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Commissioner

July 16, 2004

Dear Interested Parties:

DEP is pleased to issue the "Conducting Feasibility Evaluations under the MCP" Policy. This policy is now available for use by those parties conducting feasibility evaluations pursuant to the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000.

The purpose of this policy is to provide guidance for performing feasibility evaluations as part of response actions conducted at disposal sites. It presents approaches and feasibility metrics that parties may elect to use to satisfy statutory and regulatory requirements. While optional, use of such approaches and metrics will assure "Presumptive Certainty" of agency acceptance. The policy identifies six types of feasibility evaluations required in the MCP site assessment and remediation process. These include:

- Achieving or Approaching Background
- Critical Exposure Pathways
- Selection of Remedial Alternatives
- Technologies that Reuse, Recycle, Destroy, Detoxify, or Treat Oil and/or Hazardous Materials
- Permanent versus Temporary Solutions, and
- Reducing Oil and/or Hazardous Materials Levels Below Upper Concentration Limits.

The policy issued today provides guidance on one type of feasibility evaluation, Achieving or Approaching Background. The remaining elements of the policy are under development. These will be incorporated into this document in future updates.

The requirement to evaluate the feasibility of achieving or approaching background applies to all disposal sites where remedial actions are necessary to achieve a condition of No Significant Risk (NSR). This policy addresses the increment of cleanup beyond NSR levels toward background levels by:

- establishing when in the MCP process it is appropriate to perform the feasibility evaluation,
- establishing approaches to evaluate the feasibility of achieving or approaching background where the benefits of further risk reduction may justify the additional costs, due to the persistent nature of the contaminants and the high potential for exposure;
- identifying those conditions where DEP assumes that the potential costs of going beyond NSR to achieve or approach background are unlikely to justify the benefits (conditions of categorical infeasibility),
- identifying those conditions where DEP believes the potential costs of going beyond NSR to achieve or approach background are likely to justify the benefits (conditions of categorical feasibility), and
- providing guidance on documenting the feasibility evaluation in a response action submittal.

The guidance is intended to be useful and applicable to the majority of response actions, although there will be sites for which alternative approaches to evaluate the feasibility of achieving or approaching background are appropriate. Such alternative approaches will not have the benefit of the Presumptive Certainty of DEP approval afforded by this policy, but will be evaluated based on the applicable statutory and regulatory requirements.

DEP would like to thank the many stakeholders who contributed to the development of this policy, including those who provided comments on the recent Public Comment Draft. This input greatly assisted DEP in developing a policy that provides sufficient direction and detail where appropriate while maintaining flexibility and allowing for the application of professional judgment. A summary of the comments received and how they were incorporated into the policy is attached.

Sincerely,

Richard J. Chalpin
Acting Assistant Commissioner
Bureau of Waste Site Cleanup

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Final

CONDUCTING FEASIBILITY EVALUATIONS UNDER THE MCP

Policy #WSC-04-160

This policy provides guidance on conducting feasibility evaluations under the Massachusetts Contingency Plan (MCP). **Elements of this policy are still under development, and will be incorporated into this document in one or more future updates.**

The information contained in this document is intended solely as guidance. This document does not create any substantive or procedural rights, and is not enforceable by any party in any administrative proceeding with the Commonwealth. Parties using this guidance should be aware that there may be other acceptable alternatives for achieving and documenting compliance with the applicable regulatory requirements and performance standards of the MCP.

July 16, 2004
Date

Richard J. Chalpin
Acting Assistant Commissioner
Bureau of Waste Site Cleanup

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1.0 Introduction

In Massachusetts, the assessment and remediation of sites contaminated by releases of oil and/or hazardous materials are governed by Massachusetts General Law c. 21E and 310 CMR 40.0000, the Massachusetts Contingency Plan (MCP). While specifying a "risk based" approach, both c. 21E and the MCP recognize inherent uncertainties in the risk characterization process, and in our present-day understanding of the threats posed by environmental contaminants – particularly to sensitive human and ecological populations. For that reason, a series of regulatory provisions have been articulated to reduce, isolate, and/or detoxify site contaminants, beyond a condition of No Significant Risk (NSR), to the extent "feasible." It is important to note the statutory importance placed on the feasibility component of remedial decisions: not only are such considerations required, the presumption in c. 21E is that achievement of such goals must occur, absent a showing of "infeasibility".

While MADEP and others have published extensive specifications and guidelines on evaluating and establishing levels of No Significant Risk at disposal sites, little has been developed and disseminated on evaluating and establishing the feasibility of measures to reduce contaminant levels or exposure. This has been due largely to the judgmental nature of weighing the benefits and costs of contaminant reduction/detoxification, the most problematic element of feasibility evaluations conducted pursuant to the MCP.

1.1 Purpose

The purpose of this policy is twofold:

- To provide general guidance and parameters for conducting feasibility evaluations at all disposal sites, in accordance with 310 CMR 40.0191(2); and

- To provide elective approaches and feasibility metrics that parties may choose to use to satisfy statutory and regulatory requirements. While optional, use of such approaches and metrics will assure "Presumptive Certainty" of agency acceptance.

