# STATEMENT OF BASIS
for the
DUGWAY PROVING GROUND
ENGLISH VILLAGE WASTE TREATMENT SYSTEM FACILITY

Permit No. UGW450007

November, 2015



## INTRODUCTION

The ground water discharge permit for Dugway Proving Ground's English Village domestic wastewater lagoons is being renewed. The original permit was issued on March 1, 1994 to cover the operation of a wastewater treatment facility at English Village. The facility consists of a three-cell aerated lagoon system for treatment of domestic wastewater. In 2006, Dugway Proving Ground constructed a system to remove dissolved arsenic from its culinary water supply and the permit was modified to allow for wastes from that treatment system to be disposed in the lagoon. Adequate ground water monitoring data has now been collected for dissolved arsenic to better describe its concentration and variability in the site's compliance monitoring wells; this data will be incorporated into the background water quality table and into new protection levels.

## A. DESCRIPTION OF FACILITY

The facility is a three-cell aerated lagoon for treatment of wastewater from the English Village Community on Dugway Proving Ground, Tooele County, Utah. The lagoon cells cover a surface area of about 13 acres with a maximum operating capacity of 2,178,000 cubic feet of volume. The lagoons are lined with 36-mil Hypalon liner. The facility only receives domestic wastewater and wastes from treatment of culinary water for removal of excessive naturally-occurring dissolved arsenic. Effluent is discharged to an existing wetland area that received treated wastewater from previously-used lagoons that have been taken out of service. The wetland area, as an existing facility (as defined in UAC R317-6-1), is not a permitted facility covered by this permit. The permit does not authorize discharge of pretreated or untreated industrial, commercial or agricultural wastes to the lagoons, other than waste from removal of dissolved arsenic from English Village's culinary water supply. Under laboratory conditions, ferrihydrite-arsenic filter cakes in equilibrium with water produced arsenic concentrations below 50 micrograms (µg) per liter. Arsenic concentrations in Dugway's untreated culinary water range from 9 to 21 µg/l. Dissolved arsenic concentrations in the final cell of the lagoon ranged from 30 to 40 µg/l when measured in 2009 and 2010.

The current lagoons were constructed to replace previously-used lagoons that were located near the site of the present lagoons and which received both domestic wastewater and discharges of volatile organic compounds (VOCs). The waste streams were separated and the new lagoons were constructed to receive domestic wastewater only.

B. SUBSURFACE CONDITIONS

Groundwater in the English Village area moves to the northeast toward the axis of Skull Valley. The water table has a gentle, northward tilt with a gradient of 1 foot per 1000 feet. The lagoons are located near the site of decommissioned formerly-used lagoons. Subsurface seepage from the decommissioned lagoons may have affected ground water flow and quality. Depths to ground water in the compliance monitoring wells, when measured in October, 2014 ranged from 193 to 214 feet below ground surface and have changed very little during this permit term. The shallowest depth of the ground water is expected to be 175 feet below ground surface.

The soil types beneath the existing grade at the site are fine to very fine sands, silty sands and silts with some interstratified coarse sands and gravels of the Quaternary Lake Bonneville deposits. The regional aquifer at the site is contained in pre-Lake Bonneville alluvial sand and gravel. The overlying finer-grained Lake Bonneville lacustrine deposits protect the deeper aquifer somewhat from contamination introduced at or near the surface.

C. BACKGROUND WATER QUALITY AND PROTECTION LEVELS

Background ground water quality and protection levels are summarized in Table 1 of the permit. Monitoring data from the site's three monitor wells show that ground water quality at the site is variable. Downgradient well EVW-MW05 has significantly higher dissolved solids content and significantly lower dissolved arsenic than up-gradient well EVW-MW03 and well EVW-MW04. Because of this variability, monitor well data collected for compliance with this permit will be compared to protection levels derived from previous data from each well, rather than by comparison to data from the up-gradient well.

During the past permit term well EVW-MW05 has slightly exceeded the protection level for nitrate in the May, 2013 and October, 2014 sampling events. DWQ does not consider these exceedances as noncompliance with this permit because they are so close to the protection levels and because natural variability of nitrate in this well may not have been fully taken into account in developing the protection level. However, protection levels for nitrate have been redefined in this version of the permit according to the provisions of UAC R317-6-4.5, and further exceedances may be considered noncompliance.

