ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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JB PRITZKER, GOVERNOR JOHN J. KIM, DIRECTOR

217-524-3300

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AUG 22 2022

Shell Oil Products US
Attn: Leroy Bealer
128 East Center Street
Nazareth, PA 18064

1191150002 – Madison County
Equilon Enterprises LLC dba Shell Oil Products US
ILD080012305
Log No. B-43R-CA-107
RCRA Permits
Permit Approval

Mr. Leroy Bealer,

This is in response to the following submittals made to Illinois EPA regarding corrective action activities on your behalf by AECOM. These documents were submitted to address certain aspects of the Corrective Action requirements of the RCRA Post-Closure Permit for the above-referenced facility (Log No. B-43R):

1. A document (Log No. B-43R-CA-107) entitled "Final Design and Workplan for Proposed Steam Enhanced Extraction System at the Roxana Public Works Yard" dated January 31, 2022, and received on February 01, 2022. This is a workplan for a steam enhanced extraction (SEE) system to target and remediate the highest concentrations of benzene present at the Public Works Yard (PWY), owned by the Village of Roxana.

2. Additional information to submittal No. 1 above entitled, "Additional Information to Log No. B-43R-CA-107 (Roxana PWY SEE Workplan)" dated June 22, 2022, was received on June 24, 2022. The document provides Appendix E to Attachment B of above workplan.

The contamination present within the Village of Roxana, Illinois, is required to be addressed in accordance with the corrective action section of the facility's afore-mentioned RCRA Permit. As part of the remediation efforts conducted within the Village, a Soil Vapor Extraction (SVE) system has been installed and operated to reduce subsurface vapors originating from elevated concentrations of benzene and other volatile organic compounds (VOCs). These VOCs are present in groundwater and soil in the vadose zone at the PWY, and this submittal proposes in-situ thermal remediation (ISTR), specifically SEE, to reduce and remediate benzene as well as other VOCs present in the treatment targeted zone (TTZ) of SEE.

Illinois EPA has reviewed the subject submittals and hereby approves them subject to the following conditions and modifications.

1. In order to implement a successful Corrective Measures Program (CMP) during RCRA Corrective Action, Shell Oil Products US (SOPUS) must follow the process as described in attached document entitled "Illinois EPA Corrective Measures Program Requirements". With the subject workplan and addendum submittal, it has been determined Phase I of the CMP has been approved for the PWY SEE CMP, subject to the conditions of this letter.

2. Within 90 days of the date of this letter, a Final Design Report and Construction Work Plan must be submitted to Illinois EPA for review and approval. This document needs to include the items listed in Section 4.0 of the attached Illinois EPA CMP document and the following specific items included in Conditions below. Any required attachments must also be provided with the new workplan.

3. A scaled site layout map detailing the soil, soil gas and groundwater sampling locations, that would be conducted during SEE operations and post-shutdown of SEE must be provided in the workplan required in Condition 2.

4. With regards to the SEE shutdown criteria (Criteria 1 through 4) as described in Section 4.6 of the subject workplan, the following conditions and modifications must be met. Additional information regarding these shutdown criteria were provided by the facility during a technical meeting Illinois EPA and SOPUS on April 27, 2022, and summarized in an email on May 4, 2022, which has been incorporated below.

   A revised shutdown criteria to reflect below listed requirements and additional clarifications and/or information listed in Conditions 4.b through 4.g must be included in the workplan required in Condition 2 above for Illinois EPA review and approval:

   a. SEE shutdown cannot occur until:

      i. The target soil temperature of 80.2°C is met; and

      ii. Both Shutdown Criteria 1 and Shutdown Criteria 2 are met; or

      iii. The revised Shutdown Criteria 4 required in Condition 4.f below is met.

   b. Shutdown Criteria Item 1: Regarding the "peak" in Criteria 1, the mass recovery curve based on system monitoring/sampling is one method of tracking recovery rates and finding the point of diminishing returns, which is typically on the order of 10% of the peak. This criteria is related to determining when the system has reached diminishing returns, meaning that the SEE technology has done what it can.

c. Shutdown Criteria Item 2: The linear mass recovery rate is looked at via statistical trend data. The list of potential statistical trend analyses is not identified and must be described in detail. This criteria is also related to determining when the system has reached diminishing returns.

d. Shutdown Criteria Item 3: The intent for Criteria Item 3 is to ensure that the entire formation within the target treatment zones gets up to the necessary temperature and operates long enough for the SEE to perform as intended. MC^2 stated that the required 135 days of operation after target temperature is reached was determined from the energy balances and was an estimate of how long the proposed system would require to remove the mass.