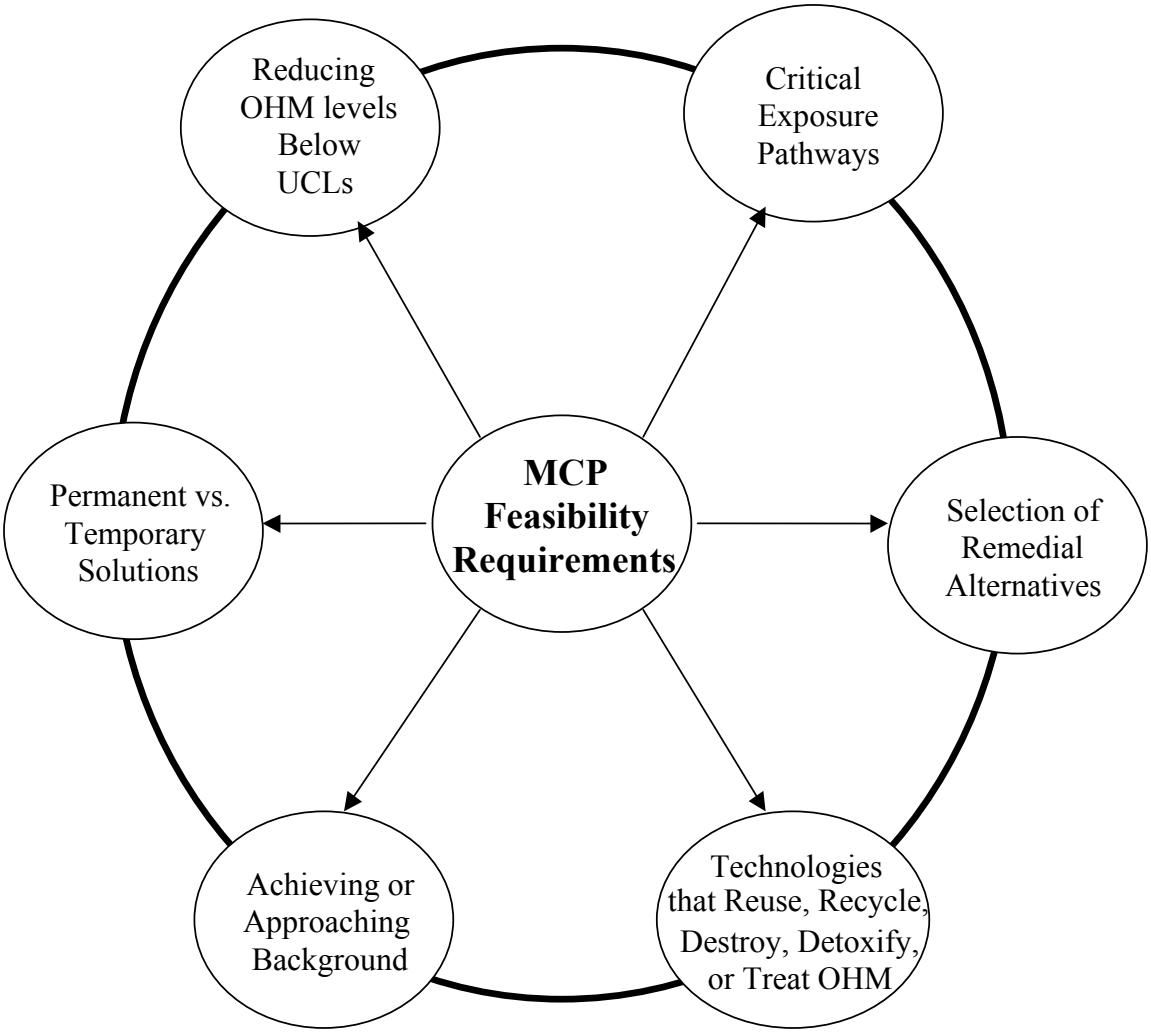
1.2 Definition of Feasibility

Considerable confusion has historically existed over the meaning of "feasibility" under c. 21 E and the MCP. *In the context of the law and regulations, "feasible" is not synonymous with "possible." Feasibility is also not solely a function of cost*. While feasibility has a number of regulatory components, as discussed in later sections of this policy, most decisions come down to one key determinant: do the benefits of achieving a remedial endpoint outweigh the costs? Accordingly, this benefit-vs.-cost element is the focus of this document.

1.3 Feasibility Evaluations Required by the MCP

Feasibility evaluations are required at 6 specific points in the MCP site assessment and remediation process, as illustrated in Figure 1-1.

Figure 1-1
Feasibility Evaluations Required by MCP



The regulatory basis for each of these required evaluations is listed below:

- 40.0414(3) - Eliminating, mitigating, or preventing a Critical Exposure Pathway;
- 40.0860 - Implementing a permanent solution or a temporary solution;
- 40.0860 - Selecting a remedial alternative;
- 40.0860 – Reducing/detoxifying concentrations of oil and hazardous materials present at a site above Upper Concentration Limits;
- 40.0191(3) - Selecting reduction/detoxification or capping technologies; and
- 40.1020 - Reducing concentrations of oil and hazardous materials to achieve or approach background levels.

General guidance and Presumptive Certainty criteria for each of the above remedial considerations are provided in this policy.

1.4 Presumptive Certainty

Because of the performance-based nature of the MCP and the judgmental nature of decision points in the site assessment and cleanup process, MADEP has developed a number of generic options to provide "shortcuts" and regulatory certainty to parties conducting response actions at contaminated sites, referred to as the "Presumptive Certainty" concept. Such a concept is implicitly evident in the generic *Method 1* soil and groundwater cleanup standards listed in 40.0900, and explicitly detailed in certain agency policies, such as the *Compendium of Analytical Methods* established by DEP as part of its analytical data quality enhancement initiative.

This policy contains specific approaches, procedures, and metrics to evaluate and establish feasibility under the MCP. **The use of these specific approaches, procedures, and metrics are optional**. Parties electing to utilize these protocols will be assured of their acceptance by MADEP staff.

In order to achieve Presumptive Certainty for the applicable feasibility evaluations, parties must:

- Adopt and fully document in the appropriate MCP response action submittal the methodologies prescribed in this policy for the specific feasibility evaluation(s) of interest;

- Conform to the indicated inclusionary or exclusionary parameters for the specific feasibility evaluation(s) of interest; and

- Apply the qualitative and/or quantitative feasibility metrics articulated for the specific evaluation(s) of interest *for each contaminant and medium*.

Parties who elect to not use the Presumptive Certainty options in this policy have an obligation to demonstrate and document compliance with all required feasibility evaluations requirements specified in MGL c. 21E and the MCP.

1.5 Documentation Requirements

Regardless of what approach is used to evaluate feasibility, appropriate documentation of such efforts must be provided in the relevant Response Action submittal(s). In cases where the Presumptive Certainty option is chosen, such documentation may be limited to a reference to this policy, along with a concise and clear discussion/justification on how site conditions conform to its Presumptive Certainty requirements.

