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Standard Guide for Use of Activity and Use Limitations, Including Institutional and Engineering Controls¹

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INTRODUCTION

Valuable property, which is, or is perceived to be, environmentally impacted, remains idle throughout the fifty states because fears of liability and corrective action costs deter potential developers, purchasers, and lenders. In response, many states have adopted voluntary corrective action or brownfields programs that utilize risk-based corrective action principles. One element of these programs may be activity and use limitations to achieve either an “acceptable risk” or a “no significant risk” level. For example, an owner/operator who volunteers to remediate a site to meet an industrial or commercial use standard may do so in exchange for a restrictive covenant that limits the use of the site to industrial or commercial purposes only. Activity and use limitations should be considered an integral part of the remedial action selection process. The user may determine, based upon post-remedial action land use, or based upon the deficiencies in available activity and use limitations, that an activity and use limitation is not feasible for the site. The most effective use of activity and use limitations as part of a federal, state, tribal or local remediation program requires careful consideration of many factors, including effectiveness, amenability to integration with property redevelopment plans, implementability, technical practicability, cost prohibitiveness, long-term reliability, acceptability to stakeholders, and cost effectiveness. While this guidance is most likely to be applied where risk-based corrective actions are conducted, use of activity and use limitations is not restricted to risk-based applications. Both institutional and engineering controls may be employed as elements of a remedial action that is based on concentration level, background, or other non-risk-based approaches.

[ASTM E2091-05](#)

1. Scope [standards.iteh.ai/catalog/standards/sist/f4abb2e3-9541-2025/astm-e2091-05](#)

1.1 This guide covers information for incorporating activity and use limitations that are protective of human health and the environment into federal, state, tribal or local remediation programs using a risk-based approach to corrective action. Activity and use limitations should be considered early in the site assessment and remedial action selection process, and should be considered an integral part of remedial action selection. In the event that an appropriate activity and use limitation cannot be found, the user may need to revisit the initial remedial action selection decision.

1.2 This guide does not mandate any one particular type of activity and use limitation but merely serves to help users identify, implement and maintain the types of activity and use limitations that may be appropriate in programs using a risk-based decision-making approach.

1.3 This guide identifies screening and balancing criteria that should be applied in determining whether any particular activity and use limitation may be appropriate. This guide identifies the need to develop long-term monitoring and stewardship plans to ensure the long-term reliability and enforceability of activity and use limitations. This guide explains the purpose of activity and use limitations in the remedial action process and the types of activity and use limitations that are most commonly available.

1.4 This guide describes the process for evaluating potentially applicable activity and use limitations and using screening and balancing criteria to select one or more activity and use limitations for a specific site. The guide also describes some

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“best practices” from a transactional, stakeholder involvement, and long-term stewardship perspective. The guide also emphasizes the importance of considering the need for, and potential applicability of, activity and use limitations EARLY in the remedial action process.

1.5 All references to specific Federal or state programs are current as of the date of publication. The user is cautioned not to rely on this guide alone but to consult directly with the appropriate program.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

E1527 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

E1912 Guide for Accelerated Site Characterization for Confirmed or Suspected Petroleum Releases

E2081 Guide for Risk-Based Corrective Action

2.2 USEPA Documents:³

EPA’s Institutional Controls: A Reference Manual (March 1998)

EPA’s Institutional Controls: A Site Manager’s Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups (September 29, 2000)

EPA’s Interim Guidance Regarding Criteria Landowners Must Meet in Order to Qualify for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA Liability (“Common Elements” Guide) (March 2003)

EPA Strategy to Ensure Institutional Control Implementation at Superfund Sites, OSWER No. 9355.0-106, (September 2004)

2.3 Other Document:

American Bar Association, Implementing Institutional Controls at Brownfields and Other Contaminated Sites (Edwards, ed., 2003)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*—The reader should review the definitions presented herein prior to reviewing this guide, as many of the items included in this guide may have specific regulatory definitions within existing federal, state, tribal, or local programs. The following terms are being defined to reflect their specific use in this guide. Many of these definitions are taken directly from Guide **E2081**. The user should not assume that these definitions replace existing regulatory definitions. Where the definition or use of a term in

this standard differs from an existing regulatory definition or use, the user should address these differences prior to proceeding with the corrective action process.