   Past completed SEE projects have shown that mass recovered during operations sometimes exceeded the initial estimated mass. Therefore, Illinois EPA cannot approve the proposed shutdown criteria 3.

e. As stated in the May 4, 2022, email, the intent of the "or" for Criteria Item 3 was to prevent the proposed Shell SEE system from operating after removing the benzene mass it was designed for if continued mass recovery is observed related to the Buckeye release. However, there is contamination present beyond the PWY boundaries to the north, northeast, east, and southeast. Contaminant concentrations to the south are not necessarily greater than those in other directions, and this alone cannot govern the shutdown of the system.

f. Shutdown Criteria Item 4: The facility states the TTZs are based on a site-specific value for soil saturation limits (Csat). However, SOPUS cannot use an unapproved site-specific Csat value. While the residential value of 580 mg/kg applies to residential designations for soil, the saturated zone is subject to meet the groundwater objectives for Class I groundwater and any other groundwater-related exposure route values. Revise Criteria 4 to indicate that if the groundwater objectives for Class I groundwater and any other groundwater-related exposure route values are met within the entire dissolved plume, then the SEE may be shutdown based on that sole criteria.

g. Figure(s) must be provided to visually present the diminishing returns in Criteria 1 and 2.

5. The Illinois EPA concurs with the use of SEE at the PWY; however, Illinois EPA disagrees with the treatment range. The current remedial approach intends to limit the scope of the SEE to only a portion of the water column; however, the full extent of the plume within the Village must be addressed. As stated in previous letters, the remedial objectives at the PWY must meet residential standards. Treatment zones must be expanded to encompass the full dissolved plume at the PWY.

The full extent of the treatment zone is considered to be within 3 feet of the water table, and extending vertically and horizontally within 3 feet of the Class I Groundwater Quality Standards (GQSs) being met. The 3-foot variance is acceptable due to this being the variance for the SEE method as defined in Attachment B to the subject submittal; "the heated area is defined as the area that extends 3 feet (ft) beyond the perimeter steam injection well locations." Again, once SOPUS is sampling below the water table within the saturated zone, the groundwater limits apply. The Csat in saturated soil can be a screening tool, but the groundwater remediation objectives to meet the requirements of 35 Ill. Adm. Code Part 742 and Part 620 must be met for the groundwater in the saturated zone.

6. Any additional data required to develop the Final Design Report and Construction Work Plan must be collected within 30 days of the date of this letter.

7. In addition to the proposed sampling locations from specific sample depths based on the 2019 Predesign Investigation, found in Table 1 and Table 2 of Attachment A of the subject submittal, the following must be addressed and incorporated into the Final Design Report:

    i. Include the multi-phase extraction (MPE) wells locations to be sampled for groundwater in Areas A and B.

    ii. Soil borings sampling during the installation of MW-8A, MW-8B, MW-29A, and MW-29B must be continuously logged and sampled. Stainless steel well materials are required as these will be permanent monitoring wells.

a. Provide the results for groundwater profiling (GWP) locations GP-15, GP-16, GP-17, and GP-18, and evaluate results of samples in comparison to what was observed at more recent investigation locations.

b. At this time, the groundwater objective for 1-methylnaphthalene is 0.49 mg/L for a Class I groundwater. With regards to the indoor air pathway evaluation, there is no toxicology data; therefore, the Csat value of 530 mg/kg, and the groundwater solubility of 26 mg/L is applicable.

c. The vertical extent of groundwater contamination at sampling locations PD-03, PD-07 and PD-17 must be delineated. The field sampling was ended prematurely.

   According to Table 6 of Attachment A, the following benzene concentrations were reported: PD-3 was 1,200 mg/L at 71 ft bgs; PD-7 was 1,400 mg/L at 55 ft bgs; and PD-17 was 2,200 mg/L at 50 ft bgs when groundwater sampling stopped at the respective borings. New borings should be installed adjacent to these locations and benzene concentration in groundwater delineated vertically until the appropriate standards are met.

d. Attachment A, Figure 2: The underground water line depicted on Figure 2, has the potential to be a preferential pathway for vapors. The location and elevation of any underground lines along Eighth Street must be provided, and a demonstration provided on how these are not a concern or how they will be addressed.

e. Attachment A, Figure 5.B: There is a typo on cross-section C-C'. Boring PD-08 is listed twice. It appears the point closest to GP-16A, should be labeled PD-09.

f. Attachment A, Appendix F: Regarding the hydraulic conductivity tests performed by laboratory analysis, the result must be increased by 2 orders of magnitude. For example, if the ex-situ K value = 3.0E-05 cm/second, 2 orders of magnitude increase = 3.0E-03 cm/second.

g. Attachment A, Appendix H: No groundwater samples were collected at PD-06, PD-10, PD-15, or PD-16. However, PD-06-, PD-09, and PD-16 had a dyeLIF response. Therefore, new samples must be collected for groundwater delineation at PD-06, PD-09, and PD-16.

