Technical Report
Prepared by Aera Energy LLC
Responding to the Order to Submit Information issued by the
Los Angeles Regional Water Quality Control Board – December 18, 2015

The Order specifies that Aera Energy LLC (Aera) provide information regarding the operation of "sumps" associated with its oilfield operations in Ventura County. "Sump" is further defined for the purposes of the order as; "any open pit, pond, excavation, natural depression, or any other area serving as a receptacle for collecting and/or storing fluids or solid waste material from an oil and gas well or group of oil and gas wells." Accordingly, Aera has attempted to provide a complete list of the locations on its property meeting the above definition

1) The locations of all current and historical sumps in Aera's area of operations used in discharges of fluids to land.

The locations where produced fluids or solids can possibly be discharged to land fall in three major categories:

A. Catch Basins: Catch basins are large, lined or unlined basins situated in natural drainage features. The catch basins were installed and are operated and maintained pursuant to agreements with the California Department of Fish and Wildlife. The purpose of catch basins is to provide finite retention capacity for stormwater and process fluid releases. Oil releases occurring concurrent with stormwater flow are captured by the action of "U-tube" siphons that preferentially release stormwater from lower in the basins while oil is collected on the top of the stormwater. If oil is present on the stormwater, it is removed by vacuum truck and shipped to onsite Aera dehydration facilities. Each of the Catch basins is identified on the spreadsheet (Attachment B) in addition to being depicted on the Aera map book re-submitted as Attachment 1.

B. The four facilities identified as "pits" by the Ventura County APCD:

Aera Energy LLC	Ventura	Ventura	300 Sqft-Surface Pit (V127), exempt from cover: < 5 mg/l
Aera Energy LLC	Ventura	Ventura	1-42.75 Sqft-Surface (9.5' x 4.5') Covered Trough (Sump)
Aera Energy LLC	Ventura	Ventura	1-242.25 Sqft-Surface Sump (Portable Open Top Mixing Bin)
Aera Energy LLC	Ventura	Ventura	70,000 Barrel Wastewater Pit (Emergency Cement Bowl)

- Pit V-127 has been located at Waterflood 1 for many decades and the only liquid that goes to the pit is rainwater that accumulates on the pump skid (two IC engines) mixed with any oil/grease that leaks from the equipment. However, under Rule 71.4, the VCAPCD defines a pit as "used to receive intermittent flows of petroleum material or crude oil". We are able to be exempted from the requirement to cover the pit because annual analysis of the accumulated stormwater shows that it is less than 5 mg/l VOC content.

- The 42.75 square feet covered, above-grade trough at the Lloyd Shaker is permitted under VCAPCD Rule 71.4. The VCAPCD defines a sump, pit, or pond as "a receptacle, formed primarily of earthen materials, although it may be lined with artificial materials." In this case, the "sump" is

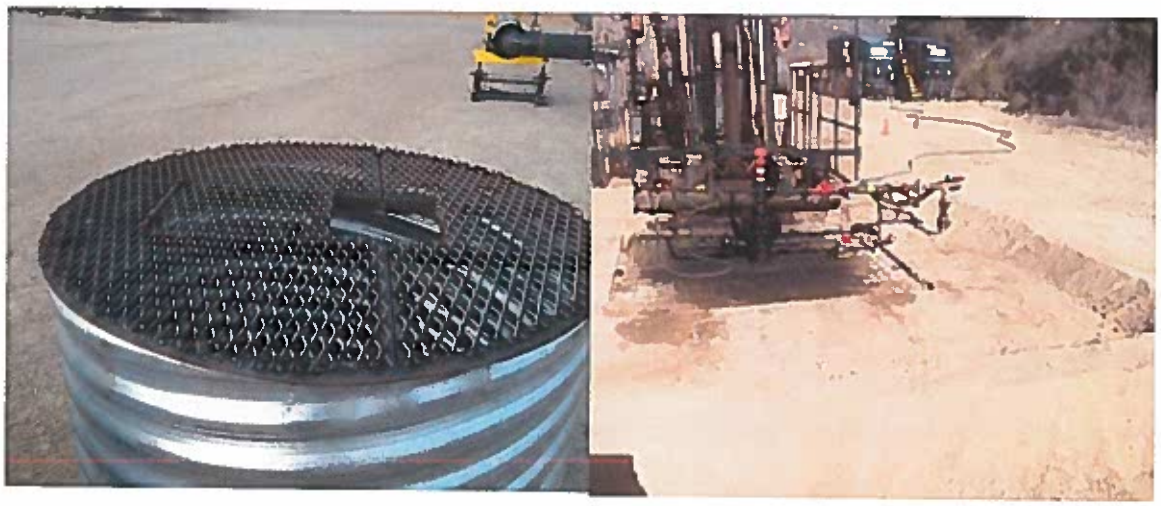
basically an above-grade metal box. As an emission control measure, the trough must have a leak-free cover which covers at least 90 percent of the liquid surface area. It also must remain closed at all times except during sampling or attended maintenance operations. Basically, vacuum trucks offload liquid and solid materials onto the shaker and the liquids drain into the metal box below. Solids from the shaker fall into a separate lined bin and the liquids are then pumped from the sump box into the two 500-bbl tanks for further separation. All the solids collected throughout the process are subsequently sent to the Aera recycling facility in Kern County.

