

CLOSURE PLAN CONTENTS AND TECHNICAL REVIEW

3.11 - CLOSURE PERFORMANCE STANDARDS (CLEANUP LEVELS)

Introduction

The goal of a closure plan is to achieve clean closure of RCRA and/or State only hazardous waste regulated units. Clean closure is the process where all hazardous waste and hazardous constituent residues are removed or are left in place at levels that are protective of public health and the environment. By achieving clean closure the facility would not be subject to further regulatory requirements. These further regulatory requirements may include post closure care implementation, payment of annual facility fees, submittal of a post closure permit application and fees, and financial assurance for implementation of post closure requirements.

To verify that clean closure has been achieved, all remaining contaminants left in equipment, containment structures, buildings, and soils, must meet closure performance standards or clean-up levels. Clean-up levels are the concentrations of hazardous constituents that must be achieved in all media of concern before a facility can be certified as clean closed. The owner or operator is required to propose clean-up levels in this section of the Closure Plan.

Submittals Required by Applicant

The most commonly agreed upon performance standards for achieving clean closure of RCRA and State regulated facilities are:

1. Cleanup to Background Levels

a. Definition and Selection of Background - For inorganic chemicals (metals) the owner or operator may use background concentration levels in setting cleanup targets for soil. Since background concentration levels do not apply to organic chemicals, then the cleanup target would have to be non-detect for organic chemicals. The background cleanup level is applicable to soils only (groundwater considerations are outside the scope of these instructions), not equipment, structures, or buildings. The background concentration should represent the original soil condition before a facility was constructed and operated. It is critical that the area selected for collecting background samples be representative of the natural or existing local conditions; it should not be affected by operations of the unit or facility or from other previous uses. The owner or operator must explain why a specific area was selected for collection of background samples and how they these samples will be collected. The Department submittal requirements are described in paragraphs b through f below.

b. Sampling Location - The closure plan should include a map showing the locations where background samples will be collected. Background soil samples should be collected from an area that has not been affected by routine operations of the facility, or by accidental chemical release or emergency incidents. Background soil samples can be collected from locations outside the facility's boundaries provided that the soil types are equivalent to soils found on site. The local Soil Conservation Service or Agricultural Cooperative Extension Office may be contacted for soil information. Within the area designated for background determinations, specific sampling locations should be determined using a two-dimensional, random sampling technique. A copy of this method is included in Appendix B.

c. Sampling Depth - The closure plan should provide a rationale for selecting the depths at which background soil samples will be taken. Background soil samples should be collected from the same geologic stratum as those samples collected for the investigatory, detection, site characterization, and confirmation sampling programs. This is recommended in "Clean Closure Guidance Manual for Hazardous Waste Management Units", EPA 530-SW-87-002. A geologic stratum is a layer of soil composed of a single soil type. Depending on the nature of the facility sampling programs, samples may need to be collected from several different geologic strata. Background soil

samples should be collected from depths corresponding to the same geologic strata as those encountered during the facility sampling programs. The owner or operator may refer to available geologic references and data or take exploratory borings to determine the type and thickness of each stratum encountered during soil sampling. The owner or operator should also submit information on the type and thickness of each stratum from which background samples will be taken.

d. Number of Samples - The closure plan should provide the rationale for the number of background samples to be taken. A sufficient number of samples in each soil horizon must be collected and analyzed to account for spatial variability in the soil horizon. The number of samples is determined by an iterative approach where the facility proposes a number of samples, takes and analyzes the samples, and then does a calculation in accordance with the Student "t" test to confirm that the number of samples was sufficient. If not, additional samples must be taken and the calculation re-done.

e. Sampling Procedures - The closure plan should specify, and provide the rationale for, the background sampling area, sampling locations and depths, number of samples, sampling methods, and sample collection equipment. Grab samples are preferable to composite samples because grab sample results provide specific information at each background sample location. Abnormally high constituent concentrations may indicate that the background samples were taken at locations which may not be representative of the natural soil condition. The owner or operator should also adhere to the sample collection, quality control, chain-of custody, labelling, packaging, transportation, and documentation requirements as described in Chapter 3.9 of these instructions.

f. Analytical Test Methods - The plan should provide the rationale for the proposed analytical test methods for background soil analysis. Background soil samples should be analyzed for the hazardous wastes, constituents, and potential reaction and degradation products of the constituents that have been managed in the regulated units. Even though these are standard test methods specified in EPA guidance, SW-846, we require the owner or operator to list the methods they plan to use so that the permit writer can double check that the methods cover the range of hazardous constituents of concern, that is, that there have not been any omissions.

g. Calculation of specific Background cleanup level - Since the owner or operator will take several samples from an area that they have designated as a background area, there will be a range of numbers from which they must calculate the specific background cleanup level. The conventional way of doing this is to calculate the mean of all the samples plus two standard deviations. These cleanup levels should also be established for each geologic stratum.