h. The separation between Areas A and B appears to have more to do with the location of the wastewater treatment plant footprint at the PWY. The Illinois EPA considers the subsurface region between Areas A and B to have high potential for contamination at similar concentrations. However, the proposed SEE treatment does not appear to be targeted at remediating this portion of the Village property. Modeling presented in Figures 10 and 11 of Attachment A, also estimates that the contamination extends between Areas A and B. Propose the necessary revisions to ensure all subsurface contamination is adequately addressed.

i. Attachment B, Appendix A: Figure WFL-01 provides the well field layout for Areas A and B. It shows the equipment staging area is directly above an area of concern that needs to be included in the remediation project. Therefore, equipment must be staged in a different area if this is preventing SOPUS from treating this area.

j. If the SEE system does not achieve the appropriate standards, SOPUS must include provisions for a transition to continuous groundwater pumping and vapor removal in the new Workplan. The revised report must describe how the potential transition will be completed.

k. O & M Plan: The facility must submit the O & M plan within the report required by Condition 2 above.

l. Health and Safety Plan: The facility must submit the Health and Safety Plan within the report required by Condition 2 above.

m. Sampling locations must be installed adjacent to MW-4 and MW-25 and samples must be collected at multiple intervals as was conducted at the PWY. Sampling must continue vertically until levels no longer exceed the benzene Class I GQS of 0.005 mg/L. The requirements for additional sampling on Eighth Street may serve to meet this requirement if sampling locations align.

8. The sampling procedure for the steam vapor monitoring points (SVP) once operations commence must be revised to address the following comments.

   a. Primary SVP row must be sampled using stainless steel canisters and Modified USEPA Total Organic-15 (TO-15) method at least once a week after the TTZ reaches half the targeted temperature. Illinois EPA acknowledges that there's potential for increase in vapor concentration at the primary SVP due to it being in close proximity to the TTZ, but with residential homes in such close proximity, all effort must be taken to avoid an exposure.

   b. All primary SVP must also be field screened with Tedlar© bags following the provided sampling frequency.

   c. Secondary SVP row must be screened for an increase from baselines established following the program frequency outlined in Section 6.

   d. If the secondary screening tests shows elevated field screening results, SOPUS must then conduct daily testing at both the primary and secondary locations until such times the results falls at or below the baseline obtained following any adjustments to the SEE system. Additionally, modified USEPA TO-15 method must be used to collect samples at each secondary vapor monitoring points to be sent out laboratory testing once the results reach baseline again after an increase for confirmation.

   If an elevation from the baseline results are noted at any of the monitoring points in the primary and/or secondary SVP rows following commencement of SEE, necessary adjustments to the SEE system must be made immediately to bring the results back to baseline values.

9. The proposed sampling for SVPs following shutdown of SEE in Section 6 of the subject submittal cannot be approved and must be revised to indicate samples will be taken at the following frequency:

   a. Three samples a week while also following condition 8 of this letter for the first two weeks following shutdown, then;

   b. Two samples a week until the MPE wells are turned off, then;

   c. Three samples a week for the first two weeks after all extraction has ceased, then;

d. Two samples a week until the TTZ reaches half the target temperature, then;

e. One sample every two weeks until ambient subsurface conditions are reached.

10. SOPUS must provide a detailed cost estimate for the proposed SEE system including costs for installation, operation and shutdown of the system pursuant to 35 IAC 724.244. The estimates must be based upon third party costs and must be supported by a detailed breakdown of the estimated third-party cost for completing each required task. The amount of the various resources needed to complete each task must be provided, as well as the unit cost of these resources and an adjustment for contingencies. Justification for all data used in these calculations must also be provided.

11. The revised Report and Workplan must indicate that SOPUS will operate the SEE system for a longer period of time in the event that the shutdown criteria required in Condition 4 of this letter have not been met during the proposed six-month duration. It would be counterproductive to shutdown the system without achieving the remediation objectives (ROs) and to leave Contaminants of Concern (COCs) behind when the subsurface temperatures have risen significantly.

12. Subsections 4.2.1 and 4.2.2 of the pre-design investigation report indicate that the VOCs concentrations are averaged. When evaluating remediation objectives and shutdown criteria, the individual concentrations at each point must be assessed and not the averaged value.

13. Subsection 3.8.1 indicates the frequency of liquid sampling is once every two-weeks. To ensure compliance with water permits, Illinois EPA has determined that weekly collection and assessment of samples is necessary. This would also identify any issues with the treatment equipment faster while the system is operational. Therefore, subsection 3.8.1 must be revised.

14. The Final Design Report and Construction Work Plan needs to be revised to indicate the site operator will conduct daily monitoring of the treatment area and equipment using a portable PID for any emissions and leaks. The monitoring procedures and a monitoring record log must also be developed and included.

15. The Final Design Report and Construction Work Plan must include provisions for the submittal of monthly CMP progress reports indicating the status and progress of SEE remediation in addition to the post construction and installation report and post SEE shutdown and completion report. The monthly CMP progress reports must include, but not be limited to the following:

    - Temperature data
    - Mass recovery rates
    - Concentrations of organic compounds in the recovered vapor

- Vapor flow rates
- Groundwater flow rates
- Condensate recovery
- Steam injection rates
- Electricity (or fuel) consumption
- Groundwater concentrations
- Contaminant recovery rates
- Energy input data.

