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June 3, 2005

Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Subject: Addendum to Interim Measures No. 3 Injection Well Operation and Maintenance Plan, PG&E Topock Compressor Station, Needles, California

Dear Mr. Shopay:

Enclosed is an addendum to Interim Measures No. 3 Injection Well Operation and Maintenance Plan, prepared for the Colorado River Basin Regional Water Quality Control Board, and submitted to Department of Toxic Substances Control (DTSC) on April 8, 2005. This addendum is intended to address Item 1 in DTSC's May 24, 2005 letter requiring a contingency for response actions associated with the operation of the Interim Measures No. 3 injection system. If you have any questions on the enclosed addendum, please call me at (805) 546-5243.

Sincerely,

Julie Eakins for Yvonne Meeks

Cc: Kate Burger/DTSC
Karen Baker/DTSC
Fred Zanoria/DTSC
Aaron Yue/DTSC
Jose Cortez/RWQCB
Liann Chavez/RWQCB

Interim Measures No. 3 Injection Well Operation and Maintenance Plan Addendum

This addendum to the *Interim Measures No. 3 Injection Well Operation and Maintenance Plan* (O&M Plan) addresses the requirement for a contingency plan to respond to hydraulic and chemical changes arising in the alluvial aquifer as a result of injection. The changes to injection flow rates within the injection wells, that are a normal consequence of injection well operations, have previously been discussed in Section 3.3 of the O&M Plan and will be further discussed in this addendum.

Contingency Plan for Well Rehabilitation

The O&M Plan presents various options for rehabilitation of the injection wells as they experience an expected decline in injectivity over time. The monitoring parameters, frequency of data collection, triggering mechanism for initiating rehabilitation, and metric for determining whether rehabilitation has been successful are presented in this addendum.

The initial metrics for determining when rehabilitation is necessary include the measured parameters of injection rate, water level in the well during injection, and the water quality of backflush water. This information initially will be collected monthly but the frequency may be adjusted in the future based on injection well performance. The specific injectivity will be calculated over time, and recorded separately for each injection well. An anomalous increase in the rate of decline in specific injectivity will result in an investigation of the potential causes for decrease (potential causes are listed in Section 3.3 of the O&M Plan). Based on the results of this investigation, a method for well rehabilitation that addresses the cause will be selected and implemented.

Successful rehabilitation is expected to return specific injectivity to a level slightly below the original. This recovered value varies from well to well and is dependant upon formation characteristics, aquifer and injection water qualities, and well design parameters.

Contingency Plan for Groundwater Hydraulic Changes

Pre-injection modeling was performed as part of the *Draft Groundwater and Hydrogeologic Investigation Report for Interim Measures No. 3 Injection Area* to provide information on how the injection system would perform over time, the fate of the injected water, and the effects of injection on the extraction system. The results of this evaluation —coupled with the field-derived parameters of water levels, water chemistry, and aquifer properties—serve as a baseline for the hydraulic response of the injection system.

The actual field response of the injection system and how closely it conforms to the predicted response will be monitored over time, with adjustments being made to system operation, if merited, based on the results of this comparison. The hydraulic response is expected to arrive at three of the observation monitoring well clusters (OW-1S/M/D, OW-

2S/M/D, and OW-5S/M/D) within the first few months of operations, and this information will be used to update the groundwater model. The response is not anticipated to reach the compliance monitoring wells (CW-1M/D through CW-4M/D) or the OW-3S/M/D cluster until after the first year of operations, providing an adequate amount of time to update the predictions and make any needed changes to the operation. Changes to the system could include varying the flow rate between multiple injection wells, varying the injection depth interval within a well, and construction of new wells.

