No VOCs have been detected in wells JR-J3 and JR-J4, which are north of and at a lower hydraulic head than well JR-J2. No recent detections of VOCs have been recorded in alluvial well JR-J17 and no historical detections have been recorded in alluvial well JR-J16, both located south of well JR-J2.

The sedimentation basin elevation is at about 452 feet MSL (Figure 15), about 3 feet below the average water level at well JR-J2, over the past 10 years (Appendix A). A linear projection of the water level between wells JR-J2 and JR-J15 indicates that the water table should be above the bottom of the sedimentation basin (Figure 16). Trenching indicates near saturated conditions (Geomatrix, 2005a) within the upper soils of the sedimentation basin. The basin appears to provide direct evaporative discharge of some portion of the groundwater between wells JR-J2 and JR-J15.

No detections of VOCs have been reported in well JR-J15, which is about 450 feet east of and at a lower hydraulic head than well JR-J2.

The distribution of VOCs in groundwater indicates that the release is limited to a small area directly adjacent to well JR-J2 and in the contributing area to the spring collection system.

4.0 EVALUATION OF WATER QUALITY PROTECTION STANDARD

According to Title 27, §20390, the WQPS comprises three general components: constituents of concern (COCs) (Title 27, §20395), of which the monitoring parameters are generally a representative subset (Title 27, §20420); concentration limits (Title 27, §20400); and monitoring points, including the point of compliance (Title 27, §20405).

4.1 CONSTITUENTS OF CONCERN

The COCs, as specified in Title 27, §20395 (a), comprise "all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit." The COCs are further defined for municipal solid waste landfills as "all constituents mandated under SWRCB Resolution No. 93-62." The RWQCB has stated in Part I(E)(4) of the draft Monitoring and Reporting Program Order No. R3-2007-0022 (MRP) that the COCs shall include all constituents listed in Appendix II to 40 CFR, Part 258 (Subtitle D). These COCs are to be analyzed once every 5 years.

Although the COCs listed in the draft MRP comply with Subtitle D, the list is overly exhaustive and will likely serve to produce an inordinate number of false positive detections,

simply by the sheer number of analytes listed. Subtitle D, Part 258.54 (a)(1) says that "The Director of an approved State may delete any of the parameters for a MSWLF unit if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit." The landfill was open for 20 years and has been inactive for an additional 10 years. A leachate collection and removal system (LCRS) is installed on one section of the landfill, producing quantifiable analytical results of what reasonably can be expected to be in the unit. Additionally, wells at the toe of the unlined landfill and the spring have been detecting a release since 1998, also producing quantifiable samples of what reasonably can be expected to be in the unit. In order to limit the number of potential false positives from the COC sampling events, the COC list should be confined to those constituents that have been detected in the LCRS samples, the downgradient monitoring wells, and the spring. Table 2 provides a summary of organic compounds that have been detected in monitoring wells, the spring discharge, leachate, and background wells. All of the organic compounds on the list have been detected in either the downgradient monitoring wells, the spring discharge, or leachate, and should be included on the COC list. In addition, the general minerals and metals have all been detected and also should be included on the COC list.

4.1.1 Monitoring Parameters

Monitoring parameters in Title 27 are defined in §20420 (e) as including "those physical parameters, hazardous constituents, waste constituents, and reaction products that provide a reliable indication of a release from a waste management unit." Most of the monitoring parameters given in Table 1 of the draft MRP are inorganic constituents. High concentrations of inorganic constituents are present in natural groundwater beneath the site. The TDS concentrations in groundwater range from about 4,500 to 8,000 mg/L (Appendix A). In contrast, TDS in leachate from the small lined portion of the landfill has ranged from about 2,500 to 4,800 mg/L (Appendix A), with an average of about 3,600 mg/L. Thus, TDS values in naturally occurring groundwater are higher than TDS values in available leachate samples from the landfill. Municipal solid waste would be unlikely to generate TDS values higher than what is seen in the leachate; the upper range of values in the existing leachate data may reflect some dissolution of the daily cover material, which is derived from local rocks. Naturally occurring groundwater also has a high degree of spatial variability, with dissolved inorganic concentrations varying depending upon the facies of the Monterey Formation or alluvium in which the monitoring well is completed. These factors, taken together, show that inorganic parameters at this site will not provide a reliable indication of a release.

VOCs, however, have been shown to be a reliable indicator of a release and their detection at well JR-J2 provided the impetus for declaring a release at the site. A time concentration plot of VOCs and inorganic parameters at well JR-J2 (Figure 11) shows that the release was indicated clearly by the VOCs; however, no changes were discernable in the inorganic parameters. This further demonstrates that the inorganic parameters are not a reliable indicator of a release at this site and should not be used as monitoring parameters. The inorganic parameters given in Table 1 of the draft MRP (chloride, nitrate, sodium, potassium, sulfate, TDS) are, however, COCs and should be monitored along with the other COCs on a 5-year basis or when triggered due to potential future indications of a release.