The reports must also provide information related to water discharge, air emissions and information from the SVP used to monitor indoor air limits.

16. The subject submittal does not adequately address the controls in place in the event of a rebound of COCs concentrations after the SEE system is shutdown and needs to be revised to address this issue. This is a critical concern, since elevated subsurface temperatures would aid in vaporization of VOCs and the remediation site being in close proximity to a residential neighborhood. Thus, one or both of the following controls must be in place immediately following SEE system shutdown.

    a. The MPE wells must remain in place until the SVE system is operational again in case of a rebound in the COCs; and/or

    b. SOPUS must have the SVE system functional immediately after the MPE wells are shutdown, and before ambient subsurface temperatures are reached as proposed in subject submittal.

17. The Final Design Report and Construction Work Plan needs to be revised to include hot sampling procedures, which would allow SOPUS to sample the system, while SEE is operating. These procedures are needed to determine the effectiveness of the SEE system while it is operational. Hot sampling is required to ensure that the ROs are achieved during SEE system operations, to evaluate system performance and do any optimizations required during operations.

    a. Hot sampling must be conducted at least once a month after the site reaches targeted temperature of 80.2°C. This sampling data must be included in the monthly reports required in Condition 15. above.

18. The proposed primary SVP row is insufficient. Additional SVPs must be installed in order to prevent an exposure in the residential area. Three additional SVPs, each vertically in line with SVP-11, SVP-8 and SVP-7 must be installed during the installation of SVP followed with the same procedure provided in section 6 to establish a baseline of soil vapor conditions.

19. The MPE wells must remain active for at least 30 days post-SEE system shutdown in order to prevent any COCs rebounding and/or migrating to residential neighborhood as discussed in condition 15. above. It is estimated that the temperature would drop 1°C per day per according to a USEPA paper on ISTR, and by this estimate the temperature would be 30°C lower than the targeted temperature following the 30-day period. This is well under benzene and other COCs boiling points at standard atmospheric pressure and would be able to address potential vaporization of the COCs.

20. During the entire SEE operation period, sub-atmospheric pressure must be maintained in the TTZ to minimize the risk of upward migration of contaminants. The pressure must also be constantly monitored to ensure that this condition is met.

21. Following SEE shutdown, SOPUS must:

    1) continue to induce an inward gradient in accordance with the facility's RCRA Permit; and

    2) monitor the vadose zone in the vicinity of any wells exceeding groundwater concentrations published in Appendix B, Table H, of 35 Ill. Adm. Code Part 742, until such time as the groundwater concentrations have been reduced at groundwater monitoring wells within the Village of Roxana.

    If vapor monitoring exceeds applicable standards, then remedial measures will be required, and the Report and Work Plan need to address this potential scenario. In addition, until concentrations in groundwater no longer exceed the values in TACO (Appendix B, Table H, of 35 Ill. Adm. Code Part 742) which indicate a potential for vapor intrusion, the groundwater will continue to be a source of potential recontamination of those zones.

22. SOPUS should notify the Illinois EPA verbally within 24hrs and in writing within 48hrs of occurrence or discovery of any major problems or leaks in the SEE system. The written notice should include how and when the problem was discovered, how long the problem was ongoing for and what actions were taken to remediate the problem.

23. All necessary permits must be obtained from the appropriate local, state, and/or federal agencies, as needed.

This action shall constitute Illinois EPA's final action on the subject submittal. The applicant may appeal this final decision to the Illinois Pollution Control Board pursuant to Section 40 of the Act by filing a petition for a hearing within thirty-five (35) days after the date of issuance of the final decision. However, the 35-day period may be extended for a period of time not to exceed ninety (90) days by written notice from the applicant and the Illinois EPA within the initial 35-day appeal period. If the owner or operator wishes to receive a 90-day extension, a

written request that includes a statement of the date the final decision was received, along with a copy of this decision, must be sent to the Illinois EPA as soon as possible.

For information regarding the request for an extension, please contact:

Illinois Environmental Protection Agency
Division of Legal Counsel
1021 North Grand Avenue East
Post Office Box 19276
Springfield, IL 62794-9276
217/782 5544

For information regarding the filing of an appeal, please contact:

Illinois Pollution Control Board, Clerk
State of Illinois Center
100 West Randolph Street, Suite 11 500
Chicago, IL 60601
312/814 3620

Work required by this letter, your submittal or the regulations may also be subject to other laws governing professional services, such as the Illinois Professional Land Surveyor Act of 1989, the Professional Engineering Practice Act of 1989, the Professional Geologist Licensing Act, and the Structural Engineering Licensing Act of 1989. This letter does not relieve anyone from compliance with these laws and the regulations adopted pursuant to these laws. All work that falls within the scope and definitions of these laws must be performed in compliance with them. The Illinois EPA may refer any discovered violation of these laws to the appropriate regulating authority.