2.0 Statutory and Regulatory Basis of this Policy

Feasibility directives and criterion are specifically articulated in MGL c. 21E §3A, with respect to achieving a permanent solution and achieving or approaching a background condition:

> "Permanent solutions….shall be required if the department finds that a level of no significant risk does not yet exist, that permanent solutions are *feasible*, and that immediate implementation of such solutions would be more cost-effective than phased implementation of temporary and permanent solutions" [MGL c. 21E §3A(f)]
>
> "Where *feasible*, a permanent solution shall include a measure or measures designed to reduce to the extent possible the level of oil or hazardous materials in the environment to the level that would exist in the absence of the site of concern." [MGL c. 21E §3A(g)]

Criteria on making determinations on feasibility are subsequently provided in MGL c. 21E §3A(h). This subsection establishes a presumption that response actions required pursuant to subsections (f) and (g), referenced above, shall be deemed feasible, UNLESS a showing is made that:

a. no technology exists to achieve the remedial goal; or
b. the costs of conducting, or risks resulting from, the remedial action would not be justified by the benefits, considering such factors as potential damage to the environment or health, costs of environmental restoration, long-term operations and maintenance costs, and nonpecuniary values; or
c. individuals with the necessary expertise to conduct the necessary remedial actions would not be available; or
d. the only available alternative for achieving the remedial goal would necessitate land disposal other than at the site itself and no off-site facility is available that is in full compliance with applicable regulations.

The MCP has applied these statutory directives to 6 specific Response Action decision points, as listed in Section 1.3 of this policy, and has defined the term "background" to refer to the level of oil or hazardous materials that would exist in the absence of the disposal site of concern. The determinative criteria specified in MGL c. 21E §3A(h) were the basis for the feasibility evaluation requirements established in the MCP at 310 CMR 40.0860.

It is important to note that the use of "or" as the conjunction in §3A(h) and 40.0860 means that a negative finding for any one of the listed conditions is sufficient to conclude that a remedial response is infeasible (e.g., if one demonstrates that no technology exists to achieve or approach a background condition, there is no need to also evaluate whether the benefits of achieving or approaching background exceed the costs).

This policy focuses primarily on the benefit-cost aspect of feasibility (criterion b.). The application of this criterion to feasibility evaluations raises the most issues for parties performing cleanups and for DEP and is subject to a range of interpretation. Conducting an evaluation based on criteria a., c., or d., each of which relates to an aspect of technological availability, is more straightforward and primarily a matter of sufficiently documenting whether the technology, expertise, or disposal facility exists.

3.0 Benefit-Cost Evaluations

Benefit-Cost analysis is outlined in the MCP at 310 CMR 40.0860(7). While closely paralleling the statutory language of MGL c. 21E §3A(h), some additional qualitative and quantitative detail is provided; specifically, remedial action alternatives to achieve stated goals shall be considered feasible UNLESS:

(a) the incremental cost of conducting the remedial action alternative is substantial and disproportionate to the incremental benefit of risk reduction, environmental restoration, and monetary and non-pecuniary values;
(b) the risk of harm to health, safety, public welfare, or the environment posed by the implementation of the alternative cannot be adequately controlled; or
(c) the alternative would destroy more than 5,000 square feet of wetlands or wildlife habitat, or would otherwise result in substantial deleterious impact to the environment and:
    1. other feasible Temporary or Permanent Solutions exist;
    2. the oil and/or hazardous materials, if any, that have come to be located in such resources do not bio-accumulate and are not likely to migrate; and
    3. the damage to such resources resulting from the implementation of the alternative would be permanent and irreparable.

The estimation of monetary *costs* of remedial actions to achieve (or approach) a specific goal is routinely conducted for actions at 21E sites. Placing a monetary and nonpecuniary value on the *benefits* resulting from such efforts, however, is a more difficult task and one that involves judgments about who is benefiting and by how much.

The benefits of permanently reducing/detoxifying contaminants and mitigating Critical Exposure Pathways include further reducing risk to public health and the environment. It is important to understand that the "No Significant Risk" standard used in the MCP is not the same as "no risk". Sites and pathways that are determined to be clean enough (i.e., pose NSR) may still pose some risk to human health and the environment. That residual risk is believed to be acceptable (not significant), to the extent there is sufficient confidence in the assessment of site contaminants, exposure potentials, contaminant toxicities, and/or longevity of containment measures.

While MCP health assessments and metrics are designed to be protective, and based on the best available science, risk information is subject to refinement as better studies are performed and better data become available. Scientific uncertainty continues to exist concerning the potential health effects following low-level exposures for many chemicals. This is particularly true for potential adverse developmental or neurological effects from short-term exposures of sensitive populations (fetuses or young children). Acknowledging this uncertainty, there is a benefit to further reduction of contaminant and exposure levels in order to achieve a cleanup that is more fully protective of human health and the environment.

Permanently reducing/detoxifying contaminants to the extent feasible also reduces the potential for cumulative impacts from multiple disposal sites upon the environment (e.g., contamination resulting from groundwater migration from several sites to a downgradient drinking water supply or surface water). Finally, people living on or near a disposal site may value for a variety of reasons (including non-pecuniary values or reasons that are not measured in monetary terms) knowing the environment is restored, to the extent feasible, to conditions that existed prior to any release of oil or hazardous material.

While there are economic methods available for assessing how much environmental restoration is valued (e.g., contingent valuation or contingent choice methods), this policy does not provide guidance on the use of such methods. The site-specific feasibility evaluation provided by this policy is based instead on qualitative and semi-quantitative measures of benefits, e.g., identifying situations for which additional remediation to reduce/detoxify contaminants and/or exposure pathways would be most likely to result in the greatest risk reduction or would be most readily achievable and cost-effective.

