



Appendix A

Current Conceptual Site Model

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: FHR North Pole Refinery - On-Site Only

Completed By: R. Andresen
 Date Completed: updated May 21, 2012


Instructions: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.

(1) Media	(2) Transport Mechanisms
<input checked="" type="checkbox"/> Surface Soil (0-2 ft bgs)	<input checked="" type="checkbox"/> Direct release to surface soil <small>check soil</small> <input checked="" type="checkbox"/> Migration to subsurface <small>check soil</small> <input checked="" type="checkbox"/> Migration to groundwater <small>check groundwater</small> <input checked="" type="checkbox"/> Volatilization <small>check air</small> <input checked="" type="checkbox"/> Runoff or erosion <small>check surface water</small> <input type="checkbox"/> Uptake by plants or animals <small>check biota</small> <input type="checkbox"/> Other (list): _____
<input checked="" type="checkbox"/> Subsurface Soil (2-15 ft bgs)	<input checked="" type="checkbox"/> Direct release to subsurface soil <small>check soil</small> <input checked="" type="checkbox"/> Migration to groundwater <small>check groundwater</small> <input checked="" type="checkbox"/> Volatilization <small>check air</small> <input type="checkbox"/> Uptake by plants or animals <small>check biota</small> <input type="checkbox"/> Other (list): _____
<input checked="" type="checkbox"/> Ground-water	<input checked="" type="checkbox"/> Direct release to groundwater <small>check groundwater</small> <input checked="" type="checkbox"/> Volatilization <small>check air</small> <input checked="" type="checkbox"/> Flow to surface water body <small>check surface water</small> <input checked="" type="checkbox"/> Flow to sediment <small>check sediment</small> <input checked="" type="checkbox"/> Uptake by plants or animals <small>check biota</small> <input type="checkbox"/> Other (list): _____
<input checked="" type="checkbox"/> Surface Water	<input checked="" type="checkbox"/> Direct release to surface water <small>check surface water</small> <input checked="" type="checkbox"/> Volatilization <small>check air</small> <input checked="" type="checkbox"/> Sedimentation <small>check sediment</small> <input checked="" type="checkbox"/> Uptake by plants or animals <small>check biota</small> <input type="checkbox"/> Other (list): _____
<input type="checkbox"/> Sediment	<input type="checkbox"/> Direct release to sediment <small>check sediment</small> <input type="checkbox"/> Resuspension, runoff, or erosion <small>check surface water</small> <input type="checkbox"/> Uptake by plants or animals <small>check biota</small> <input type="checkbox"/> Other (list): _____

(3) Exposure Media	(4) Exposure Pathway/Route	(5) Current & Future Receptors							
<input checked="" type="checkbox"/> soil	<input checked="" type="checkbox"/> Incidental Soil Ingestion <input checked="" type="checkbox"/> Dermal Absorption of Contaminants from Soil <input checked="" type="checkbox"/> Inhalation of Fugitive Dust	Residents (adults or children)	Commercial or Industrial workers	Site visitors, trespassers or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other	
<input checked="" type="checkbox"/> groundwater	<input checked="" type="checkbox"/> Ingestion of Groundwater <input checked="" type="checkbox"/> Dermal Absorption of Contaminants in Groundwater <input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water				I	C/F			
<input checked="" type="checkbox"/> air	<input checked="" type="checkbox"/> Inhalation of Outdoor Air <input checked="" type="checkbox"/> Inhalation of Indoor Air <input checked="" type="checkbox"/> Inhalation of Fugitive Dust	C/F	I	C/F					
<input checked="" type="checkbox"/> surface water	<input type="checkbox"/> Ingestion of Surface Water <input type="checkbox"/> Dermal Absorption of Contaminants in Surface Water <input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water								
<input checked="" type="checkbox"/> sediment	<input type="checkbox"/> Direct Contact with Sediment								
<input checked="" type="checkbox"/> biota	<input type="checkbox"/> Ingestion of Wild or Farmed Foods								