3.1.1 *acceptable risk*—risk which is deemed to be below a level of regulatory concern.

3.1.2 *activity and use limitations, or AULs*—legal or physical restrictions or limitations on the use of, or access to, a site or facility to eliminate or minimize potential exposures to chemicals of concern, or to prevent activities that could interfere with the effectiveness of a response action, to ensure maintenance of a condition of “acceptable risk” or “no significant risk” to human health and the environment. These legal or physical restrictions are intended to prevent adverse impacts to individuals or populations that may be exposed to chemicals of concern.

3.1.3 *affirmative easement*—one where the servient estate must permit something to be done thereon, as to pass over it, or to discharge water on it.

3.1.4 *appurtenant easement*—an easement that benefits a particular tract of land. An incorporeal right which is attached to a superior right and inheres in land to which it is attached and is in the nature of a covenant running with the land. There must be a dominant estate and a servient estate.

3.1.5 *attribute*—a characteristic of a geographic feature described by numbers, characters, images and CAD drawings, typically stored in tabular format and linked to the feature by a user assigned identifier (e.g., the attributes of a well might include depth and gallons per minute). A column in a database table.

3.1.6 *chemical release*—any spill or leak or detection of concentrations of chemical(s) of concern in environmental media.

3.1.7 *chemical(s) of concern*—the specific compounds and their breakdown products that are identified for evaluation in the risk-based corrective action process. Identification can be based on their historical and current use at a site, detected concentrations in environmental media, and their mobility, toxicity and persistence in the environment. Because chemicals of concern may be identified at many points in the risk-based corrective action process, the term should not be automatically construed to be associated with increased or unacceptable risk.

3.1.8 *computer-aided design (CAD)*—an automated system for the design, drafting, and display of graphically oriented information.

3.1.9 *coordinate system*—a reference system used to measure horizontal and vertical distances on a planimetric map.

3.1.10 *corrective action*—the sequence of remedial actions that include site assessment and investigation, risk assessment, response actions, interim remedial action, remedial action, operation and maintenance of equipment, monitoring of progress, making no further action determinations, and termination of the remedial action.

3.1.11 *corrective action goals*—concentration or other numeric values, physical condition or remedial action performance criteria that demonstrate that no further action is necessary to protect human health and the environment. For example, these goals may include one or a combination of RBSL, SSTL, RESC, SSEC and ORMC chosen for source

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

³ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

area(s), point(s) of demonstration and point(s) of exposure. The corrective action goals are specific to each Tier in the evaluation.

3.1.12 *coverage*—a digital version of a map that forms the basis of the GIS. A coverage stores geographic features and associated feature attribute tables.

3.1.13 *database*—a logical collection of interrelated information, managed and stored as a unit, usually on some form of mass-storage system such as magnetic tape or disk. A GIS database includes data about the spatial location and shape of geographic features recorded as points, lines, areas, pixels, grid cells, or tins, as well as their attributes.

3.1.14 *deed restriction*—a restriction or limitation on an interest in real property, created by a conveyance from one person to another.

3.1.15 *direct exposure pathway*—an exposure pathway where the point of exposure is at the source, without a release to any other medium and without an intermediate biological transfer step.

3.1.16 *easement in gross*—an easement in gross is not appurtenant to any estate in land or does not belong to any person by virtue of ownership of an estate in other land but is merely a personal interest in or right to use the land of another. Easements that do not benefit a particular tract of land (e.g., utility easements).

3.1.17 *easement of access*—right of ingress and egress to and from the premises of a lot owner to a street appurtenant to the land of the lot owner.

3.1.18 *easements*—a right of use over the property of another. Traditionally, the permitted kinds of uses were limited, the most important being rights of way and rights concerning flowing waters. The easement was normally for the benefit of adjoining lands, no matter who the owner was (an easement appurtenant), rather than for the benefit of a specific individual (easement in gross). The land having the right of use as an appurtenance is known as the dominant tenement and the land which is subject to the easement is known as the servient tenement.