4.0 Critical Exposure Pathways

Reserved

5.0 Permanent vs. Temporary Solutions

Reserved

6.0 Selection of Remedial Action Alternatives

Reserved

7.0 Reducing/Detoxifying OHM Present at a Site Above UCLs

Reserved

8.0 Destruction/Detoxification vs. Capping

Reserved

9.0 Achieving or Approaching Background

9.1. Applicability

The MCP requirement to evaluate the feasibility of achieving or approaching background applies to all disposal sites where remedial actions, including those remedial actions conducted pursuant to 310 CMR 40.0370, are necessary to meet the applicable No Significant Risk (NSR) standards in 310 CMR 40.0900. Specifically, 310 CMR 40.1020 requires that a background feasibility evaluation be performed at all sites where a remedial action is taken to achieve a Class A Response Action Outcome, regardless of when in the MCP process the response actions are taken (e.g., Immediate Response Action (IRA), Release Abatement Measure (RAM), or Phase IV Comprehensive Remedial Action).

As specified in 310 CMR 40.1056(2)(e), the requirement to submit a background feasibility evaluation with a Class A Response Action Outcome applies only for disposal sites where background levels are not achieved (i.e., Class A-2, Class A-3, or Class A-4 Response Action Outcomes). For Class A-1 outcomes, documentation of the feasibility evaluation is not required. Instead, documentation supporting the conclusion that the site has been restored to background must be submitted with Class A-1 Response Action Outcomes.

9.2 Timing of Background Feasibility Evaluations

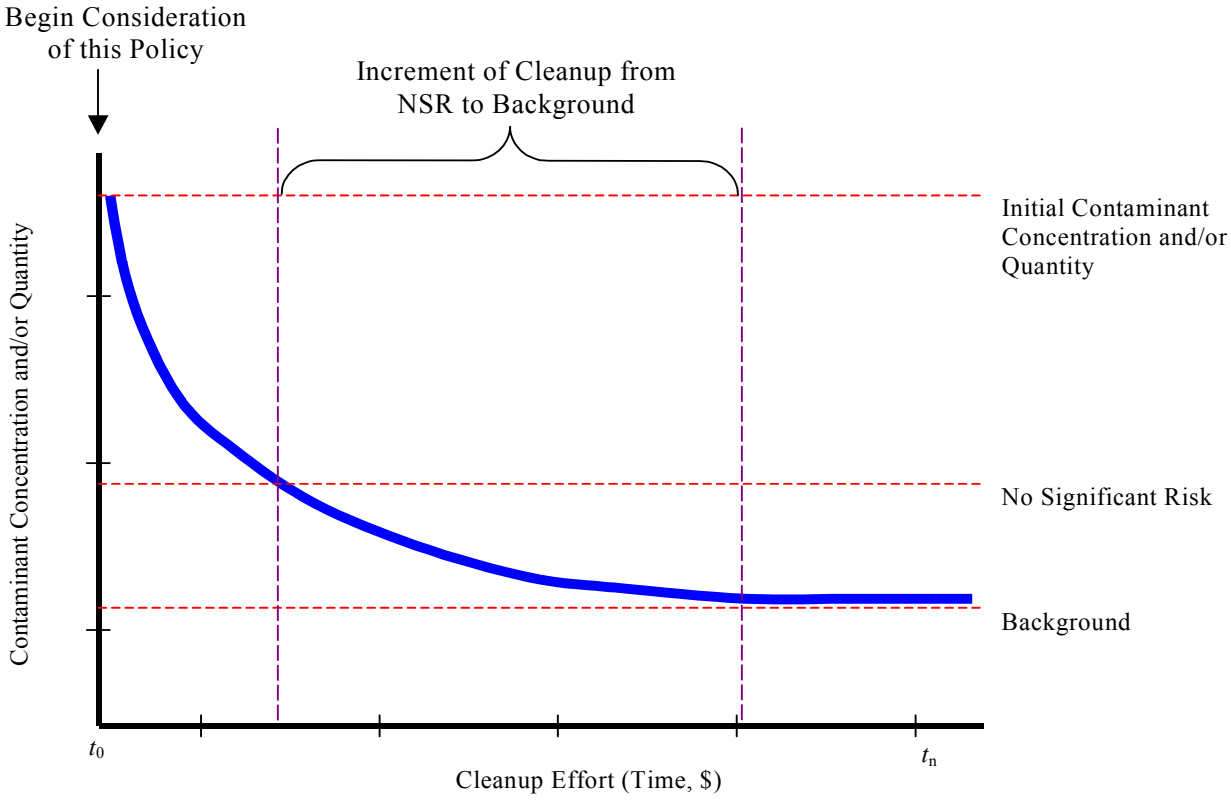
M.G.L. c.21E provides no precise timeline for when a background feasibility evaluation must be conducted. The MCP at 310 CMR 40.0852 states that the feasibility of achieving or approaching background for permanent solutions must be evaluated during Phase III in accordance with 310 CMR 40.0860 where Comprehensive Remedial Actions are or have been taken to achieve a Class A Response Action Outcome and background levels have not been achieved. In addition, 310 CMR 40.1020 requires that a background feasibility evaluation be conducted consistent with the criteria in 310 CMR 40.0860 for all sites where a remedial action is taken to achieve a Class A Response Action Outcome, regardless of when in the MCP process the remedial actions are taken.

The intent of the statutory and regulatory requirements is that parties performing response actions to obtain a Permanent Solution incorporate achieving or approaching background as a remedial objective from the outset of and throughout the MCP process. In practice, the likelihood of achieving or approaching background increases when it is included as a remedial objective at the start of response actions. That is, expanding or adapting remedial activities undertaken to meet NSR to achieve or approach background is likely to be more cost-effective than remobilizing at a later date to remediate contamination to levels below NSR.

This policy addresses the increment of cleanup beyond NSR levels toward background levels (see Figure 9-1). For sites where it is determined that the oil and/or hazardous materials have been reduced to background, it is not necessary to perform a feasibility evaluation. 310 CMR 40.0902(3) states that "if the concentration of oil and/or hazardous material at the disposal site is at or below

background levels, then the oil or hazardous material shall be considered to pose No Significant Risk." This applies as well to sites where background is above the Method 1 standards specified in 310 CMR 40.0900 (i.e., chemical levels from natural conditions or contributions from atmospheric deposition, etc. in the absence of the disposal site exceed the MCP standards for No Significant Risk).