If you have any questions regarding this letter, please feel free to contact Amy Butler at (217) 558-4716 for specific questions related to groundwater issues. All other questions regarding this letter should be referred to Visal Poornaka at (217) 558-4717.

Sincerely,

Kenneth E. Smith, P.E., Manager
Permit Section
Division of Land Pollution Control
Bureau of Land

VP

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Attachment: Illinois EPA Corrective Measures Program Requirements

Cc: Wendy Pennington (electronic copy only)

Attachment
Illinois EPA Corrective Measures Program Requirements

1.0 INTRODUCTION/PURPOSE

RCRA Corrective Action projects typically consist of two phases: (1) A RCRA Facility Investigation (RFI) where an investigation is conducted at the SWMU's of concern at a facility; and (2) implementation of corrective measures needed to properly address any contaminant encountered during the FRI. This document has been developed to outline the procedures to be carried out to implement a corrective measure program.

2.0 BRIEF OVERVIEW OF A RCRA CORRECTIVE MEASURES PROGRAM

Typically, at the end of an RFI, the concentration of contaminants present in the soil/sediments/groundwater/surface waters at a SWMU or other area of concern is compared to remediation objectives developed in accordance with 35 Ill. Adm. Code 742. If the contaminant levels are above these objectives, then some type of corrective measure must be completed to achieve these objectives. In addition, certain corrective measures may need to be carried out to support the established remediation objectives (i.e., the establishment of engineered barriers and/or institutional controls). However, at a unit where waste or high levels of contamination remains, a decision may be made to close the unit as a landfill and then provide post-closure rather than removing the material and/or achieving remediation objectives developed in accordance with 35 Ill. Adm. Code 742.

To allow for a logical and orderly progression in developing and implementing necessary corrective measures, the Corrective Measures Program (CMP) being carried out in accordance with this RCRA permit should be carried out in five phases which build on each other. It is not necessary for a corrective measures program at a given SWMU or other areas of concern to follow these five phases step-by-step; rather, phases can be combined and/or skipped, depending on the actual remedial measure selected. The overall CMP implemented must set forth a logical path for its implementation and allow for Illinois EPA oversight and approval throughout the entire process.

A brief discussion of the five phases of a CMP is as follows:

1. Phase I is the conceptual design of the selected corrective measure(s).

2. Phase II is the development of final design plans for the corrective measure, including installation and operation/maintenance plans.

3. Phase III is the actual construction/installation of the selected corrective measure.

4. Phase IV is the operation, maintenance, and monitoring of the selected corrective measure to ensure it is properly protecting human health and the environment.

5. Phase V is the final demonstration/verification that the implemented corrective measure achieved the approved remedial objectives.

Sections 3.0 through 7.0 which follow provide a more detailed discussion of each of these five phases. Section 8.0 has been developed to describe the corrective measures program which may be used in lieu of the afore-mentioned five phase procedure when soil removal is the selected remedy. It must be noted that work plans, reports, etc. must be developed to document how the Permittee carries out the required corrective measures program at each SWMU or other areas of concern. All such documents must be reviewed and approved by Illinois EPA prior to their implementation.

3.0 PHASE I OF THE CMP

Phase I of the CMP includes selection of the corrective measure to be taken and developing a basis for completing the final design of the measure. This effort should be documented in a Conceptual Design Report which describes the proposed corrective measure for each SWMU and other areas of concern and provides a conceptual design for these measures. The main criteria for Illinois EPA review is whether the proposed corrective measures are able to achieve the final cleanup objectives previously established by the Permittee and the Illinois EPA and/or provide the necessary institutional controls to prevent the migration of contaminants from the SWMU of concern. Based upon a review of the Conceptual Design Report, the Illinois EPA may approve the corrective measures, require revisions to the proposed corrective measures, or require that a totally new corrective measures proposal be submitted to the Illinois EPA.

The Conceptual Design Report should contain the following sections:

1. Introduction/Purpose. This section should contain: (1) general background information regarding the project; (2) the purpose and goals of the submittal; and (3) the scope of the project.

2. Existing Site Conditions. This section should contain a summary of the investigative activities conducted for each of the units of concern. Investigation analytical results should be provided in tabular form, and maps depicting both the horizontal and vertical extent of contamination at the site should be provided.

3. Evaluation for Potential Future Migration. Based on the existing site conditions, a conceptual model of the site should be developed and presented in this section. The potential for additional future migration of contamination for each of the units of concern must then be evaluated, especially those units which have been determined to have released hazardous waste/hazardous constituents to the groundwater. It may be helpful to develop conceptual models for contaminant migration. Of special concern in this evaluation are (1) the physical properties of the contaminants (solubility, volatility, mobility, etc.); and (2) existing site

conditions (types of soil present, location of contamination, hydrology, geology, etc.).

