

Appendix 1  
Five Year Reviews – Superfund Branch  
Kentucky Department for Environmental Protection  
Division of Waste Management

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I. Introduction

Purpose

This Appendix is provided to assist in the preparation of five year review reports for sites where regulated substances have been released into the environment and remedial efforts taken in response did not achieve complete removal of those substances. Instead, a contain-and-manage approach was adopted pursuant to Kentucky Revised Statutes (KRS) 224.01-400(18)(b), (20), and (21). The objective of the five (5) year review is to evaluate the effectiveness of selected remedies in achieving stated goals, and whether those remedies are, and will continue to be, protective of human health and the environment; or, if these goals are not being met, what additional actions may be warranted. Definitions of “release”, “site”, and “environment” are included in Kentucky Revised Statutes (KRS) 224.01-400(1). “Regulated substances” or “constituents”, for purposes of this guidance, refer to hazardous substances, pollutants, and contaminants (HSPCs) which are also defined in the same statute.

Statutory Authority

A remedy at a given site consists of an action or series of actions taken by a responsible party in response to a release or threatened release, and is intended to correct the effects of that release on the environment, pursuant to KRS 224.01-400(18). Pursuant to section (17), the Kentucky Natural Resources and Environmental Protection Cabinet (the “Cabinet”) is charged with the responsibility to review environmental conditions every five (5) years in cases where corrective actions do not achieve complete restoration or remediation of the environment. Such cases usually involve application of engineering and/or institutional controls as part of a risk management plan pursuant to sections (18)(b), (20), and (21). Engineering controls include containment, treatment, monitored natural attenuation, and a number of other methods; institutional controls typically include the execution of restrictive covenants placed on the property to control exposure to HSPCs remaining on the affected properties.

## II. Review Requirements

### Schedule

A completed five year review is due after a period of five years has elapsed from the date of issuance of a letter from the cabinet approving a risk management plan pursuant to KRS 224.01-400(18)(b), or the implementation of a final remedy that will adequately satisfy that statute. Subsequent five year reviews are due at five year intervals from the same date.

### Assessment of Protectiveness of Remedy

Data necessary for completion of a successful five year review is case-specific and generally dependent upon a number of factors unique to a given site. Reference to previously submitted information as appropriate is allowable, as the purpose of the five year review is to provide updated information relevant to the effectiveness of the risk management strategy, and not needless duplication of previously submitted material. Although the content of five year review submittals will vary widely from case to case, each should address the same essential issues, as follows:

1. Is the remedy functioning as intended by the risk management plan, or as designed? Are additional actions warranted by the results of the evaluation?
2. Are the exposure assumptions, toxicity data, risk-based screening levels, and remedial action objectives used at the time of the remedy still valid?
3. Are restrictive covenants on the deed still in effect, controlling exposure as intended, and on file in the county clerk's office?
4. Has any other information become known that could compromise or call into question the protectiveness of the remedy?

For issue 1, a wide range of issues may require review to provide a satisfactory determination, depending upon such factors as the nature of the site, the material released, the type of remedy implemented and associated maintenance issues, constituents involved, media impacted, results of routine monitoring, and others. This evaluation is highly site specific, as one management remedy may consist of a simple cap over a small area of concern while another may consist of complexly engineered systems involving more extensive areas, multiple constituents, and two or more media. Potential items of interest include the following:

- *Performance of active remedial measures.* For example, are water withdrawals in a pump-and-treat system functioning as designed in the capture and control of the groundwater contaminant plume under management? Are improvements, replacement, or discontinuation of any remedial methods appropriate?
- *Trend Analysis.* Do the data indicate recognizable trends in contaminant reduction/attenuation since remedy implementation or the last five year review? If so, are these trends positive or negative?

- *Monitoring.* Do monitoring results indicate that a plume has or has not spread beyond expected or modeled limits? Are constituent levels decreasing as expected? Are groundwater flow gradients and directions consistent with past findings?
- *System Operation/Potential Problems.* Are engineered methods operating as designed, and are maintenance procedures adequate in maintaining their effectiveness? Are there indications of problems that may compromise the integrity of a design method at some point in the future?

For issue 2, questions should be addressed regarding possible changes in exposure pathways and potential receptors, newly identified (or fewer) constituents of concern (COCs) or contaminant sources, changes in available toxicity data, risk screening levels or Preliminary Remediation Goals (PRGs) for COCs, changes in applicable drinking water MCLs, land use changes (e.g., from commercial/industrial to residential), and others.

For issue 3, questions to be addressed relate to institutional controls; for example, are restrictions on land use being followed and is the restrictive covenant still attached to the deed? Are fencing or other devices effective and in good working order?

