016	--	8.57	3,301.61	--
	MW-74	Shallow	675059.14	541546.30	3,307.78	3,310.03	3,305.78	2 to 17	4/26/2016	--	8.64	3,301.39	--
									10/4/2016	--	8.17	3,301.86	--
	MW-75	Shallow	674622.31	541132.78	3,307.80	3,310.21	3,304.80	3 to 18	4/26/2016	--	8.81	3,301.40	--
									10/4/2016	--	8.43	3,301.78	--
	MW-76	Shallow	674482.47	541053.83	3,309.70	3,311.84	3,306.70	3 to 18	4/26/2016	--	10.39	3,301.45	--
									10/4/2016	--	10.04	3,301.80	--

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
Evaporation Ponds	MW-77	Shallow	674529.89	541104.86	3,307.97	3,310.07	3,304.97	3 to 18	4/26/2016	--	8.62	3,301.45	--
									10/4/2016	--	8.22	3,301.85	--
	MW-78	Shallow	674529.23	541073.45	3,307.94	3,310.14	3,305.94	2 to 17	4/26/2016	--	8.68	3,301.46	--
									10/4/2016	--	6.78	3,303.36	--
	MW-79	Shallow	675349.67	540906.08	3,309.08	3,311.43	3,307.08	2 to 17	4/26/2016	--	9.68	3,301.75	--
									10/4/2016	--	9.20	3,302.23	--
	MW-80	Shallow	675371.74	540646.46	3,310.27	3,310.79	3,308.27	2 to 17	4/26/2016	--	8.65	3,302.14	--
									10/4/2016	--	8.28	3,302.51	--
	MW-81	Shallow	675252.80	540544.47	3,310.19	3,312.34	3,308.19	2 to 17	4/26/2016	--	10.46	3,301.88	--
									10/4/2016	--	10.10	3,302.24	--
	MW-82	Shallow	675035.42	540806.88	3,308.64	3,310.75	3,306.64	2 to 17	4/26/2016	--	9.10	3,301.65	--
									10/4/2016	--	8.68	3,302.07	--
	MW-83	Shallow	674524.97	540832.80	3,307.93	3,310.19	3,305.93	2 to 17	4/26/2016	--	8.67	3,301.52	--
									10/4/2016	--	8.16	3,302.03	--
	MW-84	Shallow	674798.43	540109.13	3,309.83	3,311.59	3,307.83	2 to 17	4/26/2016	--	8.81	3,302.78	--
									10/4/2016	--	7.42	3,304.17	--
	MW-85	Shallow	674566.12	539805.49	3,308.99	3,311.09	3,305.99	3 to 18	4/26/2016	9.44	9.98	3,301.54	0.54
									10/4/2016	9.20	9.65	3,301.80	0.45
	MW-86	Shallow	674645.96	539671.17	3,308.98	3,311.06	3,306.98	2 to 17	4/26/2016	9.30	9.34	3,301.75	0.04
									10/4/2016	8.89	8.96	3,302.16	0.07
	MW-87	Shallow	673379.98	543280.45	3,305.42	3,307.64	3,303.42	2 to 17	4/26/2016	--	8.27	3,299.37	--
									10/4/2016	--	7.70	3,299.94	--
	MW-88	Shallow	672899.14	540832.09	3,306.43	3,308.68	3,303.43	3 to 18	4/26/2016	--	8.06	3,300.62	--
									10/4/2016	--	7.77	3,300.91	--
	MW-120	Shallow	674678.95	539555.77	3,310.66	3,313.55	3,300.66	10 to 25	4/26/2016	--	11.67	3,301.88	--
									10/4/2016	--	11.65	3,301.90	--
	MW-121	Shallow	674851.38	539923.70	3,311.77	3,314.68	3,301.77	10 to 25	4/26/2016	--	12.43	3,302.25	--
									10/4/2016	--	11.67	3,303.01	--
	MW-122	Shallow	675231.06	540401.60	3,308.78	3,311.69	3,298.78	10 to 20	4/26/2016	--	10.13	3,301.56	--
									10/4/2016	--	9.80	3,301.89	--
	MW-123	Shallow	671352.15	541523.94	3,302.78	3,303.98	3,292.78	10 to 25	4/26/2016	--	5.16	3,298.82	--
									10/4/2016	--	4.90	3,299.08	--
	MW-124	Shallow	669844.77	542735.51	3,302.99	3,305.84	3,297.99	5 to 20	4/26/2016	--	8.25	3,297.59	--
									10/4/2016	--	7.81	3,298.03	--
	OCD-1R	Shallow	676741.31	541568.00	3,310.69	3,314.27	Unknown	Unknown	4/26/2016	--	12.27	3,302.00	--
									10/4/2016	--	11.68	3,302.59	--

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
Evaporation Ponds	OCD-2A	Shallow	677036.12	542157.14	3,310.83	3,314.16	3,302.33	8.5 to 23.5	4/26/2016	--	12.28	3,301.88	--
									10/4/2016	--	11.75	3,302.41	--
	OCD-2B	Valley Fill	677034.65	542167.57	3,310.66	3,313.07	3,272.16	38.5 to 48	4/26/2016	--	11.11	3,301.96	--
									10/4/2016	--	10.48	3,302.59	--
	OCD-3	Shallow	677516.31	543024.47	3,310.89	3,314.43	3,304.39	6.5 to 21.5	4/26/2016	--	12.78	3,301.65	--
									10/4/2016	--	12.27	3,302.16	--
	OCD-4	Shallow	678099.52	543893.55	3,310.31	3,313.68	3,303.81	6.5 to 21.5	4/26/2016	--	12.03	3,301.65	--
									10/4/2016	--	11.48	3,302.20	--
	OCD-5	Shallow	677081.54	544295.35	3,308.76	3,311.27	Unknown	Unknown	4/26/2016	--	10.19	3,301.08	--
									10/4/2016	--	9.65	3,301.62	--
	OCD-6	Shallow	676538.82	543540.03	3,308.11	3,311.40	3,300.11	8 to 23	4/26/2016	--	10.78	3,300.62	--
									10/4/2016	--	10.53	3,300.87	--
	OCD-7AR	Shallow	676169.74	543071.88	3,308.86	3,310.03	3,303.36	5.5 to 19.5	4/26/2016	--	9.67	3,300.36	--
									10/4/2016	--	9.33	3,300.70	--
	OCD-7B	Valley Fill	676157.36	543081.99	3,307.57	3,310.26	3,264.07	43.5 to 52.5	4/26/2016	--	9.44	3,300.82	--
									10/4/2016	--	9.11	3,301.15	--
	OCD-7C	Valley Fill	676155.95	543069.21	3,307.74	3,310.10	3,247.49	60.25 to 69.75	4/26/2016	--	8.75	3,301.35	--
									10/4/2016	--	8.29	3,301.81	--
	OCD-8A	Shallow	674976.41	543376.95	3,306.43	3,308.72	3,303.43	3 to 18	4/26/2016	--	8.37	3,300.35	--
									10/4/2016	--	7.94	3,300.78	--
	OCD-8B	Valley Fill	674992.24	543375.06	3,306.11	3,309.19	3,262.61	43.5 to 53	4/26/2016	--	8.53	3,300.66	--
									10/4/2016	--	8.10	3,301.09	--
Field East of Refinery	KWB-1A	Shallow	672969.12	526181.36	3,351.25	3,353.46	3,333.25	18 to 32	4/26/2016	--	12.95	3,340.51	--
									10/4/2016	--	10.71	3,342.75	--
	KWB-1B	Shallow	672968.90	526191.02	3,351.14	3,352.83	3,333.14	18 to 32	4/26/2016	--	14.61	3,338.22	--
									10/4/2016	--	12.33	3,340.50	--
	KWB-1C	Valley Fill	672968.22	526202.95	3,351.18	3,351.38	3,320.68	30.5 to 49.5	4/26/2016	--	15.21	3,336.17	--
									10/4/2016	--	12.95	3,338.43	--
	KWB-7	Shallow	671266.72	529055.47	3,343.00	3,346.16	3,325.00	18 to 32	4/26/2016	20.84	20.85	3,325.32	0.01
									10/4/2016	16.59	16.60	3,329.57	0.01
	KWB-8	Shallow	671000.57	527874.87	3,347.90	3,350.41	3,332.90	15 to 34	4/26/2016	21.36	22.47	3,328.83	1.11
									10/4/2016	--	16.00	3,334.41	--
	KWB-10R	Shallow	671756.34	526206.06	3,351.23	3,350.97	3,342.23	9 to 29	4/26/2016	--	15.54	3,335.43	--
									10/4/2016	13.95	13.96	3,337.02	0.01
	KWB-11A	Shallow	670643.67	529043.46	3,346.13	3,348.72	3,316.13	30 to 39.5	4/26/2016	--	21.17	3,327.55	--
									10/4/2016	--	15.65	3,333.07	--

Table 1 - Well Information and Gauging Data

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
Field East of Refinery	KWB-11B	Valley Fill	670653.84	529044.06	3,345.91	3,348.03	3,295.91	50 to 69.5	4/26/2016	--	21.81	3,326.22	--
									10/4/2016	--	16.30	3,331.73	--
	KWB-12A	Shallow	669074.44	527590.88	3,352.01	3,351.81	3,336.51	15.5 to 24.5	4/26/2016	--	20.94	3,330.87	--
									10/4/2016	--	15.35	3,336.46	--
	KWB-12B	Valley Fill	669064.18	527590.12	3,351.84	3,351.63	3,326.34	25.5 to 39.5	4/26/2016	--	20.80	3,330.83	--
									10/4/2016	--	15.20	3,336.43	--
	KWB-P4	Shallow	670970.10	537416.92	3,305.76	3,305.39	Unknown	unknown	4/26/2016	--	3.98	3,301.41	--
	MW-57	Shallow	669935.59	527579.02	3,350.95	3,350.91	3,340.95	10 to 30	4/26/2016	--	18.82	3,332.09	--
									10/4/2016	--	12.68	3,338.23	--
	MW-58	Shallow	670207.27	525197.99	3,362.56	3,362.22	3,349.56	13 to 28	4/26/2016	--	20.35	3,341.87	--
									10/4/2016	--	17.67	3,344.55	--
	MW-111	Shallow	670494.22	525254.30	3,362.52	3,365.51	3,337.52	25 to 40	4/26/2016	--	23.60	3,341.91	--
									10/4/2016	--	21.51	3,344.00	--
	MW-112	Shallow	670890.64	526198.73	3,355.38	3,358.38	3,330.38	25 to 35	4/26/2016	20.62	20.65	3,337.75	0.03
									10/4/2016	18.10	18.14	3,340.27	0.04
	MW-113	Shallow	670693.80	527483.95	3,350.06	3,352.93	3,330.06	20 to 35	4/26/2016	--	23.20	3,329.73	--
									10/4/2016	--	17.58	3,335.35	--
	MW-125	Shallow	673288.01	524663.00	3,355.60	3,358.81	3,340.60	15 to 25	4/26/2016	--	8.95	3,349.86	--
									10/4/2016	--	6.86	3,351.95	--
	MW-126A	Shallow	672845.69	525458.24	3,353.60	3,356.60	3,334.60	19 to 34	4/26/2016	--	13.71	3,342.89	--
									10/4/2016	--	11.10	3,345.50	--
	MW-126B	Valley Fill	672843.26	525464.41	3,353.60	3,356.67	3,313.60	40 to 50	4/26/2016	--	13.66	3,343.01	--
									10/4/2016	--	11.01	3,345.66	--
	MW-127	Shallow	672184.21	525464.20	3,355.50	3,358.39	3,335.50	20 to 50	4/26/2016	--	17.84	3,340.55	--
									10/4/2016	--	16.50	3,341.89	--
	MW-128	Shallow	671846.09	524917.06	3,358.80	3,358.77	3,343.80	15 to 35	4/26/2016	--	12.92	3,345.85	--
									10/4/2016	--	11.62	3,347.15	--
	MW-129	Shallow	671185.08	524876.72	3,361.60	3,364.38	3,341.60	20 to 50	4/26/2016	20.75	20.76	3,343.63	0.01
									10/4/2016	--	19.18	3,345.20	--
	MW-130	Shallow	670331.35	524029.44	3,370.20	3,369.86	3,340.20	30 to 45	4/26/2016	--	19.04	3,350.82	--
									10/4/2016	--	17.18	3,352.68	--
	MW-131	Shallow	671104.83	525228.77	3,360.40	3,363.49	3,340.40	20 to 50	4/26/2016	--	22.19	3,341.30	--
									10/4/2016	--	20.52	3,342.97	--
	MW-132	Shallow	670346.80	526629.79	3,354.30	3,357.12	3,339.30	15 to 40	4/26/2016	19.25	19.62	3,337.80	0.37
									10/4/2016	16.09	16.60	3,340.93	0.51

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Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
Field East of Refinery	MW-133	Shallow	672005.89	527446.73	3,343.40	3,349.45	3,328.40	15 to 35	4/26/2016	16.75	17.06	3,332.64	0.31
									10/4/2016	15.68	15.96	3,333.71	0.28
	MW-134	Shallow	673271.80	527263.99	3,343.10	3,346.23	3,323.10	20 to 30	4/26/2016	--	14.32	3,331.91	--
									10/4/2016	--	13.66	3,332.57	--
	MW-135	Shallow	671758.72	530211.23	3,338.00	3,337.65	3,303.00	35 to 65	4/26/2016	--	27.34	3,310.31	--
									10/4/2016	--	25.96	3,311.69	--
	RW-12R	Shallow	670542.50	527519.20	3,350.58	3,351.54	3,335.58	15 to 35	4/26/2016	--	23.38	3,328.16	--
									10/4/2016	17.15	17.18	3,334.38	0.03
	RW-13R	Shallow	671049.37	527506.74	3,349.60	3,351.54	3,334.60	15 to 35	4/26/2016	--	21.62	3,329.92	--
									10/4/2016	16.44	16.98	3,334.99	0.54
	RW-14R	Shallow	671592.73	527504.45	3,347.39	3,349.37	3,332.39	15 to 35	4/26/2016	17.98	18.12	3,331.36	0.14
									10/4/2016	16.48	16.59	3,332.87	0.11
	RW-18A	Shallow	673750.19	526188.64	3,349.04	3,350.84	Unknown	Unknown	4/26/2016	--	11.36	3,339.48	--
									10/4/2016	--	8.25	3,342.59	--
	RW-20A	Shallow	671032.06	527790.95	3,347.75	3,348.44	Unknown	Unknown	4/26/2016	19.68	20.08	3,328.68	0.40
									10/4/2016	17.58	17.67	3,330.84	0.09
	RW-20B	Shallow	671032.06	527790.95	3,347.75	3,348.44	Unknown	Unknown	4/26/2016	19.69	20.04	3,328.68	0.35
									10/4/2016	17.60	17.72	3,330.82	0.12
	RW-22	Shallow	671009.70	527889.44	3,347.17	3,349.21	3,335.67	11.5 to 39	4/26/2016	21.60	21.63	3,327.60	0.03
									10/4/2016	--	20.17	3,329.04	--
North Refinery	MW-23	Shallow	672851.25	522821.05	3,365.09	3,368.38	3,350.09	15 to 20	4/26/2016	--	10.68	3,357.70	--
									10/4/2016	--	10.30	3,358.08	--
	MW-29	Shallow	673481.15	523544.65	3,359.79	3,360.64	3,350.04	9.75 to 19.25	4/26/2016	--	8.01	3,352.63	--
									10/4/2016	--	7.53	3,353.11	--
	MW-30	Shallow	674124.92	523550.16	3,359.14	3,361.98	Unknown	Unknown	4/26/2016	--	8.15	3,353.83	--
									10/4/2016	--	8.06	3,353.92	--
	MW-39	Shallow	673039.50	523422.93	3,357.94	3,358.79	3,343.94	14 to 24	4/26/2016	--	6.08	3,352.71	--
									10/4/2016	--	5.28	3,353.51	--
	MW-40	Shallow	673161.12	523489.02	3,356.56	3,356.93	Unknown	Unknown	4/26/2016	--	4.18	3,352.75	--
									10/4/2016	--	3.32	3,353.61	--
	MW-41	Shallow	673379.87	523374.64	3,356.38	3,356.58	3,342.38	14 to 19	4/26/2016	--	4.04	3,352.54	--
									10/4/2016	--	3.40	3,353.18	--
	MW-42	Shallow	673480.27	523263.53	3,355.64	3,358.44	Unknown	Unknown	4/26/2016	--	7.17	3,351.27	--
									10/4/2016	--	6.49	3,351.95	--
	MW-43	Shallow	673115.86	522950.40	3,363.38	3,365.49	3,347.88	15.5 to 20.5	4/26/2016	--	7.54	3,357.95	--
									10/4/2016	--	6.93	3,358.56	--

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Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
North Refinery	MW-59	Shallow	672814.66	523854.12	3,359.44	3,362.43	3,344.44	15 to 30	4/26/2016	--	6.84	3,355.59	--
									10/4/2016	--	6.06	3,356.37	--
	MW-60	Shallow	672849.58	524143.12	3,359.26	3,361.98	3,344.26	15 to 30	4/26/2016	--	8.17	3,353.81	--
									10/4/2016	--	7.39	3,354.59	--
	MW-61	Shallow	672453.76	522578.38	3,369.45	3,369.47	3,355.45	14 to 29	4/26/2016	--	9.21	3,360.26	--
									10/4/2016	--	7.88	3,361.59	--
	MW-62	Shallow	672650.76	522696.50	3,368.35	3,368.81	3,354.35	14 to 29	4/26/2016	--	10.85	3,357.96	--
									10/4/2016	--	10.65	3,358.16	--
	MW-67	Shallow	673224.88	522342.43	3,365.59	3,365.45	3,353.59	12 to 27	4/26/2016	--	9.35	3,356.10	--
									10/4/2016	--	8.49	3,356.96	--
	MW-90	Shallow	672909.28	521960.18	3,367.13	3,369.42	3,362.13	5 to 20	4/26/2016	--	10.89	3,358.53	--
									10/4/2016	--	9.24	3,360.18	--
	MW-91	Shallow	672945.86	522167.26	3,365.72	3,367.73	3,358.72	7 to 22	4/26/2016	--	10.11	3,357.62	--
									10/4/2016	--	8.86	3,358.87	--
	MW-92	Shallow	672766.10	522167.26	3,366.75	3,368.72	3,361.75	5 to 20	4/26/2016	--	10.67	3,358.05	--
									10/4/2016	9.53	9.54	3,359.19	0.01
	MW-93	Shallow	672897.25	522446.83	3,364.22	3,363.79	3,359.22	5 to 20	4/26/2016	--	6.50	3,357.29	--
									10/4/2016	--	6.03	3,357.76	--
	MW-94	Shallow	673510.54	522336.27	3,365.82	3,367.97	3,360.82	5 to 20	4/26/2016	--	12.37	3,355.60	--
									10/4/2016	--	10.95	3,357.02	--
	MW-95	Shallow	673084.72	522308.89	3,366.48	3,368.70	3,359.48	7 to 22	4/26/2016	--	11.90	3,356.80	--
									10/4/2016	--	10.91	3,357.79	--
	MW-96	Shallow	673143.60	521917.50	3,366.83	3,368.92	3,359.83	7 to 22	4/26/2016	--	10.99	3,357.93	--
									10/4/2016	--	8.76	3,360.16	--
	MW-97	Shallow	672660.45	522295.96	3,366.38	3,365.92	3,358.38	8 to 23	4/26/2016	8.36	8.44	3,357.54	0.08
									10/4/2016	7.98	8.03	3,357.93	0.05
	MW-98	Shallow	672517.05	523220.39	3,358.96	3,361.36	3,345.96	13 to 23	4/26/2016	--	7.31	3,354.05	--
									10/4/2016	--	6.53	3,354.83	--
	MW-137	Shallow	672923.48	522924.27	3,363.15	3,364.83	3,353.15	10 to 30	4/26/2016	--	5.59	3,359.24	--
									10/4/2016	--	5.10	3,359.73	--
	MW-138	Shallow	672876.52	523041.05	3,364.73	3,363.24	3,354.73	10 to 25	4/26/2016	--	7.19	3,356.05	--
									10/4/2016	--	6.75	3,356.49	--
	RW-1R	Shallow	672825.27	522204.68	3,365.29	3,367.03	Unknown	Unknown	4/26/2016	--	9.61	3,357.42	--
									10/4/2016	--	8.49	3,358.54	--
	RW-2R	Shallow	672781.86	522337.29	3,368.17	3,368.17	Unknown	Unknown	4/26/2016	--	10.76	3,357.41	--
									10/4/2016	--	10.38	3,357.79	--

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Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
North Refinery	RW-7R	Shallow	673579.35	522098.94	3,365.03	3,367.09	Unknown	Unknown	4/26/2016	--	15.61	3,351.48	--
									10/4/2016	--	13.42	3,353.67	--
	RW-8	Shallow	673266.20	522321.21	3,364.89	3,368.10	Unknown	Unknown	4/26/2016	16.22	16.48	3,351.83	0.26
									10/4/2016	19.02	19.10	3,349.06	0.08
	RW-9	Shallow	673423.49	523371.16	3,356.30	3,359.51	Unknown	Unknown	4/26/2016	--	7.02	3,352.49	--
									10/4/2016	--	6.39	3,353.12	--
	RW-10	Shallow	673076.17	523469.29	3,356.12	3,360.61	Unknown	Unknown	4/26/2016	--	7.91	3,352.70	--
									10/4/2016	--	7.09	3,353.52	--
	RW-16B	Shallow	673876.71	523156.09	3,357.20	3,360.97	Unknown	Unknown	4/26/2016	--	9.90	3,351.07	--
									10/4/2016	--	9.38	3,351.59	--
	RW-17A	Shallow	673978.33	522723.59	3,362.76	3,364.72	Unknown	Unknown	4/26/2016	--	9.34	3,355.38	--
									10/4/2016	--	8.25	3,356.47	--
North RO Reject Field	MW-117	Shallow	674301.52	522979.73	3,360.07	3,363.01	3,350.07	10 to 25	4/26/2016	--	9.25	3,353.76	--
									10/4/2016	--	8.25	3,354.76	--
	MW-118	Shallow	674819.18	523375.94	3,359.62	3,361.95	3,349.62	10 to 25	4/26/2016	--	10.40	3,351.55	--
									10/4/2016	--	10.21	3,351.74	--
	MW-119	Shallow	674860.11	524575.80	3,353.83	3,356.11	3,343.83	10 to 25	4/26/2016	--	9.91	3,346.20	--
									10/4/2016	--	9.80	3,346.31	--
NCL	MW-18	Shallow	674172.45	522318.86	3,363.06	3,365.42	3,348.06	15 to 19	4/26/2016	--	9.98	3,355.44	--
									10/4/2016	--	8.12	3,357.30	--
	MW-19	Shallow	673597.29	521670.75	3,366.00	3,368.00	3,361.00	5 to 19.5	4/26/2016	--	10.58	3,357.42	--
									10/4/2016	--	7.52	3,360.48	--
	MW-45	Shallow	674247.07	523663.75	3,351.32	3,351.51	3,340.82	10.5 to 15.5	4/26/2016	--	4.67	3,346.84	--
									10/4/2016	--	3.83	3,347.68	--
	MW-53	Shallow	673626.07	521459.12	3,368.86	3,368.73	3,355.06	13.8 to 23.8	4/26/2016	--	10.72	3,358.01	--
									10/4/2016	--	7.81	3,360.92	--
	MW-54A	Shallow	674138.65	522110.51	3,363.55	3,366.49	3,350.85	12.7 to 27.7	4/26/2016	--	10.87	3,355.62	--
									10/4/2016	--	8.83	3,357.66	--
	MW-54B	Valley Fill	674148.44	522118.80	3,363.47	3,366.47	3,329.67	33.8 to 43.8	4/26/2016	--	10.87	3,355.60	--
									10/4/2016	--	8.78	3,357.69	--
	MW-55	Shallow	674091.95	522766.46	3,361.90	3,364.77	3,348.20	13.7 to 23.7	4/26/2016	--	10.00	3,354.77	--
									10/4/2016	--	8.76	3,356.01	--
	MW-56	Shallow	674160.38	523450.14	3,354.84	3,357.44	3,341.44	13.4 to 23.4	4/26/2016	--	9.39	3,348.05	--
									10/4/2016	--	9.56	3,347.88	--
	MW-108	Shallow	673659.33	521910.16	3,366.25	3,369.11	3,357.25	9 to 24	4/26/2016	--	13.18	3,355.93	--
									10/4/2016	--	10.54	3,358.57	--

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Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
NCL	NCL-31	Shallow	673629.51	521669.01	3,366.21	3,367.54	3,353.21	13 to 18	4/26/2016	--	10.21	3,357.33	--
									10/4/2016	--	7.12	3,360.42	--
	NCL-32	Shallow	673984.83	521808.14	3,364.96	3,364.91	3,347.96	17 to 22	4/26/2016	--	8.74	3,356.17	--
									10/4/2016	--	6.39	3,358.52	--
	NCL-33	Shallow	673967.20	522245.18	3,364.26	3,363.97	3,351.26	13 to 18	4/26/2016	--	8.46	3,355.51	--
									10/4/2016	--	6.37	3,357.60	--
	NCL-34A	Shallow	673885.52	522235.08	3,364.82	3,365.49	3,348.82	16 to 21	4/26/2016	--	10.46	3,355.03	--
									10/4/2016	--	8.36	3,357.13	--
	NCL-44	Shallow	673986.41	522062.11	3,364.01	3,364.45	Unknown	Unknown	4/26/2016	--	8.64	3,355.81	--
									10/4/2016	--	6.39	3,358.06	--
	NCL-49	Shallow	674099.16	521648.40	3,368.26	3,371.13	3,351.46	16.8 to 17.8	4/26/2016	--	14.86	3,356.27	--
									10/4/2016	--	12.13	3,359.00	--
South Refinery	KWB-2R	Shallow	670207.24	524897.59	3,364.56	3,364.32	Unknown	Unknown	4/26/2016	--	21.35	3,342.97	--
									10/4/2016	--	18.85	3,345.47	--
	KWB-4	Shallow	670616.38	524572.44	3,368.36	3,370.25	3,348.36	20 to 39	4/26/2016	22.89	23.03	3,347.33	0.14
									10/4/2016	20.98	21.53	3,349.16	0.55
	KWB-5	Shallow	670729.55	525244.51	3,362.60	3,364.72	3,337.90	24.7 to 38.7	4/26/2016	--	22.44	3,342.28	--
									10/4/2016	--	20.59	3,344.13	--
	KWB-6	Shallow	670449.36	526158.70	3,358.02	3,360.30	3,340.52	17.5 to 36.5	4/26/2016	--	21.73	3,338.57	--
									10/4/2016	--	18.35	3,341.95	--
	MW-28	Shallow	671508.38	524521.56	3,366.79	3,370.27	3,341.79	25 to 30	4/26/2016	--	20.24	3,350.03	--
									10/4/2016	--	18.33	3,351.94	--
	MW-48	Shallow	670689.39	524080.35	3,363.04	3,362.97	Unknown	Unknown	4/26/2016	--	16.95	3,346.02	--
									10/4/2016	--	15.19	3,347.78	--
	MW-50	Shallow	671502.45	521857.84	3,368.91	3,371.05	Unknown	Unknown	4/26/2016	--	14.07	3,356.98	--
									10/4/2016	--	12.51	3,358.54	--
	MW-52	Shallow	670165.24	523370.99	3,368.36	3,368.30	Unknown	Unknown	4/26/2016	--	17.45	3,350.85	--
									10/4/2016	--	15.07	3,353.23	--
	MW-64	Shallow	670716.03	523338.61	3,365.56	3,369.52	3,350.56	15 to 30	4/26/2016	--	18.13	3,351.39	--
									10/4/2016	--	16.22	3,353.30	--
	MW-65	Shallow	670949.22	523711.75	3,363.84	3,363.60	3,349.34	14.5 to 29.5	4/26/2016	--	14.14	3,349.46	--
									10/4/2016	12.54	12.55	3,351.06	0.01
	MW-66	Shallow	671247.57	524560.06	3,363.66	3,363.46	3,349.06	14.6 to 29.6	4/26/2016	--	14.89	3,348.57	--
									10/4/2016	--	12.82	3,350.64	--
	MW-99	Shallow	671652.52	524579.74	3,365.11	3,364.51	3,353.11	12 to 27	4/26/2016	--	15.98	3,348.53	--
									10/4/2016	--	14.01	3,350.50	--

Table 1 - Well Information and Gauging Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
South Refinery	MW-101	Shallow	671628.25	523506.58	3,362.07	3,364.23	3,354.07	8 to 23	4/26/2016	--	12.23	3,352.00	--
									10/4/2016	--	10.78	3,353.45	--
	MW-102	Shallow	671176.70	522937.01	3,365.51	3,367.64	3,353.51	12 to 27	4/26/2016	--	13.65	3,353.99	--
									10/4/2016	--	12.50	3,355.14	--
	MW-103	Shallow	670472.55	522607.80	3,370.89	3,372.47	3,363.89	7 to 22	4/26/2016	--	16.75	3,355.72	--
									10/4/2016	--	15.67	3,356.80	--
	MW-104	Shallow	670450.35	522729.44	3,369.41	3,371.43	3,366.41	3 to 18	4/26/2016	--	15.90	3,355.53	--
									10/4/2016	--	14.71	3,356.72	--
	MW-105	Shallow	671924.44	522454.93	3,365.20	3,364.99	3,357.20	8 to 18	4/26/2016	--	8.11	3,356.88	--
									10/4/2016	--	6.46	3,358.53	--
	MW-106	Shallow	672207.14	523454.55	3,359.29	3,358.98	3,359.29	0 to 11	4/26/2016	--	5.65	3,353.33	--
									10/4/2016	--	5.79	3,353.19	--
	MW-107	Shallow	671961.38	524600.45	3,359.63	3,359.44	3,347.63	12 to 22	4/26/2016	--	10.13	3,349.31	--
									10/4/2016	--	8.95	3,350.49	--
	MW-109	Shallow	670174.25	523065.52	3,368.27	3,368.09	3,353.27	15 to 29.5	4/26/2016	--	16.01	3,352.08	--
									10/4/2016	--	13.50	3,354.59	--
	MW-110	Shallow	670174.33	522796.69	3,368.46	3,368.03	3,353.46	15 to 29.5	4/26/2016	--	13.68	3,354.35	--
									10/4/2016	--	11.93	3,356.10	--
	RW-4R	Shallow	671378.27	523010.47	3,364.41	3,364.86	Unknown	Unknown	4/26/2016	--	12.09	3,352.77	--
									10/4/2016	--	10.88	3,353.98	--
	RW-5R	Shallow	671258.01	523662.01	3,362.79	3,368.56	3,349.79	13 to 33	4/26/2016	14.87	14.89	3,353.69	0.02
									10/4/2016	14.60	14.68	3,353.94	0.08
	RW-6	Shallow	670969.39	522843.22	3,366.03	3,368.36	Unknown	Unknown	4/26/2016	13.82	13.83	3,354.54	0.01
									10/4/2016	--	12.69	3,355.67	--
	RW-11-0	Shallow	669938.15	527541.66	3,351.48	3,353.95	Unknown	Unknown	4/26/2016	--	22.16	3,331.79	--
									10/4/2016	--	15.70	3,338.25	--
	RW-15C	Shallow	670820.45	524123.41	3,362.65	3,361.41	Unknown	Unknown	4/26/2016	14.59	14.63	3,346.81	0.04
									10/4/2016	--	12.74	3,348.67	--
	RW-19	Shallow	670611.43	524592.99	3,367.09	3,369.11	3,356.09	11 to 46	4/26/2016	23.18	23.58	3,345.85	0.40
									10/4/2016	21.32	21.53	3,347.75	0.21
South RO Reject Field	MW-114	Shallow	673082.16	523818.86	3,358.62	3,361.68	3,338.62	20 to 35	4/26/2016	--	4.92	3,356.76	--
									10/4/2016	--	3.68	3,358.00	--
	MW-115	Shallow	673997.34	523932.93	3,356.48	3,359.31	3,346.48	10 to 25	4/26/2016	--	5.12	3,354.19	--
									10/4/2016	--	3.98	3,355.33	--
	MW-116	Shallow	673966.06	525339.63	3,350.99	3,353.77	3,340.99	10 to 25	4/26/2016	--	8.95	3,344.82	--
									10/4/2016	--	2.88	3,350.89	--

Table 1 - Well Information and Gauging Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
TEL	MW-49	Shallow	672051.80	523610.79	3,359.69	3,359.77	Unknown	Unknown	4/26/2016	--	7.93	3,351.84	--
									10/4/2016	--	6.75	3,353.02	--
	TEL-1	Shallow	672966.33	523412.82	3,356.79	3,358.23	3,343.79	13 to 23	4/26/2016	--	5.68	3,352.55	--
									10/4/2016	--	4.74	3,353.49	--
	TEL-2	Shallow	672885.90	523419.29	3,356.80	3,359.12	3,343.80	13 to 23	4/26/2016	--	6.45	3,352.67	--
									10/4/2016	--	5.63	3,353.49	--
	TEL-3	Shallow	672796.06	523459.33	3,356.43	3,358.33	3,343.43	13 to 23	4/26/2016	--	5.73	3,352.60	--
									10/4/2016	--	4.89	3,353.44	--
	TEL-4	Shallow	672715.99	523181.18	3,358.21	3,360.24	3,345.21	13 to 23	4/26/2016	--	6.80	3,353.44	--
									10/4/2016	--	6.14	3,354.10	--
TMD	MW-8	Shallow	673215.93	529055.18	3,334.81	3,336.42	Unknown	Unknown	4/26/2016	--	8.43	3,327.99	--
									10/4/2016	--	8.48	3,327.94	--
	MW-9	Shallow	673169.56	529232.03	3,334.50	3,336.20	Unknown	Unknown	4/26/2016	--	9.12	3,327.08	--
									10/4/2016	--	8.96	3,327.24	--
	MW-16	Shallow	675613.35	534389.17	3,313.50	3,316.12	3,305.00	8.5 to 19	4/26/2016	--	8.24	3,307.88	--
									10/4/2016	--	7.13	3,308.99	--
	MW-20	Shallow	673800.56	527834.67	3,338.43	3,340.91	3,328.93	9.5 to 23.5	4/26/2016	--	10.73	3,330.18	--
									10/4/2016	--	10.18	3,330.73	--
	MW-21	Shallow	673180.38	529150.62	3,334.65	3,337.31	3,327.15	7.5 to 22	4/26/2016	--	9.93	3,327.38	--
									10/4/2016	--	9.84	3,327.47	--
	MW-25	Shallow	675386.30	537955.86	3,310.35	3,312.29	3,294.60	15.75 to 25.25	4/26/2016	--	10.60	3,301.69	--
									10/4/2016	--	11.06	3,301.23	--
	MW-26	Shallow	676229.18	535348.61	3,312.08	3,314.87	3,296.83	15.25 to 24.25	4/26/2016	--	9.35	3,305.52	--
									10/4/2016	--	7.05	3,307.82	--
	MW-27	Shallow	674495.64	532942.65	3,319.46	3,320.85	3,301.21	18.25 to 27.75	4/26/2016	--	16.23	3,304.62	--
									10/4/2016	--	14.15	3,306.70	--
	MW-46R	Shallow	674223.03	524920.28	3,350.41	3,350.11	3,346.91	3.5 to 18.5	4/26/2016	--	5.28	3,344.83	--
									10/4/2016	--	2.84	3,347.27	--
	MW-68	Shallow	674301.02	531466.90	3,325.81	3,328.21	3,311.06	14.75 to 24.5	4/26/2016	--	16.14	3,312.07	--
									10/4/2016	--	12.72	3,315.49	--
	MW-71	Shallow	673016.80	529560.41	3,332.99	3,335.29	3,323.24	9.75 to 19.5	4/26/2016	--	10.77	3,324.52	--
									10/4/2016	--	11.06	3,324.23	--
	MW-89	Shallow	675221.56	533835.00	3,316.38	3,318.32	3,314.38	2 to 17	4/26/2016	--	10.40	3,307.92	--
									10/4/2016	--	8.44	3,309.88	--
	NP-1	Shallow	672992.73	528035.04	3,339.69	3,342.40	3,330.19	9.5 to 19	4/26/2016	--	11.53	3,330.87	--
									10/4/2016	--	13.38	3,329.02	--

Table 1 - Well Information and Gauging Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Area	Well ID	Water-Bearing Zone [1]	Northing	Easting	Land Surface Elevation (ft amsl)	TOC Elevation (ft amsl)	Top of Screen Elevation (ft amsl)	Screen Interval (ft bgs)	Date Measured	Depth to PSH (ft btoc)	Depth to Water (ft btoc)	Corrected Groundwater Elevation [2] (ft amsl)	PSH Thickness (ft)
TMD	NP-2	Shallow	673571.19	527611.64	3,340.58	3,342.77	3,331.08	9.5 to 18.5	4/26/2016	--	13.34	3,329.43	--
									10/4/2016	--	12.97	3,329.80	--
	NP-3	Shallow	673990.66	528019.54	3,340.40	3,342.93	3,330.90	9.5 to 18.5	4/26/2016	--	12.28	3,330.65	--
									10/4/2016	--	11.43	3,331.50	--
	NP-4	Shallow	674337.35	528351.85	3,343.24	3,345.73	3,318.74	24.5 to 33.5	4/26/2016	--	18.34	3,327.39	--
									10/4/2016	--	18.98	3,326.75	--
	NP-6	Shallow	672945.23	529083.91	3,336.31	3,338.05	3,327.56	8.75 to 18.75	4/26/2016	--	8.72	3,329.33	--
									10/4/2016	--	9.94	3,328.11	--
	NP-8	Shallow	675399.60	538245.49	3,310.53	3,314.67	Unknown	Unknown	4/26/2016	--	12.37	3,302.30	--
									10/4/2016	--	11.96	3,302.71	--
	NP-9	Shallow	674767.14	523571.69	3,357.86	3,360.62	Unknown	Unknown	4/26/2016	--	8.71	3,351.91	--
									10/4/2016	--	9.48	3,351.14	--
Up-Gradient	UG-1	Shallow	672453.27	520746.73	3,373.02	3,372.94	3,365.02	8 to 23	4/26/2016	--	12.87	3,360.07	--
	UG-2	Shallow	670726.77	520942.36	3,380.30	3,380.41	3,365.30	15 to 30	4/26/2016	--	17.35	3,363.06	--
	UG-3R	Shallow	671992.70	519424.77	3,384.62	3,384.08	3,367.62	17 to 37	4/26/2016	--	24.51	3,359.57	--
	UG-4	Shallow	674087.85	520541.74	3,377.78	3,377.36	3,358.28	19.5 to 39.5	4/26/2016	--	18.65	3358.71	--

Notes:

[1] Wells screened in the shallow water-bearing zone are typically screened at depths of 20 to 25 ft bgs. The shallow water-bearing zone varies between confined and unconfined conditions. Wells screened in the valley fill zone are typically screened at depths ranging between 35 and 70 ft bgs. The clay lens separating the shallow and valley fill zones is discontinuous in some locations resulting in connectivity between the two zones.

[2] Water elevations corrected for PSH, if present, using a specific gravity of 0.8.

Definitions:

ft = feet
amsl = above mean sea level
bgs = below ground surface
btoc = below top of casing
PSH = phase separated hydrocarbons
unknown = screen interval not readily availble
-- = not applicable
NCL = North Colony Landfarm
RO = Reverse Osmosis
TEL = Tetra Ethyl Lead Surface Impoundment
TMD = Three Mile Ditch

Table 2 - Well Purging and Water Quality Field Measurement Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
KWB-1A	Low Flow	4/28/2016	12:20	20.3	0.5190	0.5	6.71	22.5	Clear
		10/4/2016	13:45	20.5	0.4280	1.1	6.67	-13.2	Clear
KWB-2R	Low Flow	4/28/2016	17:25	23.4	0.3290	1.2	6.78	-193.4	Cloudy/colorless to clear; odor
		10/5/2016	14:35	22.7	0.3110	0.4	6.75	-294.8	Clear; odor
KWB-5	Low Flow	4/27/2016	12:20	24.2	0.2850	1.2	6.58	-100.2	Clear
		10/5/2016	15:20	24.8	0.2800	1.5	6.69	-135.0	Clear
KWB-6	Low Flow	4/28/2016	9:25	22.9	0.2430	0.7	6.73	-260.9	Dark tint; clear; odor
		10/4/2016	15:50	22.5	0.1982	0.6	6.55	-236.1	Dark tint; clear; odor
KWB-7	Low Flow	4/27/2016	14:50	20.0	0.3540	0.5	6.80	-78.2	Clear; odor
		10/5/2016	14:20	19.7	0.3255	0.6	6.98	-93.3	Clear; strong odor
KWB-8	Low Flow	10/5/2016	10:20	18.6	0.3214	0.9	7.53	-210.2	Clear; small black particles; strong odor
KWB-10R	Low Flow	4/28/2016	11:25	21.1	0.1841	0.6	6.60	-129.9	Clear; odor
		10/4/2016	13:05	21.8	0.1648	0.8	6.55	-173.3	Clear; odor
KWB-11A	Low Flow	4/27/2016	10:55	20.0	0.7696	0.6	6.21	56.2	Clear; odor
		10/5/2016	12:30	19.3	0.5711	0.8	6.77	90.8	Clear
KWB-11B	Low Flow	4/27/2016	11:40	20.2	0.2985	1.1	6.13	52.6	Clear
		10/5/2016	13:25	19.3	0.2867	1.1	6.83	81.7	Clear
KWB-12A	Low Flow	4/27/2016	8:30	18.2	0.3970	3.9	6.70	180.4	Slightly cloudy/colorless to clear
		10/5/2016	12:05	21.4	0.3880	4.3	6.72	59.2	Clear
KWB-12B	Bladder	4/27/2016	9:15	19.7	0.3770	3.6	6.76	155.7	Clear
		10/5/2016	12:45	20.8	0.3570	3.9	6.77	-74.1	Clear
KWB-13	Bladder	4/28/2016	16:20	18.5	0.3880	3.3	6.83	75.1	Cloudy/colorless
MW-1R	Low Flow	4/27/2016	15:20	18.5	1.3790	0.6	7.16	-122.7	Clear with orange algae
MW-2A	Low Flow	4/27/2016	11:35	18.6	3.7200	0.6	6.94	-18.6	Cloudy
		10/4/2016	14:05	22.6	0.8440	0.8	7.03	22.4	Clear
MW-3	Low Flow	4/27/2016	15:25	20.4	0.7160	1.2	7.44	31.5	Clear
		10/4/2016	16:20	22.9	0.6950	1.1	7.18	-68.2	Clear
MW-4A	Low Flow	4/27/2016	12:15	19.7	0.6390	1.4	7.45	-179.1	Clear with black particles; odor
		10/4/2016	12:35	23.4	0.6220	1.4	7.33	-252.8	Clear with black particles; odor
MW-5A	Low Flow	4/26/2016	17:50	19.3	1.4540	1.6	7.26	-101.3	Clear with orange particles
		10/4/2016	13:25	23.6	1.8260	1.5	7.22	-136.1	Clear with orange particles
MW-6A	Low Flow	4/27/2016	8:10	18.4	0.5810	0.7	6.65	20.7	clear
MW-7A	Low Flow	4/26/2016	16:35	18.9	0.9810	1.1	7.41	-54.9	Cloudy with orange particles
		10/4/2016	14:30	22.1	1.0210	1.0	7.30	-92.2	Slightly cloudy to clear; orange particles

Table 2 - Well Purging and Water Quality Field Measurement Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
MW-8	Low Flow	4/28/2016	13:05	20.3	0.3989	0.7	6.94	72.3	Clear
MW-10	Low Flow	4/27/2016	10:20	20.0	0.6550	0.8	7.03	10.4	Clear with orange particles
		10/4/2016	11:00	21.2	0.8200	1.1	6.68	-22.2	Clear with small orange particles
MW-11A	Low Flow	4/27/2016	12:00	19.2	3.1200	0.4	6.96	38.2	Clear
		10/5/2016	12:10	22.3	2.5500	0.6	6.97	-72.3	Clear
MW-15	Low Flow	4/27/2016	13:00	19.5	0.6130	0.6	7.20	62.7	Clear
MW-18	Low Flow	4/29/2016	11:30	20.3	0.3400	2.5	7.10	77.4	Clear
MW-18A	Low Flow	4/26/2016	15:40	19.5	2.6700	0.8	7.25	-10.4	Clear
		10/4/2016	14:55	21.8	0.8530	0.6	7.21	-202.3	Clear
MW-20	Low Flow	4/28/2016	11:35	21.4	0.5657	1.6	6.83	103.6	Clear
MW-21	Low Flow	4/28/2016	15:45	20.5	0.6211	1.5	6.76	91.7	Clear
		10/4/2016	13:05	21.9	0.4571	1.4	6.21	124.3	Clear
MW-22A	Low Flow	4/27/2016	9:00	18.1	0.8050	1.4	7.13	-57.1	Clear with orange particles
		10/5/2016	9:05	21.0	0.8890	1.2	7.01	-109.8	Clear with orange particles
MW-23	Low Flow	4/28/2016	9:15	26.7	0.3530	0.9	7.01	-337.1	Slightly cloudy with black particles and gold tint
		10/5/2016	11:05	27.5	0.3210	1.3	6.73	-344.8	Cloudy with black particles
MW-25	Low Flow	4/27/2016	14:30	20.8	1.6890	0.7	7.07	18.3	Clear
MW-26	Low Flow	4/27/2016	15:50	18.6	0.9084	0.5	6.94	69.5	Clear
MW-27	Low Flow	4/27/2016	17:30	20.0	0.3676	0.7	6.63	63.7	Clear
MW-28	Low Flow	4/29/2016	10:25	21.2	0.2960	0.4	6.87	-371.4	Clear with black tint; odor
		10/4/2016	17:45	25.3	0.3440	1.3	6.61	-328.4	Clear; odor
MW-29	Low Flow	4/28/2016	14:55	23.4	0.3540	1.6	7.00	-280.3	Clear
		10/5/2016	15:25	26.7	0.3950	0.6	6.68	-301.0	Clear
MW-39	Low Flow	4/28/2016	14:25	23.8	0.4950	0.5	6.94	-329.2	Clear with yellow tint; odor
		10/5/2016	14:35	25.5	0.6820	0.6	6.76	-355.7	Clear; odor
MW-40	Low Flow	4/28/2016	12:30	23.4	0.3210	0.7	6.85	-374.5	Slightly cloudy to clear; black particles; odor
MW-41	Low Flow	4/28/2016	11:10	22.5	0.3280	2.3	6.89	-319.4	Clear
MW-42	Low Flow	4/28/2016	12:05	21.7	0.3940	1.8	6.77	-319.1	Clear with brown particles
MW-43	Low Flow	4/28/2016	15:55	23.4	0.6590	0.6	6.76	-412.0	Clear with yellow tint
		10/5/2016	13:20	24.6	0.6400	0.8	6.74	-404.1	Clear
MW-45	Low Flow	4/26/2016	17:45	19.2	0.5000	0.5	6.31	-4.1	Clear
		10/4/2016	14:35	22.8	0.5120	0.4	6.91	-65.7	Clear
MW-46R	Low Flow	4/29/2016	10:35	20.7	0.3960	1.4	6.71	107.8	Clear
		10/5/2016	10:00	25.2	0.4190	1.3	6.81	94.1	Clear

Table 2 - Well Purging and Water Quality Field Measurement Data

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
MW-48	Low Flow	4/27/2016	15:25	26.8	0.4430	1.6	6.75	-339.9	Slightly cloudy to clear; black tint; odor
		10/5/2016	14:05	26.0	0.3390	1.4	6.78	-305.6	Clear
MW-49	Low Flow	4/28/2016	10:10	23.5	0.2890	1.5	6.72	-343.2	Clear
		10/4/2016	16:15	25.1	0.3160	0.6	7.03	-350.2	Clear
MW-50	Low Flow	4/27/2016	7:55	19.4	0.8480	0.7	6.95	97.8	Clear
		10/5/2016	9:50	22.6	0.8480	1.0	6.93	88.5	Clear
MW-52	Low Flow	4/29/2016	10:50	20.1	0.2650	0.5	7.03	-230.6	Clear
		10/5/2016	15:25	22.3	0.2680	0.5	6.91	-130.6	Clear
MW-53	Low Flow	4/26/2016	15:40	20.8	0.3000	1.5	6.90	103.7	Clear
MW-54A	Low Flow	4/26/2016	17:20	20.0	0.1996	2.0	6.76	128.8	Clear
		10/5/2016	9:05	21.6	0.2360	2.0	6.65	38.0	Clear
MW-55	Low Flow	4/29/2016	10:40	21.2	0.4150	1.7	6.97	69.5	Clear
		10/5/2016	15:55	24.3	0.3110	1.7	7.24	-186.4	Slightly cloudy to clear
MW-56	Low Flow	4/28/2016	12:00	23.0	0.4630	1.4	7.15	-92.0	Clear
		10/5/2016	14:15	24.1	0.4050	1.4	6.79	-282.5	Clear
MW-57	Low Flow	4/27/2016	10:25	20.2	0.5060	0.4	6.69	161.6	Clear to slightly cloudy/colorless
		10/5/2016	11:20	20.1	0.4730	1.9	6.73	44.0	Slightly cloudy/colorless to clear
MW-58	Low Flow	4/28/2016	18:20	21.2	0.2250	0.5	6.70	-261.1	Clear; odor
		10/5/2016	13:50	21.3	0.1820	0.3	6.67	-220.2	Clear; odor
MW-59	Low Flow	4/29/2016	10:15	21.3	0.3090	1.6	6.93	-243.7	Clear
MW-60	Low Flow	4/29/2016	8:25	19.3	0.3560	1.1	6.93	-273.1	Clear
		10/4/2016	16:40	27.5	0.3630	2.0	6.75	-293.8	Clear
MW-61	Low Flow	4/28/2016	18:30	24.4	0.2770	0.8	6.79	-363.1	Clear
		10/5/2016	8:35	23.5	0.2890	0.7	7.35	-358.3	Clear
MW-62	Low Flow	4/28/2016	16:50	23.8	0.4640	0.7	6.52	-386.9	Clear
		10/5/2016	9:20	21.8	0.3920	0.8	6.46	-367.1	Clear
MW-64	Low Flow	4/28/2016	12:00	30.4	0.2680	1.5	6.94	-313.2	Clear; odor
		10/4/2016	14:35	28.9	0.2580	1.3	6.88	-296.1	Clear; odor
MW-65	Low Flow	4/28/2016	15:15	26.7	0.2380	1.9	6.85	-196.3	Clear; odor
		10/4/2016	15:15	27.5	0.2260	1.3	6.73	-188.6	Clear
MW-66	Low Flow	4/29/2016	9:40	19.9	0.1620	0.4	6.90	-228.9	Slightly cloudy to clear
		10/5/2016	12:30	24.2	0.1685	1.3	6.91	-163.7	Clear
MW-67	Low Flow	4/27/2016	15:30	21.7	0.2610	1.6	7.20	-355.8	Clear; odor
		10/5/2016	14:10	23.7	0.2750	1.6	6.66	-347.9	Clear with light yellow tint; odor

Table 2 - Well Purging and Water Quality Field Measurement Data

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
MW-68	Low Flow	4/28/2016	9:50	20.8	0.4084	0.9	6.63	99.3	Clear
MW-70	Low Flow	4/26/2016	16:40	19.4	0.7870	0.5	7.15	-116.3	Clear with orange algae particles
		10/4/2016	15:50	21.4	0.6780	0.5	7.07	-145.8	Clear with orange algae particles
MW-71	Low Flow	4/28/2016	9:00	18.6	0.6938	2.3	6.51	119.1	Clear
MW-72	Low Flow	4/27/2016	10:45	17.6	1.3620	0.5	7.18	-17.2	Slightly cloudy to clear with orange particles
MW-73	Low Flow	4/26/2016	14:50	16.9	0.6280	1.2	6.94	-45.4	Cloudy to slightly cloudy
MW-74	Low Flow	4/26/2016	15:45	19.0	0.6350	0.6	7.19	52.2	Clear
		10/5/2016	12:05	21.9	1.3540	0.7	7.16	35.7	Clear
MW-75	Low Flow	4/27/2016	17:10	18.8	0.8090	0.8	7.19	-87.1	Clear with gold tint; odor
		10/5/2016	11:20	22.0	0.7600	0.9	7.14	-112.5	Clear with gold tint; odor
MW-76	Low Flow	4/27/2016	16:40	21.2	0.6630	1.3	7.01	-82.9	Clear; odor
		10/5/2016	9:55	21.5	0.7580	1.3	6.84	-99.2	Clear; odor
MW-77	Low Flow	4/27/2016	14:30	20.6	0.8040	3.0	6.92	-83.9	Clear; gold tint; odor
		10/5/2016	10:40	23.7	0.7840	2.7	6.84	-81.5	Clear; gold tint; odor
MW-78	Low Flow	4/27/2016	17:30	19.6	0.4600	1.3	7.06	-69.2	Clear with gold tint
MW-79	Low Flow	4/26/2016	16:45	17.8	0.6640	0.6	7.54	86.7	Clear
		10/5/2016	13:00	20.8	0.6870	1.1	7.30	-124.1	Clear
MW-80	Low Flow	4/27/2016	16:00	17.9	0.9260	1.5	7.43	88.8	Clear
MW-81	Low Flow	4/27/2016	15:10	19.5	0.8950	2.6	7.42	71.4	Clear
MW-82	Low Flow	4/27/2016	17:50	20.1	0.8650	0.6	7.41	-90.4	Clear with yellow tint
MW-83	Low Flow	4/27/2016	13:10	20.3	0.5370	1.0	7.10	-92.7	Clear with slight gold tint
		10/4/2016	17:00	24.4	0.4620	1.4	6.97	13.6	Clear with gold tint
MW-84	Low Flow	4/27/2016	16:55	20.5	1.1400	0.6	7.19	61.5	Clear with gold tint
		10/5/2016	13:00	23.1	0.9670	0.5	7.05	-47.3	Clear with gold tint
MW-87	Low Flow	4/27/2016	16:15	19.1	1.7830	0.8	7.35	-152.1	Clear
		10/4/2016	14:00	23.1	1.6710	0.6	7.27	-172.4	Clear
MW-88	Low Flow	4/27/2016	8:10	16.8	0.7300	1.1	7.01	70.5	Clear with orange particles
		10/5/2016	8:25	18.7	0.9370	1.0	7.19	-20.6	Clear with orange particles
MW-89	Low Flow	4/27/2016	16:40	18.4	0.4419	1.0	6.59	37.3	Clear
MW-90	Low Flow	4/27/2016	11:20	20.3	0.4620	1.1	6.99	-357.5	Clear; odor
		10/5/2016	12:05	22.7	0.4960	1.1	7.59	-130.1	Clear; odor
MW-91	Low Flow	4/27/2016	10:30	21.4	0.2530	1.0	6.76	-390.9	Clear with black tint; strong odor
		10/5/2016	10:35	23.3	0.2560	1.0	6.54	-382.5	Clear with black tint; odor

Table 2 - Well Purging and Water Quality Field Measurement Data

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
MW-92	Low Flow	4/27/2016	8:45	19.7	0.3110	0.7	7.02	-264.3	Clear; sheen; odor
		10/5/2016	11:20	25.2	0.3450	0.9	6.73	-331.0	Clear with light yellow tint; odor
MW-93	Low Flow	4/28/2016	8:25	20.3	0.3640	0.9	6.59	-310.7	Clear with black particles; black tint; odor
		10/5/2016	10:15	23.5	0.3310	0.9	6.47	-351.9	Clear with black tint; odor
MW-94	Low Flow	4/27/2016	14:40	22.4	0.4310	2.4	7.14	-414.0	Clear with light yellow tint; odor
		10/5/2016	13:30	24.6	0.3340	2.5	6.73	-397.7	Clear with light yellow tint; odor
MW-95	Low Flow	4/27/2016	16:25	21.2	0.2410	1.3	7.11	-342.5	Clear; slight odor
MW-96	Low Flow	4/27/2016	12:05	21.3	0.2330	1.3	6.89	-371.6	Clear with white particles; odor
		10/5/2016	12:45	23.0	0.2620	1.2	6.74	-341.0	Slightly cloudy to clear; white particles; odor
MW-98	Low Flow	4/28/2016	11:40	22.5	0.3320	0.7	6.57	-387.6	Clear
		10/5/2016	9:25	20.1	0.3150	0.6	6.93	-362.3	Clear; odor
MW-99	Low Flow	4/29/2016	8:45	20.4	0.2280	0.6	6.84	-318.2	Clear with black particles
		10/5/2016	13:15	25.2	0.1713	1.3	6.84	-307.1	Clear
MW-101	Low Flow	4/28/2016	8:25	20.7	0.1935	1.7	6.69	-87.6	Clear
		10/4/2016	15:15	24.6	0.2010	0.9	6.68	-95.7	Clear
MW-102	Low Flow	4/28/2016	16:45	24.9	0.2310	1.5	6.83	-319.4	Clear
		10/4/2016	16:00	25.9	0.2610	1.3	6.78	-319.3	Clear
MW-103	Low Flow	4/28/2016	9:45	28.8	3.3200	1.3	6.91	-302.9	Clear
MW-104	Low Flow	4/28/2016	10:50	22.2	0.1401	1.2	7.08	-345.5	Clear
		10/4/2016	13:45	29.0	0.1244	1.2	6.68	-286.7	Clear
MW-105	Low Flow	4/28/2016	17:25	22.1	0.1627	1.0	6.83	-376.1	Clear with black tint; odor
		10/5/2016	8:25	22.7	0.1270	1.0	6.69	-379.2	Clear with black tint; odor
MW-106	Low Flow	4/28/2016	9:15	23.2	0.3270	1.2	6.62	-379.9	Clear with black tint; odor
		10/4/2016	17:15	25.3	0.3560	0.6	6.76	-360.0	Clear; odor
MW-107	Low Flow	4/29/2016	11:05	20.5	0.1958	1.2	7.08	-216.3	Clear
		10/5/2016	11:40	25.1	0.2170	1.1	6.90	-273.1	Clear
MW-108	Low Flow	4/28/2016	9:25	20.9	0.2690	1.3	7.15	-382.6	Clear with yellow tint; odor
		10/4/2016	14:20	24.9	0.3120	1.5	6.94	-342.1	Slightly cloudy with yellow tint; odor
MW-109	Low Flow	4/29/2016	10:05	21.7	0.3450	0.7	6.90	-321.1	Clear with dark tint; odor
		10/5/2016	13:55	24.0	0.3290	0.6	6.88	-366.5	Clear with black tint; odor
MW-110	Low Flow	4/29/2016	9:20	21.8	0.1992	0.5	7.03	-201.7	Cloudy/colorless to clear; odor
		10/5/2016	14:40	23.0	0.1910	0.5	7.24	-259.0	Clear; odor
MW-111	Low Flow	4/27/2016	11:20	23.9	0.2850	1.3	6.53	10.1	Cloudy/colorless to clear
		10/4/2016	16:40	24.4	0.2360	1.1	6.56	-108.1	Cloudy/colorless to clear

Table 2 - Well Purging and Water Quality Field Measurement Data

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
MW-113	Low Flow	4/28/2016	16:40	22.0	0.3049	0.7	6.44	7.3	Clear
		10/5/2016	8:35	18.9	0.1967	2.0	6.95	-3.3	Clear
MW-114	Low Flow	4/29/2016	9:45	18.7	0.3917	0.7	6.16	33.5	Clear
		10/4/2016	17:05	22.2	0.3375	1.2	7.17	169.1	Clear
MW-115	Low Flow	4/29/2016	8:50	17.3	0.5332	0.6	6.69	-141.3	Clear
		10/4/2016	16:10	20.3	0.4151	1.0	6.85	66.0	Clear
MW-116	Low Flow	4/29/2016	9:45	18.4	0.4650	1.0	6.75	145.8	Slightly cloudy
		10/5/2016	9:15	22.4	0.3590	1.9	6.90	97.7	Slightly cloudy to clear
MW-117	Low Flow	4/26/2016	18:15	16.4	0.3440	1.6	6.80	181.6	Cloudy/colorless
		10/5/2016	8:45	18.0	0.3820	1.5	6.67	27.8	Cloudy/colorless to slightly cloudy
MW-118	Low Flow	4/26/2016	17:20	17.4	0.3940	3.8	6.76	184.1	Cloudy/colorless to slightly cloudy
		10/5/2016	9:30	18.7	0.4010	3.8	7.19	43.1	Cloudy/colorless to clear
MW-119	Low Flow	4/26/2016	16:30	15.1	0.3490	1.4	7.05	180.3	Clear
		10/5/2016	10:20	18.7	0.3770	1.0	6.91	32.1	Cloudy/colorless to clear
MW-120	Low Flow	4/27/2016	14:20	19.3	1.6160	0.6	7.43	-48.4	Slightly cloudy
		10/4/2016	17:20	21.7	0.8040	0.1	7.17	-124.7	Clear
MW-121	Low Flow	4/27/2016	13:25	19.8	0.8140	0.5	7.46	23.9	Slightly cloudy to clear
		10/4/2016	16:25	22.8	0.6620	0.4	7.29	-13.7	Slightly cloudy to clear
MW-122	Low Flow	4/27/2016	12:35	19.1	0.9730	0.5	7.34	33.1	Clear
		10/4/2016	15:10	21.6	0.7790	0.5	7.20	-106.5	Clear
MW-123	Low Flow	4/27/2016	11:15	20.4	0.7390	0.8	7.08	30.9	Clear
		10/4/2016	11:45	20.4	0.7370	1.1	7.05	4.5	Clear with white particles
MW-124	Low Flow	4/26/2016	17:25	18.2	1.3020	0.5	7.06	-71.4	Clear with orange algae particles
		10/4/2016	16:40	22.3	1.1460	0.5	7.16	-93.2	Clear with orange algae particles
MW-125	Low Flow	4/29/2016	8:55	19.1	0.4400	1.3	6.50	115.7	Clear
		10/5/2016	8:30	20.9	0.4460	0.9	6.92	117.9	Clear
MW-126A	Low Flow	4/27/2016	18:15	18.4	0.3040	0.9	6.88	-136.3	Cloudy/colorless to clear
		10/5/2016	14:10	21.1	0.2100	0.8	7.33	-149.9	Clear
MW-126B	Low Flow	4/28/2016	10:20	19.2	0.4140	0.7	6.66	8.9	Cloudy/colorless to clear
		10/5/2016	14:50	20.9	0.4120	0.8	6.80	33.8	Slightly cloudy/colorless to clear
MW-127	Low Flow	4/27/2016	17:20	21.7	0.2660	0.5	6.68	-263.6	Slightly cloudy/colorless with white particles to clear; odor
		10/5/2016	15:35	22.8	0.2650	0.60	6.86	-278.5	Slightly cloudy/colorless to clear; odor
MW-128	Low Flow	4/29/2016	11:25	21.0	0.2340	0.5	6.80	-206.9	Slightly cloudy to clear
		10/5/2016	10:45	24.0	0.2170	1.3	6.78	-38.8	Slightly cloudy

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Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
MW-129	Low Flow	4/27/2016	16:25	23.3	0.2220	1.0	6.65	-108.9	Cloudy/colorless to clear; odor
		10/5/2016	17:05	23.7	0.2160	0.6	6.66	-144.2	Slightly cloudy/colorless to clear
MW-130	Low Flow	4/27/2016	17:30	24.9	0.3100	1.7	6.92	-13.0	Slightly cloudy to clear
		10/5/2016	15:00	26.5	0.3050	1.6	6.77	-102.1	Clear
MW-131	Low Flow	4/27/2016	15:35	22.3	0.2120	1.0	6.60	-123.2	Clear
		10/5/2016	16:10	22.6	0.2070	0.6	6.60	-172.1	Slightly cloudy/colorless to clear
MW-134	Low Flow	4/27/2016	18:20	18.6	0.5648	1.0	6.39	80.7	Clear
		10/4/2016	14:35	20.5	0.4143	0.9	6.64	115.7	Clear
MW-135	Bladder	4/29/2016	11:25	18.3	0.6783	2.1	6.52	139.1	Cloudy to clear
		10/5/2016	11:25	19.2	0.5792	2.7	6.74	39.3	Clear; tiny white particles
NCL-31	Low Flow	4/28/2016	10:40	24.4	0.2810	1.2	7.25	-201.6	Clear with light yellow tint, small white particles; slight odor
		10/4/2016	13:30	26.6	0.2990	1.3	7.04	-127.5	Clear with small white particles and light yellow tint; odor
MW-136	Low Flow	4/28/2016	15:20	20.8	0.4270	1.2	6.79	40.1	Cloudy/colorless
		10/4/2016	14:55	22.1	0.3630	0.6	6.67	25.8	Cloudy/colorless to clear
MW-137	Low Flow	4/28/2016	11:00	24.5	0.7780	2.3	6.84	-407.4	Cloudy to clear; yellow tint; odor; sheen
		10/5/2016	11:55	25.2	0.5530	3.6	6.67	-400.9	Cloudy to clear; yellow tint; odor; sheen
MW-138	Low Flow	4/28/2016	10:05	30.8	0.4070	1.5	6.76	-357.3	Slightly cloudy/grey tint to clear; black particles
		10/5/2016	12:25	31.4	0.3520	1.4	6.54	-353.7	Slightly cloudy with grey tint to clear with black particles; odor
NCL-32	Low Flow	4/28/2016	11:40	19.5	0.2580	2.2	7.10	-120.5	Very cloudy
		10/5/2016	15:40	22.9	0.2770	2.1	7.04	-95.4	Clear with small white particles
NCL-33	Low Flow	4/29/2016	8:40	20.2	0.3170	1.8	6.66	50.5	Clear with orange particles
		10/5/2016	15:05	24.3	0.3180	1.2	6.66	-217.7	Clear
NCL-34A	Low Flow	4/28/2016	8:25	20.7	0.2550	1.4	6.80	-356.9	Clear; odor
		10/5/2016	14:55	24.6	0.2240	1.2	6.51	-347.9	Clear; odor
NCL-44	Low Flow	4/28/2016	13:00	20.4	0.2730	1.4	6.82	-167.9	Clear
		10/4/2016	15:45	22.9	0.2880	1.3	6.87	-257.2	Clear
NCL-49	Low Flow	4/26/2016	16:30	21.0	0.2710	1.9	6.89	102.8	Clear
		10/5/2016	8:10	20.1	0.3120	1.7	6.82	128.3	Clear
NP-1	Low Flow	4/28/2016	10:45	18.5	0.5428	1.3	6.73	117.4	Clear
		10/4/2016	13:50	21.1	0.3468	1.3	6.94	123.1	Clear
OCD-1R	Low Flow	4/27/2016	8:00	17.0	1.3030	0.9	7.21	33.4	Clear
		10/5/2016	8:15	19.8	1.0370	0.6	7.25	-112.7	Clear
OCD-2A	Low Flow	4/27/2016	8:50	17.4	1.0570	0.6	7.23	-90.6	Clear with orange algae particles to clear
		10/5/2016	9:00	19.1	0.8090	0.6	7.31	-82.6	Clear

Table 2 - Well Purging and Water Quality Field Measurement Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
OCD-3	Low Flow	4/27/2016	9:40	18.7	0.8210	1.1	7.15	50.8	Clear with orange algae particles
		10/5/2016	9:45	20.0	0.7900	0.7	7.17	-41.9	Clear
OCD-4	Low Flow	4/27/2016	10:30	18.4	1.9560	0.4	7.05	29.6	Clear with orange algae particles
		10/5/2016	10:30	20.6	1.4750	0.6	7.21	-90.9	Clear with orange algae particles
OCD-5	Low Flow	4/27/2016	11:15	18.9	1.6580	0.6	7.26	-20.7	Clear with orange algae particles
		10/5/2016	11:20	21.0	1.4850	0.6	7.37	-128.7	Clear with orange algae particles
OCD-6	Low Flow	4/27/2016	9:55	18.8	1.3800	0.6	7.18	-13.4	Clear
		10/4/2016	11:35	22.0	0.6400	0.8	6.74	33.3	Clear
OCD-7AR	Low Flow	4/27/2016	9:00	19.9	1.3080	0.6	7.03	32.2	Clear
		10/4/2016	12:35	23.7	0.7480	0.6	7.01	-125.4	Clear
OCD-8A	Low Flow	4/26/2016	15:35	19.5	1.3930	1.4	7.02	-85.2	Clear with orange particles
		10/4/2016	15:30	23.4	1.2980	1.2	7.09	-122.5	Clear with orange particles
RA-313	Grab	4/27/2016	14:00	22.6	0.1249	2.1	6.71	29.7	Clear
RA-3156	Grab	4/28/2016	12:00	20.2	0.4691	2.9	7.02	-63.2	Clear
RA-4196	Grab	4/27/2016	8:35	22.9	0.2573	1.8	6.94	-88.7	Clear
		10/5/2016	9:15	23.3	0.1085	2.3	7.13	-18.7	Clear
RA-4798	Grab	4/27/2016	8:50	18.9	0.3042	1.6	7.04	-9.2	Clear
		10/5/2016	9:35	18.7	0.2714	1.7	7.39	21.4	Clear
RW-1R	Low Flow	4/27/2016	9:40	20.1	0.3410	0.8	7.02	-233.0	Slightly cloudy; black tint; black particles; odor
RW-2R	Low Flow	4/28/2016	17:40	22.5	0.5210	0.7	6.78	-394.2	Cloudy with black tint to clear with yellow tint; odor
RW-4R	Low Flow	4/28/2016	18:30	25.6	0.2770	1.5	7.08	-280.2	Clear; slight odor
RW-5R	Cycling	4/28/2016	16:00	35.7	0.1128	1.7	8.48	-304.8	No observations
RW-6R	Low Flow	4/28/2016	17:40	25.5	0.2480	2.0	6.72	-187.0	Clear; slight odor
RW-7R	Low Flow	4/27/2016	17:15	24.4	0.2280	1.2	7.15	-217.1	Clear; sheen; odor
RW-9	Low Flow	4/28/2016	15:45	22.1	0.3510	1.3	6.95	-376.4	Clear; odor
RW-10	Low Flow	4/28/2016	15:10	22.4	0.3420	0.4	7.49	-179.4	Clear with yellow tint; odor
RW-12R	Low Flow	4/28/2016	17:50	21.4	0.3598	0.3	9.70	-291.3	Clear; strong odor
RW-13R	Low Flow	4/27/2016	9:50	22.5	0.2511	2.8	7.73	-128.8	Clear; strong odor
RW-16B	Low Flow	4/28/2016	16:35	22.1	0.5200	1.4	6.98	-215.9	Clear
RW-17A	Low Flow	4/29/2016	9:40	18.9	0.5440	1.3	7.02	62.7	Clear
RW-18A	Low Flow	4/28/2016	13:15	19.4	0.4640	1.2	7.00	37.9	Clear
TEL-1	Low Flow	4/28/2016	8:55	20.0	0.3540	0.4	6.98	-262.4	Clear with black tint; sheen
		10/5/2016	11:40	22.1	0.3260	0.4	6.90	-321.4	Clear; odor