4. Corrective Measures Objectives. This section should discuss the general objectives of the proposed corrective measure to be constructed/installed, and the ability of the proposed corrective measure to achieve the established remediation objectives (unless the selected corrective measure is closure as a landfill which will require proper establishment of a final cover and proper post-closure care of the closed unit.

5. Identification of Options Available. This section should contain a brief discussion of the various options available to achieve the corrective measures objectives for each unit. This discussion should identify: (1) a general overview of each option available, including how the option will achieve the stated objective; (2) the advantages associated with each option; (3) the disadvantages associated with each option and (4) an estimate of the cost associated with choosing each remedial option.

6. Description of Selected Corrective Measure. This section should contain a qualitative discussion of the corrective measure chosen, along with the rationale which was used to select this measure from all those identified initially. This discussion should include documentation that the selected corrective measure will be effective.

7. Identification of Design Criteria. This section should identify what information must be available to design the selected corrective measure.

8. Review of Available Information. This section should contain an evaluation of the existing information to ensure that it is sufficient to complete the design of the selected corrective measure. If insufficient information is available, then the report should contain procedures for collecting the required additional information.

9. Procedures for Completing the Design. This section should contain a description of the procedures which will be followed to complete the design of the corrective measure. This should include as appropriate:

    a. Identification of the references and established guidance which will be used in designing the selected corrective measure. Justification for the selection of this procedure should also be provided.

    b. A description of the procedures which will be used to complete the design of the corrective measure.

    c. Identification of assumptions to be used in the design, and the impact these assumptions have on the overall corrective measure;

d. Significant data to be used in the design effort;

e. Identification and discussion of the major equations to be used in the design effort (including a reference to the source of the equations);

f. Sample calculations to be used in the design effort;

g. Conceptual process/schematic diagrams;

h. A site plan showing a preliminary layout of the selected corrective measure;

i. Tables giving preliminary mass balances;

j. Site safety and security provisions.

This information will form the technical basis for the detailed design of the remedial measure and the preparation of construction plans/specifications.

10. Identification of Required Permits. This section should identify and describe any necessary permits associated with the selected corrective measure, as well as the procedures which will be used to obtain these permits.

11. Long-lead Procurement Considerations. This section should identify any elements/components of the selected corrective measure which will require a large amount of time to obtain/install. The following issues should also be discussed: (1) the reason why it will take a large amount of time to obtain/install the item; (2) the length of time necessary for procurement and (3) recognized sources of such items.

12. Project Management. This section should contain information regarding the procedures and personnel which will be involved in completing the design of the selected corrective measure. A schedule for completing the design should also be provided.

4.0 PHASE II OF THE CMP

Once the Illinois EPA approves the Conceptual Design Report, the facility should complete the design of the approved corrective action (Phase II of the CMP). Upon final completion of the design, a Final Design Report, consisting of final plans, specifications, construction work plan, etc., must be submitted to the Illinois EPA for review and approval.

Several documents must be submitted to the Illinois EPA as part of Phase II of the CMP. The following text describes the expected contents of the various documents which should be developed and submitted to the Illinois EPA as part of Phase II of the CMP.

1. Final Design Report and Construction Work Plan. The Final Design Report and Construction Work Plan must contain the detailed plans, specifications and drawings needed to construct the corrective measure. In addition, this document must contain (1) calculations, data etc., in support of the final design; and (2) a detailed description of the overall management strategy, construction quality assurance procedures and schedule for constructing the corrective measure. It must be noted that the approved Conceptual Design Report forms the basis for this final report. The information which should be provided in this document includes:

    a. Introduction/Purpose. This portion of the document should: (1) provide background information regarding the project, (2) describe the purpose and goals of the project, and (3) describe the scope of the project.

    b. Detailed Plans of the Design System, including the following:

        1. Plan views;

        2. Section and supplementary views which, together with the specifications and general layouts, facilitate construction of the designed system;

        3. Dimensions and relative elevations of structures;

        4. Location and outline form of the equipment;

        5. Ground elevations; and

        6. Descriptive notations, as necessary, for clarity.

    c. Technical Specifications. Complete technical specifications for the construction of the system, including, but are not limited to, the following:

        1. All construction information, not shown in the drawings, which is necessary to inform the contractor in detail as to the required quality of materials, workmanship, and fabrication of the project;

        2. The type, size, strength, and operating characteristics of the equipment;

3. The complete requirements for all mechanical and electrical equipment, including machinery, valves, piping and jointing of pipe;

4. Electrical apparatus, wiring and meters;

5. Construction materials;

6. Chemicals, when used;

7. Miscellaneous appurtenances;

8. Instruction for testing materials and equipment as necessary; and

9. Availability of soil boring information.

d. Project Management. A description of the construction management approach, including the levels of authority and responsibility, lines of communication and qualifications if key personnel who will direct corrective measures construction/installation must be provided in the work plan.

