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PROPOSED CONDITIONS FOR APPROVAL OF CORRECTIVE ACTION INTERIM MEASURES SOIL VAPOR EXTRACTION WORK PLAN, RHO-CHEM FACILITY, 425 ISIS AVENUE, INGLEWOOD, CALIFORNIA, EPA ID NUMBER CAD 008 354 432

The Department of Toxic Substances Control (DTSC) has evaluated the revised *Interim Measures Work Plan*, dated January 31, 2000. The proposed corrective action interim measures (IM) consist of the installation and operation of a soil vapor extraction system. DTSC approves the proposed IM Work Plan with the following conditions:

Condition 1: Modifications are required to the *Design Basis for the Interim Measure* (section 4.1) with respect to the preliminary design elements:

- (a) Probe numbers may be increased.
- (b) The basis for the shallow clusters depths and screens needs to be supported.
- (c) The basis for the deep clusters depths and screens needs to be supported.
- (d) The use of a thermal/catalytic oxidation system shall entail additional sampling and monitoring of emissions from the SVE.

Condition 2: Modifications are required in the *Vapor Probe Depth and Spacing* (section 4.1.1)

- (a) Simple default soil vapor monitoring depths are not acceptable. Instead of 10, 30, 50, 75, and 90 feet bgs for the nested probes, the depths must be based on bore-hole stratigraphy. "Zone 2" shall be monitored even though no direct extraction has been proposed for it. Results of monitoring of this zone during SVE operation shall determine whether additional extraction depths need to be added later in the IM.
- (b) Locations and numbers of deep (bottom of "zone 1", "zone 2" and "zone 3") nested probes shall be dependent on a detailed soil vapor survey of the shallow vadose zone. As part of this survey,

temporary, one time expendable probes shall be used. The soil vapor survey data shall be used to refine the proposed locations of the semi-permanent probes installed within the shallow zone (upper "zone 1") at approximately 5 and 20, feet bgs, depending on the bore-hole stratigraphy, prior excavation depths, and initial vapor-phase VOC distribution. The specific depths and locations shall be selected in conjunction with DTSC. Where significant soil vapor concentrations are measured at the property lines, CEMEX must determine the lateral extent in the off-site vadose zone. More careful monitoring of those site boundaries shall be required during operation of the SVE to establish IM effect on off-site contamination.

- (c) The on-site and off-site soil vapor surveys shall be performed in separate phases with the on-site survey occurring first to expedite SVE IM implementation. The off-site soil vapor survey work plan shall be developed based on the results of the on-site survey so that off-site soil vapor survey points can be more strategically located.

Condition 3: Modifications are required in the *Vapor Extraction Well Depths and Spacing* (section 4.1.2)

- (a) After the baseline soil vapor survey is performed, the proposed extraction well locations may be adjusted. These locations should also be reviewed in consideration of observations and sidewall analytical data from the underground storage tank (UST) removals. Therefore the condition shall be that these locations be reviewed in conjunction with DTSC once the baseline on-site soil vapor survey is completed and evaluated.
- (b) Since the well depths and screening of this IM do not directly address finer-grained "soils" of zone 2, monitoring of this zone shall be provided to assess the impacts of extraction from other zones on zone 2 and to enable refinements to the SVE system as necessary.
- (c) The radius of influence (ROI), calculated on the basis of tests, in each zone is sufficient for initial installation and operation. However, on a periodic basis, the actual ROI shall be evaluated by pressure change measurements in the various probe installations. Adjustments in the proposed operating flow rates and locations of extraction points may need to be made if the ROI assumptions do not hold.

Condition 4: Modifications are required in the *SVE Treatment System Design* (section 4.1.3)

- (a) The use of a thermal/catalytic oxidation system shall entail some additional monitoring requirements during start-up in catalytic-mode and it may trigger other requirements during operation. DTSC has concerns about the creation of dioxins and furans, even at the temperatures at which thermal/catalytic oxidation systems typically operate. Therefore, CEMEX shall monitor specifically for the potential formation of these constituents during startup of the system in catalytic-mode configuration. The monitoring results shall be provided to DTSC within 60 days of sampling events.
- (b) Disposal of knockout pot liquids shall be described. It is assumed that this will be through Rho-Chem or through another appropriately licensed facility.
- (c) Evaluation of radon scavenging and collection or emission shall be made on a periodic basis during SVE operation if granular activated carbon is used as an adsorption media.