2. Cleanup to Levels Determined to Pose an Insignificant Risk to Public Health and the Environment

The U.S. EPA in its Final Rule of March 19, 1987, set forth guidelines for an alternative clean closure. It stated that "clean closure" requires the removal of all wastes and materials contaminated with waste or leachate that "pose a substantial present or potential threat to human health or the environment." Further, EPA "recognizes that at certain sites limited quantities of hazardous constituents might remain in the subsoil and yet present only insignificant risks to human health and the environment." Thus, EPA states that it will review site-specific documentation that enough removal and/or decontamination have occurred so that no further action (post-closure care) is necessary.

It should be obvious that if a facility chooses to use a health based scenario then they must already have information regarding the characteristics of the soil at the site. Therefore, the permit writer needs to be aware of the reasoning for the facility requesting this option up front.

In order to accomplish a risk-based closure, a risk assessment must be conducted on the specific facility. The risk assessment process entails the computation of theoretical cancer risk from identified carcinogens and potential hazards from non-cancer agents to human health from the contaminated media, including soil, air, and water. The Office of Scientific Affairs (OSA) in the Department uses U.S. EPA guidance for risk assessments and OSA has developed several assessments which are specific to situations in California. OSA toxicologists should be consulted for protocols, procedures, and assistance for risk assessments. The following are major areas which should be addressed in the risk assessment:

- a. Facility characterization and selection of potential chemicals of concern, emission estimates, and intermedia transport.
- b. Identification of current and future populations which could be exposed to the contamination.
- c. Identification of complete pathways of exposure for these populations and justification for elimination of pathways. Pathways which must be considered are:
 - ! Ingestion of contaminated soil;
 - ! Dermal contact with contaminated soil;
 - ! Inhalation of contaminated airborne particulates;
 - ! Inhalation of vapors;
 - ! Ingestion of contaminated drinking water;
 - ! Ingestion of contaminated fruits and vegetables;
 - ! Dermal contact with contaminated water;
 - ! Ingestion of contaminated fish or shellfish;
 - ! Ingestion of contaminated meat, eggs, or dairy products;
 - ! Ingestion of breast milk by nursing infants;
 - ! Ingestion of contaminated water while swimming; or
 - ! Other pathways which could be specifically related to the facility.

All pathways must be considered, and elimination of pathways should only occur with adequate justification that the pathway is or will not be a potential route of exposure.

3. Calculation of Potential Daily Intake of Chemical using Department/OSA and EPA Parameters
4. Selection of Reference Doses (RfD) and Cancer Potency Factors (CPF) using Department Hierarchy (California promulgated values are given precedence over EPA IRIS or HEAST values)
5. Calculation of Cancer Risk and Hazard Indices for Chemicals, Including Combining Risks from all Exposure Pathways and Combining Risks from Chemicals within the Pathway.

Once a risk assessment has been conducted, remediation strategies for the contaminated media can be considered which will lower the risks to minimal or acceptable concentrations. Following remediation, these final remediation concentrations should be verified by additional sampling. In general, cumulative (all chemicals and pathways) excess cancer risk of $1E-6$ or less and cumulative hazard indices of less than 1 are considered to be de minimis risk levels for establishment of preliminary remediation goals. Final goals are set by a risk management process which includes consideration of cost, benefit, feasibility, permanence, community acceptance, and acceptance by other agencies, in addition to risk. In accordance with EPA regulations, final remediation goals for cancer risks can range from $1E-4$ to $1E-6$.

For any remediation strategy which may require post-closure care (maintenance and monitoring), the facility must apply for a post-closure permit. In cases where a deed restriction regarding use of the property is required, then a post-closure permit is not necessary.

6. Non-Detect Levels of the Hazardous Constituent(s) of Concern

Non-detect is set at least to the practical quantitation limits established by SW-846. Each certified laboratory must meet this criteria.

This is defined as the lowest level to which chemical analytical test equipment are rated by their manufacturers to be able to measure a specific hazardous waste constituent or class of constituents. If a facility proposes this as a

cleanup level, the permit writer should accept these levels and no further review is required. However, when they submit the results of chemical analysis in the closure certification report, the laboratory that conducted the tests should state what the specific concentrations are for the non-detect levels for the specific instrument that was used. This information is provided only for historical purposes to clarify exactly what non-detect meant.

Cautionary Note 1: When none of the above 3 cleanup levels are feasible to achieve for a specific facility, then clean closure cannot be achieved and the regulated unit must be closed under landfill closure requirements. This would thus subject the facility to the post-closure permit process. As stated previously, these instructions do not address post closure permit requirements. In this situation it is recommended that the permit writer consult with his/her supervisor for further guidance.

Cautionary Note 2: A common misconception that must be clarified is that concentrations used to determine if a waste is hazardous or not, for example Total Threshold Limit Concentration (TTLC) or Soluble Threshold Limit Concentration (STLC), cannot be used as cleanup levels. TTLC's and STLC's are used for classification of hazardous wastes. These are not health-based numbers, and as such, these values cannot be used for cleanup criteria. TTLC and STLC values are not protective of human health or the environment.