- The Portable Open Top Mixing Bin is located in 20 Canyon. The metal-lined, earthen excavation is used to mix moist solids from well maintenance operations, tank bottoms, oily soils, and excavated solids from well cellars with clean dry soil prior to the resulting mixture being transported to the Aera recycling facility in Kern County. Our APCD permit restricts usage of the bin to no more than 12 hours/day and 1,440 hours/year.

- The Emergency Cement Bowl was originally a drilling mud mixing area. Prior to Aera's acquisition of the property it was converted for use as an emergency overflow pit for the produced water tanks at the Lloyd Tank Farm and Reclamation Plant. Aera inherited a VCAPCD permit from Texaco that limited the pit to receiving only processed water and operating 20 days maximum per year. At this time, the cement bowl is officially out of service, has been for many years, and is disconnected from all piping.

C. Well Cellars:

Well cellars are installed to provide access to what would otherwise be sub-surface well control valves. Cellars are typically vaults with earthen or concrete bottoms and concrete or metal sides, which act as retaining walls. Cellars are normally dry but in heavy storms they often collect stormwater and sediment, which is removed by vacuum truck and separated between liquids and solids. The liquids are blended into the makeup water for Aera's permitted Class II waterflood injection wells. The solids blended with other native soils and are transported to Aera's recycling facility in Kern County. The well cellars also collect small volume leaks from wellhead equipment or from well maintenance activities. Those releases are processed in the same manner as the stormwater and sediment. The current Aera wells that are equipped with well cellars are identified on Attachment B. Examples of a pre-fabricated well cellar and one in service are shown below.



2) A description of the procedures used to close or abandon sumps.

Aera has not closed or abandoned any catch basins during its operational history. Since the catch basins are operated and maintained pursuant to an agreement with California Department of Fish and Wildlife, that agency would dictate the closure procedures when the catch basins are no longer needed. Similarly, none of the four impoundments identified as pits by the Ventura County APCD have be demolished during Aera's operational history. When wells that are equipped with cellars are abandoned, the concrete or metal structures are removed and recycled when the upper 5'-10' of the well casing is removed and the final well cap is installed.

3) The estimated total annual volume of fluid historically discharged into the sumps and estimated annual amount of fluid to be discharged going forward.

Since most of the surface impoundments operated by Aera are associated with stormwater and spill retention, annual flows vary with rainfall amounts.

4) The physical and chemical composition of fluids discharged to the sumps.

None of the unlined surface impoundments operated by Aera are designed for direct discharge of oil or produced water. The majority serve as secondary containment features designed for use only during process upsets. A recent analysis of produced water from a well in the field is provided as Attachment 2.

5) The physical and chemical composition of any solidified waste in each sump.

The moist solids, which are blended with clean, dry soil at the Portable Open Top Mixing Bin are comprised of tank bottoms, excavated solids from well cellars, reservoir rock from well workover operations and oily soil from spill cleanup.

6) The location of any of any domestic, municipal, and commercial water wells within a half-mile radius of any current or historic sump.

Based on information obtained from the Ventura County Watershed Protection Division, three agricultural supply wells are located within ½ mile of the outer production boundary of Aera's operations. (Three green squares to the north of the yellow polygons on Attachment 3 and 4.) All three are in separate canyon watersheds from Aera's operations.

7) Historic water quality data available for any wells within a half-mile radius of any current or historic sump.

Aera was not able to obtain any water quality data on the agricultural supply wells since they are confidential records.

8) Current sampling results for any wells within a half-mile radius of any current or historic sump.

Aera does not control the wells identified as active agricultural wells and did not request access to the privately owned wells.

9) Locations, well construction, and survey data for any monitoring wells in the vicinity of any current or historic sumps.

Aera does not operate any shallow groundwater monitoring wells in or nearby to its operational area. According to a review of the GeoTracker GAMA website (Attachment 5), the four sets of monitoring wells near Aera's operations are operated at the USA Petrochem facility, a former BJ Services UST site, and two Chevron (formerly Texaco) installations.

I, Ron Chambers, certify under penalty of law that this document and all attachments were prepared by me, or under my direction or supervision, in accordance with a system designed to assure that qualified personnel gathered and evaluated 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 fine and imprisonment for knowing violations.

Ron Chambers 3/15/16