Condition 5: Modifications are required in the *IM Shutdown Evaluation* (section 4.3)

- (a) Cycling - During the cyclical operating mode that CEMEX proposes in Section 4.2, monitoring of the probes shall be performed on an enhanced basis, one round at the "shutdown", and one round at "turn-on". The periodicity of cycling shall be adjusted to the site conditions in consultation with DTSC. This monitoring shall be used to evaluate the rebound effect as one of the five performance-based criteria cited in Section 4.3.
- (b) Performance-based monitoring - CEMEX shall prepare concentration versus time (individual monitoring probe values) and mass removal versus time (based on flow rate and blower inlet VOC concentrations) plots. These plots shall be compared to the iso-concentration maps produced for the various probe depths to allow evaluation of effectiveness of operation for interim reports. Although biweekly qualitative wellhead VOC concentrations may be used to track system operation, quarterly VOC concentrations and/or VOC concentration abrupt shifts shall be documented by quantitative analyses. All major operational decisions, including "operation shutdown", shall be supported by quantitative measurements which shall be used for calculation of mass removal rates, etc.

- (c) Asymptote definition - The CEMEX definition of the asymptote for “operation shutdown”, less than 5% variation over six consecutive weeks and /or mass removal rate of one pound per day, shall be modified. The less than 5% variation over a given cycle (not necessarily 6 weeks) plus or minus a mass removal rate (rate to be determined) may be utilized as the basis for instituting “cycling” or lengthening individual rebound or “pulse” cycle. The soil vapor mass removal rate shall become asymptotic to a mass value that when calculated out leaves no remaining threat to surface receptors or threat of discharge to ground water which would exceed regulatory or health-risk levels.
- (d) Performance based criteria are not precisely related to diminishing cost benefits of continuing operation. While DTSC recognizes the limits of SVE operation in some situations, mass removal through one means or another shall be achieved in corrective action such that there is no residual threat to surface receptors or threat of discharge to waters which would violate statutes or regulations or exceed health-risk levels. This IM may or may not achieve these levels but the final remedy must address them. In some instances, the performance-based criteria are effectively proxies for a final remedy.
- (e) Target soil matrix concentration levels for shutdown need to be related to human health risk and ground or surface water threat. The mechanism for evaluation shall include modeling to demonstrate that residual adsorbed and vapor-phase contamination satisfies the closure criteria described in (c) and (d) above.
- (f) Although FID or PID measurements can be used to determine when asymptotic conditions need to be evaluated, fixed or mobile laboratory measurements shall be made to support any proposed shutdown decision.
- (g) The use of 200% of pre-shutdown value of well-head concentration as an exceed/not exceed level is not acceptable as a criterion. These data shall be reviewed in consultation with DTSC STAFF when baseline system behavior is evaluated.

Condition 6: *Soil and Soil Vapor Data Sufficiency* [5.1 and 5.2]

- (a) Compiled data are not sufficient data to support IM design. This section has limited accuracy. In approval of the IM work plan, DTSC excludes whether or not the data are adequate at this time.

There has not been a comprehensive vapor-phase investigation. Therefore, the existing data are not sufficient. However, Conditions 1 and 2 require an on-site soil vapor survey to be performed prior to completion of the system installation.

- (b) Additional soil data are required as part of the installation of the vertical extraction wells portion of the IM. Each well shall be continuously sampled, as appropriate, to provide a detailed log of the "soil stratigraphy". Selected soil samples shall be analyzed to provide a baseline of the fine-grained zones which will be impacted by the SVE. Borings that will be continuously logged shall be identified to DTSC prior to drilling.
- (c) The IM cites the installation, based on data collected by the Target Environmental services study and the Phase II Report, of an undetermined number of new monitoring probes as part of the implementation of the IM. This data shall not serve as the sole basis for installation locations. The proposed on-site soil vapor survey shall be used to identify areas at the site with elevated concentrations of chlorinated VOCs, which will be indicative of source areas. See conditions 3 and 4.
- (d) The guidance for soil vapor sampling shall be the protocols described in the 1997 revised Los Angeles Regional Water Quality Control Board (LARWQCB) *Interim Guidance for Active Soil Gas Investigation* and the joint 2003 DTSC and LARWQCB *Supplemental Advisory*.

Condition 7: *Drilling Methods* [5.3]

- (a) Vapor probe clusters may be more than the five proposed by CEMEX depending on the results of the on-site soil vapor survey and the anticipated ROI.
- (b) Samples shall be obtained continuously, as appropriate, and a continuous log prepared. Probe depths shall be selected based on these logs.

Condition 8: *Soil Sampling and Analysis* [5.4]

- (a) Soil samples shall be obtained and prepared using U.S. EPA Method 5035, which includes methanol and sodium bisulfate preservation, for VOC soil sampling. DTSC staff may be present to observe. Sending Encore sub-samples directly to the laboratory is not acceptable.