FLINT HILLS RESOURCES ALASKA, LLC
 NORTH POLE REFINERY, NORTH POLE, ALASKA
HUMAN HEALTH RISK ASSESSMENT

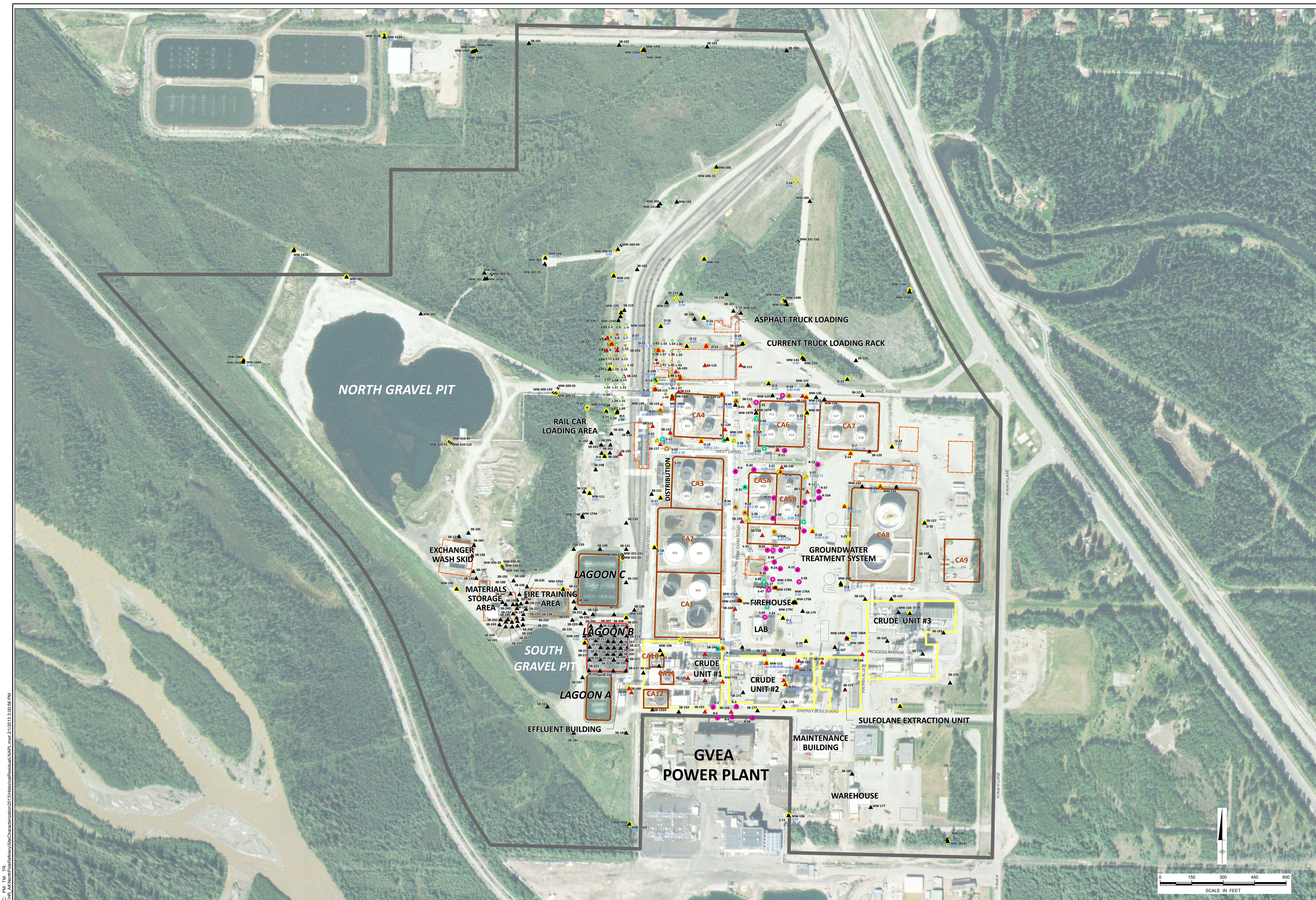
**HUMAN HEALTH CONCEPTUAL
 SITE MODEL GRAPHIC FORM -
 ON SITE ONLY**

 APPENDIX **A**



Appendix B

Historical Residual LNAPL



- LEGEND**
- MONITORING WELL
 - VERTICAL PROFILE WELL
 - OBSERVATION WELL
 - ⊗ ABANDONED OBSERVATION WELL
 - ⊗ OBSERVATION WELL TO BE ABANDONED
 - RECOVERY WELL
 - ⊗ ABANDONED RECOVERY WELL
 - ACTIVE LNAPL RECOVERY WELL (2012)
 - WATER TABLE MONITORING WELL
 - HISTORIC LNAPL RECOVERY WELL
 - ABANDONED HISTORIC LNAPL WELL
 - >1% LNAPL SATURATION IN SOIL SAMPLE
 - <1% LNAPL Saturation in soil sample
 - 1.39 Observed Range of LNAPL Thickness (Feet)
 - ▲ Qualitative Indications of LNAPL Observed (boring logs)
 - ▲ No Qualitative Indications of LNAPL Observed (boring logs)
 - △ No Data (boring log)