Cautionary Note 3: In dealing with PCB cleanups, the permit writer should be aware that these wastes are not regulated under RCRA but under the Toxic Substances Control Act (TSCA) and by the Department. There are specific prescribed cleanup levels in 40 CFR, Subpart G (PCB Cleanup Policy), Section 761.120, et.seq. At this time these levels can not be regarded as health based cleanup standards. The Department's Office of Scientific Affairs is developing guidance in this area. The permit writer should consult with his/her supervisor for further guidance.

Specific guidance on cleanup levels for treatment equipment and surrounding areas:

1. Cleanup Levels for Surrounding Soils

Background for inorganics; non-detect for organics; or health-based risk assessment levels.

2. Cleanup Levels for Containment Areas (tank pads, berms, walls, etc.) Non-Detect

Non-detect is used in this case because prior to use in hazardous waste service there was no presence of hazardous constituents in the tanks or on berms, pads or walls.

3. Cleanup Levels for Containers

None required since normally containers of 55 gallons or less capacity are disposed of and managed as hazardous waste. In the situation of a larger size container, use the same cleanup standards as tanks.

4. Cleanup Levels for Aboveground Tanks

! Tanks with Secondary Containment - Non-detect as determined by wipe sampling (see Chapter 3.7 for details on this test method) of the interior surface of the tank. The logic here is that the tank should be restored to the same condition it was in when it was new or before hazardous wastes were ever put into it.

Note: If the facility cannot achieve a non-detect cleanup level then they must manage the tank as a hazardous waste. This is based on the assumption the empty tank becomes a hazardous waste by the mixture rule. This means they must manifest it offsite to an authorized hazardous waste treatment or disposal facility.

! Tanks without Secondary Containment - Same non-detect level for the tanks with secondary containment. However, there is a higher probability that there have been releases to surrounding soil areas since no secondary containment was ever provided. If this is the case, the facility can propose to achieve "clean closure" levels for

the surrounding soils but they must state in their closure plan that if they cannot achieve these levels then they will submit a post closure care permit application. It is important that this commitment is made by this type of facility at this point of submitting a closure plan.

Cautionary Note: Title 22, Section 66264.197 requires that a facility (without adequate secondary containment) prepare a contingent closure and post-closure plan which meets the closure, post-closure and financial assurance requirements of landfills. If the cost for closure and post-closure as a landfill are greater than the cost to clean close the facility, then the cost estimate for financial assurance must be the greater of the two.

Without detailed site characterization data the contingent closure plan and cost estimates will be based on engineering judgement and the permit writer should seek the advice of his/her supervisor. In situations such as these the facility has the option to demonstrate to the Department that there has not been releases and therefore no contingent closure and post-closure financial assurance is required.

5. Cleanup Levels for Underground Tanks

This area is currently under evaluation by the Department and specific guidance will be provided at a future date.

6. Cleanup Levels for Treatment Equipment other than Tanks

It is recognized that for small pieces of equipment (e.g., pumps and filters that have been in contact with hazardous wastes, it is very difficult to gain access to interior surfaces. The use of wipe samples to confirm that decontamination was successful is inappropriate. This workgroup suggests the analysis of the rinsewaters or other rinse solvents to non-detect levels is acceptable proof that this small equipment has been decontaminated. Note: This method does not apply to tanks since there is access to interior surfaces to take wipe samples.

Actions Required by Permit Writer

If the facility proposes an alternative cleanup level which must include a health based risk assessment, then the permit writer does not review this assessment but rather submits it to a Department toxicologist for technical review by submitting a formal work order request form. It is the permit writer's responsibility to verify that the assessment was based on accurate results of sampling for the hazardous constituents of concern. See Appendix B for protocols that should be given to the facility on how to prepare the risk assessment (Revised Screening Procedure for the Preliminary Endangerment Assessment).

If it is determined that the alternative cleanup level is an acceptable risk, then the only mitigation measure required would be a deed restriction limiting the use of the property to a land use consistent with the health based risk assessment. If the alternative cleanup level requires more than a deed restriction to be protective of human health and the environment (e.g., cap, soil/groundwater/air monitoring, maintenance) then a post-closure permit would be required. As previously stated, this scenario is outside the scope of these instructions and the permit writer should consult his/her supervisor.

Key Questions

! None if the proposed cleanup level is non-detect. The permit writer accepts these as their target level.

! If an alternative cleanup level is proposed, the permit writer must submit the health-based risk assessment to a Department toxicologist for review and approval. The permit writer should review the document to make sure the basis of the risk assessment is consistent with other information in the closure plan (e.g., the risk assessment included all the hazardous constituents of concern; there are no unusual disclaimers or inaccurate assumptions).

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List of Examples:

List of Attachments:

List of References:

List of Appendices:

Appendix B - two-dimensional, random sampling technique

Appendix B - protocols that should be given to the facility on how to prepare the risk assessment (Revised Screening Procedure for the Preliminary Endangerment Assessment).