Memorandum

To: David Chapman

From: Jamie Holmes, Stratus Consulting Inc.

Date: 3/9/2006

Subject: Dilution water required to bring Questa wastewater treatment plant into compliance

This memorandum describes a simple approach to calculating the amount of nitrogen-free dilution water that would be required to bring the Questa wastewater treatment plant (WWTP) into compliance with its discharge permit. The WWTP data presented in this memorandum come from a letter, dated February 9, 2006, from Marcus J. Rael of Robles, Rael, & Anaya, P.C., to Rebecca de Neri Zagal. This memorandum first presents effluent volume data, then presents the nitrogen concentrations in the effluent, and finally shows a simple calculation of the volume of dilution water required to bring the effluent into compliance.

Mr. Rael calculates the current volume of effluent seepage from the infiltration ponds to the subsurface to be 63.99 ac-ft/yr. This was calculated as follows:

Effluent discharged to infiltration lagoons:	69.54 ac-ft/yr
- Evaporative loss from infiltration lagoons:	5.55 ac-ft/yr
Total seepage from infiltration lagoons:	63.99 ac-ft/yr

In addition, Mr. Rael claims that another 12.54 ac-ft/yr of seepage comes from aeration/facultative lagoon. The lagoon has an impermeable barrier under it, and there is no explanation of why or how this barrier has failed. For the purposes of this calculation, we will include the 12.54 ac-ft/yr of aeration lagoon seepage, bringing the total volume of seepage to 63.99 + 12.54 = 76.53 ac-ft/yr.

The letter states that the concentration of nitrogen in the December effluent was 30.2 mg/L. We will assume that 30.2 mg/L nitrogen represents an average annual concentration. However, if it is indeed the case that the barrier under the aeration lagoon has failed and untreated or partially treated wastewater is infiltrating from this lagoon, it is likely that nitrogen concentrations in seepage from this lagoon would be considerably higher than 30.2 mg/L. Because we have no additional data or explanation, we will assume that 76.53 ac-ft/yr of seepage contains 30.2 mg/L nitrogen.

The permitted effluent concentration is 20 mg/L. The effluent concentration in December was thus (30.2)/(20) = 1.51 times of the permitted concentration. By simple proportion, if one exceeds the permitted concentration of nitrogen by 1.51 times, then one needs 1.51 times more nitrogen-free water to dilute the effluent to its permitted concentration. Thus, the total volume of effluent water would have to be 76.53 x 1.51 = 115.56 ac-ft/yr, and the total volume of nitrogen-

free dilution water required to bring the effluent into compliance would be 115.56 – 76.53 = 39.03 ac-ft/yr.