 - LIF RESULTS- PERCENT MAXIMUM FLUORESCENCE
 - ◆ >200%
 - ◆ 140 - 200%
 - ◆ 70 - 140%
 - ◆ 3 - 70%
 - ◆ 0 - 3%
 - ▭ FHRA PROPERTY BOUNDARY
 - ▭ REFINERY UNITS (HIGH RISK DRILLING WOULD REQUIRE A GPR)
 - ▭ INDUSTRIAL ACTIVITY AREAS; MATERIALS STORAGE AREA
 - ▭ DIKED CONTAINMENT AREAS (DIFFICULT ACCESS-CONFINED SPACES)
 - ▭ LAGOONS A, B, AND C

NOTES:

- "HISTORIC LNAPL RECOVERY WELL" LOCATIONS ARE WELLS WHERE LNAPL WAS RECOVERED HISTORICALLY BUT ARE NOT CURRENTLY BEING USED TO RECOVER LNAPL
- FOR THE PURPOSES OF THIS FIGURE, "RESIDUAL LNAPL" REFERS TO QUANTITATIVE DATA (LIF/UVOST RESPONSE, MEASUREMENT OF LNAPL ACCUMULATION IN A MONITORING WELL, SOIL ANALYTICAL DATA) AND QUALITATIVE FIELD DATA (PID READINGS AND VISUAL/OLFACTORY OBSERVATIONS) INDICATING THE PRESENCE OF LNAPL.

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 NORTH POLE REFINERY, NORTH POLE, ALASKA