D. GROUND WATER CLASSIFICATION

Based on samples from up-gradient monitoring well, EVW-MW03, ground water in the vicinity of the site is Class II.

E. BEST AVAILABLE TREATMENT TECHNOLOGY

The administration of this permit is founded on the use of best available treatment technology, in accordance with the requirements of UAC R317-6-1.3. Construction standards of the lagoons are covered under the construction permit issued on March 1, 1994. The three-

cell aerated lagoon cover a surface area of 13 acres with a maximum operation depth of 6.25 feet. The lagoon system is sized to accept up to 2,178,000 cubic feet of volume. The permit does not allow treatment of pre-treated or untreated industrial, commercial or agricultural wastes in the lagoon system, except for waste from arsenic removal treatment of Dugway's English Village culinary water supply. The lagoons are lined with a 36-mil Hypalon synthetic liner, provided a performing seepage rate no greater than 1/8 inch per day. The effluent is discharged to an existing wetland that previously received effluent from the formerly-used, decommissioned lagoons.

To verify that seepage from the lagoons is not degrading ground water quality in violation of the Utah Water Quality Act and the Utah Ground Water Quality Protection Regulations, Dugway Proving Ground monitors three wells adjacent to the lagoons. Well EVW-MW 03 samples ground water up-gradient of the lagoons and well EVW-MW05 samples ground water downgradient from them. Well EVW-MW04 is not in an optimal location to monitor downgradient water quality as it is located on the eastern side of the second lagoon cell and ground water flows from a south-southeast direction and approaches the alignment of the lagoon cells in an oblique direction. Potentially, ground water mounding due to excessive leakage from the lagoons may affect ground water quality in this well. Any regulatory decisions based on monitoring data from this well will take these characteristics into account.

In the event that ground water monitoring reveals that seepage from the lagoons is degrading ground water quality in excess of permit protection levels, Dugway Proving Ground will be required to follow the contingency procedures contained in Part I.G.4 of the permit.

Because waste from the arsenic treatment system is primarily a solid precipitate, any disposal of sludge from the lagoon must follow applicable state and federal law.

F. WATER QUALITY MONITORING

The lagoon system has one upgradient and two downgradient monitor wells located along the presumed direction of ground water flow at the centerline of the lagoons, and completed in the uppermost water-bearing zone under the lagoons. The two downgradient wells, EVW-MW04 and EVW-MW05, will be used to monitor compliance. Ground water will be sampled and analyzed semi-annually for nitrate, pH, dissolved arsenic and total dissolved solids.

The English Village Ground Water Discharge Permit limits the lagoons to the receipt of only domestic wastewater and wastes from removal of dissolved arsenic from English Village's culinary water supply. In the past, domestic and industrial wastes were discharged into the collection system resulting in the presence of VOCs such as acetone, carbon disulfide, methylene chloride, naphthalene and phenols in the nearby abandoned lagoons. To ensure that industrial waste is not disposed undetected in the collection system and new lagoons, and to provide early warning of discharge of VOCs, the final lagoon cell will be sampled and monitored for presence of the VOCs listed in Part I.D of the permit, biannually in odd-numbered years. If any VOCs are detected and

confirmed in subsequent sampling, Dugway Proving Grounds will develop a plan to prevent those particular compounds from being discharged into the lagoon.

If the results of these compliance sampling and detection indicate that any of the protection levels have been exceeded in the downgradient wells, or if VOCs are detected in the lagoon water, then sampling of regularly-monitored parameters in all three monitor wells, or of all VOCs listed in Part I.D may be required on a monthly basis until the English Village wastewater treatment facility is brought into compliance, or until notification by the Director that a regular monitoring schedule may be followed.

Separate sets of protection levels have been established for the two downgradient wells, based on background monitoring data for each well. Background levels of major ions have also been determined for all three monitor wells. In the event that protection levels at the downgradient wells are exceeded, comparison of the proportions of these major ions in all three wells with levels in the lagoon water may help to determine whether the observed rise in contaminant levels in the downgradient well are the result of migration of ground water from an up-gradient source, or because of discharge from the lagoon. To better understand the chemistry of lagoon water, the final cell of the lagoon system will be monitored for major ions, nitrate and total Kjeldahl nitrogen annually in the fall, when concentrations of these parameters should be highest.

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