Table 2 - Well Purging and Water Quality Field Measurement Data

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Well	Purge Method[1]	Date	Time	Temperature (°C)	Specific Conductivity (S/m)	DO (mg/L)	pH (std units)	ORP (mV)	Field Observations of Purge Water [2]
TEL-2	Low Flow	4/28/2016	9:40	21.6	0.3710	0.5	6.73	-335.7	Clear with black tint; odor; sheen
		10/5/2016	12:35	23.4	0.3560	0.5	6.67	-352.3	Clear
TEL-3	Low Flow	4/28/2016	10:30	20.0	0.3850	0.5	6.64	-358.0	Clear with black tint; odor
		10/5/2016	13:20	23.5	0.2050	0.4	6.78	-346.8	Clear; odor; sheen
TEL-4	Low Flow	4/28/2016	7:55	19.0	0.5480	0.4	6.91	-291.6	Clear with brown tint
		10/5/2016	10:25	22.1	0.5030	0.7	6.85	-351.3	Clear; odor
UG-1	Low Flow	4/27/2016	9:25	23.2	0.3270	4.7	7.11	157.4	Clear
UG-2	Low Flow	4/27/2016	8:35	23.1	0.2510	3.9	6.97	152.1	Clear; no odor
UG-3R	Bladder	4/27/2016	11:35	23.0	0.2410	5.8	7.08	150.4	Clear to slightly cloudy/colorless
UG-4	Low Flow	4/27/2016	10:20	24.1	0.3890	3.9	6.88	152.0	Clear

[1] Purge Methods:

Low Flow = peristaltic pump with dedicated tubing, purged until parameters stabilized
Bladder = bladder pump with dedicated tubing, purged until parameters stabilized
Cycling = bladder pump with non-dedicated tubing, purged until parameters stabilized
Grab = irrigation well sample collected from tap or valve

Definitions:

°C = degrees Celsius
DO = dissolved oxygen
mg/L = milligrams per liter
mV = milliVolts
ORP = oxidation/reduction potential
S/m = Siemens per meter
std units = standard pH units
N/A = not applicable
Odor assumed to be a hydrocarbon odor unless otherwise specified

[2] Potential Explanations of Water Quality Observatins:

"Odor" likely due to the presence of petroleum hydrocarbons
"Cloudy water" likely due to presence of suspended inorganic particles (silt, clay)
"Dark tint", "yelow tint", "grey tint", "yellow color", "gold color", or "black color" likely due to suspended clay/silt particles or microbrial activity
"Particles" of varying color likely due to suspended clay/silt particles
"Orange algae" likely due to microbial acitivity

Table 3 - Groundwater Screening Levels and Selected Critical Groundwater Screening Level
2016 Annual Groundwater Report
HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Analyte	NMED GW Human Health (20.6.2.3103.A)	NMED GW Domestic (20.6.2.3103.B)	NMED GW Irrigation (20.6.2.3103.C)	USEPA MCL	NMED Tap Water (Table A-1)	USEPA Tap Water	NMED TPH (Table 6-2)	CGWSL	CGWSL Source
TPH (mg/L)									
TPH - gasoline range organics									
TPH - diesel range organics							2.00E-01	2.00E-01	NMED TPH (2012)
TPH - diesel range organics (Evaporation Ponds)							4.00E-01	4.00E-01	NMED TPH (2012)
VOCs (mg/L)									
1,1,1-Trichloroethane	6.00E-02			2.00E-01				6.00E-02	NMED GW Human Health (20.6.2.3103.A)
1,1,2,2-Tetrachloroethane	1.00E-02							1.00E-02	NMED GW Human Health (20.6.2.3103.A)
1,1,2,2-Tetrachloroethene	2.00E-02							2.00E-02	NMED GW Human Health (20.6.2.3103.A)
1,1,2-Trichloroethane	1.00E-02			5.00E-03				5.00E-03	USEPA MCL
1,1,2-Trichloroethene	1.00E-01							1.00E-01	NMED GW Human Health (20.6.2.3103.A)
1,1-Dichloroethane	2.50E-02							2.50E-02	NMED GW Human Health (20.6.2.3103.A)
1,1-Dichloroethene				7.00E-03				7.00E-03	USEPA MCL
1,2-Dibromo-3-chloropropane				2.00E-04				2.00E-04	USEPA MCL
1,2-Dibromoethane	1.00E-04			5.00E-05				5.00E-05	USEPA MCL
1,2-Dichloroethane	1.00E-02			5.00E-03				5.00E-03	USEPA MCL
1,2-Dichloropropane				5.00E-03				5.00E-03	USEPA MCL
1,2,4-Trimethylbenzene						1.50E-02		1.50E-02	USEPA Tap Water
1,3,5-Trimethylbenzene						1.20E-01		1.20E-01	USEPA Tap Water
2-Butanone					5.56E+00			5.56E+00	NMED Tap Water(Table A-1)
4-Methyl-2-Pentanone					1.24E+00			1.24E+00	NMED Tap Water(Table A-1)
Acetone					1.41E+01			1.41E+01	NMED Tap Water(Table A-1)
Benzene	1.00E-02			5.00E-03				5.00E-03	USEPA MCL
Bromodichloromethane				8.00E-02				8.00E-02	USEPA MCL
Bromomethane					7.54E-03			7.54E-03	NMED Tap Water(Table A-1)
Carbon Disulfide					8.10E-01			8.10E-01	NMED Tap Water(Table A-1)
Carbon tetrachloride	1.00E-02			5.00E-03				5.00E-03	USEPA MCL
Chlorobenzene				1.00E-01				1.00E-01	USEPA MCL
Chlorodibromomethane (dibromochloromethane)				8.00E-02				8.00E-02	USEPA MCL
Chloroethane (ethyl chloride)					2.09E+01			2.09E+01	NMED Tap Water(Table A-1)
Chloroform	1.00E-01			8.00E-02				8.00E-02	USEPA MCL
Chloromethane					2.03E-02			2.03E-02	NMED Tap Water(Table A-1)
cis-1,2-Dichloroethene				7.00E-02				7.00E-02	USEPA MCL
cis-1,3-Dichloropropene					4.70E-03			4.70E-03	NMED Tap Water(Table A-1)
Dibromochloromethane				8.00E-02				8.00E-02	USEPA MCL
Dichlorodifluoromethane					1.97E-01			1.97E-01	NMED Tap Water(Table A-1)
Ethylbenzene	7.50E-01			7.00E-01				7.00E-01	USEPA MCL
Isopropylbenzene (cumene)					4.47E-01			4.47E-01	NMED Tap Water(Table A-1)
m-Xylene					1.93E-01			1.93E-01	NMED Tap Water(Table A-1)
Methyl acetate					1.99E+01			1.99E+01	NMED Tap Water(Table A-1)
Methylene chloride (dichloromethane)	1.00E-01			5.00E-03				5.00E-03	USEPA MCL
Naphthalene	3.00E-02							3.00E-02	NMED GW Human Health (20.6.2.3103.A)
Methyl tert-butyl ether					1.43E-01			1.43E-01	NMED Tap Water(Table A-1)
o-Xylene					1.93E-01			1.93E-01	NMED Tap Water(Table A-1)
Styrene				1.00E-01				1.00E-01	USEPA MCL
Tetrachloroethene				5.00E-03				5.00E-03	USEPA MCL
Toluene	7.50E-01			1.00E+00				7.50E-01	NMED GW Human Health (20.6.2.3103.A)
trans-1,2-Dichloroethene				1.00E-01				1.00E-01	USEPA MCL
trans-1,3-Dichloropropene					4.70E-03			4.70E-03	NMED Tap Water(Table A-1)
Trichloroethylene				5.00E-03				5.00E-03	USEPA MCL
Trichloroethene				5.00E-03				5.00E-03	USEPA MCL
Trichlorofluoromethane					1.14E+00			1.14E+00	NMED Tap Water(Table A-1)
Vinyl chloride	1.00E-03			2.00E-03				1.00E-03	NMED GW Human Health (20.6.2.3103.A)
Xylenes	6.20E-01			1.00E+01				6.20E-01	NMED GW Human Health (20.6.2.3103.A)
Metals (mg/L)									
Arsenic	1.00E-01			1.00E-02				1.00E-02	USEPA MCL
Barium	1.00E+00			2.00E+00				1.00E+00	NMED GW Human Health (20.6.2.3103.A)
Chromium	5.00E-02			1.00E-01				5.00E-02	NMED GW Human Health (20.6.2.3103.A)
Iron		1.00E+00						1.00E+00	NMED GW Domestic (20.6.2.3103.B)
Lead	5.00E-02			1.50E-02				1.50E-02	USEPA MCL
Manganese		2.00E-01						2.00E-01	NMED GW Domestic (20.6.2.3103.B)
Mercury	2.00E-03			2.00E-03				2.00E-03	NMED GW Human Health (20.6.2.3103.A)
Nickel			2.00E-01					2.00E-01	NMED GW Irrigation (20.6.2.3103.C)
Selenium	5.00E-02			5.00E-02				5.00E-02	NMED GW Human Health (20.6.2.3103.A)
Vanadium					6.31E-02			6.31E-02	NMED Tap Water(Table A-1)
Water Quality Parameters (mg/L, unless noted)									
Chloride		2.50E+02						2.50E+02	NMED GW Domestic (20.6.2.3103.B)
Cyanide	2.00E-01			2.00E-01				2.00E-01	NMED GW Human Health (20.6.2.3103.A)
Fluoride	1.60E+00							1.60E+00	NMED GW Human Health (20.6.2.3103.A)
Nitrate (NO_3 as N)	1.00E+01			1.00E+01				1.00E+01	NMED GW Human Health (20.6.2.3103.A)
pH (Std pH units)		6 to 9						6 to 9	NMED GW Domestic (20.6.2.3103.B)
Sulfate		6.00E+02						6.00E+02	NMED GW Domestic (20.6.2.3103.B)
Total Dissolved Solids		1.00E+03						1.00E+03	NMED GW Domestic (20.6.2.3103.B)
Other Parameters (mg/L, unless noted)									
Uranium	3.00E-02			3.00E-02				3.00E-02	NMED GW Human Health (20.6.2.3103.A)
Combined Radium 226 and 228 (pCi/L)	3.00E+01			5.00E+00				5.00E+00	USEPA MCL
Polychlorinated Biphenyls	1.00E-03			5.00E-04				5.00E-04	USEPA MCL

Definitions and Notes:

Blank cell indicates no standard is available

CGWSL = Critical Groundwater Screening Level

Heirarchy of selecting the CGWSL is as follows:

1. Lowest of either NMED GW Standard (20.6.2.3103) or USEPA MCL.
2. If no NMED GW Standard or USEPA MCL available, NMED Tap Water value.
3. If no NMED Tap Water value, USEPA Tap Water value, if available.
4. NMED TPH screening for "unknown oil" used for TPH-DRO.
5. NMED TPH screening value for "Diesel #2/New Crankase Oil" applied to TPH DRO samples collected from Evaporation Ponds.

mg/L = milligrams per liter

NMED = New Mexico Environment Department

NMED GW Domestic = NMED groundwater standard for domestic exposure, NMAC 20.6.2.3103.B

NMED GW Human Health = NMED groundwater standard for human health exposure, NMAC 20.6.2.3103.A

NMED GW Irrigation = NMED groundwater standard for irrigation exposure, NMAC 20.6.2.3103.C

NMED Tap Water = NMED Risk Assessment Guidance for Site Investigations and Remediation, July 2015, Table A-1, Tap Water Screening Level

NMED TPH = NMED Risk Assessment Guidance for Site Investigations and Remediation, February 2012, Table 6-2 TPH Screening Guidelines for Potable Groundwater

NMAC - New Mexico Administrative Code

pCi/L = PicoCuries per liter

SVOC = semivolatile organic compound

TPH = total petroleum hydrocarbons

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level from "Regional Screening Level (RSL) Summary Table", November 2015

USEPA Tap Water = United States Environmental Protection Agency Tap Water screening level from"Regional Screening Level (RSL) Summary Table", November 2015

VOC = volatile organic compound

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
Cross-Gradient	KWB-13	Apr-13			<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15			**0.0630 J**		**0.00302**	**0.000456 J**	<0.000330	<0.000260	<0.000380	<0.000370	**0.00317 J**	<0.000340	<0.000780	**0.00254 J**
		Apr-16			**0.0505 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-17	Apr-14			**0.038 J**											
	NP-5	Apr-13			<0.053		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15			**0.0387 J**		**0.000804 J**	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	RA-3156	Apr-13					<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Nov-13					<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14					<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-136	Oct-15		<0.0314	**0.0721 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314	**0.162**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314	**0.118**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
Evaporation Ponds	MW-1R	Apr-13				<0.052	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-13	FD			<0.052	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14				<0.020	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15				**0.124**	<0.000373	<0.000387	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16				**0.163**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-2A	Apr-14		**0.13**		<0.020	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.250**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.295**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**0.0363 J**		**0.260**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		**0.212**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.0435 JB**		**0.195**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-3	Apr-14		**0.0493 J**		**1.00**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.540**		**9.10**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Nov-14	FD	**0.520**		**9.20**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.134**		**8.50**	<0.000370	<0.000390	**0.000609 J**	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-15	FD	**0.151 J**		**8.60**	<0.000370	<0.000390	**0.000638 J**	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**3.59**		**11.2**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD	**0.839**		**10.2**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**0.499**		**10.2**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16	FD	**0.490**		**9.97**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.611**		**11.0**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16	FD	**0.571**		**10.5**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-4A	Apr-14		**0.342 H**		**3.40**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.350**		**3.80**	<0.00037	<0.00039	**0.0013**	<0.00026	<0.00038	**0.00044 J**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.130**		**5.60**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.000461 J**	<0.00100	**0.000658 J**	<0.000780	**0.00293 J**
		Oct-15		**3.44**		**9.81**	**0.000502 J**	<0.000387	<0.000331	<0.000260	<0.000384	**0.000641 J**	<0.00100	<0.000341	<0.000780	**0.00237 J**
		Apr-16		**0.402**		**8.76**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000605 J**	<0.00100	**0.000352 J**	<0.000780	**0.00201 J**
		Oct-16		**0.396**		**5.84**	**0.000553 J**	<0.000387	<0.000331	<0.000260	<0.000384	**0.000516 J**	<0.00100	**0.000870 J**	<0.000780	**0.00365**
	MW-4B	Apr-13		**0.102**		**0.360**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		**0.119**		**1.31**	<0.000370	<0.000390	**0.00183**	<0.000260	**0.000462 J**	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-5A	Apr-14		**4.48 H**		**6.10**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0032 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.900**		**2.00**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.00081 J**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**1.19**		**4.30**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00138**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**1.72**		**2.31**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00174**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**2.09**		**8.92**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00212**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**1.17**		**3.08**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00130**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-5B	Apr-13		**1.78**		**7.10**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		**1.14**		**11.00**	**0.000976 J**	<0.000390	<0.000330	<0.000260	<0.000380	**0.00148**	<0.00100	<0.000340	<0.000780	<0.00110
	MW-5C	Apr-13		**0.065**		**0.220**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		**0.580**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.000507 J**	<0.00100	<0.000340	<0.000780	<0.00110
	MW-6A	Mar-13		**0.190**		**3.00**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		**0.238**		**1.50**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	**0.0016 J**	<0.00050	**0.0016 J**
		Apr-15		<0.0310		**4.50**	<0.000370	<0.000390	**0.000715 J**	<0.000260	<0.000380	<0.000370	<0.00100	**0.000920 J**	<0.000780	<0.00110
		Apr-16		<0.0314		**4.81**	<0.000373	<0.000387	<0.000331	<0.000260	**0.00116**	<0.000367	<0.00100	**0.00119**	<0.000780	**0.00119 J**
	MW-6B	Mar-13		<0.0500		<0.053	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Mar-13	FD	<0.0500		<0.054	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		**0.386**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-7A	Apr-14		**0.463 H**		**0.930**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0018 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.360**		**1.10**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.002**	<0.0010	<0.00034	<0.00078	<0.0011
		Nov-14	FD	**0.370**		**1.10**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.0025**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.201**		**1.20**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00194**	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-15	FD	**0.19 J**		**1.20**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00185**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**0.347**		**1.06**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00175**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD	**0.417**		**1.13**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00174**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**0.251**		**1.22**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00168**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16	FD	**0.269**		**1.32**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00168**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.235**		**1.21**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00188**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16	FD	**0.212**		**1.25**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00166**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-7B	Apr-13		<0.0500		<0.053	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		**0.120**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-10	Apr-14		**1.08**		**2.00**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0020 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.910**		**2.20**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.0018**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.41 J**		**2.60**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00195**	<0.00100	<0.000340	<0.000780 J	<0.00110
		Oct-15		**0.730**		**1.79**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00201**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**1.06**		**3.19**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00216**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**1.05**		**2.65**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.0019**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-11A	Apr-14		<0.0100		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14														
		Apr-15		<0.0310		**0.0558 J**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15														
		Apr-16		<0.0314		<0.0247	<0.001	<0.001	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16														
	MW-11B	Mar-13		<0.0500		<0.052	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		<0.0250	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-12	Apr-14				<0.020										
	MW-13	Apr-14				<0.020										
	MW-15	Mar-13		<0.0500		**0.200**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		**0.149**		**0.570**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.16		**1.01**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.000809 J**	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		**0.203**		**0.549**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000602 J**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-18A	Apr-14				<0.020	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14				**0.074 J**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**0.0770 J**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**0.215**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**0.460**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000490 J**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**0.424**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000586 J**	<0.00100	<0.000341	<0.000780	<0.00106

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

			Analyte Group:	TPH			Volatile Organic Compounds									
			Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
			Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
			CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup													
Evaporation Ponds	MW-18B	Apr-13		0.100		<0.052	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		0.280	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-22A	Apr-14		3.46		5.80	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.0055	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		3.30		5.60	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	0.008	<0.0010	<0.00034	<0.00078	<0.0011
		Nov-14	FD	4.30		5.30	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	0.0099	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		2.57		5.80	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00557	<0.00100	<0.000340	<0.000780 J	<0.00110
		Apr-15	FD	3.80		6.39	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00733	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		3.63		4.56	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00928	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD	3.31		4.46	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00967	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		3.53		7.43	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00907	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16	FD	4.02		7.66	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00887	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		3.48		5.73	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00805	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16	FD	3.25		6.18	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.0062	<0.00100	<0.000341	<0.000780	<0.00106
	MW-22B	Apr-13		1.99		3.00	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0065	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		2.34		5.60	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00634	<0.00100	<0.000340	<0.000780 J	<0.00110
	MW-70	Apr-14		1.42		0.530	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		1.20		0.720	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		1.27 J		0.790	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		1.37		0.599	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		1.46		0.896	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		1.32		0.772	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-72	Nov-13		0.093		<0.051	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.092		0.760	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310		1.30	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314		0.950	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-73	Oct-13		1.22		3.10	0.0053	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.985		4.80	0.0021 J	<0.00060	<0.00060	<0.00060	<0.00050	0.0016 J	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		0.378		4.00	0.00171	<0.000390	<0.000330	<0.000260	<0.000380	0.0029	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		0.925		5.17	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00270	<0.00100	<0.000341	<0.000780	<0.00106
	MW-74	Apr-14		1.09		28.0	<0.000373	<0.000387	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		0.680		30.0	<0.000373	<0.000387	<0.00033	<0.00026	<0.00038	0.00053 J	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		0.0910 J		38.0	<0.000373	<0.000387	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		3.23		18.9	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000826 J	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		1.20		18.4	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000972 J	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		0.135		64.3	0.000718 J	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-75	Apr-14		1.66		9.00	0.0019 J	<0.00060	0.0011 J	<0.00060	<0.00050	0.0047 J	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		2.50		13.0	0.0012	<0.00039	<0.0016	<0.0013	<0.0019	0.0028 J	<0.0050	<0.0017	<0.0039	<0.0053
		Apr-15		2.31		22.0	0.000710 J	<0.000390	<0.00330	<0.00260	<0.00380	0.00935 J	<0.0100	<0.00340	<0.00780	<0.0110
		Oct-15		10.9		19.6	0.00252	<0.000387	<0.000331	<0.000260	<0.000384	0.00463	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		1.39		18.2	<0.000373	<0.000387	0.00134	<0.000260	<0.000384	0.00577	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		2.46		16.6	0.000631 J	0.00103	<0.000331	<0.000260	<0.000384	0.00407	<0.00100	<0.000341	<0.000780	<0.00106
	MW-76	Apr-14		0.856		4.60	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.0037 J	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		1.10		23.0	0.0026 J	<0.0019	0.0049 J	<0.0013	<0.0019	0.013	<0.0050	<0.0017	<0.0039	<0.0053
		Apr-15		0.356 J		21.0	0.000699 J	0.000697 J	<0.000330	<0.000260	<0.000380	0.0122	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		0.773		25.2	0.000531 J	0.000499 J	<0.000331	<0.000260	<0.000384	0.00839	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		0.759		24.1	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00756	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		2.19		43.7	0.00187	0.00166	0.00227	<0.000260	0.000437 J	0.0245	<0.00100	<0.000341	<0.000780	0.00214 J
	MW-77	Apr-14		1.13		39.0	0.0019 J	0.0019 J	0.0020 J	<0.00060	0.0016 J	0.0069	<0.00070	<0.00050	0.0011 J	0.0027 J
		Nov-14		1.30		91.0	0.0053	0.0044 J	0.019	<0.0013	0.0072	0.0091	<0.0050	0.0036 J	0.0073 J	0.01 J
		Apr-15		0.893		140	0.00333	0.00239	0.00962	<0.000260	0.00363	0.0131	<0.00100	0.00101	0.00216 J	0.00531
		Oct-15		2.68		173	0.00348	0.00223	0.00156	<0.000260	0.00533	0.00722	<0.00100	0.00112	0.00386 J	0.00589
		Apr-16		0.968		101	<0.000373	0.00161	0.00287	<0.000260	0.00300	0.00647	<0.00100	0.000583 J	0.00138 J	0.00390
		Oct-16		1.53 J		86.1	0.00432 J	<0.00387	<0.00331	<0.00260	0.00766 J	0.00552 J	<0.0100	<0.00341	<0.00780	<0.0106
	MW-78	Mar-13		0.373		6.40	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.075
		Apr-14		0.333 J		29.0	<0.00050	<0.00060	0.0031 J	<0.00060	0.0013 J	<0.00060	<0.00070	0.0021 J	0.0014 J	0.0021 J
		Apr-15		0.279		67.0	0.00132	0.000829 J	0.0114	<0.000260	0.00262	0.000629 J	<0.00100	0.00356	0.00385 J	0.00502
		Apr-16		0.269		63.2	<0.000373	<0.000387	0.00275	<0.000260	0.000942 J	<0.000367	<0.00100	0.00135	0.00125 J	0.00135 J
	MW-79	Apr-14		0.076		1.30	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		0.055 J		0.590	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		0.560	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		0.0383 J		0.575	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		0.516	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		0.0513 J		0.413	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-80	Mar-13		<0.0500		0.054	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.0489 J		0.200	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310		0.750	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314		0.317	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-81	Mar-13		<0.0500		0.140	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Mar-13	FD	<0.0500		0.150	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.0318 J		3.60	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310		8.00	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		0.0339 J		8.64	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-82	Mar-13		1.30		2.70	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.611		4.20	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD	0.649		4.20	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		0.361		14.0	<0.000370	<0.000390	0.000339 J	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		0.334		8.41	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-83	Apr-14		0.489 J		20.0	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		0.430		22.0	<0.00037	<0.00039	<0.00033	<0.00026	0.00044 J	<0.00037	<0.0010	0.00087 J	0.0011 J	<0.0011
		Apr-15		0.278		31.0	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	0.000607 J	<0.000780	<0.00110
		Oct-15		6.26		40.3	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		0.310		26.0	<0.000373	<0.000387	0.00114	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		0.234		28.9	<0.000373	<0.000387	0.000449 J	<0.000260	<0.000384	<0.000367	<0.00100	0.000569 J	<0.000780	<0.00106
	MW-84	Apr-14		0.607		27.0	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.0020 J	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		0.610		75.0	<0.00037	<0.00039	0.00070 J	<0.00026	0.00098 J	0.0025	<0.0010	0.00055 J	<0.00078	<0.0011
		Apr-15		0.613		62.0	<0.000370	<0.000390	0.000664 J	<0.000260	0.000574 J	0.00279	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		1.96		82.1	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00125	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		0.519		83.8	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00129	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		1.58 J		95.3	<0.00373	<0.00387	<0.00331	<0.00260	<0.00384	<0.00367	<0.0100	<0.00341	<0.00780	<0.0106
	MW-87	Apr-14		<0.0100		0.230	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		0.120	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		0.390	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.000569 J	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		0.0451 J		0.251	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000696 J	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		0.0421 J		0.449	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000646 J	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314		0.405	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00107	<0.00100	<0.000341	<0.000780	<0.00106
	MW-88	Apr-14		0.0497 J		0.370	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		0.048 J		0.570	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		0.610	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314		0.455	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		0.636	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		0.0848 J		0.635	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

			Analyte Group:	TPH			Volatile Organic Compounds									
			Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
			Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
			CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup													
Evaporation Ponds	MW-120	Apr-14		**0.073**		**0.230**	<0.0050	<0.0050	<0.00060	<0.00060	<0.00050	<0.00060	**0.0026 J**	<0.00050	<0.00050	<0.0015
		Nov-14		**0.057 J**		**2.40**	<0.00050	<0.00060	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**3.09**	<0.00037	<0.00039	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**0.181**		**1.30**	<0.000370	<0.000390	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**0.0845 J**		**1.82**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314		**0.920**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-121	Apr-14		<0.0100		**0.092**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.510**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.565**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314		**0.460**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		**0.456**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.0514 JB**		**0.593**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-122	Apr-14		**0.0289 J**		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**5.50**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**4.79**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**0.0340 J**		**6.06**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		**0.824**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.0443 JB**		**0.412**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-123	Apr-14		<0.0100		**2.80**	<0.00050	<0.00070	<0.00060	<0.00060	<0.00050	**0.0014 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**1.60**		**2.70**	<0.00040	<0.00031	<0.00033	<0.00026	<0.00038	**0.0017**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**1.90**		**3.60**	<0.000400	<0.000310	<0.000330	<0.000260	<0.000380	**0.00124**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**1.24**		**2.13**	<0.000398	<0.000306	<0.000331	<0.000260	<0.000384	**0.00126**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**1.83**		**3.82**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00143**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**1.50**		**3.53**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00163**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-124	Apr-14		<0.0100		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		<0.022	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310 J		**0.0550 J**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314		**0.0298 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-1R	Apr-14		<0.0100		<0.021	<0.0050	<0.0050	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.230**	<0.00050	<0.00060	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.242**	<0.00037	<0.00039	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314		**0.266**	<0.000370	<0.000390	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		**0.241**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.0450 J**		**0.267**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-2A	Apr-14		<0.0100		<0.020	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.093 J**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.104**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780 J	<0.00110
		Oct-15		<0.0314		**0.0455 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		**0.0682 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.0333 J**		**0.0722 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-3	Apr-14		<0.0100		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.07 J**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.0484 J**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314		**0.0251 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-4	Apr-14		<0.0100		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.065 J**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.0464 J**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314		<0.0247	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-5	Apr-14		**0.127**		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD	**0.140**		<0.021	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.260**		**0.540**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310		**0.218**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**0.0402 J**		**0.0951 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314		**0.0576 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.0391 J**		**0.0423 J**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-6	Apr-14		**0.297**		**0.820**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031		**0.540**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.0819 J**		**1.00**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**1.88**		**1.09**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**0.0939**		**1.11**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.242**		**1.11**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-7AR	Apr-14		**0.889**		**4.00**	**0.0017 J**	<0.00060	<0.00060	<0.00060	<0.00050	**0.0015 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD	**0.883**		**4.10**	**0.0016 J**	<0.00060	<0.00060	<0.00060	<0.00050	**0.0018 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.760**		**3.50**	**0.00054 J**	<0.00039	<0.00033	<0.00026	<0.00038	**0.0022**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.715**		**4.29**	**0.000760 J**	<0.000390	<0.000330	<0.000260	<0.000380	**0.00196**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**1.20**		**4.12**	**0.00129**	<0.000387	<0.000331	<0.00026	<0.000384	**0.00202**	<0.001	<0.000341	<0.00078	<0.00106
		Apr-16		**0.443**		**5.24**	<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00141**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**1.08**		**5.28**	**0.00172**	<0.000387	<0.000331	<0.000260	<0.000384	**0.00179**	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-7B	Mar-13		<0.0500		<0.052	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		**0.120**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	OCD-8A	Apr-14		**0.728**		**2.90**	**0.0010 J**	<0.00060	<0.00060	<0.00060	<0.00050	**0.0044 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD	**0.764**		**2.80**	<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0047 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		**0.660**		**1.80**	<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.004**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		**0.491**		**2.60**	**0.000370 J**	<0.000390	<0.000330	<0.000260	<0.000380	**0.00498**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		**0.648**		**2.74**	**0.000454 J**	<0.000387	<0.000331	<0.000260	<0.000384	**0.0051**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		**0.726**		**3.26**	**0.000482 J**	<0.000387	<0.000331	<0.000260	<0.000384	**0.00475**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		**0.714**		**3.23**	**0.00108**	<0.000387	<0.000331	<0.000260	<0.000384	**0.00507**	<0.00100	<0.000341	<0.000780	<0.00106
	OCD-8B	Apr-13		**0.298**		**0.890**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15		<0.0310		**0.840**	<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00155**	<0.00100	<0.000340	<0.000780	<0.00110
Field East of Refinery	KWB-1A	Apr-14			<0.021		<0.0050	<0.0050	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			**0.15 J**		<0.0050	<0.0050	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			**0.0932 J**		<0.00050	<0.00060	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			**0.114**		<0.00037	<0.00039	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			**0.127**		<0.000370	<0.000390	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			**0.166**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	KWB-1C	Apr-13			<0.044		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15			**0.113**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	KWB-7	Nov-14			**1.00**		**0.210**	**0.0085 J**	**0.077**	<0.0026	**0.073**	**0.013**	**0.03 J**	**0.015**	<0.0078	**0.051**
		Apr-15			**1.43**		**0.0766**	**0.000982 J**	**0.929**	<0.000260	**0.0285**	**0.0225**	**0.012**	**0.00377**	**0.00213 J**	**0.00718**
		Oct-15			**0.721**		**0.00557**	<0.000387	**0.0164**	<0.000260	**0.024**	**0.00677**	**0.00225 J**	**0.000608 J**	<0.000780	**0.00145 J**
		Apr-16			**1.22**		**0.0482**	**0.00903**	**0.0365**	<0.000260	**0.0248**	**0.0104**	**0.0141**	**0.00167**	<0.000780	**0.0235**
		Oct-16			**1.06**		**0.007**	**0.000877 J**	**0.0364**	<0.000260	**0.0167**	**0.00582**	**0.0012 JJ4**	<0.000341	**0.00155 J**	**0.0196**
	KWB-8	Oct-16			**3.02**		**0.17 J**	<0.0774	**11.5**	<0.0520	**0.828**	<0.0734	<0.200 J4	**0.150 J**	**1.48**	**1.16**

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
Field East of Refinery	KWB-10R	Nov-14				12.0		0.410	0.110	5.10	<0.0065	0.400	5.20	0.190	0.320	0.180	1.200
		Apr-15				9.16		0.457	0.136	5.65	<0.00260	0.528	3.87	0.138	0.343	0.141	1.38
		Oct-15				4.65		0.358	0.100	6.77	<0.000260	0.523	4.66	0.186	0.254	0.124	1.08
		Apr-16				5.24		0.323	0.0886	5.26	<0.0130	0.437	3.71	0.150 J	0.184	0.0937 J	0.829
		Oct-16				7.50		0.307	0.0765	0.565	<0.00520	0.513	3.62	0.133	0.196	0.110	0.860
	KWB-11A	Nov-14			<0.031	0.710		0.052	0.0013	0.0078	<0.00026	<0.00038	0.0012	0.015	0.00076 J	<0.00078	0.0025 J
		Nov-14	FD		0.290	0.860		0.047	0.0011	0.0072	<0.00026	<0.00038	0.0015	0.019	0.00068 J	<0.00078	0.0022 J
		Apr-15			0.339	1.87		0.0658	0.00168	0.0248	<0.000260	<0.000380	0.00648	0.0233	0.000869 J	<0.000780	0.00275 J
		Oct-15			0.217	0.646		0.0528	0.00117	0.00571	<0.000260	<0.000384	0.00434	0.0165	0.000511 J	<0.000780	0.00181 J
		Apr-16			0.267	3.74		0.0256	0.00122	0.00541	<0.000260	<0.000384	0.00477	0.0134	0.000423 J	<0.000780	<0.00106
		Oct-16			0.223 B	1.36		0.0341	0.000945 J	0.00725	<0.000260	<0.000384	0.00416	0.00936 J4	0.000483 J	<0.000780	0.00158 J
	KWB-11B	Apr-14			2.74	3.20		0.230	0.0046 J	<0.00060	<0.00060	0.020	<0.00060	0.011	<0.00050	<0.00050	0.0043 J
		Nov-14			<0.031	<0.022		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	0.0365 J		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00121	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	<0.0247		0.000489 J	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.0565 JB	0.0388 J		0.000394 J	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	0.00153 J J4	<0.000341	<0.000780	<0.00106
	KWB-12A	Nov-14			<0.031	<0.022		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Nov-14	FD		<0.031	0.074 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	0.0310 J		0.000452 J	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-15	FD		<0.0310	0.305		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	0.0377 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.0348 JB	0.0329 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	KWB-12B	Apr-14			<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			<0.031	<0.022		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	0.0740 J		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD		<0.0314	0.0372 J		0.000895 J	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	0.000692 J	<0.000780	0.00226 J
		Apr-16			<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16	FD		<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.0581 JB	0.0351 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16	FD		0.0416 JB	0.0806 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	0.0139	<0.000341	<0.000780	<0.00106
	KWB-P4	Apr-13				<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15				0.0820 J		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-57	Apr-14			0.350	0.780		<0.00050	<0.00060	0.0013 J	<0.00060	<0.00050	<0.00060	0.0010 J	<0.00050	<0.00050	<0.0015
		Nov-14			0.047 J	0.26 J		<0.00037	<0.00039	0.006	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	0.200		0.00163	0.000463 J	<0.000330	<0.000260	0.000667 J	<0.000370	0.00156 J	0.000561 J	<0.000780	0.00197 J
		Oct-15			<0.0314	0.242		<0.000373	<0.000387	0.00123 J	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	0.198		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.0467 JB	0.103		<0.000373	<0.000387	0.000681 J	<0.000260	<0.000384	<0.000367	<0.00100 J4	<0.000341	<0.000780	<0.00106
	MW-58	Nov-14				7.80		0.860	0.098	7.40	<0.0065	2.40	<0.0092	0.48	0.076	<0.02	1.60
		Apr-15				9.00		1.04	0.195	6.03	<0.00260	1.98	0.0187	0.318	0.083	0.0174 J	2.16
		Oct-15				5.11		0.893	0.0651 J	6.89	<0.0260	2.00	<0.0367	0.354 J	0.0603 J	<0.0780	2.18
		Apr-16				6.27		0.753	0.0179	4.12	<0.00260	1.11	0.200	0.257	0.0183	0.00806 J	0.848
		Oct-16				7.78		0.387	0.00321	5.92	<0.000260	1.10	0.0468	0.0867	0.0201	0.0159	0.893
	MW-111	Apr-14			2.36	1.30		0.0021 J	<0.00060	0.110	<0.00060	0.0085	2.00	0.0016 J	0.0011 J	0.0011 J	0.0057 J
		Nov-14			1.70	2.00		0.0074	0.0017	0.180	<0.00026	0.026	1.6 E	0.0064 J4	0.0052	0.0016 J	0.027
		Apr-15			1.37	1.90		0.00256	0.000567 J	0.0755	<0.000260	0.00824	<0.000370	0.00294 J	0.00158	<0.000780	0.00881
		Oct-15			0.674	2.10		0.00122	<0.000387	0.0243	<0.000260	0.00615	1.32	0.00645	<0.000341	<0.000780	0.00113 J
		Apr-16			1.31	2.04		<0.000373	<0.000387	0.0299	<0.000260	0.00122	1.54	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			1.13	2.04		0.00215	<0.000387	0.0432	<0.000260	0.00226	1.29	0.00103 J	<0.000341	<0.000780	0.00177 J
	MW-112	Nov-14			28.00	2.20		0.350	0.090	8.50	<0.0065	0.970	1.00	0.200	0.600	0.730	2.00
	MW-113	Apr-14			17.30	0.230		0.058	0.026	2.30	<0.00060	0.400	0.01	<0.00070	0.090 J	0.064	0.910
		Nov-14			2.40	0.640		0.041	0.0071	1.50	<0.00026	0.007	0.02	0.048 J4	0.016	0.0046 J	0.100
		Nov-14	FD		2.70	0.820		0.039	0.0069 J	1.20	<0.0026	0.0079 J	0.019	0.032 J	0.015	<0.0078	0.100
		Apr-15			<0.0310	0.330		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.0178	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-15	FD		<0.0310	0.241		0.000538 J	<0.000390	0.000402 J	<0.000260	<0.000380	0.0158	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	0.115		<0.000373	<0.000387	0.000477 J	<0.000260	<0.000384	0.0158	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD		<0.0314	0.0917 J		<0.000373	<0.000387	0.000533 J	<0.000260	<0.000384	0.0176	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			0.581	0.156		0.000753 J	<0.000387	0.0136	<0.000260	0.00354	0.0143	<0.00100	<0.000341	<0.000780	0.00518
		Apr-16	FD		0.627	0.180		0.000813 J	<0.000387	0.0148	<0.000260	0.00364	0.0143	<0.00100	<0.000341	<0.000780	0.00531
		Oct-16			0.215 B	0.236		0.00977	<0.000387	0.00660	<0.000260	0.0199	0.0137	0.00208 JJ4	<0.000341	<0.000780	0.0143
		Oct-16	FD		0.218 B	0.188		0.00933	<0.000387	0.00588	<0.000260	0.0175	0.0143	0.00200 JJ4	<0.000341	<0.000780	0.0127
	MW-125	Apr-14			0.0383 J	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			<0.031	0.047 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010 J4	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310 J	<0.0250 B		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	0.0523 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	0.0578 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			<0.0314	0.0756 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-126A	Apr-14			0.142	0.710		0.0030 J	<0.00060	0.0034 J	<0.00060	<0.00050	<0.00060	0.0013 J	0.0011 J	0.0022 J	0.0045 J
		Nov-14			0.410	0.880		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	0.757		0.000397 J	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			0.640	0.569		0.00251	<0.000387	0.0447	<0.000260	0.00475	<0.000367	<0.00100	<0.000341	0.000858 J	0.0103
		Apr-16			0.202	0.751		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.702	0.924		<0.000373	<0.000387	0.0503	<0.000260	<0.000384	<0.000367	<0.00100 J4	<0.000341	<0.000780	<0.00106
	MW-126B	Apr-14			0.079	0.340		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			<0.031	0.280		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	0.392		0.000409 J	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	0.140		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	0.361		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.0546 JB	0.346		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100 J4	<0.000341	<0.000780	<0.00106
	MW-127	Apr-14			37.70	3.50		0.290	0.063	6.80	<0.00060	0.930	1.40	0.140	0.330	2.40	0.870
		Nov-14			6.10	1.30		0.078	0.0061	1.80	<0.00026	0.240	0.760	0.040	0.068	0.150	0.150
		Apr-15			9.73	1.68		0.126	0.00854	4.41	<0.000260	0.424	0.868	0.0658	0.142	0.183	0.296
		Oct-15			6.54	0.585		0.098	<0.00774	1.51	<0.00520	0.299	0.730	0.0415 J	0.0552	0.216	0.141
		Apr-16			6.40	1.43		0.0941	0.00632	2.01	<0.000260	0.348	0.629	0.0425	0.0375	0.287	0.149
		Oct-16			3.81 B	1.22		0.0332	<0.00387	0.644	<0.00260	0.120	0.575	<0.0100 J4	0.0127	0.0877	0.0514
	MW-128	Apr-14			3.19	2.10		0.0095	0.0045 J	0.240	<0.00060	0.043	1.30	0.012	<0.00050	0.0019 J	0.014 J
		Nov-14			1.20	2.40		0.0028	0.00048 J	0.120	<0.00026	0.012	0.95 E	0.0061	<0.00034	0.00092 J	0.0055
		Apr-15			1.23 J	3.00		0.00374	0.000551 J	0.297	<0.000260	0.0114	1.60	0.00346 J	<0.000340	0.000928 J	0.00326
		Oct-15			0.644	1.78		<0.00746	<0.00774	0.0297	<0.00520	<0.00768	0.86	<0.0200	<0.00682	<0.0156	<0.0212
		Apr-16			0.620	2.45		0.00209	<0.000387	0.0231	<0.000260	0.00494	0.846	0.00104 J	<0.000341	<0.000780	0.00153 J
		Oct-16			0.907	2.75		0.00197	<0.000387	0.109	<0.000260	0.00408	0.832	0.00225 J	<0.000341	<0.000780	0.0037
	MW-129	Nov-14			4.60	2.70		0.014	0.0043 J	0.084	<0.0026	0.025	5.4 E	<0.01	0.016	0.071	0.059
		Apr-15			3.29	2.45		0.00286	0.000679 J	0.0372	<0.000260	0.00131	7.04	0.00407 J	0.00112	<0.000780	0.00357
		Oct-15			4.11 J	1.31		<0.0373	<0.0387	<0.0331	<0.0260	<0.0384	5.79	<0.1	<0.0341	<0.0780	<0.106
		Apr-16			2.70	1.68		0.00382	0.000880 J	<0.0166	<0.000260	<0.0192	4.59	0.00534	0.000796 J	<0.0390	0.00278 J
		Oct-16			2.17	1.68		0.00143	0.000479 J	0.00791	<0.000260	0.000985 J	4.73	0.00186 JJ4	<0.000341	0.00092 J	0.00124 J

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
Field East of Refinery	MW-130	Apr-14		<0.0100	0.330		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	0.700		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	0.0012	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310 J	0.960		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.000510 J	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314	0.508		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000449 J	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314	1.08		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000538 J	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		0.200	1.09		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.0013	0.00112 J	<0.000341	<0.000780	<0.00106
	MW-131	Apr-14		26.20	3.40		0.230	0.066	3.10	<0.00060	0.210	5.30	0.058	0.180	1.40	0.650
		Nov-14		9.10	3.70		0.058	0.016	1.80	<0.0026	0.067	5.6 E	0.043 J	0.065	0.310	0.180
		Apr-15		7.68	2.80		0.0486	0.0119	1.91	<0.000260	0.0692	5.23	0.0468	0.0606	0.215	0.145
		Oct-15		6.76	4.00		0.0231	0.00694	2.19	<0.000260	0.048	4.54	0.0589	0.0243	0.0522	0.0859
		Apr-16		9.16	2.12		0.0212	0.00562	2.42	<0.000260	0.0535	3.69	0.0353	0.0370	0.142	0.0883
		Oct-16		6.31	1.86		0.0133	0.00398 J	1.58	<0.00130	0.0324	4.09	0.0135 JJ4	0.0182	0.0299	0.0613
	MW-133	Nov-14		9.40	2.80		0.280	0.053 J	0.620	<0.026	0.300	5.60	<0.1	0.038 J	0.1 J	0.22 J
		Apr-15		11.3	3.10		0.138	<0.0390	0.788	<0.0260	0.199	6.67	<0.1	<0.0340	<0.0780	<0.11
	MW-134	Apr-14		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	0.064 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310	0.100		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-15	FD	<0.0310	0.0886 J		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314	0.0503 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD	<0.0314	0.0457 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		0.0420 J	0.0971 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.00100	<0.000780	<0.00106
		Apr-16	FD	<0.0314	0.0774 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314	0.184		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16	FD	<0.0314	0.135		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-135	Apr-14		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	0.310		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310	0.0823 J		0.000793 J	<0.000390	<0.000330	<0.000260	<0.000380	0.000829 J	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314	0.0571 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000608 J	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314	0.162		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00197	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		0.0638 JB	0.147		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000685 J	<0.00100 J4	<0.000341	<0.000780	<0.00106
	RA-4196	Apr-14					<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.0026 J	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15					<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00173	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00394	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00507	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00657	<0.00100 J4	<0.000341	<0.000780	<0.00106
	RA-4798	Apr-14					<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.01	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD				<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.0027 J	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14					<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	0.0086	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15					<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.0163	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.00858	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.0121	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.0124	<0.00100 J4	<0.000341	<0.000780	<0.00106
	RW-12R	Apr-16			1.38		0.0145	<0.00194	0.424	<0.00130	0.00606	0.00568	<0.00500	<0.00170	<0.00390	0.0140 J
	RW-13R	Apr-16			0.808		0.0443	0.00539	0.878	<0.000260	0.0691	0.0779	0.0148	0.0139	0.0175	0.108
	RW-18	Apr-13					<0.000373	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14					<0.000373	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15					<0.000373	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	RW-20	Apr-15			2.10		0.539	0.113	1.87	<0.00260	0.973	0.209	0.183	0.059	0.211	1.35
	RW-22	Apr-15			5.40		0.575	0.0853	4.07	<0.00260	1.09	0.178	0.164	0.0952	0.216	0.945
North Refinery	MW-23	Apr-14		32.1	6.00		0.020 J	<0.012	11.0	<0.012	0.320	<0.012	0.200	<0.010	<0.010	0.035 J
		Nov-14		39.0	6.00		0.370	0.069	15.0	<0.013	0.190	0.019 J	0.12 J	0.17	0.52	1.10
		Apr-15		31.1	6.79		0.473	0.0997	11.6	<0.00650	0.146	0.0253	0.15 J	0.181	0.431	1.37
		Oct-15		34.0	41.8		0.000677 J	<0.000387	20.3	<0.000260	0.519	0.02	0.213 J	0.00237	0.00501	0.00805
		Apr-16		34.7	28.7		<0.00186	<0.00194	15.5	<0.00130	0.179	0.0297	0.193	0.00284 J	0.00412 J	0.0176
		Oct-16		37.1	21.2		<0.00932	<0.00968	12.2	<0.00650	0.168	0.0433	0.220	<0.00852	<0.0195	<0.0265
	MW-29	Apr-14		<0.0100 B	0.51		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	0.0026 J	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	1.20		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310	1.20		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		0.0738 J	0.658		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314	1.27		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314	1.04		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000424 J	<0.00100	<0.000341	<0.000780	<0.00106
	MW-39	Oct-13		2.37	4.60		0.064	<0.0050	0.330	<0.0050	0.0072	<0.0050	<0.0050	0.041	0.0093	0.086
		Apr-15		0.147	5.20		<0.000370	<0.000390	<0.000330	<0.000260	0.000713 J	<0.000370	<0.00100	0.00632	0.00137 J	0.00753
		Oct-15		0.0759 J	3.83		0.000527 J	<0.000387	<0.000331	<0.000260	0.000727 J	<0.000367	0.00583	0.0053	0.00108 J	0.00645
		Apr-16		5.16	12.5		0.0526	<0.00968	2.14	<0.00650	0.0211 J	<0.00918	<0.0250	0.0365	0.0293 J	0.181
		Oct-16		7.24	9.26		0.0673 J	<0.0387	3.62	<0.0260	<0.0384	<0.0367	<0.100	0.0428 J	<0.0780	0.204 J
	MW-40	Apr-13		0.919	1.70		<0.000373	<0.000387	0.021	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		1.01	0.880		<0.000373	<0.000387	0.011	<0.00060	<0.00050	<0.00060	0.0028 J	<0.00050	<0.00050	0.0056 J
		Apr-15		0.735	4.50		<0.000373	<0.000387	0.0198	<0.000260	0.000399 J	<0.000370	<0.00100	<0.000340	<0.000780	0.00606
		Apr-16		1.03	4.92		0.000760 J	<0.000387	0.0112	<0.000260	0.000609 J	<0.000367	<0.00100	<0.000341	<0.000780	0.0144
	MW-41	Oct-13		0.083	1.30		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.233	0.300		<0.00050	<0.00060	0.018	<0.00060	<0.00050	0.0036 J	0.0026 J	<0.00050	<0.00050	<0.0015
		Apr-15		0.103	1.60		<0.000370	<0.000390	0.0019	<0.000260	<0.000380	0.0044	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		0.171	2.26		<0.000373	<0.000387	0.00360	<0.000260	<0.000384	0.00384	<0.00100	<0.000341	<0.000780	<0.00106
	MW-42	Oct-13		3.17	4.80		0.110	<0.0050	0.700	<0.0050	<0.0050	0.021	<0.0050	<0.0050	<0.0050	0.220
		Apr-14		2.90	1.40		0.063	<0.00060	0.540	<0.00060	0.0030 J	0.022	0.0043 J	0.0011 J	0.0023 J	0.110
		Apr-15		1.37	7.00		0.0247	<0.00390	0.216	<0.00260	<0.00380	0.0145	<0.0100	<0.00340	<0.00780	0.0484
		Apr-16		0.737	5.88		0.0169	<0.00194	0.103	<0.00130	<0.00192	0.0114	<0.00500	<0.00170	<0.00390	0.0380
	MW-43	Apr-14		2.89	1.20		0.029	0.0015 J	0.350	<0.00060	0.015	0.014	0.005	0.014	0.029	0.160
		Nov-14		4.80	7.40		0.027	<0.0039	1.10	<0.0026	0.021	0.011	<0.01	0.012	0.03 J	0.170
		Apr-15		2.65	8.04		0.0576	0.00448 J	0.992	<0.00260	0.0483	0.0162	<0.0100 J	0.0227	0.0538	0.300
		Oct-15		30.5	9.95		0.477	0.101	13.0	<0.00260	0.179	0.0274	0.212	0.333	0.808	1.48
		Apr-16		31.6	6.24		0.502	0.112 J	12.4	<0.0650	0.968	<0.0918	<0.250	0.626	1.66	1.86
		Oct-16		38.0	6.51		0.433	<0.0968	12.4	<0.0650	0.810	<0.0918	<0.250	0.555	0.618 J	1.81
	MW-59	Apr-13		0.130	<0.052		<0.0050	<0.0050	0.037	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.247	0.068		<0.00050	<0.00060	0.013	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	0.860		<0.000370	<0.000390	0.0119	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314	0.919		<0.000373	<0.000387	0.00329	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-60	Apr-14		0.658	0.110		0.0029 J	<0.00060	0.030	<0.00060	0.0019 J	<0.00060	0.0041 J	<0.00050	<0.00050	0.0063 J
		Nov-14		0.540	0.630		<0.00037	<0.00039	0.0032	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		0.238	1.10		0.000879 J	<0.000390	0.0127 J	<0.000260	0.000627 J	<0.000370	<0.00100	<0.000340	<0.000780	0.00280 J
		Apr-15	FD	0.228	1.00		0.000430 J	<0.000390	0.00829 J	<0.000260	0.000450 J	<0.000370	<0.00100	<0.000340	<0.000780	0.00163 J
		Oct-15		0.241	0.803		<0.000373	<0.000387	0.00326	<0.000260	0.000394 J	<0.000367	<0.00100	<0.000341	<0.000780	0.00176 J
		Oct-15	FD	0.249	0.627		<0.000373	<0.000387	0.00307	<0.000260	0.000395 J	<0.000367	<0.00100	<0.000341	<0.000780	0.00181 J
		Apr-16		0.575	1.21		<0.000373	<0.000387	0.00473	<0.000260	0.000604 J	<0.000367	<0.00100	<0.000341	<0.000780	0.00283 J
		Apr-16	FD	0.396	1.19		0.000402 J	<0.000387	0.00565	<0.000260	0.000533 J	<0.000367	<0.00100	<0.000341	<0.000780	0.00272 J
		Oct-16		0.331	0.628		0.000948 J	<0.000387	0.00898	<0.000260	0.000935 J	<0.000367	<0.00100	<0.000341	<0.000780	0.00736
		Oct-16	FD	0.251	0.573		0.000618 J	<0.000387	0.00574	<0.000260	0.000825 J	<0.000367	<0.00100	<0.000341	<0.000780	0.00552

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

			Analyte Group:	TPH			Volatile Organic Compounds									
			Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
			Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
			CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup													
North Refinery	MW-61	Apr-14		10.9 J	3.40		0.200	0.0058 J	1.60	<0.0030	0.11	<0.0030	0.140	0.0041 J	0.093	0.420
		Nov-14		11.00	6.40		0.430	0.1	1.30	<0.013	0.16	<0.018	0.14 J	<0.017	<0.039	1.20
		Apr-15		6.77	9.40		0.531	0.13	1.74 J	<0.00260	0.209	<0.00370	0.176 J	0.00784 J	0.0130 J	1.69
		Oct-15		5.13	3.32		0.233	<0.00387	0.681	<0.00260	0.0659	<0.00367	0.0668	0.00496 J	0.0379 J	0.374
		Apr-16		2.60	3.59		0.139	<0.00194	0.493	<0.00130	0.0292	<0.00184	0.0340	0.00263 J	0.0185 J	0.226
		Oct-16		4.21	3.55		0.119	<0.00968	0.501	<0.00650	0.0353	<0.00918	0.0335 J	<0.00852	0.0260 J	0.225
	MW-62	Apr-14		7.37	2.00		0.27 E	0.06	1.00	<0.00060	0.093	0.0022 J	0.110	<0.0050	0.0056	0.72
		Nov-14		42.00	29.0		<0.019	<0.019	17.0	<0.013	0.910	0.025 J	0.42 J4	<0.017	<0.039	0.08 J
		Apr-15		21.10	36.9		<0.00370	<0.00390	12.8	<0.00260	0.457	0.0151	0.158 J	<0.00340	<0.00780	0.0405
		Oct-15		18.50	7.62		0.662	0.158	1.50	<0.00520	0.163	<0.00734	0.186	0.00886 J	<0.0156	1.73
		Apr-16		7.81	7.54		0.502	0.114	1.12	<0.00650	0.356	<0.00918	0.236	<0.00852	<0.0195	1.80
		Oct-16		11.3	4.72		0.62 J6	0.149 J6	3.28 J6	<0.0260 J6	0.0535 JJ6	<0.0367 J6	0.189 JJ6	<0.0341 J6	<0.0780 J6	1.14 J6
	MW-67	Nov-14		0.81	4.20		0.029	<0.0050	0.140	0.0022 J	0.005	0.460	0.0053 J	<0.0017	<0.0039	0.0084 J
		Apr-15		0.78	8.40		0.0050 J	<0.0019	0.143	0.00198	0.00447	0.869	<0.00100	<0.000340	0.00260 J	0.00291 J
		Oct-15		2.16	5.18		0.00108	<0.000390	0.172	<0.00520	<0.00768	0.924	<0.0200	<0.00682	<0.0156	<0.0212
		Apr-16		1.29	11.1		<0.00746	<0.00774	0.223	0.00527 J	0.00869 J	0.359	<0.0100	<0.00341	<0.0078	<0.0106
		Oct-16		1.03	9.36		0.0108	<0.00387	0.214	0.00322 J	0.0124	0.253	0.0298 J	0.00407 J	<0.00780	0.012 J
	MW-90	Apr-14		0.317	1.40		<0.00050	<0.00060	0.0035 J	<0.00060	<0.00050	<0.00060	0.0025 J	<0.00050	<0.00050	<0.0015
		Nov-14		0.210	2.30		<0.00037	<0.00039	0.015	<0.00026	0.00039 J	<0.00037	0.0049 JJ4	0.00037 J	<0.00078	<0.0011
		Apr-15		0.242	7.68		<0.000370	<0.000390	0.0125	<0.000260	0.000433 J	0.00575	0.00178 J	<0.000340	0.00194 J	<0.00110
		Oct-15		0.166	0.992		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		0.119	4.03		<0.000373	<0.000387	0.00662	0.000294 J	<0.000384	<0.000367	0.00105 J	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314	1.11		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-91	Apr-14		11.90	2.90		0.220	0.064	2.20	<0.0030	0.150	<0.0030	0.062	0.036	0.410	0.580
		Nov-14		7.90	11.0		0.18 J	<0.097	2.50	<0.065	0.17 J	<0.092	<0.25	<0.085	0.92 J	0.54 J
		Apr-15		14.70	15.9		0.184	0.0476	2.91	<0.00260	0.491	<0.00370	0.0490 J	0.150	1.91	0.852
		Oct-15		12.20	20.3		0.226	0.0626	3.47	<0.00650	0.449	<0.00918	0.0884 J	0.180	0.652	0.933
		Apr-16		22.10	22.2		0.266	0.0719	3.85	<0.0130	0.899	<0.0184	0.124 J	0.365	4.01	1.69
		Oct-16		20.6	16.3		0.218 J	<0.0968	3.15	<0.0650	0.816	<0.0918	<0.250	0.310	3.33	1.58
	MW-92	Apr-16		5.50	20.4		0.0588	0.0174	2.87	0.064	0.462	0.113	0.224 J	0.0268	0.0173	0.188
		Oct-16		6.05	22.8		0.0308	0.00835 J	2.05	0.0968	0.400	0.134	0.174	0.0151 J	<0.0156	0.110
	MW-93	Apr-14		9.90	14.0		0.370	0.076	1.80	<0.0030	0.067	0.0059 J	0.120	0.015 J	0.019 J	0.610
		Nov-14		6.50	11.0		0.240	0.046 J	1.30	<0.013	0.039 J	<0.018	0.17 JJ4	<0.017	<0.039	0.450
		Apr-15		3.67	15.3		0.206	0.0368	0.734 J	<0.00260	0.0675	<0.00370	0.0554 J	0.00938 J	0.00961 J	0.319
		Oct-15		5.14	16.5		0.241	0.0414	1.21	<0.00260	0.0717	<0.00367	0.100	0.011	0.0170 J	0.494
		Apr-16		1.06	7.83		0.0331	0.00543	0.258	<0.00130	0.0106	<0.00184	0.0113 J	<0.00170	<0.00390	0.0567
		Oct-16		2.57	8.66		0.103	0.0146	0.567	<0.00260	0.0114	<0.00367	0.0326 J	<0.00341	<0.00780	0.250
	MW-94	Nov-14		5.50	9.40		0.540	0.12	0.370	<0.0052	0.58	1.30	0.220	0.400	0.700	0.71
		Oct-15		6.12	25.6		0.432	0.0857	0.339	<0.00260	0.509	0.798	0.202	0.360	0.553	0.574
		Apr-16		7.91	8.69		0.489	0.100	0.417	0.0149 J	0.553	0.621	0.228 J	0.387	0.687	0.615
		Oct-16		6.83	9.76		0.458	0.0917	0.297	<0.00130	0.564	2.01	0.128	0.390	0.468	0.592
	MW-95	Apr-13		0.053	3.40		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		0.093	1.10		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	7.58		<0.000370	<0.000390	0.00148	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		0.129	8.06		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.000379 J	<0.00100	<0.000341	<0.000780	<0.00106
	MW-96	Apr-14		25.8	2.20		0.019 J	<0.015	0.056 J	<0.015	<0.012	35.0	0.065 J	<0.012	0.015 J	<0.038
		Nov-14		26.0	10.0		<0.0093	<0.0097	<0.0083	<0.0065	<0.0096	28.0 E	<0.025	<0.0085	<0.02	<0.026
		Apr-15		45.1	12.0		0.000553 J	<0.000390	0.00288	<0.000260	0.00172	35.0	0.00126 J	0.0011	0.00156 J	0.00547
		Oct-15		24.3	9.23		<0.186	<0.194	<0.166	<0.13	<0.192	39.2	<0.5	<0.17	<0.39	<0.53
		Apr-16		25.3	10.8		<0.00746	<0.00774	<0.000331	<0.00520	<0.00768	32.9	<0.0200	<0.00682	<0.0156	<0.0212
		Oct-16		20.0	7.74		<0.0186	<0.0194	<0.0166	<0.0130	<0.0192	39.6	<0.0500	<0.0170	<0.0390	<0.0530
	MW-98	Apr-14		32.1	2.20		0.440	0.1	5.80	<0.0060	1.00	<0.0060	0.230	0.031 J	0.300	1.90
		Apr-14	FD	32.5	2.70		0.460	0.1	6.10	<0.0060	1.00	<0.0060	0.210	0.033 J	0.320	2.00
		Nov-14		26.0	5.40		0.340	<0.097	4.80	<0.065	0.630	<0.092	0.45 JJ4	<0.085	0.280 J	1.60
		Apr-15		19.3	7.06		0.360	0.087	4.17	<0.00650	0.927	<0.00920	0.174 J	0.0358	0.283	1.74
		Oct-15		18.6	6.38		0.380	0.0836	4.79	<0.00650	0.659	<0.00918	0.237	0.0316	0.268	1.71
		Apr-16		14.7	6.88		0.177	0.0462 J	4.07	<0.0260	0.430	<0.0367	0.139 J	<0.0341	0.220 J	0.865
		Oct-16		20.0	4.97		0.299	0.0823 J	3.59	<0.0260	0.698	<0.0367	<0.100	<0.0341	0.245 J	1.37
	MW-137	Oct-15		30.0	20.1		0.437	0.102	9.44	<0.0260	1.59	0.0606 J	0.215 J	0.480	2.16	1.16
		Apr-16		33.8	11.8		0.460	0.102 J	9.65	<0.0650	1.65	<0.0918	0.262 J	0.539	2.53	1.23
		Oct-16		30.9	9.65		0.421	<0.0968	10.5	<0.0650	1.54	<0.0918	<0.250	0.343	1.51	1.10
	MW-138	Oct-15		5.08	6.73		0.0792	0.0189 J	1.54	<0.00520	0.569	0.0926	0.0894 J	<0.00682	<0.0156	0.0339 J
		Apr-16		4.86	15.5		<0.00373	<0.00387	1.46	<0.00260	0.309	0.0955	0.0959	<0.00341	0.0158 J	<0.0106
		Oct-16		2.28	10.3		<0.00373	<0.00387	0.494	<0.00260	0.0149	0.0935	0.0364 J	<0.00341	<0.00780	<0.0106
	RW-1	Apr-15		2.95 J	12.0		<0.0190	<0.0190	0.962	1.02	0.0470 J	<0.0180	<0.0500	<0.0170	<0.0390	<0.0530
	RW-1R	Apr-16		2.13	8.54		0.00369	0.000516 J	0.426	2.14	0.0214	0.0133	0.00762	0.00110	0.00542	0.0122
	RW-2	Apr-15		18.30	19.7		0.330	0.0772	5.34	0.619	1.02	<0.00370	0.157 J	0.0853	0.115	0.53
	RW-2R	Apr-16		20.8	17.3		0.188	0.0419 J	5.86	0.555	0.591	0.0226 J	0.145 J	0.0461 J	0.0569 J	0.299
	RW-7	Apr-15		1.05	9.70		0.0818	0.000663 J	0.0535	<0.000260	0.0185	0.0122	0.0112	0.00176	0.00396 J	0.0367
	RW-7R	Apr-16		0.0588 J	1.97		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.0687	<0.00100	<0.000341	<0.000780	<0.00106
	RW-8	Apr-15			7.30		0.00710 J	<0.00390	0.0412	<0.00260	0.00801 J	2.41	<0.0100	<0.00340	<0.00780	<0.0110
	RW-9	Apr-13		4.14	2.30		0.007	<0.0050	1.10	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.015
		Apr-14		3.26	0.480		0.0065	<0.00060	0.680	<0.00060	0.0015 J	0.0034 J	0.0075	<0.00050	0.0019 J	0.024
		Apr-15		2.55	3.20		<0.0190	<0.0190	0.790	<0.0130	<0.0190	<0.0180	<0.0500	<0.0170	<0.0390	<0.0530
		Apr-16		0.492 J	3.44		0.0283	<0.00194	0.466	<0.00130	0.00775	0.00656	0.00554 J	<0.00170	<0.00390	0.0708
	RW-10	Apr-13		<0.0500	0.650		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		<0.0100	0.150		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	4.80		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.157	3.66		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	RW-16	Apr-13			0.580		<0.00050	<0.00060	<0.0050	<0.0050	<0.0050	0.0051	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			0.110		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.013	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD		0.230		<0.000370	<0.000390	<0.00060	<0.00060	<0.00050	0.012	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15			1.90		<0.000373	<0.000387	<0.000330	<0.000260	<0.000380	0.019	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16			2.29		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.0186	<0.00100	<0.000341	<0.000780	<0.00106
	RW-17	Apr-13		<0.0500	0.290		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		<0.0100	0.110		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	0.0031 J	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	1.20		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00772	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314	1.75		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	0.195	<0.00100	<0.000341	<0.000780	<0.00106
North RO Reject Field	MW-117	Apr-14		<0.0100	<0.022		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	0.029 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010 J4	<0.00034	<0.00078	<0.0011
		Nov-14	FD	<0.031	0.12 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310	0.0323 J		0.00285	0.000897 J	<0.000330	<0.000260	<0.000380	<0.000370	0.00150 J	0.000942 J	<0.000780	0.00229 J
		Oct-15		<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314	0.0265 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100 J4	<0.000341	<0.000780	<0.00106
	MW-118	Apr-14		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	0.032 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010 J4	<0.00034	<0.00078	<0.0011
		Apr-15		<0.0310	0.0307 J		0.000863 J	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15		<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16		<0.0314	0.0248 J		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16		<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100 J4	<0.000341	<0.000780	<0.00106

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
North RO Reject Field	MW-119	Apr-14			<0.0100	<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			<0.031	**0.053 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010 J4	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	**0.0353 J**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			**0.0557 JB**	**0.0570 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100 J4	<0.000341	<0.000780	<0.00106
NCL	MW-18	Oct-13				**0.580**		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14				**0.280**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15				**2.41**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16				**2.02**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-45	Apr-14				**0.270**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0043 J**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14				**0.860**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.0048**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**1.10**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00356**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**0.874**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00268**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**1.11**		<0.000373	<0.000387	<0.000331	<0.000418	<0.000384	**0.00152**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**1.15**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00206**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-53	Apr-13				<0.053		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14				<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15				**0.296**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16				**0.316**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-54A	Apr-14				**0.570**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14				**2.60**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**2.93**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**3.29**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**3.34**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**3.24**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-54B	Apr-13			<0.0500	**0.63**		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15			<0.0310	**2.47**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
	MW-55	Apr-14			<0.0100	<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			<0.031	**0.120**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.00049 J**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			<0.0310	**0.227**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0314	**0.300**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00433**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16			<0.0314	**0.691**		**0.0599**	<0.000387	<0.000331	<0.000260	<0.000384	**0.0163**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			<0.0314	**0.354**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00521**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-56	Apr-14				**0.290**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0057**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14				**0.800**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.004**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**1.62**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.0129**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**0.680**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00975**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**1.07**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.0160**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**1.18**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.00819**	<0.00100	<0.000341	<0.000780	<0.00106
	MW-108	Apr-14				**3.00**		**0.031**	**0.0034 J**	**0.390**	<0.00060	**0.0049 J**	<0.00060	**0.0092**	**0.0028 J**	**0.0065**	**0.054**
		Nov-14				**7.70**		**0.039**	**0.0046 J**	**0.410**	<0.0013	**0.0056**	<0.0018	**0.012 J**	**0.0031 J**	**0.0078 J**	**0.059**
		Apr-15				**9.03**		**0.0465**	**0.00603 J**	**0.423**	<0.00260	**0.0101**	<0.00370	**0.0113 J**	**0.00412 J**	**0.00956 J**	**0.0706**
		Oct-15				**7.89**		**0.0616**	**0.00805 J**	**0.394**	<0.00260	**0.00812 J**	<0.00367	**0.0166 J**	**0.00444 J**	**0.00978 J**	**0.0855**
		Apr-16				**9.20**		**0.0599**	<0.0194	**0.504**	<0.0130	<0.0192	<0.0184	**<0.0500**	<0.0170	<0.0390	**0.0795 J**
		Oct-16				**15.2**		**0.0561**	<0.00968	**0.362**	<0.00650	<0.00960	<0.00918	<0.0250	<0.00852	<0.0195	**0.0721 J**
	NCL-31	Apr-14				**0.65**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.00060 J**	**0.0021 J**	<0.00050	<0.00050	<0.0015
		Nov-14				**2.00**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.00078 J**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**2.38**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.000497 J**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**2.10**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**1.87**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**24.2**		**0.000554 J**	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	NCL-32	Nov-14				**2.30**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**2.80**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**7.50**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000476 J**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**4.05**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000751 J**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**1.20**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.000385 J**	<0.00100	<0.000341	<0.000780	<0.00106
	NCL-33	Apr-14				**3.70**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14				**4.60**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**5.30**		<0.000370	<0.000390	**0.00105**	<0.000260	<0.000380	**0.000806 J**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**4.53**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780 J	<0.00106
		Apr-16				**6.55**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**5.70**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	NCL-34A	Nov-14				**5.30**		**0.110**	<0.0019	**0.270**	<0.0013	**0.0048 J**	<0.0018	<0.0050	<0.0017	<0.0039	**0.1**
		Apr-15				**10.0**		**0.0979**	**0.00122**	**1.21**	<0.000260	**0.00565**	<0.00730	**0.00636**	**0.00121**	<0.000780	**0.0952**
		Oct-15				**5.11**		**0.0589**	**0.000423 J**	**0.695 J**	<0.000260	**0.00215**	**0.00168**	<0.00100	**0.000477 J**	<0.000780	**0.0658**
		Apr-16				**19.2**		**0.102**	<0.0194	**3.25**	<0.0130	**0.0758**	<0.0184	**<0.0500**	<0.0170	<0.0390	**0.188**
		Oct-16				**10.8**		**0.0754 J**	<0.0387	**1.13**	<0.0260	<0.0384	<0.0367	**<0.100**	<0.0341	<0.0780	**0.111 J**
	NCL-44	Apr-14				**1.50**		<0.00050	<0.00060	**0.0011 J**	<0.00060	<0.00050	<0.00060	**0.0026 J**	<0.00050	<0.00050	<0.0015
		Nov-14				**3.90**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.00058 J**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**5.50**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.000410 J**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**6.17**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**7.59**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**8.88**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	NCL-49	Apr-14				<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14				**0.042 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Nov-14	FD			**0.028 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15				**0.0967 J**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-15	FD			**0.0832 J**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15				**0.0770 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-15	FD			**0.0960 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16				**0.0890 J**		<0.000373	<0.00774	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16	FD			**0.0664 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16				**0.0712 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16	FD			**0.0626 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
South Refinery	KWB-2R	Nov-14				**5.50**		**0.790**	**0.039**	**4.40**	<0.0065	**2.90**	**0.034**	**0.510**	**0.031**	**0.035 J**	**0.740**
		Apr-15				**5.20**		**0.307**	<0.00390	**1.98**	<0.00260	**0.992**	**0.0186**	**0.0260 J**	**0.0115**	**0.0140 J**	**0.236**
		Oct-15				**3.95**		**0.317**	<0.0387	**4.00**	<0.0260	**1.72**	<0.0367	**<0.1**	<0.0341	<0.0780	**0.448**
		Apr-16				**1.49**		**0.0497**	**0.000489 J**	**0.0558**	<0.000260	**0.0483**	**0.0231**	**0.00806**	**0.00189**	**0.00152 J**	**0.0515**
		Oct-16				**1.84**		**0.0347**	**0.000427 J**	**0.398**	<0.000260	**0.0130**	**0.0184**	**0.0044 J**	**0.00185**	**0.00290 J**	**0.0289**
	KWB-5	Nov-14				**1.80**		<0.0037	<0.0039	**0.410**	<0.0026	**0.0095 J**	**9.9 E**	**0.023 J**	<0.0034	<0.0078	<0.011
		Apr-15				**2.30**		**0.0158**	**0.00419**	<0.000330	<0.000260	**0.0395**	<0.000370	**0.0392**	**0.00713**	**0.013**	**0.0394**
		Oct-15				**1.39**		**0.00334**	**0.00179**	**1.2 J**	<0.000260	**0.0151**	**10.7**	**0.0156**	**0.00312**	**0.00578**	**0.0166**
		Apr-16				**2.36**		**0.00535**	**0.000901 J**	**0.688**	<0.000260	**0.00678**	**12.6**	**0.0114**	**0.00349**	**0.00412 J**	**0.0158**
		Oct-16				**1.89**		<0.00186	<0.00194	**0.367**	<0.00130	<0.00192	**9.88**	**0.00511 JJ4**	<0.00170	<0.00390	<0.00530