HISTORICAL RESIDUAL LNAPL

PLATE 1

CITY OF NORTH POLE, ALASKA, PROJECT: NORTH POLE REFINERY, PHASE 1, 2013.00-56.PM

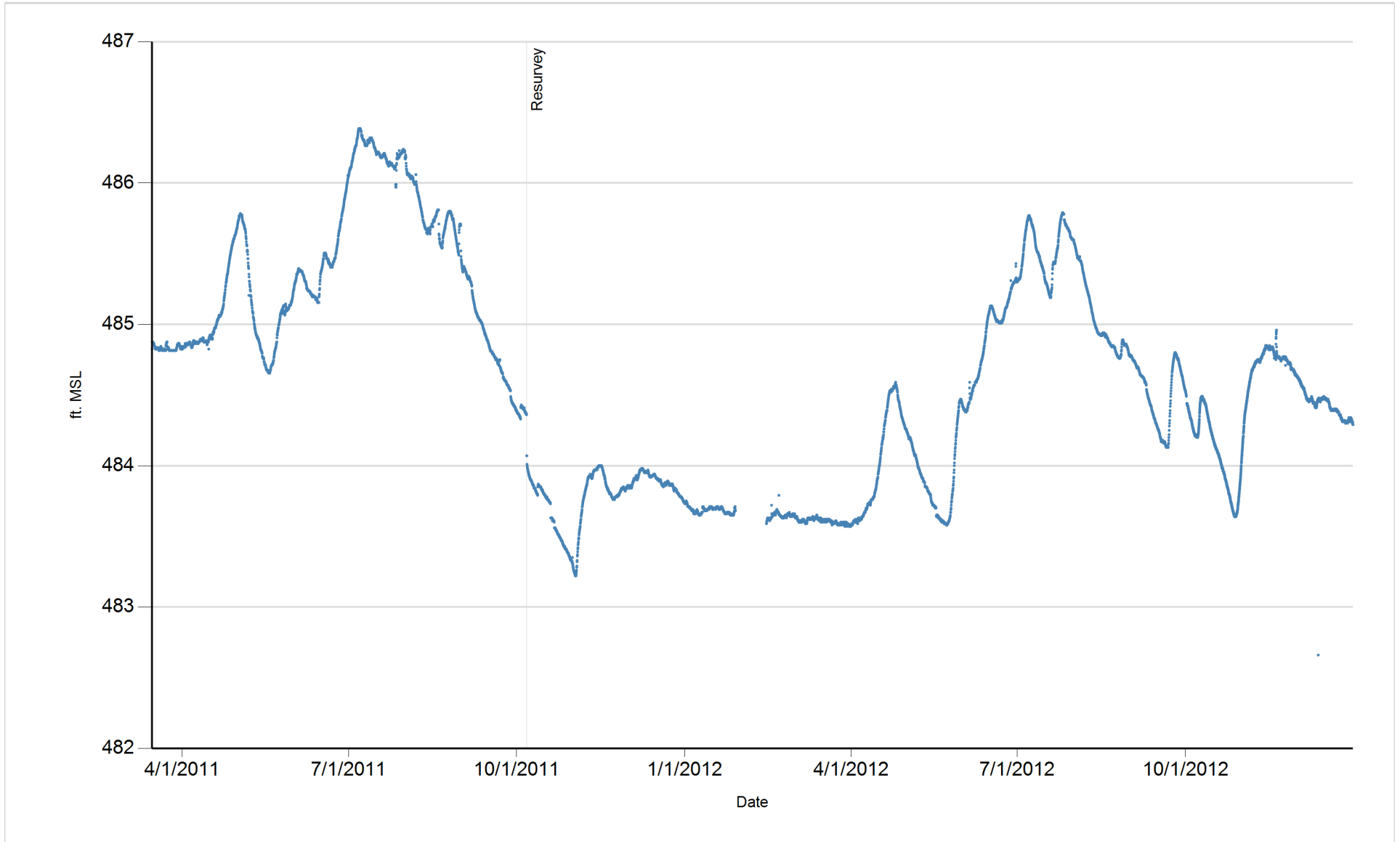
Appendix C

Hydrographs

MW-113 Well Hydrograph
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Screen Info
MW-113	MW-113 screened interval (475.2-479.7 ft. MSL)

