Conducting Phased Environmental Site Assessments at Upstream Oil and Gas Sites

Darlene Howat, M.Sc., A.Ag.
Alberta Environment
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INTRODUCTION

Since July 2001, Alberta Environment has required oil and gas operators to conduct Phase 1 environmental site assessments (ESA) on upstream oil and gas facilities following abandonment and prior to reclamation. As of October 1, 2003, operators must also submit the Phase I ESA report with the reclamation certificate application as well as a Phase II ESA report on sites where the Phase 1 ESA has indicated there was a likelihood of contamination or there was insufficient information to determine whether contamination may be present.

Determining which sites and facility types require a Phase II ES A has been the subject of the Alberta Environment – Canadian Association of Petroleum Producers (CAPP) Environmental Site Assessment Sub-Committee which began meeting in February 2004. Within the sub-committee, two working groups were formed: the Drilling Waste Working Group and Phase II ESA Working Group.

The Drilling Waste Working Group assisted in the development of the exemption parameters for Phase II ESAs for drilling waste disposal areas which were published in Alberta Environment's Fact Sheet, *Assessing Drilling Waste Disposal Areas*, R&R/04-1. Phase II ESAs are required for onsite drilling waste disposal areas and remote sumps if:

- a *Notification of Drilling Waste Disposal* form or other analytical data is not available or if the information indicates the disposal may not be compliant with the EUB's *Guide 50 Drilling Waste Management* (1996) requirements or

- the site does not meet Alberta Environment's exemption requirements as specified in *Assessing Drilling Waste Disposal Areas*, R&R/04-1.

Alberta Environment is currently working with industry representatives in the Drilling Waste Working Group to revise R&R/04-1.

During the last three months, the Phase II ESA Working Group has met to discuss the types of infrastructure that require a Phase II ESA and under what conditions. As part of the stakeholder consultation process, the draft Phase I ESA Decision Trees, developed by the Phase II ESA Working Group, are being provided to RemTech 2004 participants for input and discussion. The decision trees are meant to supplement the Phase I ESA form and provide guidance to assessors on the types of facilities and information needed to determine whether a Phase II ESA is required.

A primary objective of this paper is to solicit your feedback on draft Phase I ESA decision trees referred to above.

BACKGROUND
The Phase I Environmental Site Assessment

Objective

The Canadian Standards Association states that the purpose of a Phase 1 ESA is to identify actual and potential site contamination. However, because a Phase I does not involve sample collection or other intrusive investigations, "a Phase I ESA report can, in most cases, only describe the likelihood of contamination being present or absent at a property" (CSA 1994). The American Society of Testing and Materials states that the goal of a Phase I ESA is to identify *recognized environmental conditions* which are defined as the presence or likely presence of any hazardous substances or petroleum products on a property due to an existing release, past release of any hazardous substances or petroleum products into the ground, surface water or groundwater (ASTM 2003). The term *recognized environmental conditions* "includes hazardous substances or petroleum products even under conditions in compliance with laws", but does not include "*de minimis* conditions that generally do not present a material risk of harm to public health or the environment" (ASTM 2000).

Both Standards indicate there are limitations to the Phase I ESA process. A Phase I ESA that is performed under the requirements of the CSA Phase I ESA Standard will reduce, but not eliminate uncertainty as to the potential for contamination to be present at a site. "Where this potential has been identified, the further reduction or elimination of uncertainty requires the performance of a Phase II ESA" (CSA 1994). The ASTM cautions that no environmental site assessment can wholly eliminate uncertainty regarding the potential for *recognized environmental conditions* in connection with a property (ASTM 2000). A Phase I ESA cannot eliminate uncertainty regarding the potential for *recognized environmental conditions*, but can reduce uncertainty regarding contamination (ASTM 2000).