e. Construction Quality Assurance/Quality Control. A construction quality assurance/quality control plan describing the procedures which will be followed to ensure the corrective measure is constructed/installed in accordance with the approved plans and specifications.

f. Schedule. The work plan must contain a schedule for completion of all major activities associated with construction/installation of the selected corrective measures. All major points of the construction/installation should be highlighted.

g. Waste Management Practices. This portion of the document should identify the wastes anticipated to be generated during the construction/installation of the corrective measures, and provide a description of the procedures for appropriate characterization and management of these wastes.

h. Required Permits. Copies of permit applications submitted to other Bureaus of the Illinois EPA for the selected corrective measure must be provided in the report. If it is determined that no permit is required for construction/installation and implementation of the corrective measures, rationale and justification must be provided to support this contention.

i. Cleanup Verification. The report must contain the procedures which will be followed that the approved remediation objectives have been achieved when operation of the system is completed.

2. Operation and Maintenance Plan. An Operation and Maintenance Plan must be developed and submitted as part of Phase II of the CMP. This plan should outline the procedures for performing operations, long term maintenance, and monitoring of the corrective measure.

a. Introduction and Purpose. This portion of the document should provide a brief description of the facility operations, scope of the corrective measures project, and summary of the project objectives.

b. System Description. This portion of the document should provide a description of the corrective measure and significant equipment, including manufacturer's specifications. This portion of the permit should also include a narrative of how the selected system equipment is capable of complying with the final engineered design of the corrective measure.

c. Operation and Maintenance Procedures. This portion of the document should provide a description of the normal operation and maintenance procedures for the corrective measures system, including:

1. Description of tasks for operation;

2. Description of tasks for maintenance;

3. Description of prescribed treatment or operation conditions; and

4. Schedule showing the frequency of each operation and maintenance task.

d. Inspection Schedule. This portion of the document should provide a description of the procedures for inspection of the corrective measures system, including problems to look for during the inspection procedure, specific inspection items, and frequency of the inspections.

e. Waste Management Practices. This portion of the document should provide a description of the wastes generated by the corrective measure, and the appropriate procedures for proper characterization/management of these wastes.

f. Contingency Procedures. This portion of the document should provide a description of the procedures which will address the following items:

1. System breakdowns and operational problems including a list of redundant and emergency backup equipment and procedures;

2. Alternative procedures (i.e., stabilization) which are to be implemented in the event that the corrective measure fails. The alternative procedures must be able to prevent release or threatened releases of hazardous wastes/hazardous constituents which may endanger human health and the environment, or exceed cleanup standards.

3. Notification of facility and regulatory personnel in the event of a breakdown in the corrective measures, including written notification identifying what occurred, what response action is being taken and any potential impacts on human health and the environment.

5.0 PHASE III OF THE CMP

Once the final design report is approved by the Illinois EPA, construction/installation of the approved corrective measure must commence. During this period, quarterly reports should be submitted which contain the following information:

1. Summary of activities completed during the reporting period;

2. An estimate of the percentage of the work completed;

3. Summaries of all actual or proposed changes to the approved plans and specifications or its implementation;

4. Summaries of all actual or potential problems encountered during the reporting period;

5. Proposal for correcting any problems; and

6. Projected work for the next reporting period.

Upon completion of construction/installation of the approved corrective measure, a Construction Completion Report must be submitted to the Illinois EPA documenting that these efforts were carried out in accordance with the Illinois EPA approved plans and specifications. This report should contain a thorough description of the efforts that went into constructing/installing the corrective measure and demonstrate that the procedures in the Illinois EPA-approved Final Design Report were followed during this effort. Such a report should be formatted in a logical and orderly manner and contain the following information:

1. An introduction discussing the background of the project and the purpose and scope of the corrective measure described in the report.

2. Identification of the plans, technical specifications and drawings which were used in constructing/installing the corrective measure. These specifications and drawings should have been approved by the Illinois EPA during Phase II.

3. Identification of any variations from the Illinois EPA approved plans, technical specifications and drawings used in construction/installing the corrective measure. Justification regarding the need to vary from the approved plans and specifications must also be provided.

4. A description of the procedures used to construct/install the corrective measure, including the procedures used for quality assurance and quality control.

5. As-built drawings, including identification of any variations from the approved plans, technical specifications and drawings.

6. A summary of all test results from the construction/installation effort, including quality assurance/quality control testing.

7. Actual test results, including quality assurance/quality control test results. These results should be located in an attachment/appendix and be well organized.

8. Identification of any test results which did not meet the specified value and a description of the action taken in response to this failure, including re-testing efforts.

9. Photographs documenting the various phases of construction.

10. A detailed discussion of how the construction/installation effort met the requirements of the approved Final Design Report.