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
South Refinery	KWB-6	Nov-14				1.80		0.260	0.047	5.1	<0.0026	0.810	0.160	0.098	0.200	0.530	1.10
		Apr-15				4.50		0.680	0.124	15.9	<0.00650	2.04	0.119	0.239	0.760	1.70	3.47
		Oct-15				1.41		0.325 J	<0.194	8.61	<0.13	0.831	9.07	<0.5	0.297 J	<0.39	1.33 J
		Apr-16				3.75		0.876	0.134	12.4	<0.00130	0.799	0.138	0.137	0.243	0.120	1.88
		Oct-16				1.78		0.292	0.0449	3.41	<0.00520	0.241	0.135	0.0549 J	0.0232	0.0167 J	0.417
	MW-28	Apr-14			6.32	3.00		0.00069 J	<0.00060	0.810	<0.00060	0.0052	3.60	0.0042 J	0.00053 J	0.0053	0.0086 J
		Nov-14			16.00	3.70		0.12	0.011 J	3.30	<0.0065	0.150	2.00	0.06 J	<0.0085	0.054 J	0.22
		Apr-15			7.85 J	13.0		0.0950 J	<0.0390	3.02	<0.0260	0.0625 J	1.33	<0.1	<0.0340	<0.0780	0.194 J
		Oct-15			9.88	16.2		0.151	<0.0387	3.05	<0.0260	0.0441 J	1.11	<0.1	<0.0341	<0.0780	0.243 J
		Apr-16			4.83	17.0		0.113	0.00861 J	1.37	<0.00260	0.0276	0.261	0.0247 J	0.00496 J	0.0350 J	0.161
		Oct-16			6.13	22.2		0.253	0.0202 J	2.55	<0.0130	0.0796	0.630	0.0504 J	<0.0170	0.0683 J	0.338
	MW-48	Nov-14			4.5 J	4.00		0.200	<0.0097	0.140	<0.0065	0.075	1.10	0.028 J	0.01 J	0.03 J	0.13
		Apr-15			3.65 J	3.90		0.140	0.00962 J	0.890	<0.00260	0.158	0.223	0.0245 J	0.00973 J	0.0146 J	0.153
		Oct-15			2.99	2.97		0.211	0.00235 J	0.204 J	<0.00130	0.0655	0.832	0.0128 J	0.00658	0.0120 J	0.125
		Apr-16			23.3	15.3		0.310	0.0223	7.17	<0.00520	0.790	0.326	0.101	0.0788	0.214	0.750
		Oct-16			15.8	7.81		0.323	0.0284	5.12	<0.00130	0.448	0.851	0.0832	0.0356	0.214	0.538
	MW-50	Apr-14			0.0223 J	0.120		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			0.0263 J	0.36 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			0.032 J	0.902		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	0.00219	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			<0.0310 J	0.642		<0.000373 J	<0.000387 J	<0.000331 J	<0.000260 J	<0.000384 J	<0.000367	<0.00100 J	<0.000341	<0.000780 J	<0.00106 J
		Apr-16			<0.0314	1.10		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			<0.0314	1.02		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-52	Apr-14			0.0386 J	0.170		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD		136	0.330		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14			90.7	0.28 J		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15			27.00	0.370		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15			33.10	0.158		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780 J	<0.00106
		Apr-16			19.6	0.324		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			19.2	0.367		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-64	Apr-16				12.3		0.666	0.14	25.3	<0.0130	3.11	0.666	0.195 J	2.44	18.8	7.70
		Oct-16				12.0		0.435	0.0904 J	30.9	<0.0260	2.61	0.531	0.140 J	1.51	11.6	5.30
	MW-65	Nov-14				15.00		0.060	0.022 J	8.90	<0.013	1.20	3.40	0.22 J	0.025 J	<0.039	0.210
		Apr-15				12.40		0.0514	0.0228	9.99	<0.00260	1.03	3.22	0.239	0.0228	0.0294 J	0.158
		Apr-16				10.6		0.0309	0.0165	9.73	<0.00260	0.288	3.71	0.155	0.0149	0.0211 J	0.0971
		Oct-16				7.99		<0.00746	<0.00774	8.04	<0.00520	0.0574	2.70	0.194	0.00937 J	0.0271 J	0.0298 J
	MW-66	Apr-14			6.64	2.10		<0.00050	<0.00060	0.890	<0.00060	0.0039 J	2.30	0.055	0.0014 J	0.0027 J	0.0069 J
		Nov-14			23.00	3.30		0.012	<0.0039	6.50	<0.0026	0.19	1.90	0.22 J4	0.015	0.052	0.120
		Apr-15			8.18	4.51		<0.0190	<0.0190	3.16	<0.0130	0.0615	1.66	0.0617 J	<0.0170	<0.0390 J	0.0668 J
		Oct-15			8.74	1.40		0.00409	0.000859 J	4.1 J	<0.000260	0.0234	2.42	0.133	0.0039	0.00722	0.032
		Apr-16			6.09	4.19		0.0094 J	<0.00387	3.09	<0.00260	0.0181	1.48	0.0638	<0.00341	<0.0078	0.0285 J
		Oct-16			7.32	4.24		0.00241	0.000547 J	3.80	<0.000260	0.0214	1.48	0.0979	0.00365	0.0109	0.0265
	MW-99	Nov-14			14.0	2.50		0.33	0.036	2.60	<0.0026	0.59	3.4 E	0.044 J	0.15	0.58	0.840
		Apr-15			6.76	1.94		0.337	0.0706	0.973	<0.00650	0.252	0.0799	0.0376 J	0.315	0.149 J	0.937
		Oct-15			19.4	1.87		0.400	0.0169 J	7.28	<0.00650	0.551	3.96	0.0453 J	0.0953	0.221	0.604
		Apr-16			18.1	4.29		0.498	0.0129	5.59	<0.00260	0.629	1.99	0.0656	0.0843	0.0427 J	0.615
		Oct-16			17.8 B	2.26		0.343	<0.00774	5.08	<0.00520	0.635	2.45	0.0343 J	0.108	0.190	0.699
	MW-101	Apr-14			4.56	4.30		0.0022 J	0.00092 J	1.10	<0.0013 R	0.015	<0.00060	0.0029 J	<0.00050	0.0038 J	0.011 J
		Nov-14			1.40	5.30		<0.0037	<0.0039	0.220	<0.0026	0.0050 J	0.120	0.01 JJ4	<0.0034	<0.0078	<0.011
		Apr-15			0.18	6.00		<0.00190	<0.00190	0.0187	<0.00130	0.00202 J	0.113	<0.00500 J	<0.00170	<0.00390	<0.00530
		Oct-15			0.0803 J	5.08		<0.00186	<0.00194	<0.00166	<0.00130	<0.00192	0.0981	<0.00500	<0.00170	<0.00390	<0.00530
		Apr-16			0.614	5.84		<0.000373	<0.000387	0.0664 J6	<0.000260	0.00176	0.119	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.208	2.95		<0.000373	<0.000387	0.000845 J	<0.000260	<0.000384	0.104	<0.00100	<0.000341	<0.000780	<0.00106
	MW-102	Nov-14			36.00	9.50		0.260	0.059	11.0	<0.013	0.990	2.00	0.18 J	0.54	2.00	1.80
		Apr-15			24.50	9.96		0.136	0.0278	9.83	<0.00260	0.602	1.88	0.129	0.247	1.45	0.846
		Oct-15			31.40	11.4		0.465	0.115	12.3	<0.0260	1.04	2.12	0.256 J	0.361	1.20	1.43
		Apr-16			26.2	9.69		0.402	0.110	10.8	<0.0260	0.858	2.07	0.278 J	0.0881 J	0.541	0.632
		Oct-16			31.5	14.8		0.337	0.0773 J	13.2	<0.0260	1.03	1.61	0.278 J	0.0952 J	0.626	0.719
	MW-103	Apr-13			3.31	5.40		<0.0050	<0.0050	0.580	<0.0050	0.036	<0.0050	0.013	<0.0050	0.006	<0.015
		Apr-14			1.43 J	5.90		0.015	<0.00060	0.760	<0.00060	0.150	<0.00060	0.051	0.0045 J	0.0094	0.017
		Apr-15			4.15	8.66		0.0102	<0.000390	<0.000330	<0.000260	0.0879	0.000441 J	0.022	0.00549	0.0154	0.0137
		Apr-16			3.55	7.35		<0.00186	<0.00194	1.35	<0.00130	0.0508	<0.00184	0.0108 J	0.00422 J	0.0153 J	<0.00530
	MW-104	Apr-14			1.42	0.72		<0.00050	<0.00060	0.056	<0.00060	0.0012 J	<0.00060	0.0030 J	<0.00050	<0.00050	<0.0015
		Apr-14	FD		1.42	0.69		<0.00050	<0.00060	0.058	<0.00060	0.0013 J	<0.00060	0.0027 J	<0.00050	<0.00050	<0.0015
		Nov-14			1.3 J	0.70		<0.00037	<0.00039	0.094	<0.00026	0.0021	0.00049 J	0.0018 JJ4	<0.00034	<0.00078	<0.0011
		Nov-14	FD		1.40	0.62		<0.0037	<0.0039	0.110	<0.0026	<0.0038	<0.0037	<0.01	<0.0034	<0.0078	<0.011
		Apr-15			0.78	0.81		<0.000370	<0.000390	0.0243	<0.000260	<0.000380	0.00138	<0.00100	<0.000340	<0.000780 J	<0.00110
		Apr-15	FD		0.88	0.79		<0.000370	<0.000390	0.0242	<0.000260	0.000481 J	0.00135	<0.00100	<0.000340	<0.000780 J	<0.00110
		Oct-15			1.05	1.06		<0.00186	<0.00194	0.257	<0.00130	0.0126	0.00189 J	<0.00500	<0.00170	<0.00390	<0.00530
		Oct-15	FD		1.18	3.00		0.000420 J	<0.000387	0.309	<0.000260	0.0117	0.00199	0.00132 J	<0.000341	<0.000780	<0.00106
		Apr-16			0.797	2.23		<0.000373	<0.000387	0.0707	<0.000260	0.00108	0.00130	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16	FD		0.775	2.19		<0.000373	<0.000387	0.0685	<0.000260	0.00107	0.00120	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			1.35	2.55		<0.00186	<0.00194	0.341	<0.00130	0.00837	<0.00184	<0.00500	<0.00170	<0.00390	<0.00530
		Oct-16	FD		1.26	2.68		<0.00186	<0.00194	0.284	<0.00130	0.00721	0.00509	<0.00500	<0.00170	<0.00390	<0.00530
	MW-105	Nov-14			14.00	7.80		0.11 J	<0.097	3.40	<0.065	0.580	<0.092	<0.25	<0.085	<0.2	<0.26
		Apr-15			6.50	3.74		0.0678	0.0325	1.71	<0.00130	0.545	<0.00180	0.0623 J	0.00965	0.0314	0.214
		Oct-15			4.37	2.31		0.0487	0.0291	0.580	<0.00260	0.188	<0.00367	0.0299 J	<0.00341	<0.00780	0.109
		Apr-16			33.6	21.2		0.103 J	<0.0968	13.5	<0.0650	2.02	<0.0918	<0.250	<0.0852	<0.195	0.379 J
		Oct-16			43.7	8.66		0.141	<0.0387	18.2	<0.0260	2.77	<0.0367	0.129 J	<0.0341	<0.0780	0.683
	MW-106	Apr-14			27.90	2.10		0.097 J	0.018 J	9.30	<0.012	0.160	0.047 J	0.083 J	0.024 J	0.35	0.31
		Apr-15			1.52	3.40		0.0173	0.00273	0.395	<0.000260	0.0206	<0.000370	0.0126	0.00393	0.042	0.0514
		Oct-15			23.80	19.6		0.0921 J	<0.0387	10.4	<0.0260	0.0823 J	0.0397 J	0.113 J	<0.0341	0.216 J	0.217 J
		Apr-16			23.9	19.5		0.0824	0.0114 J	12.7	<0.00650	0.0446	0.0580	0.0442 J	<0.00852	0.124 J	0.203
		Oct-16			27.1	21.8		0.126	0.0219 J	11.3	<0.0130	0.044 J	0.109	0.069 J	<0.0170	0.146 J	0.297
	MW-107	Apr-14			7.32	4.90		0.017 J	0.012 J	7.00	<0.0060	0.048 J	1.6 J	0.110	<0.0050	0.017 J	0.12 J
		Nov-14			17.00	4.90		0.031	0.0052 J	8.20	<0.0026	0.300	2.3 E	0.15 J4	0.0035 J	0.02 J	0.12
		Apr-15			9.85	7.20		0.0133	<0.00390	5.32	<0.00260	0.00658 J	1.77	0.0157 J	<0.00340	0.0106 J	0.0146 J
		Oct-15			14.9 J	4.72		0.100	<0.0387	6.29	<0.0260	0.0403 J	2.77	<0.1	0.0431 J	<0.0780	0.13 J
		Apr-16			4.89	6.80		0.00111	0.000591 J	1.28	<0.000260	0.00466	2.44	0.00773	0.00145	0.00399 J	0.00572
		Oct-16			17.7	7.24		0.00205 J	<0.00194	6.35	<0.00130	0.0192	3.05	0.0614	0.00265 J	0.00800 J	0.0112 J
	MW-109	Apr-14			2.02	2.70		0.0027 J	<0.00060	0.310	<0.00060	0.050	<0.00060	0.0036 J	<0.00050	0.0045 J	0.0059 J
		Nov-14			1.00	3.70		0.00063 JJ3	0.00040 JJ5J3	0.280	<0.00026 J3	0.020	<0.00037 J3	0.0026 JJ4J5J3	0.00036 JJ5J3	0.0057 J3	0.0031 J3J5
		Apr-15			2.36	8.10		<0.00370	<0.00390	0.621	<0.00260	0.019	<0.00370	<0.0100	<0.00340	0.0117 J	0.0176 J
		Oct-15			1.46	0.842		0.00487 J	<0.00387	0.845 J	<0.00260	0.0126	<0.00367	<0.0100	<0.00341	0.0141 J	0.0176 J
		Apr-16			1.93	5.92		0.00418 J	<0.00194	0.532	<0.00130	0.00864	<0.00184	<0.00500	<0.00170	0.00837 J	0.0142 J
		Oct-16			2.12	3.19		<0.00746	<0.00774	0.995	<0.00520	0.0115 J	<0.00734	<0.0200	<0.00682	<0.0156	<0.0212
	MW-110	Apr-14			2.05	1.20		0.030	0.0043 J	0.081	<0.00060	0.070	<0.00060	0.013	<0.00050	0.0023 J	0.028
		Nov-14			0.47	0.820		0.001	<0.00039	0.0015	<0.00026	0.0016	<0.00037	0.0017 JJ4	<0.00034	<0.00078	<0.0011
		Apr-15			1.12	2.20		0.00548	0.00166	0.132	<0.000260	0.00609	<0.000370	0.00482 J	<0.000340	0.00352 J	0.00624
		Oct-15			1.48	<0.0247		0.035	0.00228 J	0.348 J	<0.00130	0.182	<0.00184	0.00731 J	<0.00170	0.00464 J	0.0298
		Apr-16			0.735	1.55		0.000871 J	0.000525 J	0.0132	<0.000260	0.000927 J	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16			0.503	1.00		<0.000373	<0.000387	0.000511 J	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
South Refinery	RA-313	Apr-13					<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14					<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15					<0.000370	<0.000390	**0.000366 J**	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16					<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	RW-4	Apr-15			**3.72**		<0.000370	<0.000390	**0.0167**	<0.000260	**0.00245**	**0.0902**	<0.00100	<0.000340	<0.000780 J	<0.000780	<0.00110
	RW-4R	Apr-16			**5.03**		<0.000373	<0.000387	**0.0140**	<0.000260	<0.000384	**0.191**	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	RW-5R	Apr-15			**6.42**		**0.298**	**0.0558**	**2.92**	<0.00260	**1.03**	**2.15**	**0.174**	**0.522**	**2.26**	**2.26**	**1.91**
		Apr-16			**7.39**		**0.437**	**0.100**	**3.48**	<0.00520	**1.20**	**1.64**	**0.205**	**0.570**	**2.51**	**2.51**	**2.25**
	RW-6	Apr-15			**11.40**		**0.134**	**0.028**	**0.636**	<0.00260	**0.0476**	**2.27**	**0.0602**	**0.0558**	**0.0126 J**	**0.0126 J**	**0.158**
	RW-6R	Apr-16			**4.20**		**0.00555**	**0.00111**	**0.218**	<0.000260	**0.00474**	**2.68**	**0.00574**	**0.00275**	**0.00683**	**0.00683**	**0.00747**
South RO Reject Field	MW-114	Apr-14		<0.0100	<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	**0.032 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	**0.0012 JJ4**	<0.00034	<0.00078	<0.00078	<0.0011
		Apr-15		<0.0310 J	<0.0250 B		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Oct-15		<0.0314	<0.0247		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Apr-16		<0.0314	**0.0317 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Oct-16		<0.0314	**0.0410 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-115	Apr-14		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	**0.110**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010 J4	<0.00034	<0.00078	<0.00078	<0.0011
		Apr-15		<0.0310 J	<0.0250 B		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Oct-15		**0.0324 J**	**0.103**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Apr-16		<0.0314	**0.0616 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Oct-16		<0.0314	**0.0582 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-116	Apr-14		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	**0.026 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010 J4	<0.00034	<0.00078	<0.00078	<0.0011
		Apr-15		<0.0310 J	<0.0250 B		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Oct-15		<0.0314	**0.0607 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Apr-16		<0.0314	**0.112**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Oct-16		<0.0314	**0.0868 J**		**0.000389 J**	<0.000387	**0.000536 J**	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
TEL	MW-49	Apr-14		**1.99**	**5.60**		**0.022**	**0.0018 J**	**0.220**	<0.00060	**0.0043 J**	**0.049**	**0.0054**	<0.00050	**0.0040 J**	**0.0040 J**	**0.034**
		Nov-14		**1.00**	**7.00**		**0.017**	**0.0018 J**	**0.170**	<0.00052	**0.0036**	**0.055**	**0.0031 J**	<0.00068	**0.0029 J**	**0.0029 J**	**0.026**
		Apr-15		**0.65**	**8.60**		**0.00954**	<0.000390	**0.077**	<0.000260	**0.00274**	**0.0553 J**	**0.00117 J**	<0.000340	<0.000780	<0.000780	**0.0175**
		Oct-15		**1.58**	**7.66**		**0.015**	**0.000858 J**	**0.179**	<0.000260	**0.00457**	**0.0447**	**0.00255 J**	<0.000341	**0.00201 J**	**0.00201 J**	**0.038**
		Apr-16		**1.75**	**8.63**		**0.0305**	<0.000387	**0.196**	<0.00520	<0.00768	**0.0535**	<0.0200	<0.00682	<0.0156	<0.0156	**0.0540 J**
		Oct-16		**2.82**	**9.26**		**0.0457 J**	<0.0387	**0.241**	<0.0260	<0.0384	**0.0628 J**	**<0.100**	<0.0341	<0.0780	<0.0780	<0.106
	TEL-1	Apr-14		**0.384 J**	**8.70**		**0.0012 J**	<0.00060	<0.00060	<0.00060	<0.00050	**0.0039 J**	**0.0029 J**	**0.0024 J**	**0.0010 J**	**0.0010 J**	**0.0024 J**
		Apr-14	FD	**0.35**	**7.70**		**0.0012 J**	<0.00060	<0.00060	<0.00060	<0.00050	**0.0040 J**	**0.0029 J**	**0.0023 J**	**0.0011 J**	**0.0011 J**	**0.0023 J**
		Nov-14		**0.20**	**6.00**		**0.00086 J**	<0.00039	<0.00033	<0.00026	**0.00047 J**	**0.0018**	<0.0010	**0.0022**	**0.00099 J**	**0.00099 J**	**0.0022 J**
		Apr-15		**0.18**	**9.80**		**0.00103**	<0.000390	<0.000330	<0.000260	<0.000380	**0.00478**	<0.00100	**0.00214**	<0.000780	<0.000780	**0.00214 J**
		Oct-15		**0.15**	**7.46**		**0.000971 J**	<0.000387	**0.000378 J**	<0.000260	<0.000384	**0.00245**	**0.00102 J**	**0.00197**	**0.00108 J**	**0.00108 J**	**0.00197 J**
		Apr-16		**0.153**	**8.51**		**0.000807 J**	<0.000387	<0.000331	<0.000260	**0.000718 J**	**0.00229**	<0.00100	**0.00160**	**0.000793 J**	**0.000793 J**	**0.00160 J**
		Oct-16		**0.193**	**3.58**		**0.000939 J**	<0.000387	<0.000331	<0.000260	**0.000666 J**	**0.000724 J**	<0.00100	**0.00183**	<0.000780	<0.000780	**0.00183 J**
	TEL-2	Apr-14		**6.08 J**	**17.0**		**0.200**	**0.032**	**1.20**	<0.00060	**0.015**	**0.011**	**0.023**	**0.018**	**0.043**	**0.043**	**0.260**
		Nov-14		**1.7 J**	**18.0**		**0.140**	**0.026**	**0.87**	<0.0026	**0.0099 J**	**0.012**	**0.017 J**	**0.016**	**0.034 J**	**0.034 J**	**0.200**
		Apr-15		**5.12**	**20.0**		**0.138**	**0.0198 J**	**0.905**	<0.00520	**0.0119 J**	**0.0113 JJ3**	<0.0200	**0.0182 J**	**0.0372 J**	**0.0372 J**	**0.189**
		Oct-15		**2.86**	**18.7 J**		**0.138**	**0.0109**	**0.535**	<0.00130	**0.00577**	**0.011**	**0.00630 J**	**0.0097**	**0.0186 J**	**0.0186 J**	**0.155**
		Apr-16		**3.12**	**18.1**		**0.125**	**0.0143**	**0.709**	<0.000260	**0.00692**	**0.0156**	**0.00966**	**0.0102**	**0.0243**	**0.0243**	**0.146**
		Oct-16		**3.08**	**17.0**		**0.0976**	**0.00929 J**	**0.962**	<0.00260	**0.00418 J**	**0.0110**	<0.0100	**0.0066 J**	**0.0218 J**	**0.0218 J**	**0.123**
	TEL-3	Apr-14		**0.971 J**	**8.30**		**0.027**	**0.0029 J**	**0.0092**	<0.00060	<0.00050	**0.0030 J**	**0.0034 J**	**0.0032 J**	<0.00050	**0.021**	**0.021**
		Nov-14		**0.45**	**6.30**		**0.016**	**0.0017**	**0.023**	<0.00026	**0.00068 J**	<0.00037	**0.0010 J**	**0.0023**	**0.0010 J**	**0.0010 J**	**0.014**
		Apr-15		**0.67**	**9.40**		**0.0104**	<0.00390	**0.0206**	<0.00260	<0.00380	**0.00560 J**	<0.0100	<0.00340	<0.00780	<0.00780	<0.0110
		Oct-15		**0.63**	**5.86**		**0.0213**	**0.00128**	**0.0385**	<0.000260	**0.000880 J**	**0.000964 J**	**0.00123 J**	**0.00316**	**0.00154 J**	**0.00154 J**	**0.0202**
		Apr-16		**1.05**	**14.1**		**0.0128 J**	<0.00968	**0.317**	<0.00650	<0.00960	**0.0445**	<0.0250	<0.00852	<0.0195	<0.0195	<0.0265
		Oct-16		**0.589**	**4.22**		**0.0157**	**0.00115**	**0.0123**	<0.000260	**0.000539 J**	**0.00109**	**0.00107 J**	**0.00232**	**0.00119 J**	**0.00119 J**	**0.0105**
	TEL-4	Apr-14		**3.11 J**	**8.60**		**0.099**	<0.00060	**0.370**	<0.00060	**0.0035 J**	**0.120**	**0.0035 J**	**0.0013 J**	**0.0046 J**	**0.0046 J**	**0.061**
		Nov-14		**3.30**	**7.40**		**0.110**	<0.0077	**1.20**	<0.0052	**0.0087 J**	**0.064**	<0.02	<0.0068	<0.016	<0.016	**0.120**
		Nov-14	FD	**2.80**	**5.70**		**0.110**	<0.0077	**1.20**	<0.0052	**0.0085 J**	**0.066**	<0.02	<0.0068	<0.016	<0.016	**0.120**
		Apr-15		**2.09**	**8.40**		**0.0742**	<0.00390	**0.171**	<0.00260	<0.00380	**0.140**	<0.0100	<0.00340	<0.00780	<0.00780	**0.0394**
		Apr-15	FD	**2.26**	**8.50**		**0.0758**	<0.00390	**0.155**	<0.00260	<0.00380	**0.142**	<0.0100	<0.00340	<0.00780	<0.00780	**0.0407**
		Oct-15		**2.77**	**4.98**		**0.074**	**0.000524 J**	**0.637**	<0.000260	**0.00655**	**0.00902**	**0.00422 J**	**0.00162**	**0.00623**	**0.00623**	**0.0719**
		Oct-15	FD	**2.70**	**5.73**		**0.0861**	<0.00387	**0.657**	<0.00260	**0.00756 J**	**0.0127**	<0.0100	<0.00341	**0.00878 J**	**0.00878 J**	**0.0837**
		Apr-16		**2.36**	**9.13**		**0.142**	<0.00387	**0.530**	<0.00260	**0.016**	**0.105**	<0.0100	<0.00341	**0.0132 J**	**0.0132 J**	**0.142**
		Apr-16	FD	**2.65**	**8.65**		**0.147**	<0.00387	**0.557**	<0.00260	**0.0161**	**0.0945**	<0.0100	<0.00341	**0.0128 J**	**0.0128 J**	**0.147**
		Oct-16		**2.52**	**6.36**		**0.0775**	<0.00387	**0.514**	<0.00260	<0.00384	**0.0415**	<0.0100	<0.00341	<0.00780	<0.00780	**0.0668**
		Oct-16	FD	**2.72**	**6.66**		**0.105**	<0.00387	**0.479**	<0.00260	<0.00384	**0.0476**	<0.0100	<0.00341	<0.00780	<0.00780	**0.0863**
TMD	MW-8	Oct-13		<0.0500	<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		<0.0100	<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0014 J**	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	**0.380**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16		<0.0314	**0.230**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-16	Apr-13			<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			**0.058**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15			**0.340**		<0.000370	<0.000390	<0.00033	<0.000260	<0.000380	<0.000370	<0.00100 J	<0.000340	<0.000780	<0.000780	<0.00110
	MW-20	Apr-13			<0.053		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-14	FD		<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15			**0.150**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16			**0.149**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-21	Apr-14		<0.0100	<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0051**	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Nov-14		<0.031	**0.092 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.006**	<0.0010	<0.00034	<0.00078	<0.00078	<0.0011
		Apr-15		<0.0310	**0.180**		<0.000370	<0.000390	<0.00033	<0.000260	<0.000380	**0.00729**	<0.00100 J	<0.000340	<0.000780	<0.000780	<0.00110
		Oct-15		<0.0314	**0.194**		<0.000373	<0.000387	**0.000613 J**	<0.000260	<0.000384	**0.00636**	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Apr-16		<0.0314	**0.190**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.0101**	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Oct-16		<0.0314	**0.132**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.0112**	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-25	Apr-13			<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15			**0.690**		<0.000370	<0.000390	<0.00033	<0.000260	<0.000380	<0.000370	<0.00100 J	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16			**0.348**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-26	Apr-13			<0.053		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15			**0.0530 J**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16			**0.103**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-27	Apr-13			<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14			<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Apr-15			**0.110**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16			**0.134**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
	MW-46R	Apr-14			<0.021		**0.00074 J**	<0.00060	<0.00060	<0.00060	**0.00086 J**	<0.00060	<0.00070	<0.00050	<0.00050	<0.00050	<0.0015
		Nov-14			**0.042 J**		<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	<0.00037	<0.0010	<0.00034	<0.00078	<0.00078	<0.0011
		Apr-15			**0.0540 J**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.000780	<0.00110
		Apr-16			**0.0622 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106
		Oct-16			**0.0459 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.000780	<0.00106

Table 4A - Summary of Groundwater Analytical Data - Total Petroleum Hydrocarbons and Volatile Organic Compounds

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	TPH			Volatile Organic Compounds									
				Analyte:	GRO	DRO	DRO - EP	1,2,4-TMB	1,3,5-TMB	Benzene	cis-1,2-DCE	Ethyl-benzene	MTBE	Naphtha-lene	o-Xylene	Toluene	Total Xylenes
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	0.200	0.400	0.015	0.120	0.005	0.070	0.700	0.143	0.030	0.193	0.750	0.620
				CGWSL Source:		NMED TPH	NMED TPH	USEPA TW	USEPA TW	USEPA MCL	USEPA MCL	USEPA MCL	NMED TW	WQCC HH	NMED TW	WQCC HH	WQCC HH
Area	Well ID	Date	Dup														
TMD	MW-68	Apr-13				<0.052		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14				<0.020		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15				**0.130**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16				**0.162**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-71	Oct-13				**0.096**		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14				<0.021		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15				**0.0930 J**		<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16				**0.0252 J**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	MW-89	Apr-13				**0.058**		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14				**0.210**		<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15				**2.40**		<0.000370	<0.000390	<0.00033	<0.000260	<0.000380	<0.000370	<0.00100 J	**0.000538 J**	<0.000780	<0.00110
		Apr-16				**3.38**		<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	NP-1	Apr-14						<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	**0.0056**	<0.00070	<0.00050	<0.00050	<0.0015
		Nov-14						<0.00037	<0.00039	<0.00033	<0.00026	<0.00038	**0.084**	<0.0010	<0.00034	<0.00078	<0.0011
		Apr-15						<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.204**	<0.00100	<0.000340	<0.000780	<0.00110
		Oct-15						<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.291**	<0.00100	<0.000341	<0.000780	<0.00106
		Apr-16						<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.213**	<0.00100	<0.000341	<0.000780	<0.00106
		Oct-16						<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	**0.283**	<0.00100	<0.000341	<0.000780	<0.00106
	NP-2	Apr-13		<0.0500	<0.052			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
	NP-6	Apr-13						<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-15						<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	**0.00878**	<0.00100 J	<0.000340	<0.000780	<0.00110
Up-Gradient	UG-1	Apr-13		<0.0500	<0.053			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		<0.0100	<0.021			<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	<0.0250 B			<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314	**0.0302 J**			<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	UG-2	Apr-13		<0.0500	<0.052			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-13	FD	<0.0500	<0.053			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		<0.0100	<0.020			<0.0050	<0.0050	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	<0.0250 B			<0.00050	<0.00060	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314	**0.0692 J**			<0.000370	<0.000390	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	UG-3R	Apr-13		<0.0500	<0.053			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.015
		Apr-14		<0.0100	<0.020			<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-14	FD	<0.0100	<0.020			<0.00050	<0.00060	<0.00060	<0.00060	<0.00050	<0.00060	<0.00070	<0.00050	<0.00050	<0.0015
		Apr-15		<0.0310	<0.0250 B			<0.000370	<0.000390	<0.000330	<0.000260	<0.000380	<0.000370	<0.00100	<0.000340	<0.000780	<0.00110
		Apr-16		<0.0314	<0.0247			<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106
	UG-4	Apr-16		<0.0314	**0.0349 J**			<0.000373	<0.000387	<0.000331	<0.000260	<0.000384	<0.000367	<0.00100	<0.000341	<0.000780	<0.00106

Definitions

X	Reported concentration, X, exceeds the CGWSL.
X	Analyte detected above the detection limit at a concentration equal to X
< x	Analyte not detected at detection limit equal to x.
< x	Analyte not detected at detection limit equal to x, but x exceeds the CGWSL.
	Blank cell indicates a sample was collected from the well during the indicated sampling event, but the analyte was not analyzed.
---	No applicable CGWSL

Abbreviations

1,2,4-TMB	1,2,4-trimethylbenzene
1,3,5-TMB	1,3,5-trimethylbenzene
CGWSL	Critical Groundwater Screening Level (see Table 3)
CGWSL Source	Source for CGWSL value (see Table 3)
cis-1,2-DCE	cis-1,2-dichloroethene
DRO	diesel range organics
DRO-EP	diesel range organics data from wells located in the Evaporation Ponds area
Dup	Duplicate Sample
FD	field duplicate sample
GRO	gasoline range organics
mg/L	milligrams per liter
MTBE	methyl tert-butyl ether
NMED TPH	NMED Risk Assessment Guidance for Site Investigations and Remediation, February 2012, Table 6-2 TPH Screening Guidelines for Potable Groundwater
NMED TW	NMED Risk Assessment Guidance for Site Investigations and Remediation, July 2015, Table A-1, Tap Water Screening Level
TPH	total petroleum hydrocarbons
USEPA TW	United States Environmental Protection Agency Tap Water screening level, "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites", November 2015
USEPA MCL	United States Environmental Protection Agency Maximum Contaminant Level, "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites", November 2015
WQCC HH	NMED Groundwater standard for human health exposure, NMAC 20.6.2.3103.A

Lab Footnote

B	Analyte was also detected in the associated method blank.
E	The sample concentration exceeds machine calibration.
H	The reported result is from a sample analyzed outside of Holding Time.
J	Indicates an estimated value.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
R	The sample concnetration is rejected based on data validation.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
Cross-Gradient	KWB-13	Apr-13			<0.0100	0.0232				<0.00500	0.932	<0.00500	0.0208	<2.0E-04	<0.0100	0.0165		0.0206
		Apr-14			0.00259 J	0.0145				0.00121 J	<0.00500	<0.000700	<0.00250	<4.0E-05	<0.00100	0.0126		0.0172
		Apr-15			0.0118	0.122				0.0182	12.3	0.019	0.399	<4.9E-05	0.0144	0.011		0.0426
		Apr-16			0.00484 J	0.0459	0.384	<0.005	0.00161 J	0.00621 J	4.00	0.00403 J	0.0747	<4.9E-05	<0.00175	0.0188	0.0261 J	0.0304
	MW-17	Apr-14			<0.00200	0.0152				<0.00200	<0.100	0.00724 J	<0.00500			0.0104		
	NP-5	Apr-13			<0.0100	<0.0100				<0.0100	<0.400	<0.0100	<0.0100			0.0135		
		Apr-15			0.00288	0.0159				0.00109 J	0.437	0.000415 J	0.00318 J			0.0125		
	RA-3156	Apr-13																
		Nov-13																
		Apr-14													<0.00500			
		Apr-16																
	MW-136	Oct-15			0.00381	0.103				0.00365	1.18	0.00218	0.204	<4.9E-05	0.00425	0.00463		0.0212
		Apr-16			0.00280 J	0.0270	0.695	<0.005	0.00132 J	<0.00270	0.599	<0.00120	0.0591	<4.9E-05	<0.00350	0.0112	0.0702	0.0197 J
		Oct-16			0.00284	0.0134	0.512	<0.00016	0.000279 J	0.00118 JB	0.0892 JB	0.00094 JB	0.0112 B	<4.9E-05	0.00184 JB	0.00562	0.0720	0.0176
Evaporation Ponds	MW-1R	Apr-13			<0.0250	<0.0250				<0.0250	1.77	<0.0250	1.64			<0.0250		
		Apr-13	FD		<0.0250	<0.0250				<0.0250	1.64	<0.0250	1.59			<0.0250		
		Apr-14			0.00335 J	0.0214				<0.00200	2.39	<0.00140	1.38			<0.00200		
		Apr-15			0.00366 J	0.0240 J				<0.00270	3.49	<0.00120	2.14 J			<0.00190		
		Apr-16			0.00917 J	0.0301				0.0188	9.67	<0.00120	2.94			<0.00190		
	MW-2A	Apr-14			0.0194 J	0.0222 J				<0.00500	0.737 J	<0.00350	1.21			<0.00500		
		Nov-14			0.048	0.026				0.0078	3.10	<0.0012	1.50			0.0051 J		
		Apr-15			0.0155 J	0.0255 J				<0.00540	0.571 J	<0.00240	1.98			<0.00380		
		Oct-15			0.00962	0.0241				<0.00108	0.588	<0.000480	2.88			0.00153 J		
		Apr-16			0.0154	0.0228 J				<0.00270	3.37	<0.00120	2.50			0.00432 J		
		Oct-16			0.00798	0.0208				0.00105 J	0.146	<0.000240	1.43			0.00056 J		
	MW-3	Apr-14			0.0298	0.0185				<0.00200	<0.100	<0.00140	0.254			0.0458		
		Nov-14			0.035	0.022 J				0.0081	0.570	<0.0012	2.20			0.019		
		Nov-14	FD		0.029	0.022 J				0.006	0.340 J	<0.0012	2.50			0.023		
		Apr-15			0.0288	0.0186 J				<0.00270	<0.0750	<0.00120	1.55			0.108		
		Apr-15	FD		0.0346	0.0215				0.00198 J	0.0806 J	0.000346 J	1.85			0.112		
		Oct-15			0.0248	0.0157				<0.000540	0.366	0.000298 J	1.29			0.00892		
		Oct-15	FD		0.0281	0.0158				0.00107 J	0.559	0.000371 J	1.33			0.00804		
		Apr-16			0.0388	0.0175 J				<0.00270	0.677	<0.00120	2.61			0.00580 J		
		Apr-16	FD		0.0348	0.0168 J				<0.00270	0.612	<0.00120	2.62			0.00575 J		
		Oct-16			0.055	0.0152				0.000868 J	1.82	0.000241 JB	1.60			0.00258		
		Oct-16	FD		0.0553	0.0152				0.000869 J	1.75	0.000692 JB	1.60			0.00263		
	MW-4A	Apr-14			0.147	0.0121				<0.00200	2.31	<0.00140	2.24			<0.00200		
		Nov-14			0.057	0.014 J				<0.0027	0.820	<0.0012	2.70			<0.0019		
		Apr-15			0.108 J	0.0139 J				0.00570 J	3.15	<0.00120	2.96			<0.00190		
		Oct-15			0.112	0.014				0.00126 J	2.09	<0.000240	1.75			0.000588 J		
		Apr-16			0.188	0.0125 J				<0.00270	3.21	<0.00120	2.39			<0.00190		
		Oct-16			0.172	0.0121				0.000815 J	1.08	0.000566 JB	1.69			0.000608 J		
	MW-4B	Apr-13			0.0371	<0.0250				<0.0250	<1.00	<0.0250	1.30			<0.0250		
		Apr-15			0.101	0.0349				<0.00110	3.60	0.00189 J	8.68			<0.000760		
	MW-5A	Apr-14			0.106	0.0142 J				<0.00500	7.10	<0.00350	1.74			<0.00500		
		Nov-14			0.064	0.014 J				<0.0027	4.40	<0.0012	2.00			0.0040 J		
		Apr-15			0.0938	0.0128 J				<0.00540	5.62	<0.00240	1.84			<0.00380		
		Oct-15			0.0705	0.0143				0.000685 J	5.34	<0.000240	1.82			0.000954 J		
		Apr-16			0.213	0.0149 J				<0.00270	8.10	<0.00120	1.34			<0.00190		
		Oct-16			0.0638	0.0117				<0.000540	4.19	0.000445 JB	1.73			0.000606 J		
	MW-5B	Apr-13			0.122	<0.0250				<0.0250	<1.00	<0.0250	2.44			<0.0250		
		Apr-15			0.201	0.0112 J				0.00277 J	6.11	<0.00120	3.87			0.00197 J		
	MW-5C	Apr-13			0.0139	0.0166				<0.0100	1.04	<0.0100	0.943			<0.0100		
		Apr-15			0.0145	0.0200 J				<0.00270	1.15	<0.00120	0.975			<0.00190		
	MW-6A	Mar-13			0.00788	0.0143				<0.00500	0.660	<0.00500	0.277			<0.00500		
		Apr-14			0.0113	0.0287				0.00234 J	<0.100	<0.00140	1.37			0.0192		
		Apr-15			0.0129	0.0308				<0.00270	0.155 J	<0.00120	1.40			0.0308		
		Apr-16			0.00953 J	0.0158 J				<0.00270	0.0787 J	<0.00120	0.505			<0.00190		
	MW-6B	Mar-13			0.0493	0.0139				<0.00500	1.54	<0.00500	2.39			<0.00500		
		Mar-13	FD		0.0537	0.0163				<0.00500	1.69	<0.00500	2.43			<0.00500		
		Apr-15			0.0333	0.0164				<0.00110	1.37	<0.000480	3.45			<0.000760		
	MW-7A	Apr-14			0.0256	0.0152				<0.00200	2.99	<0.00140	0.509			<0.00200		
		Nov-14			0.021	0.018 J				0.0027 J	1.30	<0.0012	1.50			<0.0019		
		Nov-14	FD		0.02	0.017 J				<0.0027	1.50	<0.0012	1.60			<0.0019		
		Apr-15			0.019	0.0149				0.000895 J	0.984	<0.000240	1.11			0.000620 J		
		Apr-15	FD		0.0194	0.0156				0.00131 J	0.996	0.000288 J	1.06			0.000570 J		
		Oct-15			0.0255	0.0155				0.00116 J	2.86	0.000494 J	0.632			0.000638 J		
		Oct-15	FD		0.0253	0.0159				0.00114 J	2.86	0.000524 J	0.629			0.000647 J		
		Apr-16			0.0382	0.0170 J				0.00370 J	6.35	<0.00120	0.682			<0.00190		
		Apr-16	FD		0.0305	0.0158 J				<0.00270	4.43	<0.00120	0.588			<0.00190		
		Oct-16			0.0181	0.0173				0.00184 J	1.66	0.000527 JB	0.563			0.000402 J		
		Oct-16	FD		0.0186	0.0159				0.00184 J	1.66	0.000618 JB	0.563			0.000507 J		
	MW-7B	Apr-13			<0.0250	<0.0250				<0.0250	<1.00	<0.0250	0.397			<0.0250		
		Apr-15			0.00588	0.0111				0.000702 J	0.188	<0.000240	0.58			<0.000380		
	MW-10	Apr-14			0.0211	0.0134				<0.00200	<0.100	<0.00140	2.70			<0.00200		
		Nov-14			0.019	0.021				0.00092 JB	0.140	0.00098 J	2.40			0.0015 J		
		Apr-15			0.020	0.0128 J				<0.00270	<0.0750	<0.00120	2.43			<0.00190		
		Oct-15			0.0173	0.0124				<0.000540	0.0570 J	<0.000240	2.55			<0.000380		
		Apr-16			0.0196	0.0123 J				<0.00270	<0.0750	<0.00120	2.83			<0.00190		
		Oct-16			0.0191	0.0184				<0.000540	0.589	0.000399 JB	2.21			<0.000380		
	MW-11A	Apr-14			<0.0100	0.0321				<0.0100	2.50	<0.00700	1.56			<0.0100		
		Nov-14																
		Apr-15			<0.00500	0.0410 J				<0.0100	<0.300	<0.00480	0.912			<0.00760		
		Oct-15																
		Apr-16			<0.00125	0.0301				0.00353 J	0.416 J	<0.00120	0.876 V			<0.00190		
		Oct-16																
	MW-11B	Mar-13			<0.0250	<0.0250				<0.0250	3.25	<0.0250	0.316			<0.0250		
		Apr-15			0.00453 J	0.0189 J				<0.00540	4.38	<0.00240	0.427			<0.00380		
	MW-12	Apr-14			<0.00500	0.0194				<0.00500	0.441 J	<0.00140	0.200			0.0172 J		
	MW-13	Apr-14			0.00205 J	0.031				<0.00200	<0.100	<0.00140	0.192			<0.00200		
	MW-15	Mar-13			0.0337	0.0218				<0.0100	<0.400	<0.0100	1.77			<0.0100		
		Apr-14			0.0605	0.0217				0.00381 J	<0.100	<0.00140	0.363			0.00535 J		
		Apr-15			0.0279	0.0236 J				<0.00270	<0.0750	<0.00120	0.861			0.0195		
		Apr-16			0.0216	0.0203 J				<0.00270	<0.0750	<0.00120	0.887			0.00201 J		
	MW-18A	Apr-14			<0.0100	0.0135				<0.0100	<0.500	<0.00700	0.189	<4.0E-05	<0.0100	<0.0100		<0.00900
		Nov-14			0.0034	0.016				0.00080 JB	1.10	0.00030 J	0.076	<4.9E-05	0.0065 B	0.0069		0.0047 J
		Apr-15			0.0041	0.0129				0.000794 J	0.379	<0.00480	0.0221	<4.9E-05	0.00225	0.0503		0.00652
		Oct-15			0.00485	0.0173				0.00184 J	0.572	0.000262 J	0.363	<4.9E-05	0.0033	0.00108 J		0.00360 J
		Apr-16			0.00644 J	0.0155 J	3.14	<0.005	<0.00130	<0.00270	0.358 J	<0.00120	0.366	<4.9E-05	0.0121 J	<0.00190	0.0417 J	0.00258 J
		Oct-16			0.00411	0.0166	2.73	<0.00016	<0.000260	<0.000540	0.722	<0.00024	0.576	<4.9E-05	0.00618	0.000448 J	0.0375	0.00128 J

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
Evaporation Pond's	MW-18B	Apr-13			<0.0100	0.0126				<0.0100	<0.400	<0.0100	0.572			<0.0100		
		Apr-15			0.012	0.0125				0.000942 J	0.139	0.000814 J	0.789			<0.000380		
	MW-22A	Apr-14			0.0568	0.0153				<0.00200	2.19	<0.00140	3.61			<0.00200		
		Nov-14			0.060	0.019				0.00081 JB	6.90	<0.00024	6.00			0.0016 J		
		Nov-14	FD		0.064	0.018 J				0.0030 J	8.10	<0.0012	6.30			<0.0019		
		Apr-15			0.0545	0.0179 J				<0.00270	2.34	<0.00120	5.18			<0.00190		
		Apr-15	FD		0.0362	0.0147 J				<0.00270	2.89	<0.00120	4.36			<0.00190		
		Oct-15			0.0482	0.0166				<0.000540	4.62	<0.000240	5.86			0.000966 J		
		Oct-15	FD		0.0479	0.0165				<0.000540	4.54	<0.000240	5.81			0.000979 J		
		Apr-16			0.0449	0.0174 J				<0.00270	4.42	<0.00120	6.06			<0.00190		
		Apr-16	FD		0.0455	0.0167				<0.00270	4.46	<0.00120	6.20			<0.00190		
		Oct-16			0.0452	0.0179				0.000678 J	5.41	<0.000240	7.28			0.000938 J		
		Oct-16	FD		0.0447	0.0183				0.000633 J	5.26	<0.000240	7.15			0.000874 J		
	MW-22B	Apr-13			0.0343	<0.0250				<0.0250	1.78	<0.0250	3.37			<0.0250		
		Apr-15			0.0389	0.0160 J				<0.00270	2.32	0.00134 J	4.32			<0.00190		
	MW-70	Apr-14			0.0286	0.0157				<0.00200	3.36	<0.00140	0.262			<0.00200		
		Nov-14			0.021	0.020				0.00055 J	2.50	<0.00024	0.730			0.00044 J		
		Apr-15			0.0252	0.0151				0.000653 J	3.29	<0.000240	0.222			<0.000380		
		Oct-15			0.0163	0.0166				<0.000540	2.99	<0.000240	0.227			<0.000380		
		Apr-16			0.0238	0.0147 J				<0.00270	6.19	<0.00120	0.543			<0.00190		
		Oct-16			0.0189	0.0162				<0.000540	4.69	<0.000240	0.381			<0.000380		
	MW-72	Nov-13			0.0929	0.0186				<0.0100	20.9	<0.00500	5.26			<0.0100		
		Apr-14			0.048	0.0154				<0.00100	7.13	<0.000700	5.69			<0.00100		
		Apr-15			0.149	0.0321				<0.00270	32.3	<0.00120	3.05			0.0155		
		Apr-16			0.0318	0.0195 J				<0.00270	7.20	<0.00120	4.86			<0.00190		
	MW-73	Oct-13			0.108	0.012				<0.00500	9.29	<0.00500	3.09			<0.00500		
		Apr-14			0.0982	0.0132 J				<0.00500	5.71	<0.00350	2.77			<0.00500		
		Apr-15			0.0757	0.00999 J				<0.00270	2.40	<0.00120	2.61			0.00233 J		
		Apr-16			0.0990	0.0114 J				<0.00270	8.28	<0.00120	3.17			0.00201 J		
	MW-74	Apr-14			0.0599	0.0137 J				<0.00500	<0.250	<0.00350	1.18			0.193		
		Nov-14			0.062	0.014				0.00074 JB	0.110	<0.00024	0.88			0.250		
		Apr-15			0.0549	0.00894 J				<0.00270	0.175 J	<0.00120	0.406			0.480		
		Oct-15			0.0733	0.0127				<0.00108	<0.030	<0.000480	1.17			0.0608		
		Apr-16			0.136	0.0151 J				<0.00270	0.756	<0.00120	2.19			0.0150		
		Oct-16			0.0699	0.0147				0.00120 J	0.203 B	<0.000240	0.0907			0.585		
	MW-75	Apr-14			0.299	0.0166				0.00221 J	4.01	<0.00140	1.10			0.00288 J		
		Nov-14			0.350	0.016				0.0019	4.20	0.00029 J	0.960			0.0025		
		Apr-15			0.400	0.0183 J				0.00396 J	10.7	<0.00120	0.901			0.00311 J		
		Oct-15			0.328	0.0149				0.00155 J	3.75	<0.000240	0.821			0.00248		
		Apr-16			0.183	0.0218 J				<0.00270	2.52	<0.00120	1.01			0.00310 J		
		Oct-16			0.275	0.0150				0.00156 J	3.29	<0.000240	0.916			0.00245		
	MW-76	Apr-14			0.0712	0.0151				0.00181 J	4.00	<0.000700	1.06			0.00301 J		
		Nov-14			0.100	0.018				0.0027	5.10	0.00046 J	1.80			0.0049		
		Apr-15			0.0777	0.0127 J				<0.00270	4.04	<0.00120	1.10			0.00258 J		
		Oct-15			0.0582	0.0143				0.00126 J	3.75	0.000242 J	0.753			0.0025		
		Apr-16			0.0610	0.0140 J				<0.00270	4.68	<0.00120	1.07			0.00298 J		
		Oct-16			0.0818	0.0163				0.00266	6.79	<0.000240	1.25			0.00582		
	MW-77	Apr-14			0.0765	0.0138				0.00884 J	9.80	<0.000700	1.06			0.0113		
		Nov-14			0.054	0.013 J				0.0097	9.80	0.0013 J	0.770			0.021		
		Apr-15			0.0928	0.0158 J				0.0144	14.9	<0.00120	0.666			0.0135		
		Oct-15			0.0500	0.0132 J				0.00980 J	8.54	<0.00120	0.703			0.0119		
		Apr-16			0.0749	0.0136 J				0.0132	12.2	<0.00120	0.687			0.0137		
		Oct-16			0.0505	0.0120 JB				0.00899 J	7.87	<0.00120	0.706			0.00996 J		
	MW-78	Mar-13			<0.0250	0.0284				0.0843	<1.00	<0.00500	0.491			<0.0250		
		Apr-14			0.0217	0.0388				0.0476	7.58	0.00107 J	1.46			0.0105		
		Apr-15			0.0211	0.0318				0.133	12.3	<0.00120	1.29			0.0156		
		Apr-16			0.0210	0.0445				0.0761	14.8	<0.00120	0.946			0.0141		
	MW-79	Apr-14			0.0188	0.0138				<0.00200	0.108 J	<0.00140	1.34			0.00675 J		
		Nov-14			0.0073	0.020				0.00065 JB	0.230	<0.00024	4.00			0.0017 J		
		Apr-15			0.00807 J	0.0154 J				<0.00270	0.276 J	<0.00120	1.46			<0.00190		
		Oct-15			0.0126	0.0165				<0.00108	3.03	<0.000480	3.76			0.00144 J		
		Apr-16			0.0113	0.0181 J				<0.00270	0.882	<0.00120	3.00			<0.00190		
		Oct-16			0.0208	0.0184				<0.000540	5.37	<0.000240	3.68 V			<0.000380		
	MW-80	Mar-13			<0.0250	<0.0250				<0.0250	1.31	<0.0100	0.583			<0.0250		
		Apr-14			0.0143	0.016				<0.00200	2.10	<0.00140	0.703			<0.00200		
		Apr-15			0.0187	0.0151 J				<0.00270	1.73	<0.00120	0.555			<0.00190		
		Apr-16			0.00788 J	0.0185 J				0.0465	1.34	<0.00120	0.234			<0.00190		
	MW-81	Mar-13			<0.0250	<0.0250				<0.0250	<1.00	<0.0100	2.14			<0.0250		
		Mar-13	FD		<0.0250	<0.0250				<0.0250	<1.00	<0.0100	2.08			<0.0250		
		Apr-14			0.0188	0.0162				<0.00200	<0.100	<0.00140	0.137			0.00757 J		
		Apr-15			0.022	0.0131 J				<0.00270	0.183 J	<0.00120	0.132			0.0235		
		Apr-16			0.030	0.0212 J				<0.00270	0.136 J	<0.00120	0.106			0.0467		
	MW-82	Mar-13			0.105	<0.0250				<0.0250	1.80	<0.0250	1.55			<0.0250		
		Apr-14			0.133	0.021				<0.00200	3.06	0.000773 J	1.33			<0.00200		
		Apr-14	FD		0.126	0.021				<0.00200	2.73	<0.00140	1.36			<0.00200		
		Apr-15			0.0929	0.0302				0.00570 J	1.68	<0.00120	1.38			0.00302 J		
		Apr-16			0.0510	0.0387				<0.00270	0.414 J	<0.00120	1.76			0.00199 J		
	MW-83	Apr-14			0.0388	0.0197				0.00430 J	4.65	0.000914 J	0.986			0.00977		
		Nov-14			0.03	0.046				0.0089	12.0	0.00037 J	0.700			0.0075		
		Apr-15			0.0304	0.0116 J				0.0115	8.98	<0.00120	0.863			0.00376 J		
		Oct-15			0.0215	0.0403				0.00791	1.87	0.000860 J	0.170			0.00806		
		Apr-16			0.0313	0.0248 J				0.0153	5.63	<0.00120	0.573			0.00364 J		
		Oct-16			0.0131	0.121				0.00973	1.85	0.00141 JB	0.434			0.00925		
	MW-84	Apr-14			0.114	0.0144				0.00416 J	3.21	<0.000700	3.58			0.00577 J		
		Nov-14			0.083	0.029				0.019 B	1.60	<0.00024	3.60			0.014		
		Apr-15			0.116	0.0135 J				0.00500 J	2.54	<0.00120	2.83			0.00452 J		
		Oct-15			0.0827	0.0249 J				0.022	0.397 J	<0.00240	2.74			0.0308		
		Apr-16			0.115	0.0173 J				0.00771 J	1.27	<0.00120	3.30			0.00714 J		
		Oct-16			0.0981	0.0189				0.00917	0.868	<0.000240	2.71			0.0110		
	MW-87	Apr-14			0.00862 J	0.0168				<0.0250	0.789	<0.00140	0.103			<0.00200		
		Nov-14			0.0024	0.027				0.00082 JB	0.200	<0.00024	1.50			0.0014 J		
		Apr-15			0.00635	0.0184				0.000789 J	0.194	<0.000240	0.102			0.00115 J		
		Oct-15			0.00702	0.0322				<0.000540	11.8	<0.000240	6.04			0.00131 J		
		Apr-16			0.0106	0.0200 JO1				<0.00270	4.56	<0.00120	2.70 V			<0.00190		
		Oct-16			0.00673	0.0179				<0.000540	1.53	<0.000240	0.731			<0.000380		
	MW-88	Apr-14			0.0106	0.0115				<0.00200	<0.100	<0.00140	0.796			<0.00200		
		Nov-14			0.012	0.021				<0.00054	1.40	<0.00024	1.60			0.0015 J		
		Apr-15			0.0231	0.0132 J				<0.00270	2.11	<0.00120	1.42			<0.00190		
		Oct-15			0.00917	0.0108				<0.000540	0.0268 J	<0.000240	0.772			<0.000380		
		Apr-16			0.00976 J	0.0107 J				<0.00270	<0.0750	<0.00120	0.844			<0.00190		
		Oct-16			0.00911	0.0104				0.000551 J	<0.0150	<0.000240	0.976			<0.000380		

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
Evaporation Ponds	MW-120	Apr-14			0.0307	0.0335				0.00217 J	8.09	0.00213 J	1.19			<0.00200		
		Nov-14			0.026	0.018				0.001	12.0	0.00064 J	1.50			0.038		
		Apr-15			0.00974 J	0.0108 J				<0.00270	2.63	<0.00120	1.33			0.0335		
		Oct-15			0.0101	0.0149				<0.000540	4.74	<0.000240	1.79			0.00113 J		
		Apr-16			0.0138	0.0176 J				<0.00270	7.32	<0.00120	2.14			0.00511 J		
		Oct-16			0.0135	0.0194				<0.000540	5.90	<0.000240	1.96			<0.000380		
	MW-121	Apr-14			0.0465	0.016				<0.00100	0.963	<0.000700	4.22			0.00446 J		
		Nov-14			0.071	0.019				0.0014	2.00	0.00070 J	3.80			0.012		
		Apr-15			0.0366	0.0142				<0.00110	0.700	<0.000480	3.85			0.00792		
		Oct-15			0.0413	0.0138				<0.000540	0.287	<0.000240	2.70			0.0109		
		Apr-16			0.0443	0.0179 J				<0.00270	0.530	<0.00120	3.56			0.00777 J		
		Oct-16			0.0377	0.0130				<0.000540	0.262	<0.000240	2.33			0.00746		
	MW-122	Apr-14			0.00917 J	0.0406				<0.00200	5.37	0.00144 J	2.09			<0.00200		
		Nov-14			0.018	0.034				0.0015	2.60	0.00036 J	1.10			0.040		
		Apr-15			0.0116 J	0.0273 J				<0.00540	0.606 J	<0.00240	1.92			0.00988 J		
		Oct-15			0.00629	0.0251				<0.00108	1.59	<0.000480	1.27			0.00120 J		
		Apr-16			0.00444 J	0.0291				<0.00270	0.610	<0.00120	1.50			<0.00190		
		Oct-16			0.00559	0.0272				<0.000540	5.20	<0.000240	1.61			<0.000380		
	MW-123	Apr-14			0.0226	0.0175				<0.00200	0.102 J	<0.00140	2.66			<0.00200		
		Nov-14			0.023	0.027				0.00093 JB	0.300	0.00075 J	2.70			0.0013 J		
		Apr-15			0.0258	0.0200 J				<0.00270	<0.0750	<0.00120	2.59			<0.00190		
		Oct-15			0.025	0.0226				<0.000540	0.0657 J	0.000254 J	2.72			<0.000380		
		Apr-16			0.0275	0.0242 J				<0.00270	<0.0750	<0.00120	2.92			<0.00190		
		Oct-16			0.0226	0.0236				<0.000540	0.0599 J	0.000364 JB	2.59			<0.000380		
	MW-124	Apr-14			0.00952 J	0.0216				<0.00200	2.48	<0.00140	0.479			<0.00200		
		Nov-14			0.0052	0.027				0.00086 JB	2.70	0.00051 J	1.10			0.00093 J		
		Apr-15			0.00276	0.0192				0.00126 J	1.22	0.000379 J	0.816			<0.000380		
		Oct-15			0.00443	0.0247				<0.00108	2.93	<0.000480	0.562			<0.000760		
		Apr-16			0.00477 J	0.0288				<0.00270	4.08	<0.00120	0.749			<0.00190		
		Oct-16			0.00303	0.0323				0.00124 J	4.99	0.000546 JB	0.469			<0.000380		
	OCD-1R	Apr-14			0.00833 J	0.0144 J				0.00407 J	0.650	<0.00140	1.52			0.00892 J		
		Nov-14			0.0071	0.020				0.00081 JB	0.340	<0.00024	0.410			0.019		
		Apr-15			0.00662 J	0.0176 J				<0.00540	0.238 J	<0.00240	0.773			0.0217		
		Oct-15			0.00447	0.0184				<0.00108	0.593	<0.000480	1.59			0.00229 J		
		Apr-16			0.00729 J	0.0141 J				0.105	1.54	<0.00120	0.462			0.00420 J		
		Oct-16			0.00524	0.0286				0.00312	3.04	<0.000240	3.92			0.000543 J		
	OCD-2A	Apr-14			0.00332 J	0.0185				<0.00200	0.425	<0.00140	0.563			0.00245 J		
		Nov-14			0.0021	0.023				0.00089 JB	0.710	<0.00024	0.590			0.0075		
		Apr-15			0.00197 J	0.0193 J				<0.00270	0.965	<0.00120	0.313			<0.00190		
		Oct-15			0.00361 J	0.0234				0.00385 J	2.64	<0.000480	1.34			<0.000760		
		Apr-16			0.00640 J	0.0209 J				0.00304 J	5.47	<0.00120	1.66			<0.00190		
		Oct-16			0.00234	0.0264				0.000783 J	1.50	0.00026 J	0.535			<0.000380		
	OCD-3	Apr-14			0.00631 J	0.0198				<0.00200	1.69	<0.00140	0.134			0.00206 J		
		Nov-14			0.0055 J	0.019 J				<0.0027	2.2 V	<0.0012	0.160 J			0.0040 J		
		Apr-15			0.00421 J	0.0198 J				<0.00270	1.69	<0.00120	0.165			<0.00190		
		Oct-15			0.00184 J	0.0224				<0.000540	0.352	<0.000240	0.412			0.00113 J		
		Apr-16			0.00389 J	0.0214 J				<0.00270	1.23	<0.00120	0.0524			<0.00190		
		Oct-16			0.00422	0.0228				<0.000540	2.31	<0.000240	0.527			<0.000380		
	OCD-4	Apr-14			<0.00500	0.0213				<0.00500	3.13	<0.00140	0.276			<0.00500		
		Nov-14			0.0036 J	0.025				<0.0027	3.80	<0.0012	0.310			<0.0019		
		Apr-15			0.00351 J	0.0263 J				<0.00540	4.06	<0.00240	0.311			<0.00380		
		Oct-15			0.00701	0.0226				<0.000540	6.61	<0.000240	0.233			<0.000380		
		Apr-16			0.00209 J	0.0226 J				<0.00270	0.855	<0.00120	0.119			<0.00190		
		Oct-16			0.00374	0.0255				<0.000540	3.46	<0.000240	0.285			<0.000380		
	OCD-5	Apr-14			0.00738 J	0.0206				<0.00200	2.47	<0.00140	0.411			<0.00200		
		Apr-14	FD		0.00491 J	0.0211				<0.00200	1.28	<0.00140	0.364			<0.00200		
		Nov-14			0.0099 J	0.028				<0.0027	4.80	<0.0012	0.360			<0.0019		
		Apr-15			0.00805 J	0.0284 J				<0.00540	5.34	<0.00240	0.328			<0.00380		
		Oct-15			0.0166	0.0272				0.00108 J	11.3	<0.000480	0.306			<0.000760		
		Apr-16			0.0126	0.0279				<0.00270	15.4	0.00177 J	0.267			<0.00190		
		Oct-16			0.00863	0.0288				0.000559 J	9.09	<0.000240	0.295			<0.000380		
	OCD-6	Apr-14			0.0160 J	0.0191 J				<0.00500	2.56	<0.00350	2.15			<0.00500		
		Nov-14			0.014	0.024 J				0.0027 J	7.60	<0.0012	1.20			<0.0019		
		Apr-15			0.0141	0.0240 J				<0.00270	3.91	<0.00120	2.07			<0.00190		
		Oct-15			0.0235	0.0254				<0.00108	9.38	<0.000480	2.32			0.00110 J		
		Apr-16			0.0139	0.0214 J				<0.00270	2.39	<0.00120	2.22			<0.00190		
		Oct-16			0.0120	0.0253				0.000759 JB	1.82	0.000501 JB	2.61			0.00090 J		
	OCD-7AR	Apr-14			0.158	0.0147				<0.00200	7.59	<0.00140	2.87			0.00425 J		
		Apr-14	FD		0.165	0.0152				<0.00200	8.08	<0.00140	2.92			0.00356 J		
		Nov-14			0.110	0.015 J				<0.0027	4.30	<0.0012	2.40			0.0020 J		
		Apr-15			0.084	0.0111 J				<0.00270	1.66	<0.00120	2.56			<0.00190		
		Oct-15			0.201	0.0162				<0.00108	9.36	<0.00048	2.88			0.0023 J		
		Apr-16			0.150	0.0145 J				<0.00270	2.89	<0.00120	2.25			0.00195 J		
		Oct-16			0.169	0.0151				0.000837 J	10.3	<0.000240	2.92			0.00178 J		
	OCD-7B	Mar-13			<0.00500	0.016				<0.00500	<0.200	<0.00500	0.0246			<0.00500		
		Apr-15			0.00294 J	0.0196 J				<0.00270	3.52	<0.00120	0.710			<0.00190		
	OCD-8A	Apr-14			0.0676	0.023				<0.00200	7.72	<0.00140	3.14	<4.0E-05	0.0279	<0.00200		0.00223 J
		Apr-14	FD		0.0683	0.0218				<0.00200	7.73	<0.00140	3.12	<4.0E-05	0.0279	<0.00200		0.00219 J
		Nov-14			0.050	0.080				0.0072	13.0	<0.0012	4.70	<4.9E-05	0.062	<0.0019		0.0065 J
		Apr-15			0.0541	0.0336				0.000836 J	12.3	<0.000240	6.38	<4.9E-05	0.0598	0.000802 J		0.00100 J
		Oct-15			0.0622	0.0287				0.000787 J	9.70	0.000380 J	4.11	<4.9E-05 J	0.0471	0.000836 J		0.00231 J
		Apr-16			0.0618	0.0199 J	0.813	<0.005	<0.00130	<0.00270	8.89	<0.00120	3.80	<4.9E-05	0.0306	<0.00190	<0.00165	0.00190 J
		Oct-16			0.0616	0.0213	0.776	<0.00016	0.00124 J	0.000710 J	6.60	0.000478 JB	3.08	<4.9E-05	0.0260	0.000984 J	0.00108 J	0.000745 J
	OCD-8B	Apr-13			<0.0250	<0.0250				<0.0250	<1.00	<0.0250	0.417			<0.0250		
		Apr-15			0.0126	0.0141				0.000872 J	0.239	0.000392 J	5.98			0.000525 J		
Field East of Refinery	KWB-1A	Apr-14			0.00441 J	0.010				<0.00100	0.0770 J	<0.000700	0.371	<4.0E-05	0.00833	<0.00100		0.0223
		Nov-14			0.0035	0.0087				0.00069 JB	<0.0500	0.00029 JB	0.420	<4.9E-05	0.0082	0.00076 J		0.037
		Apr-15			0.00362	0.00932				0.000649 J	0.108	0.000599 J	0.543	<4.9E-05	0.00866	0.00247		0.0236
		Oct-15			0.00416	0.00949				<0.000540	0.0387 J	0.000260 J	0.439	<4.9E-05	0.00846	0.000753 J		0.0209
		Apr-16			0.00401 J	0.0131 J	0.741	<0.005	0.0122	<0.00270	<0.0750	<0.00120	0.552	<4.9E-05	0.0100	0.00528 J	0.0247 J	0.0258
		Oct-16			0.00296	0.00944	0.608 O1V	<0.00016	0.0143	0.00127 JB	0.0845 JB	0.000408 J	0.500	<4.9E-05	0.00846	0.00106 J	0.0188	0.0204
	KWB-1C	Apr-13			<0.0100	0.0146				<0.0100	<0.400	<0.0100	<0.0100			<0.0100		
		Apr-15			0.00338	0.00918				<0.000540	0.0537 J	0.000320 J	0.462			0.000549 J		
	KWB-7	Apr-13			<0.00500	0.0646				<0.00500	1.09	<0.00500	1.78	<2.0E-04	0.0237	<0.00500		0.0139
		Apr-15			0.020	0.0645				0.000832 J	1.44	0.000625 J	5.65	<4.9E-05	0.00901	<0.000380		0.00133 J
		Oct-15			0.00939	0.0647				<0.000540	1.04	<0.000240	4.09	<4.9E-05	0.00442	<0.000380		0.00182 J
		Apr-16			0.0104	0.0550	0.503	<0.005	0.00739 J	<0.00270	1.42	<0.00120	3.48	<4.9E-05	0.0121	<0.00190	0.00299 J	0.00196 J
		Oct-16			0.00597	0.0560	0.455	<0.00016	0.00298	<0.000540	0.677	0.000441 J	3.04	<4.9E-05	0.0107	<0.000380	0.00286 J	0.000901 J
	KWB-8	Oct-16			0.00109 J	0.139	0.665	<0.00016	<0.000260	0.00071 JB	0.672	0.00387	0.997	<4.9E-05 J6	0.00102 JB	0.000475 J	0.000746 J	0.00122 J