The CSA and ASTM documents stress that a Phase I ESA can form the basis for additional investigation of a site through a Phase II ESA. If there is insufficient information to complete a Phase I ESA, uncertainty will not be reduced and a Phase II ESA would be required. However, there is a significant risk that a Phase II ESA conducted on sites with inaccurate or non-comprehensive Phase I ESA information will not expose all substances of concern (CSA 2000), thereby leading to potential environmental risk and liability.

Timing

The requirement to conduct a Phase I ESA applies to all oil and gas sites following abandonment, unless the Phase II ESA provides a rationale for the site investigation and sampling locations. Unfortunately, some Phase I ESAs are conducted following reclamation of a site, which makes the site visit less valuable as locations of spills, pits, etc. are likely not visible. There also can be a reluctance to follow through on Phase II ESA work even when Phase I ESA information indicates the need. In all cases, conducting a Phase I ESA following abandonment, prior to commencing reclamation, will be the most efficient and effective. Potential damages to the reclaimed site will be

avoided and if remediation is required, removal of topsoil and subsoil will not be required.

Phase I ESA Results

Alberta Environment developed a Phase I Environmental Site Assessment Form (November 2002) to provide a standardized approach to conducting a Phase I ESA. Sections of the form pertain to a review of the company files, EUB spill database, aerial photographs, site visit and interview with a past or current operator or the landowner. Following completion of these sections, the reviewer determines if the information is consistent and thorough, and answers the questions in the Conclusion and Recommendation section (Part 5) of the Phase I ESA form. If there was very little information available on the site, due to missing company files for example, then a Phase II ESA is required to determine the condition of a site. Alternatively, if there is information on the site, but it is inconsistent, a Phase II ESA would also be required to determine if contamination is present. However, if adequate, consistent information is available, which types of infrastructure or events would require further investigation?

The Phase II Environmental Site Assessment

Definition

CSA defines a Phase II ESA as "the systematic, iterative process … by which an Assessor seeks to characterize and/or delineate the concentrations or quantities of substances of concern related to a site and compare those levels to criteria".

Objective

A Phase II ESA can be used to confirm or refute the potential contamination identified in a Phase 1 ESA, provide supplemental information for previous Phase II ESAs and provide the basis for evaluating site remediation needs.

A Phase II ESA characterization may range from a simple identification to a full delineation of the contamination on site" (CSA 2000). The Standard developed by the CSA establishes the fundamentals and practices for a Phase II ESA. The Standard provides a consistent framework and establishes "minimum requirements for conducting Phase II ESAs that can accommodate broader regulatory and liability requirements, as well as address pertinent site-specific requirements" (CSA 2000). The framework includes development of a sampling plan, preparation for and execution of an investigation that includes sampling and measuring, followed by interpretation and reporting on the information obtained.

ASTM International (2003) states "the primary objectives of conducting a Phase II ESA are to evaluate the *recognized environmental conditions* identified in the Phase I ESA for the purpose of providing sufficient information regarding the nature and extent of contamination".

Publications on contamination evaluation by the Canadian Council of Ministers of the Environment (CCME) also recommend sampling and analysis to determine the types and concentrations of contaminants present at a site as well as to verify "no impact" in the

areas believed to be unaffected by site activities. Following completion of a Phase II ESA, a conclusion may be reached that there is no reasonable basis to suspect contamination at the site or that contaminants are present.

The CSA and ASTM note inherent limitations of the Phase II ESA process. The CSA states that analyzed samples "represent one discrete portion of any site at any given time and may or may not be representative of the entire site or the portion in question" (CSA 2000). A Phase II ESA cannot eliminate uncertainty regarding the potential for *recognized environmental conditions*, but can reduce uncertainty regarding the presence of contamination at a site (ASTM 2000).

Components of a Phase II ESA Report

It is difficult to develop a prescriptive guide for Phase II ESAs due to varying site conditions (e.g., soils, geography, topography, site operations, contamination types). However, Alberta Environment has developed an outline of the Phase II ESA components for upstream oil and gas sites in the Fact Sheet, *Upstream Oil and Gas Reclamation and Remediation Program, Detailed Program Changes: The Application Process*, R&R/03-08, using information from the Canadian Standards Association and ASTM publications. In most cases, a qualified professional should be retained to assess the nature and extent of any contamination at a site.