- (b) Samples shall not be obtained at 5-foot default intervals. Instead, samples shall be obtained continuously for purposes of logging as appropriate. Borings continuously logged shall be identified to DTSC prior to drilling. Soil samples shall be selected for analysis based on soil lithology and vapor analyzer measurements. Soil samples shall be selected for analyses from fine-grained zones, at areas of lithologic change, or from intervals where PID field screening results indicate the presence of VOCs.
- (c) Samples from the finer-grained materials of "zone 2" shall be submitted to the laboratory for analysis as well as from other fine-grained horizons encountered.
- (d) The soil samples submitted for analysis of organic carbon, etc. shall not be obtained at the default intervals cited. Soil samples selected for analysis shall be obtained based on the lithologic log and on vapor analyzer readings. For example, samples submitted for organic carbon analysis shall be obtained from several lithologic horizons to evaluate the variability of organic carbon content based on grain size using the continuous lithologic log.

Condition 9: *Soil Vapor Monitoring Probe Cluster Installation* [5.5.1]

- (a) The probe depths are not acceptable at defaults of 10, 30, 90 feet bgs. See conditions 1 and 2.
- (b) The lateral system is addressing soils at 10 to 15 feet below grade--only in the vicinity of the second set of former USTs.
- (c) Specific probe construction details and diagram (e.g. commercial probe design/screen type and size, type, connection, etc.; use of tubing 1/4 inch O.D. (3/16 inch I.D.) diameter rather than 1-inch diameter PVC pipe as proposed; type of tubing, e.g. Nylaflo, Teflon, polyethylene, etc.) shall be provided before initiation of the IM
- (d) Specific probe insertion/installation procedures shall be provided before initiation of the IM.
- (e) The rationale for depth of probe placement must be based on examination of lithologies from continuous sampling and selection of coarser-grained materials; with the exception of the probe to be completed in the fine-grained soil of "Zone 2." DTSC will be available for consultation on selected placement intervals.

- (f) The complete lateral and vertical extent of the soil vapor plume on and off-site of the Facility for all Rho-Chem volatile constituents of concern shall be determined by a multi-level soil vapor survey of the vadose zone on-site and off-site of the Rho-Chem property. As discussed in Conditions 2 (c), this survey will be completed in two phases; an on-site and an off-site phase. Temporary, one time expendable probes shall be used by the CEMEX consultants for rapid characterization of the contaminated soil vapor plume and to reduce the number of permanent monitoring probes necessary. The multi-level soil vapor survey of the entire vadose zone with expendable probes shall be conducted to determine the lateral and vertical extent of the vadose zone soil vapor plume. This survey shall be guided by contaminant concentration and lithologic data from past studies. Concentration data shall be collected using an on-site mobile lab or quick-turnaround fixed laboratory. With these data, nested multi-level permanent soil vapor probes shall be located in strategic positions in relation to contaminant concentrations.
- (h) Soil vapor samples shall also be collected from within the production areas, drum storage areas, product storage areas and at the Facility boundaries. Secondary containment structures at the Facility shall not be penetrated in order to preserve the integrity of the containment, unless DTSC approves the sampling. If samples at the Facility boundaries show detectable concentrations of the Rho-Chem volatile constituents of concern, nested multi-level permanent soil vapor probe(s) shall be completed at a later date beyond the Facility boundaries based on the off-site soil vapor survey and accessibility.
- (l) Permanent nested multi-level soil vapor probes shall be constructed on-site and located based on the results of the on-site shallow soil vapor survey and anticipated ROIs. DTSC shall participate in the determination on the number and location of the temporary and permanent probes prior to construction of any probes. Permanent soil vapor probes shall be strategically placed within the soil vapor plume to monitor the progress of the remediation.

Condition 10: *SVE Well Cluster Installation* [5.5.2]

- (a) The IM shall also be designed to address the soil in the finer silty clay of zone 2. This may consist of assuring that screening in shallow and deep zones is located directly against upper and lower parts of zone 2 in locations where significant concentrations of zone

2 contaminants are defined. The soil vapor survey shall determine the distribution of contamination in zone 2. The individual monitoring in zone 2 during operation of wells in zones 1 and 3 shall allow determination of the effectiveness of cleanup with respect to those wells. Additional extraction shall be added in zone 2 if demonstrated to be necessary by the monitoring results from operation in zones 1 and 3.

- (b) The shallow SVE wells shall be drilled and continuously cored to assure adequate lithologic control on installation with respect to zone 2.
- (c) The two deep wells proposed are demonstrated to be sufficient to address "zone 3." The IM shall iteratively address the actual ROI, which is estimated at 150 to 200 feet. If the soil vapor survey demonstrates that off-site areas are affected, additional deep wells shall be added that will assure adequate influence out beyond the Facility boundary to capture the off-site contamination.
- (d) Specific monitoring protocol or other evidence shall be provided by CEMEX before initiation of the IM to assure that multiple small diameter well completions (two for zone 1 and three for the unsaturated portion of zone 3) in the same boring shall not adversely affect SVE effectiveness by creation of blind zones.