Contingency Plan for Groundwater Quality Changes

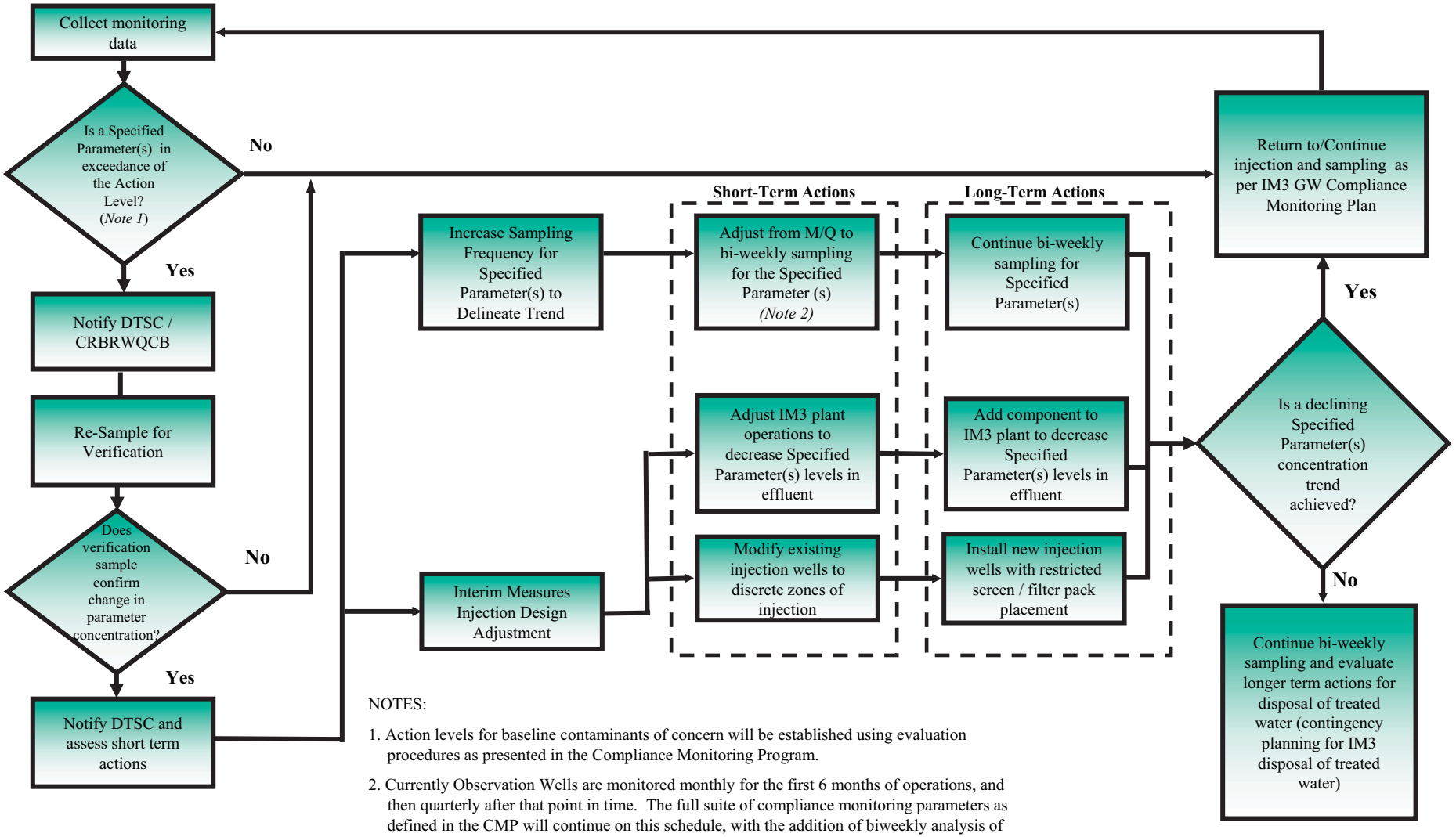
The Interim Measure No. 3 (IM3) treatment system involves extracting water from the floodplain portion of the site and then treating the water to remove chromium. The extracted water shares a similar origin with groundwater in the injection area but shows some variance in chemistry due to water quality stratification and exposure to the atmosphere during the treatment process. Geochemical modeling of mixing reactions that could take place between the injected water and the host groundwater indicate that water quality will not be degraded due to the known water-water and water-rock interactions, but it is prudent to plan out a contingency program both for identifying potential problems and for providing timely corrections to problems should they arise.

Figure 1 presents a flow chart for the contingency plan for how groundwater quality change within the injection system will be managed. The foundation of this system is timely reporting of any exceedance of an established Action Level. The Action Level will be based on the results of an analysis of the baseline groundwater quality data for the injection area and will use data evaluation procedures provided in the *Groundwater Compliance Monitoring Plan for Interim Measure No. 3 Injection Area*. The monitoring data, collected initially on a monthly basis for the first 6 months and quarterly past that point, will be evaluated to determine if an exceedance has been detected. After notifying the appropriate regulatory agencies, verification of the sample results will be performed (this will occur within 30 days of the original reported exceedance). If the exceedance is verified, increased sampling of the compliance point where the exceedance occurred will be implemented. The frequency of sampling will be increased to biweekly for the specified parameter and for any other parameter associated with this exceedance. (Note: quarterly sampling for the full suite of parameters will continue outside of this contingency program.)

After sufficient information has been collected (within 90 days of the initial reporting), a report will be prepared to verify that an exceedance has occurred and to establish that the concentration of the specified parameter is remaining at an elevated or increasing level. A recommendation for adjustments to the injection system will be made in this report. These adjustments could include modifications to how the IM3 treatment plant is currently being operated to decrease the concentration of the specified parameter injected in the plant effluent, or modifications to the discrete screen intervals into which the treated effluent is being injected. The initial compliance monitoring points for groundwater quality are relatively close to the injection point, so results from implementing these measures should be known within a few months' time (before injected water can move a significant distance from the injection point).

If short-term methods do not decrease the exceedance at the compliance point to concentrations below the Action Level within a time frame similar to that over which the original exceedance was observed, a recommendation will be made to implement long-term methods. These methods could include the addition of components to the treatment process to remove a specific constituent or the installation of new injection wells with screened intervals restricted to injection depth intervals not showing exceedance.

Should the long-term actions not decrease the specified parameter to concentrations below the Action Level, longer-term actions for disposal of treated water as discussed in contingency planning for IM3 will be developed and submitted for approval to the regulatory agencies.



NOTES:

1. Action levels for baseline contaminants of concern will be established using evaluation procedures as presented in the Compliance Monitoring Program.
2. Currently Observation Wells are monitored monthly for the first 6 months of operations, and then quarterly after that point in time. The full suite of compliance monitoring parameters as defined in the CMP will continue on this schedule, with the addition of biweekly analysis of the Action Level triggering parameter.

FIGURE 1
CONTINGENCY PLANNING FOR IM3 GW INJECTION, JUNE 2005

INTERIM MEASURES NO. 3 INJECTION WELL
OPERATION AND MAINTENANCE PLAN ADDENDUM,
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

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