R&R/03-08 discusses a Phase II ESA as potentially including of the following:

- A review of Phase I ESA information (Note: In some cases, a Phase I ESA may not have been fully completed due to a lack of information.)
- Development of a site investigation plan
- Completion of a site investigation (includes geophysical work, sample collections)
- Interpretation and evaluation of analytical data from the site investigation
- Estimation of the lateral and vertical extent of the contamination
- A detailed description of remediation activities
- Confirmatory sampling locations and analytical data
- Preparation of a report

This scope is greater than indicated in some standard guidances but was set in an attempt to simplify and condense the ESA framework.

There may be a requirement to complete more than one iteration of the site investigation portion of the Phase II ESA, depending on the objectives of the users and clients and the objectives for the work. Additional remediation work would be required if the

confirmatory samples indicted Alberta Environment's remediation requirements were not met.

CONSULTATION PROCESS

Over the last few months, the Phase II ESA Working Group comprised of staff from Alberta Environment and Sustainable Resource Development and CAPP members, has discussed ways of clarifying which facilities and triggers identified in a Phase I ESA lead to a requirement to conduct a Phase II ESA for a single well facility. As a result of these discussions, six draft Phase I ESA decision trees have been developed for infrastructure typically associated with a wellsite: pipelines (on lease), wellcentre, surface facilities (above ground tanks, tankfarms, facility buildings, etc.), drilling waste disposal areas, pits, and underground storage tanks). Although each decision tree is for a particular component of a site, the lease must be evaluated as a whole. For example, there may be other spills or releases not directly associated with one type of infrastructure which would require investigation. Each of the draft decision trees is presented on the following pages.

Considerations and Questions

1. The broken lines in the decision trees indicate that the proponent still has a responsibility to practice due diligence and look for indications of contamination, even if there is documentation of clean-up or Phase II ESA information available. Therefore, the assessment process should continue along all the pathways to provide diligence.

    - Are other steps required to ensure due diligence?
    - Do the decision trees reflect the work of the Canadian Standards Association and ASTM on environmental site assessments?

2. The oval boxes in each decision tree have a provision for documentation of clean-up or Phase II ESA required. Alberta Environment has required confirmatory analytical data, as outlined in the Fact Sheets, *Detailed Program Changes: The Application Process,* R&R/03-08, and *Assessing Drilling Waste Disposal Areas,* R&R/04-1, to provide assurance that the site meets all remediation requirements.

    - What type of documentation is reasonable in lieu of confirmatory analytical data ?
    - What other information would be valuable and provide assurance? Please provide an example, if possible.

3. Alberta Environment wants to hear from you which format (i.e., decision tree or checklist) you prefer and how the instrument can be structured to provide disclosure and clarity.