Figure 9-1: Implementation of Background Feasibility Policy



The curve on Figure 9-1 illustrates the reduction of oil and hazardous material concentrations and/or quantities from the initial conditions present at the time that DEP received notification of the release until levels that would approach background conditions are achieved. In some cases it is not feasible to *achieve* background (e.g., costs disproportionately outweigh the benefits), but it is feasible to conduct remedial activities to approach background.

The ability to achieve or approach background depends on the type and concentration and/or quantities of contamination present at the site, the volume of affected media, and the associated cost of treatment to reduce the concentration from NSR to or near background levels. A benefit-cost evaluation looks at whether it would be feasible to reduce the concentration and quantity of contamination below NSR. Benefit-cost criteria are further discussed in Section 9.3

9.3 Presumptive Certainty of Achieving or Approaching Background

The balance of this section provides approaches and criteria that DEP finds acceptable for evaluating the feasibility of achieving or approaching background and/or supporting a conclusion that achieving or approaching background is infeasible. While other approaches and metrics may also exist to conform to regulatory requirements, parties who elect to use the approaches and criteria articulated in this policy will be assured of Presumptive Certainty of agency acceptance.

In addition to logistical constraints, the recommendations and criteria articulated below are premised on the assumption that the maximum benefit from remedial actions to achieve or approach background would be in addressing contaminants that are likely to be persistent in the environment and located in areas where exposure to human and ecological receptors are more likely (i.e., S-1 soils and/or GW-1, GW-2, and GW-3 groundwater categories, as defined in 310 CMR 40.0900). Conversely, the benefits of additional remedial actions to achieve or approach background in cases where contaminants are likely to degrade in a reasonable timeframe are considered insufficient to justify the costs of those actions (i.e., "categorically infeasible").

Figure 9-2 summarizes the process for evaluating the feasibility of achieving or approaching background in soil and groundwater.

9.3.1 Conditions of Categorical Feasibility

For a limited number of pollutants, it is DEP's position that remedial actions to achieve or approach background are almost always feasible, i.e., the cost of conducting a remedial action would be modest and exceeded by the benefit or risk reduction.

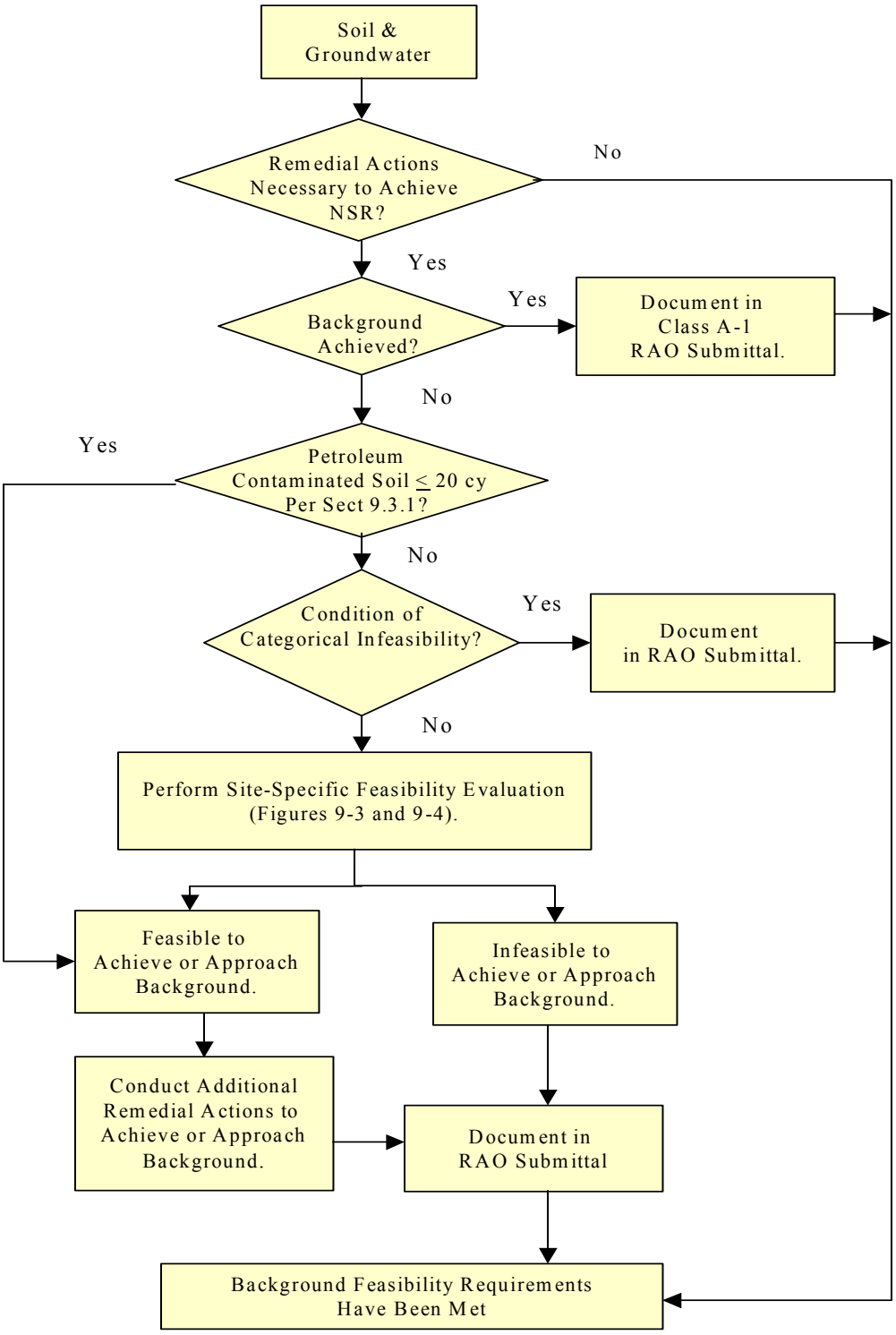
It is DEP's position that it is categorically feasible to remove small quantities of petroleum-contaminated soil. Specifically, for the purposes of achieving Presumptive Certainty pursuant to this policy, it is DEP's position that it is feasible to achieve background at a site where a condition of NSR has been reached, the remaining contamination is limited to 20 cubic yards or less of soil contaminated solely by petroleum products, and where such soil:

- is located less than three feet below the ground surface;
- is not covered by pavement or a permanent structure;
- is not located within a sensitive environment (e.g., wetlands); and
- is not located in an area where removal activities will substantially interrupt public service or threaten public safety (See Section 9.3.2.2).