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
Field East of Refinery	KWB-10R	Nov-14			0.036	3.40				0.001	8.20	0.0042	0.190			0.00052 J		
		Apr-15			0.0259	3.50				<0.000540	7.48	0.00172 J	0.149			<0.000380		
		Oct-15			0.0217	3.72				<0.000540	5.84	0.00109 J	0.157			<0.000380		
		Apr-16			0.0226	4.31				<0.00270	7.43	0.00131 J	0.199			<0.00190		
		Oct-16			0.0301	0.816				0.000798 JB	6.11	0.00102 J	0.161			<0.000380		
	KWB-11A	Nov-14			0.002	0.028				0.00076 JB	<0.05	0.0061 B	0.160	<4.9E-05	0.0039	0.0079		0.013
		Nov-14	FD		0.002	0.028				<0.00054	<0.05	0.0055	0.160	<4.9E-05	0.0042	0.0082		0.012
		Apr-15			0.00251 J	0.0240 J				<0.00270	<0.0750	0.00825 J	0.294	<4.9E-05	0.00675 J	0.00262 J		0.0122 J
		Oct-15			0.00266	0.0267				<0.000540	<0.0150	0.00515	0.191	<4.9E-05	0.00461	0.00776		0.0112
		Apr-16			0.00231 J	0.00508	0.502	<0.005	0.00175 J	<0.00270	<0.0750	0.00851 J	0.222	<4.9E-05	0.00476 J	0.00852 J	0.0326 J	0.0118 J
		Oct-16			0.0022	0.0227	0.449	<0.00016	0.00194 J	<0.000540	<0.0150	0.00525	0.212	<4.9E-05 J3J6O1	0.00476 B	0.00529	0.0217	0.0102
	KWB-11B	Apr-14			0.00157 J	0.0117				<0.00100	<0.0500	0.000903 J	<0.00250	<4.0E-05	<0.00100	0.00848		0.00741
		Nov-14			0.0011 J	0.013				<0.0027	<0.05	0.00090 JB	0.0030 J	<4.9E-05	<0.00035	0.0073		0.0081
		Apr-15			0.00147 J	0.0127				0.00116 J	<0.0150	<0.000240	0.00271 J	<4.9E-05	<0.000350	0.00783		0.00806
		Oct-15			0.00185 J	0.0134				0.000703 J	<0.0150	<0.000240	0.000257 J	<4.9E-05	<0.000350	0.00769		0.00812
		Apr-16			<0.00125	0.0135 J	0.173 JJ6O1	<0.005	<0.00130	<0.00270	0.121 J	<0.00120	0.00188 J	<4.9E-05	<0.00175	0.00949 J	0.00987 J	0.00814 J
		Oct-16			0.00109 J	0.0116	0.105	<0.00016	<0.000260	<0.000540	<0.0150	<0.000240	0.00080 J	<4.9E-05 J3	0.000559 JB	0.00701	0.0101	0.00727
	KWB-12A	Nov-14			0.0014 J	0.017				0.00086 JB	<0.0500	<0.00024	0.0011 J	<4.9E-05	0.00074 J	0.0052		0.013
		Nov-14	FD		0.0016 J	0.010				0.00060 J	<0.0500	<0.00024	0.0016 J	<4.9E-05	0.00065 J	0.0046		0.012
		Apr-15			0.00160 J	0.0168				0.00164 J	0.269	0.000780 J	0.00353 J	<4.9E-05	0.000930 J	0.00435		0.0108
		Apr-15	FD		0.00145 J	0.0138				<0.000540	<0.0150	<0.000240	0.000251 J	<4.9E-05	0.000503 J	0.00375		0.01
		Oct-15			0.00242	0.017				0.000659 J	0.0285 J	<0.000240	0.000862 J	<4.9E-05	0.000959 J	0.00368		0.0139
		Apr-16			0.00162 J	0.0164 J	0.695	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	<0.00125	<4.9E-05	<0.00175	0.00370 J	0.0331 J	0.0132 J
		Oct-16			0.00159 J	0.0156	0.481	<0.00016	<0.000260	0.00159 JB	<0.0150	0.000256 J	<0.000250	<4.9E-05 J3	0.000739 J	0.00360	0.0288	0.0110
	KWB-12B	Apr-14			0.00286 J	0.00926				<0.00100	<0.0500	<0.000700	<0.00250	<4.0E-05	<0.00100	0.00318 J		0.013
		Apr-14	FD		0.00240 J	0.0108				<0.00100	<0.0500	<0.000700	<0.00250	<4.0E-05	<0.00100	0.00363 J		0.0136
		Nov-14			0.0015 J	0.013				0.00086 JB	<0.05	<0.00024	0.0027 J	<4.9E-05	0.00071 J	0.0042		0.013
		Apr-15			0.00151 J	0.00823				0.000588 J	<0.0150	<0.000240	0.000826 J	<4.9E-05	0.000469 J	0.00348		0.0108
		Oct-15			0.00182 J	0.0118				<0.000540	0.0175 J	<0.000240	0.00117 J	<4.9E-05	0.00120 J	0.0037		0.0129
		Oct-15	FD		0.00237	0.0118				0.000599 J	0.0312 J	<0.000240	<0.000250 B	<4.9E-05	0.000565 J	0.00361		0.0129
		Apr-16			0.00178 J	0.0130 J	0.712	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	0.00441 J	<4.9E-05	<0.00175	0.00307 J	0.0302 J	0.0125 J
		Apr-16	FD		0.00165 J	0.0116 J	0.651	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	0.00434 J	<4.9E-05	<0.00175	0.00301 J	0.0282 J	0.0117 J
		Oct-16			0.00159 J	0.0101	0.464	<0.00016	<0.000260	0.00136 JB	0.0358 J	<0.000240	0.00955	<4.9E-05 J3	0.000824 J	0.00248	0.0263	0.0112
		Oct-16	FD		0.00161 J	0.0108	0.533	<0.00016	<0.000260	0.00147 JB	0.0369 J	0.000299 J	0.0104	<4.9E-05 J3	0.000703 J	0.00295	0.0265	0.0114
	KWB-P4	Apr-13																
		Apr-15																
	MW-57	Apr-14			0.0889	2.17				0.0456	38.8	0.0269	2.73			0.00342 J		
		Nov-14			0.0055	0.052				0.0015	1.00	0.0019 J	1.30			0.0088		
		Apr-15			0.00495	0.0267				0.00104 J	0.658	0.000946 J	0.192			0.03		
		Oct-15			0.0066	0.0339				<0.000540	0.301	0.000729 J	0.852			0.0159		
		Apr-16			0.00654 J	0.0344				0.00322 J	0.881	0.00266 J	0.378			0.0131		
		Oct-16			0.00564	0.0253				0.000798 JB	0.559	0.000516 J	0.104			0.0169		
	MW-58	Nov-14			0.0078	0.670				0.00083 J	0.66	0.0058	0.094	<4.9E-05	0.0015 J	0.00040 J		0.0043 J
		Apr-15			0.0121	0.819				<0.000540	1.76	0.00339	0.0946	<4.9E-05	0.00140 J	<0.000380		0.00229 J
		Oct-15			0.0081	1.03				<0.000540	1.29	0.00190 J	0.117	<4.9E-05	0.00108 J	<0.000380		<0.000180 B
		Apr-16			0.0135	0.744	0.518	<0.005	<0.00130	<0.00270	1.06	0.00297 J	0.391	<4.9E-05	<0.00175	0.00524 J	<0.00165	0.00259 J
		Oct-16			0.00683	0.915	0.455	<0.00016	0.000318 J	0.00108 JB	1.01	0.00234	0.114	<4.9E-05 J3	0.00133 J	<0.000380	<0.000330	0.00451 J
	MW-111	Apr-14			0.0114	0.254				0.00252 J	7.64	0.000856 J	1.57			<0.00100		
		Nov-14			0.014	0.22				0.0024	8.00	0.0013 J	1.60			0.00046 J		
		Apr-15			0.0201	0.147				0.00167 J	5.03	0.00141 J	1.72			<0.000380		
		Oct-15			0.0144	0.127				0.00239	7.14	0.00205	1.52			<0.000380		
		Apr-16			0.0131	0.0926				<0.00270	6.67	<0.00120	1.66			<0.00190		
		Oct-16			0.0108	0.0757				0.000976 JB	6.14	0.00031 J	1.41			<0.000380		
	MW-112	Nov-14			0.005	7.60				0.0021	5.80	0.0013 J	0.31			0.0018 J		
	MW-113	Apr-14			0.00326 J	0.0882				0.00423 J	1.87	0.00211 J	0.408			<0.00200		
		Nov-14			0.0088	0.047				0.00059 J	0.680	0.00025 J	1.90			0.00044 J		
		Nov-14	FD		0.0093	0.048				<0.00054	0.700	<0.00024	1.90			0.00070 J		
		Apr-15			0.00294	0.033				0.00171 J	0.559	0.000733 J	0.918			0.0025		
		Apr-15	FD		0.00418	0.0518				0.00221	1.01	0.000872 J	0.857			<0.000380		
		Oct-15			0.00366	0.0242				<0.000540	0.196	<0.000240	0.765			<0.000380		
		Oct-15	FD		0.00379	0.0233				<0.000540	0.203	<0.000240	0.767			<0.000380		
		Apr-16			0.00282 J	0.0251				<0.00270	0.270 J	<0.00120	0.734			<0.00190		
		Apr-16	FD		0.00306 J	0.0289				<0.00270	0.347 J	<0.00120	0.823			<0.00190		
		Oct-16			0.00138 J	0.0249				<0.000540	1.17 O1	<0.000240	1.36 O1V			<0.000380		
		Oct-16	FD		0.00125 J	0.0245				<0.000540	1.13	<0.000240	1.37			<0.000380		
	MW-125	Apr-14			0.00471 J	0.011				<0.00100	0.0544 J	<0.000700	0.470			<0.00100 B		
		Nov-14			0.0036	0.0092				0.00056 J	<0.05	<0.00024	0.420			0.0033		
		Apr-15			0.00369	0.00961				<0.000540	<0.0150	<0.000240	0.405			0.00581 J		
		Oct-15			0.0044	0.00911				<0.000540	0.0196 J	<0.000240	0.371			0.00409		
		Apr-16			0.00408 J	0.00922 J				<0.00270	<0.0750	<0.00120	0.438			0.00410 J		
		Oct-16			0.00383	0.00806				0.000898 JB	<0.0150	<0.000240	0.370			0.00253		
	MW-126A	Apr-14			0.00322 J	0.0163				0.00131 J	0.463	0.00132 J	0.194			0.00175 J		
		Nov-14			0.0021	0.028				0.0017	1.70	0.0010 J	0.79			0.00053 J		
		Apr-15			0.0027	0.0185				0.00164 J	1.02	0.000293 J	0.824			<0.000380		
		Oct-15			0.00195 J	0.0146				<0.000540	0.786	<0.000240	0.642			<0.000380		
		Apr-16			0.00222	0.0174				<0.00270	0.803	<0.00120	0.797			<0.00190		
		Oct-16			0.00257	0.0109				<0.000540	0.299	<0.000240	0.371			<0.000380		
	MW-126B	Apr-14			0.00299 J	0.0182				<0.00100	1.32	<0.000700	0.918			<0.00100		
		Nov-14			0.0039	0.017				0.0013	0.390	0.00064 J	0.098			0.0026		
		Apr-15			0.00377 J	0.0110 J				<0.00270	<0.0750	<0.00120	0.0892			0.00215 J		
		Oct-15			0.00442	0.0116				0.000580 J	0.154	0.000342 J	0.0609			0.00206		
		Apr-16			0.00430 J	0.0133 J				<0.00270	0.170 J	<0.00120	0.0744			0.00285 J		
		Oct-16			0.00404	0.00919				<0.000540	0.0351 J	<0.000240	0.0539			0.00133 J		
	MW-127	Apr-14			0.00433 J	0.785				0.00192 J	1.66	0.000968 J	0.156			<0.00100		
		Nov-14			0.0064	1.20				0.0035	3.90	0.002	0.140			0.0012 J		
		Apr-15			0.00626	0.534				0.00241	1.64	0.00138 J	0.109			<0.000380		
		Oct-15			0.00499	0.116				<0.000540	0.323	<0.000240	0.0943			<0.000380		
		Apr-16			0.00535 J	0.137				<0.00270	0.357 J	<0.00120	0.103			<0.00190		
		Oct-16			0.00453	0.0797				<0.000540	0.296	<0.000240	0.101			<0.000380		
	MW-128	Apr-14			0.0549	0.0867				0.00181 J	3.53	0.00132 J	2.33			<0.00100		
		Nov-14			0.062	0.094				0.0051	5.00	0.013	2.60			0.0012 J		
		Apr-15			0.052	0.0783				0.000905 J	2.94	0.00246	2.42			<0.000380 B		
		Oct-15			0.0552	0.0772				<0.000540	2.65	<0.000240	2.31			<0.000380		
		Apr-16			0.341	0.372				0.00347 J	15.4	0.00336 J	12.9			<0.00190		
		Oct-16			0.0643	0.0676				0.00182 JB	3.12	0.00222	2.11			<0.000380		
	MW-129	Nov-14			0.027	0.660				0.0045	7.80	0.0044	1.20			0.0032		
		Apr-15			0.0338	0.498				0.00227	6.42	0.00277	1.21			<0.000380		
		Oct-15			0.0271	0.546				<0.000540	5.07	0.000292 J	1.09			<0.000380		
		Apr-16			0.0272	0.593				<0.00270	5.49	<0.00120	1.10			<0.00190		
		Oct-16			0.0236	0.607				0.000625 JB	4.79	0.000529 J	1.00			<0.000380		

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
Field East of Refinery	MW-130	Apr-14			0.00474 J	0.037				0.00626	2.84	0.00398 J	0.202			0.00569		
		Nov-14			0.0046	0.026				0.0025	1.20	0.0012 J	0.120			0.0037		
		Apr-15			0.00718	0.677				0.00205	0.143 J	0.00929	0.242			<0.00190 B		
		Oct-15			0.00477	0.0195				0.000567 J	0.162	0.000362 J	0.0921			0.00224		
		Apr-16			0.00449 J	0.0228 J				<0.00270	0.451 J	<0.00120	0.105			0.00575 J		
		Oct-16			0.00403	0.0188				0.000869 JB	0.104	<0.000240	0.0891			0.00675		
	MW-131	Apr-14			0.0196	2.37				0.00159 J	2.25	0.00106 J	0.378			<0.00100		
		Nov-14			0.023	2.60				0.0028	3.80	0.0014 J	0.36			0.00050 J		
		Apr-15			0.022	2.67				0.000747 J	2.34	0.000919 J	0.316			<0.000380		
		Oct-15			0.0261	2.88				0.00371	4.71	0.00294	0.337			<0.000380		
		Apr-16			0.0222	2.67				<0.00270	1.46	<0.00120	0.305			<0.00190		
		Oct-16			0.0207	2.69				<0.000540	1.34	<0.000240	0.285			<0.000380		
	MW-133	Nov-14			0.019	0.130				0.00060 J	3.50	0.00080 J	0.380			<0.00038		
		Apr-15			0.00897	0.157				<0.000540	5.53	0.00145 J	0.312			0.00124 J		
	MW-134	Apr-14			0.00701 J	0.0168				<0.00200	0.581	<0.00140	0.031			0.00570 J		
		Nov-14			0.0059	0.015				0.0024	0.360	0.00024 J	0.031			0.0120		
		Apr-15			0.00881 J	0.0143 J				0.00285 J	0.234 J	<0.00120	0.00773 J			0.0197		
		Apr-15	FD		0.00575	0.0107				0.00148 J	0.131	<0.000240	0.00795			0.0129		
		Oct-15			0.00621	0.0101				0.000869 J	<0.0150	<0.000240	0.0065			0.00756		
		Oct-15	FD		0.0063	0.00964				0.000709 J	<0.0150	<0.000240	0.00594			0.00807		
		Apr-16			0.00566 J	0.0112 J				<0.00270	<0.0750	0.00131 J	0.0102 J			0.00812 J		
		Apr-16	FD		0.00555 J	0.00895 J				<0.00270	0.0767 J	<0.00120	0.0110 J			0.00711 J		
		Oct-16			0.00511	0.00827				0.00158 JB	0.0181 JB	<0.000240	0.00886			0.00647		
		Oct-16	FD		0.00475	0.00833				0.00148 JB	0.0293 JB	0.000513 J	0.00817			0.00416		
	MW-135	Apr-14			0.00454 J	0.0856				0.00467 J	1.68	0.00227 J	0.0799			0.0344		
		Nov-14			0.0088	0.410				0.018	9.60	0.0100	0.420			0.038		
		Apr-15			0.00871 J	0.413				0.0168	5.33	0.0119	0.500			0.0337		
		Oct-15			0.00442	0.058				0.00319	1.52	0.00144 J	0.0438			0.0399		
		Apr-16			0.0216	0.303				0.0130	5.54	0.00566 J	0.225			0.128		
		Oct-16			0.00394	0.0397				0.00149 JB	0.598	0.000686 J	0.0324			0.0368		
	RA-4196	Apr-14													<0.000500			
		Apr-15																
		Oct-15																
		Apr-16																
		Oct-16																
	RA-4798	Apr-14													0.000731 J			
		Apr-14	FD												0.00136 J			
		Nov-14																
		Apr-15																
		Oct-15																
		Apr-16																
		Oct-16																
	RW-12R	Apr-16			<0.00125	0.0512				0.0453	0.213 J	0.00204 J	0.547			<0.00740		
	RW-13R	Apr-16			0.00922 J	0.0165				<0.00270	0.572	<0.00120	1.26					
	RW-18	Apr-13			<0.0100	0.015				<0.00500	0.496	<0.00500	<0.00500			0.0124		
		Apr-14			0.00496 J	0.0137				<0.00200	0.295 J	<0.00140	0.00572 J			0.011		
		Apr-15			0.00379	0.0105				0.000703 J	<0.0150	<0.000240	<0.000250			0.00988		
		Apr-16			0.00400 J	0.0124 J				<0.00270	<0.0750	<0.00120	<0.00125			0.00436 J		
	RW-20	Apr-15			0.00375 J	0.527				<0.00270	1.75	0.00354 J	0.872			<0.00190		
	RW-22	Apr-15			0.00248	0.816				0.0032	0.140	0.00397	0.845			0.00234		
North Refinery	MW-23	Apr-14			0.00898	9.23				<0.00100	<0.0500	0.00224 J	0.0877			0.00280 J		
		Nov-14			0.022	0.100				0.0014 B	0.059 J	0.00075 J	0.210			0.0020 J		
		Apr-15			0.0164	0.319				<0.00270	0.560	0.00336 J	0.212			0.125		
		Oct-15			0.0104	11.0				0.00113 J	0.0742 J	0.00578	0.089			0.00109 J		
		Apr-16			0.0113	12.8				<0.00270	0.456 J	0.0186	0.105			<0.00190		
		Oct-16			0.00776	12.0				0.00711	1.89	0.0334	0.184			0.0019 J		
	MW-29	Apr-14			0.00836	<0.000900 B				<0.00100	0.228	<0.000700 B	0.558 J			0.00119 J		
		Nov-14			0.00093 J	0.020				0.00062 JB	<0.0500	0.00037 J	0.47			0.00063 J		
		Apr-15			0.000896 J	0.017				<0.000540	0.0678 J	<0.000240	0.382			<0.000380		
		Oct-15			0.00100 J	0.0161				<0.000540	<0.0150	<0.00120	0.369			0.00165 J		
		Apr-16			<0.00125	0.0182 J				<0.00270	<0.0750	<0.00120	0.485			0.0141		
		Oct-16			0.00165 J	0.0156				0.000619 JB	0.0168 J	0.000465 J	0.374			0.000713 J		
	MW-39	Oct-13			0.0147	0.022				<0.00500	<0.200	<0.00500	0.0383			<0.00500		
		Apr-15			0.00256 J	0.0228 J				<0.00270	<0.0750	<0.00120	0.208			<0.00190		
		Oct-15			0.00156 J	0.0222				<0.000540	0.0199 J	<0.00240	0.186			0.00266		
		Apr-16			0.0195	0.0209 J				0.00407 J	0.0932 J	0.00124 J	0.0161 J			0.0192		
		Oct-16			0.0274	0.0145				0.00128 JB	0.016 J	0.000867 J	0.0211			0.00146 J		
	MW-40	Apr-13			<0.0100	0.0284				<0.0100	<0.400	<0.00500	0.0479			<0.0100		
		Apr-14			0.00157 J	0.0278				<0.00100	<0.0500	<0.000700	0.0451			0.00202 J		
		Apr-15			0.00122 J	0.0336				<0.00270	0.345 J	0.00213 J	0.0398			<0.00190		
		Apr-16			0.00154 J	0.0392				<0.00270	0.512	0.00311 J	0.0321			<0.00190		
	MW-41	Oct-13			0.00849	0.016				<0.00500	<0.200	<0.00500	0.832			<0.00500		
		Apr-14			0.00475 J	0.014				<0.00100	0.0729 J	<0.000700	0.854			0.00163 J		
		Apr-15			0.00591 J	0.0203 J				<0.00270	0.136 J	<0.00120	1.01			<0.00190		
		Apr-16			0.00578 J	0.0210 J				<0.00270	<0.0750	<0.00120	0.888			<0.00190		
	MW-42	Oct-13			0.00973	0.0252				<0.00500	0.213	<0.00500	0.152			<0.00500		
		Apr-14			0.012	0.0284				<0.00100	0.527	0.000766 J	0.189			0.00168 J		
		Apr-15			0.00935 J	0.0242 J				<0.00270	0.136 J	<0.00120	0.171			0.00393 J		
		Apr-16			0.00814 J	0.0274				<0.00270	0.182 J	<0.00120	0.197			<0.00190		
	MW-43	Apr-14			0.0106	0.103				<0.00100	<0.0500	<0.000700	0.470		0.00617	0.00128 J		<0.000900
		Nov-14			0.009	0.420				0.0013	<0.0500	0.0018 J	0.370	<4.9E-05	0.0059	0.022 O1J6		0.00062 J
		Apr-15			0.0134	0.239				<0.00270	<0.0750	<0.00120	0.402	<4.9E-05	0.00482 J	0.0518		<0.000900
		Oct-15			0.018	0.108				0.00111 J	0.0583 J	0.000577 J	0.157	<4.9E-05	0.00465	0.000853 J		0.00386 J
		Apr-16			0.0106	0.251	1.78	<0.0008	<0.00130	<0.00270	0.163 J	0.00151 J	0.274	<4.9E-05	0.00625 J	0.205	<0.00165	0.00455 J
		Oct-16			0.00946	0.0772	1.36	<0.00016	<0.000260	0.00121 JB	0.089 J	0.00051 J	0.196	<4.9E-05 J3	0.00666	0.0211	0.000344 J	0.00328 J
	MW-59	Apr-13			0.0274	0.0168				<0.00500	<0.200	<0.0100	0.506			<0.00500		
		Apr-14			0.0324	0.0144				<0.00100	0.164 J	<0.000700	0.464			0.00432 J		
		Apr-15			0.0172	0.0163				<0.000540	0.163	0.000394 J	0.465			0.00573 J		
		Apr-16			0.0763	0.113				<0.00270	0.976	<0.00120	2.34			<0.00190		
	MW-60	Apr-14			0.00662	0.0191				<0.00100	0.0539 J	<0.000700	0.348		<0.00100	<0.00100		<0.000900
		Nov-14			0.0026	0.017				0.00065 J	0.065 J	0.00046 J	0.380	<4.9E-05	0.0016 J	0.014		0.00029 J
		Apr-15			0.00464 J	0.0177 J				<0.000540	0.0725 J	0.000305 J	0.340	<4.9E-05	<0.000350 B	<0.00190		0.000695 J
		Apr-15	FD		0.00850 J	0.0177				<0.000540	0.0960 J	<0.000240	0.335		<0.000350 B	<0.000380 B		
		Oct-15			0.00884	0.0167				<0.000540	0.286	0.000907 J	0.332	<4.9E-05 J	0.000645 J	0.014		0.00128 J
		Oct-15	FD		0.0088	0.0179				<0.000540	0.291	0.000328 J	0.342	<4.9E-05	0.000516 J	<0.000380		0.00115 J
		Apr-16			0.0111	0.0203 J	0.438	<0.005	<0.00130	<0.00270	0.105 J	<0.00120	0.364	<4.9E-05	<0.00175	<0.00190	0.00235 J	0.000910 J
		Apr-16	FD		0.0121	0.0193 J	0.449	<0.005	<0.00130	<0.00270	0.165 J	<0.00120	0.377	<4.9E-05	<0.00175	<0.00190	0.00254 J	0.00110 J
		Oct-16			0.00457	0.0154	0.347	<0.00016	0.000490 J	0.00133 JB	0.151 B	0.000403 J	0.336	<4.9E-05	0.00178 JB	<0.000380	0.00252 J	0.000358 J
		Oct-16	FD		0.00478	0.0147	0.332	<0.00016	0.000589 J	0.00129 JB	0.148 B	0.000342 J	0.339	<4.9E-05	0.00135 JB	<0.000380	0.00251 J	0.000307 J

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
North Refinery	MW-61	Apr-14			0.00127 J	0.0305				<0.00100	0.0734 J	<0.000700 B	0.0226			<0.00100		
		Nov-14			0.002	0.053				0.00081 J	<0.05	0.0012 J	0.0044 J			0.0087		
		Apr-15			0.00463 J	0.0499 J				<0.00270	<0.15	<0.00240	0.00444 J			0.168		
		Oct-15			0.00107 J	0.0246				0.00119 J	0.0828 J	0.00122 J	0.0416			0.00688		
		Apr-16			<0.00125	0.0192 J				<0.00270	<0.0750	<0.00120	0.0664			0.0101		
		Oct-16			0.000831 J	0.0223				0.00145 JB	0.0204 J	0.000914 J	0.0746			<0.000380		
	MW-62	Apr-14			0.00288 J	0.0679				<0.00100	0.0711 J	<0.000700	0.00786			0.00279 J		
		Nov-14			0.010	9.30				0.0021	0.260	0.0098	0.100			0.0019 J		
		Apr-15			0.0136	9.30				0.00149 J	0.0542 J	0.00419	0.0677			0.0187		
		Oct-15			0.00293	0.0235				<0.000540	0.0154 J	0.000278 J	0.00266 J			0.00587		
		Apr-16			0.00321 J	0.0390				<0.00270	<0.0750	<0.00120	<0.00125			0.00935 J		
		Oct-16			0.0115	0.0252				0.000596 JB	0.0385 J	0.000715 J	0.00213 J			<0.000380		
	MW-67	Nov-14			0.0018 J	0.120				0.00074 J	<0.0500	0.00094 J	0.130	<4.9E-05	0.0033	0.014		0.00036 J
		Apr-15			0.00371	0.140				<0.000540	0.0384 J	0.00113 J	0.080	<4.9E-05	0.00198 J	0.000386 J		0.00108 J
		Oct-15			0.0063	0.129				0.000623 J	<0.0150	0.00100 J	0.0785	<4.9E-05	0.000885 J	0.000445 J		0.00164 J
		Apr-16			0.0101	0.229	0.471	<0.005	<0.00130	<0.00270	<0.0750	0.00135 J	0.117	<4.9E-05	<0.00175	<0.00190	<0.00165	0.00139 J
		Oct-16			0.0103	0.161	0.451	<0.00016	<0.000260	0.000671 JB	0.0242 J	0.00127 J	0.104	<4.9E-05	0.000689 J	0.000479 J	<0.000330	0.000595 J
	MW-90	Apr-14			0.00439 J	0.0183				<0.00100	0.0589 J	0.000780 J	0.0745			<0.00100		
		Nov-14			0.011	0.014				0.00067 J	0.410	<0.00024	0.052			0.021		
		Apr-15			0.00709	0.0233				<0.000540	0.473	0.000242 J	0.345			0.00172 J		
		Oct-15			0.00883	0.0126				<0.000540	1.56	<0.000240	0.0504			0.0334		
		Apr-16			0.0111	0.0140 J				<0.00270	1.34	<0.00120	0.166			0.00262 J		
		Oct-16			0.0103	0.00945				<0.000540	0.201	0.000244 J	0.0186			0.0663		
	MW-91	Apr-14			0.00394 J	0.130				<0.00100	0.117 J	0.00191 J	0.00450 J			<0.00100		
		Nov-14			0.0047	0.094				0.00099 J	<0.0500	0.0013 J	0.026			0.0098		
		Apr-15			0.00509	0.094				<0.000540	0.0957 J	0.00236	0.00502			0.0138		
		Oct-15			0.00552	0.0824				<0.000540	0.0165 J	0.0027	0.00246 J			0.0248		
		Apr-16			0.00660 J	0.0716				<0.00270	<0.0750	0.00376 J	0.00267 J			<0.00740		
		Oct-16			0.0088	0.0554				<0.000540	<0.0150	0.0034	0.00304 JB			0.00063 J		
	MW-92	Apr-16			0.00316 J	3.44 O1V				<0.00270	0.328 J	<0.00120	0.0363			0.00207 J		
		Oct-16			0.00732	2.81				0.00101 JB	0.0744 J	0.00183 J	0.0274			0.00172 J		
	MW-93	Apr-14			0.00671	0.0823				0.00329 J	0.163 J	0.00288 J	0.0471			0.00282 J		
		Nov-14			0.003	0.052				0.0065	3.20	0.0054	1.30			0.013		
		Apr-15			0.00687 J	0.0346				0.00442 J	1.83	0.00126 J	0.227			0.0646		
		Oct-15			0.00502	0.0486				0.00365	1.29	0.00327	0.120			0.0709		
		Apr-16			0.0137	0.0231 J				0.00907 J	0.858	<0.00120	0.0663			0.0242		
		Oct-16			0.00195 JJ3J6	0.0263				0.00337 B	1.19	0.00112 J	0.335			0.0119 J3J6		
	MW-94	Nov-14			0.017	0.780				0.0014	0.081 J	<0.00024	0.0065			0.0012 J		
		Oct-15			0.0215	1.57				0.00144 J	<0.0150	<0.000240	0.00194 J			0.000935 J		
		Apr-16			0.0286	0.353				<0.00270	<0.0750	<0.00120	0.00666 J			<0.00190		
		Oct-16			0.0115	0.635				0.00119 JB	0.0159 J	0.000255 J	0.00631			0.000962 J		
	MW-95	Apr-13			<0.00500	0.130				<0.00500	1.02	<0.00500	0.0567			<0.00500		
		Apr-14			<0.00100	0.126				<0.00100	0.0549 J	<0.000700	0.0419			<0.00100		
		Apr-15			0.00133 J	0.0762				<0.000540	0.0357 J	0.000477 J	0.0247			0.000381 J		
		Apr-16			0.00175 J	0.0736				<0.00270	<0.0750	<0.00120	0.0214 J			<0.00190		
	MW-96	Apr-14			0.00469 J	0.109				<0.00100	<0.0500	<0.000700	0.00250 J			<0.00100		
		Nov-14			0.0049	0.073				0.0021	0.370	0.00089 J	0.110			0.0019 J		
		Apr-15			0.00421	0.126				0.000816 J	0.0338 J	0.000576 J	0.00352 J			0.000731 J		
		Oct-15			0.00397	0.158				0.000655 J	0.132	0.000953 J	0.00236 J			0.000640 J		
		Apr-16			0.00463 J	0.155				<0.00270	<0.0750	<0.00120	0.00174 J			0.00330 J		
		Oct-16			0.00238	0.106				<0.000540	0.0573 J	<0.000240	0.0070			0.000695 J		
	MW-98	Apr-14			0.00167 J	0.0156				<0.00100	<0.00500	0.00919	0.0259			0.00335 J		
		Apr-14	FD		0.00177 J	0.0145				<0.00100	<0.00500	0.00934	0.0267			0.00464 J		
		Nov-14			0.00068 J	0.017				0.0011	0.064 J	0.0079	0.027			0.020		
		Apr-15			<0.00250	0.0177 J				<0.00270	<0.0750	0.00894 J	0.0192 J			0.108		
		Oct-15			0.00109 J	0.0149				0.000932 J	0.0339 J	0.00659	0.0213			0.00514		
		Apr-16			0.00199 J	0.0204 J				<0.00270	<0.0750	0.00934 J	0.0312			<0.00190		
		Oct-16			0.00110 J	0.015				0.000797 JB	0.016 J	0.00734	0.0233			0.000906 J		
	MW-137	Oct-15			0.0525	0.127				0.00326	1.63	0.00596	0.120	<4.9E-05	0.00874	0.00218		0.00904
		Apr-16			0.0893	0.0567	0.982	<0.005	<0.00130	<0.00270	0.0953 J	0.00601 J	0.144	<4.9E-05	0.0101	0.00327 J	<0.00165	0.00840 J
		Oct-16			0.0345	0.0453	0.799	<0.00016	<0.000260	0.000628 JB	0.0169 J	0.00436	0.120	<4.9E-05	0.00652	0.00368	<0.000330	0.00529
	MW-138	Oct-15			0.00728	0.131				0.00218	2.54	0.00195 J	0.249	<4.9E-05	0.0042	0.000743 J		0.00705
		Apr-16			0.00777 J	0.220	1.56	<0.005	<0.00130	<0.00270	0.221 J	<0.00120	0.164	<4.9E-05	0.00598 J	<0.00190	<0.00165	0.00531 J
		Oct-16			0.00609	0.0947	1.01	<0.00016	<0.000260	0.000775 JB	0.0178 J	0.000407 J	0.143	<4.9E-05	0.00523	0.00284	<0.000330	0.00306 J
	RW-1	Apr-15			0.00607	0.0305				0.0029	0.216	0.000495 J	0.126			0.00302 J		
	RW-1R	Apr-16			0.00695 J	0.0414				<0.00270	17.1	0.00149 J	0.317			0.00246 J		
	RW-2	Apr-15			0.0264	0.0245 J				0.00553 J	0.381 J	0.00233 J	0.313			0.0705		
	RW-2R	Apr-16			0.00552 J	0.171				0.00750 J	2.25	0.0153	0.0705			0.422		
	RW-7	Apr-15			0.00239 J	0.508				<0.00270	0.0976 J	<0.00120	0.028			<0.00190		
	RW-7R	Apr-16			0.0154	0.0293				<0.00270	1.09	<0.00120	1.22			<0.00190		
	RW-8	Apr-15			0.00556 J	0.0889				<0.00270	0.427 J	<0.00120	0.0556			0.00200 J		
	RW-9	Apr-13			<0.0100	0.0703				<0.0100	<0.400	<0.00500	0.288			<0.0100		
		Apr-14			0.00434 J	0.047				<0.00100	0.942	<0.000700	0.417			0.00250 J		
		Apr-15			0.00392	0.0397				0.00102 J	0.257	0.000449 J	0.460			0.0144		
		Apr-16			0.00476 J	0.0550				<0.00270	0.169 J	<0.00120	0.441			0.00735 J		
	RW-10	Apr-13			<0.00500	0.0215				<0.00500	1.79	<0.00500	0.224			<0.00500		
		Apr-14			0.00174 J	0.0185				<0.00100	5.22	<0.000700	0.217			0.00143 J		
		Apr-15			0.00171 J	0.0258				0.000561 J	0.454	<0.000240	0.237			0.00517		
		Apr-16			0.00175 J	0.0372				<0.00270	1.27	<0.00120	0.266			0.0404		
	RW-16	Apr-13			0.0167	0.0163				<0.00500	<0.200	<0.00500	0.485			<0.00500		
		Apr-14			0.0127	0.0141				<0.00100	0.174 J	0.000789 J	0.576			0.00272 J		
		Apr-14	FD		0.0132	0.0147				<0.00100	0.184 J	<0.000700	0.596			0.00278 J		
		Apr-15			0.0171	0.0138 J				<0.00270	<0.0750	<0.00120	0.421			<0.00190		
		Apr-16			0.0115	0.0138 J				<0.00270	<0.0750	<0.00120	0.406			0.0223		
	RW-17	Apr-13			0.0107	0.0244				<0.00500	0.462	0.00563	0.704			<0.00500		
		Apr-14			0.00888	0.0228				<0.00100	0.471	0.019	0.675			0.00156 J		
		Apr-15			0.0111	0.0274				<0.00270	0.0850 J	0.00425 J	0.121			0.0361		
		Apr-16			0.0522	0.119				<0.00270	0.197 J	0.0385	3.55			0.0714		
North RO Reject Field	MW-117	Apr-14			0.00366 J	0.017				0.00210 J	0.780	0.00109 J	0.033			<0.00100 B		
		Nov-14			0.0025	0.02				0.0031	0.950	0.00072 J	0.014			0.0077		
		Nov-14	FD		0.0024	0.016				0.0024	0.710	0.00086 J	0.014			0.0079		
		Apr-15			0.00249 J	0.0162 J				<0.00270	0.492 J	<0.00120	0.00809 J			0.0168		
		Oct-15			0.00351	0.0214				0.00364	1.42	0.00113 J	0.0149			0.00486		
		Apr-16			0.00266 J	0.0186 J				<0.00270	0.684	<0.00120	0.0103 J			0.00857 J		
		Oct-16			0.00312	0.0249				0.00417 B	1.57	0.00137 J	0.0171			0.00403		
	MW-118	Apr-14			0.0109	0.0147				0.00312 J	0.952	0.00266 J	0.0526			<0.00100		
		Nov-14			0.012	0.033				0.0032	1.10	0.0010 J	0.020			0.0065		
		Apr-15			0.00977 J	0.0180 J				<0.00270	0.253 J	0.00175 J	0.00454 J			0.00863 J		
		Oct-15			0.0117	0.0131				0.00137 J	0.155	0.000329 J	0.00223 J			0.00509		
		Apr-16			0.0108	0.0139 J				<0.00270	0.426 J	<0.00120	0.00480 J			0.00645 J		
		Oct-16			0.0117	0.0111				0.000649 JB	0.0658 J	<0.000240	0.000302 J			0.0156		

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
North RO Reject Field	MW-119	Apr-14			0.00470 J	0.0126				0.00119 J	0.350	<0.000700	0.0148			<0.00100 B		
		Apr-14	FD		0.00446 J	0.0126				0.00114 J	0.341	<0.000700	0.0136			<0.00100 B		
		Nov-14			0.0062	0.06				0.0042	2.30	0.0016 J	0.062			0.0013 J		
		Apr-15			0.00398 J	0.0156 J				<0.00270	0.309 J	<0.00120	0.0151 J			<0.00190		
		Oct-15			0.00417	0.0105				0.000744 J	0.0886 J	<0.000240	0.00485 J			0.00189 J		
		Apr-16			0.00315 J	0.00645 J				<0.00270	<0.0750	<0.00120	<0.00125			0.00259 J		
		Oct-16			0.00404	0.00979				<0.000540	0.0660 J	<0.000240	0.0019 J			0.00334		
NCL	MW-18	Oct-13			<0.00500	0.025				<0.00500	<0.200	<0.00500	0.017	<2.0E-04	<0.00500	0.00853		0.02
		Apr-14			0.00313 J	0.0168				<0.00100	0.146 J	<0.000700	0.0203	<4.0E-05	0.00151 J	0.0112		0.0172
		Apr-15			0.00321	0.0167				0.00108 J	<0.0150	<0.000240	0.00671	<4.9E-05	0.00120 J	0.00947		0.0147
		Apr-16			0.00395 J	0.0207 J	1.36	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	0.0157 J	<4.9E-05	<0.00350	0.0153	0.0480 J	0.0200 J
	MW-45	Apr-14			0.00268 J	0.0159				<0.00100	0.786	0.00443 J	0.535	<4.0E-05	0.00736	0.00191 J		0.00217 J
		Nov-14			0.0028	0.018				<0.00054 B	0.820	<0.00024 B	0.6	<4.9E-05	0.0083	0.00071 J		0.00030 J
		Apr-15			0.00395	0.0185				<0.000540	1.66	0.00527	0.534	<4.9E-05	0.00666	<0.000380		0.000411 J
		Oct-15			0.00373	0.0216				0.000591 J	0.600	0.00667	0.551	<4.9E-05	0.00472	<0.000380		0.00118 J
		Apr-16			0.00752 J	0.0191 J	0.671	<0.005	<0.00130	<0.00270	4.14	0.00443 J	0.633	<4.9E-05	0.00631 J	<0.00190	<0.00165	0.00188 J
		Oct-16			0.00346	0.0182	0.636	<0.00016	<0.000260	<0.000540	0.942	0.000647 J	0.576	<4.9E-05	0.00513 B	<0.000380	0.000909 J	0.000251 J
	MW-53	Apr-13			<0.00500	0.0267				<0.00500	<0.200	<0.0100	1.00			<0.00500		
		Apr-14			0.00217 J	0.0232				<0.00100	<0.00500	<0.000700	0.778			0.00141 J		
		Apr-15			0.00179 J	0.0256				<0.000540	0.0338 J	0.000252 J	1.20			0.00566		
		Apr-16			0.00193 J	0.0308				<0.00270	<0.0750	<0.00120	1.07			0.00617 J		
	MW-54A	Apr-14			0.00532	0.0181				<0.00100	0.0714 J	0.000847 J	0.495			0.00134 J		
		Nov-14			0.0045	0.019				<0.00054 B	0.079 J	<0.00024 B	0.450			<0.00038		
		Apr-15			0.00312	0.0173				<0.000540	0.0537 J	<0.000240	0.450			0.000509 J		
		Oct-15			0.00312	0.0192				0.000898 J	<0.0150	0.00110 J	0.488			0.00126 J		
		Apr-16			0.00343 J	0.0189 J				<0.00270	<0.0750	<0.00120	0.512			<0.00190		
		Oct-16			0.00236	0.0158				<0.000540	<0.0150	<0.000240	0.437			0.000709 J		
	MW-54B	Apr-13			<0.00500	0.0183				<0.00500	<0.200	<0.00500	0.145			<0.00500		
		Apr-15			0.0022	0.0165				<0.000540	0.0520 J	<0.000240	0.165			0.000400 J		
	MW-55	Apr-14			0.00506	0.0106				<0.00100	0.0618 J	<0.000700	0.195	<4.0E-05	0.00498 J	0.0245		0.0176
		Apr-14	FD		0.00484 J	0.00952				<0.00100	<0.0500	<0.000700	0.185	<4.0E-05	0.00409 J	0.0238		0.0177
		Nov-14			0.0045	0.013				<0.00054 B	0.056 J	<0.00024 B	0.093	<4.9E-05	0.0025	0.013		0.017
		Apr-15			0.00457	0.011				0.00108 J	0.0483 J	<0.000240	0.139	<4.9E-05	0.00268	0.019		0.0147
		Oct-15			0.00582	0.0128				0.00104 J	<0.0150	<0.000240	0.0468	<4.9E-05	0.00168 J	0.00934		0.0189
		Apr-16			0.00933 J	0.0157 J	1.31	0.000891 J	0.00141 J	<0.00270	0.128 J	0.00168 J	0.151	5.14E-05 J	<0.00350	0.00896 J	0.0460 J	0.0244 J
		Oct-16			0.00543	0.0140	1.21	<0.00016	0.00068 J	0.00168 J	0.0587 JB	0.000582 J	0.113	5.31E-05 J	0.00314 B	0.00746	0.0335	0.0170
	MW-56	Apr-14			0.00689	0.0137				<0.00100	<0.0500	0.000927 J	0.36			0.00495 J		
		Nov-14			0.0067	0.014				<0.00054 B	0.061 J	<0.00024 B	0.35			0.0031		
		Apr-15			0.00727	0.0143				<0.000540	0.0230 J	0.000739 J	0.293			0.00372		
		Oct-15			0.00731	0.0166				<0.000540	<0.0150	0.000392 J	0.321			0.00491		
		Apr-16			0.00777 J	0.0203 J				<0.00270	<0.0750	<0.00120	0.373			0.00381 J		
		Oct-16			0.00721	0.0138				<0.000540	<0.0150	0.000540 J	0.282			0.00125 J		
	MW-108	Apr-14			0.00320 J	0.046				0.00333 J	0.310	0.00196 J	0.0338			0.00115 J		
		Nov-14			0.0061	0.049				<0.00054 B	<0.0500	<0.00024 B	0.045			0.0012 J		
		Apr-15			0.00462	0.0387				0.00259	0.0411 J	0.00155 J	0.0256			<0.000380		
		Oct-15			0.00399	0.0482				0.00226	0.0288 J	0.00157 J	0.0239			0.00234		
		Apr-16			0.00454 J	0.481				<0.00270	0.206 J	0.00209 J	0.0501			<0.00190		
		Oct-16			0.0102	0.0462				0.00732	3.13	0.0101	0.182			0.00126 J		
	NCL-31	Apr-14			0.011	0.0229				<0.00100	1.02	0.00104 J	1.83			0.00110 J		
		Nov-14			0.026	0.021				<0.00054 B	0.950	<0.00024 B	2.00			0.00059 J		
		Apr-15			0.00847	0.0224				0.000989 J	0.834	0.000803 J	1.70			<0.000380		
		Oct-15			0.00655	0.0334				0.00175 J	1.49	0.00140 J	2.28			<0.000380		
		Apr-16			0.00495 J	0.0241 J				<0.00270	0.838	<0.00120	1.85			<0.00190		
		Oct-16			0.0428	0.022				0.000711 JB	1.04	0.000493 J	2.48			<0.000380		
	NCL-32	Nov-14			0.013	0.200				0.0084	1.40	<0.00024 B	0.470			0.00044 J		
		Apr-15			0.00446 J	0.0556				0.00960 J	1.39	0.0167	0.968			<0.00190		
		Oct-15			0.00653	0.129				0.028	4.57	0.0289	1.34			0.000884 J		
		Apr-16			0.0108	0.227				0.0660	9.75	0.0681	1.77			<0.00190		
		Oct-16			0.00428	0.0254				0.00312	0.407 B	0.00296	1.06			0.00138 J		
	NCL-33	Apr-14			0.00230 J	0.0246				<0.00100	2.98	<0.000700	0.0896			0.00142 J		
		Nov-14			0.0019 J	0.032				<0.00054 B	3.60	<0.00024 B	0.110			0.00067 J		
		Apr-15			0.00407 J	0.0247 J				<0.00270	2.26	0.00569 J	0.108			<0.00190		
		Oct-15			0.00385	0.0274				<0.000540	2.49	0.000259 J	0.117			0.000519 J		
		Apr-16			0.00444 J	0.0246 J				<0.00270	0.770	<0.00120	0.188			<0.00190		
		Oct-16			0.00593	0.0224				0.00187 J	1.93	0.000459 J	0.128			0.00217		
	NCL-34A	Nov-14			0.00042 J	0.260				0.00078 J	<0.05	0.00066 J	0.053			<0.00038		
		Apr-15			<0.00120	0.547				<0.00270	<0.0750	0.00183 J	0.0369			<0.00190		
		Oct-15			0.00218 J	0.382				<0.00270	<0.0750	0.00136 J	0.042			0.00641 J		
		Apr-16			0.00184 J	0.854				<0.00270	<0.0750	<0.00120	0.0185 J			<0.00190		
		Oct-16			0.000745 J	0.370				<0.000540	<0.0150	<0.000240	0.0279			0.0142		
	NCL-44	Apr-14			0.0383	0.0276				<0.00100	1.25	<0.000700	0.656			0.00122 J		
		Nov-14			0.042	0.031				<0.00054 B	1.20	0.00064 J	0.680			0.00065 J		
		Apr-15			0.0617	0.0311				<0.00270	1.47	0.00123 J	0.703			<0.00190		
		Oct-15			0.070	0.0306				0.00105 J	2.09	0.000414 J	0.723			<0.000380		
		Apr-16			0.0459	0.0371				<0.00270	1.82	<0.00120	1.11			<0.00190		
		Oct-16			0.049	0.0276				0.00165 JB	1.78	0.000521 J	0.896			0.000394 J		
	NCL-49	Apr-14			0.00187 J	0.0115				<0.00100	<0.0500	<0.000700	<0.00250			0.00451 J		
		Nov-14			0.0014 J	0.012				<0.00054 B	<0.0500	<0.00024 B	0.0011 J			0.0032		
		Nov-14	FD		0.0016 J	0.011				<0.00054 B	<0.0500	<0.00024 B	0.0015 J			0.0026		
		Apr-15			0.00151 J	0.0109				<0.000540	0.0232 J	0.000252 J	0.00215 J			0.00279		
		Apr-15	FD		0.00145 J	0.0106				<0.000540	<0.0150	<0.000240	0.00146 J			0.00281		
		Oct-15			0.00218	0.0118				<0.000540	<0.0150	<0.000240	0.000528 J			0.00363		
		Oct-15	FD		0.00208	0.0116				<0.000540	<0.0150	<0.000240	0.000279 J			0.00365		
		Apr-16			0.00188 J	0.0150 J				<0.00270	<0.0750	<0.00120	<0.00125			0.00518 J		
		Apr-16	FD		0.00178 J	0.0134 J				<0.00270	<0.0750	<0.00120	<0.00125			0.00483 J		
		Oct-16			0.00156 J	0.0116				<0.000540	<0.0150	<0.000240	0.000460 JB			0.00551		
		Oct-16	FD		0.00137 J	0.0117				<0.000540	<0.0150	<0.000240	0.000493 JB			0.00549		
South Refinery	KWB-2R	Nov-14			0.0053	0.089				0.00060 J	0.570	0.0039	0.310			0.00048 J		
		Apr-15			0.00281	0.274				0.000702 J	0.329	0.00468	0.356			<0.000380		
		Oct-15			0.0039	0.259				0.000641 J	0.0295 J	0.00195 J	0.0529			<0.000380		
		Apr-16			0.00401 J	0.0326				<0.00270	0.883	<0.00120	0.898			0.00551 J		
		Oct-16			0.00325	0.0343				0.00113 JB	0.465	0.000548 J	0.609			<0.000380		
	KWB-5	Nov-14			0.024	3.70				0.00059 J	5.40	0.00042 J	2.30			0.00082 J		
		Apr-15			0.0225	3.42				<0.000540	3.39	0.000632 J	1.57			<0.000380		
		Oct-15			0.0209	3.65				<0.000540	3.22	0.000340 J	1.59			<0.000380		
		Apr-16			0.0252	3.63				<0.00270	4.28	<0.00120	1.82			<0.00190		
		Oct-16			0.0212	3.82				<0.000540	3.13	<0.000240	1.60			<0.000380		

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
South Refinery	KWB-6	Nov-14			0.0095	0.160				0.00073 J	0.770	0.0010 J	2.20			0.0013 J		
		Apr-15			0.00621	0.294				<0.000540	0.870	0.00182 J	2.16			<0.000380		
		Oct-15			0.0124	0.136				<0.000540	0.558	0.00137 J	2.04	<4.9E-05	0.00186 J	<0.000380		0.00239 J
		Apr-16			0.00703 J	0.327				<0.00270	0.546	0.00143 J	2.55			<0.00190		
		Oct-16			0.00915	0.0891				0.00095 JB	0.303	0.00103 J	1.87			<0.000380		
	MW-28	Apr-14			0.00429 J	0.142				<0.00100	<0.00500	<0.000700 B	0.0397	<2.0E-04	0.00817	<0.00100		<0.000900 B
		Nov-14			0.0067	0.100				0.0017 B	0.073 J	0.0045	0.100	<4.9E-05	0.0056	0.0020 J		0.0099
		Apr-15			0.00912 J	0.0772				0.000931 J	0.0712 J	0.011	0.0685	<4.9E-05	0.00489	0.0204 J		0.00634
		Oct-15			0.00936	0.0484				0.000931 J	0.0744 J	0.0136	0.0261	<4.9E-05	0.0036	0.0205		0.00557
		Apr-16			0.0610	0.331	1.23	<0.005	<0.00130	0.00274 J	0.342 J	0.0520	0.164	<4.9E-05	0.0226	0.00220 J	<0.00165	0.0158 J
		Oct-16			0.0154	0.0424	1.27	<0.00016	0.000289 J	0.00213 B	0.0951 JB	0.0168	0.0375	<4.9E-05	0.00387 B	0.000605 J	<0.000330	0.00701
	MW-48	Nov-14			0.033	0.350				0.0031	1.40	0.012	2.00			0.0014 J		
		Apr-15			0.004	0.0204 J				<0.000540	0.562	0.000320 J	0.0948 J			<0.000380 B		
		Oct-15			0.0108	0.367				0.000690 J	0.131	0.00215	1.24			0.00487		
		Apr-16			0.0125	2.77				<0.00270	0.177 J	0.00371 J	0.390			<0.00190		
		Oct-16			0.0107	1.18				0.00119 JB	0.166	0.00173 J	0.565			0.00052 J		
	MW-50	Apr-14			<0.00100	0.0199				<0.00100	0.123 J	0.00124 J	1.32			<0.00100		
		Nov-14			0.0042	0.024				0.00060 J	3.70	0.0010 J	1.50			0.00040 J		
		Apr-15			0.00138 J	0.0226				<0.000540	0.471	0.00102 J	1.53			<0.000380		
		Oct-15			0.00166 J	0.0219				<0.000540	0.0271 J	0.000889 J	1.37			0.000495 J		
		Apr-16			0.00234 J	0.0141 JB				<0.00270	0.0916 J	<0.00120	0.214			0.0994		
		Oct-16			0.00434	0.0207				<0.000540	0.160	0.000413 J	0.295			0.0704		
	MW-52	Apr-14			0.00373 J	0.00923				<0.00100	<0.0500	<0.000700	0.036	<4.0E-05	0.00268 J	0.00103 J		0.0236
		Apr-14	FD		0.00349 J	0.00988				0.00143 J	0.0709 J	<0.000700	0.0324	<4.0E-05	0.00206 J	0.00124 J		0.0238
		Nov-14			0.0033	0.0097				0.00057 J	<0.05	0.00076 J	0.060	<4.9E-05	0.0067	0.002		0.025
		Apr-15			0.00318	0.0098				<0.000540	0.0256 J	<0.000240	0.0478	<4.9E-05	0.00625	<0.000380 B		0.0253
		Oct-15			0.00429	0.0129				0.000582 J	0.0180 J	<0.000240	0.0446	<4.9E-05	0.00684	0.00187 J		0.0262
		Apr-16			0.0193	0.0436	0.736	<0.005	0.00155 J	<0.00270	0.158 J	<0.00120	0.230	<4.9E-05	0.0263	0.00545 J	0.0438 J	0.123
		Oct-16			0.00343	0.0104	0.718	<0.00016	0.000423 J	0.000547 JB	<0.0150	<0.000240	0.0484	<4.9E-05 J3	0.0081	0.00179 J	0.0105	0.0243
	MW-64	Apr-16			0.0333	2.26				<0.00270	<0.0750	0.00187 J	0.0599			<0.00190		
		Oct-16			0.0302	2.41				0.000897 JB	0.0566 JB	0.00105 J	0.048			0.000493 J		
	MW-65	Nov-14			0.058	0.370				0.00074 J	8.60	0.0019 J	2.20			0.00042 J		
		Apr-15			0.0186	3.08				<0.000540	2.88	0.00153 J	0.790			<0.000380		
		Apr-16			0.0142	3.42 V				<0.00270	2.09	0.00124 J	0.748 V			<0.00190		
		Oct-16			0.0120	2.97				0.00121 JB	1.66	0.00103 J	0.605			<0.000380		
	MW-66	Apr-14			0.00300 J	1.90				<0.00100	0.397 J	<0.000700	0.335	<4.0E-05	0.00857	<0.00100		<0.000900
		Nov-14			0.0029	2.20				0.00076 J	1.40	0.0026	0.280	<4.9E-05	0.0068	0.0015 J		0.00084 J
		Apr-15			0.00298	2.35				<0.000540	0.635	0.000902 J	0.189	<4.9E-05	0.00613	<0.000380		0.000941 J
		Oct-15			0.0037	2.00				<0.000540	0.792	0.000430 J	0.220	<4.9E-05	0.00743	<0.000380		0.00175 J
		Apr-16			0.0148	12.7	0.378	<0.005	<0.00130	0.00289 J	4.74	0.00659 J	1.13	<4.9E-05	0.121	<0.00190	<0.00165	0.00670 J
		Oct-16			0.00269	1.88	0.283	<0.00016	<0.000260	0.000733 JB	0.717	0.000342 J	0.216	<4.9E-05 J3	0.00497	<0.000380	<0.000330	0.000342 J
	MW-99	Nov-14			0.012	0.430				0.0019	1.20	0.0038	0.29			<0.00038		
		Apr-15			0.00289	0.159				0.000639 J	0.457	0.00571	0.0802			0.000808 J		
		Oct-15			0.00812	0.279				0.000832 J	0.382	0.00153 J	0.191			<0.000380		
		Apr-16			0.0491	5.05				0.00682 J	4.55	0.0193	1.20			<0.00190		
		Oct-16			0.00635	1.14				0.00128 JB	0.208	0.0015 J	0.354			<0.000380		
	MW-101	Apr-14			0.0320 J	<0.000900 B				<0.00100	1.42 J	<0.000700	1.12			<0.00100		
		Nov-14			0.049	0.089				0.00061 J	1.80	0.00065 J	0.98			0.0012 J		
		Apr-15			0.0939	0.0501				0.000581 J	3.58	<0.000240	1.08			<0.000380		
		Oct-15			0.056	0.0382				<0.000540	2.59	<0.00240	1.13			0.00344 J		
		Apr-16			0.0293	0.0898				<0.00270	1.38	<0.00120	1.34			<0.00190		
		Oct-16			0.0783	0.0366				0.00145 JB	2.56	0.000266 J	1.06			<0.000380		
	MW-102	Nov-14			0.012	0.250				0.0016	0.100 J	0.0026	0.049			0.0013 J		
		Apr-15			0.010	6.21				<0.000540	0.138	0.00344	0.0431			<0.000380		
		Oct-15			0.0123	0.423				0.00106 J	0.0723 J	0.00263	0.0273			0.000393 J		
		Apr-16			0.0117	7.71				<0.00270	0.222 J	0.00339 J	0.0308			<0.00190		
		Oct-16			0.0132	0.427				0.002 B	0.094 JB	0.00223	0.0214			<0.000380		
	MW-103	Apr-13			<0.00500	0.823				<0.00500	<0.200	<0.0100	<0.00500			<0.00500		
		Apr-14			0.00270 J	1.47				<0.00100 B	<0.0500	<0.000700 B	0.00278 J			<0.00100		
		Apr-15			0.00617 J	9.36				<0.0110	<0.300	<0.00480	0.0125 J			0.0607 J		
		Apr-16			0.00594 J	26.8				<0.00270	<0.0750	0.00148 J	0.0262			<0.00190		
	MW-104	Apr-14			<0.00100	<0.000900 B				<0.00100	<0.0500	<0.000700	0.038			<0.00100		
		Apr-14	FD		<0.00100	0.0188				<0.00100	<0.0500	<0.000700	0.0216			<0.00100 B		
		Nov-14			0.0018 J	0.030				<0.00054	<0.0500	<0.000240	0.031			<0.00038		
		Nov-14	FD		0.0017 J	0.029				0.00075 J	<0.0500	<0.000240	0.032			0.00095 J		
		Apr-15			0.000408 J	0.0195				<0.000540	0.0945 J	0.000364 J	0.0228			<0.000380		
		Apr-15	FD		0.000400 J	0.0196				<0.000540	0.0490 J	<0.000240	0.0217			<0.000380		
		Oct-15			0.00150 J	0.0229				0.000591 J	0.0385 J	<0.000240	0.0148			<0.000380		
		Oct-15	FD		0.00149 J	0.0218				<0.000540	<0.0150	<0.000240	0.0142			<0.000380		
		Apr-16			0.00165 J	0.0343 O1				<0.00270	<0.0750	<0.00120	0.0113 J			<0.00190 J3J6		
		Apr-16	FD		0.00195 J	0.0319				<0.00270	<0.0750	<0.00120	0.00995 J			<0.00190		
		Oct-16			0.0164	0.0293				0.00128 JB	0.015 JB	<0.000240	0.00278 J			<0.000380		
		Oct-16	FD		0.0194	0.0290				0.00132 JB	0.019 JB	<0.000240	0.00277 J			<0.000380		
	MW-105	Nov-14			0.011	0.120				0.0027	0.870	0.0025	0.270			0.012		
		Apr-15			0.00662	0.108				0.00184 J	2.55	0.00279	0.105			<0.000380		
		Oct-15			0.00849	0.214				0.00221	1.07	0.00562	0.0917			0.0108 J		
		Apr-16			0.0197	1.31				<0.00270	0.286 J	0.00176 J	0.195			0.00947 J		
		Oct-16			0.0121	1.15				0.00154 JB	0.265	0.00118 J	0.117			<0.000380		
	MW-106	Apr-14			0.00755	0.030				0.00115 J	0.101 J	0.00337 J	0.0124			0.00320 J		
		Apr-15			0.00491	0.089				0.00283	1.16	0.0296	0.147			0.00957		
		Oct-15			0.00726	0.0451				0.00385	0.650	0.00907	0.0119			0.00522		
		Apr-16			0.0150	0.0379				<0.00270	<0.0750	0.00274 J	0.0113 J			<0.00190		
		Oct-16			0.0152	0.0232				0.00143 JB	0.0422 JB	0.00305 B	0.00515 B			0.000476 J		
	MW-107	Apr-14			0.00688	2.74				<0.00100	10.1	<0.000700	0.270			<0.00100		
		Nov-14			0.015	0.520				0.00097 J	3.80	0.00049 J	0.390			<0.00038		
		Apr-15			0.0107	1.75				<0.000540	0.787	0.000331 J	0.158			<0.000380 B		
		Oct-15			0.00883	1.55				0.000625 J	0.368	0.000259 J	0.178			<0.000380		
		Apr-16			0.0100	10.2				0.00340 J	1.78	0.00200 J	0.454			<0.00190		
		Oct-16			0.00388	1.30				0.00093 JB	0.158	0.000595 J	0.0896			<0.000380		
	MW-109	Apr-14			0.0223	0.562				0.00194 J	1.64	<0.000700	0.345			<0.00100		
		Nov-14			0.0077	0.094				0.00076 J	0.460	<0.00024	0.180			<0.00038		
		Apr-15			0.00554	0.101				<0.000540	0.154	<0.000240	0.140 J			<0.000380 B		
		Oct-15			0.00134 J	0.112				0.000783 J	0.102	0.000334 J	0.127			0.00328		
		Apr-16			0.0331	0.299				<0.00270	0.677	0.00147 J	0.624			<0.00190		
		Oct-16			0.00269	0.0617				<0.000540	0.090 J	<0.000240	0.0821			<0.000380		
	MW-110	Apr-14			0.0281	0.0599				<0.00100	1.32	<0.000700	1.44			<0.00100		
		Nov-14			0.051	0.048				0.00074 J	1.20	<0.00024	1.80			0.00038 J		
		Apr-15			0.00924	0.0617				0.000649 J	0.379	0.000690 J	0.612			<0.000380 B		
		Oct-15			0.013	0.0765				0.000557 J	0.321	0.000523 J	0.882			<0.000380		
		Apr-16			0.0854	0.300				0.00399 J	2.77	0.00565 J	6.26			<0.00190		
		Oct-16			0.0344	0.048				<0.000540	0.730	0.000412 J	1.67			<0.000380		