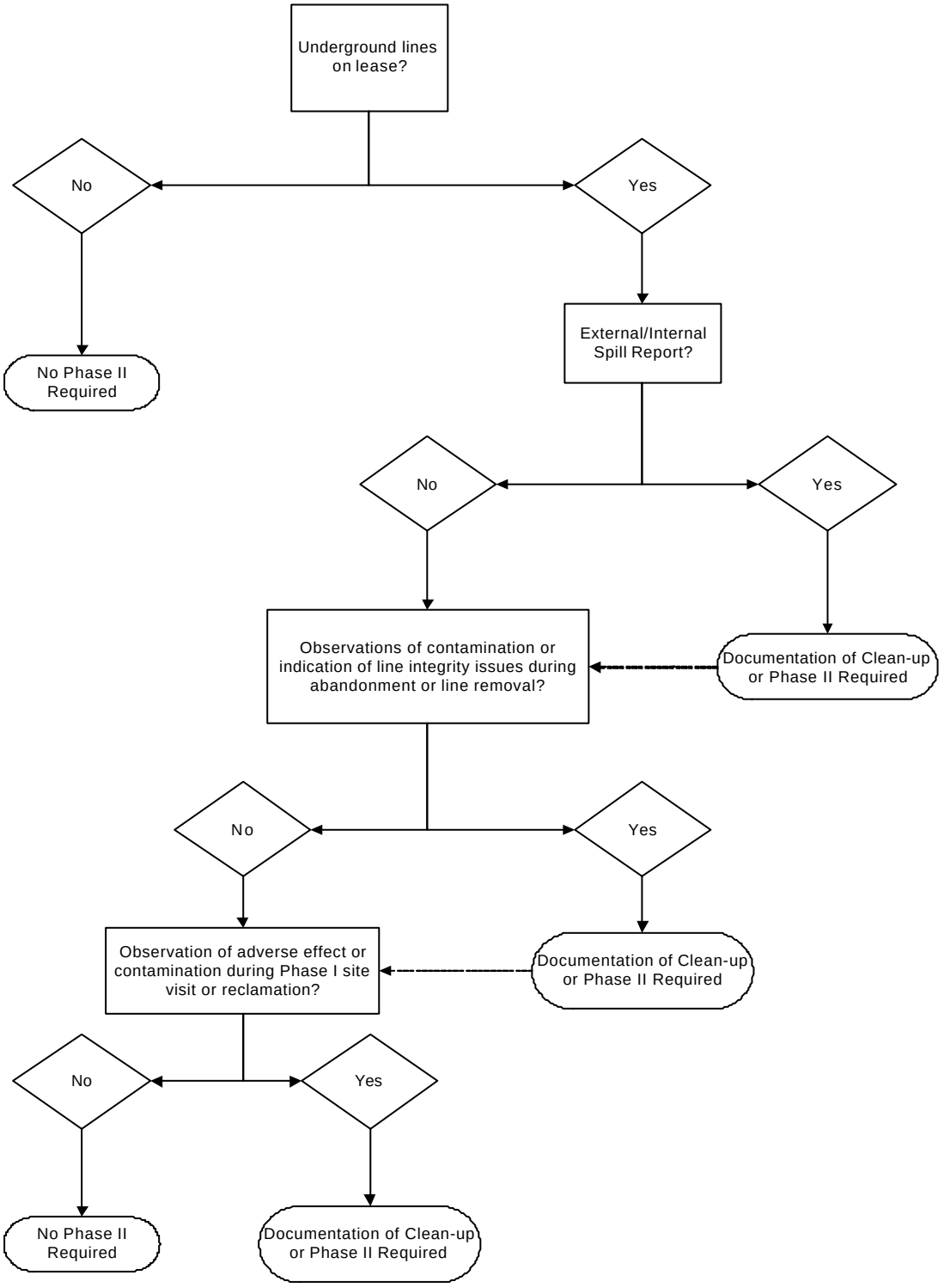
    - Instead of the decision tree, would similar or same questions work better in a checklist format?

- Is a change to the Phase I ESA form all that is required?