Condition 11: *Sampling and Monitoring* (8.0)

- (a) In addition to weekly monitoring of the SVE system inlet and outlet, in accordance with the South Coast Air Quality Management District (SCAQMD), monitoring of probes shall be performed using portable device. The FID is not acceptable alone. As indicated by the vapor analyzer showing anomalous changes in distribution or concentration, samples shall be collected and analyzed by mobile laboratory. Inlet/outlet grab sample measurements are not adequate measures of subsurface conditions. Quarterly O&M reports shall include a summary of the system operation and monitoring data.
- (b) The shutdown/restart sequence concentrations cannot be interpreted in the way proposed. The shutdown periods shall be varied as less change is observed in a shorter period.
- (c) The remediation goals are specified in Condition 5.
- (d) Criterion 2 may not require additional continuous coring. The work

done in siting the deeper probes shall allow targeted sampling of the finer-grained zones.

Condition 12: *Waste Management* (5.7, 6.3.2 and 7.4.5)

- (a) Investigation-derived decontamination water shall be disposed through Rho-Chem or other appropriately permitted facility.
- (b) The permits to discharge any additional waste water effluent from the SVE operation shall be obtained prior to initiation of the IM. The alternative shall be explained more thoroughly prior to initiation of the IM, e.g. where stored, in what, etc.

Condition 13: *Design Criteria* (6.2)

- (a) Using the soil concentrations rather than including actual soil gas concentrations as a basis for design is specifically not approved herein. However, the monitoring program being required for this IM obviates the need for dependence on the estimated values.

Condition 14: *Soil Vapor Treatment System, Data Collection, Sample Collection and Laboratory Analysis* (6.3.4, 7.4.3, 7.4.4 respectively)

- (a) Because a thermal/catalytic oxidizer is being used as a component to the SVE systems, additional air monitoring is necessary to assure that dioxins are not being created and emitted. Prior to initiation of the IM, CEMEX shall provide the technical details and a schedule for such monitoring.
- (b) The monitoring proposed in section 7.4.4 shall include a one time sampling and laboratory analysis for dioxins during start-up of the catalytic oxidizer system.
- (c) The weekly monitoring proposed in section 7.4.4 shall include field laboratory analysis for VOCs, at such times that a mobile laboratory is on-site to address samples from the vapor probes.

Comment [11]: Conference call with John Hart with the DTSC held on April 5th, at which time John was in agreement with this approach.

Condition 15: *Utilities* (6.4)

- (a) Prior to initiation of the IM, CEMEX shall provide the technical details for whether an existing utility connection or new one is to be installed for disposal of scrubber blowdown water.

Condition 16: *Sampling and Monitoring* (8.0)

- (a) Laboratory analysis shall include ELAP-certified mobile laboratories where appropriate.

Condition 17: *Data Quality Objectives* (8.1)

- (a) Prior to initiating the IM, the DQOs shall be adjusted to reflect concerns about dioxin emission, surface receptors, and migration to ground water.

Condition 18: *Soil Sampling Procedures* (8.2.1)

- (a) CEMEX is required to use U.S. EPA Method 5035, which includes methanol and sodium bisulfate preservation, for VOC soil sampling. The specific protocols shall be described in the revised Workplan, DTSC staff may be present to observe sampling procedures. Sending Encore sub-samples directly to the laboratory is not acceptable.

Condition 19: *Soil Vapor Sampling Procedures, Analytical Methods/Quality Control for Soil Vapor Samples, and Equipment Calibration and Maintenance* (8.3.1, 8.3.3, and 8.4.4 respectively)

- (a) Soil vapor sampling shall be performed according to the protocols described in the 1997 revised Los Angeles Regional Water Quality Control Board (LARWQCB) *Interim Guidance for Active Soil Gas Investigation* and the joint 2003 DTSC and LARWQCB *Supplemental Advisory*.
- (b) The target analyte estimated detection limits for soil vapor analysis summarized in Table 10 shall be adjusted such that indoor air issues may be addressed with the data.
- (c) Equipment calibration and maintenance shall be performed according to the protocols described in the 1997 revised Los Angeles Regional Water Quality Control Board (LARWQCB) *Interim Guidance for Active Soil Gas Investigation* and the joint 2003 DTSC and LARWQCB *Supplemental Advisory*.

Condition 20: *Sample Custody Procedures* (8.4.3)

- (a) Soil vapor samples shall be analyzed by an ELAP-certified mobile laboratory at the site