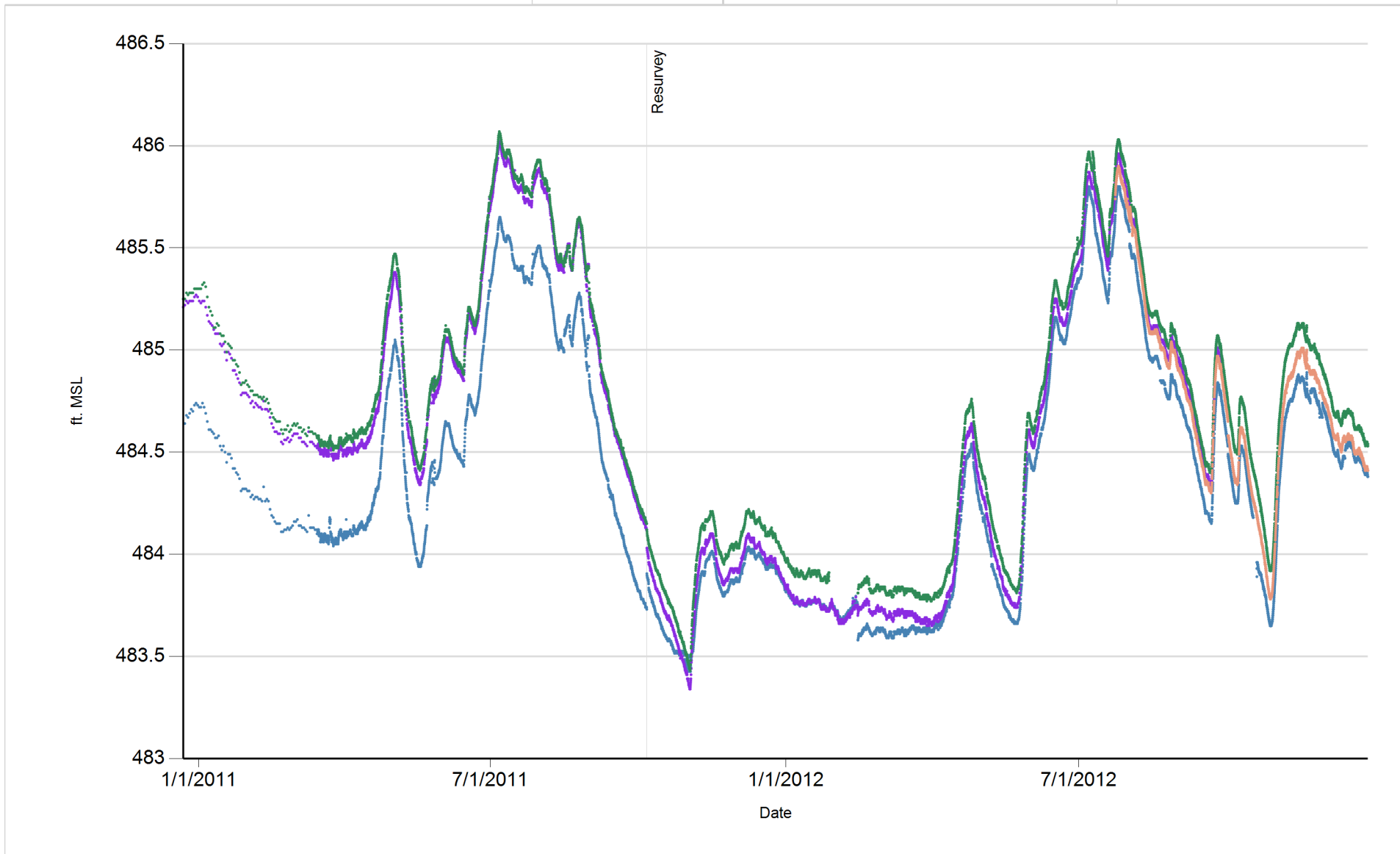
Draft



MW-186 Well Nest Hydrograph
North Pole Refinery
Flint Hills Resources Alaska, LLC