The VOCs should continue to be used as monitoring parameters. However, as with the COCs, rather than monitoring for a complete U.S. Environmental Protection Agency (EPA) Method 8260 list, an abbreviated list should be used consisting of the organic compounds that have been detected in the release to groundwater or that might be expected in a future release. Table 2 groups the organic compounds by type and shows the number of times a compound has been detected at a trace level or above the Practical Quantitation Limit in either the downgradient monitoring wells and spring, the leachate, or in background wells. As discussed in Section 3.2.2, the chlorinated hydrocarbons in the release are represented primarily by PCE and its breakdown products along with 1,1-DCA. As shown in Table 2, these constituents should be used as monitoring parameters.

In addition, a host of petroleum hydrocarbons (PHCs) or other organic compounds associated with PHCs have been detected in groundwater or leachate. However, many of these have also been detected in samples from background wells, indicating a source other than the landfill for the PHC-related compounds. Although the PHC-related compounds do not appear to be part of the signature for the release, it may be prudent to monitor for the major PHC compounds (benzene, toluene, ethylbenzene, and xylenes) as well as methyl tert-butyl ether (MTBE). These have been included as recommended monitoring parameters.

Common laboratory contaminants such as acetone, methylene chloride, and bis(2-ethylhexl) phthalate do not contribute to the delineation of the release and should not be used as monitoring parameters. Similarly, the pesticides and soil fumigants and chloroform have been detected rarely and generally at trace concentrations. They also do not appear to be part of the signature of the release and should not be used as monitoring parameters.

Dichlorofluoromethane (Freon 12) has been detected only on three occasions. However, experience has shown that when a new cover cap is installed, the partial pressures of some of the heavier gases, such as the freons, may tend to increase, allowing them to move toward the water table. Thus, it may be prudent to utilize Freon 12 as a monitoring parameter.

4.1.2 Field Parameters

Table 1 of the draft MRP also includes field parameters as monitoring parameters. Additionally, footnote 2 at the bottom of Table 1 of the MRP implies that Title 27 requires concentration limits to be developed for field parameters. Title 27 does not contain such a requirement. Rather, Title 27, §20415 (e)(13) states that "The ground water portion of the monitoring program shall include an accurate determination of the ground water surface elevation and field parameters (temperature, electrical conductivity, turbidity, and pH) at each well each time ground water is sampled." In their Statement of Reasons for Article 5 of Chapter 15 (subsequently adopted into Title 27), the State Water Resources Control Board (SWRCB, 1990) discusses why field parameters are collected: "The requirement to obtain field parameters is retained from Subsection 2555(f) of repealed Article 5 because such data provides additional indications of conditions in the aquifer." Thus, field parameters are collected with the sample to aid in understanding the conditions in the aquifer that might affect the representativeness of the sample, not to determine whether there has been a release.

Therefore, in order to comply with Title 27, field parameters (dissolved oxygen, electrical conductivity, pH, temperature, and turbidity) need to be measured each time a sample is collected; however, it is not appropriate to establish concentration limits for field parameters or use these parameters as detection monitoring parameters.

4.2 CONCENTRATION LIMITS

Concentration limits have been determined for inorganic COCs at the site using Upper and Lower 95% Tolerance Limit statistical procedures (GeoLogic, 2007) according to EPA guidelines (EPA, 1992). Because of the various groundwater regimes across the site and the associated variability in groundwater quality, the statistics are applied on an intrawell basis; that is, the most recent constituent concentration from each well is compared against a concentration limit derived from data for that well instead of to a limit derived from a background well. Upgradient monitoring wells JR-J1 and JR-J10 are not at risk to receive an inorganic release from the landfill and these wells will no longer have concentration limits for any constituents.

The statistics have been applied to field parameters as well as monitoring parameters and COCs. As described in Section 4.1, field parameters should not be used as detection monitoring parameters and these will no longer have concentration limits. Additionally, total alkalinity is redundant since its individual components (bicarbonate, carbonate, and hydroxide) are COCs; therefore, total alkalinity will no longer have concentration limits.

Anthropogenic constituents (VOCs, herbicides, pesticides, PCBs, phthalate esters, phenols, and semivolatile organic compounds) are not present in native groundwater beneath the site. Therefore, the concentration limit for these constituents will continue to be the method detection limit.

4.3 MONITORING POINTS AND POINT OF COMPLIANCE

According to Title 27, §20164, a monitoring point is "a well, device, or location specified in the waste discharge requirements at which monitoring is conducted and at which the water quality protection standard, under §20390 applies." Additionally, a background monitoring point is "a well, device, or location specified in the waste discharge requirements at which monitoring for background water quality or background soil quality is conducted." The WQPS does not apply at a background monitoring point. Further, the point of compliance is defined as "a vertical surface at the hydraulically downgradient edge of a waste management unit and that extends through the uppermost aquifer underlying the unit."

The draft MRP indicates that wells JR-J2, JR-J17, and JR-J18 shall serve as point of compliance wells. Actually, well JR-J19 is located between wells JR-J2 and JR-J17 and should also be considered a point of compliance well. These wells are located at the eastern toe of the landfill and are hydraulically downgradient of the landfill.

The draft MRP identifies wells JR-J3, JR-J4, JR-J15, and JR-J19 as additional monitoring points located downgradient of the landfill. As noted above, well JR-J19 should be a point of compliance well.

The draft MRP indicates that wells JR-J1 and JR-J10 shall serve as background monitoring points as they are located hydraulically upgradient (west and northwest) of the landfill. Because intrawell statistics are being applied, the WQPS would not apply to background wells JR-J1 and JR-J10.