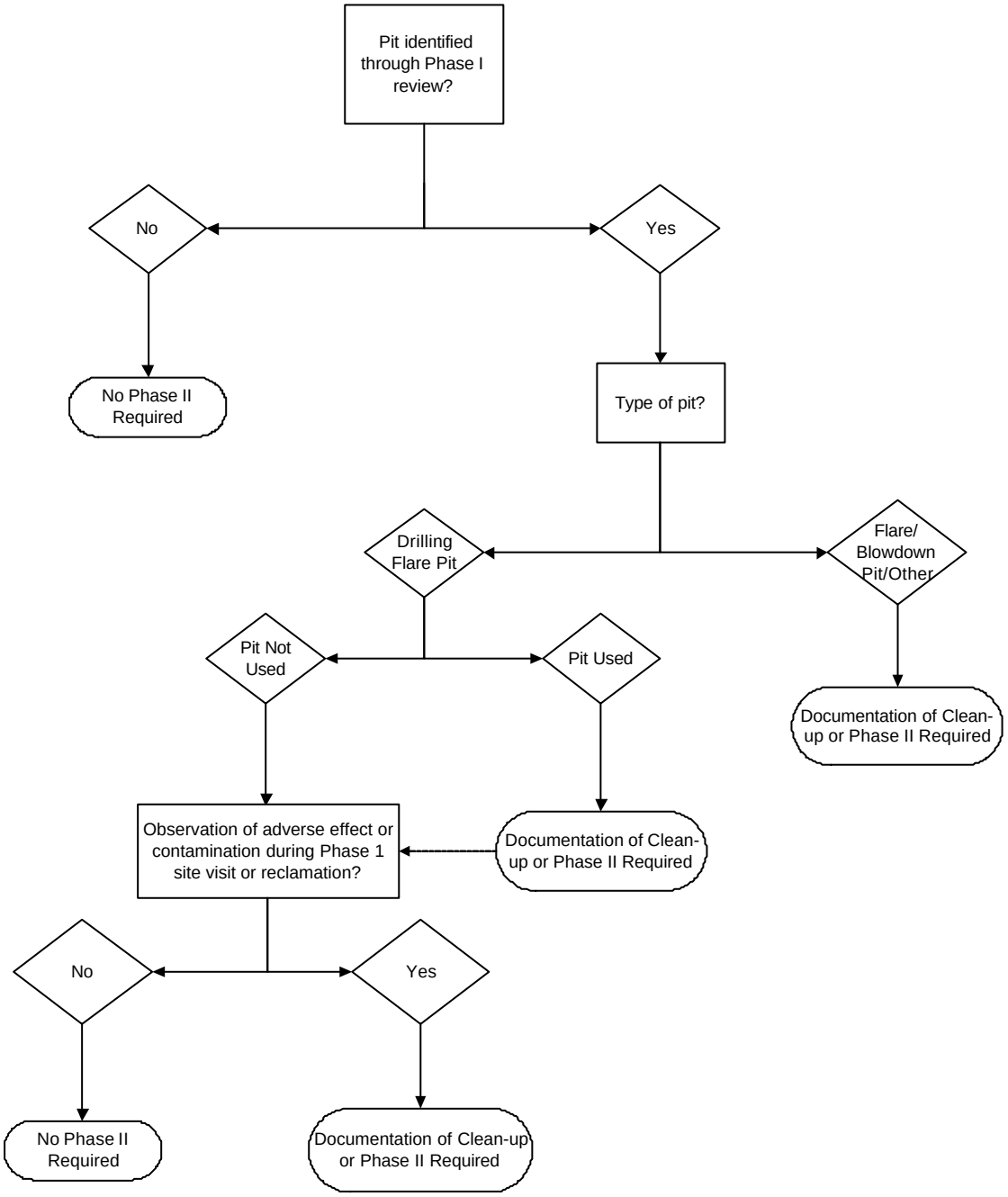
NEXT STEPS

Please provide your comments to land.management@gov.ab.ca by November 1, 2004. Subsequently, Alberta Environment will be developing a Fact Sheet to advise stakeholders of any changes in the Phase I or Phase II ESA requirements.