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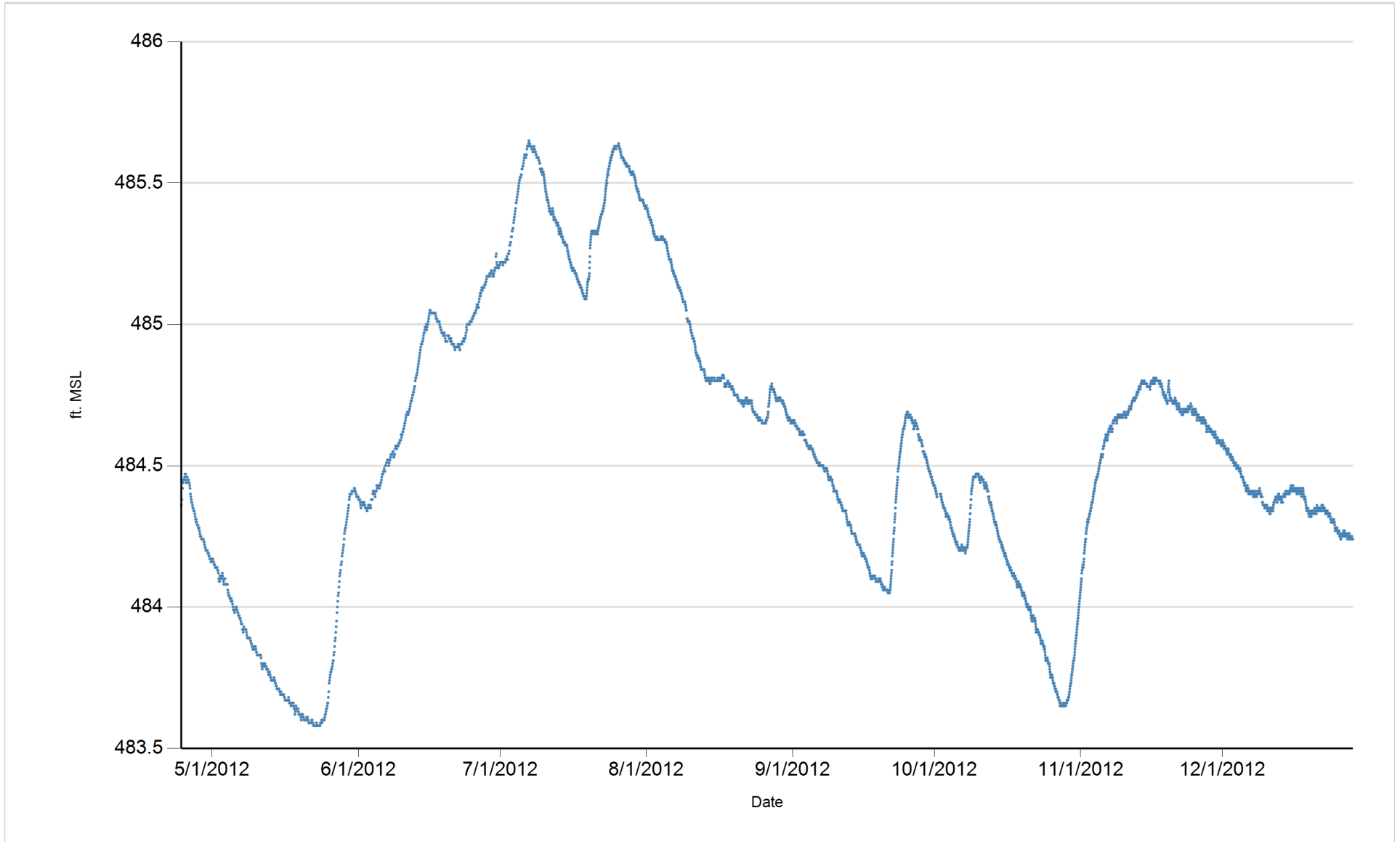
Well	Screen Info
MW-186A	MW-186A screened interval (477.9-487.6 ft. MSL)
MW-186B	MW-186B screened interval (432.3-442.0 ft. MSL)
MW-186C	MW-186C screened interval (392.3-401.9 ft. MSL)
MW-186E	MW-186E screened interval (417.3-422.0 ft. MSL)



O-12 Well Hydrograph
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Screen Info
O-12	O-12 screened interval (476.3-486.1 ft. MSL)

Draft



S-43 Well Hydrograph
North Pole Refinery
Flint Hills Resources Alaska, LLC

Well	Screen Info
S-43	S-43 screened interval (481.5-490.8 ft. MSL)

Draft