9.3.2 Conditions of Categorical Infeasibility

For certain types of pollutants in certain types of environmental settings, remedial actions to achieve or approach background may be considered to be categorically infeasible, i.e.,

Figure 9-2
Process For Evaluating Feasibility to Achieve or Approach Background
Presumptive Certainty Option



the incremental cost of conducting a remedial action would be substantial and almost always disproportionate to the incremental benefit or risk reduction. In these cases, documentation that disposal site conditions are consistent with the criteria provided in any one of the subsections of 9.3.2 below would be sufficient to support a conclusion that achieving or approaching background is not feasible. Accordingly, it would be unnecessary to conduct a site-specific feasibility evaluation, as outlined in Section 9.3.3, *for those specific contaminants and environmental settings*, though it would be still necessary to conduct a site-specific evaluation for all other contaminants and scenarios. In all cases, it is necessary to provide a feasibility discussion in the appropriate response action submittal(s), even if such a discussion is limited to a demonstration that site conditions are consistent with the categorical infeasibility criteria of this policy.

9.3.2.1 Excavations Under Permanent Structures

Any portion of remedial work required to achieve or approach background that requires excavation under the foundation of a building or other permanent structure such that the integrity of the structure would be impaired may be considered infeasible. When appropriate, an assertion that additional remedial actions to achieve or approach background would threaten the integrity of a permanent structure should include an evaluation by a Massachusetts Registered Professional Engineer.

This criteria does not apply to any building or permanent structure for which demolition or any reconstruction is planned that would allow access to the contamination. Pavement and fencing are not considered permanent structures.

Regardless of whether a permanent structure exists, if in-situ technologies were implemented to achieve NSR, then in-situ technologies must still be evaluated for the purpose of achieving or approaching background concentrations in the soil beneath the permanent structure.

9.3.2.2 Remedial Actions That Will Substantially Interrupt Public Service or Threaten Public Safety

Any portion of remedial work required to achieve or approach background that will substantially interrupt public service or threaten public safety may be considered infeasible. For the purposes of obtaining Presumptive Certainty, examples of what could constitute a substantial interruption or threat to public safety are limited to: interruption of utilities to a large number of customers for any period of time; interruption of energy utilities to an individual customer where the interruption would create an unacceptable hazard or risk (such as the interruption of medical treatment, or heat during the winter months); any utility interruption that compromises critical services (e.g., police, fire, hospitals, and other medical facilities); interruption of rail traffic; interruption on public roadways that would

create unreasonable traffic delays or congestion; or excavation activities that would pose a likely safety risk (e.g., open excavation) for which arrangements to secure the site and prevent risk are not reasonably possible.

9.3.2.3 Remediation of Degradable (Nonpersistent) Contaminants

It is DEP's position that achieving or approaching background can be deemed infeasible for degradable/nonpersistent contaminants regardless of media classification, except for small quantities of petroleum-contaminated soil considered accessible for remediation as described in Section 9.3.1. The benefits of additional remedial actions to achieve or approach background for degradable/nonpersistent contaminants would be considered insufficient to justify the costs of those actions. For example, for benzene, this policy supports a finding that it is infeasible to achieve or approach background since this compound would be expected to readily degrade in most environmental settings.

Table 9-1 provides a list of contaminants that are considered degradable (nonpersistent) in the environment. This list is consistent with those organic compounds considered to be nonpersistent in the environment as provided in Table 4 of 310 CMR 40.1514(4).

For the evaluation of contaminants not listed in Table 9-1, parties have two options: (a) consider and evaluate the contaminant as a persistent contaminant, as described in this policy, or (b) demonstrate compliance with the statutory and regulatory requirements of evaluating the feasibility of achieving or approaching background by means other than the application of this policy.

9.3.2.4 Remediation of Persistent Contaminants Located in S-2 and S-3 Soils

It is DEP's position that achieving or approaching background can be deemed infeasible for persistent contaminants in soil located in areas with lower exposure potential (i.e., S-2 and S-3 soil categories). For example, this policy supports a finding that it is infeasible to achieve or approach background for vinyl chloride (a persistent compound) in soil located in an area classified as S-2 or S-3.

Table 9-2 provides a list of contaminants that are considered persistent in the environment. This list is consistent with those organic compounds considered to be persistent in the environment as provided on Table 4 of 310 CMR 40.1514(4); it also includes metals, which are considered to be persistent in the environment.

TABLE 9-1

LIST OF DEGRADABLE (NONPERSISTENT) CONTAMINANTS

310 CMR 40.1514(4)

Acenaphthene Acetone Benzene Benzoic Acid Chlorobenzene Chloroethane 2-Chlorophenol 2,4-Dichlorophenoxyacetic Acid	Dimethyl Phthalate Ethylbenzene Hexachlorobenzene 2-Hexanone Isophorone Methylene Chloride Methyl Ethyl Ketone Methyl Naphthalene Naphthalene	Nitrobenzene Petroleum Compounds (except No. 6 oil) Phenol Tetrahydrofuran Toluene 2,4,6-Trichlorophenol Xylenes