Issue 4 would involve any other observations or developments that would have a bearing on the protectiveness of the site remedy.

### III. Report and Recommendations

#### Five Year Review Report

The five year review report will include an evaluation of the issues identified in Part II above, including any site data gathered after approval of the risk management plan relevant to control and/or reduction of environmental/human health risks existing at the site. This would include, but not be limited to, the following:

- Analysis and summary of trends in analytical data during previous five years and for the life of the remedy;
- An evaluation (**including recent photos**) of the integrity and condition of any engineering controls implemented as part of the risk management plan, and recommendations for improvements, maintenance, replacement, or discontinuation of such controls; An overall evaluation of the effectiveness of all components of the site remedy and whether the remedy provides adequate protection of human health and the environment, effectively controls potential exposure pathways, and reduces exposure risks with respect to potential receptors. Recommendations for any improvements or modifications deemed appropriate or necessary will also be included.

- Certification that restrictive covenants on the deed are being followed and the restrictive covenant remains on file in the county clerk's office. **Include copy of restrictive covenant/deed restriction.**

In addition, other data for submittal may include recent photos documenting current site conditions and integrity of caps and other engineering controls, historical information, current land use, the physical and geologic/hydrogeologic setting, document reviews, and any other information considered relevant to implementation of the management plan.

Review by Cabinet (Notice of Deficiencies)

Following submittal of the five (5) year review report, the Cabinet will perform a review of the document and issue a letter identifying any deficiencies noted. Timetables for additional submittals or other information, if necessary, will be specified in each letter on a case-by-case basis.

## Appendix 2

### Checklist For Five Year Reviews

#### Soils

- 1. Are soils on the site under management, and contain regulated substances above *de minimus* concentrations? If yes, go to 2. If no, go to 6.
- 2. If the remedy includes capping, are caps/covers, etc. in good condition?
- 3. If buildings or other structures are covering areas of contamination, are they still intact and providing an adequate cover?
- 4. Are other engineering controls designed to contain and manage soil contamination intact, in good condition, and performing as designed?
- 5. If applicable, have levels of COC's in soils remained consistent or decreased since last review?

#### Groundwater

- 6. Is groundwater at the site under management, and contain regulated substances above *de minimus* concentrations? If yes, go to 7. If no, go to 10.
- 7. Does analysis of monitoring data show significant changes in COC levels since last review?
- 8. Does analysis of monitoring data indicate migration of the contaminant plume beyond limits designed in the final remedy or risk management plan since last review?
- 9. Have groundwater flow directions/hydraulic gradients significantly changed since last review?

#### Engineering Controls

- 10. Are engineering controls in use as part of the contain-and-manage remedy at the site? If yes, go to 11. If no, go to 16.
- 11. If pump-and-treat methods are in use, have water withdrawal rates significantly changed since last review?
- 12. If groundwater extraction is occurring, have any other stresses on the aquifer in the area been introduced that might influence the capture zone, such as installation of additional wells at a nearby location?
- 13. Are engineering systems performing adequately and as designed in the remedy?
- 14. Are there indications of problems or potential problems in the design and capacity of engineered systems that may compromise the effectiveness of the remedy?
- 15. Are maintenance procedures for engineered systems adequate in maintaining system performance?

#### Institutional Controls

- 16. Have a restrictive covenant or other institutional controls been executed for the property(ies) under management? If yes, **please include a copy**, and go to 17. If no, go to 20.
- 17. Is the restrictive covenant still attached to the deed recorded in the county clerk's office?
- 18. Is the current land use consistent with the restrictions placed on the deed? If no, explain the inconsistency.
- 19. If applicable, are other controls in place, including site security measures, fencing, signage, etc.?

#### Risk Assumptions

- 20. Has the land use changed since management plan implementation or since last review?
- 21. Have toxicity values for COCs changed since management plan implementation or since last review?
- 22. Exposure pathways/potential receptors changed since management plan implementation or since last review?

Appendix 3  
Certification Statement – Five Year Review

The party responsible for the five year review, or an authorized agent, must sign the following certification. Examples of authorized agents include the owner, president, plant manager/engineer, city engineer, or other appropriate person authorized to certify the accuracy of documents submitted.

**“I certify under penalty of law that the information contained in this document, including attachments and supporting data, is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information.”**

\_\_\_\_\_  
Applicant or legally authorized representative (print)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**“I certify under penalty of law that the information contained in this document, including attachments and supporting data, is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information.”**

\_\_\_\_\_  
Property Owner (if different from Applicant) (print)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date