Table 4B - Summary of Groundwater Analytical Data - Total Metals

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HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	Well ID	Date	Dup															
South Refinery	RA-313	Apr-13																
		Apr-14																
		Apr-15																
		Apr-16																
	RW-4	Apr-15		0.00183 J	0.0521					<0.000540	0.0744 J	0.000665 J	0.104			<0.000380		
	RW-4R	Apr-16		0.00440 J	0.0623					<0.00270	0.181 J	<0.00120	0.0728			<0.00190		
	RW-5R	Apr-15		0.00136 J	0.0259					<0.000540	0.0952 J	0.000336 J	0.0177			<0.000380		
		Apr-16		0.00183 J	0.0282					<0.00270	<0.0750	<0.00120	0.0191 J			<0.00190		
	RW-6	Apr-15		0.0332	1.66					<0.000540	13.8	0.000574 J	0.280			<0.000380		
	RW-6R	Apr-16		0.0712	0.480					<0.00270	3.70	<0.00120	0.553			<0.00190		
South RO Reject Field	MW-114	Apr-14		0.00292 J	0.0153					<0.00100	0.0777 J	<0.000700	1.20			<0.00100 B		
		Nov-14		0.0031	0.026					0.0023	0.810	0.00055 J	1.20			0.0018 J		
		Apr-15		0.00279	0.0165					0.000896 J	0.361	0.000317 J	0.927			<0.000380 B		
		Oct-15		0.00355	0.0134					<0.000540	0.0486 J	<0.000240	0.905			0.000757 J		
		Apr-16		0.00344 J	0.0155 J					<0.00270	<0.0750	<0.00120	1.15			<0.00190		
		Oct-16		0.00327	0.0119					0.00115 JB	<0.0150	0.000617 J	0.899			0.00839		
	MW-115	Apr-14		0.00444 J	0.0102					<0.00100	0.0685 J	<0.000700	0.0262			<0.00100 B		
		Nov-14		0.0034	0.015					0.00086 J	0.130	0.00024 J	0.030			0.0028		
		Apr-15		0.00697 J	0.0118					<0.000540	0.0684 J	<0.000240	0.120			<0.000380 B		
		Oct-15		0.00761	0.0119					0.000763 J	0.0367 J	<0.000240	0.124			0.000590 J		
		Apr-16		0.0230	0.0415					<0.00270	0.134 J	0.00135 J	0.308			0.00217 J		
		Oct-16		0.00838	0.00908					0.000944 JB	0.116 B	0.000381 J	0.146			<0.000380		
	MW-116	Apr-14		0.00442 J	0.0102					<0.00100	0.108 J	<0.000700	0.00627			<0.00100 B		
		Nov-14		0.0038	0.0098					0.0010 J	0.11	<0.00024	0.0042 J			0.0055		
		Apr-15		0.00521	0.00931					<0.000540	<0.0150	<0.000240	0.00454 J			<0.000380 B		
		Oct-15		0.00825	0.0434					0.00542	2.45	0.00183 J	0.0815			0.000668 J		
		Apr-16		0.00422 J	0.0231 J					<0.00270	0.800	<0.00120	0.0396			<0.00190		
		Oct-16		0.00720	0.0118					0.000922 JB	0.119	0.000397 J	0.0506			0.000738 J		
TEL	MW-49	Apr-14		0.00457 J	0.0409					<0.00100	<0.0500	<0.000700	0.302	<4.0E-05	0.00856	0.00113 J		<0.000900 B
		Nov-14		0.0055	0.100					0.0082	3.40	0.012	0.330	<4.9E-05	0.02	0.0019 J		0.011
		Apr-15		0.00433	0.0514					0.00147 J	0.530	0.00133 J	0.269	<4.9E-05	0.00842	<0.000380		0.00195 J
		Oct-15		<0.000250 B	0.0429					<0.000540	0.0195 J	0.000453 J	0.209	<4.9E-05	0.0074	0.0117		0.00145 J
		Apr-16		0.00489 J	0.0439	0.695	<0.005	<0.00130		<0.00270	0.0770 J	<0.00120	0.269	<4.9E-05	0.00686 J	<0.00190	<0.00165	0.00245 J
		Oct-16		0.00505	0.0449	0.642	<0.00016	<0.000260		0.000766 JB	0.127	0.000423 J	0.223	<4.9E-05 J6	0.00867	<0.000380	<0.000330	0.000357 J
	TEL-1	Apr-14		0.00402 J	0.0117					<0.00100	<0.0500	0.00109 J	0.0827			<0.00100 B		
		Apr-14	FD	0.00372 J	0.0108 J					<0.00100	<0.0500	<0.000700	0.0751 J			<0.00100 B		
		Nov-14		0.0026	0.011					0.00090 J	<0.0500	<0.00024	0.140			<0.00038		
		Apr-15		0.00537	0.0119					0.00501	0.0741 J	<0.000240	0.0523			<0.000380		
		Oct-15		<0.000250 B	<0.000360 B					0.00318	0.0506 J	<0.000240	0.103			0.00798 J		
		Apr-16		0.00407 J	0.0126 J					0.0269	0.104 J	<0.00120	0.199			<0.00190		
		Oct-16		0.00256	0.00987					0.00911 B	0.0829 J	0.0003 J	0.216			<0.000380		
	TEL-2	Apr-14		0.0115	0.0729					0.00127 J	<0.0500	0.00248 J	0.00988			0.00593		
		Nov-14		0.012	0.110					0.0017	<0.05	0.0024	0.013			0.0011 J		
		Apr-15		0.0132	0.185					0.00134 J	0.0326 J	0.00276	0.0101			0.000383 J		
		Oct-15		0.0118	0.153					0.00178 J	0.0291 J	0.00242	0.00753			0.00679		
		Apr-16		0.0101	0.127					0.00303 J	<0.0750	0.00131 J	0.0212 J			<0.00190		
		Oct-16		0.0147	0.0773					0.00209 B	0.0279 J	0.00145 J	0.0144			0.000618 J		
	TEL-3	Apr-14		0.00330 J	0.0147					0.00723	0.0610 J	<0.000700	0.0122			<0.00100 B		
		Nov-14		0.0013 J	0.012					0.0053	0.076 J	<0.00024	0.015			<0.00038		
		Apr-15		0.00354	0.0145					0.00466	0.0738 J	0.000599 J	0.00827			<0.000380		
		Oct-15		<0.000250 B	<0.000360 B					0.00613	0.0417 J	0.000435 J	0.0139			0.00966		
		Apr-16		0.00876 J	0.0208 J					0.0269	0.171 J	<0.00120	0.00661 J			<0.00190		
		Oct-16		0.00126 J	0.0156					0.138	0.456	0.000368 J	0.0133			<0.000380		
	TEL-4	Apr-14		0.0128	0.0376					0.223	0.0921 J	<0.000700 B	0.408			0.00103 J		
		Nov-14		0.010	0.043					0.38	0.093 J	<0.00024 B	0.290			<0.00038		
		Nov-14	FD	0.010	0.042					0.51	0.130	<0.00024 B	0.280			<0.00038		
		Apr-15		0.00613	0.0244					0.419	1.57	0.00227	0.872			<0.000380		
		Apr-15	FD	0.00598	0.0233					0.599	2.41	0.00262	0.860			0.000420 J		
		Oct-15		0.0106	0.0338					0.315	0.107	0.00255	0.406			0.0201		
		Oct-15	FD	0.00929	0.0326					0.281	0.107	0.00206	0.412			0.0135		
		Apr-16		0.00710 J	0.0247 J					0.282	0.331 J	0.00330 J	0.751			<0.00190		
		Apr-16	FD	0.00736 J	0.0245 J					0.306	0.628	0.00316 J	0.750			<0.00190		
		Oct-16		0.00784	0.0190					0.688	1.93	0.00263	0.508			0.000883 J		
		Oct-16	FD	0.00700	0.0199					0.389	1.07	0.00241	0.501			<0.000380		
TMD	MW-8	Oct-13		0.00929	0.0123					0.0986	0.307	<0.00500	0.584			0.0158		
		Apr-14		0.00884 J	0.0114					0.0212	<0.100	<0.00140	0.557			0.0237		
		Apr-15		0.0108	0.0107					0.234	0.779	0.000470 J	0.507			0.0188		
		Apr-16		0.00885 J	0.0117 J					0.107	0.397 J	<0.00120	0.538			0.00622 J		
	MW-16	Apr-13		<0.0100	0.0162					<0.0100	<0.400	<0.0100	0.052			<0.0100		
		Apr-14		0.00470 J	0.0151					<0.00200	<0.100	<0.00140	0.244			0.00322 J		
		Apr-15		0.00500 J	0.0174 J					<0.00270	<0.0750	<0.00120	0.0950 J			0.00213 J		
	MW-20	Apr-13		<0.0100	0.0101					<0.0100	<0.400	<0.0100	0.251			0.016		
		Apr-14		0.00750 J	0.00905 J					<0.00200	<0.100	<0.00140	0.0906			0.0179		
		Apr-14	FD	0.00865 J	0.0103					<0.00200	<0.100	<0.00140	0.080			0.017		
		Apr-15		0.00621	0.0104					<0.000540	0.0746 J	<0.000240	0.00743			0.0289		
		Apr-16		0.00628 J	0.0113 J					<0.00270	<0.0750	<0.00120	0.00814 J			0.0305		
	MW-21	Apr-14		0.00724 J	0.00373 J					<0.00200	<0.100	<0.00140	0.432			0.0259		
		Nov-14		0.0054	0.008					0.00078 J	<0.05	<0.00024	0.820			0.018		
		Apr-15		0.00656 J	0.0100 J					<0.00270	<0.0750	<0.00120	0.323 J			0.0258		
		Oct-15		0.00635	0.00939					<0.000540	<0.0150	<0.000240	0.658			0.029		
		Apr-16		0.00607 J	0.0100 J					<0.00270	<0.0750	<0.00120	0.354			0.0327		
		Oct-16		0.00613	0.0079					<0.000540	<0.0150	<0.000240	0.616			0.0287		
	MW-25	Apr-13		<0.0100	0.0121					<0.0100	<0.400	<0.0100	0.129			<0.0100		
		Apr-14		0.00502 J	0.0265					<0.00500	<0.250	<0.00350	1.09			<0.00500		
		Apr-15		0.00984 J	0.0187 J					<0.00270	<0.0750	<0.00120	0.582 J			0.0204		
		Apr-16		0.00582 J	0.0148 J					0.00332 J	<0.0750	<0.00120	0.889			<0.00190		
	MW-26	Apr-13		<0.0100	<0.0100					<0.0100	<0.400	<0.0100	0.212			<0.0100		
		Apr-14		0.00413 J	0.00878 J					<0.00200	<0.100	<0.00140	0.731			0.0241		
		Apr-15		0.00351	0.00944					<0.000540	0.0811 J	<0.000240	0.613			0.0197		
		Apr-16		0.00384 J	0.0101 J					<0.00270	<0.0750	<0.00120	0.847			0.0194		
	MW-27	Apr-13		<0.00500	0.0145					<0.00500	<0.200	<0.00500	0.0102			0.0199		
		Apr-14		0.00249 J	0.0166					<0.00100	<0.00500	<0.000700	0.00554			0.0192		
		Apr-15		0.00239	0.0235					<0.000540	<0.0150	<0.000240	0.0318			0.018		
		Apr-16		0.00228 J	0.0179 J					<0.00270	<0.0750	<0.00120	0.0186 J			0.0127		
	MW-46R	Apr-14		0.00338 J	0.0259					0.00222 J	0.621	<0.000700	0.0998			<0.00100 B		
		Nov-14		0.0042	0.024					0.0028	1.10	0.00083 J	0.140			0.0034		
		Apr-15		0.00307	0.0188					0.00106 J	0.297	0.000608 J	0.116			0.00116 J		
		Apr-16		0.00317 J	0.0140 J					<0.00270	0.159 J	<0.00120	0.125			<0.00190		
		Oct-16		0.00314	0.0150					0.000894 JB	0.196	0.000459 J	0.137			0.00154 J		

Table 4B - Summary of Groundwater Analytical Data - Total Metals

2016 Annual Groundwater Report
HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Total Metals													
				Analyte:	Arsenic	Barium	Boron	Cadmium	Cobalt	Chromium	Iron	Lead	Manganese	Mercury	Nickel	Selenium	Uranium	Vanadium
				Units:	mg/L	mg/L	mg/L	mg/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	0.010	1.00	0.75	0.005	0.050	0.050	1.00	0.015	0.200	0.002	0.200	0.050	0.030	0.0631
				CGWSL Source:	USEPA MCL	WQCC HH	WQCC Irr	USEPA MCL	WQCC Irr	WQCC HH	WQCC Dom	USEPA MCL	WQCC Dom	WQCC HH	WQCC Irr	WQCC HH	WQCC HH	NMED TW
Area	**Well ID**	**Date**	**Dup**															
TMD	MW-68	Apr-13		<0.00500	**0.0147**				<0.00500	**0.279**	<0.00500	<0.00500			**0.0314**		
		Apr-14		**0.00325 J**	**0.0142**				<0.00200	<0.100	<0.00140	<0.00500			**0.0248**		
		Apr-15		**0.00292**	**0.0159**				<0.000540	**0.0594 J**	**0.000524 J**	**0.00131 J**			**0.0123**		
		Apr-16		**0.00314 J**	**0.0133 J**				<0.00270	<0.0750	<0.00120	**0.0393**			**0.00339 J**		
	MW-71	Oct-13		**0.00536**	**0.00969**				<0.00500	<0.200	<0.00500	<0.00500	<2.0E-04	<0.00500	**0.0417**		**0.0251**
		Apr-14		**0.00458 J**	**0.0086**				<0.00100	<0.0500	<0.000700	<0.00250	<4.0E-05	**0.00123 J**	**0.0452**		**0.0252**
		Apr-15		**0.00411**	**0.00897**				**0.000581 J**	**0.0373 J**	<0.000240	**0.000898 J**	<4.9E-05	**0.00134 J**	**0.0349**		**0.0229**
		Apr-16		**0.00436 J**	**0.0103 J**	**0.689 V**	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	<0.00125	<4.9E-05	<0.00175	**0.0370**	**0.0605**	**0.0257**
	MW-89	Apr-13		**0.0132**	**0.0134**				<0.00500	<0.200	<0.00500	**0.670**			<0.00500		
		Apr-14		**0.0128**	**0.014**				<0.00100	**0.195 J**	<0.000700	**0.537**			**0.0188**		
		Apr-15		**0.00900 J**	**0.0144 J**				<0.00270	**0.12 J**	<0.00120	**0.0710 J**			**0.0275**		
		Apr-16		**0.00839 J**	**0.0155 J**				<0.00270	**0.228 J**	<0.00120	**0.0788**			**0.0311**	<0.00100	
	NP-1	Apr-14															
		Nov-14															
		Apr-15															
		Oct-15															
		Apr-16															
		Oct-16															
	NP-2	Apr-13															
	NP-6	Apr-13															
		Apr-15															
Up-Gradient	UG-1	Apr-13		<0.00500	**0.0137**				<0.00500	<0.200	<0.00500	<0.00500	<2.0E-04	<0.00500	<0.00500		**0.0111**
		Apr-14		**0.00158 J**	**0.0128**				**0.00159 J**	**0.0832 J**	<0.000700	**0.00575**	<4.0E-05	**0.00121 J**	**0.00728**		**0.0135**
		Apr-15		**0.00113 J**	**0.0137**				**0.00242**	**0.0262 J**	<0.000240	**0.000764 J**	<4.9E-05	<0.000350 B	**0.0103**		**0.0105**
		Apr-16		<0.00125	**0.0136 J**	**0.574**	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	<0.00125	<4.9E-05	<0.00175	**0.0140**	**0.0252 J**	**0.0107 J**
	UG-2	Apr-13		<0.00500	**0.0172**				<0.00500	<0.200	<0.00500	**0.0801**	<2.0E-04	**0.0125**	<0.00500		**0.0148**
		Apr-13	FD	<0.00500	**0.0182**				<0.00500	<0.200	<0.00500	**0.0711**	<2.0E-04	**0.0121**	**0.00581**		**0.0166**
		Apr-14		**0.00385 J**	**0.0167**				<0.00100	**0.673**	<0.000700	**0.488**	<4.0E-05	**0.0256**	**0.00209 J**		**0.0082**
		Apr-15		**0.00205**	**0.0153**				<0.000540	<0.0150	<0.000240	**0.011**	<4.9E-05	**0.00527**	<0.000380 B		**0.0115**
		Apr-16		**0.00202 J**	**0.0150 J**	**0.343**	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	**0.0147**	<4.9E-05	**0.00905**	**0.00321 J**	**0.0156 J**	**0.0123 J**
	UG-3R	Apr-13		<0.00500	**0.0149**				<0.00500	<0.200	<0.00500	<0.00500	<2.0E-04	<0.00500	<0.00500		**0.00815**
		Apr-14		**0.00184 J**	**0.017**				<0.00100	<0.0500	<0.000700	<0.00250	<4.0E-05	<0.00100	**0.00534**		**0.0109**
		Apr-14	FD	**0.00167 J**	**0.0163**				<0.00100	<0.0500	<0.000700	<0.00250	<4.0E-05	<0.00100	**0.0064**		**0.0101**
		Apr-15		**0.00258**	**0.0595**				**0.00368**	**2.05**	**0.000626 J**	**0.0725**	<4.9E-05	<0.000350 B	<0.000380 B		**0.0135**
		Apr-16		**0.00182 J**	**0.0198 J**	**0.295**	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	**0.00141 J**	<4.9E-05	**0.00188 J**	**0.00386 J**	**0.0122 J**	**0.0104 J**
	UG-4	Apr-16		<0.00125	**0.0184 J**	**1.19**	<0.005	<0.00130	<0.00270	<0.0750	<0.00120	**0.00752 J**	<4.9E-05	**0.00203 J**	**0.00634 J**	**0.0364 J**	**0.00749 J**

Definitions

X	Reported concentration, X, exceeds the CGWSL.
X	Analyte detected above the detection limit at a concentration equal to X
< x	Analyte not detected at detection limit equal to x.
< x	Analyte not detected at detection limit equal to x, but x exceeds the CGWSL.
	Blank cell indicates a sample was collected from the well during the indicated sampling event, but the analyte was not analyzed.

Abbreviations

CGWSL	Critical Groundwater Screening Level (see Table 3)
CGWSL Source	Source for CGWSL value (see Table 3)
Dup	Duplicate Sample
FD	Field duplicate sample
mg/L	milligrams per liter
NMED TW	NMED Risk Assessment Guidance for Site Investigations and Remediation, July 2015, Table A-1, Tap Water Screening Level
WQCC Dom	NMED Groundwater standard for domestic exposure taken from 20.6.2.3103.B
WQCC HH	NMED Groundwater standard for human health exposure, NMAC 20.6.2.3103.A
WQCC Irr	NMED Groundwater standard for irrigation exposure
USEPA MCL	United States Environmental Protection Agency Maximum Contaminant Level, "Regional Screening Levels for Chemical Contaminants at Superfund Sites", November 2015

Lab Footnote

B	Analyte was also detected in the associated method blank.
J	Indicates an estimated value.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
Cross-Gradient	KWB-13	Apr-13			457	141	0.701	1.31	176	1,820	3,910	14.1	<0.0200
		Apr-14			418	158	0.580	0.724	143	1,820	3,750	14.6	<0.00500 H
		Apr-15			474	788	0.704	6.65	148	1,970	3,060	15.3	<0.00180
		Apr-16			626	148	0.630	2.26 J	258	2,500	3,720	13.7	<0.00120
	MW-17	Apr-14			395	174	1.19	2.31	72.2	1,200	2,340	2.19	
	NP-5	Apr-13			465	413	2.58	<0.400	253	3,090	5,980	2.33	
		Apr-15			448	993	2.13	0.484 J	209	3,030	6,060 J	1.38	
	RA-3156	Apr-13			516	245	<0.500	3.03	162	1,560	3,050	6.62	
		Nov-13			537	238	0.208	3.06	169	1,450	3,390	9.09	
		Apr-14			<0.500	278	0.299	2.67		1,800	3,280	7.89	
		Apr-16			370	1,140	0.478	3.67 J	695	1,070	3,050	<0.197	
	MW-136	Oct-15			706	265	1.56	3.20	144	2,740	4,020	22.1	<0.00180
		Apr-16			699	336	1.23	2.95 J	149	2,870	4,250	9.76	<0.00120
		Oct-16			651	355	1.66	2.81	140	2,530	4,400	12.4	0.00188 J
Evaporation Ponds	MW-1R	Apr-13			633	1,650	0.877	4.56	816	1,980	5,460	<1.00	
		Apr-13	FD		592	1,610	0.869	4.66	904	1,920	5,400	<1.00	
		Apr-14			540	1,560	0.567	4.27	1,010	1,900	5,740	<0.150	
		Apr-15			765 J	1,970	0.821	4.52 J	1,080 J	2,400	5,020	<0.0200	
		Apr-16			1,030	3,330	0.603 J6	6.54	2,090	3,320	10,100	<0.197	
	MW-2A	Apr-14			794	5,440	2.19	6.58	3,440	4,310	16,200	<0.150	
		Nov-14				4,900	2.30	5.80		3,900	13,000	1.30	
		Apr-15			944	6,730	1.06	7.71 J	4,780	4,830	14,200	0.0404 J	
		Oct-15			677	3,870	2.14	5.85	2,590	3,670	10,500	0.0390 J	
		Apr-16			933	8,400	1.53	7.35	5,280	7,640	20,700	0.501 J	
		Oct-16			598	3,290	3.43	4.91	2,270	3,450	9,660	0.122	
	MW-3	Apr-14			827	2,300	1.39	6.57	1,300	1,930	7,400	9.07	
		Nov-14			760	2,000	1.70	6.80	1,200	2,600	7,200	4.80	
		Nov-14	FD		780	2,600	2.20	7.00	1,200	2,700	7,100	5.20	
		Apr-15			839	33.2	2.10	6.16	1,850	25.0	12,200	24.5	
		Apr-15	FD		927	3,270	1.60	6.80	1,790	3,000	17,800	20.2	
		Oct-15			613	1,950	1.99	7.17	1,220	2,810	6,140	0.182	
		Oct-15	FD		636	1,920	1.84	7.11	1,210	2,730	6,480	0.0580 J	
		Apr-16			728	1,360	1.87	5.64	1,160	2,640	6,260	0.404 J	
		Apr-16	FD		690	1,290	1.87	5.47	1,140	2,530	6,240	0.231 J	
		Oct-16			574	1,290	2.21	5.69	865	2,380	5,180	0.052 J	
		Oct-16	FD		591	1,270	2.20	5.85	854	2,380	5,040	0.049 J	
	MW-4A	Apr-14			571		1.47	4.24	990		5,600	0.199 J	
		Nov-14			690	1,400	1.60	5.10	1,000	2,500	5,700	0.960	
		Apr-15			660	1,560	1.29	4.12 J	1,080	2,850	7,470	<0.0200	
		Oct-15			394	1,380	1.92	5.23	1,010	2,110	4,290	0.0530 J	
		Apr-16			507	1,860	1.78	4.03 J	1,060	2,990	5,090	<0.197	
		Oct-16			393	1,510	2.06	4.06	890	1,970	4,610	0.064 J	
	MW-4B	Apr-13			371	928	0.870	3.64	556	1,330	3,660	<1.00	
		Apr-15			367	1,110	0.963	2.32	696	1,340	3,410 J	<0.0200	
	MW-5A	Apr-14			562	4,710	3.03	6.58	4,230	8,160	18,100	<0.150	
		Nov-14			580	3,300	1.90	6.40	4,200	8,100	16,000	<0.02	
		Apr-15			519	4,100	1.53	6.15 J	4,220	9,370	17,000	<0.0200	
		Oct-15			513	4,760	1.78	7.27	4,500	8,480	17,800	0.0450 J	
		Apr-16			472	3,010	3.11	7.39	2,990	5,610	13,700	1.72	
		Oct-16			500	3,500	3.43	6.34	3,880	7,950	16,300	0.044 JJ6	
	MW-5B	Apr-13			473	1,840	2.20	10.8	1,600	2,950	7,500	2.93	
		Apr-15			482	1,590	1.41	9.01	1,580	3,510	5,980	<0.0200	
	MW-5C	Apr-13			420	639	1.20	4.21	446	1,580	3,620	<1.00	
		Apr-15			427	585	0.910	3.97 J	485	2,020	3,290	<0.0200	
	MW-6A	Mar-13			301	980	2.05	1.36	735	1,610	3,950	<1.00	
		Apr-14			762	1,620	1.31	2.44	998	1,980	5,600	0.245 J	
		Apr-15			809	2,010	1.85	2.14 J	1,090	2,240	6,500	0.875	
		Apr-16			449	1,300	1.52	1.74 J	835	2,360	4,290	0.461 J	
	MW-6B	Mar-13			530	1,370	0.533	4.31	710	1,640	4,480	<1.00	
		Mar-13	FD		478	1,420	0.814	4.87	753	1,690	4,510	<1.00	
		Apr-15			568	1,740	0.669 J	5.09	873	2,280	4,760	<0.0200	
	MW-7A	Apr-14			469	2,670	1.19	4.46	1,750	3,290	7,760	<0.150	
		Nov-14			760	3,600	0.690	5.20	2,600	4,100	11,000	<0.02 J6	
		Nov-14	FD		770	1,800	1.20	5.20	2,500	2,100	11,000	<0.02	
		Apr-15			609	3,080	0.693	4.18	2,060	3,620	9,840	<0.0200	
		Apr-15	FD		593	3,100	0.996	4.21	2,060	3,190	9,300	0.0262 J	
		Oct-15			403	2,470	1.08	3.96	1,590	4,020	7,100	<0.0197	
		Oct-15	FD		404	2,230	1.12	3.95	1,690	3,150	7,180	<0.0197	
		Apr-16			459	2,500	1.24	4.18 J	1,810	3,360	7,620	<0.197	
		Apr-16	FD		423	2,550	1.24	3.94 J	1,690	3,710	7,540	<0.197 J6	
		Oct-16			406	2,790	1.49	4.22	1,600	3,420	7,460	0.026 J	
		Oct-16	FD		395	2,240	1.45	4.01	1,550 O1V	2,790	7,340	0.047 J	
	MW-7B	Apr-13			545	1,030	3.09	6.66	540	1,800	4,280	<1.00	
		Apr-15			556	1,060	0.795	6.27	672	2,200	4,640	<0.0200	
	MW-10	Apr-14			545	1,660	0.551	4.06	1,060	2,290	5,540	<0.150	
		Nov-14			750	1,700	0.88 J6	4.30	1,200 V	2,800	5,900	0.230	
		Apr-15			466	1,380	0.919	3.54 J	941	2,110	5,030	<0.0200	
		Oct-15			518	1,580	0.783	3.68	1,080	2,620	5,340	0.28 J	
		Apr-16			523	1,530	0.826	3.83 J	1,110	2,220	5,120	<0.197	
		Oct-16			647	2,100	1.18	3.54	1,180	3,740	6,550	0.097 J	
	MW-11A	Apr-14			1,250	12,400	0.647	22.9	5,140	2,410	25,400	0.488 J	
		Nov-14			2,600	17,000	<0.0099	21.0	8,300	3,000	30,000	15.0	
		Apr-15			1,630	11,800	0.0639 J	19 J	6,090	2,910	24,900 J	1.47	
		Oct-15			1,200	9,930	0.152	20.3	5,260	3,780	18,300	0.265	
		Apr-16			1,280 V	9,440	0.414 J6	19.0	5,150	3,510	18,600	0.715 JJ6	
		Oct-16			1,230	9,180	0.752	20.8	4,850	3,250	16,600	0.048 JB	
	MW-11B	Mar-13			855	6,560	<0.500	35.2	3,340	3,030	15,100	<1.00	
		Apr-15			1,070	6,000	0.562	36.6	4,040	3,860	12,700	<0.0200	
	MW-12	Apr-14			728	2,460	0.685	5.57	1,280	2,490	7,960	4.10	
	MW-13	Apr-14			682	1,780	0.354	5.56	914	2,180	6,520	0.463 J	
	MW-15	Mar-13			771	2,640	2.13	6.02	1,240	2,180	8,120	13.3	
		Apr-14			849	2,960	2.33	5.68	1,420	1,770	19,900	40.2	
		Apr-15			565	2,150	2.12	5.01	1,300	2,000	5,470	16.0	
		Apr-16			487	611	2.01	5.53	795	1,240	4,720	3.99	
	MW-18A	Apr-14			723	10,200	3.63	61.4	6,620	6,760	27,700	2.61	<0.00500
		Nov-14			850	12,000	<0.0099	54.0	7,500	10,000	32,000	<0.02	<0.0018
		Apr-15			718	11,600	6.14	56.7	7,290	9,490	32,600	2.18	<0.00180
		Oct-15			711	9,930	5.43	51.8	6,250	10,600	27,400	0.146	<0.00180
		Apr-16			704	6,820	2.83	46.6	4,730	6,360	20,500	0.371 J	<0.00180
		Oct-16			662	7,270	3.22	42.4	4,740	6,870	20,200	0.030 J	<0.00180

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
Evaporation Ponds	MW-18B	Apr-13			592	803	1.10	6.32	474	1,870	4,060	<1.00	
		Apr-15			581	763	0.931	5.91	460	1,840	4,410	0.0280 J	
	MW-22A	Apr-14			514	2,290	0.766	4.02	1,290	2,540	6,640	<0.150	
		Nov-14			610	2,000	0.580	3.90	1,400	2,600	6,600	<0.02	
		Nov-14	FD		720	1,700	0.770	3.9 J	1,700	2,200	6,600	<0.02	
		Apr-15			549	2,150	0.758	3.79 J	1,450	2,500	7,270	<0.0200	
		Apr-15	FD		494	2,020	0.682	3.16 J	1,240	2,590	6,630	<0.0200	
		Oct-15			529	1,980	0.621	3.64	1,480	2,660	6,330	0.358 J	
		Oct-15	FD		527	1,970	0.610	3.65	1,640	2,650	6,090	0.441 J	
		Apr-16			548	1,890	0.645	4.08 J	1,440	2,340	6,190	<0.197	
		Apr-16	FD		541	1,900	0.660	4.04 J	1,440	2,560	6,160	<0.197	
		Oct-16			570	1,940	0.752	3.96	1,490	2,380	6,970	0.219 B	
		Oct-16	FD		563	2,030	0.733	3.88	1,450	2,400	7,220	0.049 JB	
	MW-22B	Apr-13			530	1,470	0.619	4.48	932	2,240	5,460	<1.00	
		Apr-15			477	1,400	0.823	4.02 J	1,150	2,170	5,590	<0.0200	
	MW-70	Apr-14			697	1,310	0.560	5.38	729	2,950	5,080	0.210 J	
		Nov-14			700			5.50	730				
		Apr-15			695	1,240	0.740	4.90	774	2,230	5,700	<0.0200 J	
		Oct-15			756			5.51	782				
		Apr-16			720	1,370	0.775	5.46	908	2,240	5,730	0.416 J	
		Oct-16											
	MW-72	Nov-13			753	3,540	6.26	9.43	2,340	2,200	9,890	<0.500	
		Apr-14			795	4,350	6.27	9.87	2,440	3,020	10,300	3.10	
		Apr-15			896	5,240	3.91	13.3	3,030	3,800	12,900	6.37	
		Apr-16			700	3,310	5.88	8.82	2,060	3,400	9,140	1.88	
	MW-73	Oct-13			571	2,110	2.19	2.73	2,430	3,140	9,720	<0.500	
		Apr-14			590	2,260	2.09	2.54	2,160	3,510	9,120	<0.150	
		Apr-15			659	2,480	1.94	3.12 J	2,200	4,560	9,360	0.757	
		Apr-16			597	2,790	1.96	2.32 J	2,240	5,090	9,360	0.501 J	
	MW-74	Apr-14			656	1,970	8.66	45.6	2,250	4,050	8,940	67.0	
		Nov-14			670	1,600	6.40	45.0	2,300	4,400	8,700	420	
		Apr-15			552	1,170	6.02	39.4	2,230	4,450	9,360	176	
		Oct-15			558	1,810	6.19	39.2	2,330	4,140	8,720	12.3	
		Apr-16			632	1,640	7.44	35.6	2,080	3,100	8,280	0.796 J	
		Oct-16			566	1,900	8.61	44.9	3,120	4,880	10,200	211	
	MW-75	Apr-14			379	1,610	8.37	21.4	1,550	1,930	6,180	<0.150	
		Nov-14			410	1,400	6.90	20.0	1,500	2,400	5,700	<0.02	
		Apr-15			372	11.8 J	8.20	20.3	1,490	14.2 J	4,020	<0.2	
		Oct-15			352	1,550	7.80	19.3	1,560	2,510	5,280	0.0590 J	
		Apr-16			374	1,530	7.62	21.5	1,640	1,940	5,940	<0.197	
		Oct-16			351	1,400	7.88	17.5	1,480	2,080	6,000	0.0490 JB	
	MW-76	Apr-14			470	1,200	3.16	30.0	980	1,730	4,980	<0.150	
		Nov-14			610	1,300	3.00	31.0	1,100	2,800	6,000	<0.02	
		Apr-15			558	18.1 J	3.15	29.7	1,120	22 J	4,650	<0.2	
		Oct-15			445	1,370	3.10	28.0	1,070	2,480	4,840	0.0310 J	
		Apr-16			531	1,180	2.96	29.4	1,110	2,250	5,220	<0.197	
		Oct-16			553	1,200	3.26	28.6	1,130	2,490	6,010	0.0470 JB	
	MW-77	Apr-14			627	781	3.50	72.1	1,540	3,390	8,060	2.85	
		Nov-14			630	500	2.70	84.0	1,300	4,100	8,200	<0.02	
		Apr-15			609	10.8 J	4.21	72.1	1,410	37.7 J	5,350	<0.2	
		Oct-15			557	433	2.42	82.5	1,490	4,820	7,510	0.211	
		Apr-16			589	378	3.03	82.9	1,610	4,010	7,110	0.4060 J	
		Oct-16			579	294	3.14	82.1	1,380	4,000	7,850	0.0470 JB	
	MW-78	Mar-13			286	655	19.7	22.7	660	2,270	5,260	2.51	
		Apr-14			542	215	10.9	25.2	524	2,650	5,760	<0.150	
		Apr-15			576	63.2	0.0979 J	18.9	320	19.6 J	2,560	4.24	
		Apr-16			659	72.5	9.96	22.9	540	2,690	5,270	<0.197	
	MW-79	Apr-14			599	1,810	8.56	9.27	1,510	2,690	6,920	12.5	
		Nov-14			650	1,600	5.80	8.60	1,100	2,500	5,600	2.90	
		Apr-15			649	1,570	5.52	7.98	1,150	2,930	5,660	1.9 J	
		Oct-15			517	1,440	6.43	7.61	857	2,440	5,210	0.147	
		Apr-16			603	1,390	7.08	8.43	1,140	2,040	5,320	1.87	
		Oct-16			525 V	1,380	7.01	7.28	869 V	2,000	5,180	0.070 JB	
	MW-80	Mar-13			635	1,310	3.82	4.02	911	2,260	5,130	<1.00	
		Apr-14			645	1,470	3.62	3.84	983	2,070	6,080	2.73	
		Apr-15			693	1,600	3.15	3.08 J	1,210	2,700	5,600	0.519	
		Apr-16			875	1,970	3.30	4.07 J	1,240	2,270	6,340	0.523 J	
	MW-81	Mar-13			560	1,260	7.57	6.47	915	2,070	4,950	12.2	
		Mar-13	FD		563	1,280	7.66	6.57	903	2,120	5,040	4.61	
		Apr-14			111	1,140	8.13	9.51	255	2,350	6,500	79.1	
		Apr-15			583	1,110	6.20	9.40	1,380	2,800	6,260	99.5	
		Apr-16			687	1,120	5.93	12.2	1,690	2,790	6,730	105	
	MW-82	Mar-13			298	1,520	19.2	10.3	1,890	2,600	6,270	<1.00	
		Apr-14			279	2,880	18.2	9.55	1,800	3,910	6,260	<0.150	
		Apr-14	FD		286	1,510	18.0	9.02	1,810	2,070	5,460	<0.150	
		Apr-15			284	1,110	10.7	9.28	1,700	2,200	5,770	<0.0200	
		Apr-16			350	1,360	12.1	9.87	1,790	2,350	5,410	0.262 J	
	MW-83	Apr-14			484	271	4.58	53.8	616	3,920	7,400	4.54	
		Nov-14			520	14.0	3.90	56.0	410	4,200	6,400	<0.02	
		Apr-15			566	55.5	3.96	58.4	364	32.7 J	4,810	<0.2	
		Oct-15			388	202	7.32	34.0	271	3,210	4,530	0.0860 J	
		Apr-16			483	769	4.80	36.7	563	3,770	4,980	<0.197	
		Oct-16			417	11.0	6.99	45.9	139	3,300	4,610	0.101	
	MW-84	Apr-14			698	1,620	6.07	8.80	1,750	3,660	10,500	<0.150	
		Nov-14			610	1,300	5.20	14.0	1,600	5,800	11,000	0.140	
		Apr-15			555	1,460	4.41	7.41	1,480	4,620	4,230	<0.2	
		Oct-15			596	1,070	8.23	17.0	1,580	7,300	12,400	4.83	
		Apr-16			643	1,410	5.54	10.2	1,840	4,550	9,480	<0.197	
		Oct-16			561	1,230	5.96	12.2	1,460	5,280	9,560	0.048 J	
	MW-87	Apr-14			662	5,340	1.50	28.6	3,120	4,760	13,600	2.11	
		Nov-14			750			26.0	2,700				
		Apr-15			740	4,880	1.19	27.3	3,190	4,390	13,800	0.241	
		Oct-15			737			26.5	3,250				
		Apr-16			728 V	4,180	1.40	27.9 V	3,230 V	4,310	12,000	<0.197	
		Oct-16											
	MW-88	Apr-14			377	2,000	1.26	3.11	1,330	2,820	7,340	<0.150	
		Nov-14			570			3.00	1,300				
		Apr-15			519	3,000	1.80	2.66 J	2,250	4,970	11,000	<0.0200	
		Oct-15			397			3.03	1,270				
		Apr-16			417	1,610	1.22	3.10 J	1,220	2,600	5,800	<0.197	
		Oct-16											

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
Evaporation Ponds	MW-120	Apr-14			587	2,180	3.56	3.99	1,470	3,430	8,000	<0.150	
		Nov-14			850	2,800	2.00	5.00	1,900	3,600	8,700	1.80	
		Apr-15			677	2,480	2.49	3.92 J	1,620	3,080	7,660	2.49	
		Oct-15			860 J	3,640	2.38	3.60	1,790 J	3,100	9,720	0.0350 J	
		Apr-16			939	3,690	2.56	4.25 J	1,910	2,510	9,100	<0.197	
		Oct-16			919	3,830	2.68	3.71	1,520	2,410	9,080	0.047 JJ6	
	MW-121	Apr-14			750	1,880	3.85	3.15	922	2,210	6,040	2.41	
		Nov-14			720	1,400	3.20	3.40	940	3,100	6,100	3.8 J6	
		Apr-15			642	1,370	3.69	2.67	854	2,740	6,040	2.08	
		Oct-15			619	1,220	4.24	3.38	942	3,360	6,290	2.96	
		Apr-16			718	1,520	4.34	3.39 J	968	3,790	5,550	2.13	
		Oct-16			588	1,150	5.24	3.18	834	3,070	5,470	1.69	
	MW-122	Apr-14			492	1,370	3.53	5.14	1,050	2,190	5,740	<0.150	
		Nov-14			860	4,200	2.10	5.90	3,900	5,700	16,000	0.940	
		Apr-15			658	2,970	3.38	5.51 J	2,660	4,380	10,700	0.229	
		Oct-15			382	1,580	3.29	4.06	1,090	2,560	5,700	0.0380 J	
		Apr-16			549	1,920	3.57	4.78 J	1,350	3,430	6,700	0.499 J	
		Oct-16			491	1,760	3.29	4.31	1,160	2,270	5,730	0.028 J	
	MW-123	Apr-14			539	1,680	1.21	4.25	1,170	2,050	5,900	<0.150	
		Nov-14			580	1,400	1.00	3.90	1,100	2,300	5,600	<0.02	
		Apr-15			532	1,560	1.16	3.84 J	1,120	2,220	5,650	<0.0200	
		Oct-15			527	1,710	1.11	3.71	1,190	2,360	5,490	0.27 J	
		Apr-16			570	1,880	1.09	3.73 J	1,320	2,410	5,850	<0.197	
		Oct-16			510	1,600	1.20	3.59	1,090	2,420	4,990	0.047 J	
	MW-124	Apr-14			798	3,380	0.968	6.94	1,610	3,800	10,000	<0.150	
		Nov-14			820	3,000	0.660	7.10	1,700	3,800	9,500	<0.02	
		Apr-15			779	3,240	0.922	6.80	1,970	3,610	11,400	0.0265 J	
		Oct-15			780	3,210	0.915	7.41	1,840	4,120	10,100	0.0310 J	
		Apr-16			929	1,490	1.20	8.45	2,150	1,720	9,800	0.415 J	
		Oct-16			719	3,270	1.31	6.37	1,670	3,930	9,340	0.047 J	
	OCD-1R	Apr-14			656	3,940	3.40	4.52	3,000	3,410	11,400	0.808 J	
		Nov-14			840	5,800	1.10	4.10	4,700	6,300	11,000	1.10	
		Apr-15			837	5,290	2.50	4.95 J	4,050	4,860	14,900	1.29	
		Oct-15			641	3,100	2.78	4.86	2,660	3,710	9,160	0.144	
		Apr-16			641	2,570	2.90	4.54 J	2,220	3,550	8,960	0.928 J	
		Oct-16			701	2,560	3.36	4.76	1,800	3,060	8,900	0.053 JB	
	OCD-2A	Apr-14			662	2,490	0.770	4.78	1,460	2,060	7,300	<0.150	
		Nov-14			840			4.5	2,700				
		Apr-15			788	2,960	0.969	5.05	1,600	2,740	8,340	0.264	
		Oct-15			707			7.05	1,490				
		Apr-16			678	1,800	0.705	5.98	1,340	2,750	5,870	0.417 J	
		Oct-16											
	OCD-3	Apr-14			514	990	0.768	13.4	680	2,000	5,160	<0.150	
		Nov-14			760			13.0 J5	1,700 O1V				
		Apr-15			659	1,610	1.02	12.6	1,060	2,240	6,070	0.0878 J	
		Oct-15			760			14.1	904				
		Apr-16			746	1,640	0.899	14.5	1,100	3,080	5,890	<0.197	
		Oct-16											
	OCD-4	Apr-14			818	5,370	0.787	37.1	2,520	2,880	12,900	<0.150	
		Nov-14			1,100			36.0	3,400				
		Apr-15			1,010	5,850	0.506	36.5	3,590	4,550	12,900	<0.0200	
		Oct-15			833			33.2	2,560				
		Apr-16			927	5,320	0.608	36.2	3,400	3,610	12,700	0.446 J	
		Oct-16											
	OCD-5	Apr-14			744	4,810	0.613	35.7	2,580	2,710	12,400	<0.150	
		Apr-14	FD		694	5,250	0.670	35.1	2,400	2,970	11,900	<0.150	
		Nov-14			1,000	5,100	0.420	35.0	3,500	3,400	12,000	<0.02	
		Apr-15			901	4,490	0.691	39.6	2,930	3,090	10,800	0.0434 J	
		Oct-15			836	4,700	0.548	39.6	3,130	3,430	12,000	0.0380 J	
		Apr-16			900	5,030	0.774 J3J6	41.2	2,960	3,780	9,960	0.222 J	
		Oct-16			851	4,700	0.892	39.0	2,830	3,080	12,700	0.052 JBJ6	
	OCD-6	Apr-14			806	4,500	2.34	13.4	3,120	2,770	11,900	0.232 J	
		Nov-14			780	2,900	2.50	11.0	1,700	2,600	7,700	<0.02	
		Apr-15			779	4,050	1.85	15.5	2,470	3,320	10,300	0.211	
		Oct-15			756	4,510	2.09	15.0	3,380	3,400	10,700	0.0280 J	
		Apr-16			866	4,440	2.47	17.0	2,700	3,410	10,600	1.22	
		Oct-16			790	4,110	2.79	14.1	2,600	2,850	10,200	0.092 J	
	OCD-7AR	Apr-14			646	2,290	2.74	6.92	2,250	3,450	8,060	<0.150	
		Apr-14	FD		651	2,890	2.82	7.22	2,220	4,330	8,700	<0.150	
		Nov-14			700	2,800	3.50	6.60	2,500	3,900	9,100	0.150	
		Apr-15			609	2,110	2.91	5.52	2,050	3,650	8,260	0.260	
		Oct-15			635	2,490	2.55	5.83	2,870	4,500	8,960	0.025 J	
		Apr-16			694	2,550	2.78	6.27	2,580	4,740	8,480	1.03	
		Oct-16			596	3,020	3.50	5.78	2,410	4,870	8,860	0.043 J	
	OCD-7B	Mar-13			552	867	1.33	12.2	650	2,270	4,670	<1.00	
		Apr-15			641	910	0.852	11.9	685	2,580	4,520	<0.0200	
	OCD-8A	Apr-14			671	3,200	2.04	8.7	2,170	3,690	10,300	<0.150	<0.00500
		Apr-14	FD		657	3,030	1.92	8.73	2,260	3,330	9,780	<0.150	<0.00500
		Nov-14			1200	6,300	1.70	13	3,500	3,500	13,000	<0.02	<0.0018
		Apr-15			1190	6,270	0.826	10.8	3,330	3,620	13,700	<0.0200	<0.00180
		Oct-15			946	5,140	1.36	11	2,870	3,690	11,900	<0.0197	<0.00180
		Apr-16			762	3,480	1.88	9.09	2,410	3,630	11,000	<0.197	<0.00180
		Oct-16			680	3,270	2.39	9.22	2,380	3,660	9,600	0.0870 J	0.00182 J
	OCD-8B	Apr-13			716	2,180	0.980	8.75	1,330	2,880	7,400	<1.00	
		Apr-15			680	2,020	0.934	9.51	1,520	2,910	7,110	0.0233 J	
Field East of Refinery	KWB-1A	Apr-14			583	459	0.916	1.28	206	2,440	5,180	<0.150	<0.00500
		Nov-14			590	470	1.00	0.99 J	220	2,800	4,500	1.40	<0.0018
		Apr-15			596	555	1.17	1.01	202	3,400	5,320	4.22	<0.00180
		Oct-15			549	539	1.15	1.09	230	2,800	4,580	0.666 J	<0.00180
		Apr-16			619	575	1.26	1.37 J	271	3,080	4,990	4.61	<0.00120
		Oct-16			553	553	1.21	1.21	274	2,950	4,600	0.514 B	<0.00180
	KWB-1C	Apr-13			474	380	1.03	5.68	161	2,150	4,420	1.75	
		Apr-15			619	1,160	25.3	1.23	210	2,920	5,340	0.180	
	KWB-7	Nov-14			360	440	0.780	0.26 J	280	1,000	2,800	<0.02	<0.0018
		Apr-15			279	301	0.754	0.209 J	238	886	2,100	<0.2	<0.00180 J
		Oct-15			320	358	0.813	0.152 J	252	1,120	2,570	0.202 J	<0.00180
		Apr-16			325	281	0.917	0.236 J	248	953	2,830	<0.197	0.00500 J
		Oct-16			355	420	0.933	0.194 J	281	1,160	3,030	0.0580 JB	<0.00180
	KWB-8	Oct-16			251	579	0.467	0.351 J	443	701	3,120	0.0380 JB	<0.00900

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
Field East of Refinery	KWB-10R	Nov-14			170	190	0.590	0.51 J	160	<0.077	1,200	<0.02	
		Apr-15			132	800	19.7	0.44 J	141	1.03 J	1,190	<0.2	
		Oct-15			132	192	1.31	0.491 J	136	0.117 J	1,090	0.0420 J	
		Apr-16			149	190	1.42	0.573 J	153	<0.0774	1,090	<0.197	
		Oct-16			148	189	1.28	0.548 J	135	110	1,160	0.364 B	
	KWB-11A	Nov-14			720	1,200	0.590	0.79 J	400	1,100	4,700	47.0	<0.0018
		Nov-14	FD		740	1,500	0.590	0.81 J	430	1,400	4,500	46.0	<0.0018
		Apr-15			568	1,270	0.580	0.305 J	370	2,280	4,020	15.7	<0.00180 J
		Oct-15			674	1,620	0.660	0.748 J	406	1,570	5,320	49.3	<0.00180
		Apr-16			710	1,600	0.642	0.797 J	426	1,570	5,840	42.4	0.023
		Oct-16			647	1,460	0.742	0.719 J	450	1,590	5,940	30.9	<0.00180
	KWB-11B	Apr-14			396	291	0.291	2.15	77.4	1,250	2,480	2.25	<0.00500 H
		Nov-14			450	240	0.400	2.20	86.0	1,400	2,100	2.40	<0.0018
		Apr-15			469	275	0.318	2.12	93.0	1,760	2,630	2.80	<0.00180 J
		Oct-15			410	247	0.467	2.07	80.6	1,340	2,350	2.17	<0.00180
		Apr-16			438	218	0.441	2.11 JO1	81.3 V	1,200	2,160	2.43	<0.00120
		Oct-16			408	239	0.479	2.00	81.0	1,290	2,410	2.17	<0.00180
	KWB-12A	Nov-14			590	140	0.470	0.89 J	140	2,300	3,400	4.30	<0.0018
		Nov-14	FD		610	130	0.450	0.67 J	150	2,400	3,700	4.30	<0.0018
		Apr-15			528	668	18.5	0.723 J	128	2,380	3,660	4.31	<0.00180
		Apr-15	FD		493	133	0.605	0.63 J	123	2,110	3,630	4.34	<0.00180
		Oct-15			560	138	0.618	0.963 J	155	2,730	3,490	4.55	<0.00180
		Apr-16			579	539	0.879	0.811 J	155	2,360	3,670	6.18	<0.00180
		Oct-16			549	163	0.757	1.15	161	2,400	3,930	7.34	<0.00180
	KWB-12B	Apr-14			526	122	0.296	0.756	138	2,130	3,800	5.56	<0.00500
		Apr-14	FD		569	129	0.291	0.795	143	2,070	3,620	5.55	<0.00500
		Nov-14			650	120	0.310	0.720 J	170	2,400	3,600	4.50	<0.0018
		Apr-15			549	689	20.2	0.523 J	130	2,520	3,730	3.80	<0.00180
		Oct-15			537	124	0.398	0.537 J	131	2,580	3,320	4.77	<0.00180
		Oct-15	FD		538	123	0.430	0.569 J	127	2,450	3,270	4.82	<0.00180
		Apr-16			528	121	0.438	0.466 J	132	2,520	3,600	6.42	<0.00120
		Apr-16	FD		500	108	0.459	0.445 J	123	1,930	3,930	4.30	<0.00120
		Oct-16			497	129	0.500	0.565 J	128	2,210	3,620	5.44	<0.00180
		Oct-16	FD		505	116	0.474	0.584 J	129	2,190	3,740	5.56	<0.00180
	KWB-P4	Apr-13											
		Apr-15											
	MW-57	Apr-14			674	152	0.395	11.2	118	464	1,700	<0.150	
		Nov-14			570	540	1.80	1.20	440	1,900	4,100	2.70	
		Apr-15			641	1,430	22.3	1.57	460	2,890	6,010	16.2	
		Oct-15			487	541	1.69	1.16	342	2,050	3,330	12.9	
		Apr-16			593	386	2.02	1.59 J	368	2,350	3,660	11.0	
		Oct-16			538	210	2.99	2.00	387	2,710	4,730	33.3	
	MW-58	Nov-14			340	140	1.40	0.55 J	66.0	160	1,300	<0.02	<0.0018
		Apr-15			200	149	1.15	0.317 J	58.8	9.63	1,150	<0.2	<0.00180
		Oct-15			234	239	1.35	0.459 J	71.5	4.8 J	1,240	<0.197	<0.00180
		Apr-16			262	278 J	1.24	0.421 J	123	134	1,510	0.518 J	<0.00120
		Oct-16			210	174	1.57	0.392 J	94.2	3.77 J	1,140	0.062 JB	<0.00180
	MW-111	Apr-14			214	525	1.01	0.456	198	235	2,020	0.153 J	
		Nov-14			260	510	2.00	0.49 J	220	250	1,700	<0.02	
		Apr-15			270	427	1.01	0.521 J	172	294	1,600	<0.0200	
		Oct-15			227	408	1.51	0.415 J	222	473 J	1,530	0.0220 J	
		Apr-16			248	402	1.33	<0.185	229	355	2,130	0.0640 J	
		Oct-16			224	426	1.39	0.222 JB	192	390	1,820	0.088 JB	
	MW-112	Nov-14			190	230	1.00	0.31 J	190	5.40	1,200	<0.02	
	MW-113	Apr-14			300	205	0.282	1.45	152	693	2,440	<0.150	
		Nov-14			300	180	0.560	0.4 J	160	800	1,900	<0.02	
		Nov-14	FD		320	190	0.490	0.4 J	170	860	2,000	<0.02	
		Apr-15			285	194	0.606	0.526 J	151	957	2,030	<0.0200	
		Apr-15	FD		259	191	0.607	0.622 J	132	877	1,980	<0.0200	
		Oct-15			287	197	0.503	0.528 J	153	1,000	2,020	0.243 J	
		Oct-15	FD		288	197	0.493	0.529 J	156	998	2,140	<0.197	
		Apr-16			314	199	0.294 J3	0.611 J	154	1,090	2,370	0.393 J	
		Apr-16	FD		327	207	0.389	0.612 J	167	1,080	2,400	0.0480 J	
		Oct-16			298 V	182	0.488	0.429 J	156	925	2,150	0.047 JB	
		Oct-16	FD		299	195	0.594	0.408 J	160	945	2,240	0.051 JB	
	MW-125	Apr-14			636	361	1.17	1.56	297	2,700	4,960	0.399 J	
		Nov-14			610	340	1.0000	1.30	260	2,900	4,100	0.200	
		Apr-15			523 J	329	1.17	1.21	217	2,680	4,700	0.295	
		Oct-15			524	316	1.22	1.31	224	2,750	4,200	0.348 J	
		Apr-16			577	342	1.18	1.39 J	245	2,900	4,440	0.537 J	
		Oct-16			530	294	1.25	1.33	220	2,660	4,370	0.247 B	
	MW-126A	Apr-14			472	331	0.599	3.09	197	2,080	4,510	<0.150	
		Nov-14			360	190	0.980	0.66 J	180	1,400	2,400	<0.02	
		Apr-15			355	898	0.833	0.602 J	189	1,530	2,900	<0.2	
		Oct-15			281	200	1.03	0.511 J	178	1,300	2,500	<0.197	
		Apr-16			342	245	1.02	0.465 J	124	1,270	2,360	0.258 J	
		Oct-16			192	78.9	1.28	0.379 J	132	875	1,860	0.139 B	
	MW-126B	Apr-14			354	341	0.795	0.531	196	1,600	4,030	<0.150	
		Nov-14			600	290	0.680	2.40	210	2,400	3,500	0.390	
		Apr-15			548	319	0.658	2.1 J	196	2,550	3,660	0.684 J	
		Oct-15			531	295	0.850	2.18	201	2,330	4,060	0.438 J	
		Apr-16			574	314	0.837	2.54 J	214	2,700	3,590	0.737 JB	
		Oct-16			542	286	0.862	2.19	220	2,210	3,650	0.295 B	
	MW-127	Apr-14			185	275	0.950	0.612	145	392	2,040	<0.150	
		Nov-14			290	240	0.930	0.99 J	160	620	1,800	<0.02	
		Apr-15			238	209	0.902	0.579 J	147	511	1,750	<0.2	
		Oct-15			234	243	1.06	0.256 J	143	642	1,900	<0.197	
		Apr-16			244	245	1.10	0.335 J	153	552	1,910	<0.197	
		Oct-16			248	237	1.14	0.282 J	146	713	3,840	0.049 JB	
	MW-128	Apr-14			207	283	0.991	0.515	106	172	1,380	<0.150	
		Nov-14			250	320	1.10	1.20	110	250	1,400	<0.02	
		Apr-15			214 J	307	1.22	0.414 J	104	290	1,490	<0.0200	
		Oct-15			202	282	1.22	0.341 J	105	280	1,560	<0.197	
		Apr-16			1010	266	1.22	1.92 J	560	286	1,580	1.28	
		Oct-16			203	249	1.28	0.586 J	108	280	1,470	0.046 JB	
	MW-129	Nov-14			270	320	0.980	0.8 J	210	52.0	1,300	<0.02	
		Apr-15			192	302	0.900	0.53 J	195	69.4	1,330	<0.2	
		Oct-15			169	313	1.08	0.315 J	194	57.8	1,280	<0.197	
		Apr-16			170	300	1.10	0.331 J	210	44.1	1,520	<0.197	
		Oct-16			162	293	1.13	0.270 J	198	44.1	1,340	0.077 JB	

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
Field East of Refinery	MW-130	Apr-14			321	316	0.533	1.34	284	1,020	3,080	0.975 J	
		Nov-14			310	250	0.730	1.00	310	1,200	2,600	0.350	
		Apr-15			81.8 J	259	0.952	6.71	125	1,080	3,710	0.471	
		Oct-15			261	237	0.829	0.688 J	293	1,200	2,380	0.495 J	
		Apr-16			281	293	0.907	0.870 J	324	1,030	2,570	3.82 J6	
		Oct-16			260	253	0.914	0.695 J	285	1,110	2,600	0.631	
	MW-131	Apr-14			147	337	0.637	0.573	150	12.2	1,360	<0.150	
		Nov-14			200	290	0.470	0.64 J	160	8.30	1,200	<0.02	
		Apr-15			168	271	0.683	0.328 J	157	9.57	1,980	<0.0200	
		Oct-15			197	295	0.787	0.622 J	161	16.1	1,180	0.0380 J	
		Apr-16			158	288	0.774	0.238 J	167	9.49	1,250	<0.197	
		Oct-16			158	291	0.868	0.250 J	158	9.61	1,270	0.053 JB	
	MW-133	Nov-14			200	170	1.10	0.46 J	140 V	140	1,300	<0.02	
		Apr-15			163	174	1.19	0.323 J	122	116	1,190	<0.2	
	MW-134	Apr-14			569	459	0.952	1.94	273	2,650	5,540	2.64	
		Nov-14			660	580	0.910	1.80	310	3,100	4,600	7.40	
		Apr-15			840	767	1.24	2.21 J	454	3,470	5,520	8.15	
		Apr-15	FD		710	752	1.35	1.46	307	3,380	6,400	8.04	
		Oct-15			532	521	1.31	1.60	302	2,980	5,040	3.33	
		Oct-15	FD		529	516	1.32	1.58	301	3,030	4,690	2.98	
		Apr-16			576 V	498	1.24	1.70 J	311 V	2,800	4,560	2.79	
		Apr-16	FD		565	497	1.24	1.69 J	303	2,780	4,910	2.73	
		Oct-16			518	460	1.23	1.60	288	2,980	5,020	2.10	
		Oct-16	FD		512	473	1.18	1.58	286	2,910	4,860	2.28	
	MW-135	Apr-14			618	1,030	0.739	1.58	507	2,090	5,700	47.3	
		Nov-14			840	1,300	0.780	2.80	570	2,500	5,600	69.0	
		Apr-15			848	1,100	0.764	1.42 J	552	2,170	5,040	67.8	
		Oct-15			677	1,380	1.17	1.32	544	2,460	5,800	76.9	
		Apr-16			2780	1,010	0.993	5.74	2,640	2,470	5,320	34.7	
		Oct-16			590	1,310	1.18	0.993 J	624	2,500	5,980	58.9	
	RA-4196	Apr-14			813	137	0.375	2.15		1,100	2,600	<0.150	
		Apr-15			391	144	0.410	2.07	93.4	1,400	2,170	<0.0200	
		Oct-15			417	145	0.324	2.26	104	1,470	2,290	0.269 J	
		Apr-16			422	122	0.344	2.36 J	103	1,150	2,800	0.0700 J	
		Oct-16			382	151	0.299	2.11	103	1,310	2,410	0.0490 JBJ6	
	RA-4798	Apr-14			412	137	0.389	2.07		1,270	2,340	2.73	
		Apr-14	FD		489	146	0.370	2.49		1,150	2,280	<0.150	
		Nov-14			400	150	0.330	2.20	110	1,400	2,200	1.50	
		Apr-15			465	183	0.415	2.21	128	1,740	2,740	0.936	
		Oct-15			396	142	0.335	2.12	105	1,520	2,230	1.53	
		Apr-16			449	142	0.347	2.40 J	117	1,290	2,290	1.28	
		Oct-16			437	174	0.359	2.27	129	1,560	2,880	0.930	
	RW-12R	Apr-16			448	174	0.334	0.437 J	181	1,610	3,130	0.326 J	
	RW-13R	Apr-16			202	222	0.691	0.346 J	167	341	1,190	0.0460 J	
	RW-18	Apr-13			474	411	2.400	1.13	226	3,230	5,820	3.24	
		Apr-14			545	347	1.78	0.984	218	2,860	5,600	3.33	
		Apr-15			482	232	2.46	1.30	230	3,670	4,440	6.55	
		Apr-16			542	193	2.85	1.13 J	186	3,800	4,640	2.79	<0.00120
	RW-20	Apr-15			228	256	0.53	<0.18	228	125	1,430	<0.2	
	RW-22	Apr-15			184	402	0.86	0.319 J	274	78.4	1,680	<0.2	
North Refinery	MW-23	Apr-14			88.3	509	1.33	1.12	483	24.0	1,940	<0.150	
		Nov-14			260	920	2.40	1.30	740	740	4,000	<0.02	
		Apr-15			222	864	1.63	0.562 J	577	509	3,030	0.0259 J	
		Oct-15			114	480	1.72	1.92	463	29.9	2,190	2.7 J	
		Apr-16			110	500	1.81	2.14 J	561	1.84 J	1,990	<0.197	
		Oct-16			259	445	1.58	2.16	430	0.536 J	2,140	<0.197	
	MW-29	Apr-14			539	319	2.66	9.84	293	2,450	4,860	<0.150	
		Nov-14			570	320	1.80	4.60	300	2,500	4,100	<0.02 J6	
		Apr-15			427	283	0.795	1.52	207	2,100	1,000	<0.0200	
		Oct-15			397	115	0.722	0.823 J	167	2,080	3,330	<0.197	
		Apr-16			465	134	1.04	1.29 J	210	2,620	3,830	0.105 J6	
		Oct-16			398	282	0.919	0.964 J	227	1,660	3,210	0.502 J	
	MW-39	Oct-13			89.9	385	2.31	0.353	1,080	893	3,600	<0.500	
		Apr-15			509	190	3.09	3.62 J	179	1,380	2,640	<0.2	
		Oct-15			432	152	2.48	3.14	133	1,660	2,960	0.300 J	
		Apr-16			113	305	2.68	0.459 J	1,290	951	4,010	0.530 J	
		Oct-16			189	334	2.35	0.546 J	1,510	2,360	5,950	<0.197	
	MW-40	Apr-13			374	153	1.34	1.34	109	1,220	2,720	<1.00	
		Apr-14			386	179	1.28	1.56	124	1,340	2,700	<0.150	
		Apr-15			571	298	1.66	1.89 J	134	1,380	2,640	<0.2	
		Apr-16			504	146	1.70	1.76 J	127	1,680	2,670	<0.197	
	MW-41	Oct-13			232	373	1.05	0.404	425	1,170	3,140	<0.500	
		Apr-14			242	275	0.747	0.444	387	1,450	3,760	<0.150	
		Apr-15			313	290	1.07	0.648 J	501	1,410	2,710	<0.0200	
		Apr-16			258	312	1.04	0.393 J	453	1,180	2,530	<0.197	
	MW-42	Oct-13			233	697	0.987	0.535	455	862	3,610	<0.500	
		Apr-14			248	914	0.545	0.560	508	954	3,440	<0.150	
		Apr-15			309	562	0.962	0.579 J	611	1,110	3,440	<0.0200	
		Apr-16			295	457	0.867	0.617 J	601	1,090	3,010	<0.197	
	MW-43	Apr-14			205	886	0.250	0.596	531	218	2,650	<0.150	<0.0500
		Nov-14			200	750	0.780	0.61 J	590 V	98.0	2,300	<0.02	0.0025 J
		Apr-15			186	726	0.709	<0.18	511	122	2,290	<0.0200	<0.00180
		Oct-15			241	984	2.19	1.26	658	677	4,160	<0.197 J	0.081
		Apr-16			178	1,010	2.27	0.956 J	812	747	4,820	0.270 J	<0.00120
		Oct-16			212	855	2.00	1.23	664	619	4,470	<0.197	<0.0180
	MW-59	Apr-13			478	197	1.06	0.657	152	1,790	3,320	<1.00	
		Apr-14			514	176	0.475	0.643	156	1,890	3,420	<0.150	
		Apr-15			489 J	178	1.23	0.489 J	139	1,760	3,300	0.0241 J	
		Apr-16			2,370	126	1.28	2.61 J	711	1,790	3,300	0.374 J	
	MW-60	Apr-14			374	238	2.50	0.586	181	1,860	3,440	<0.150	0.140 J
		Nov-14			530	200	1.10	0.63 J	240	1,900	3,400	<0.02	<0.0018
		Apr-15			411 J	198	0.968	0.558 J	190	1,810	3,530	<0.2	<0.00180
		Apr-15	FD		403 J	241	1.07	0.541 J	186	1,910	3,710	<0.2	<0.00180
		Oct-15			395	209	0.964	0.565 J	185	1,910	3,560	<0.197	<0.00180
		Oct-15	FD		416	210	0.996	0.569 J	191 J	1,990	3,660	0.276 J	<0.00180
		Apr-16			446	212	0.568	0.624 J	227	2,090	3,980	0.0410 J	<0.00120
		Apr-16	FD		447	190	1.00	0.588 J	226	2,140	3,200	0.0650 J J6	<0.00120
		Oct-16			408	163	1.04	0.540 J	151	2,020	3,610	0.071 JB	<0.00180
		Oct-16	FD		410	162	1.05	0.509 J	149	2,050	3,280	0.066 JBJ6	<0.00180

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
North Refinery	MW-61	Apr-14		365	520	0.813	0.629	420	1,070	3,400	<0.150	
		Nov-14		470	250	1.50	1.10	290	930	2,700	<0.02	
		Apr-15		457	287	1.30	1.1 J	349	1,280	2,910	<0.2	
		Oct-15		375	179	2.61	2.28	286	2,080	2,520	<0.197	
		Apr-16		439	240	2.65	2.82 J	278	2,120	2,680	0.552 J	
		Oct-16		409	115	3.14	3.89	226	1,400	2,430	<0.197	
	MW-62	Apr-14		285	240	1.11	1.12	224	440	3,430	<0.150	
		Nov-14		160	470	1.60	1.80	480	5.50	2,100	<0.02	
		Apr-15		126	485	1.52	1.72	478	21.0	1,930	<0.0200	
		Oct-15		425	273	1.93	1.31	399	1,900	4,050	<0.197	
		Apr-16		481	276	1.92	1.42 J	456	1,850	3,830	0.322 J	
		Oct-16		371	243	1.79	1.15	359	1,390	3,460	<0.197	
	MW-67	Nov-14		240	170	0.610	0.59 J	160	380	1,600	<0.02	<0.0018
		Apr-15		194	208	0.698	0.531 J	160	329	1,510	<0.2	<0.00180
		Oct-15		192	225	0.589	0.533 J	177	311	1,450	<0.197	<0.00180
		Apr-16		202	312	0.548	0.427 J	218	281	1,790	<0.197	0.0440 J
		Oct-16		205	310	0.620	0.574 J	211	303	1,880	<0.0197 J6	<0.0180
	MW-90	Apr-14		270	162	0.892	0.928	185	1,070	2,600	<0.150	
		Nov-14		520	160	9.30	3.50	500	6,200	8,800	4.80	
		Apr-15		302	104	2.73	1.63	286	2,230	3,800	<0.2	
		Oct-15		481	22.7	6.77	2.07	135	4,530	5,130	3.44	
		Apr-16		411	85.9	6.25	1.69 J	246	3,250	5,180	0.377 J	
		Oct-16		534	74.7	8.22	1.84	142	3,610	5,730	14.7	
	MW-91	Apr-14		251	29.0	0.933	0.435	38.8	240	1,540	<0.150	
		Nov-14		460	36.0	1.30	1.00	37.0	830	2,000	<0.02	
		Apr-15		355	32.8	1.40	0.523 J	30.8	643	1,980	<0.2	
		Oct-15		361	35.7	1.34	0.686 J	35.0	854	2,280	<1.97	
		Apr-16		379	37.1	1.37	0.464 J	36.6	776	2,270	0.320 J	
		Oct-16		366	37.4	1.45	0.525 J	35.1	862	2,260	<0.0197	
	MW-92	Apr-16		130 O1	415	1.30	1.73 J	450 O1V	24.1	2,310	0.602 J	
		Oct-16		134	539	1.63	2.02	454	14.6	2,150	<0.985	
	MW-93	Apr-14		414	173	1.16	3.11	103	645	2,130	<0.150	
		Nov-14		640	200	3.10	4.70	130	1,700	3,100	<0.02	
		Apr-15		579	221	2.23	2.58 J	126	2,050	3,080	<0.0200	
		Oct-15		516	251	2.37	5.23	133	3,070	3,080	2.92 J	
		Apr-16		677	206	3.06	1.76 J	164	2,130	3,270	<0.197	
		Oct-16		553 V	200	2.78	3.45 O1	167 V	1,630	3,260	<0.197	
	MW-94	Nov-14		190	230	0.590	0.58 J	370	240	2,600	<0.02	
		Oct-15		109	245	1.01	0.224 J	355	75.8	2,530	<0.197	
		Apr-16		124	217	1.02	0.189 J	532	199	2,980	<0.197	
		Oct-16		137	172	1.04	0.467 J	319	175	2,530	<0.0197	
	MW-95	Apr-13		177	207	0.569	0.541	136	169	1,450	<1.00	
		Apr-14		177	226	0.560	0.494	143	160	1,440	<0.150	
		Apr-15		178	275	1.02	0.655 J	177	359	1,680	<0.2	
		Apr-16		191	280	0.805	0.518 J	180	326	1,670	<0.197	
	MW-96	Apr-14		154	146	0.606	0.891	234	286	1,750	<0.150	
		Nov-14		390	220	1.80	1.90	310	1,200	3,000	<0.02	
		Apr-15		208	884	1.19	1.03	224	1,730	1,680	0.211 J	
		Oct-15		230	190	1.23	1.21	244	583	1,990	0.202 J	
		Apr-16		187	159	1.18	1.10 J	234	255	1,590	0.313 J	
		Oct-16		210	169	1.19	1.03	225	456	1,990	0.023 J	
	MW-98	Apr-14		471	36.3	0.962	0.218	92.1	1,800	3,360	<0.150	
		Apr-14	FD	475	38.0	1.02	0.229	92.8	1,810	3,390	<0.150	
		Nov-14		460	32.0	1.90	0.2 J	81.0	1,600	2,800	<0.02	
		Apr-15		497	41.6	1.29	<0.18	91.5	2,010	3,040	<0.0200	
		Oct-15		427	55.7	1.53	0.134 J	74.9	1,790	3,340	<0.197	
		Apr-16		539	74.2	1.43	<0.185	89.6	1,690	3,040	<0.197	
		Oct-16		450	88.0	1.52	0.241 J	72.7	1,610	3,370	<0.197	
	MW-137	Oct-15		142	390	1.97	1.90	1,320	1,090	3,880	<0.197	0.144
		Apr-16		178	343	1.87	2.43 J	1,740	2,160	3,950	<0.197	0.348 J
		Oct-16		142	445	1.32	1.23	960	1,040	3,550	<0.197	<0.0450
	MW-138	Oct-15		139	490	1.08	1.75	410	154	1,920	<0.197	<0.00180
		Apr-16		160	571	1.13	2.03 J	568	164	2,180	<0.197	0.0290 J
		Oct-16		138	527	0.927	1.84	426	122	2,380	<0.197	<0.0450
	RW-1	Apr-15		358	224	1.33	3.57	210	1,330	2,410	<0.2	
	RW-1R	Apr-16		505	180	1.38	6.39	203	1,500	2,990	0.422 J	
	RW-2	Apr-15		726	365	1.75	5.55 J	383	3,510	5,310	<0.2	
	RW-2R	Apr-16		875	430	2.09	5.80	396	2,200	3,810	0.281 J	
	RW-7	Apr-15		252	237	1.15	1.88 J	192	19.0	1,500	<0.2	
	RW-7R	Apr-16		262	186	0.651	0.651 J	110	624	878	<0.197	
	RW-8	Apr-15		227	115	0.801	0.353 J	209	473	1,600	<0.2	
	RW-9	Apr-13		262	292	1.46	1.95	314	775	2,670	<1.00	
		Apr-14		291	318	1.10	1.57	306	1,260	3,380	<0.150	
		Apr-15		315	313	1.68	1.69	318	1,310	3,150	<0.2	
		Apr-16		336	313	1.69	1.96 J	356	1,440	3,370	1.73	
	RW-10	Apr-13		343	190	2.38	6.78	236	1,730	3,190	<1.00	
		Apr-14		324	231	2.17	5.84	227	2,060	3,420	<0.150	
		Apr-15		494	187	3.34	9.04	172	2,010	3,290	0.639	
		Apr-16		638	159	4.28	13.2	176	2,040	3,330	1.21	
	RW-16	Apr-13		580	451	4.54	1.14	522	2,700	5,350	<1.00	
		Apr-14		531	452	3.74	0.799	430	2,680	5,130	<0.150	
		Apr-14	FD	556	429	3.89	0.767	455	2,550	5,150	<0.150	
		Apr-15		641	534	4.61	1.69 J	594	3,220	5,430	2.87	
		Apr-16		604	416	3.01	1.15 J	502	3,360	5,610	2.45	
	RW-17	Apr-13		598	505	2.19	4.13	383	2,960	5,470	<1.00	
		Apr-14		585	524	1.84	3.88	405	3,280	6,100	<0.150	
		Apr-15		683	494	2.58	9.10	631	4,180	5,840	31.6	
		Apr-16		2,840	377	2.22	28.7	1,800	3,400	5,880	4.77	
North RO Reject Field	MW-117	Apr-14		646	97.0	3.03	9.29	167	2,140	4,980	<0.150	
		Nov-14		610	96.0	3.00	5.20	110	2,000	3,000	0.650	
		Nov-14	FD	640	96.0	2.40	5.00	98.0	2,200	3,300	0.640	
		Apr-15		613	87.2	3.79	5.97	102	2,220	3,670	0.372 J	
		Oct-15		478	55.4	3.40	6.44	109	1,690	2,980	0.779 J	
		Apr-16		554	94.4	3.45	5.82	112	2,060	3,390	0.349	
		Oct-16		592	272	3.57	6.90	115	2,240	3,590	0.137 JB6	
	MW-118	Apr-14		732	92.3	5.58	6.15	134	2,190	5,200	<0.150	
		Nov-14		670	160	4.9 J6	6.20	140	2,700	3,700	0.98	
		Apr-15		601	767	4.14	5.30	153	2,510	3,960	1.70	
		Oct-15		583	86.6	5.13	5.64	162	2,690	3,960	0.622 J	
		Apr-16		573	189	5.86	4.80 J	152	2,480	3,950	1.57	
		Oct-16		559	131	6.47	5.92	164	2,640	4,450	6.71	