11. A certification meeting the requirements of 35 Ill. Adm. Code 702.126 by an independent qualified, licensed professional engineer and by an authorized representative of the owner/operator.

6.0 PHASE IV OF THE CMP

Once the corrective measure has been constructed/installed, it must be operated, maintained and monitored in accordance with the approved plans and specifications (this is Phase IV of the CMP). During this period, quarterly reports must be submitted to the Illinois EPA documenting the results of these efforts. These reports include the following:

1. Introduction. -- A brief description of the facility operations, scope of the corrective measures project, and summary of the project objectives.

2. System Description. -- A description of the corrective measures constructed/installed at the site, and identify significant equipment. Describe the corrective measure and identify significant equipment.

3. Monitoring Results. -- A description of the monitoring and inspection procedures to be performed on the corrective measures. A summary of the monitoring results for the corrective measures, including copies of any laboratory analyses which document system effectiveness, provide a description of the monitoring procedures and inspections performed, and include a summary of the monitoring results for the corrective measure. Copies of all laboratory analytical results which document system monitoring must be provided.

4. Effectiveness Determination. -- Calculations and other relevant documentation which demonstrates the effectiveness of the selected corrective measure in remediating/stabilizing contamination to the extent anticipated by the corrective measures final design. Copies of relevant analytical data should be provided to substantiate this determination.

5. System Effectiveness Recommendation. -- Based upon the results of the effectiveness determination required under Item 4 above, recommendations on continued operation of the corrective measure must be provided. If the corrective measure is not performing in accordance with the final design, a recommendation on revisions or expansion of the system should be provided.

7.0 PHASE V OF THE CMP

Once all corrective measures have been completed, a report must be developed documenting all the efforts which were carried out as part of implementing the corrective measure and demonstrating, as appropriate, that the approved remediation objectives have been achieved. This report should contain a compilation of all previous reports and also contain sufficient information to demonstrate that the approved remediation objectives have been achieved. It must be noted that such a report will not be developed for a unit closed as a landfill until the post-closure care period has been completed.

8.0 PROCEDURES WHICH SHOULD BE FOLLOWED WHEN SOIL REMOVAL IS THE SELECTED CORRECTIVE MEASURE

Sections 2.0 through 6.0 above describe the procedures which should be followed when it is necessary to design some type of physical corrective measure (e.g., a final cover system, some type of treatment system, etc.). However such detail is not necessary if excavation/removal is selected as the remedial action for the contaminated soil encountered at the site. In general, a work plan should be developed for this effort (for Illinois EPA review and approval) which fully describes each step to be used in removing the contaminated soil from the property. This includes a description of (1) the equipment utilized in the removal effort, (2) the pattern followed in removing the soil; (3) the depth to which the soil will be removed; (4) management of the soil on-site after it is removed

from the ground; (5) loading areas; (6) the ultimate destination of the soil; and (7) any other steps critical to the removal effort.

One way to conduct a soil removal effort is to collect and analyze a sufficient number of soil samples to clearly determine the horizontal and vertical extent of soil contamination prior to conducting the soil removal effort. The boundaries of soil which must be removed are defined by the Illinois EPA established cleanup objectives for the project. Soil excavation must extend to sample locations where soil test results indicate that the remediation objectives are met. Closure verification sampling is not necessary in such cases, if a registered professional engineer oversees the soil removal effort and certifies that the remediation limits extend to these boundaries.

Another way to conduct a soil removal effort is to collect and analyze a limited number of soil samples prior to the soil removal effort and to rely mainly on field observation to determine the extent of the soil removal. In such cases closure verification sampling is necessary. Soil samples must be collected for analysis from the bottom and sidewalls of the final excavation. The following sampling/analysis effort is necessary to demonstrate that the remaining soil meets the established cleanup objectives:

1. A grid system should be established over the excavation.

2. Samples should be collected from the floor of the excavation at each grid intersection, including intersections along the perimeter of the excavation.

3. Samples should be collected at 6"-12" below the ground surface (bgs) along the excavation sidewalls at each grid intersection around the excavation perimeter. Samples must also be collected at the midpoint of the excavation wall at each grid intersection along the excavation perimeter.

4. Collection/analysis of all required samples must be in accordance with the procedures set forth in the approved plan.

5. Soil samples which must be analyzed for volatile organic compounds (VOCs) must be collected in accordance with the procedures set forth in Method 5035 of SW-846. In addition, such samples must be collected 6"-12" beneath the floor/sidewalls of the excavation to minimize the possibility of volatilization of the contaminants prior to the collection of the samples.

6. No random sampling may be conducted to verify achievement of cleanup objectives have been met.

7. Additional soil must be removed, as necessary, until it can be demonstrated that the remaining soil in and around the area of concern meets the established cleanup objectives. Additional samples must be collected and analyzed in accordance with the procedures described above from areas where additional soil has been removed.