TABLE 9-2

LIST OF PERSISTENT CONTAMINANTS

310 CMR 40.1514(4)

Arsenic Asbestos[1] Benzo(a)pyrene Benzo(g,h,i)perylene Beryllium Bromodichloromethane Bromoform Cadmium Carbon Tetrachloride Chloroform Chromium Copper Cyanide p-Dichlorobenzene(1,4) 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichlroethylene	cis-1,2-Dichloroethylene trans-1.2-Dichlrooethylene 2,6-Dinitrotoluene 1,4-Dioxane bis(2-Ehtylhexyl)phthalate Heptachlor Hexachlorobenzene Lead p-Dichlorobenzene(1,4) 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichlroethylene cis-1,2-Dichloroethylene trans-1.2-Dichlrooethylene 2,6-Dinitrotoluene 1,4-Dioxane bis(2-Ehtylhexyl)phthalate	Lead Mercury Methyl Tert-Butyl Ether No. 6 Fuel Oil Pentachlorophenol PCBs Selenium 1,1,2,2-Tetrachloroethane Tetrachloroethylene 1,2,4-Trichlrobenzene 1,1,1-Trichloroethane 1,1,2-Trichlrooethane Trichloroethylene Vinyl Chloride Zinc

[1] Due to the unique qualities of asbestos, the criteria outlined in this policy to evaluate the feasibility of achieving or approaching background is not applicable. See DEP's Asbestos in Soil Policy for more information.

9.3.3 Site-Specific Evaluation of the Feasibility to Achieve or Approach Background

For persistent contaminants that are located in areas with the highest exposure potential (i.e., S-1 soils and/or GW-1, GW-2, or GW-3 groundwater), a finding that it is "categorically infeasible" to achieve or approach background, as described in Section 9.3.2, cannot be supported. In such cases, a site-specific feasibility evaluation must be performed, as described in this section, or by means other than the application of this policy. The site-specific feasibility evaluation would be performed for soil (S-1 sites) and groundwater (GW-1, GW-2, or GW-3 sites) separately.

A feasibility evaluation includes both a technological element and a benefit-cost element. A finding of infeasibility based on either evaluation is sufficient to conclude that achieving or approaching background is infeasible. Documentation that disposal site conditions are consistent with those identified as conditions of categorical infeasibility (Section 9.3.2) are sufficient to support a conclusion that achieving or approaching background is not feasible. In such cases, it is unnecessary to evaluate feasibility as outlined in this section.

For sites containing both persistent and nonpersistent contaminants, the nonpersistent contaminants can be eliminated from the feasibility evaluation described in this section.

For sites at which there are multiple (co-located) contaminants, if it is determined to be infeasible to achieve or approach background for any ***one*** of the co-located contaminants, then it is unnecessary to evaluate the feasibility of achieving or approaching background for the remaining co-located contaminants.

9.3.3.1 Definition of "Background"

M.G.L. c.21E describes background as those conditions that would exist in the absence of the disposal site of concern. The MCP provides a formal definition of this term in 40.0006, which recognizes the fact that historic human activities in some locations have resulted in the widespread presence of some chemicals in the environment (310 CMR 40.0006):

Background means those levels of oil and hazardous material that would exist in the absence of the disposal site of concern, which are:

> *(a) ubiquitous and consistently present in the environment at and in the vicinity of the disposal site of concern; and attributable to geologic or ecologic conditions or atmospheric deposition of industrial process or engine emissions,*
> *(b) attributable to coal or wood ash associated with fill materials;*
> *(c) releases to groundwater from a public water supply system; or*
> *(d) petroleum residues that are incidental to the normal operation of motor vehicles.*

Background, therefore, does not necessarily equal pristine conditions.

Guidance on establishing background levels at a site is provided in Section 2.3 of DEP's *Guidance for Disposal Site Risk Characterization*, July 1995. For sites where background is above the Method 1 standards specified in 310 CMR 40.0900 (i.e., chemical levels from natural conditions or contributions from atmospheric deposition, etc. in the absence of the disposal site exceed the MCP standards for No Significant Risk), the site-specific background concentration would be the cleanup standard for that compound and a background feasibility evaluation would not be necessary.

9.3.3.2 Definition of "Approaching Background"

M.G.L. c.21E and the MCP do not provide a definition of "approaching background" in either soil or groundwater. For parties who elect to use this policy, the following criteria shall be used for this purpose. These criteria would apply regardless of the risk characterization method used to achieve NSR. Several options are presented to provide flexibility in the evaluation.

Soil

Background in soil for persistent contaminants located in areas classified as S-1 shall be considered approached if:

- the concentration of each persistent contaminant at each sampling location is at or below the Method 1 S-1 standards as specified in 310 CMR 40.0900; or

- when using a soil vapor extraction system, the concentration of each persistent contaminant in the influent stream has been reduced by treatment to the point of inflection on a concentration versus time curve (i.e., point of diminishing return below no significant risk);[2] or

- the mass of each persistent contaminant present in S-1 soils is reduced by 50 percent below the mass present at NSR; or

- the exposure point concentration of each persistent contaminant is reduced by 50 percent below the exposure point concentration present at NSR.

Groundwater

Background in groundwater shall be considered approached for persistent contaminants in areas classified as GW-1, GW-2, or GW-3 if:

- the concentrations of each persistent contaminant at each Exposure Point are at or below 1/2 the applicable Method 1 groundwater standards as specified in 310 CMR 40.0900; or

- when using a groundwater/Non Aqueous Phase Liquid (NAPL) extraction and treatment system, the concentrations/quantity of each persistent contaminant in the influent stream, respectively, have been reduced by treatment to the point of inflection on a concentration versus time curve (i.e., point of diminishing return below no significant risk).

These criteria are summarized in Figures 9-3 and 9-4.

9.3.3.3 Technological Evaluation

The technological element of a feasibility assessment considers: whether there is a remedial technology available that can reduce contaminants beyond No Significant Risk to achieve or approach background levels in soil and groundwater; whether the

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[2] To demonstrate that the soil and groundwater treatment has achieved a "point of diminishing returns," monitoring data should show that contaminant concentrations have stabilized and the graph of the concentration versus treatment time should fit a curve generally defined by the equation $C = C_f + C_0 e^{-kt}$, where:

C	is the contaminant concentration at time t;
C_f	is the coefficient representing the final concentration which the curve approaches asymptotically;
C_0	is the coefficient representing the concentration difference between the final concentration and the concentration at time zero;
e	is 2.710, the base of natural logarithms;
k	is the coefficient representing the exponential factor which indicates how fast concentration approaches C_f; and
t	is the time from some fixed starting point.