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
North RO Reject Field	MW-119	Apr-14			680	235	2.61	1.13	140	1,980	4,200	0.176 J	
		Apr-14	FD		655	216	2.62	1.08	136	1,830	4,140	0.174 J	
		Nov-14			670	49.0	2.60	1.80	77.0	2,300	3,200	<0.02	
		Apr-15			590	48.2	1.99	0.232 J	54.5	2,040	3,030	0.292 J	
		Oct-15			624	152	2.65	0.985 J	86.3	2,290	3,500	0.437 J	
		Apr-16			595	191	2.50	0.614 J	101	1,900	3,330	0.518 J	
		Oct-16			619	280	2.91	0.991 J	132	2,010	3,690	0.189 B	
NCL	MW-18	Oct-13			456	114	2.26	13.3	64.7	1,450	3,260	21.3	<0.0200
		Apr-14			507	159	0.954	2.89	83.2	1,830	3,700	35.2	<0.00500
		Apr-15			407	185	1.45	7.18	66.7	1,600	3,110 J	36.1	<0.00180
		Apr-16			504	178	1.39	3.69 J	107	1,600	2,920	42.6	0.00200 J
	MW-45	Apr-14			524	441	0.877	4.12	348	2,130	4,640	<0.150	<0.00500
		Nov-14			590	470	1.50	4.60	360	2,000	4,300	<0.02	<0.0018
		Apr-15			605	1,260	1.44	4.47	346	2,580	5,300 J	<0.0200	<0.00180
		Oct-15			610	454	1.37	5.02	376	2,910	4,660	0.0290 J	<0.00180
		Apr-16			689	524	1.51	6.33	429	2,710	4,760	<0.197	<0.00180
		Oct-16			640	546	1.48 J6	5.30	392	2,810	4,730	0.377 B	0.00953
	MW-53	Apr-13			284	107	1.20	1.06	103	1,080	2,570	<1.00	
		Apr-14			290	95.4	0.827	0.935	87.6	1,190	2,060	<0.150	
		Apr-15			348	1,010	0.922	1.16	104	1,290	2810 J	34.5	
		Apr-16			459	346	1.06	1.42 J	161	1,340	2,890	25.3	
	MW-54A	Apr-14			354	211	0.600	0.275	69.2	666	1,800	<0.150	
		Nov-14			370	190	1.20	0.38 J	74.0	680	1,900	0.85 J	
		Apr-15			318	192	1.10	0.276 J	62.9	712	2,080 J	0.450	
		Oct-15			356	210	1.10	0.33 J	70.2	796	2,140	4.32 J	
		Apr-16			381	176	1.12	0.303 J	69.4	625	1,780	<0.197 J6	
		Oct-16			331	175	0.997	0.254 J	61.5	670	1,770	0.134 J6B	
	MW-54B	Apr-13			345	176	<0.500	1.16	48.8	747	2,050	<1.00	
		Apr-15			307	166	0.613	0.767 J	48.0	752	1,890 J	0.0276 J	
	MW-55	Apr-14			560	357	1.14	0.926	233	2,670	5,100	9.61	<0.00500
		Apr-14	FD		573	445	1.10	0.882	231	2,600	5,360	9.43	<0.00500
		Nov-14			610	190	2.40	0.9 J	130	2,300	3,600	6.5 J	<0.0018
		Apr-15			627	266	1.88	0.692 J	167	2,940	4,910 J	15.5	<0.00180
		Oct-15			411	216	1.85	0.756 J	166	2,300	4,000	5.57	<0.00180
		Apr-16			472	442	1.04	0.829 J	253	2,080	4,200	2.26	<0.00120
		Oct-16			465	219	2.09	0.732 J	174	2,190	3,810	3.65	<0.00180
	MW-56	Apr-14			559	365	0.639	1.88	237	1,840	4,320	2.32	
		Nov-14			540	340	1.20	2.10	250	1,900	3,500	<0.02	
		Apr-15			485	927	1.11	1.90	272	1,900	3,640 J	1.28	
		Oct-15			514	399	1.12	2.05	342	2,490	4,080	4.34	
		Apr-16			559 V	403	1.10	2.32 JO1	379 V	1,970	3,790	2.76	
		Oct-16			446 V	263	1.19	1.97	317 V	1,910	4,110	0.151 B	
	MW-108	Apr-14			316	101	1.58	1.07	89.3	1,130	2,820	<0.150	
		Nov-14			350	82.0	3.30	3.20	110	1,200	2,500	0.190	
		Apr-15			289	78.8	2.52	1.50	76.8	962	2,540 J	<0.39	
		Oct-15			298	77.5	2.30	1.31	88.9	1,090	2,530	<0.197	
		Apr-16			333	79.6	2.04	1.28 J	92.6	981	2,120	0.304 J	
		Oct-16			343	112	2.75	3.88	116	1,340	2,830	0.046 JB	
	NCL-31	Apr-14			267	69.6	0.776	0.321	112	1,030	2,300	<0.150	
		Nov-14			380	160	1.40	0.43 J	150	1,300	2,600	0.110	
		Apr-15			266	89.5	1.25	0.22 J	100	1,240	2,670 J	<0.2	
		Oct-15			392	129	1.20	0.418 J	125	2,100	3,220	<0.197	
		Apr-16			340	78.9	1.14	0.272 J	109	1,420	3,020	0.385 J	
		Oct-16			445	67.8	1.57	0.564 J	148	2,400	3,820	0.084 JB	
	NCL-32	Nov-14			440	460	4.60	19.0	82.0	800	2,000	0.570	
		Apr-15			446	177	1.92	4.15 J	92.6	1,050	2,250	<0.2	
		Oct-15			540	329	1.57	4.98	97.0	1,430	2,280	<0.197	
		Apr-16			697	206	2.05	7.60	115	1,340	2,740	<0.197	
		Oct-16			390	128	1.48	3.26	102	1,220	2,230	1.77	
	NCL-33	Apr-14			358	302	1.83	3.78	105	557	1,920	<0.150	
		Nov-14			450	340	2.60	5.00	110	720	2,100	<0.02	
		Apr-15			431	281	2.58	4.31 J	111	800	2,280	<0.0200	
		Oct-15			419	404	2.49	4.86	119	847	2,140	<0.197	
		Apr-16			622	280	2.82	7.58	113	1,370	3,200	0.367 J	
		Oct-16			462	400	2.65	5.28	109	900	2,790	0.075 JB	
	NCL-34A	Nov-14			250	180	1.40	0.86 J	120	100	1,200	<0.02	
		Apr-15			275	249	1.36	0.57 J	117	110	1,490	<0.2	
		Oct-15			202	182	1.43	0.877 J	103	104 J	1,250	0.284 J	
		Apr-16			347	416	1.31	2.20 J	140	82.2	1,540	0.265 J	
		Oct-16			249	238	1.43	1.27	107	95.0	1,370	0.047 JB	
	NCL-44	Apr-14			265	149	1.20	2.06	66.0	454	1,720	<0.150	
		Nov-14			290	850	1.80	2.20	70.0	450	1,500	<0.02	
		Apr-15			269	161	1.78	1.64 J	73.4	468	2,510	<0.2	
		Oct-15			276	182	1.69	2.07	71.4	633	1,890	<0.197	
		Apr-16			414	234	1.59	2.62 J	98.3	965	2,120	<0.197	
		Oct-16			373	222	1.67	2.29	94.9	1,030	2,130	0.081 JB	
	NCL-49	Apr-14			430	104	0.501	0.625	116	1,680	3,000	5.21	
		Nov-14			440	98.0	0.650	0.72 J	120	1,500	2,600	4.30	
		Nov-14	FD		430	98.0	0.590	0.75 J	120	1,700	2,600	4.50	
		Apr-15			377	109	1.64	0.552 J	105	1,400	2,840 J	4.53	
		Apr-15	FD		380	395	0.531	0.589 J	105	1,650	2,850 J	4.50	
		Oct-15			406	112	0.593	0.607 J	115	1,770	2,830	5.79	
		Oct-15	FD		407	113	0.598	0.613 J	114	1,800	2,860	5.79	
		Apr-16			468	119	0.685	0.749 J	136	1,570	2,820	5.71	
		Apr-16	FD		470	119	0.685	0.792 J	137	1,580	2,790	5.63	
		Oct-16			425	128	0.600	0.590 J	120	1,700	2,770	6.08	
		Oct-16	FD		429	130	0.600	0.597 J	122	1,670	3,290	6.01	
South Refinery	KWB-2R	Nov-14			330	160	1.20	1.20	200	1,200	2,600	<0.02	
		Apr-15			233	259	0.879	0.777 J	267	884	2,450	<0.2	
		Oct-15			168	228	1.21	1.23	296	418	1,970	<0.197	
		Apr-16			322	207	0.485	0.456 J	325	1,460	2,910	0.0340 JJ6	
		Oct-16			275	215	0.901	0.433 J	282	1,150	2,850	0.0740 JB	
	KWB-5	Nov-14			270	570	0.770	1.00	210	12.0	1,500	0.200	
		Apr-15			237	518	0.687	1.79	198	8.08	1,500	<0.0200	
		Oct-15			228	575	0.853	1.60	203	6.81	1,540	0.243 J	
		Apr-16			252	5,800	0.392	1.66 J	222	235 J	1,760	0.0400 J	
		Oct-16			228	562	0.910	1.34	220	6.46	1,560	0.046 JBJ6	

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup										
South Refinery	KWB-6	Nov-14			260	240	0.800	0.2 J	150	330	1,600	0.370	
		Apr-15			212	305	0.366	0.22 J	193	16.2	1,460	0.148	
		Oct-15			229	265	0.935	0.181 J	144	264	1,410	0.273 J	
		Apr-16			246	313	1.03	0.206 J	199	83.1	1,410	<0.197	
		Oct-16			232	280	0.977	0.219 JB	109	275	1,590	0.077 JB	
	MW-28	Apr-14			164	157	1.02	0.382	102	166	1,560	<0.150	0.0500 J
		Nov-14			590	140	0.730	0.92 J	96.0	1,300	3,000	<0.02	<0.0018
		Apr-15			439 J	160	1.59	0.685 J	89.5	1,080	2,760	<0.39	0.0132
		Oct-15			379	159	1.67	0.632 J	92.7	1,060	3,000	0.211 J	0.0108
		Apr-16			1500	135	1.42	4.06 J	450	672	3,040	0.470 J	<0.00120
		Oct-16			480	147	1.40	0.640 J	74.0	1,320	1,900	0.046 JB	<0.0180
	MW-48	Nov-14			190	410	0.290	2.40	380	260	1,800	<0.02	
		Apr-15			258 J	161	0.498	0.68 J	276	47.6	725	<0.2	
		Oct-15			186	391	0.644	2.61	355	235	1,940	<0.197	
		Apr-16			234	1110	1.45	1.80 J	314	20.5	2,950	<0.197	
		Oct-16			200	580	1.07	1.18	339	239	2,270	0.030 JB	
	MW-50	Apr-14			410	172	0.671	2.36	130	1,300	2,910	<0.150	
		Nov-14			450	200	0.830	2.30	160	1,600	2,800	<0.02	
		Apr-15			450	259	0.966	2.18	178	1,680	2,860	<0.2	
		Oct-15			403	226	0.899	2.29	175	1,740	2,770	2.61 J	
		Apr-16			645	491	3.96	8.60	969	4,280	4,580	150	
		Oct-16			546	511	3.86 J6	12.4	912	4,690	9,320	0.594	
	MW-52	Apr-14			156	223	1.57	0.204	257	820	2,580	1.19	<0.00500 H
		Apr-14	FD		161	225	1.51	0.186 J	218	821	2,510	1.38	<0.00500 H
		Nov-14			190	150	1.50	0.3 J	320	990	2,000	1.90	<0.0018
		Apr-15			168 J	158	1.88	0.252 J	267	832	3,740	1.54	<0.00180
		Oct-15			196	144	1.76	0.242 J	285	998	2,040	3.13	<0.00180
		Apr-16			778	160	1.79	1.20 J	1,350	995	1,920	1.73	<0.00120
		Oct-16			194	144	1.77	0.262 J	278	1,100	2,370	1.04	0.00182 J
	MW-64	Apr-16			109	379	1.08	0.754 J	396	39.9	1,510	<0.197	
		Oct-16			109	356	0.855	0.689 J	361	4.08 J	1,650	0.079 JB	
	MW-65	Nov-14			260	470	0.720	0.89 J	290	310	1,900	<0.02	
		Apr-15			147	382	1.21	0.783 J	257	<0.0770	1,410	0.0613 J	
		Apr-16			155 V	394	1.28	0.691 J	311 V	0.323 J	1,750	0.0490 JJ6	
		Oct-16			157	356	1.48	1.46	287	0.431 J	1,380	0.219 B	
	MW-66	Apr-14			151	209	1.12	0.785	180	<0.200 B	1,170	<0.150	<0.00500 B
		Nov-14			140	150	1.20	1.00	160	0.51 J	990	<0.02	<0.0018
		Apr-15			120	141	1.53	0.858 J	134	0.596 J	948	0.0292 J	<0.00180
		Oct-15			134	201	1.34	0.742 J	163	0.11 J	1,090	<0.197	0.00180 J
		Apr-16			600	134	1.36	4.83 J	740	0.591 J	942	0.363 J	<0.00120
		Oct-16			131	174	1.42	0.770 J	155	0.327 J	1,020	0.048 JB	<0.00180
	MW-99	Nov-14			170	180	0.420	3.90	170	140	1,100	<0.02	
		Apr-15			48.7	33.4	0.328	5.30	23.9	41.3	267	0.789	
		Oct-15			176	249	0.706	0.955 J	215	127	1,390	<0.197	
		Apr-16			805	208	0.866	6.37	1,100	153	1,410	0.0330 JJ6	
		Oct-16			137	192	0.656	3.60	168	39.0	1,200	0.035 JB	
	MW-101	Apr-14			209	217	0.779	0.504	153	161	1,440	<0.150	
		Nov-14			280	230	1.00	0.81 J	150	340	1,600	<0.02	
		Apr-15			188	201	0.708	0.485 J	141	188	1,340	<0.2	
		Oct-15			188	236	0.993	0.483 J	138	206	1,470	0.23 J	
		Apr-16			220	239	0.940	0.522 J	169	168	1,270	0.197 J	
		Oct-16			183	229	1.00	0.509 J	112	191	1,400	0.127 B	
	MW-102	Nov-14			290	220	0.610	0.8 J	430	590	2,200	<0.02	
		Apr-15			94.4	175	0.825	0.419 J	357	1.75 J	1,470	0.0642 J	
		Oct-15			193	219	1.13	0.683 J	385	296	1,750	<0.197	
		Apr-16			127	245	0.901	0.372 J	437	2.35 J	1,530	0.339 J	
		Oct-16			176	271	1.28	0.772 J	418	217	1,740	0.062 JBJ6	
	MW-103	Apr-13			19.2	661	6.88	0.759	1,120	82.2	2,800	<1.00	
		Apr-14			24.5	1,040	7.45	0.831	1,420	<10.0 B	3,820	<0.150	
		Apr-15			192	7,890	3.44	2.46 J	6,710	19.6	12,500	<0.0200	
		Apr-16			193	13,700	5.44	3.73 J	7,960	2.24 J	21,100	0.430 J	
	MW-104	Apr-14			232	86.0	2.26	5.06	95.7	690	1,390	<0.150	
		Apr-14	FD		235	82.4	2.24	5.52	91.9	679	1,440	<0.150	
		Nov-14			230	54.0	2.10	6.00	69.0	710	1,300	<0.02	
		Nov-14	FD		230	54.0	1.80	6.30	67.0	800	1,300	<0.02	
		Apr-15			208	31.4	1.67	4.73	42.7	856	1,070	<0.0200	
		Apr-15	FD		207	31.0	2.12	4.63	42.3	679	1,130	0.185	
		Oct-15			169	21.0	2.01	4.92	38.6	510	912	<0.197	
		Oct-15	FD		170	21.6	2.07	4.86	40.3	473	925	<0.197	
		Apr-16			179 V	25.9	2.49	4.96 JJ5O1	43.6 V	408	819	0.455 JB	
		Apr-16	FD		178	25.6	2.51	5.16	44.7	439	809	0.286 JB	
		Oct-16			165	72.9	1.94	4.77	38.4	322	975	0.064 JB	
		Oct-16	FD		164	73.4	1.90	4.78	37.9	323	928	0.082 JB	
	MW-105	Nov-14			660	37.0	0.960	7.00	29.0	1,300	2,400	<0.02	
		Apr-15			111	25.3	0.7 J	4.26	17.2	263	530	<0.2	
		Oct-15			148	13.4	0.330	4.41	12.0	297	664	0.221 J	
		Apr-16			257	42.0	1.48	4.55 J	52.6	278	1,300	0.414 J	
		Oct-16			227	12.7	2.06	4.97	20.7	20.6	1,050	0.105 B	
	MW-106	Apr-14			400	160	1.00	1.90	195	1,500	3,350	<0.150	
		Apr-15			197	280	6.81	10.4	162	559	1,400	22.3	
		Oct-15			373	148	1.76	2.43	221	1,790	3,420	<0.197	
		Apr-16			422	185	1.51	4.40 J	271	1,380	3,120	<0.197	
		Oct-16			347	216	1.30	1.37	240	1,410	3,080	0.053 JB	
	MW-107	Apr-14			144	261	1.20	0.562	75.2	<0.200 B	1,250	<0.150	
		Nov-14			230	300	1.70	0.73 J	83.0	160	1,200	<0.02	
		Apr-15			160 J	291	1.54	0.583 J	73.1	27.1	1,220	<0.0200	
		Oct-15			176	297	1.67	0.88 J	76.9	102	1,390	<0.197	
		Apr-16			727	277	1.67	3.22 J	381	6.07	1,850	0.376 J	
		Oct-16			186	271	1.82	0.965 J	80.1	72.4	1,480	0.170 B	
	MW-109	Apr-14			92.9	393	1.26	0.634	465	237	1,980	<0.150	
		Nov-14			280	270	2.40	1.30	490	920	2,500	<0.02	
		Apr-15			192 J	261	2.04	0.929 J	406	931	2,910	<0.39	
		Oct-15			181	232	1.81	0.862 J	438	950	2,170	<0.197	
		Apr-16			707	204	1.90	4.01 J	2,200	848	2,190	0.384 J	
		Oct-16			153	226	2.06	0.802 J	431	751	2,590	0.036 JB	
	MW-110	Apr-14			79.0	92.4	1.25	0.129 J	249	364	1,260	<0.150	
		Nov-14			100	86.0	1.50	0.14 J	270	1,100	1,200	<0.02	
		Apr-15			107 J	93.8	1.64	0.244 J	244	283	1,420	<0.0200	
		Oct-15			174	136	1.62	0.268 J	294	787	1,680	<0.197	
		Apr-16			555	99.0	1.53	1.19 J	1,380	2,100	1,360	0.765 J	
		Oct-16			115	97.6	1.50	0.150 J	276	555	1,430	0.062 JB	

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

			Analyte Group:	Water Quality Parameters								
			Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
			Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
			CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
			CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	Well ID	Date	Dup									
South Refinery	RA-313	Apr-13		166	14.8	0.699	1.11	16.4	389	824	<1.00	
		Apr-14		171	17.2	1.01	0.935		450	868	<0.150	
		Apr-15		150	19.1	0.914	1.04	17.8	605	808	<0.0200	
		Apr-16		175	17.6	0.893	1.02 J	17.3	501	881	0.680 J	
	RW-4	Apr-15		202	258	0.845	1.67	144	468	1710 J	<0.0200	
	RW-4R	Apr-16		207	351	1.06	2.00 J	290	470	1,810	0.346 J	
	RW-5R	Apr-15		4.82	260	0.965	0.461 J	189	0.376 J	565	<0.0200	
		Apr-16		4.61 J	262	0.564	0.364 J	203	0.655 J	399	0.495 J	
	RW-6	Apr-15		168	414	0.628	0.686 J	205	129	1,650	0.0335 J	
	RW-6R	Apr-16		191	405	0.747	0.356 J	226	104	1,470	0.485 J	
South RO Reject Field	MW-114	Apr-14		611	167	2.07	2.84	152	1,920	3,620	<0.150	
		Nov-14		620	200	2.20	2.70	130	2,300	3,400	0.360	
		Apr-15		570 J	80.3	1.95	2.29	114	2,140	3,640	0.0752 J	
		Oct-15		579	111	1.89	2.46	104	2,250	2,990	<0.197	
		Apr-16		681	88.6	1.87	2.59 J	126	1,170	3,710	0.416 J	
		Oct-16		569	231	2.03	2.49	89.3	2,100	4,050	4.69	
	MW-115	Apr-14		569	222	1.29	0.645	227	2,470	4,880	<0.150	
		Nov-14		690	500	1.50	0.72 J	340 V	3,000	5,700	<0.02	
		Apr-15		546 J	464	2.42	0.425 J	385	3,510	6,200	0.0333 J	
		Oct-15		532	326	2.80	0.578 J	320	3,640	4,640	<0.197	
		Apr-16		2410	153	1.93 J6	2.64 J	1,290	2,020	5,390	0.375 J	
		Oct-16		541	382	2.69	0.395 JB	144	2,750	4,990	0.113 B	
	MW-116	Apr-14		607	221	1.43	1.39	241	2,160	4,520	2.86	
		Nov-14		580	240	1.70	1.60	230	2,200	3,700	0.740	
		Apr-15		534 J	131	2.28	3.57	92.1	1,800	3,300	0.0753 J	
		Oct-15		644	223	2.80	5.67	145	2,280	3,800	<0.197	
		Apr-16		719	500	1.33	1.63 J	259	3,300	4,580	0.473 J	
		Oct-16		569	196	2.91	4.26	114	2,040	3,500	0.048 JB	
TEL	MW-49	Apr-14		189	366	0.896	1.60	338	472	2,280	<0.150	<0.00500 B
		Nov-14		280	380	1.60	3.30	320	500	2,100	<0.02	<0.0018
		Apr-15		197	423	1.18	2.04	309	665	2,340	<0.2	<0.00180
		Oct-15		192	381	1.45	2.48	326	621	2,260	<0.197	0.00280 J
		Apr-16		203	368	1.38	2.19 J	347	584	2,270	0.0580 J	<0.00180 J3J6
		Oct-16		206	364	1.50	2.45	329	602	1,860	0.179 BJ6	<0.00900
	TEL-1	Apr-14		383	228	2.00	1.35	460	1,380	3,080	<0.150	
		Apr-14	FD	359	224	1.90	1.30	427	1,370	3,140	<0.150	
		Nov-14		600	150	3.10	1.90	340	1,900	3,600	<0.02	
		Apr-15		209	269	2.26	0.962 J	434	1,230	2,480	<0.2	
		Oct-15		479	195	2.54	1.92	374	2,060	3,390	<0.197	
		Apr-16		389	113	3.00	1.72 J	373	1,510	2,570	0.0380 J	
		Oct-16		477	51.4	3.39	2.22	155	1,710	3,090	0.0730 JB	
	TEL-2	Apr-14		158	312	1.22	1.42	378	554	2,340	<0.150	
		Nov-14		250	300	1.40	1.30	390	580	2,400	<0.02	
		Apr-15		164	949	0.914	0.945 J	372	498 J	2,390	<0.2	
		Oct-15		188	371	1.18	1.10	404	680	2,460	<0.197	
		Apr-16		224	344	1.08	0.954 J	419	825	2,720	0.0460 J	
		Oct-16		228	294	1.04	1.14	406	764	2,830	0.0390 JB	
	TEL-3	Apr-14		573	127	3.06	7.60	143	1,320	2,900	<0.150	
		Nov-14		710	50.0	3.70	6.60	49.0	1,600	2,900	<0.02	
		Apr-15		485	829	2.52	6.12	184	1,330	2,750	0.224 J	
		Oct-15		550	66.4	2.95	6.85	74.7	1,520	2,960	<0.197	
		Apr-16		473	585	2.71	7.31	364	622	2,900	0.042 J	
		Oct-16		427	25.1	3.43	5.27	20.6	1,020	1,850	0.045 JB	
	TEL-4	Apr-14		332	588	0.429	0.575	565	1,480	4,480	<0.150	
		Nov-14		380	440	1.90	0.62 J	530	1,800	4,200	<0.02	
		Nov-14	FD	360	480	1.30	0.62 J	520	2,100	4,100	<0.02	
		Apr-15		301	1,190	0.678	0.455 J	294	947	3,200	<0.2	
		Apr-15	FD	289	535	0.690	0.411 J	281	1,140	3,300	<0.2	
		Oct-15		412	347	2.55	0.934 J	657	4,000	7,150	0.385 J	
		Oct-15	FD	417	353	3.14	0.95 J	693	4,040	6,590	<0.197	
		Apr-16		410	524	1.53	0.666 J	509	2,070	4,260	0.0440 J	
		Apr-16	FD	408	519	1.53	0.618 J	515	1,980	4,040	0.0400 JJ6	
		Oct-16		370	336	1.69	0.613 J	465	2,290	5,350	0.0340 JB	
		Oct-16	FD	370	347	1.58	0.608 J	454	2,240	5,370	0.0360 JB	
TMD	MW-8	Oct-13		454	399	2.31	1.91	410	2,590	4,960	5.33	
		Apr-14		486	383	1.78	2.05	388	2,710	5,060	5.20	
		Apr-15		390	321	1.51	1.59	328	2,940	4,210	1.10	
		Apr-16		377	275	2.02	1.69 J	295	2,380	3,690	0.503 J	
	MW-16	Apr-13		503	346	2.04	9.42	363	2,000	4,710	<1.00	
		Apr-14		531	422	2.79	8.99	388	2,170	4,020	0.269 J	
		Apr-15		666	660	2.32	10.2	545	2,670	4,890	0.461	
	MW-20	Apr-13		479	347	2.27	<0.400	237	2,730	5,020	1.29	
		Apr-14		505	457	2.11	0.416	249	2,580	4,900	6.74	
		Apr-14	FD	487	440	1.72	0.419	247	2,700	4,840	6.50	
		Apr-15		510	429	1.51	0.398 J	232	3,490	4,790	5.08	
		Apr-16		594	515	2.18	0.370 J	274	2,790	4,850	8.09	
	MW-21	Apr-14		510	537	1.70	0.491	97.1	2,970	5,560	22.6	
		Nov-14		600	450	2.40	1.90	430	2,900	5,200	17.0	
		Apr-15		542	481	1.90	1.81 J	468	3,210	5,210	17.0	
		Oct-15		530	550	1.75	2.00	436	3,520	5,190	16.5	
		Apr-16		590	516	1.69	2.31 J	440	3,150	5,720	15.0	
		Oct-16		543	474	1.74	1.91	429	3,150	4,240	12.0	
	MW-25	Apr-13		325	776	1.36	3.70	469	1,320	3,120	<1.00	
		Apr-14		985	4,440	0.635	6.80	1,220	2,060	11,700	<0.150	
		Apr-15		896	6,780	1.03	8.34	3,710	5,740	17,000	0.0974 J	
		Apr-16		647	4,130	1.13	6.61	2,670	4,100	11,800	0.125	
	MW-26	Apr-13		497	378	1.83	4.86	352	2,580	4,720	<1.00	
		Apr-14		718	953	2.16	6.01	662	4,330	8,280	0.252 J	
		Apr-15		698	1,130	1.15	5.42	704	5,950	8,660	0.268	
		Apr-16		725	1,260	1.86	5.75	695	4,520	8,730	0.301	
	MW-27	Apr-13		350	139	1.44	9.67	139	1,320	2,420	<1.00	
		Apr-14		431	148	0.983	9.89	159	1,600	2,600	0.632 J	
		Apr-15		607	246	0.928	11.2	128	2,320	3,640	0.703	
		Apr-16		470	234	1.19	9.36	156	3,950	3,150	0.687	
	MW-46R	Apr-14		592	191	1.61	1.56	165	2,120	4,540	0.394 J	
		Nov-14		650	290	1.90	2.30	170	2,300	3,800	<0.02	
		Apr-15		599	288	1.24	1.82	152	2,590	3,980	0.169	
		Apr-16		645	290	1.47	1.26 J	168	2,470	3,980	0.052 JJ6	
		Oct-16		605 V	339	1.97	1.83	161	2,170	4,010	0.368	

Table 4C - Summary of Groundwater Analytical Data - Water Quality Parameters and Cyanide

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

				Analyte Group:	Water Quality Parameters								
				Analyte:	Calcium	Chloride	Fluoride	Potassium	Sodium	Sulfate	TDS	Nitrate/Nitrite	Cyanide
				Units:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
				CGWSL:	---	250	1.60	---	---	600	1,000	10.0	0.200
				CGWSL Source:		WQCC Dom	WQCC HH			WQCC Dom	WQCC Dom	USEPA MCL	USEPA MCL
Area	**Well ID**	**Date**	**Dup**										
TMD	MW-68	Apr-13			376	426	1.68	5.57	238	1,380	3,240	7.58	
		Apr-14			375	299	1.79	4.84	207	1,330	2,920	5.10	
		Apr-15			552	397	1.15	4.65	242	2,610	4,460	4.52	
		Apr-16			489	263	1.75	5.58	206	1,840	2,980	0.51	
	MW-71	Oct-13			656	1,080	1.49	3.76	472	2,790	6,250	52.3	<0.0200
		Apr-14			558	887	1.39	4.15	399	2,740	6,280	53.6	<0.00500
		Apr-15			642	906	1.09	3.59	447	3,150	6,110	50.6	<0.00180
		Apr-16			669	907	1.62	3.72 J	502	2,890	5,450	45.6	<0.00180
	MW-89	Apr-13			456	200	2.48	9.81	150	1,530	2,960	<1.00	
		Apr-14			542	248	2.40	10.5	188	2,030	3,360	1.34	
		Apr-15			528	324	3.61	13.5	302	2,200	3,720	2.34	
		Apr-16			556	399	3.58	12.0	299	1,490	3,640	3.64	
	NP-1	Apr-14			439	434	1.82	4.95	352	2,560	4,820	11.6	
		Nov-14											
		Apr-15			473	436	2.06	3.53 J	451	2,930	4,450	8.41	
		Oct-15											
		Apr-16			470	391	1.96	3.12 J	403	2,620	4,460	0.494 J	
		Oct-16											
	NP-2	Apr-13			517	379	1.70	1.63	258	2,660	5,160	1.74	
	NP-6	Apr-13											
		Apr-15											
Up-Gradient	UG-1	Apr-13			466	132	0.620	1.62	79.8	1,580	3,090	7.80	<0.0200
		Apr-14			474	126	0.580	1.59	79.6	1,720	2,960	10.1	<0.00500
		Apr-15			455 J	133	0.865	1.11	84.6	1,880	2,920	14.4	<0.00180
		Apr-16			512	102	0.926	1.07 J	99.7	1,920	4,050	17.0	0.00432 J
	UG-2	Apr-13			331	137	1.16	2.52	123	1,090	2,410	4.44	<0.0200
		Apr-13	FD		338	136	1.13	2.52	117	1,080	2,400	4.59	<0.0200
		Apr-14			403	97.1	1.14	1.75	104	1,530	2,660	3.77	<0.00500
		Apr-15			337 J	72.2	1.65	1.73	82.6	1,080	1,170	4.62	<0.00180
		Apr-16			402	86.5	1.75	2.04 J	103	1,210	2,240	5.46	0.00511
	UG-3R	Apr-13			270	20.9	0.561	1.57	42.0	785	1,590	1.11	<0.0200
		Apr-14			422	46.8	0.492	1.65	56.9	1,480	2,340	2.26	<0.00500
		Apr-14	FD		389	46.8	0.496	1.53	53.6	1,500	2,400	2.20	<0.00500
		Apr-15			420 J	27.5	0.716	2.36	59.1	1,450	1,420	1.03	<0.00180
		Apr-16			440	47.7	0.690	1.86	75.8	1,350	2,340	1.73	<0.00180
	UG-4	Apr-16			590	49.2	0.668	1.99 J	224	2,480	4,140	0.407	<0.00180

Definitions

X	Reported concentration, X, exceeds the CGWSL.
X	Analyte detected above the detection limit at a concentration equal to X
< x	Analyte not detected at detection limit equal to x.
< x	Analyte not detected at detection limit equal to x, but x exceeds the CGWSL.
	Blank cell indicates a sample was collected from the well during the indicated sampling event, but the analyte was not analyzed.
---	No applicable CGWSL

Abbreviations

CGWSL	Critical Groundwater Screening Level (see Table 3)
CGWSL Source	Source for CGWSL value (see Table 3)
Dup	Duplicate sample
FD	field duplicate sample
mg/L	milligrams per liter
USEPA MCL	United States Environmental Protection Agency Maximum Contaminant Level, "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites", November 2015
WQCC Dom	NMED Groundwater standard for domestic exposure taken from 20.6.2.3103.B
WQCC HH	NMED Groundwater standard for human health exposure, NMAC 20.6.2.3103.A

Lab Footnote

B	Analyte was also detected in the associated method blank.
H	The reported result is from a sample analyzed outside of Holding Time.
J	Indicates an estimated value.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
V	The sample concentration is too high to evaluate accurate spike recoveries.

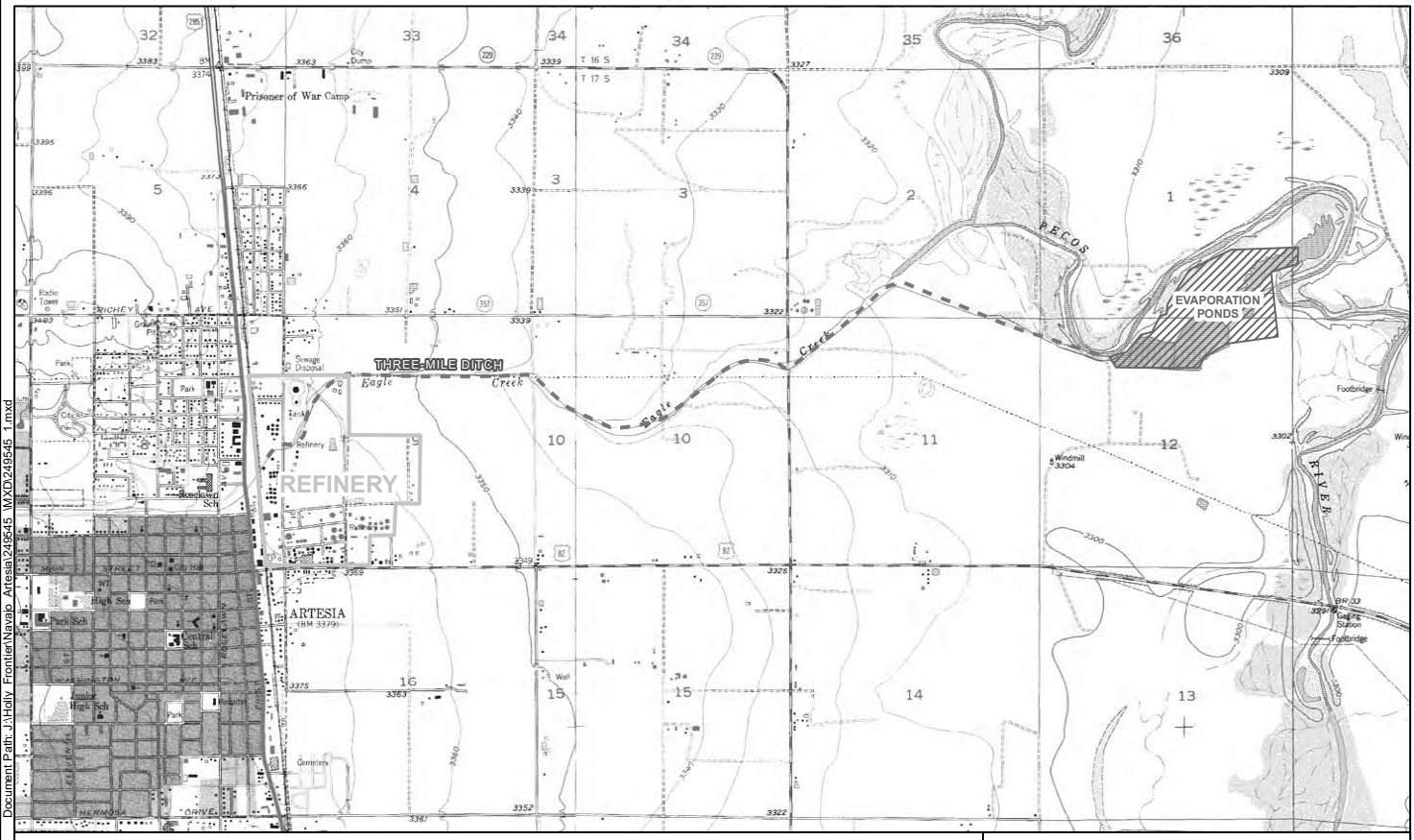
Table 5 - Summary of Production from Recovery Trenches and Wells

2016 Annual Groundwater Report

HollyFrontier Navajo Refining LLC, Artesia Refinery, Artesia, New Mexico

Recovery Well	Recovery Method	Volume of Water Recovered [1] (gallons)					Volume of PSH Recovered [1] (gallons)				
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total 2016	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total 2016
RW-1R	Automated Pump	101	16,139	0	0	16,240	0	0	0	0	0
RW-2R	Automated Pump	0	110,797	279,973	80,018	470,788	0	223	4,816	4,451	9,490
RW-4R	Automated Pump	0	1	0	5	6	0	0	0	1	1
RW-5R	Automated Pump	0	2	834	50,896	51,732	0	0	0	0	0
RW-6R	Automated Pump	0	13	2	1	16	1	0	0	0	1
RW-7R	Automated Pump	1,318,614	676,672	310,749	87,736	2,393,771	0	0	0	0	0
RW-8R	Automated Pump	421,215	280,097	152,160	713,259	1,566,731	0	4	0	0	4
RW-12R	Automated Pump	0	0	0	0	0	0	0	0	0	0
RW-13R	Automated Pump	0	1	113,481	203,602	317,084	0	0	11,251	2,160	13,411
RW-14R	Automated Pump	0	0	53	0	53	0	1	0	0	1
RW-15	Automated Pump	2,559	0	0	0	2,559	686	267	0	0	953
RW-19	Automated Pump	0	947	50	1,026	2,023	0	1	106	744	851
RW-20	Automated Pump	128,929	501,875	725,853	636,369	1,993,026	0	442	0	0	442
RW-22	Automated Pump	0	396,782	488,137	269,062	1,153,981	0	0	8,803	1	8,804
TOTAL VOLUME RECOVERED:		1,871,418	1,983,326	2,071,292	2,041,974	**7,968,010**	687	938	24,976	7,357	**33,958**

[1] Volumes of recovered water and PSH are based on automated system readings, rounded to the nearest gallon



Document Path: J:\Holly Frontier\Navajo Artesia\249545 WMXD\249545 1.mxd

SOURCE: BASE MAP USGS 7.5 MINUTE SERIES QUADS, ARTESIA AND SPRINGLAKE QUADRANGLES, 1955, PHOTOREVISED 1983.

N

0 1,600 3,200
Feet

SITE LOCATION MAP

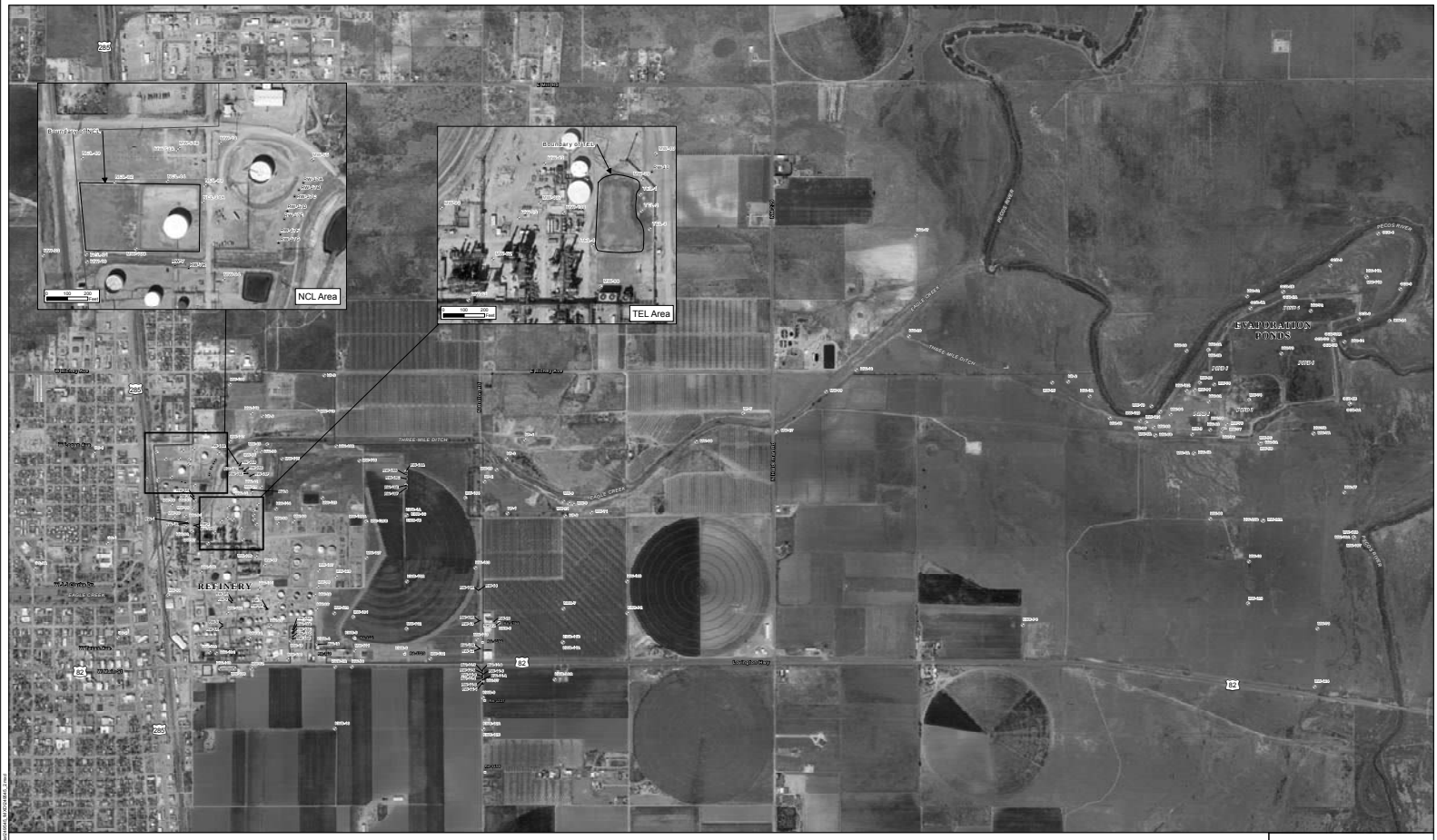
NAVAJO REFINIG COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

PROJECT NUMBER: 29545	FILE NAME: 249545_1
AUTHOR: MREEVES	DATE: 6/15/2016

TRC

505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE
1



LEGEND

- IRRIGATION WELL
- MONITORING WELL
- RECOVERY WELL
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2015

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

WELL LOCATION MAP

NAVAJO REFING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MREVES	DATE: 03/03/15	REV: REV_1

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FIGURE 2

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Tank Number	Location in Relation to AOCs & SWMUs	Diameter (ft)	Height / Length (ft)	Capacity (bbls)	Date Constructed	Contents
6	PW-6 between AOC 3 & AOC 4					Out of Service
11	AOC 3	89	29	35,500	B. 1983	Reformate
12	AOC 3	89	29	35,500	B. 1983	Reformate
14	AOC 6	10	10	250	1990	Slop
16	SWMU 17	29	14	2,250	B. 1979	Out of Service
40	Between AOC 3 & AOC 4	9	72	730	B. 1973	Spent Caustic
41	Between AOC 3 & AOC 4	9	72	730	B. 1973	Spent Caustic
42	Between AOC 3 & AOC 4	9	67	700		Mild Naphtha
45	Between AOC 3 & AOC4	13	90	1,400		Butane
46	Between AOC 3 & AOC 4	12	47	920		Isobutane
47	West of AOC 3	13	36	700		Out of Service
48	Between AOC 3 & AOC 4	13	36	700		Butane
52	AOC 7					Out of Service
55	AOC 7	45	36	30,800	BBLT 1979	Stripped Sour Water
56	AOC 7	48	36	30,800	B. 1979	Sweet Naphtha
57	AOC 7	90	40	55,000	1981	Benfree Unit Feed
58	SWMU 17	35	30	4,700	B. 1979	Out of Service
59	SWMU 17	35	30	4,700	B. 1979	Light Cycle Oil
61	SWMU 17	50	30	9,700	B. 1987	Light Cycle Oil
63	SWMU 17	51	30	10,000	B. 1987	Carbon Black Oil
65	SWMU 17	50	30	10,380	1999	Carbon Black Oil
71	West of AOC 3	10.5	44	714		Propane
72	West of AOC 3	10.5	44	714		Propane
73	West of AOC 3	10	103	1,125		Propane
74	West of AOC	3	10	103	1,125	Propane
75	SWMU 17	65	32	10,900	2003	Carbon Black Oil
76	West of AOC 3	11	79			Propane
77	West of AOC 3	12	79			Propane
78	AOC 5	175	40	90,000	2008	Reformate
81	AOC 6	106.5	40	60,000	2009	PG Asphalt
82	AOC 6	140	40	100,000	2009	PG Asphalt
106	AOC 3	67	40	22,500	B. 1971	Sour Water
107	AOC 3	67	40	22,500	B. 1971	Casing Head
108	AOC 3	67	40	22,500	1951	Alkylate
109	AOC 3	67	40	22,500	B. 1971	Alkylate
110	AOC 3	106	35	54,000	1920	Asphalt
111	AOC 4	49	30	9,500	B. 1981	Splitter Bottoms
112	AOC 4	49	30	9,500	B. 1981	Splitter Bottoms
113	AOC 4	48		10,300		Out of Service
114	AOC 3	38		1,100		N-Butane
115	AOC 3	51		12,900		N-Butane
116	AOC 3	48				Isobutane
117	AOC 3	48	48	10,470	1960	Splitter Bottoms
119	AOC 3	51		12,300		Isobutane
124	AOC 4	40	30	6,700	1951	Gasoline
400	AOC 5	120	48	96,796	1983	Gas Oil
401	AOC 5	90	32	35,000	1983	Benfree Product
402	AOC 5	90	32	35,000	1983	Light Cat Naphtha
403	AOC 8	45	30	8,250		Out of Service
404	AOC 8	45	36	8,250		Out of Service
405	AOC 8	37	28	4,575		Out of Service
406	AOC 8	38	28	5,400		Out of Service
409	AOC 6	67	40	21,450		Out of Service
410	AOC 8	79	40	30,850	B. 1973	Asphalt
411	AOC 3	100	40	52,000	1951	Casing Head
412	AOC 3	100	40	52,000	1951	Gasoline Blend
413	AOC 4	67	36	21,500	about 1960	Raw Kerosene
415	AOC 3	67	40	25,000	1953	Alkylate
417	AOC 4	50	30	9,900	B. 1981	Gasoline
418	AOC 4	67	33	25,000	B. 1987	Raw Kerosene
419	AOC 4	53	28	30,300	B. 1981	Diesel
420	AOC 8	50	32	8,930	B. 1989	Asphalt
422	AOC 6	50	30	8,200	B. 1973	Light Cycle Oil
423	AOC 6	50	32	8,300	B. 1970	Light Cycle Oil
431	AOC 3	109	52	45,800	B. 1984	Fuel Oil
432	AOC 3	109	52	45,800	B. 1973	Fuel Oil
433	AOC 3	117	42	52,500	B. 1984	Gas Oil
434	AOC 4	117	42	7,600	1975	Raw Diesel
435	AOC 5	30	40	5,000	Redac. 1987	Sour Water
437	AOC 6	120	45	80,000	1976/2005	Crude Oil
438	AOC 5	95	48	54,500	1976	Gas Oil
439	AOC 5	130	46	107,900	1978	Sour Naphtha
450	AOC 5	120	40	80,170	1987	Sour Naphtha
451	AOC 5	35	40	6,800	2015	Biodiesel
452	AOC 5	35	40	6,800	2015	Ethanol
464	AOC 5	60	40	20,000	2010	RO Permeate
465	North of AOC 3					Fresh Water
797	AOC 7	65	40	20,000	2009	Sour Water
801	AOC 9	110	32	54,000	1987	Wastewater
802	AOC 7	40	40	20,000	2002	Sour Water
806	AOC 11	90	7	800		Separator (CSO)
809	West of AOC 11	20	10	850	1954	Treated Wastewater
814	AOC 8	50	32	30,000	2005	Pitch
821	AOC 3	105	40	65,000	2016	Naphtha
821	SWMU 6	156	40	90,000	2005	LK/SO
829	North of AOC 9	105	40	30,500	2015	Wastewater
830	North of AOC 9	150	40	100,000	2013	Stormwater (stop)
834	AOC 1	85	40	40,000	1967	Diesel
835	Northeast of SWMU 6	111	40	68,000		Diesel
836	AOC 9	63.5	32	30,400	1998	Wastewater
838	AOC 1	74	40	29,900		Diesel
1123	AOC 7	25	24	1,000	2003	Caustic
1125	AOC 6	150	40	100,000	2009	Crude Oil
1127	AOC 5	77	40	30,000	2009	Pitch
7107	East of AOC 5	25	40	5,900	2011	Treated Wastewater

TANK TABLE NOTES:
AOC = AREA OF CONCERN
SWMU = SOLID WASTE MANAGEMENT UNIT
ft = FEET
bbls = BARRELS
B. = BEFORE DATE SHOWN, ACTUAL DATE UNKNOWN
BBLT = BEBULT DATE SHOWN
RO = REVERSE OSMOSIS
OOS = OUT OF SERVICE
ULSD = ULTRA-LOW-SULFUR-DIESEL

LEGEND

- MONITORING WELL
- RECOVERY WELL
- REFINERY BOUNDARY
- TANK

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2015

N W E S

0 250 500
Feet

1 IN = 250 FT

New Mexico

WELL LOCATIONS AND TANK INFORMATION WITHIN REFINERY

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLCHALLACE | CHECKED: JOSEPH P. | DATE: 2016-03-_ | FILE NAME: 2016_Well Locations

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FIGURE 3

LEGEND

- MONITORING WELL
- RECOVERY WELL
- GROUNDWATER FLOW DIRECTION
- VALLEY FILL ZONE POTENTIOMETRIC SURFACE CONTOURS (FT AMSL)
- REFINERY BOUNDARY

3351.83 GROUNDWATER ELEVATION (FT)

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2015

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

SHALLOW SATURATED ZONE
POTENTIOMETRIC SURFACE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE	SAVED: 2/14/2017	MXD: 249545_04_ShallowPot_Spring

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505 E. HUNTLAND DR.
SUITE 250
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PH:512-329-6080

FIGURE 4

Document Path: J:\Holly_Frontier\Navajo_Artesia\249545_Spring_COC\MXD\249545_04_ShallowPot_Spring.mxd

LEGEND

- MONITORING WELL
- REFINERY BOUNDARY
- VALLEY FILL ZONE POTENTIOMETRIC SURFACE CONTOURS (FT AMSL)
- 3301.56 GROUNDWATER ELEVATION (FT)
- GROUNDWATER FLOW DIRECTION

N W E S

0 1,500 3,000
Feet
1 inch = 1,500 feet

New Mexico

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS, 2016.

VALLEY FILL ZONE
POTENTIOMETRIC SURFACE MAP
FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | SAVED: 2/22/2017 | MXD: 240545_05_ValleyPot_Spring

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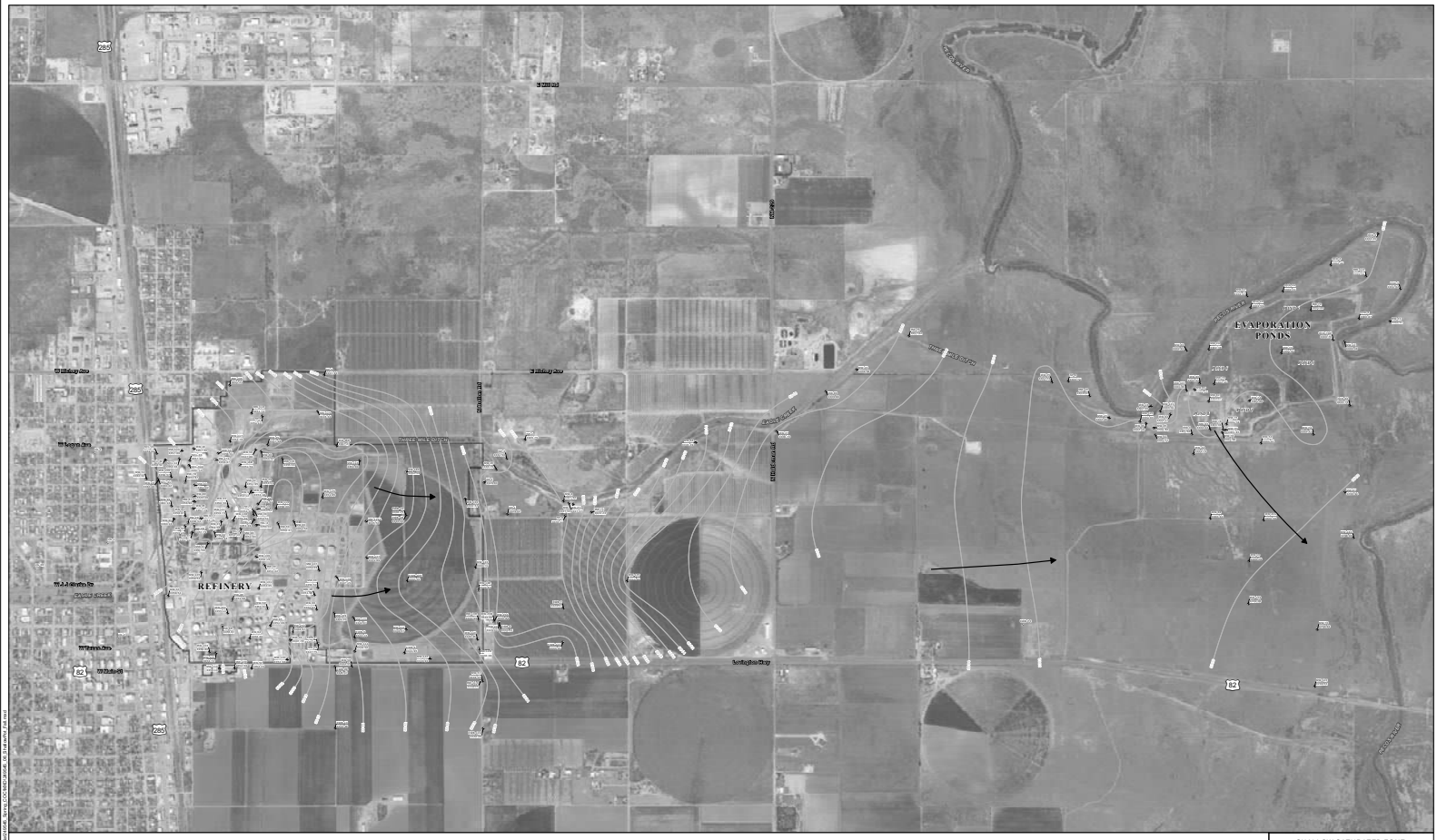
FIGURE 5

Document Path: J:\Holly_Frontier\Navajo_Artesia\240545_Spring_COC\MXD\240545-05_ValleyPot_Spring.mxd



LEGEND

- MONITORING WELL
- RECOVERY WELL
- MONITORING WELL (NOT MEASURED)
- VALLEY FILL ZONE POTENTIOMETRIC SURFACE CONTOURS (FT AMSL)
- GROUNDWATER FLOW DIRECTION
- REFINERY BOUNDARY
- 3306.70 GROUNDWATER ELEVATION (FT)
- LOCALIZED POTENTIOMETRIC SINK AROUND ACTIVE RECOVERY WELL

AERIAL IMAGERY SOURCE: GOOGLE AND THROUGHOUT MAPPING 2015

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

SHALLOW SATURATED ZONE POTENTIOMETRIC SURFACE MAP 2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | NAD83 US FEET | MXD: 2016H_SZ_EvaluationPlan_Fig1

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FIGURE 6

Document Path: J:\Hfy_Artesia\Map_Projects\Evaluation_Plan\2016\2016H_SZ_EvaluationPlan_Fig1.mxd

LEGEND

- MONITORING WELL
- REFINERY BOUNDARY
- VALLEY FILL ZONE POTENTIOMETRIC SURFACE CONTOURS (FT AMSL)
- 3336.43 GROUNDWATER ELEVATION (FT)
- GROUNDWATER FLOW DIRECTION

N W E S

0 1,500 3,000
Feet
1 inch = 1,500 feet

New Mexico

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS, 2016.

VALLEY FILL ZONE
POTENTIOMETRIC SURFACE MAP
SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE	SAVED: 2/22/2017	MXD: 240545_07_ValleyPot_Fall

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FIGURE
7

Document Path: J:\Holly_Frontier\Navajo_Artesia\240545_Spring_COC\MXD\240545-07_ValleyPot_Fall.mxd

LEGEND

- IRRIGATION WELL
- MONITORING WELL
- RECOVERY WELL
- REFINERY BOUNDARY

WELLS WITH PSH

- MONITORING WELL
- RECOVERY WELL

PSH THICKNESS IN FEET

- 0.01 - 1.11 FEET
- PSH THICKNESS
- WELL NOT SAMPLED

NOTE:

1. ALL PSH THICKNESSES ARE PROVIDED IN FEET.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

AERIAL IMAGERY SOURCE: GOOGLE AND THIRD DATA PARTNERS 2016

PHASE SEPARATED HYDROCARBON THICKNESS MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLDWILKER | MXRD: 32.13127 | GIS: 2016_1S_PSH_Series

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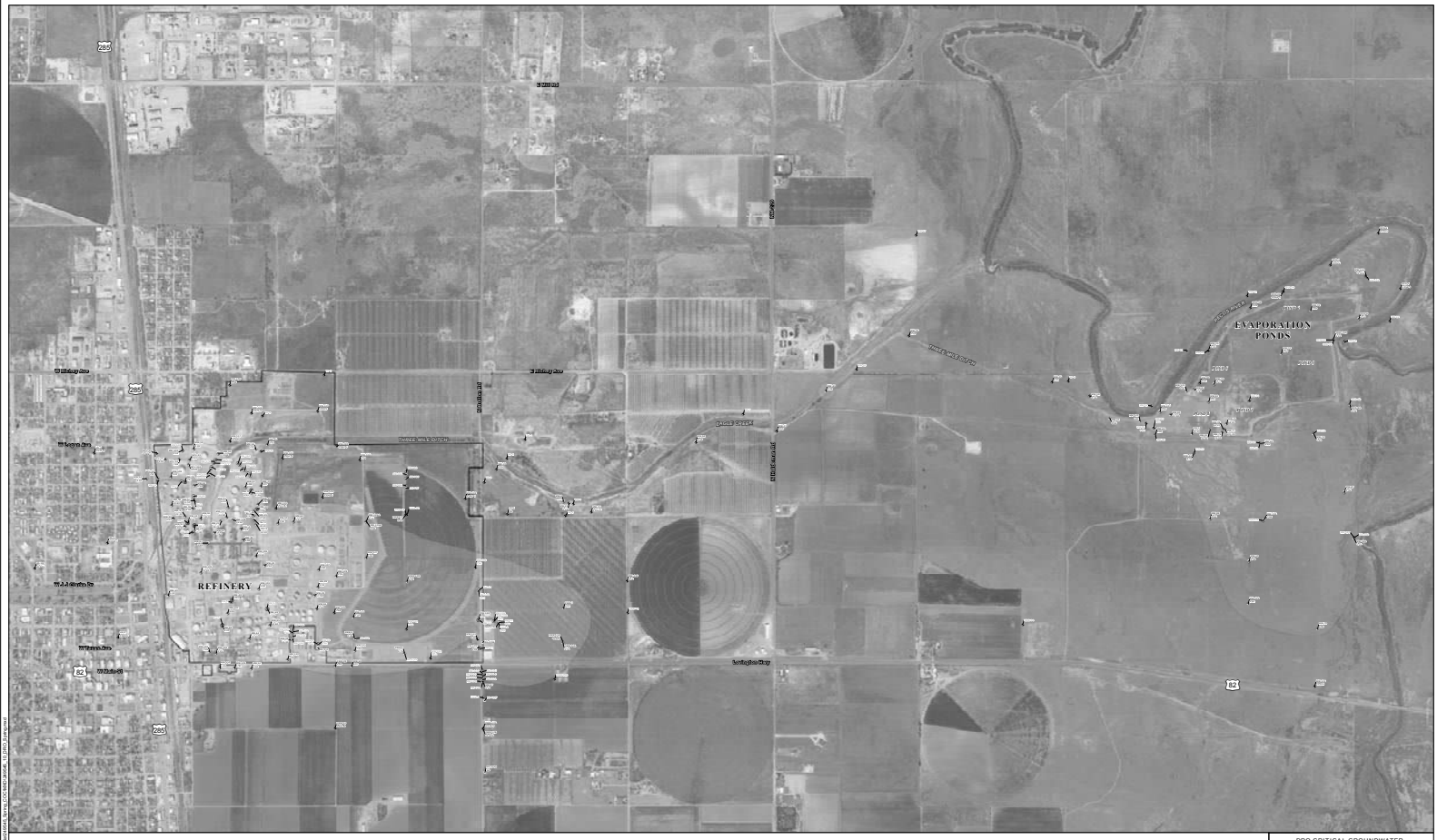
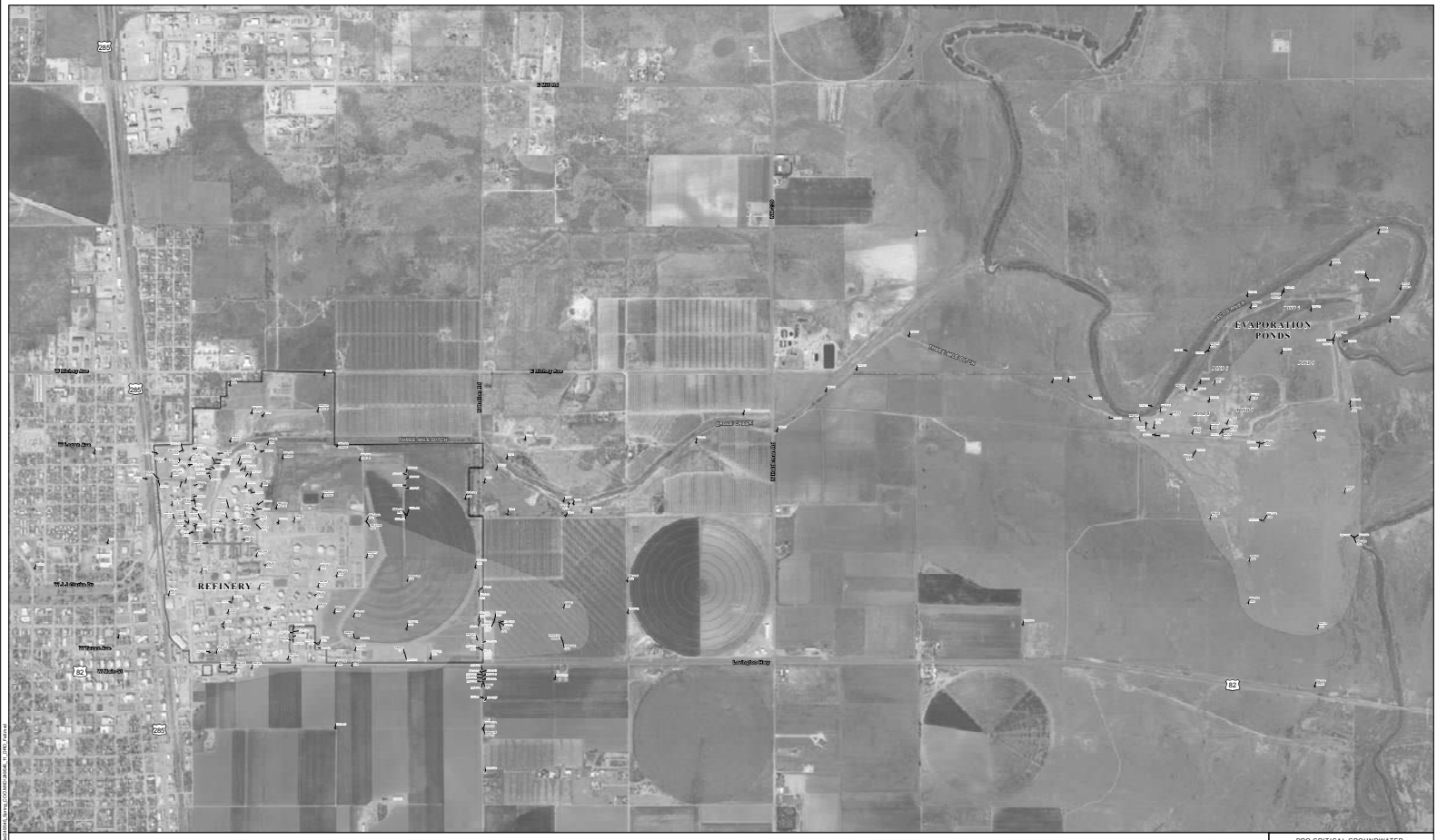
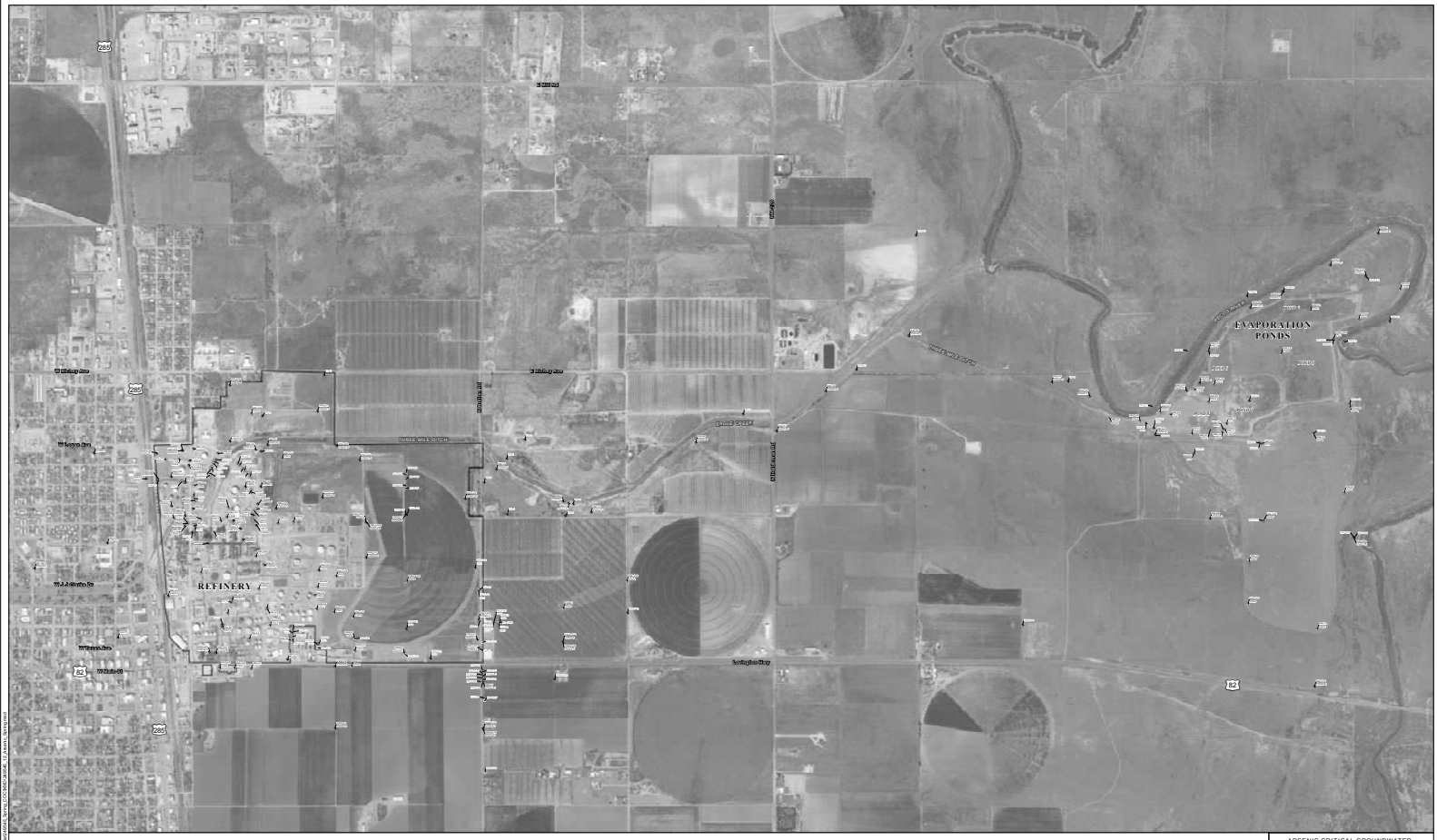
FIGURE 8

REFINERY
EVAPORATION PONDS
THREE MILE DITCH
THREE MILE DITCH
THREE MILE DITCH


REFINERY
EVAPORATION PONDS
THREE MILE DITCH
CAMPO CREEK
Artesia Hwy
Hillcrest Rd
Dunlap St
W Main St
W Texas Ave
W Quay Ave
W Grand Ave
W Chisum Ave
W Richardson Ave
W Mahone Ave
W Bullock St
W Dallas St
W Washington Ave
W Hill Ave
W Hillcrest Ave
W Hillcrest Ave
W Hillcrest


EVAPORATION PONDS
REFINERY
THREE MILE DITCH
CAMP CREEK
Grand Ave
Richardson Ave
Texas Ave
W Main St
W Quay Ave
W Richardson Ave
W Grand Ave
W Texas Ave
W Dallas St
W Washington Ave
W Mahone Ave
W Chisum Ave
W Hillcrest Ave
W Hillcrest Ave
W Hillcrest



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDING SCREENING LEVELS
- RECOVERY WELL

0.003 ARSENIC CONCENTRATION
<0.0013 ARSENIC NOT DETECTED ABOVE SAMPLE DETECTION LIMIT.
MW-11A WELL NOT SAMPLED
PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)
REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | MXRD: 37-0.0007 | MXD: 2016R1_12_Arsenic_Series