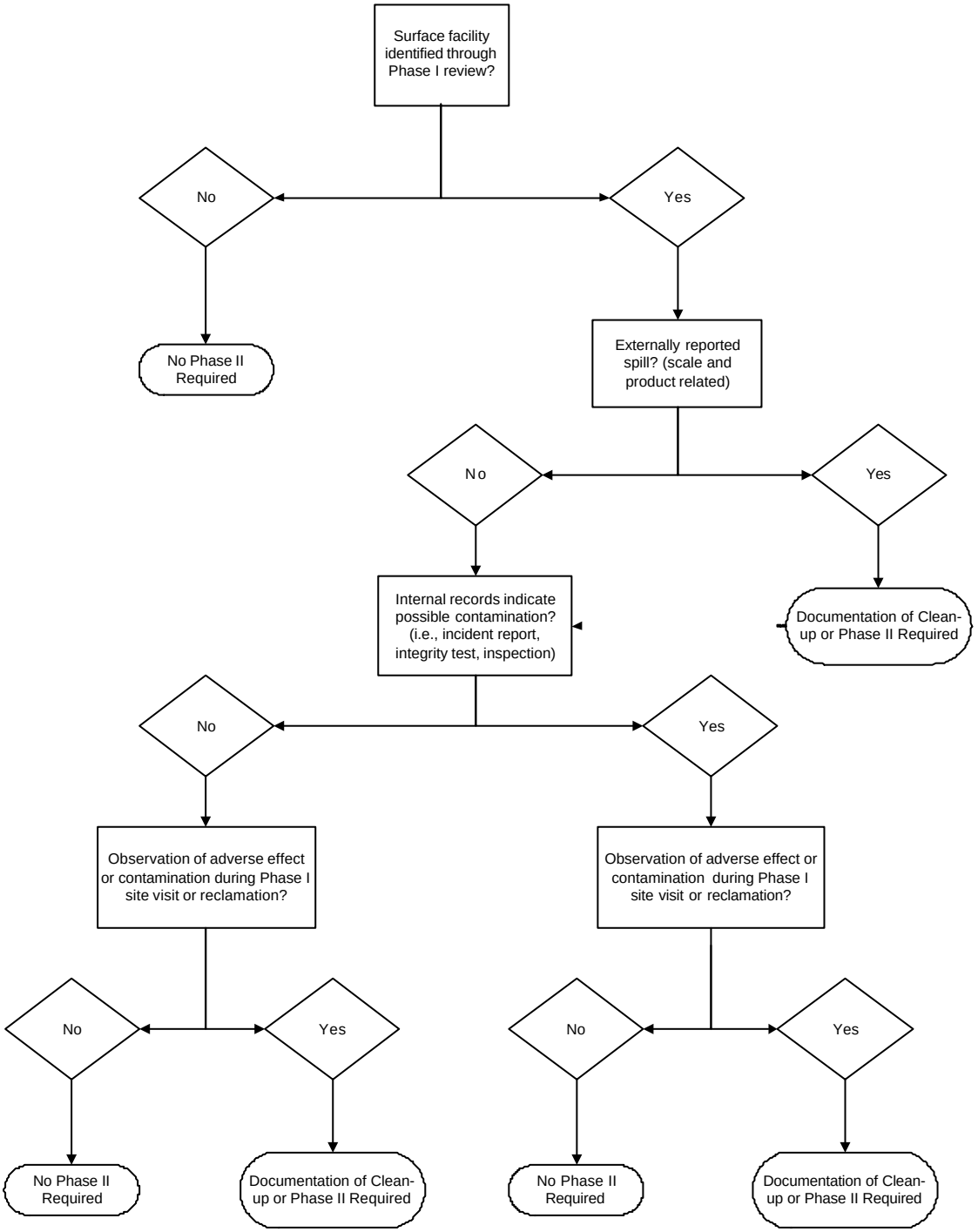
Phase I Decision Tree for Pipelines (On Lease)
For a Single Well Facility
DRAFT for Discussion Purposes Only