The lower limb of the curve should be substantially linear, and the slope of the final portion of the curve should approach zero. The x and y axes should be of a scale that minimizes data distortion and appropriate statistical methods should be applied to support the conclusion that the monitoring data fits the curve.

suitable technologies can comply with or be modified to comply with applicable regulatory requirements; and whether the reliability of the technology has been sufficiently proven. The technological availability evaluation may also consider the criteria listed in 310 CMR 40.0860(5)(c) and (d), which address the existence and availability of the expertise or disposal facility(s) required to implement remedial actions to achieve or approach background.

For the purposes of using this policy and achieving Presumptive Certainty, it is assumed that at least one remedial action alternative exists to achieve or approach background, and the only remaining issue is whether the costs of implementing this alternative(s) are justified by the benefits.

9.3.3.4 Benefit-Cost Evaluation

The MCP at 40.0860(7)(a) does not quantify when an incremental cost of conducting the remedial action is "substantial and disproportionate" to the incremental benefit. However, consistent with the above regulation, DEP will apply the following more specific benefit-cost criteria to those parties who elect to rely on this policy:

- It shall be considered feasible to conduct remedial actions to **achieve** background conditions if the additional costs to remediate beyond a NSR condition are equal to or less than 20 percent of the cost to remediate to NSR.

- In cases where it is not feasible to achieve background conditions, it shall be considered feasible to conduct remedial actions to **approach** background conditions if the additional costs to remediate beyond NSR are equal to or less than 20 percent of the cost to remediate to NSR.

For evaluating the costs to remediate to NSR, all costs incurred *during* and *after* the implementation of the remedial actions, including related site assessment costs, should be considered. For evaluating the costs to remediate from NSR to achieve or approach background, only the additional time, testing, upgrade and maintenance, and removal/treatment/disposal costs shall be considered. The costs incurred for remobilizing equipment to do additional work to achieve or approach background shall not be factored into the costs.

Figure 9-3
Presumptive Certainty Criteria for Soil for Achieving/Approaching Background

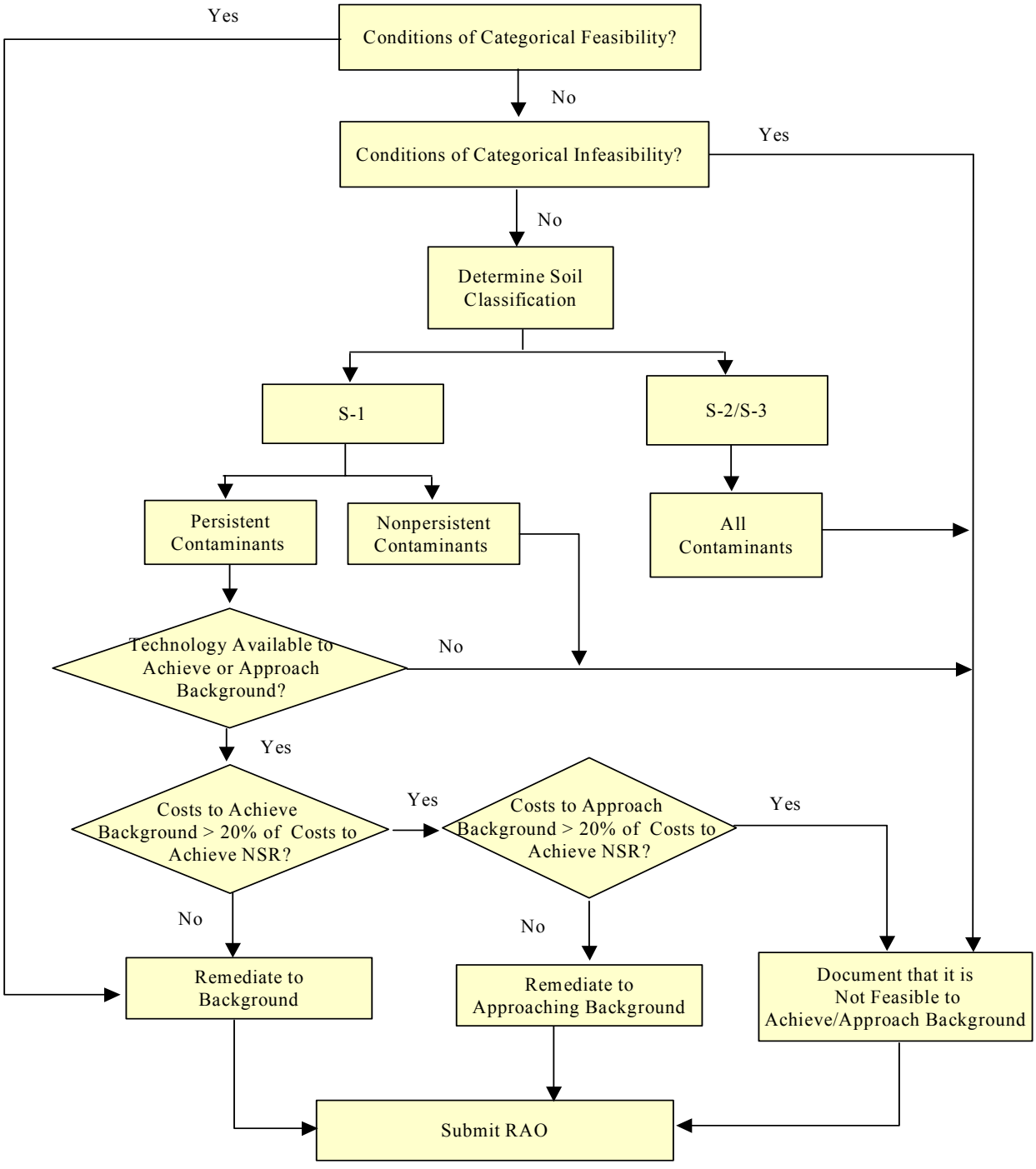

Figure 9-4
Presumptive Certainty Criteria for Groundwater for Achieving/Approaching Background