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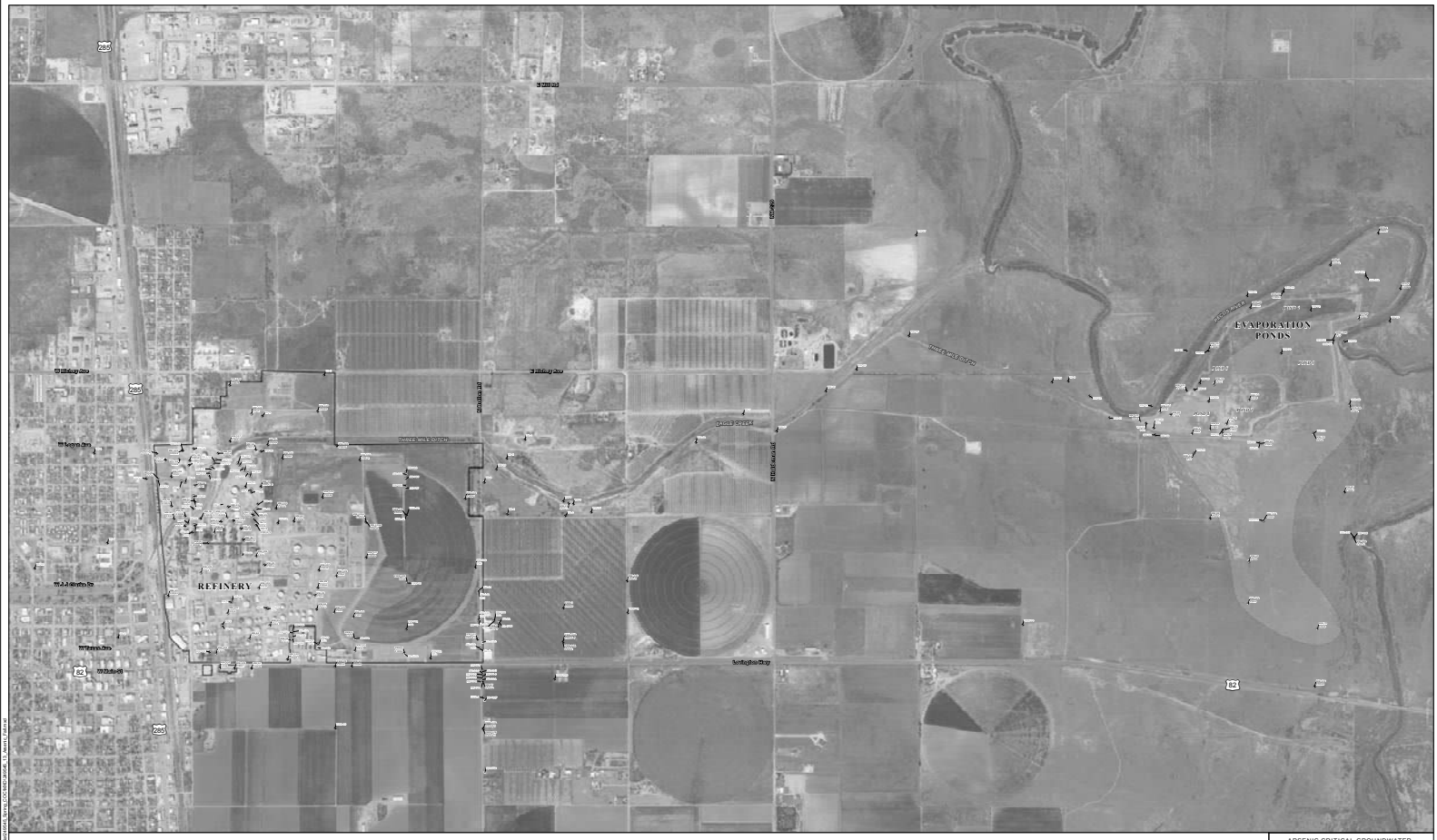
FIGURE 12

Document Path: J:\Hfy_Artesia\Map_Arsenic\2016 Series CG-MXD (PDF)_12_Arsenic_Series.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL

0.005 ARSENIC CONCENTRATION

<0.0013 ARSENIC NOT DETECTED ABOVE SAMPLE DETECTION LIMIT

MW-11A WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.01 mg/L)

REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THIRD DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

ARSENIC CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOWLACE | MXD: 2016_Arsenic_Map

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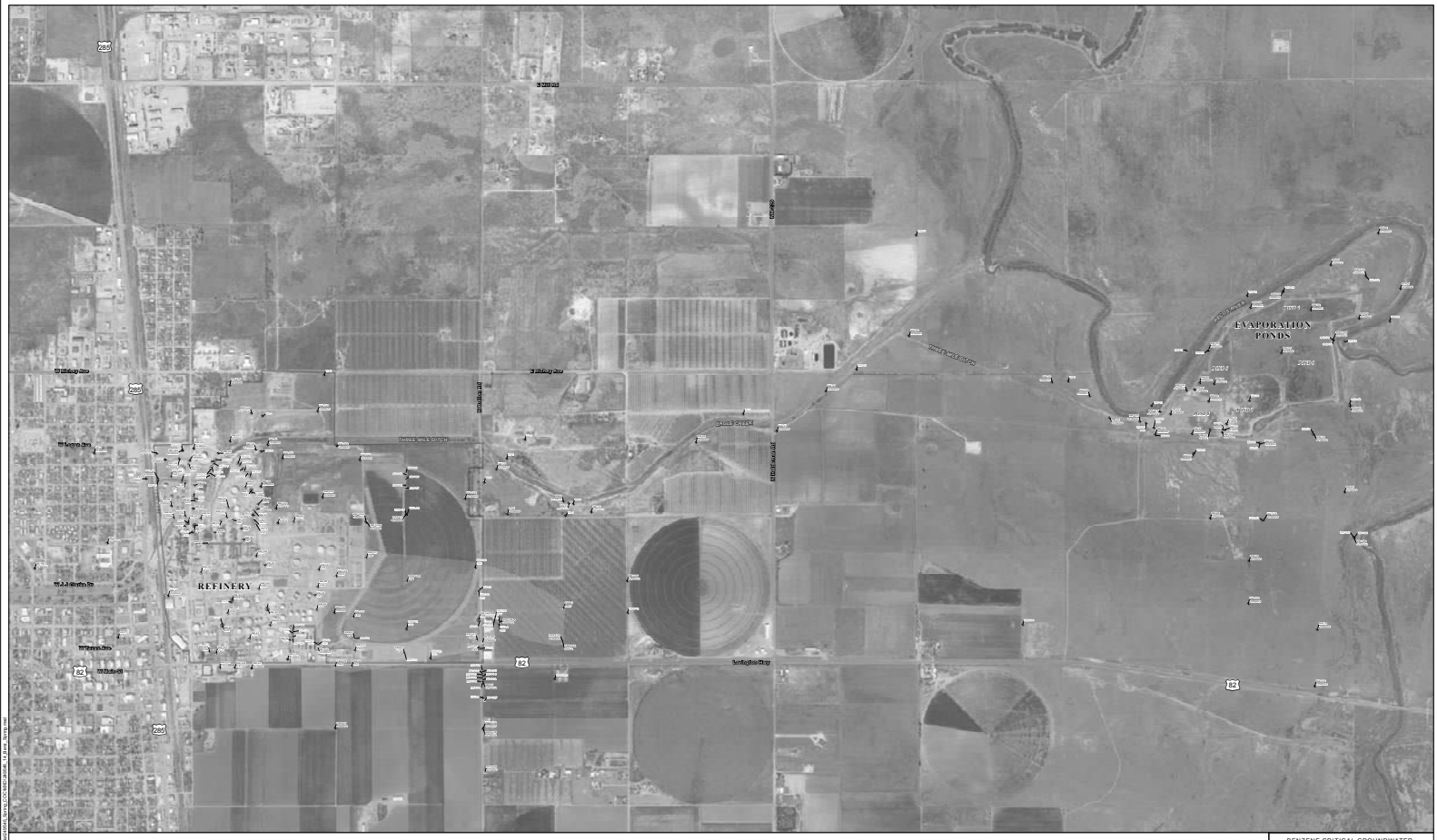
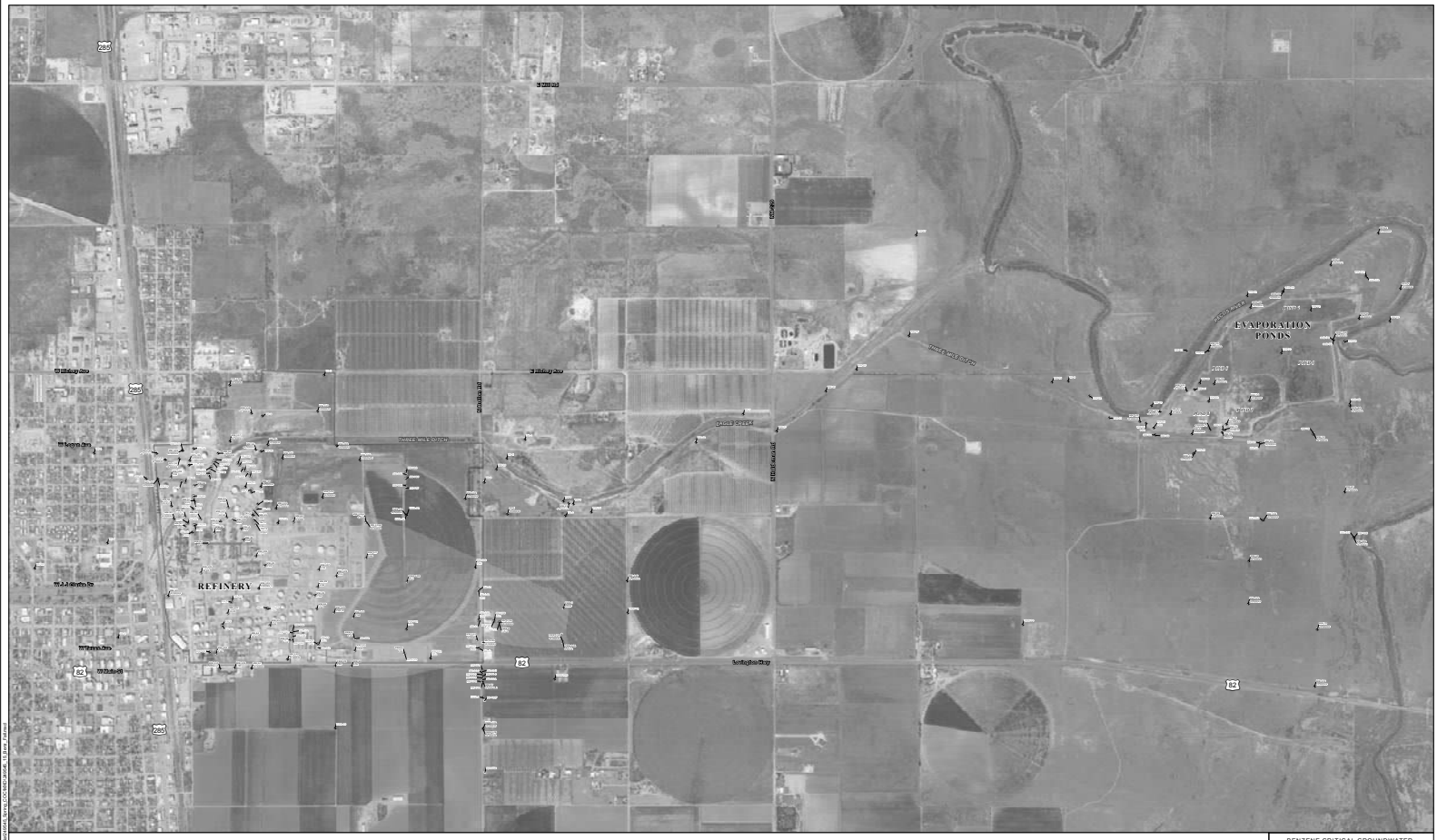
FIGURE 13

Document Path: J:\Hilly_Frontier\Navajo Refining\Artesia Survey CY-2016\JFSAR_V_Arsenic.mxd


EVAPORATION PONDS
REFINERY
THREE MILE DITCH
CAMP CREEK
Dayton Rd
Hillcrest Rd
Hillcrest Dr
Hillcrest Ave
Hillcrest Way
Hillcrest Pkwy
Hillcrest Ln
Hillcrest Dr
Hillcrest Ave



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL
- 12.400 BENZENE CONCENTRATION
- <0.00033 BENZENE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT
- MW-115 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- BENZENE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.005 mg/L)
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THREE DEVS PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

BENZENE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | MXD: 2016_H_Benz_Cal

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FIGURE 15

Document Path: J:\Hfy_Artesia\Map_Attachments_Benz\CG-MW-2016H_H_Benz_Cal.mxd

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

0.13 NAPHTHALENE CONCENTRATION

<0.0010 NAPHTHALENE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT

MW-11A WELL NOT SAMPLED

PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)

NAPHTHALENE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.03 mg/L)

REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

NAPHTHALENE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | SAVED: 2/15/2017 | MXD: 249545_16_Naphth_Spring

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FIGURE 16

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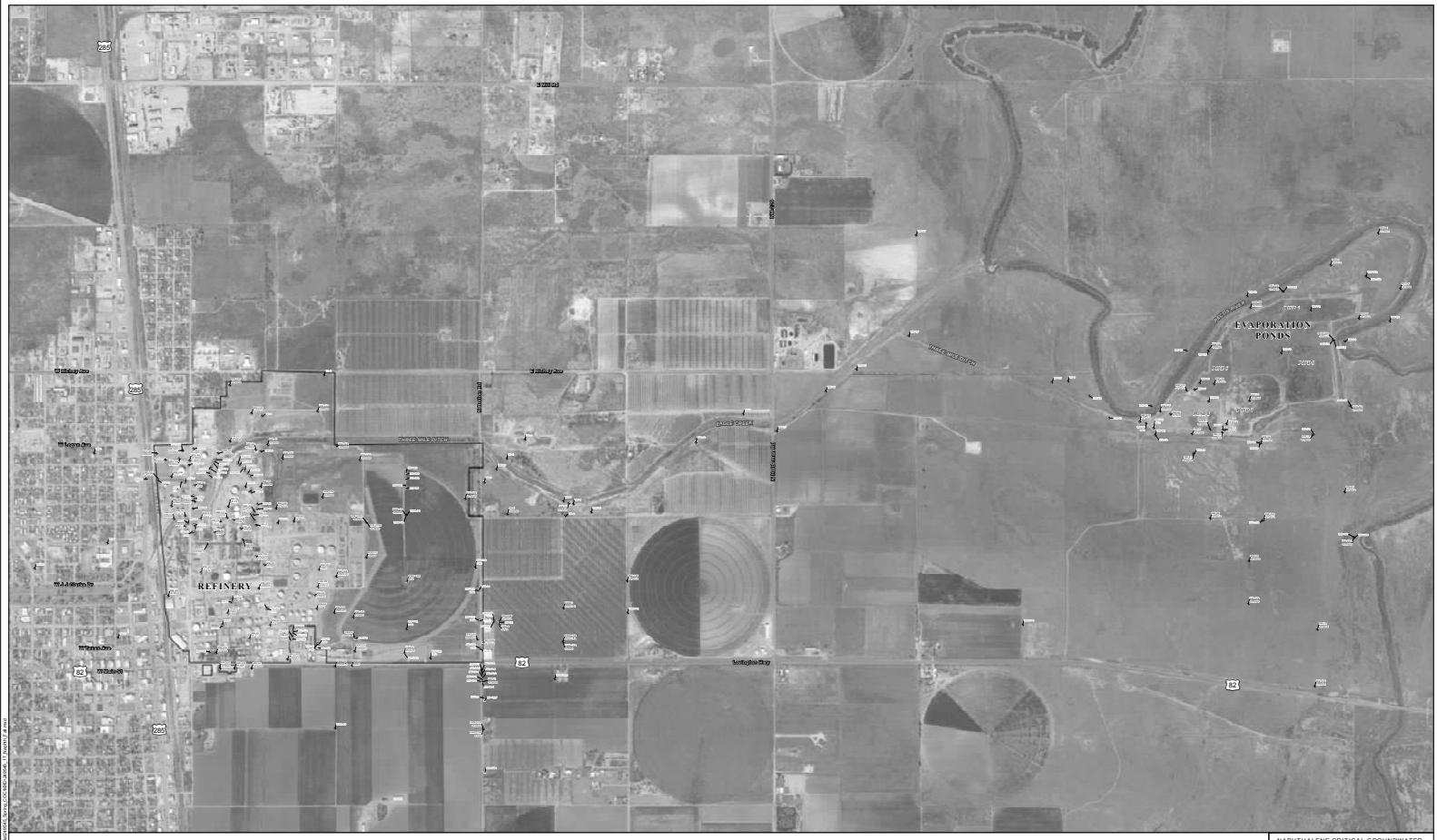

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL
- 0.128 NAPHTHALENE CONCENTRATION
- <0.000189 NAPHTHALENE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT
- MW-115 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- NAPHTHALENE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.03 mg/L)
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEKOSKIPARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

NAPHTHALENE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLCHALICE | SHEET: 2 OF 2 | MXD: 2016H2_17_Naph_Fal

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FIGURE 17

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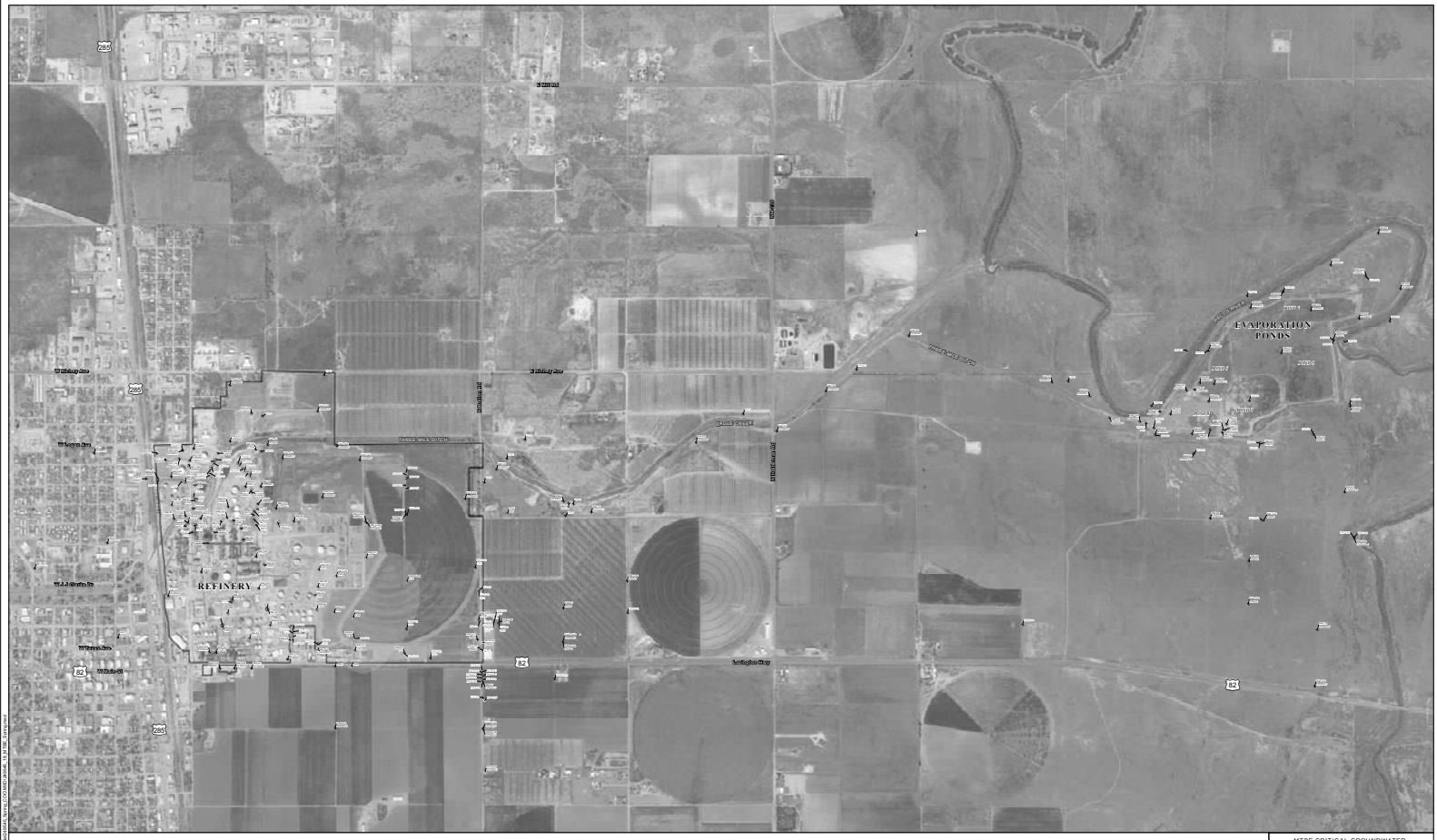

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

2.87 MTBE CONCENTRATION
<0.00037 MTBE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT
MW-114 WELL NOT SAMPLED
PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
MTBE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.143 mg/L)
REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.
3. MTBE = METHYL TERT-BUTYL ETHER

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

MTBE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | MXD: 2016_1S_GTM_Series

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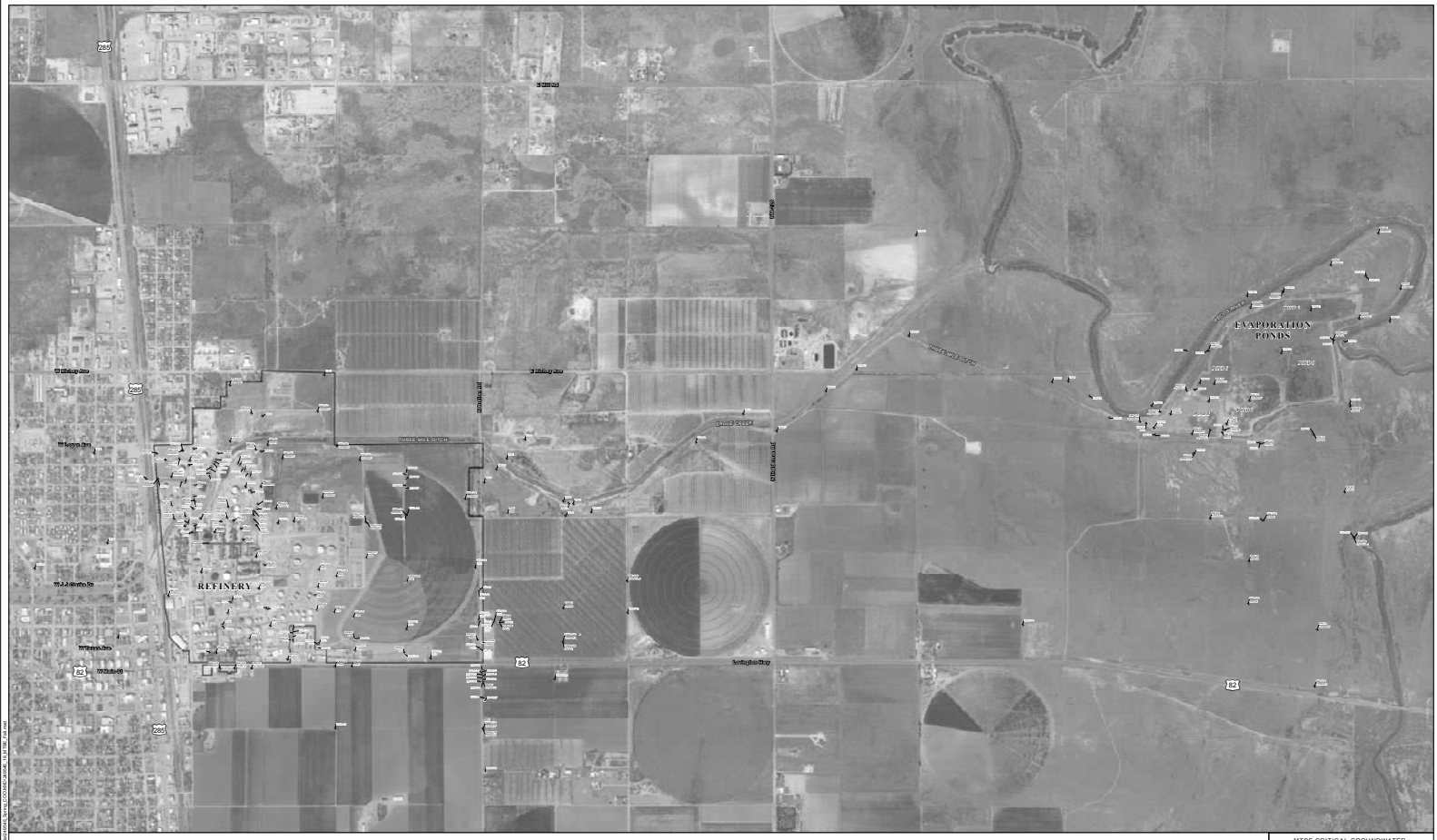
FIGURE 18

Document Path: J:\Hilly_Frontier\Map_Mxds\2016_Series C\2016_GTM\2016_1S_GTM_Series.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL
- 0.53 MTBE CONCENTRATION
- <0.00037 MTBE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT
- WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- MTBE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 0.143 mg/L)
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.
3. MTBE = METHYL TERT-BUTYL ETHER

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

MTBE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLCHALICE	MAND: 2-0-0017	MXD: SHR4_16_MTBE_Fall

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FIGURE 19

Document Path: J:\Hollyfrontier Artesia\Maps\Annual\Fall Sprng CG\2016 SHR4_16_MTBE_Fall.mxd

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

312.00 CHLORIDE CONCENTRATION
WELL NOT SAMPLED
PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)
REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | MXRD: 2-1320.7 | MXD: 2016H_CR_Chloride_Survey

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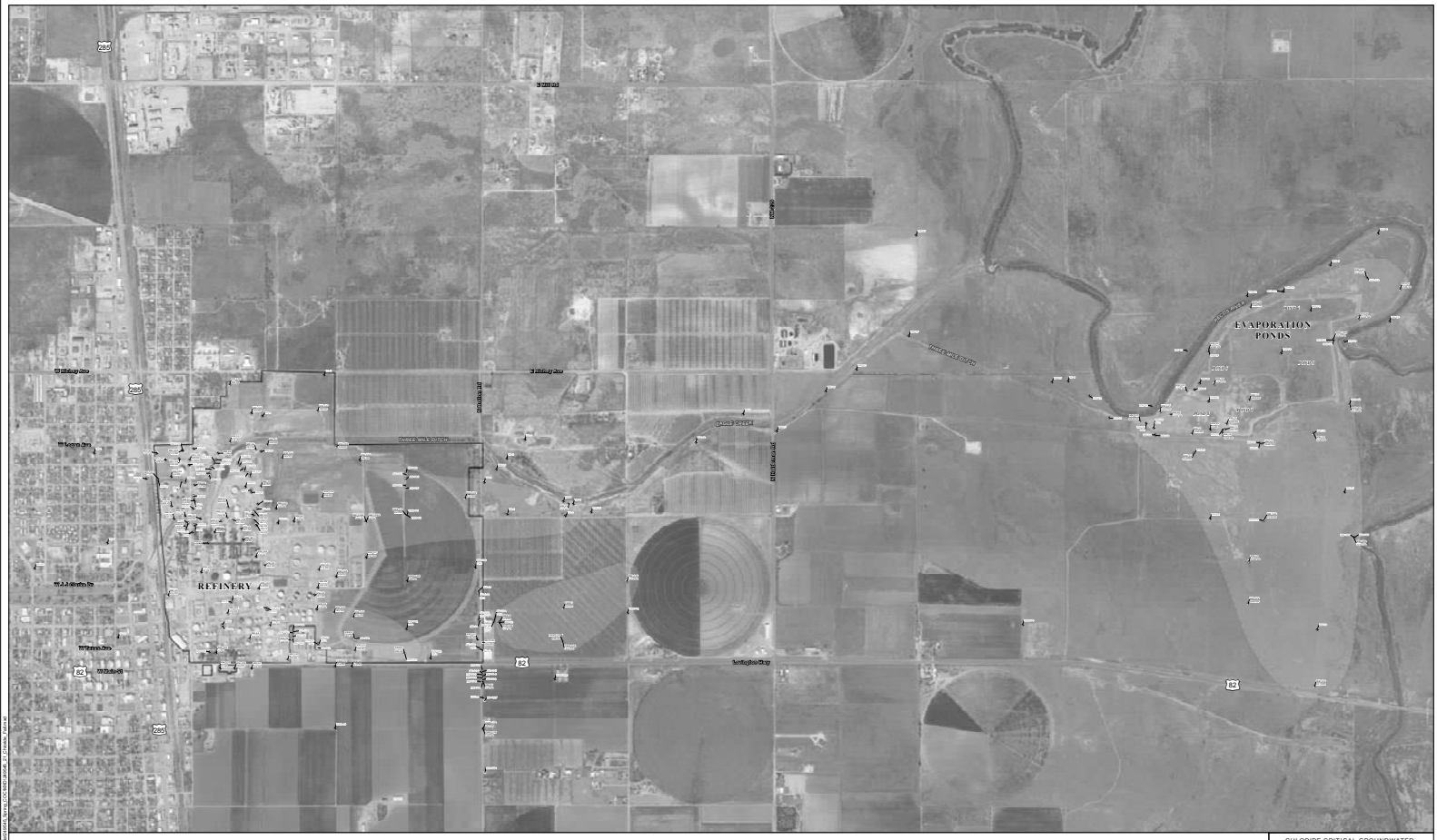
FIGURE 20

Document Path: J:\Hilly_Frontier\Navajo Artesia\Latest Survey CCG-MXD (PDF)\2_CR_Chloride_Survey.mxd



LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL
- 284.00 CHLORIDE CONCENTRATION
- 0.005-0 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 250 mg/L)
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THIRD DATA PARTNERS 2016

NOTE:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

CHLORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOWLACE | MXD: 2016_Chloride_Fig

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FIGURE 21

Document Path: J:\Hilly_Frontier\Navajo Artesia\Annual Rpts\GW\2016\Figures\2016_Chloride_Fig.mxd

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL
- 0.45 FLUORIDE CONCENTRATION
- 0.005-0 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTE:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOWLACE | PAGE: 23.00" | MXD: 2016H_1S_Fluoride_Exceed

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FIGURE
22

Document Path: J:\Hollyfrontier Artesia\Maps\Annual Gwmp CY2016\2016H_1S_Fluoride_Exceed.mxd

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL
- 3.88 FLUORIDE CONCENTRATION
- EXW-4 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1.6 mg/L)
- REFINERY BOUNDARY

NOTE:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

FLUORIDE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLDWLACE | SHEET: 2-0207 | MXD: 2016_2_Fluoride_Fal

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FIGURE 23

Document Path: J:\Hfy_Artesia\Map_Archive\Annual Sprg CY2016\2016_2_Fluoride_Fal.mxd

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- IRRIGATION WELL
- RECOVERY WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

47100.00 SULFATE CONCENTRATION
<0.077 SULFATE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT
5120.J WELL NOT SAMPLED
PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)
REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 FIRST SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE | MXRD: 21300TC | MXD: MRWA_SL_Sulfate_Series

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FIGURE 24

Document Path: J:\Hfy_Artesia\Map_Packs\Sulfate Series CG-FIG\SF.mxd Jul 21, 2016 - 10:12 AM

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL
- 2100.00 SULFATE CONCENTRATION
- 2020.C WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 600 mg/L)
- REFINERY BOUNDARY

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

SULFATE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLCHELACE | MXD: 2016_2_Sulfate_Fat

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH 512-329-6080

FIGURE 25

Document Path: J:\Hfy_Artesia\Map_Mxds\Sulfate_Sprng_CG\2016\2016_2_Sulfate_Fat.mxd

REFINERY
EVAPORATION PONDS
PAGE MILL DITCH
CAMPBELL STREET
N Mahone Dr
W Richardson Ave
W Quay Ave
W Texas Ave
W Chisum St
W Dallas St
S 13th St
S 9th St
S 8th St
S Roselawn St
S Kansas St
S Dakota St
S Colorado St
S Texas St
S Mississippi St
S Illinois St
S Indiana St
S Ohio St
S Pennsylvania St
S Michigan St
S Wisconsin St
S Minnesota St
S Iowa St
S Nebraska

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- IRRIGATION WELL EXCEEDS SCREENING LEVELS
- RECOVERY WELL

- 3620 TOTAL DISSOLVED SOLIDS CONCENTRATION
- 0.03-0.2 WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 1000 mg/L)
- REFINERY BOUNDARY

NOTE:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

AERIAL IMAGERY SOURCE: GOOGLE AND THEIR DATA PARTNERS 2016

Document Path: J:\Hollyfrontier\Artesia\Artesia Spring GW\MXD\WRAP_07_TDS_Exd.mxd

TOTAL DISSOLVED SOLIDS CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLOVELACE	MXD: 07-0001	IMG:SARMA_07_TDS_Fnl

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH 512-329-6080

FIGURE 27

REFINERY
EVAPORATION PONDS
THREE MILE DITCH
Grand Canyon Dr
Grand Canyon Dr
Grand Canyon Dr

LEGEND

- MONITORING WELL EXCEEDS SCREENING LEVELS
- MONITORING WELL
- IRRIGATION WELL
- RECOVERY WELL
- 14.70 NITRATE/NITRITE CONCENTRATION
- <0.20 NITRATE/NITRITE NOT DETECTED ABOVE SAMPLE DETECTION LIMIT
- WELL NOT SAMPLED
- PSH PHASE-SEPARATED HYDROCARBON PRESENT IN WELL (≥ 0.03 FEET THICK)
- NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE AREA (CONCENTRATION > 10 mg/L)
- REFINERY BOUNDARY

NOTES:

1. ALL CONCENTRATIONS ARE IN MILLIGRAMS PER LITER (mg/L).
2. J = CONCENTRATION QUALIFIED AS AN ESTIMATED VALUE.

N W E S

0 750 1,500
Feet

1 IN = 750 FT

New Mexico

AERIAL IMAGERY SOURCE: GOOGLE AND THIRD DATA PARTNERS 2016

Document Path: J:\Hilly_Frontier\Map_Attachments\2016 CCA\HFI_2016_2H_Nitrate_Full.mxd

NITRATE/NITRITE CRITICAL GROUNDWATER SCREENING LEVEL EXCEEDANCE MAP
2016 SECOND SEMIANNUAL EVENT

2016 ANNUAL GROUNDWATER REPORT
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AUTHOR: MLCHELACE	MAPS: DERBY	MXD: 2016H2_2H_Nitrate_Full

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH 512-329-6080

FIGURE 29

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.
Generated on 01/20/2017

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 3366 ft. Lat: 32.755° N Lon: 104.384° W
Station: **ARTESIA 6 S, NM US GHCND:USC00290600**

Observation Time Temperature: 0730 Observation Time Precipitation: 0730

Preliminary	Year	Month	Day	Temperature (F) 24 hrs. ending at observation time Max.	Temperature (F) 24 hrs. ending at observation time Min.	Temperature (F) at Observation	Precipitation 24 Hour Amounts ending at observation time: Rain, melted snow, etc. (in)	Precipitation: Flag	Precipitation: Snow, ice pellets, hail (in)	Precipitation: Flag	Precipitation At Obs Time: Snow, ice pellets, hail, ice on ground (in)	Evaporation: 24 Hour Wind Movement (mi)	Evaporation: Amount of Evap. (in)	Soil Temperature (F) 4 in depth: Ground Cover (see *)	4 in depth: Max.	4 in depth: Min.	8 in depth: Ground Cover (see *)	8 in depth: Max.	8 in depth: Min.
	2016	4	1	71	36	43	0.25		0.0		0.0		0.37	5	58	54			
	2016	4	2	72	28	30	0.24		0.0		0.0		0.04	5	56	50			
	2016	4	3	63	30	32	0.00		0.0		0.0		0.20	5	54	50			
	2016	4	4	79	32	42	0.00		0.0		0.0		0.20	5	54	52			
	2016	4	5	84	36	37	0.00		0.0		0.0		0.60	5	55	54			
	2016	4	6	89	37	43	0.00		0.0		0.0		0.40	5	55	54			
	2016	4	7	75	40	43	0.00		0.0		0.0		0.18	5	57	54			
	2016	4	8	82	41	54	0.00		0.0		0.0		0.34	5	56	55			
	2016	4	9	83	41	47	0.00		0.0		0.0		0.23	5	57	55			
	2016	4	10	84	45	55	0.00		0.0		0.0		0.39	5	59	57			
	2016	4	11	85	44	50	0.00		0.0		0.0		0.35	5	59	57			
	2016	4	12	73	41	43	0.00		0.0		0.0		0.33	5	59	57			
	2016	4	13	73	33	39	0.04		0.0		0.0		0.15	5	56	53			
	2016	4	14	76	33	46	0.00		0.0		0.0		0.29	5	58	55			
	2016	4	15	86	33	55	0.00		0.0		0.0		0.42	5	59	57			
	2016	4	16	88	55		0.00		0.0		0.0								
	2016	4	17	72	42	43	0.00		0.0		0.0								
	2016	4	18	70	43	47	0.00		0.0		0.0		0.32						
	2016	4	19	70	47	55	0.00		0.0		0.0		0.22	5	59	58			
	2016	4	20	78	40	48	0.00		0.0		0.0		0.33	5	59	58			
	2016	4	21	86	47	54	0.00		0.0		0.0		0.42	5	60	59			
	2016	4	22	81	46	47	0.00		0.0		0.0		0.15	5	62	60			
	2016	4	23	84	47	53	0.00		0.0		0.0		0.56	5	61	61			
	2016	4	24	89	49	54	0.00		0.0		0.0		0.35	5	62	61			
	2016	4	25	82	53	56	0.00		0.0		0.0		0.34	5	63	62			
	2016	4	26	89	56	63	0.00		0.0		0.0		0.64	5	67	63			
	2016	4	27	78	42	46	0.00		0.0		0.0		0.53	5	62	61			
	2016	4	28	82	41	45	0.00		0.0		0.0		0.48	5	62	61			
	2016	4	29	87	45	55	0.00		0.0		0.0		0.36	5	63	61			
	2016	4	30	79	41	43	0.00		0.0		0.0		0.52	5	62	61			
			Summary	80	41		0.53		0.0										

The '*' flags in Preliminary indicate the data have not completed processing and qualitycontrol and may not be identical to the original observation
Empty, or blank, cells indicate that a data observation was not reported.
***Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown**
"s" This data value failed one of NCDC's quality control tests.
"T" values in the Precipitation category above indicate a TRACE value was recorded.
"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.
Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

HMI
Groundwater

Hydrologic Monitoring
1654 W. Sam Houston Pkwy. N.
Houston, Texas 77043

Phone 713.464.5206
Fax 713.464.5207

May 5, 2016

Ms. Julie Speer, P.G., EIT
Associate Project Manager
TRC
505 East Huntland Drive, Suite 250
Austin, Texas 78752

Subject: April 2016 (Annual Event) Groundwater Monitoring
Sitewide Gauging, April 26, 2016
Groundwater Sampling, April 26-29, 2016
Navajo Refining Company, Artesia, New Mexico

Dear Ms. Speer:

This document summarizes groundwater monitoring field activities conducted by Hydrologic Monitoring, LLC (HMI) on behalf of TRC at the Navajo Refining Company, Artesia Refinery, Artesia, New Mexico.

Contents

Field Activities Narrative
Table 1: (Gauging Data, Groundwater Field Parameters, Well Inspections, with Analytical Program)
Groundwater Sampling Forms and Field Instrument Calibration Log
(to follow in multiple emails due to file size, in the order shown on Table 1)
Chain-of-Custody Forms
Groundwater Sampling SOP Memo

Field Activities Narrative

1. HMI conducted the *April 2016 (Spring) Event* (Annual event, including the A = Annual and the SA = Semiannual Event designations on the attached scoping table, at the Navajo Refinery, Artesia, New Mexico. Sitewide gauging was conducted April 26, 2016. Groundwater sampling (162 wells sampled) was conducted April 26-29, 2016.

2. Groundwater sampling was conducted in accordance with the Site Sampling and Analysis Plan, EPA guidance, and the attached Memorandum – Low-Flow Groundwater Monitoring Standard Operating Procedures, Navajo Refining Co. - Artesia, New Mexico. Per regulatory instruction, if

measured LNAPL thickness was *less than* 0.03-feet, in any well scheduled for groundwater sampling, the LNAPL was removed, and the well was sampled. If LNAPL thickness equaled *0.03-feet or greater*, the well was not sampled. Gauging data, groundwater field parameters, and well inspection information is summarized in Table 1. Samples were shipped Fedex, to ESC Lab Sciences, Mt. Juliet, TN. The groundwater sampling process is documented on the attached groundwater sampling forms.

3. Field QA/QC Sampling (per Refinery Area):

Evaporation Ponds
Duplicates:
Dup-EP-01 at MW-7A
Dup-EP-02 at MW-22A
Dup-EP-03 at MW-3
Equipment Blanks:
EB-EP-01 collected over decontaminated gauging probe following sampling at MW-74
EB-EP-02 collected over decontaminated gauging probe following sampling at MW-124
EB-EP-03 collected over decontaminated gauging probe following sampling at MW-5A
EB-EP-04 collected over decontaminated gauging probe following sampling at MW-79
Trip Blank-EP-01
Trip Blank-EP-02
Trip Blank-EP-03

NCL
Duplicate:
Dup-NCL-01 at NCL-49
Equipment Blank:
EB-NCL-01 collected over decontaminated gauging probe following sampling at NCL-32
Trip Blank-NCL-01

TEL
Duplicate:
Dup-TEL-01 at TEL-4
Equipment Blank:
EB-TEL-01 collected over decontaminated gauging probe following sampling at TEL-3
Trip Blank-TEL-01

TMD
Trip Blank-TMD-01
Limited TMD scope generated no additional field QA/QC samples

REST ("rest" of the site)
Duplicates:
Dup-REST-01 at MW-113
Dup-REST-02 at MW-104
Dup-REST-03 at MW-134
Dup-REST-04 at MW-60
Dup-REST-05 at KWB-12B

Equipment Blanks:
EB-REST-01 collected over decontaminated gauging probe following sampling at MW-113
EB-REST-02 collected over decontaminated gauging probe following sampling at MW-104

EB-REST-03 collected over decontaminated gauging probe following sampling at MW-134
EB-REST-04 collected over decontaminated gauging probe following sampling at MW-60
EB-REST-05 collected over decontaminated gauging probe following sampling at KWB-12B
Trip Blank-REST-01
Trip Blank-REST-02
Trip Blank-REST-03
Trip Blank-REST-04

4. Site Notes:
   HMI 8-person team completed annual training at the safety training trailers on 4-26-16.
   HMI's DISA backgound check/drug/alcohol requirements were approved by onsite safety-trailer personnel on 10-19-15, as reported through HASC.
   Per Navajo, purgewater is disposed in the pad sump, just inside, and to the left of the Main Gate entrance. Alternately, North Bundle Pad sump, as before (fenced area of drums, etc.), notifying FCC control room for entrance.
   Sitewide well and gate lock combinations are "2013", and less often "2002".
   With suggested telephone notification, Fedex pickup from locked shed (35-25-39 combination) is approx. 16:00 daily, across from Artesia Wool Co.
   North side of Hwy 82, east of site, gate with cable and combination lock (8810).
   POTW bldg, check-in as needed, to borrow a key or get gate unlocked.
   Navajo's Mr. Robert Combs or Richard Orosco for daily permit(s).
   Navajo-well locks continued to be deployed as possible, by HMI in 1H16.
   Well surface completion inspections are documented on respective well gauging and sampling forms, and is summarized in Table 1. Well inspection items of potential concern (i.e., "Issues") are highlighted in yellow-color in Table 1. HMI provided sitewide well inspection photographs on a portable memory stick to TRC on April 7, 2016 (and to Robert Combs, Navajo on April 26, 2016), to serve as a reference of well surface completion-conditions of the monitoring/recovery well network, and to assist with the understanding of potential inspection issues, and continues to update Robert's Excel file of well photos as well surface completions are upgraded.

HMI appreciates the opportunity to assist TRC with this project. If you have any questions or would like additional information please feel free to call us at 713.464.5206.

Sincerely,

HYDROLOGIC MONITORING

Scott C. Ude

Scott C. Ude, P.G.

STATE OF TEXAS
SCOTT C. UDE
GEOLOGY
353
LICENSED
PROFESSIONAL GEOSCIENTIST

The seal appearing on this document was authorized by Scott C. Ude, P.G. 353 on May 5, 2016.

Attachments

cc: Bryan Gilbert, P.G., TRC-Austin

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
							Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																			Analytical Suite and Frequency [c]									
MW-6A	Monitoring	MDB	1	EP	26-Apr	11:40	NA	11.88	0.00	19.01	27-Apr	8:10	6.65	18.4	5,810	0.7	20.7	1.6	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-6B	Monitoring	MDB		EP	26-Apr	11:45	NA	11.79	0.00	52.23			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
MW-85	Monitoring	MDB		EP	26-Apr	17:30	9.44	9.98	0.54	20.34			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-86	Monitoring	MDB		EP	26-Apr	17:50	9.30	9.34	0.04	19.21			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]
MW-120	Monitoring	MDB	2	EP	26-Apr	11:50	NA	11.67	0.00	28.00	27-Apr	14:20	7.43	19.3	16,160	0.6	-48.4	64.5	Sl Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-121	Monitoring	MDB	3	EP	26-Apr	11:55	NA	12.43	0.00	27.32	27-Apr	13:25	7.46	19.8	8,140	0.5	23.9	12.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-84	Monitoring	MDB	4	EP	26-Apr	12:00	NA	8.81	0.00	20.56	27-Apr	16:55	7.19	20.5	11,400	0.6	61.5	7.6	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-122	Monitoring	MDB	5	EP	26-Apr	12:05	NA	10.13	0.00	23.31	27-Apr	12:35	7.34	19.1	9,730	0.5	33.1	4.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-81	Monitoring	MDB	6	EP	26-Apr	13:25	NA	10.46	0.00	18.63	27-Apr	15:10	7.42	19.5	8,950	2.6	71.4	5.5	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-80	Monitoring	MDB	7	EP	26-Apr	13:35	NA	8.65	0.00	19.69	27-Apr	16:00	7.43	17.9	9,260	1.5	88.8	12.1	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-79	Monitoring	MDB	8	EP	26-Apr	13:45	NA	9.68	0.00	19.25	26-Apr	16:45	7.54	17.8	6,640	0.6	86.7	9.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-82	Monitoring	MDB	9	EP	26-Apr	13:55	NA	9.10	0.00	20.00	27-Apr	17:50	7.41	20.1	8,650	0.6	-90.4	4.4	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-74	Monitoring	MDB	10	EP	26-Apr	14:10	NA	8.64	0.00	20.19	26-Apr	15:45	7.19	19.0	6,350	0.6	52.2	4.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-73	Monitoring	MDB	11	EP	26-Apr	14:25	NA	9.20	0.00	19.60	26-Apr	14:50	6.94	16.9	6,280	1.2	-45.4	56.4	Sl Cloudy	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-2A	Monitoring	MDB	12	EP	26-Apr	12:10	NA	10.62	0.00	17.31	27-Apr	11:35	6.94	18.6	37,200	0.6	-18.6	2.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-2B	Monitoring	MDB		EP	26-Apr	12:15	NA	10.35	0.00	52.00			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
MW-72	Monitoring	MDB	13	EP	26-Apr	12:20	NA	7.09	0.00	13.92	27-Apr	10:45	7.18	17.6	13,620	0.5	-17.2	18.7	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
OCD-6	Monitoring	MDB	14	EP	26-Apr	12:35	NA	10.78	0.00	26.91	27-Apr	9:55	7.18	18.8	13,800	0.6	-13.4	4.5	Clear	Yes	Closure	Pad Issue	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
OCD-7AR	Monitoring	MDB	15	EP	26-Apr	12:40	NA	9.67	0.00	21.29	27-Apr	9:00	7.03	19.9	13,080	0.6	32.2	17.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
OCD-7B	Monitoring	MDB		EP	26-Apr	12:45	NA	9.44	0.00	56.81			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
OCD-7C	Monitoring	MDB		EP	26-Apr	12:50	NA	8.75	0.00	71.95			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
MW-76	Monitoring	SCD	16	EP	26-Apr	11:55	NA	10.39	0.00	20.33	27-Apr	16:40	7.01	21.2	6,630	1.3	-82.9	4.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-77	Monitoring	SCD	17	EP	26-Apr	12:05	NA	8.62	0.00	20.52	27-Apr	14:30	6.92	20.6	8,040	3.0	-83.9	5.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-78	Monitoring	SCD	18	EP	26-Apr	12:10	NA	8.68	0.00	19.57	27-Apr	17:30	7.06	19.6	4,600	1.3	-69.2	19.1	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-75	Monitoring	SCD	19	EP	26-Apr	12:15	NA	8.81	0.00	23.68	27-Apr	17:10	7.19	18.8	8,090	0.8	-87.1	2.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-83	Monitoring	SCD	20	EP	26-Apr	12:20	NA	8.67	0.00	19.91	27-Apr	13:10	7.10	20.3	5,370	1.0	-92.7	8.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-3	Monitoring	SCD	21	EP	26-Apr	12:25	NA	8.73	0.00	20.18	27-Apr	15:25	7.44	20.4	7,160	1.2	31.5	9.6	Clear	Yes	Yes	Issue	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-88	Monitoring	SCD	22	EP	26-Apr	12:45	NA	8.06	0.00	20.28	27-Apr	8:10	7.01	16.8	7,300	1.1	70.5	5.9	Clear	Yes	Yes	Hole in pad	Yes		SA	SA	SA	SA	SA	SA	-	-	A	A	A
MW-22A	Monitoring	SCD	23	EP	26-Apr	12:55	NA	7.38	0.00	22.65	27-Apr	9:00	7.13	18.1	8,050	1.4	-57.1	25.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-22B	Monitoring	SCD		EP	26-Apr	13:00	NA	7.26	0.00	54.66			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
							Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																			Analytical Suite and Frequency [c]									
MW-10	Monitoring	SCD	24	EP	26-Apr	13:15	NA	4.81	0.00	18.45	27-Apr	10:20	7.03	20.0	6,550	0.8	10.4	6.4	Clear	Yes	Yes	Cracked pad	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-123	Monitoring	SCD	25	EP	26-Apr	13:30	NA	5.16	0.00	25.71	27-Apr	11:15	7.08	20.4	7,390	0.8	30.9	8.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-4A	Monitoring	SCD	26	EP	26-Apr	13:40	NA	11.29	0.00	>12.06	27-Apr	12:15	7.45	19.7	6,390	1.4	-179.1	8.4	Clear	Yes	Issue	Issue	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-4B	Monitoring	SCD		EP	26-Apr	13:40	NA	10.54	0.00	72.37			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
MW-5A	Monitoring	SCD	27	EP	26-Apr	13:50	NA	7.96	0.00	20.05	26-Apr	17:50	7.26	19.3	14,540	1.6	-101.3	9.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-5B	Monitoring	SCD		EP	26-Apr	13:30	NA	8.06	0.00	53.41			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
MW-5C	Monitoring	SCD		EP	26-Apr	13:35	NA	8.25	0.00	71.60			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
MW-7A	Monitoring	SCD	28	EP	26-Apr	13:55	NA	7.34	0.00	17.25	26-Apr		7.41	18.9	9,810	1.1	-54.9	81.1	Clear	Yes	Yes	Issue	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-7B	Monitoring	SCD		EP	26-Apr	14:05	NA	8.59	0.00	52.55			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
OCD-8A	Monitoring	SCD	29	EP	26-Apr	15:10	NA	8.37	0.00	20.74	26-Apr	15:35	7.02	19.5	13,930	1.4	-85.2	6.3	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
OCD-8B	Monitoring	SCD		EP	26-Apr	14:20	NA	8.53	0.00	56.63			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
KWB-P4	Monitoring	BRH		REST	26-Apr	14:50	NA	3.98	0.00	30.26			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		B	B	B	-	B	-	-	-	-	-	-
MW-25	Monitoring	BRH	30	TMD	26-Apr	11:55	NA	10.60	0.00	28.18	27-Apr	14:30	7.07	20.8	16,890	0.7	18.3	2.1	Clear	Yes	Yes	Subsidence	Yes		SA	A	A	-	A	A	-	-	A	A	A
NP-8	Monitoring	BRH		TMD	26-Apr	11:59	NA	12.37	0.00	15.20			Not in sampling program							Issue	Issue	Yes	Yes		SA	Not in samp prgm; gauged to top of protective steel casing									
MW-1R	Monitoring	BRH	31	EP	26-Apr	12:05	NA	10.68	0.00	20.63	27-Apr	15:20	7.16	18.5	13,790	0.6	-122.7	51.0	Clear	Yes	Issue	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
MW-15	Monitoring	BRH	32	EP	26-Apr	12:18	NA	11.57	0.00	21.70	27-Apr	13:00	7.20	19.5	6,130	0.6	62.7	1.8	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
OCD-1R	Monitoring	BRH	33	EP	26-Apr	12:30	NA	12.27	0.00	23.90	27-Apr	8:00	7.21	17.0	13,030	0.9	33.4	1.9	Clear	Yes	Issue	Issue	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
OCD-2A	Monitoring	BRH	34	EP	26-Apr	12:40	NA	12.28	0.00	27.58	27-Apr	8:50	7.23	17.4	10,570	0.6	-90.6	7.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	A	A	A
OCD-2B	Monitoring	BRH		EP	26-Apr	12:43	NA	11.11	0.00	50.39			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
OCD-3	Monitoring	BRH	35	EP	26-Apr	12:50	NA	12.78	0.00	25.48	27-Apr	9:40	7.15	18.7	8,210	1.1	50.8	6.9	Clear	Yes	Yes	Pad destryd	Yes		SA	SA	SA	SA	SA	SA	-	-	A	A	A
OCD-4	Monitoring	BRH	36	EP	26-Apr	12:55	NA	12.03	0.00	25.44	27-Apr	10:30	7.05	18.4	19,560	0.4	29.6	13.2	Clear	Yes	Yes	Subsidence	Yes		SA	SA	SA	SA	SA	SA	-	-	A	A	A
MW-11A	Monitoring	BRH	37	EP	26-Apr	13:05	NA	9.49	0.00	22.00	27-Apr	12:00	6.96	19.2	31,200	0.4	38.2	3.2	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	SA	SA	SA
MW-11B	Monitoring	BRH		EP	26-Apr	13:08	NA	9.45	0.00	47.30			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
OCD-5	Monitoring	BRH	38	EP	26-Apr	13:00	NA	10.19	0.00	25.42	27-Apr	11:15	7.26	18.9	16,580	0.6	-20.7	47.3	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-87	Monitoring	BRH	39	EP	26-Apr	15:02	NA	8.27	0.00	20.39	27-Apr	16:15	7.35	19.1	17,830	0.8	-152.1	2.5	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	A	A	A
MW-18A	Monitoring	BRH	40	EP	26-Apr	15:15	NA	10.03	0.00	22.59	26-Apr	15:40	7.25	19.5	26,700	0.8	-10.4	1.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	SA	SA	SA	SA	SA
MW-18B	Monitoring	BRH		EP	26-Apr	15:08	NA	10.01	0.00	50.60			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
MW-18T	Monitoring	BRH		EP	26-Apr	15:10	NA	9.80	0.00	50.40			Not in sampling program							Issue	Issue	Issue	Yes		SA	Not in samp prgm; gauged to highest pt of shattered PVC									
MW-70	Monitoring	BRH	41	EP	26-Apr	16:15	NA	7.71	0.00	22.05	26-Apr	16:40	7.15	19.4	7,870	0.5	-116.3	21.3	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	A	A	A
MW-124	Monitoring	BRH	42	EP	26-Apr	17:00	NA	8.25	0.00	22.02	26-Apr	17:25	7.06	18.2	13,020	0.5	-71.4	14.3	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																	PSH Expected? [b]	Gauging Frequency	Analytical Suite and Frequency [c]									
							Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label			Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
MW-13	Monitoring	BRH		EP	26-Apr	14:18	NA	12.11	0.00	21.10			Not in sampling program							Yes	Yes	Yes	Yes		SA	No sampling due to location N. of river									
MW-69	Monitoring	BRH		EP	26-Apr	14:10	NA	11.39	0.00	22.51			Not in sampling program							Yes	Yes	Yes	Yes		SA	No sampling due to location N. of river									
MW-12	Monitoring	BRH		EP	26-Apr	14:05	NA	10.66	0.00	17.93			Not in sampling program							Yes	Yes	Yes	Yes		SA	No sampling due to location N. of river									
MW-24	Monitoring	BRH		EP	26-Apr	13:40	NA	12.28	0.00	23.51			Not in sampling program							Yes	Yes	Issue	Yes		SA	No sampling due to location E. of river									
MW-14	Monitoring	BRH		EP	26-Apr	13:48	NA	11.71	0.00	>11.93			Not in sampling program							Yes	Issue	Yes	Yes		SA	No sampling due to location N. of river									
RW-12	Recovery [d]	BTB	Field E of Refinery				Not in gauging program						Not in sampling program												-	-	-	-	-	-	-	-	-	-	-
RW-12R	Recovery [d]	BTB	43	REST	26-Apr	15:46	NA	23.38	0.00	NM	28-Apr	17:50	9.70	21.4	3,598	0.3	-291.3	9.8	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-113	Monitoring	BTB	44	REST	26-Apr	16:00	NA	23.20	0.00	37.80	28-Apr	16:40	6.44	22.0	3,049	0.7	7.3	8.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
KWB-8	Monitoring	BTB		REST	26-Apr	16:04	21.36	22.47	1.11	35.80			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]
RW-22	Recovery [d]	BTB		REST	26-Apr	16:12	21.60	21.63	0.03	NM			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
RW-20A	Recovery [d]	BTB		REST	26-Apr	14:53	19.68	20.08	0.40	NM			No sampling (LNAPL 0.03' or greater)							NA	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
RW-20B	Recovery [d]	BTB		REST	26-Apr	14:56	19.69	20.04	0.35	NM			No sampling (LNAPL 0.03' or greater)							NA	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
RW-13	Recovery [d]	BTB	Field E of Refinery				Not in gauging program						Not in sampling program												-	-	-	-	-	-	-	-	-	-	-
RW-13R	Recovery [d]	BTB	45	REST	26-Apr	15:04	NA	21.62	0.00	NM	27-Apr	9:50	7.73	22.5	2,511	2.8	-128.8	3.7	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
	Recovery [d]	BTB	Field E of Refinery				Not in gauging program						Not in sampling program												-	-	-	-	-	-	-	-	-	-	-
RW-14R	Recovery [d]	BTB		REST	26-Apr	15:14	17.98	18.12	0.14	NM			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-133	Monitoring	BTB		REST	26-Apr	15:20	16.75	17.06	0.31	37.66			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-134	Monitoring	BTB	46	REST	26-Apr	15:28	NA	14.32	0.00	32.93	27-Apr	18:20	6.39	18.6	5,648	1.0	80.7	11.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
RA-4798	Irrigation	BTB	47	REST	27-Apr	8:50	Not in gauging program				27-Apr	8:50	7.04	18.9	3,042	1.6	-9.2	1.2	Clear	NA	NA	Yes	Yes		NA	SA	-	-	SA	-	-	-	SA	SA	SA
RA-4196	Irrigation	BTB	48	REST	27-Apr	8:35	Not in gauging program				27-Apr	8:35	6.94	22.9	2,573	1.8	-88.7	1.7	Clear	NA	NA	Yes	Yes		NA	SA	-	-	SA	-	-	-	SA	SA	SA
RA-1227	Irrigation	BTB		REST	NA	NA	Removed from program by Navajo, 4-14-15						Removed from program by Navajo, 4-14-15												NA	A [h]	-	-	A [h]	-	-	-	A [h]	A [h]	A [h]
RA-3156	Irrigation	BTB	49	REST	28-Apr	12:00	Not in gauging program				28-Apr	12:00	7.02	20.2	4,691	2.9	-63.2	10.3	Clear	NA	NA	NA	Yes		NA	A	-	-	A	-	-	-	A	A	A
RA-313	Irrigation	BTB	50	REST	27-Apr	14:00	Not in gauging program				27-Apr	14:00	6.71	22.6	1,249	2.1	29.7	1.0	Clear	NA	NA	NA	Yes		NA	A	-	-	A	-	-	-	A	A	A
KWB-7	Monitoring	BTB	51	REST	26-Apr	13:45	20.84	20.85	0.01	34.83	27-Apr	14:50	6.80	20.0	3,540	0.5	-78.2	6.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	SA	SA	SA	SA	SA
MW-135	Monitoring	BTB	52	REST	26-Apr	13:51	NA	27.34	0.00	65.55	29-Apr	11:25	6.52	18.3	6,783	2.1	139.1	29.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-20	Monitoring	BTB	53	TMD	26-Apr	13:17	NA	10.73	0.00	26.66	28-Apr	11:35	6.83	21.4	5,657	1.6	103.6	1.0	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
NP-3	Monitoring	BTB		TMD	26-Apr	13:20	NA	12.28	0.00	21.59			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
NP-4	Monitoring	BTB		TMD	26-Apr	13:25	NA	18.34	0.00	36.98			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
NP-2	Monitoring	BTB		TMD	26-Apr	13:30	NA	13.34	0.00	21.49			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
NP-1	Monitoring	BTB	54	TMD	26-Apr	13:34	NA	11.53	0.00	21.88	28-Apr	10:45	6.73	18.5	5,428	1.3	117.4	1.3	Clear	Yes	Yes	Yes	Yes		SA	SA	-	-	SA	-	-	-	A	A	A