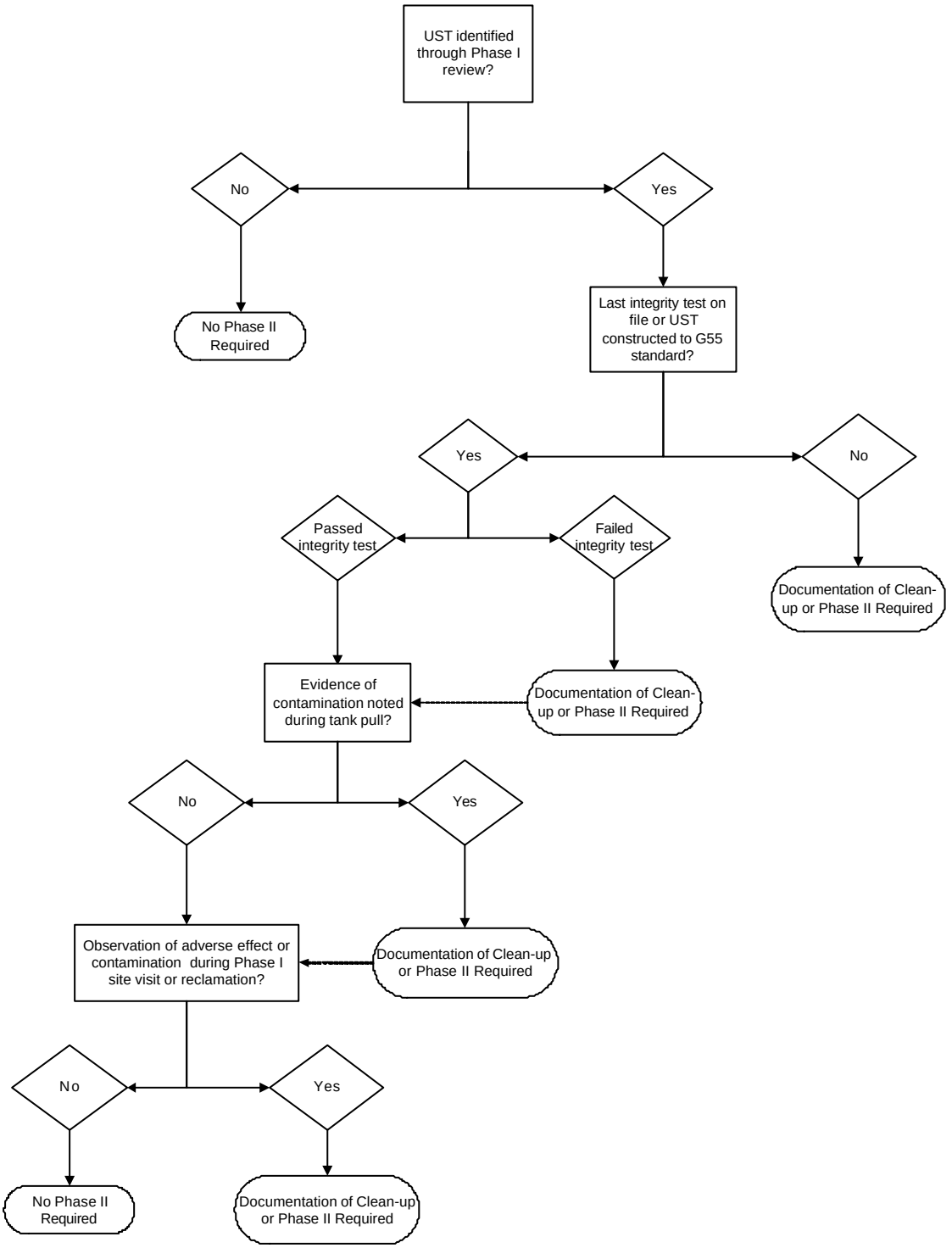
Phase I Decision Tree for Pits
For a Single Well Facility
DRAFT for Discussion Purpose Only