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
							Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																			Analytical Suite and Frequency [c]									
NP-6	Monitoring	BTB		TMD	26-Apr	13:40	NA	8.72	0.00	19.98			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	-	-	B	-	-	-	-	-	-
MW-8	Monitoring	BTB	55	TMD	26-Apr	12:56	NA	8.43	0.00	20.12	28-Apr	13:05	6.94	20.3	3,989	0.7	72.3	4.4	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-21	Monitoring	BTB	56	TMD	26-Apr	13:00	NA	9.93	0.00	25.12	28-Apr	15:45	6.76	20.5	6,211	1.5	91.7	1.5	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-9	Monitoring	BTB		TMD	26-Apr	13:04	NA	9.12	0.00	20.19			Not in sampling program							Yes	Yes	Cracked pad	Yes		SA	Not in sampling program									
MW-71	Monitoring	BTB	57	TMD	26-Apr	13:09	NA	10.77	0.00	21.87	28-Apr	9:00	6.51	18.6	6,938	2.3	119.1	3.9	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	A	A	A	A	A
MW-68	Monitoring	BTB	58	TMD	26-Apr	13:18	NA	16.14	0.00	26.52	28-Apr	9:50	6.63	20.8	4,084	0.9	99.3	6.5	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
MW-27	Monitoring	BTB	59	TMD	26-Apr	13:56	NA	16.23	0.00	30.28	27-Apr	17:30	6.63	20.0	3,676	0.7	63.7	6.9	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
MW-89	Monitoring	BTB	60	TMD	26-Apr	14:00	NA	10.40	0.00	20.28	27-Apr	16:40	6.59	18.4	4,419	1.0	37.3	3.6	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
MW-16	Monitoring	BTB		TMD	26-Apr	14:04	NA	8.24	0.00	21.23			Removed from sampling program by Navajo, 4-14-15							Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
MW-26	Monitoring	BTB	61	TMD	26-Apr	14:08	NA	9.35	0.00	27.58	27-Apr	15:50	6.94	18.6	9,084	0.5	69.5	4.2	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
KWB-11A	Monitoring	BTB	62	REST	26-Apr	14:15	NA	21.17	0.00	42.27	27-Apr	10:55	6.21	20.0	7,696	0.6	56.2	1.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KWB-11B	Monitoring	BTB	63	REST	26-Apr	14:18	NA	21.81	0.00	72.49	27-Apr	11:40	6.13	20.2	2,985	1.1	52.6	1.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KWB-3AR	Monitoring	BTB		REST			NM	NM	NM	NM			Removed from program by Navajo (farmer Jack Joy, 575-365-6042)												SA	SA	SA	-	SA	SA	SA	SA	SA	SA	SA
MW-117	Monitoring	GDS	64	REST	26-Apr	15:44	NA	9.25	0.00	27.22	26-Apr	18:15	6.80	16.4	3,440	1.6	181.6	120.0	Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-118	Monitoring	GDS	65	REST	26-Apr	15:48	NA	10.40	0.00	28.29	26-Apr	17:20	6.76	17.4	3,940	3.8	184.1	38.9	Sl Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
NP-9	Monitoring	GDS		TMD	26-Apr	15:52	NA	8.71	0.00	25.89			Not in sampling program							Yes	Issue	Issue	Yes		SA	Not in sampling program									
MW-119	Monitoring	GDS	66	REST	26-Apr	16:05	NA	9.91	0.00	28.11	26-Apr	16:30	7.05	15.1	3,490	1.4	180.3	5.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
NP-5	Monitoring	GDS		REST	26-Apr	15:18	NA	12.00	0.00	25.06			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	-	B	B	-	-	B	B	B
MW-136	Monitoring	GDS	67	REST	26-Apr	15:29	NA	10.90	0.00	27.92	28-Apr	15:20	6.79	20.8	4,270	1.2	40.1	75.0	Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-126A	Monitoring	GDS	68	REST	26-Apr	12:36	NA	13.71	0.00	37.51	27-Apr	18:15	6.88	18.4	3,040	0.9	-136.3	8.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-126B	Monitoring	GDS	69	REST	26-Apr	12:39	NA	13.66	0.00	51.45	28-Apr	10:20	6.66	19.2	4,140	0.7	8.9	19.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-127	Monitoring	GDS	70	REST	26-Apr	12:30	NA	17.84	0.00	53.25	27-Apr	17:20	6.68	21.7	2,660	0.5	-263.6	5.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-129	Monitoring	GDS	71	REST	26-Apr	12:51	20.75	20.76	0.01	53.08	27-Apr	16:25	6.65	23.3	2,220	1.0	-108.9	7.0	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-#18A [e]	Recovery [d]	GDS	72	REST	26-Apr	11:57	NA	11.36	0.00	17.78	28-Apr	13:15	7.00	19.4	4,640	1.2	37.9	2.8	Clear	Yes	Yes	Yes	Yes		SA	A	-	-	A	A	-	-	A	A	A
KWB-1A	Monitoring	GDS	73	REST	26-Apr	12:05	NA	12.95	0.00	33.49	28-Apr	12:20	6.71	20.3	5,190	0.5	22.5	6.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	SA	SA	SA	SA	SA
KWB-1B	Monitoring	GDS		REST	26-Apr	12:08	NA	14.61	0.00	33.92			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
KWB-1C	Monitoring	GDS		REST	26-Apr	12:11	NA	15.21	0.00	52.71			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	-	B	B	-	-	B	B	B
KWB-10R	Monitoring	GDS	74	REST	26-Apr	12:17	NA	15.54	0.00	29.46	28-Apr	11:25	6.60	21.1	1,841	0.6	-129.9	7.7	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-131	Monitoring	GDS	75	REST	26-Apr	12:45	NA	22.19	0.00	53.41	27-Apr	15:35	6.60	22.3	2,120	1.0	-123.2	6.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
KWB-5	Monitoring	GDS	76	REST	26-Apr	13:00	NA	22.44	0.00	37.68	27-Apr	12:20	6.58	24.2	2,850	1.2	-100.2	6.9	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
							Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																			Analytical Suite and Frequency [c]									
MW-111	Monitoring	GDS	77	REST	26-Apr	13:08	NA	23.60	0.00	40.81	27-Apr	11:20	6.53	23.9	2,850	1.3	10.1	8.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
KWB-6	Monitoring	GDS	78	REST	26-Apr	13:26	NA	21.73	0.00	36.44	28-Apr	9:25	6.73	22.9	2,430	0.7	-260.9	7.1	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-112	Monitoring	GDS		REST	26-Apr	13:17	20.62	20.65	0.03	37.54			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-132	Monitoring	GDS		REST	26-Apr	13:54	19.25	19.62	0.37	42.66			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-57	Monitoring	GDS	79	REST	26-Apr	14:02	NA	18.82	0.00	34.32	27-Apr	10:25	6.69	20.2	5,060	0.4	161.6	44.0	Sl Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
RW-#11-0[e]	Recovery [d]	GDS		REST	26-Apr	14:10	NA	22.16	0.00	22.20			No sample due to insufficient water column							Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
KWB-9	Monitoring	GDS		REST			Historically obstructed @ 15.11'						Removed from program by Navajo, 4-26-16 (farmer Jack Joy, 575-365-6042)												SA[h]	A[h]	A[h]	-	A[h]	A[h]	A[h]	A[h]	A[h]	A[h]
KWB-12A	Monitoring	GDS	80	REST	26-Apr	14:23	NA	20.94	0.00	25.03	27-Apr	8:30	6.70	18.2	3,970	3.9	180.4	2.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KWB-12B	Monitoring	GDS	81	REST	26-Apr	14:28	NA	20.80	0.00	39.39	27-Apr	9:15	6.76	19.7	3,770	3.6	155.7	2.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
KWB-2R	Monitoring	GDS	82	REST	26-Apr	14:58	NA	21.35	0.00	39.41	28-Apr	17:25	6.78	23.4	3,290	1.2	-193.4	5.4	Clear	Yes	Yes	Yes	Yes	Y	SA[h]	SA [d,h]	SA [d]	-	SA [d]	SA [d,h]	-	-	SA [d]	SA [d,h]	SA [d,h]
MW-58	Monitoring	GDS	83	REST	26-Apr	15:05	NA	20.35	0.00	33.06	28-Apr	18:20	6.70	21.2	2,250	0.5	-261.1	5.7	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]
KWB-13	Monitoring	GDS	84	REST	26-Apr	14:41	NA	25.00	0.00	33.10	28-Apr	16:20	6.83	18.5	3,880	3.3	75.1	>200	Cloudy	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	A	A	A	A	A
MW-103	Monitoring	SCU	85	REST	26-Apr	12:12	NA	16.75	0.00	25.22	28-Apr	9:45	6.91	28.8	33,200	1.3	-302.9	3.4	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-104	Monitoring	SCU	86	REST	26-Apr	12:27	NA	15.90	0.00	21.97	28-Apr	10:50	7.08	22.2	1,401	1.2	-345.5	5.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-64	Monitoring	SCU	87	REST	26-Apr	12:33	NA	18.13	0.00	34.08	28-Apr	12:00	6.94	30.4	2,680	1.5	-313.2	5.2	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-65	Monitoring	SCU	88	REST	26-Apr	11:40	NA	14.14	0.00	28.78	28-Apr	15:15	6.85	26.7	2,380	1.9	-196.3	9.9	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-5	Recovery [d]	SCU		S Refinery			Not in gauging program						Not in sampling program												-	-	-	-	-	-	-	-	-	-	-
RW-5R	Recovery [d]	SCU	89	REST	26-Apr	13:05	14.87	14.89	0.02	35.30	28-Apr	16:00	8.48	35.7	1,128	1.7	-304.8	4.6	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-102	Monitoring	SCU	90	REST	26-Apr	13:20	NA	13.65	0.00	26.45	28-Apr	16:45	6.83	24.9	2,310	1.5	-319.4	8.6	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-4	Recovery [d]	SCU	91	REST	26-Apr	13:27	NA	12.09	0.00	36.62	28-Apr	18:30	7.08	25.6	2,770	1.5	-280.2	9.0	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
RW-6	Recovery [d]	SCU	92	REST	26-Apr	13:23	13.82	13.83	0.01	34.90	28-Apr	17:40	6.72	25.5	2,480	2.0	-187.0	4.2	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-99	Monitoring	SCU	93	REST	26-Apr	14:05	NA	15.98	0.00	27.80	29-Apr	8:45	6.84	20.4	2,280	0.6	-318.2	19.3	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-66	Monitoring	SCU	94	REST	26-Apr	14:15	NA	14.89	0.00	29.80	29-Apr	9:40	6.90	19.9	1,620	0.4	-228.9	13.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-28	Monitoring	SCU	95	REST	26-Apr	14:24	NA	20.24	0.00	34.55	29-Apr	10:25	6.87	21.2	2,960	0.4	-371.4	1.2	Clear	Yes	Issue	Issue	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-59	Monitoring	SCU	96	REST	26-Apr	14:35	NA	6.84	0.00	32.72	29-Apr	10:15	6.93	21.3	3,090	1.6	-243.7	5.9	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-60	Monitoring	SCU	97	REST	26-Apr	14:47	NA	8.17	0.00	37.78	29-Apr	8:25	6.93	19.3	3,560	1.1	-273.1	5.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-107	Monitoring	SCU	98	REST	26-Apr	15:05	NA	10.13	0.00	19.05	29-Apr	11:05	7.08	20.5	1,958	1.2	-216.3	4.5	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-128	Monitoring	SCU	99	REST	26-Apr	15:16	NA	12.92	0.00	35.35	29-Apr	11:25	6.80	21.0	2,340	0.5	-206.9	9.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-125	Monitoring	SCU	100	REST	26-Apr	15:25	NA	8.95	0.00	28.31	29-Apr	8:55	6.50	19.1	4,400	1.3	115.7	2.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-116	Monitoring	SCU	101	REST	26-Apr	15:45	NA	8.95	0.00	27.63	29-Apr	9:45	6.75	18.4	4,650	1.0	145.8	64.9	Sl Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																						Analytical Suite and Frequency [c]									
					Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
MW-46R	Monitoring	SCU	102	TMD	26-Apr	15:55	NA	5.28	0.00	19.36	29-Apr	10:35	6.71	20.7	3,960	1.4	107.8	18.3	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-115	Monitoring	SCU	103	REST	26-Apr	16:04	NA	5.12	0.00	27.50	29-Apr	8:50	6.69	17.3	5,332	0.6	-141.3	1.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-114	Monitoring	SCU	104	REST	26-Apr	16:17	NA	4.92	0.00	38.24	29-Apr	9:45	6.16	18.7	3,917	0.7	33.5	7.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
RW-#15C [e]	Recovery [d]	SCU		REST	26-Apr	17:00	14.59	14.63	0.04	22.30			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-48	Monitoring	SCU	105	REST	26-Apr	17:05	NA	16.95	0.00	32.00	27-Apr	15:25	6.75	26.8	4,430	1.6	-339.9	16.8	Clear	Yes	Yes	Issue	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-130	Monitoring	SCU	106	REST	26-Apr	17:20	NA	19.04	0.00	45.00	27-Apr	17:30	6.92	24.9	3,100	1.7	-13.0	30.5	Sl Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
KWB-4	Monitoring	SCU		REST	26-Apr	17:28	22.89	23.03	0.14	41.75			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-19	Recovery [d]	SCU		REST	26-Apr	17:45	23.18	23.58	0.40	NM			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-52	Monitoring	SCU	107	REST	26-Apr	17:55	NA	17.45	0.00	34.67	29-Apr	10:50	7.03	20.1	2,650	0.5	-230.6	2.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-109	Monitoring	SCU	108	REST	26-Apr	18:05	NA	16.01	0.00	29.48	29-Apr	10:05	6.90	21.7	3,450	0.7	-321.1	3.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-110	Monitoring	SCU	109	REST	26-Apr	18:10	NA	13.68	0.00	29.75	29-Apr	9:20	7.03	21.8	1,992	0.5	-201.7	8.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
UG-2	Monitoring	SCU	110	REST	26-Apr	18:25	NA	17.35	0.00	29.28	27-Apr	8:35	6.97	23.1	2,510	3.9	152.1	3.6	Clear	Yes	Yes	Yes	Yes		A	A	A	A	A	A	A	A	A	A	A
UG-3R	Monitoring	SCU	111	REST	26-Apr	18:35	NA	24.51	0.00	38.58	27-Apr	11:35	7.08	23.0	2,410	5.8	150.4	96.2	Sl Cloudy	Yes	Yes	Yes	Yes		A	A	A	A	A	A	A	A	A	A	A
UG-1	Monitoring	SCU	112	REST	26-Apr	18:50	NA	12.87	0.00	24.08	27-Apr	9:25	7.11	23.2	3,270	4.7	157.4	2.8	Clear	Yes	Yes	Yes	Yes		A	A	A	A	A	A	A	A	A	A	A
UG-4	Monitoring	SCU	113	REST	26-Apr	19:10	NA	18.65	0.00	39.24	27-Apr	10:20	6.88	24.1	3,890	3.9	152.0	8.4	Clear	Yes	Yes	Yes	Yes		A	A	A	A	A	A	A	A	A	A	A
MW-101	Monitoring	TAB	114	REST	26-Apr	12:40	NA	12.23	0.00	26.85	28-Apr	8:25	6.69	20.7	1,935	1.7	-87.6	8.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-105	Monitoring	TAB	115	REST	26-Apr	12:50	NA	8.11	0.00	17.20	28-Apr	17:25	6.83	22.1	1,627	1.0	-376.1	9.1	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-2	Recovery [d]	TAB	116	REST	26-Apr	15:00	NA	10.76	0.00	36.13	28-Apr	17:40	6.78	22.5	5,210	0.7	-394.2	19.3	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	A [d]	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-61	Monitoring	TAB	117	REST	26-Apr	13:10	NA	9.21	0.00	29.30	28-Apr	18:30	6.79	24.4	2,770	0.8	-363.1	5.8	Clear	Yes	Yes	Cracked pad	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-62	Monitoring	TAB	118	REST	26-Apr	13:20	NA	10.85	0.00	29.50	28-Apr	16:50	6.52	23.8	4,640	0.7	-386.9	1.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-93	Monitoring	TAB	119	REST	26-Apr	13:30	NA	6.50	0.00	20.23	28-Apr	8:25	6.59	20.3	3,640	0.9	-310.7	10.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-43	Monitoring	TAB	120	REST	26-Apr	14:00	NA	7.54	0.00	19.67	28-Apr	15:55	6.76	23.4	6,590	0.6	-412.0	3.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-137	Monitoring	TAB	121	REST	26-Apr	13:40	NA	5.59	0.00	29.60	28-Apr	11:00	6.84	24.5	7,780	2.3	-407.4	22.4	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-138	Monitoring	TAB	122	REST	26-Apr	13:50	NA	7.19	0.00	24.81	28-Apr	10:05	6.76	30.8	4,070	1.5	-357.3	11.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-23	Monitoring	TAB	123	REST	26-Apr	14:20	NA	10.68	0.00	23.10	28-Apr	9:15	7.01	26.7	3,530	0.9	-337.1	41.3	Sl Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
TEL-4	Monitoring	TAB	124	TEL	26-Apr	14:30	NA	6.80	0.00	27.27	28-Apr	7:55	6.91	19.0	5,480	0.4	-291.6	3.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
TEL-3	Monitoring	TAB	125	TEL	26-Apr	14:40	NA	5.73	0.00	27.19	28-Apr	10:30	6.64	20.0	3,850	0.5	-358.0	3.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
TEL-2	Monitoring	TAB	126	TEL	26-Apr	14:50	NA	6.45	0.00	27.20	28-Apr	9:40	6.73	21.6	3,710	0.5	-335.7	2.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
TEL-1	Monitoring	TAB	127	TEL	26-Apr	15:00	NA	5.68	0.00	27.00	28-Apr	8:55	6.98	20.0	3,540	0.4	-262.4	4.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-39	Monitoring	TAB	128	REST	26-Apr	12:30	NA	6.08	0.00	25.44	28-Apr	14:25	6.94	23.8	4,950	0.5	-329.2	2.7	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16
Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
				Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																						Analytical Suite and Frequency [c]									
MW-98	Monitoring	TAB	129	REST	26-Apr	15:15	NA	7.31	0.00	26.80	28-Apr	11:40	6.57	22.5	3,320	0.7	-387.6	0.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
RW-10	Recovery [d]	TAB	130	REST	26-Apr	15:50	NA	7.91	0.00	23.77	28-Apr	15:10	7.49	22.4	3,420	0.4	-179.4	5.3	Clear	Issue	Yes	Issue	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-40	Monitoring	TAB	131	REST	26-Apr	15:50	NA	4.18	0.00	24.75	28-Apr	12:30	6.85	23.4	3,210	0.7	-374.5	10.2	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-41	Monitoring	TAB	132	REST	26-Apr	16:00	NA	4.04	0.00	21.56	28-Apr	11:10	6.89	22.5	3,280	3.2	-319.4	4.7	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
RW-9	Recovery [d]	TAB	133	REST	26-Apr	16:10	NA	7.02	0.00	21.97	28-Apr	15:45	6.95	22.1	3,510	1.3	-376.4	3.5	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-42	Monitoring	TAB	134	REST	26-Apr	16:20	NA	7.17	0.00	24.32	28-Apr	12:05	6.77	21.7	3,940	1.8	-319.1	7.2	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-29	Monitoring	TAB	135	REST	26-Apr	16:30	NA	8.01	0.00	22.00	28-Apr	14:55	7.00	23.4	3,540	1.6	-280.3	6.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
RW-#16B [e]	Recovery [d]	TAB	136	REST	26-Apr	16:40	NA	9.90	0.00	17.70	28-Apr	16:35	6.98	22.1	5,200	1.4	-215.9	7.6	Clear	Yes	Yes	Issue	Yes		SA	A	A	-	A	A	-	-	A	A	A
MW-30	Monitoring	TAB		REST	26-Apr	16:50	NA	8.15	0.00	23.50			Not in sampling program							Yes	Yes	Yes	Yes		SA	Not in sampling program									
MW-56	Monitoring	TAB	137	NCL	26-Apr	17:00	NA	9.39	0.00	26.50	28-Apr	12:00	7.15	23.0	4,630	1.4	-92.0	1.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-49	Monitoring	TAB	138	TEL	26-Apr	15:40	NA	7.93	0.00	33.15	28-Apr	10:10	6.72	23.5	2,890	1.5	-343.2	7.3	Clear	Yes	Non-std	Bad Hinge	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
MW-106	Monitoring	TAB	139	REST	26-Apr	15:30	NA	5.65	0.00	22.80	28-Apr	9:15	6.62	23.2	3,270	1.2	-379.9	7.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-45	Monitoring	TAB	140	NCL	26-Apr	17:20	NA	4.67	0.00	15.05	26-Apr	17:45	6.31	19.2	5,000	0.5	-4.1	13.2	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	SA	SA	SA	SA	SA
MW-50	Monitoring	CJH	141	REST	26-Apr	11:05	NA	14.07	0.00	28.25	27-Apr	7:55	6.95	19.4	8,480	0.7	97.8	3.1	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-97	Monitoring	CJH		REST	26-Apr	11:16	8.36	8.44	0.08	21.20			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-92	Monitoring	CJH	142	REST	26-Apr	11:30	NA	10.67	0.00	22.60	27-Apr	8:45	7.02	19.7	3,110	0.7	-264.3	5.2	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-1	Recovery [d]	CJH	143	REST	26-Apr	11:40	NA	9.61	0.00	35.39	27-Apr	9:40	7.02	20.1	3,410	0.8	-233.0	32.8	Sl Cloudy	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	A [d]	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-91	Monitoring	CJH	144	REST	26-Apr	11:50	NA	10.11	0.00	25.35	27-Apr	10:30	6.76	21.4	2,530	1.0	-390.9	8.5	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
MW-90	Monitoring	CJH	145	REST	26-Apr	11:58	NA	10.89	0.00	22.80	27-Apr	11:20	6.99	20.3	4,620	1.1	-357.5	8.7	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-96	Monitoring	CJH	146	REST	26-Apr	12:08	NA	10.99	0.00	25.55	27-Apr	12:05	6.89	21.3	2,330	1.3	-371.6	24.6	Clear	Yes	Closure	Issue	Yes		SA	SA	SA	SA	SA	SA	-	-	SA	SA	SA
MW-94	Monitoring	CJH	147	REST	26-Apr	12:17	NA	12.37	0.00	23.46	27-Apr	14:40	7.14	22.4	4,310	2.4	-414.0	9.0	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
RW-8	Recovery [d]	CJH		REST	26-Apr	12:27	16.22	16.48	0.26	37.19			No sampling (LNAPL 0.03' or greater)							Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	-	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
MW-67	Monitoring	CJH	148	REST	26-Apr	12:40	NA	9.35	0.00	27.30	27-Apr	15:30	7.20	21.7	2,610	1.6	-355.8	7.9	Clear	Yes	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]	SA [d]
MW-95	Monitoring	CJH	149	REST	26-Apr	12:50	NA	11.90	0.00	25.37	27-Apr	16:25	7.11	21.2	2,410	1.3	-342.5	7.6	Clear	Yes	Yes	Yes	Yes		SA	A	A	A	A	A	-	-	A	A	A
RW-7	Recovery [d]	CJH	150	REST	26-Apr	13:02	NA	15.61	0.00	37.00	27-Apr	17:15	7.15	24.4	2,280	1.2	-217.1	4.5	Clear	Yes	Yes	Yes	Yes	Y	SA	A [d]	A [d]	A [d]	A [d]	A [d]	-	-	A [d]	A [d]	A [d]
NCL-34A	Monitoring	CJH	151	NCL	26-Apr	13:15	NA	10.46	0.00	19.31	28-Apr	8:25	6.80	20.7	2,550	1.4	-356.9	3.4	Clear	Issue	Yes	Yes	Yes	Y	SA	SA [d]	SA [d]	-	SA [d]	SA [d]	-	-	SA [d]	SA [d]	SA [d]
NCL-33	Monitoring	CJH	152	NCL	26-Apr	13:23	NA	8.46	0.00	19.60	29-Apr	8:40	6.66	20.2	3,170	1.8	50.5	18.8	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
NCL-44	Monitoring	CJH	153	NCL	26-Apr	13:32	NA	8.64	0.00	21.55	28-Apr	13:00	6.82	20.4	2,730	1.4	-167.9	7.6	Clear	Issue	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
NCL-32	Monitoring	CJH	154	NCL	26-Apr	13:42	NA	8.74	0.00	17.15	28-Apr	11:40	7.10	19.5	2,580	2.2	-120.5	>200	V Cloudy	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-108	Monitoring	CJH	155	NCL	26-Apr	14:20	NA	13.18	0.00	27.74	28-Apr	9:25	7.15	20.9	2,690	1.3	-382.6	9.3	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA

Table 1: Gauging Data, Groundwater Field Parameters and Well Inspections, 1H16

Navajo Refining Company - Artesia Refinery, Artesia, New Mexico

Well ID	Well Type	HMI Use	HMI Use (# Samp Wells)	Location	Gauge Date	Gauge Time	Depth to LNAPL (ft btoc)	Depth to Water (ft btoc)	LNAPL Column (ft)	Total Depth (ft btoc)	Sample Date	Sample Time	pH (S.U.)	Temp (C)	Spec. Cond. (umho/cm)	D. O. (mg/l)	ORP (mg/l)	Turb. (NTU)	Water Clarity	Cap	Casing	Well Secured	Label	PSH Expected? [b]	Gauging Frequency	Purge Parameters	DRO	GRO	VOC	Metals (As, Ba, Cr, Fe, Pb, Mn, Se)	Metals (Hg, Ni, V, B, Cd, Co, U)	Cyanide	Cations/Anions	Nitrates / Nitrites as Nitrogen	TDS
							Hydrologic Monitoring-Collected Data (Gauging/Groundwater Field Parameter/Well Inspection)																			Analytical Suite and Frequency [c]									
NCL-31	Monitoring	CJH	156	NCL	26-Apr	13:55	NA	10.21	0.00	20.16	28-Apr	10:40	7.25	24.4	2,810	1.2	-201.6	7.5	Clear	Issue	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-19	Monitoring	CJH		NCL	26-Apr	14:05	NA	10.58	0.00	22.08			Not in sampling program							Yes	Issue	Issue	Yes		SA	Not in sampling program									
MW-55	Monitoring	CJH	157	NCL	26-Apr	14:42	NA	10.00	0.00	26.58	29-Apr	10:40	6.97	21.2	4,150	1.7	69.5	3.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
RW-#17A [e]	Recovery [d]	CJH	158	REST	26-Apr	14:50	NA	9.34	0.00	16.02	29-Apr	9:40	7.02	18.9	5,440	1.3	62.7	5.8	Clear	Yes	Issue	Issue	Yes		SA	A	A	A	A	A	-	-	A	A	A
MW-18	Monitoring	CJH	159	NCL	26-Apr	14:32	NA	9.98	0.00	22.20	29-Apr	11:30	7.10	20.3	3,400	2.5	77.4	2.8	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	A	A	A	A	A
MW-54A	Monitoring	CJH	160	NCL	26-Apr	16:55	NA	10.87	0.00	31.30	26-Apr	17:20	6.76	20.0	1,996	2.0	128.8	3.9	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-54B	Monitoring	CJH		NCL	26-Apr	17:55	NA	10.87	0.00	46.80			Biennial sampling (1H17, 1H19, etc.)							Yes	Yes	Yes	Yes		SA	B	B	B	B	B	-	-	B	B	B
NCL-49	Monitoring	CJH	161	NCL	26-Apr	16:05	NA	14.86	0.00	32.18	26-Apr	16:30	6.89	21.0	2,710	1.9	102.8	5.5	Clear	Yes	Yes	Yes	Yes		SA	SA	SA	-	SA	SA	-	-	SA	SA	SA
MW-53	Monitoring	CJH	162	NCL	26-Apr	15:15	NA	10.72	0.00	23.60	26-Apr	15:40	6.90	20.8	3,000	1.5	103.7	5.6	Clear	Yes	Yes	Yes	Yes		SA	A	A	-	A	A	-	-	A	A	A
KWB-P3	Monitoring			Field E of Refinery			Not in gauging program						Not in sampling program												Not included in monitoring program due to distance from impacts									

Notes: Abbreviations:

A = Annual (Mar/Apr event)
B = Biennial (starts Mar/Apr 2011)
BR = Bolton Road
DRO = Diesel Range Organics
E = East
EP = Evaporation Ponds
ft bgs = ft below ground surface
ft btoc = ft below top of casing
ft MSL = ft Mean Sea Level
GRO = Gasoline Range Organics
HR = Haldeman Road
in = inches
N = North
NA = Not accessible
NAPI = North API Separator
NCL = North Colony Landfarm
NE = Northeast
NW = Northwest
OCD = Oil Conservation District
PSH = Phase Separated Hydrocarbon
ROW = right of way
RR = Richey Road
S = South
SA = Semi-annual (Mar/Apr and Sep/Oct events)
SE = Southeast
SW = Southwest
TMD = Three Mile Ditch
TEL = Tetra Ethyl Lead Impoundment
UG = Upgradient
US285 = U.S. Highway 285
US82 = U.S. Highway 82
VOC = Volatile Organic Compounds
W = West
Y = Yes

Footnotes:

[a] Well const. info. provided where available. TOC & ground surface elevs relative to benchmark G-416. Total depth based on 4/2010 measurements.
[b] PSH was present during March 2012 gw monitoring event or a recovery pump is in place. Note that recovery wells are gauged at least monthly.
[c] Analytical Suite to include the following:

1. Purge parameters to be measured and recorded in the field will include pH, temp, spec. cond., diss. oxy., and oxidation-reduction potential.
2. DRO by Method 8015Mod.
3. GRO by Method 8015Mod.
4. VOCs by Method 8260, to include methyl tert butyl ether (MTBE).
5. Total metals by Method 6010/6020 and/or 7470. Specific metals shown in heading, abbreviations from periodic chart (incl B, Cd, Co, U, per 3-7-16 State request).
6. Dissolved metals - same list as total metals but only analyzed during March/April event (field filtered by HMI)
7. Cyanide by Method SM4500.
8. Cations/anions to include Calcium, Potassium, and Sodium by Method 6010 or 6020 and Sulfate, Chloride and Fluoride by Method 300.
9. Nitrates/Nitrites as Nitrogen by Method 300.
10. Total Dissolved Solids by Method 2540C.

"-" indicates parameter not required.

Note - samples will not be collected from any well where PSH is measured to be 0.03 feet thick or greater.

[d] Samples to be collected at frequency indicated only if <0.03 feet of PSH is present.
[e] Recovery trenches 11, 15, 16, 17 and 18 have multiple vertical "wells". Gauging & sampling points are: RW #11-0, RW #15C, RW #16B, RW #17A and RW #18A.

= Well with current or former LNAPL (light nonaqueous phase liquid)

HMI
Groundwater

Hydrologic Monitoring
1654 W. Sam Houston Pkwy. N.
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M E M O R A N D U M

Low-Flow Groundwater Monitoring Standard Operating Procedures
Navajo Refining Company – Artesia, New Mexico

HMI conducts low-flow groundwater sampling in accordance with the Site's Sampling and Analysis Plan and EPA guidance (including Puls and Barcelona, 1996 EPA Guidance on Low-Flow Groundwater Sampling, and Yeskis & Zavala, 2002, EPA/542:S-02/00, Groundwater Sampling Guidelines for Superfund and RCRA Project Managers).

Groundwater Sampling Methodology

HMI conducts low-flow groundwater sampling using a peristaltic pump and dedicated polyethylene tubing at wells with requisite depths-to-water. At limited wells with depths-to-water greater than peristaltic range, low-flow groundwater sampling is conducted using dedicated or non-dedicated bladder pumps. Sample intakes are generally set at mid-screen, when possible (and no nearer than two feet from the base of the well, when possible). Sample intake depths are permanently marked, ensuring that future sampling events consistently monitor the targeted water-bearing interval. During sampling with a peristaltic pump, the sample tube is attached to the pump using a one-foot section of dedicated, flexible silicone tubing (item #5703, Geotech Environmental Equipment, Inc.). A two-foot segment of polyethylene tubing connects the silicone tubing in the pump to the flow-through cell, using a disposable segment of silicone tubing. Purging commences through a sealed flow-through cell at EPA-recommended purge rates (generally 0.1 to 0.2 liters/minute), while drawdown is monitored in the well. Groundwater field parameter readings are collected at 0.5-liter intervals (generally the equivalent of one cell volume "turnover"). Field parameters of pH, specific conductivity, temperature, dissolved oxygen, and oxidation-reduction potential are monitored inside the cell. Turbidity is monitored outside of the cell. Groundwater field instrumentation is calibrated daily, per manufacturer specifications. The field instrument calibration log is included in the HMI deliverables package. Purging continues until a requisite volume of groundwater is purged (generally a minimum of 3,000 ml or six flow-through cell volumes), and field parameters have stabilized in accordance with EPA guidance:

Water Quality Parameters (Stabilization Parameters in Accordance with EPA (2002), Groundwater Sampling Guidelines for Superfund and RCRA Project Managers, Yeskis & Zavala, EPA/542:S-02/001)

• pH	+/- 0.1 units;
• Temperature	-
• Conductivity	+/- 3%
• Dissolved Oxygen	+/- 0.3 mg/L
• ORP	+/- 10%
• Turbidity	10%

Just prior to sampling, the input tubing to the flow-through cell is disconnected from the disposable silicone receiving tubing on the input barb on the flow-through cell, and groundwater samples are collected directly into laboratory-supplied containers. Groundwater samples are placed in iced coolers, and remain in HMI's custody until delivered to ESC Lab Sciences via Fedex-overnight. Peristaltic tubes and/or downhole bladder pumps/tubing for non-dedicated bladder pumps, may be dedicated in respective wells. Alternately, dedicated tubing may be retrieved, bagged, labeled and stored at HMI. In the unlikely event of wells with limited water columns, sampling may be conducted with disposable bailers. Grab samples are collected at operating irrigation wells that are scheduled for sampling. The purging and sampling process at each sampled well is documented on groundwater sampling field forms.

Cross-Contamination Prevention Program

Dedicated bladder pumps and/or dedicated peristaltic tubing are used as possible to minimize potential cross-contamination issues during the groundwater monitoring process. Remaining non-dedicated equipment (e.g., non-dedicated bladder pumps, electronic gauging probe, etc.) is properly decontaminated prior to use and between wells. The decontamination procedure may include a combination of chemical and mechanical decontamination. For example, scrubbing with ethyl alcohol (isopropanol) as warranted, followed by scrubbing using an Alconox-water solution, and distilled water rinse. The decontamination procedure for non-dedicated bladder pumps consists of cycling an Alconox-water solution through the pump's bladder. Distilled water is then cycled through the pump's bladder, followed by decontaminating the exterior body of the pump, using methods above.

HMI Deliverables

HMI provides accurate field documentation of all groundwater monitoring activities performed, including a brief field narrative, a summary table (with gauging data, groundwater field parameters collected at sampled wells, well inspection information, and scheduled analytical program), site Chain-of-Custodies by each Refinery "Area", followed by groundwater sampling forms, and field instrument calibration log.

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-6A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MOB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1140	NA	11.88	0.0	19.01	14.05	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy
4/27/16	745	NA	11.93	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	750	12.02	0.5	6.44	18.4	5920	3.4	51.1	7.7	Clear	*Low-flow groundwater sample:*
	752	12.05	1.0	6.47	18.4	5890	1.5	46.7	7.0		(A) peristaltic pump w/ ded tubing
	755	12.08	1.5	6.50	18.3	5880	1.3	41.4	6.6		B) ded bladder pump
	757	12.09	2.0	6.52	18.3	5840	1.0	36.7	4.7		C) non-ded bladder pump; or
	800	12.10	2.5	6.56	18.3	5820	0.9	34.5	3.1		*Standard groundwater sample:*
	802	12.11	3.0	6.60	18.3	5820	0.8	28.9	2.0		D) bailer due to limited column; or
	805	12.13	3.5	6.63	18.4	5810	0.7	21.5	1.8		E) recovery well cycling sample
✓	807	12.14	4.0	6.65	18.4	5810	0.7	20.7	1.6	✓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	810	MW-6A	12.14	6.65	18.4	5810	0.7	20.7	1.6	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-6B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1145	NA	11.79	0.0	52.23	42.27	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,Va)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,Va)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
												If <0.03 feet of PSH present, remove PSH and sample groundwater

* Oil absorbent sock removed; fully-saturated bagged; Domingo to replace.

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-85
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDM

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1730	9.44	9.98	0.54	20.34	NA	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5			NOT SAMPLED DUE TO					B) ded bladder pump
			2.0			PRESENCE OF	LNAPL	≥	0.03'		C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
		MW-85			NOT SAMPLED					DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	NaOH	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

* Oil absorbent sock removed bagged; Domingo to replace.

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-86
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1750	9.30	9.34	0.04	19.21	NA	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5		NOT SAMPLED DUE TO						B) ded bladder pump
			2.0		PRESENCE OF LNAPL ≥0.03'						C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
		MW-86			NOT SAMPLED					DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
						Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)					HNO3	6010/6020
							Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)				HNO3	Field filtered 0.45-u
								Total Metals (Hg,Ni,Va) + B,Ca,Co,U			HNO3	6010/6020 and/or 7470
								Dissolved Metals (Hg,Ni,Va) + B,Ca,Co,U			HNO3	Field filtered 0.45-u
								Anions (Chloride,Fluoride,Sulfate)			Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-120
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in-stick up) Initials: MDB

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1150	NA	11.67	0.0	28.00	17.5	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 70's
4/27/16	1355	NA	11.82	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1400	12.18	0.5	7.62	22.5	16410	2.4	-65.7	69.4	Sl. Cloudy	*Low-flow groundwater sample:*
	1402	12.19	1.0	7.60	21.4	16400	1.4	-60.1	68.7		(A) peristaltic pump w/ ded tubing
	1405	12.19	1.5	7.57	20.2	16360	1.0	-58.4	66.4		B) ded bladder pump
	1407	12.19	2.0	7.53	19.6	16330	0.8	-53.4	65.9		C) non-ded bladder pump; or
	1410	12.19	2.5	7.50	19.5	16280	0.7	-50.7	67.1		*Standard groundwater sample:*
	1412	12.19	3.0	7.48	19.4	16200	0.6	-50.0	62.8		D) bailer due to limited column; or
	1415	12.19	3.5	7.45	19.3	16180	0.6	-49.4	63.4		E) recovery well cycling sample
	1417	12.19	4.0	7.43	19.3	16160	0.6	-48.4	64.5		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1420	MW-120	12.19	7.43	19.3	16160	0.6	-48.4	64.5	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	6010/6020 and/or 7470
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-121
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in-stick up)

Initials: MWA

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1155	NA	12.43	0.0	27.32	17.5	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's
4/27/16	1300	NA	12.43	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1305	12.54	0.5	7.74	21.1	8160	2.8	54.1	36.1	Sl. Cloudy	*Low-flow groundwater sample:*
↓	1307	12.57	1.0	7.68	20.5	8170	1.4	49.0	33.4	↓	(A) peristaltic pump w/ ded tubing
	1310	12.60	1.5	7.61	20.2	8160	1.0	37.4	26.7		B) ded bladder pump
	1312	12.63	2.0	7.55	20.0	8140	0.7	34.3	23.4	Clear	C) non-ded bladder pump; or
	1315	12.65	2.5	7.51	19.9	8160	0.6	30.3	18.9		*Standard groundwater sample:*
	1317	12.67	3.0	7.48	19.8	8140	0.5	28.2	16.4		D) bailer due to limited column; or
	1320	12.68	3.5	7.47	19.8	8140	0.5	25.4	14.7		E) recovery well cycling sample
	1322	12.69	4.0	7.46	19.8	8140	0.5	23.9	12.7		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1325	MW-121	12.69	7.46	19.8	8140	0.5	23.9	12.7	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
						Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)					HNO3	6010/6020
								Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)			HNO3	Field filtered 0.45-u
									~~Total Metals (Hg,Ni,Va)~~		~~HNO3~~	~~6010/6020 and~~/or 7470
									~~Dissolved Metals (Hg,Ni,Va)~~		~~HNO3~~	~~Field filtered 0.45~~-u
								Anions (Chloride,Fluoride,Sulfate)			Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-84
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in; stickup)

Initials: MDM

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1200	NA	8.81	0.0	20.56	15.7	Yes	Yes	Yes	Yes		Weather: Sl. cloudy 70's
4/27/16	1630	NA	8.79	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1635	8.88	0.5	7.38	22.3	10930	2.5	44.1	8.3	Clear w/ gold tint	*Low-flow groundwater sample:*
	1637	8.97	1.0	7.32	21.5	11270	1.1	51.7	7.8		(A) peristaltic pump w/ ded tubing
	1640	9.01	1.5	7.29	21.2	11290	0.9	54.6	6.2		B) ded bladder pump
	1642	9.07	2.0	7.27	20.8	11310	0.8	56.1	6.8		C) non-ded bladder pump; or
	1645	9.10	2.5	7.24	20.6	11320	0.7	57.4	7.4		*Standard groundwater sample:*
	1647	9.14	3.0	7.21	20.6	11390	0.7	58.1	7.9		D) bailer due to limited column; or
	1650	9.18	3.5	7.20	20.5	11400	0.6	60.4	8.2		E) recovery well cycling sample
	1652	9.23	4.0	7.19	20.5	11400	0.6	61.5	7.6		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1655	MW-84	9.23	7.19	20.5	11400	0.6	61.5	7.6	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-122
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1205	NA	10.13	0.0	23.31	18.4	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 70's
4/27/16	1200	NA	10.15	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1205	10.63	0.5	7.82	20.4	9910	2.1	28.1	14.8	Clear	*Low-flow groundwater sample:*
	1207	10.83	1.0	7.71	19.9	9850	1.2	33.4	13.1		(A) peristaltic pump w/ ded tubing
	1210	10.97	1.5	7.60	19.5	98.30	1.0	37.4	9.8		B) ded bladder pump
	1212	11.08	2.0	7.52	19.2	9800	0.8	39.1	7.4		C) non-ded bladder pump; or
	1215	11.19	2.5	7.45	19.1	9760	0.6	38.7	6.8		*Standard groundwater sample:*
	1220	11.20	3.0	7.40	19.1	9750	0.5	37.1	6.1	Reduced purge	D) bailer due to limited column; or
	1225	11.21	3.5	7.37	19.0	9720	0.5	36.0	5.4	rate to 0.1 L/m	E) recovery well cycling sample
	1230	11.23	4.0	7.34	19.1	9730	0.5	33.1	4.8		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1235	MW-122	11.23	7.34	19.1	9730	0.5	33.1	4.8	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-81
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: [illegible]

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1325	NA	10.46	0.0	18.63	13.70	Yes	Yes	Yes	Yes		Weather: ss, cloudy 80's
4/27/16	1445	NA	10.46	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1450	10.59	0.5	7.62	21.6	9050	3.9	50.7	10.5	Clear	*Low-flow groundwater sample:*
	1452	10.67	1.0	7.59	20.7	9040	3.0	58.1	9.8		(A) peristaltic pump w/ ded tubing
	1455	10.72	1.5	7.56	20.3	9030	2.8	61.2	8.1		B) ded bladder pump
	1457	10.76	2.0	7.52	20.0	9020	2.7	64.7	7.9		C) non-ded bladder pump; or
	1500	10.81	2.5	7.50	19.8	9000	2.7	66.2	6.7		*Standard groundwater sample:*
	1502	10.84	3.0	7.48	19.6	8980	2.6	67.5	6.1		D) bailer due to limited column; or
	1505	10.89	3.5	7.45	19.6	8970	2.6	69.4	5.8		E) recovery well cycling sample
	1507	10.93	4.0	7.42	19.5	8950	2.6	71.4	5.5		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1510	MW-81	10.93	7.42	19.5	8950	2.6	71.4	5.5	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or~~ 7470
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-80
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1335	NA	8.65	0.0	14.69	14.67	Yes	Yes	Yes	Yes		Weather: 61. Cloudy 80's
4/27/16	1535	NA	8.65	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1540	8.73	0.5	7.82	19.5	9290	3.3	88.6	13.4	Clear	*Low-flow groundwater sample:*
↑	1542	8.76	1.0	7.77	18.8	9260	2.3	85.2	12.9	↓	(A) peristaltic pump w/ ded tubing
↓	1545	8.79	1.5	7.69	18.2	9250	1.8	75.8	12.2	↓	B) ded bladder pump
↓	1547	8.80	2.0	7.62	18.2	9230	1.6	78.4	11.7	↓	C) non-ded bladder pump; or
↓	1550	8.81	2.5	7.56	18.0	9250	1.6	82.4	12.5	↓	*Standard groundwater sample:*
↓	1552	8.82	3.0	7.50	18.0	9260	1.6	83.3	13.3	↓	D) bailer due to limited column; or
↓	1555	8.83	3.5	7.47	18.0	9270	1.5	84.2	12.8	↓	E) recovery well cycling sample
↓	1557	8.84	4.0	7.43	17.9	9260	1.5	88.8	12.1	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1600	MW-80	8.84	7.43	17.9	9260	1.5	88.8	12.1	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

+EB-EP-04
(for same analysis)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-79
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDR

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1345	NA	9.68	0.0	19.25	15.0	Yes	Yes	Yes	Yes		Weather: 61 Cloudy 80's
4/26/16	1620	NA	9.68									

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/26/16	1625	9.76	0.5	7.91	19.0	6330	3.4	94.7	14.1	Clear	*Low-flow groundwater sample:*
	1627	9.80	1.0	7.84	18.4	6396	2.0	99.4	12.1		(A) peristaltic pump w/ ded tubing
	1630	9.83	1.5	7.79	17.9	6516	1.3	98.4	10.4		B) ded bladder pump
	1632	9.87	2.0	7.74	17.8	6560	1.0	96.4	11.1		C) non-ded bladder pump; or
	1635	9.91	2.5	7.63	17.8	6610	0.8	92.2	10.9		*Standard groundwater sample:*
	1637	9.96	3.0	7.58	17.8	6620	0.7	90.4	10.4		D) bailer due to limited column; or
	1640	9.99	3.5	7.55	17.8	6620	0.6	87.1	10.6		E) recovery well cycling sample
	1642	10.03	4.0	7.54	17.8	6640	0.6	86.7	9.9		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/26/16	1645	MW-79	10.03	7.54	17.8	6640	0.6	86.7	9.9	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
	1710	EB-EP-04	NA							Same as above	Same	Same

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-82
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1355	NA	9.10	0.0	20.00	15.0	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's
4/27/16	1725	NA	9.09	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1730	9.15	0.5	7.69	21.2	8570	2.3	-64.6	7.6	Clear w/yellow	*Low-flow groundwater sample:*
	1732	9.16	1.0	7.63	20.7	8590	1.1	-72.5	7.1	tint	(A) peristaltic pump w/ ded tubing
	1735	9.17	1.5	7.57	20.4	8610	0.8	-77.4	6.8		B) ded bladder pump
	1737	9.17	2.0	7.52	20.3	8640	0.7	-80.6	6.2		C) non-ded bladder pump; or
	1740	9.17	2.5	7.47	20.2	8650	0.6	-82.7	7.4		*Standard groundwater sample:*
	1742	9.17	3.0	7.45	20.1	8650	0.6	-85.6	6.1		D) bailer due to limited column; or
	1745	9.17	3.5	7.43	20.1	8660	0.6	-88.7	5.7		E) recovery well cycling sample
	1747	9.17	4.0	7.41	20.1	8650	0.6	-90.4	4.4		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1750	MW-82	9.17	7.41	20.1	8650	0.6	-90.4	4.4	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or~~ 7470
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

+EB-EP-01
(for same analysis)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-74
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in-stickup) Initials: MDB

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1410	N/A	8.64	0.0	20.19	14.8	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's
4/26/16	1520	NA	8.64	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/26/16	1525	8.69	0.5	7.30	20.7	6200	3.1	64.3	12.7	Clear	*Low-flow groundwater sample:*
	1527	8.71	1.0	7.26	19.9	6210	2.0	60.1	10.4		(A) peristaltic pump w/ ded tubing
	1530	8.73	1.5	7.25	19.5	6250	1.2	58.6	8.6		B) ded bladder pump
	1532	8.74	2.0	7.23	19.2	6300	0.8	56.0	7.1		C) non-ded bladder pump; or
	1535	8.74	2.5	7.21	19.0	6330	0.6	54.8	6.6		*Standard groundwater sample:*
	1537	8.74	3.0	7.19	19.0	6340	0.6	53.7	6.1		D) bailer due to limited column; or
	1540	8.74	3.5	7.19	19.0	6350	0.6	53.1	5.5		E) recovery well cycling sample
	1542	8.74	4.0	7.19	19.0	6350	0.6	52.2	4.9		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/26/16	1545	MW-74	8.74	7.19	19.0	6350	0.6	52.2	4.9	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
4/26/16	1605	EB-EP-01	NA							Same as above	Same	Same
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Trip Blank-EP-01

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-73
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MGM

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1425	NA	9.20	0.0	19.60	14.6	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/26/16	1430	9.30	0.5	6.56	18.7	6190	3.0	-20.8	136	Cloudy	*Low-flow groundwater sample:*
	1432	9.31	1.0	6.60	17.9	6200	2.4	-23.1	104		(A) peristaltic pump w/ ded tubing
	1435	9.32	1.5	6.67	17.5	6230	1.6	-30.7	99.4		B) ded bladder pump
	1437	9.32	2.0	6.73	17.1	6250	1.4	-34.6	82.1		C) non-ded bladder pump; or
	1440	9.32	2.5	6.82	17.0	6290	1.3	-39.1	71.4		*Standard groundwater sample:*
	1442	9.32	3.0	6.88	17.0	6310	1.3	-40.7	65.4	Sl. cloudy	D) bailer due to limited column; or
	1445	9.32	3.5	6.91	17.0	6290	1.2	-43.1	60.5		E) recovery well cycling sample
	1447	9.32	4.0	6.94	16.9	6280	1.2	-45.4	56.4		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/26/16	1450	MW-73	9.32	6.94	16.9	6280	1.2	-45.4	56.4	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-2A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in; stickup) Initials: MDH

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1210	NA	10.62	0.0	17.31	15.0	Yes	Yes	Yes	Yes		Weather: 51, Cloudy 70's
4/27/16	1110	NA	10.63	0.0								

Well Purging Record

* Double-Checked

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm) *	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1115	10.96	0.5	7.18	20.2	37500	2.4	-58.0	7.1	Clear	*Low-flow groundwater sample:*
↓	1117	11.01	1.0	7.12	19.4	37600	1.5	-60.1	6.4	↓	(A) peristaltic pump w/ ded tubing
	1120	11.04	1.5	7.07	19.1	37700	1.0	-51.7	5.7		B) ded bladder pump
	1122	11.04	2.0	7.04	18.7	37500	0.7	-44.8	4.2		C) non-ded bladder pump; or
	1125	11.06	2.5	6.98	18.6	37200	0.7	-31.5	3.7		*Standard groundwater sample:*
	1127	11.08	3.0	6.97	18.5	37200	0.7	-26.4	3.1		D) bailer due to limited column; or
	1130	11.11	3.5	6.95	18.5	37200	0.7	-22.7	3.5		E) recovery well cycling sample
↓	1132	11.14	4.0	6.94	18.6	37200	0.6	-18.6	2.9	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1135	MW-2A	11.14	6.94	18.6	37200	0.6	-18.6	2.9	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~

If <0.03 feet of PSH present, remove PSH and sample groundwater

(Not in Sampling program)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-2B (gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1215	NA	10.35	0.0	52.00	No Sample	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy, 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,Va)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,Va)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H_2SO_4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-72
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MMB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1220	NA	7.09	0.0	13.92	11.93	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 70°
4/27/16	1020	NA	7.11	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1025	7.24	0.5	7.51	18.9	13570	2.3	38.7	31.4	Sl. Cloudy w/ Orange	*Low-flow groundwater sample:*
	1027	7.25	1.0	7.46	18.4	13580	1.4	32.8	27.8	particles	(A) peristaltic pump w/ ded tubing
	1030	7.25	1.5	7.42	18.0	13610	1.0	22.0	26.1	↓	B) ded bladder pump
	1032	7.25	2.0	7.35	17.9	13630	0.8	7.1	25.9	Clear w/ Orange	C) non-ded bladder pump; or
	1035	7.25	2.5	7.31	17.5	13610	0.6	-3.8	23.6	particles	*Standard groundwater sample:*
	1037	7.25	3.0	7.25	17.5	13630	0.5	-9.2	20.4		D) bailer due to limited column; or
	1040	7.25	3.5	7.21	17.6	13630	0.5	-14.7	19.9		E) recovery well cycling sample
	1042	7.25	4.0	7.18	17.6	13620	0.5	-17.2	18.7		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1045	MW-72	7.25	7.18	17.6	13620	0.5	-17.2	18.7	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: OCD-6
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1235	NA	10.78	0.0	26.91	21.6	Yes	lid can't	Yes	Yes	cracked	Weather: Sl. Cloudy 70°s
4/27/16	930	NA	10.84	0.0				close properly			fuel	

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	935	10.89	0.5	7.51	20.1	14520	3.2	-45.7	21.6	Clear	*Low-flow groundwater sample:*
	937	10.95	1.0	7.43	19.4	14490	1.5	-33.8	14.7		(A) peristaltic pump w/ ded tubing
	940	10.96	1.5	7.37	19.1	14010	1.1	-18.1	11.3		B) ded bladder pump
	942	10.96	2.0	7.32	18.9	13460	0.9	-10.6	6.5		C) non-ded bladder pump; or
	945	10.96	2.5	7.27	18.8	13900	0.7	-8.6	5.9		*Standard groundwater sample:*
	947	10.97	3.0	7.24	18.8	13850	0.6	-10.4	5.1		D) bailer due to limited column; or
	950	10.97	3.5	7.21	18.8	13820	0.6	-11.6	4.7		E) recovery well cycling sample
	952	10.97	4.0	7.18	18.8	13800	0.6	-13.4	4.5		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	955	OCD-6	10.97	7.18	18.8	13800	0.6	-13.4	4.5	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: OCD - 7AR
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in; stickup) Initials: MPB

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1240	NA	9.67	0.10	21.29	16.0	Yes	Yes	Yes	Yes		Weather: sl. cloud, 80's
4/27/16	835	NA	9.71	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	840	9.84	0.5	7.12	21.3	12520	2.2	-37.2	74.4	Clear w/ orange	*Low-flow groundwater sample:*
	842	9.88	1.0	7.09	20.4	12600	1.4	-10.4	51.9	particles	(A) peristaltic pump w/ ded tubing
	845	9.91	1.5	7.06	20.2	12650	1.0	8.8	37.8		B) ded bladder pump
	847	9.93	2.0	7.05	20.0	12820	0.8	18.8	31.5		C) non-ded bladder pump; or
	850	9.94	2.5	7.04	19.8	13050	0.6	24.4	28.4		*Standard groundwater sample:*
	852	9.96	3.0	7.04	19.7	13110	0.6	29.3	24.1		D) bailer due to limited column; or
	855	9.97	3.5	7.03	19.8	13090	0.6	30.4	20.6		E) recovery well cycling sample
	857	9.98	4.0	7.03	19.9	13080	0.6	32.2	17.9		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	900	OCD-7AR	9.98	7.03	19.9	13080	0.6	32.2	17.9	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,Va)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,Va)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: OCD-7B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MDB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1245	NA	9.44	0.0	56.81	51.85	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy 80's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,Va)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,Va)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical; ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

(Not in Sampling Program)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: OCD-7C (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: MAB

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1250	NA	8.75	0.0	71.95	No Sample	Yes	Yes	Yes	Yes		Weather: Sl. Cloudy, 80's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,Va)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,Va)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-76
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in; stick up) Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1155	NA	10.39	0.0	20.33	16.0	Yes	Yes	Yes	Yes		Weather: Clear 80's
4/27/16	1615	NA	10.40	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1620	10.46	0.5	7.46	22.8	6800	3.8	-76.7	8.6	Clear; odor	*Low-flow groundwater sample:*
↓	1622	10.46	1.0	7.16	22.4	6690	2.6	-77.5	7.4	↓	(A) peristaltic pump w/ ded tubing
↓	1625	10.46	1.5	7.10	21.9	6680	2.3	-78.0	6.8	↓	B) ded bladder pump
↓	1627	10.46	2.0	7.05	21.5	6650	1.9	-79.9	6.2	↓	C) non-ded bladder pump; or
↓	1630	10.46	2.5	7.03	21.3	6640	1.5	-80.6	5.9	↓	*Standard groundwater sample:*
↓	1632	10.46	3.0	7.02	21.3	6640	1.3	-81.3	5.4	↓	D) bailer due to limited column; or
↓	1635	10.46	3.5	7.01	21.2	6630	1.3	-82.1	5.3	↓	E) recovery well cycling sample
↓	1637	10.46	4.0	7.01	21.2	6630	1.3	-82.9	4.9	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1640	MW-76	10.46	7.01	21.2	6630	1.3	-82.9	4.9	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-77
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in; stickup) Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1205	NA	8.62	0.0	20.52	15.2	Yes	Yes	Yes	Yes		Weather: Clear 80's
4/27/16	1405	NA	8.63	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1410	8.77	0.5	7.11	21.8	7940	4.0	-71.5	9.4	Clear; gold tint; odor	*Low-flow groundwater sample:*
	1412	8.79	1.0	7.01	21.5	7980	3.6	-72.9	8.6		A) peristaltic pump w/ ded tubing
	1415	8.80	1.5	6.99	21.1	8000	3.4	-73.6	7.9		B) ded bladder pump
	1417	8.80	2.0	6.97	20.9	8020	3.2	-75.5	6.5		C) non-ded bladder pump; or
	1420	8.81	2.5	6.95	20.7	8030	3.1	-77.3	6.2		*Standard groundwater sample:*
	1422	8.82	3.0	6.93	20.6	8030	3.1	-80.5	5.8		D) bailer due to limited column; or
	1425	8.82	3.5	6.93	20.6	8040	3.1	-81.2	5.5		E) recovery well cycling sample
	1427	8.82	4.0	6.92	20.6	8040	3.0	-83.9	5.4		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1430	MW-77	8.82	6.92	20.6	8040	3.0	-83.9	5.4	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-78
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1210	NA	8.68	0.0	19.57	14.6	Yes	Yes	Yes	Yes		Weather: Clear 80's
4/27/16	1705	NA	8.69	0.0	19.57							

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1710	8.77	0.5	7.25	21.8	5650	3.6	-79.3	24.5	clear w/ gold tint	*Low-flow groundwater sample:*
	1712	8.84	1.0	7.23	20.7	5220	2.1	-73.4	22.9		A) peristaltic pump w/ ded tubing
	1715	8.89	1.5	7.16	20.0	4870	1.7	-72.8	19.8		B) ded bladder pump
	1717	8.94	2.0	7.12	19.8	4700	1.5	-72.3	18.2		C) non-ded bladder pump; or
	1720	8.98	2.5	7.10	19.7	4630	1.4	-71.6	19.1		*Standard groundwater sample:*
	1722	9.02	3.0	7.07	19.6	4610	1.4	-70.5	19.5		D) bailer due to limited column; or
	1725	9.06	3.5	7.06	19.6	4600	1.3	-69.9	19.3		E) recovery well cycling sample
	1727	9.10	4.0	7.06	19.6	4600	1.3	-69.2	19.1		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1730	MW-78	9.10	7.06	19.6	4600	1.3	-69.2	19.1	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	NaOH	SM4500
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-75
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD/BEH

Well Inspection Information

(4in-stickup)

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1215	NA	8.81	0.0	23.68	18.4	Yes	Yes	Yes	Yes		Weather: Clear 80's
4-27-16	1645	NA	8.84	0.0	23.68	18.4						

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4-27-16	1650	8.87	0.5	7.84	20.7	9230	2.3	-74.1	8.1	Clear w/ gold tint,	*Low-flow groundwater sample:*
	1653	8.87	1.0	7.42	20.0	8810	1.2	-70.8	6.2	odor	A) peristaltic pump w/ ded tubing
	1655	8.88	1.5	7.35	19.7	8520	0.9	-69.9	4.9		B) ded bladder pump
	1658	8.88	2.0	7.29	19.2	8380	0.9	-71.4	4.3		C) non-ded bladder pump; or
	1700	8.88	2.5	7.25	19.0	8190	0.8	-74.5	3.8		*Standard groundwater sample:*
	1703	8.88	3.0	7.22	19.0	8140	0.8	-79.2	3.6		D) bailer due to limited column; or
	1705	8.88	3.5	7.20	18.9	8110	0.8	-84.6	3.1		E) recovery well cycling sample
	1708	8.88	4.0	7.19	18.8	8090	0.8	-87.1	2.7		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4-27-16	1710	MW-75	8.88	7.19	18.8	8090	0.8	-87.1	2.7	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H_2SO_4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
												If <0.03 feet of PSH present, remove PSH and sample groundwater

TB-EP-02
4/27/16

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-83
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in) stickup

Initials: SCP

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1220	NA	8.67	0.0	19.91	15.6	Yes	Yes	Yes	Yes		Weather: Clear 80's
4/27/16	1245	NA	8.65	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1250	8.74	0.5	7.50	22.2	5230	2.0	-83.9	20.5	clear w/ slight gold tint	*Low-flow groundwater sample:*
↓	1252	8.79	1.0	7.25	20.9	5310	1.6	-85.0	15.5	↓	A) peristaltic pump w/ ded tubing
	1255	8.81	1.5	7.18	20.7	5330	1.2	-85.9	13.8		B) ded bladder pump
	1257	8.83	2.0	7.14	20.5	5350	1.1	-87.0	11.9		C) non-ded bladder pump; or
	1300	8.84	2.5	7.12	20.4	5350	1.1	-88.9	10.5		*Standard groundwater sample:*
	1302	8.84	3.0	7.11	20.4	5360	1.0	-89.8	9.3		D) bailer due to limited column; or
	1305	8.85	3.5	7.11	20.4	5360	1.0	-91.5	8.7		E) recovery well cycling sample
↓	1307	8.85	4.0	7.10	20.3	5370	1.0	-92.7	8.2	↓	F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1310	MW-83	8.85	7.10	20.3	5370	1.0	-92.7	8.2	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

+ DUP-EP-03
(for same analysis)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-3
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

(2in; stickup)

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1225	NA	8.73	0.0	20.18	16.1	Yes	Yes	Issue	Yes	No Pad	Weather: Clear 80's
4/27/16	1500	NA	8.76	0.0							Visible	

No protective casing; stainless steel well casing with locked expandable cap; probed for pad, but not found.

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1505	8.81	0.5	7.98	21.7	7070	3.4	20.4	24.5	Clear	*Low-flow groundwater sample:*
	1507	8.83	1.0	7.78	21.0	7080	1.9	23.8	18.7		A) peristaltic pump w/ ded tubing
	1510	8.84	1.5	7.64	20.6	7120	1.6	27.6	14.5		B) ded bladder pump
	1512	8.85	2.0	7.54	20.5	7140	1.4	29.8	11.8		C) non-ded bladder pump; or
	1515	8.85	2.5	7.49	20.5	7150	1.3	29.9	10.9		*Standard groundwater sample:*
	1517	8.85	3.0	7.45	20.4	7160	1.3	30.2	10.1		D) bailer due to limited column; or
	1520	8.85	3.5	7.44	20.4	7160	1.2	30.9	9.8		E) recovery well cycling sample
	1522	8.85	4.0	7.44	20.4	7160	1.2	31.5	9.6		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1525	MW-3	8.85	7.44	20.4	7160	1.2	31.5	9.6	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	HNO3	6010/6020 and/or 7470
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45~~-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
	1200	DUP-EP-03	8.85	7.44	20.4	7160	1.2	31.5	9.6	Same as above	Same	Same

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-88
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in; stickup) Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1245	NA	8.06	0.0	20.28	14.8	Yes	Yes	Yes	Yes	hole in	Weather: Clear 80's
4/27/16	745	NA	8.09	0.0							well pad	

Hole in west side of well pad; well remains functional

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	750	8.14	0.5	6.28	16.5	7360	2.1	69.2	31.9	Clear w/ orange	*Low-flow groundwater sample:*
	752	8.15	1.0	6.60	16.6	7350	1.6	62.8	20.8	particles	(A) peristaltic pump w/ ded tubing
	755	8.16	1.5	6.85	16.7	7320	1.4	66.3	13.2		B) ded bladder pump
	757	8.16	2.0	6.88	16.7	7320	1.3	67.2	9.7		C) non-ded bladder pump; or
	800	8.16	2.5	6.92	16.7	7330	1.2	68.3	8.6		*Standard groundwater sample:*
	802	8.17	3.0	6.97	16.8	7320	1.2	69.6	7.1		D) bailer due to limited column; or
	805	8.18	3.5	7.00	16.8	7310	1.1	70.3	6.3		E) recovery well cycling sample
	807	8.18	4.0	7.01	16.8	7300	1.1	70.5	5.9		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	810	MW-88	8.18	7.01	16.8	7300	1.1	70.5	5.9	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	6010/6020 and/or 7470
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45~~-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~

If <0.03 feet of PSH present, remove PSH and sample groundwater

+Dup- EP-02
(for same analysis)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-22A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(4in; stick up) Initials: SCO

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1255	NA	7.38	0.0	22.65	17.4	Yes	Yes	Yes	Yes		Weather: Clear 70's
4/27/16	835	NA	7.40	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	840	7.47	0.5	7.29	18.9	7990	2.5	-35.4	48.4	Clear w/ orange	*Low-flow groundwater sample:*
	842	7.53	1.0	7.25	18.3	8000	1.8	-42.4	34.5	particles	(A) peristaltic pump w/ ded tubing
	845	7.56	1.5	7.18	18.2	8020	1.6	-47.1	33.6		B) ded bladder pump
	847	7.59	2.0	7.15	18.1	8030	1.6	-49.3	26.2		C) non-ded bladder pump; or
	850	7.61	2.5	7.13	18.0	8030	1.5	-50.3	27.4		*Standard groundwater sample:*
	852	7.63	3.0	7.13	18.0	8040	1.5	-52.6	26.9		D) bailer due to limited column; or
	855	7.65	3.5	7.14	18.0	8050	1.5	-55.3	26.5		E) recovery well cycling sample
	857	7.66	4.0	7.13	18.1	8050	1.4	-57.1	25.7		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	900	MW-22A	7.66	7.13	18.1	8050	1.4	-57.1	25.7	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
	1000	Dup-EP-02	7.66	7.13	18.1	8050	1.4	-57.1	25.7	Same as above	Same	Same
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-22B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1300	NA	7.26	0.0	54.66	49.66	Yes	Yes	Yes	Yes		Weather: Clear 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

* Located approx. 15yds off left side of path (after the "S" turn)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-10
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in; stickup)

Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1315	NA	4.81	0.0	18.45	13.3	Yes	Yes	Yes	Yes	Cracked Pad	Weather: Clear 70's
4/27/16	955	NA	4.82	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1000	4.83	0.5	7.42	21.8	7190	2.0	-49.1	36.6	Clear w/orange particles	*Low-flow groundwater sample:*
	1002	4.83	1.0	7.29	21.2	6940	1.5	-35.5	22.9		(A) peristaltic pump w/ ded tubing
	1005	4.84	1.5	7.18	20.2	6790	1.2	-21.9	11.3		B) ded bladder pump
	1007	4.84	2.0	7.11	20.0	6670	0.9	-9.6	8.5		C) non-ded bladder pump; or
	100	4.84	2.5	7.08	19.9	6610	0.8	-1.2	7.6		*Standard groundwater sample:*
	1012	4.84	3.0	7.05	19.9	6580	0.9	+5.0	6.8		D) bailer due to limited column; or
	1015	4.84	3.5	7.04	20.0	6560	0.9	+9.3	6.5		E) recovery well cycling sample
	1017	4.84	4.0	7.03	20.0	6550	0.8	+10.4	6.4		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1020	MW-10	4.84	7.03	20.0	6550	0.8	+10.4	6.4	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	HNO3	6010/6020 and/or 7470
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-123
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in; stickup) Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1330	NA	5.16	0.0	25.71	25.0	Yes	Yes	Yes	Yes		Weather: Clear 70's
4/27/16	1050	NA	5.18	0.0								

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1055	5.19	0.5	7.55	19.8	7260	1.9	-15.7	27.1	Clear	*Low-flow groundwater sample:*
	1057	5.19	1.0	7.35	20.3	7290	1.4	-6.0	19.2		(A) peristaltic pump w/ ded tubing
	1100	5.20	1.5	7.22	20.2	7350	1.2	+7.0	13.5		B) ded bladder pump
	1102	5.20	2.0	7.16	20.3	7380	1.0	+16.0	10.8		C) non-ded bladder pump; or
	1105	5.20	2.5	7.14	20.3	7380	0.9	+22.0	9.6		*Standard groundwater sample:*
	1107	5.20	3.0	7.12	20.3	7390	0.9	+26.5	8.7		D) bailer due to limited column; or
	1110	5.20	3.5	7.10	20.4	7380	0.9	+28.5	8.5		E) recovery well cycling sample
	1112	5.20	4.0	7.08	20.4	7390	0.8	+30.9	8.1		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1115	MW-123	5.20	7.08	20.4	7390	0.8	+30.9	8.1	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or~~ 7470
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

~1/2-ft of subsidence under pad; Top portion of protective steel casing is missing - well casing extends above prot. casing; Lock on expandable locking cap.

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-4A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

(Stick up)

Initials: SCP

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1340	NA	11.29	0.0	>12.06	11.50	Yes	Issue	Issue	Yes	Major subsidence	Weather: Clear 70's
4/27/16	1150	NA	11.31	0.0	>12.06	11.50					under pad	(~0.5')

Well Purging Record

Blockage at 12.06' TOC. Blockage at 7.3' and 10.5' TOC but tubing will pass

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/27/16	1155	11.33	0.5	7.66	21.5	6340	4.1	-182.7	15.8	Clear w/ black particles	*Low-flow groundwater sample:*
	1157	11.33	1.0	7.53	20.6	6350	3.0	-191.8	9.6	odor	A) peristaltic pump w/ ded tubing
	1200	11.33	1.5	7.50	20.1	6360	2.2	-188.6	9.4		B) ded bladder pump
	1202	11.33	2.0	7.49	19.8	6380	1.8	-186.3	8.9		C) non-ded bladder pump; or
	1205	11.33	2.5	7.47	19.7	6390	1.6	-183.6	8.6		*Standard groundwater sample:*
	1207	11.33	3.0	7.46	19.8	6380	1.5	-182.4	8.5		D) bailer due to limited column; or
	1210	11.33	3.5	7.45	19.7	6390	1.5	-180.9	8.5		E) recovery well cycling sample
	1212	11.33	4.0	7.45	19.7	6390	1.4	-179.1	8.4		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/27/16	1215	MW-4A	11.33	7.45	19.7	6390	1.4	-179.1	8.4	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7~~470
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-4B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1340	NA	10.54	0.0	72.37	67.37	Yes	Yes	Yes	Yes		Weather: Clear 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500

If <0.03 feet of PSH present, remove PSH and sample groundwater

+EB-EP-03
(for same analysis)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-5A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in; stickup) Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1350	NA	7.96	0.0	20.05	14.8	Yes	Yes	Yes	Yes		Weather: Clear 70's

* Confirmed

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/26/16	1730	8.01	0.5	7.53	19.7	13,830	4.2	-93.0	39.2	Clear w/ orange	*Low-flow groundwater sample:*
	1732	8.01	1.0	7.43	19.5	13,870	2.3	-94.2	33.8	particles	(A) peristaltic pump w/ ded tubing
	1735	8.01	1.5	7.35	19.3	13,890	2.0	-96.4	27.4		B) ded bladder pump
	1737	8.01	2.0	7.31	19.4	14,060	1.8	-97.7	19.8		C) non-ded bladder pump; or
	1740	8.01	2.5	7.28	19.5	14,270	1.7	-98.6	13.9		*Standard groundwater sample:*
	1742	8.01	3.0	7.27	19.5	14,480	1.7	-99.6	10.5		D) bailer due to limited column; or
	1745	8.01	3.5	7.26	19.4	14,520	1.6	-100.5	9.9		E) recovery well cycling sample
	1747	8.01	4.0	7.26	19.3	14,540	1.6	-101.3	9.2		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/26/16	1750	MW-5A	8.01	7.26	19.3	14,540	1.6	-101.3	9.2	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or~~ 7470
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
	1810	EB-EP-03								Same as above	Same	Same

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-5B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1330	NA	8.06	0.0	53.41	48.5	Yes	Yes	Yes	Yes		Weather: Clear 70's

* Confirmed

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-5C (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1335	NA	8.25	0.0	71.60	66.6	Yes	Yes	Yes	Yes		Weather: Clear 70s

Well Purging Record

*Soft bottom

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
												If <0.03 feet of PSH present, remove PSH and sample groundwater

2-in stainless steel well casing extends approximately 1-foot above the top of the steel protective casing; expandable locking cap is locked.

+ DUP-EP-01 (for same analysis)

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-7A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

(2in) stickup)

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1355	NA	7.34	0.0	17.25	12.1	Yes	Yes	Issue	Yes		Weather: Clear 70's

Well Purging Record

* Soft, sticky bottom

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/26/16	1615	7.45	0.5	7.82	19.6	10,230	2.3	-20.6	165	Cloudy w/ orange	*Low-flow groundwater sample:*
	1617	7.46	1.0	7.68	19.4	10,120	1.8	-30.3	144	particles	(A) peristaltic pump w/ ded tubing
	1620	7.46	1.5	7.57	19.2	10,060	1.5	-38.7	150		B) ded bladder pump
	1622	7.46	2.0	7.48	19.1	9,940	1.3	-46.0	74.7		C) non-ded bladder pump; or
	1625	7.46	2.5	7.44	19.0	9,880	1.2	-49.4	83.4		*Standard groundwater sample:*
	1627	7.46	3.0	7.42	19.0	9,820	1.2	-51.3	83.2		D) bailer due to limited column; or
	1630	7.46	3.5	7.41	18.9	9,810	1.2	-53.2	81.5		E) recovery well cycling sample
	1632	7.46	4.0	7.41	18.9	9,810	1.1	-54.9	81.1		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/26/16	1635	MW-7A	7.46	7.41	18.9	9,810	1.1	-54.9	81.1	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
	1200	DUP-EP-01	7.46	7.41	18.9	9,810	1.1	-54.9	81.1	Same as above	Same	Same

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: MW-7B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCD

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1405	NA	8.59	0.0	52.55	47.6	Yes	Yes	Yes	Yes		Weather: Clear 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								(A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
										If <0.03 feet of PSH present, remove PSH and sample groundwater		

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: OCD - 8A
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Well Inspection Information

(2in - stickup)

Initials: SCD

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1510	NA	8.37	0.0	20.74	16.4	Yes	Yes	Yes	Yes		Weather: Clear 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
4/26/16	1515	8.82	0.5	6.94	21.1	13,750	2.9	-28.6	9.5	Clear w/ orange particles	*Low-flow groundwater sample:*
	1517	8.97	1.0	6.97	20.4	13,900	2.4	-51.0	8.8		A) peristaltic pump w/ ded tubing
	1520	9.04	1.5	6.99	20.0	13,910	1.8	-64.8	8.1		B) ded bladder pump
	1522	9.09	2.0	7.00	19.7	13,910	1.7	-72.6	7.7		C) non-ded bladder pump; or
	1525	9.11	2.5	7.01	19.5	13,920	1.5	-79.3	7.5		*Standard groundwater sample:*
	1527	9.13	3.0	7.02	19.5	13,930	1.4	-81.7	7.2		D) bailer due to limited column; or
	1530	9.15	3.5	7.02	19.4	13,930	1.4	-83.9	6.7		E) recovery well cycling sample
	1532	9.16	4.0	7.02	19.5	13,930	1.4	-85.2	6.3		F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
4/26/16	1535	OCD-8A	9.16	7.02	19.5	13,930	1.4	-85.2	6.3	DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470 ✓
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u ✓
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500 ✓

If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: OCD-8B (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: EP

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: SCO

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4/26/16	1420	NA	8.53	0.0	56.63	51.1	Yes	Yes	Yes	Yes		Weather: Clear 70's

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										GRO	HCL	8015M
										VOC	HCL	8260
										Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)	HNO3	6010/6020
										Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)	HNO3	Field filtered 0.45-u
										Total Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	6010/6020 and/or 7470
										Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)	HNO3	Field filtered 0.45-u
										Anions (Chloride,Fluoride,Sulfate)	Neat	300
										Nitrate-Nitrite	H2SO4	per historical, ESC Lab Sciences
										TDS	Neat	2540C
										Cyanide	NaOH	SM4500
												If <0.03 feet of PSH present, remove PSH and sample groundwater

Monitoring Well Purging and Sampling Record

Navajo Refining Company
Artesia Refinery
Artesia, New Mexico

Well: KWB-P4 (Gauge only)
Event: Spring 2016 (Annual)
Area of Concern: Rest

Hydrologic Monitoring
for TRC
Houston, Texas

Initials: BRH

Well Inspection Information

Date	Time	Depth to LNAPL (Ft-TOC)	Depth to Water (Ft-TOC)	LNAPL Thickness (Ft)	Well Total Depth (Ft-TOC)	Sample Intake (Ft-TOC)	Well Inspection: Cap	Casing	Well Secured	Label	Other	Comments
4-26-16	1450	NA	3.98	0.0	30.26	22.8	Yes	Yes	Yes	Yes		Weather: Sunny, windy, 80s

Well Purging Record

Date	Time	Depth to Water (Ft-TOC)	Cum. Vol. Purged (L)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Water Color / Clarity	
			0.5								*Low-flow groundwater sample:*
			1.0								A) peristaltic pump w/ ded tubing
			1.5								B) ded bladder pump
			2.0								C) non-ded bladder pump; or
			2.5								*Standard groundwater sample:*
			3.0								D) bailer due to limited column; or
			3.5								E) recovery well cycling sample
			4.0								F) irrigation well grab sample

Well Sampling Record

Date	Time	Sample I.D.	Depth to Water (Ft-TOC)	pH (std units)	T (C)	SC (umho/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction-Potential (mV)	Turbidity (NTU)	Parameter	Preserv	Comments Lab: ESC Lab Sciences, Mt. Juliet, TN
										DRO	HCL	8015M
										~~GRO~~	~~HCL~~	~~8015M~~
										VOC	HCL	8260
										~~Total Metals (As,Ba,Cr,Fe,Pb,Mn,Se) and/or Cations (Ca,K,Na)~~	~~HNO3~~	~~6010/6020~~
										~~Dissolved Metals (As,Ba,Cr,Fe,Pb,Mn,Se)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										~~Total Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~6010/6020 and/or 7470~~
										~~Dissolved Metals (Hg,Ni,V,B,Cd,Co,U)~~	~~HNO3~~	~~Field filtered 0.45-u~~
										~~Anions (Chloride,Fluoride,Sulfate)~~	~~Neat~~	~~300~~
										~~Nitrate-Nitrite~~	~~H2SO4~~	~~per historical, ESC Lab Sciences~~
										~~TDS~~	~~Neat~~	~~2540C~~
										~~Cyanide~~	~~NaOH~~	~~SM4500~~
										If <0.03 feet of PSH present, remove PSH and sample groundwater		