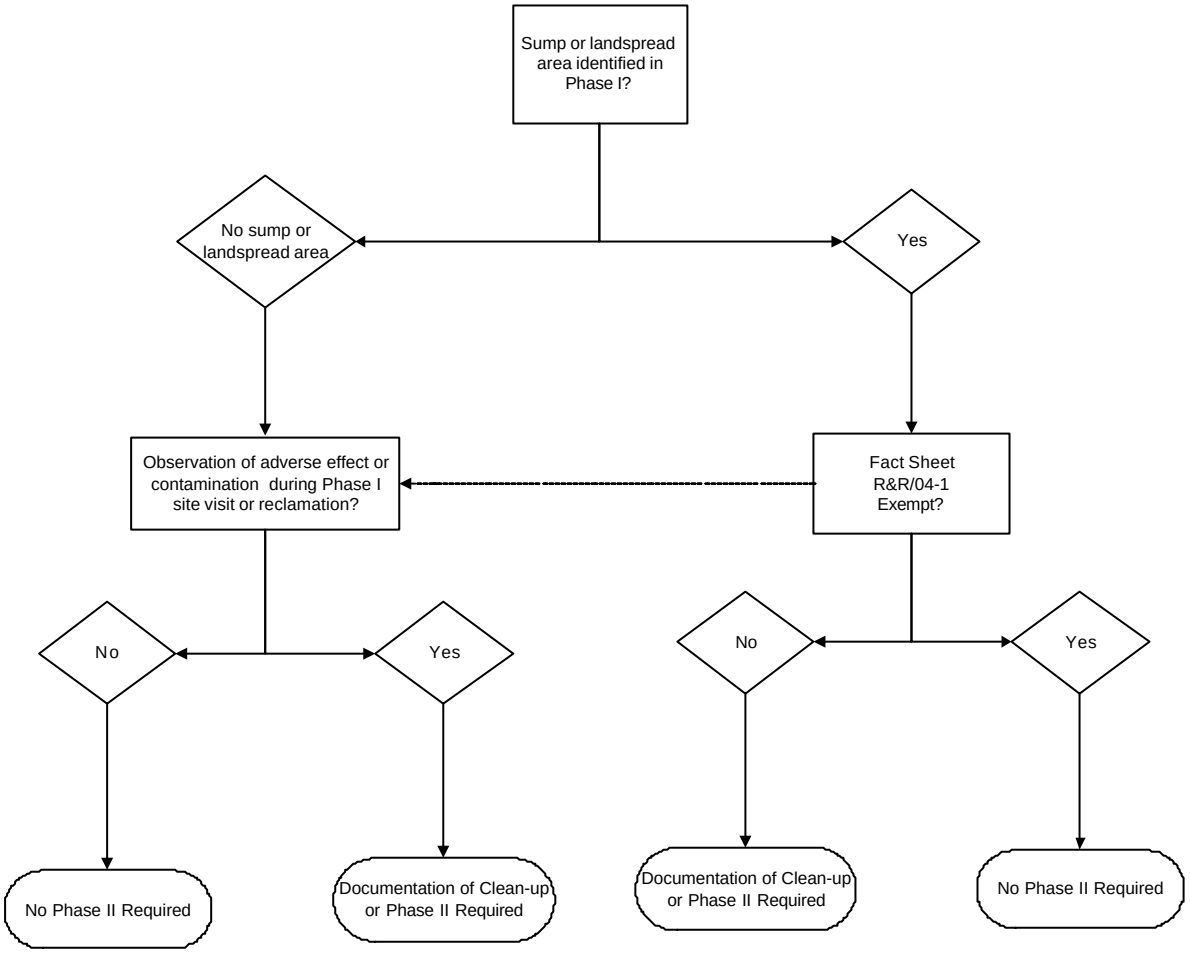
Phase I Decision Tree for Each Surface Facility
(eg. Above Ground Tanks, Tankfarms, Facility Buildings, etc.
For a Single Well Facility
DRAFT for Discussion Purposes Only



Phase I Decision Tree for UST's
For a Single Well Facility
DRAFT for Discussion Purposes Only



Phase I Decision Tree for Drilling Waste Disposal Areas
For a Single Well Facility
DRAFT for Discussion Purposes Only



Phase I Decision Tree for Well Center
For a Single Well Facility
DRAFT for Discussion Purposes Only