3.1.19 *ecological evaluation*—a process for organizing and analyzing data, information, assumptions and uncertainties to evaluate the likelihood that adverse effects to relevant ecological receptors or habitats may occur or are occurring as a result of exposure to chemical(s) of concern.

3.1.20 *engineering controls*—physical modifications to a site or facility to reduce or eliminate the potential for exposure to chemicals of concern (e.g., slurry walls, capping, hydraulic controls for ground water, or point of use water treatment).

3.1.21 *equitable servitudes*—building restrictions and restrictions on the use of land which may be enforced in equity. If there is a scheme in their creation, a subsequent owner may enforce them by injunctive relief against another subsequent owner. Such servitudes are broader than covenants running with the land because they are interests in land.

3.1.22 *exposure*—contact of an organism with chemicals of concern at the exchange boundaries (e.g., skin, lungs, and liver) when the chemicals of concern are available for absorption or adsorption.

3.1.23 *exposure assessment*—the determination or estimation (qualitative or quantitative) of the magnitude, frequency, duration and route of exposure between a source area and a receptor.

3.1.24 *exposure pathway*—the course a chemical(s) of concern takes from the source area(s) to a receptor or relevant ecological receptor and habitat. An exposure pathway describes the mechanism by which an individual or population is exposed to a chemical(s) of concern originating from a site. Each exposure pathway includes a source or release from a source of a chemical concern, a point of exposure, an exposure route, and the potential receptors or relevant ecological receptors and habitats. If the exposure point is not at the source, a transport or exposure medium or both (e.g., air or water) are also included.

3.1.25 *exposure route*—the manner in which a chemical(s) of concern comes in contact with a receptor (e.g., ingestion, inhalation, dermal contact).

3.1.26 *exposure scenario*—the description of the circumstances, including site properties and chemical properties, or the potential circumstances under which a receptor or a relevant ecological receptor or habitat could be in contact with chemical(s) of concern.

3.1.27 *facility*—the property containing the source of the chemical(s) of concern where a release has occurred. A facility may include multiple sources and, therefore, multiple sites.

3.1.28 *geographic information system (GIS)*—a geographic information system (GIS) is a computer-based tool for tracking, mapping and analyzing resources using either an explicit geographic reference, such as a latitude and longitude or national grid coordinate, either from entry of this data from geographical location devices or by geographical coding an address or other descriptive location. GIS technology integrates common database operations such as query and statistical analysis with the visualization and geographic analysis benefits offered by maps.

3.1.29 *global positioning system*—a system of satellites and receiving devices used to compute positions on the Earth. GPS is used in navigation, and its precision supports cadastral surveying.

3.1.30 *highest and best use*—the reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value. The four criteria that the highest and best use must meet are legal permissibility, physical possibility, financial feasibility, and maximum profitability.

3.1.31 *indirect exposure pathways*—an exposure pathway with at least one intermediate release to any media, or an intermediate biological transfer step, between the source and the point(s) of exposure (e.g., chemicals of concern from soil through ground water to the point(s) of exposure).

3.1.32 *interim remedial action*—the course of action to reduce migration of chemical(s) of concern in its vapor, dissolved, or liquid phase, or to reduce the concentrations of a chemical of concern at a source area.

3.1.33 *institutional control*—a legal or administrative restriction on the use of, or access to a site or facility to eliminate

or minimize potential exposures to a chemical(s) of concern (e.g., deed restrictions, restrictive zoning).

3.1.34 *map query*—the process of selecting information from a GIS by asking spatial or logical questions of the geographic data.

3.1.34.1 *Discussion*—Spatial query is the process of selecting features based on location or spatial relationship (e.g., select all monitoring wells within 300 ft of the river). Logical query is the process of selecting features whose attributes meet specific logical criteria (e.g., select all groundwater data whose value for benzene is greater than 5 ug/l or select all data whose value is “non-detect”). Once selected, additional operations can be performed, such as drawing them, listing their attributes or summarizing attribute values.

3.1.35 *natural attenuation*—the reduction in the mass or concentration(s) of chemicals of concern in environmental media due to naturally occurring physical, chemical and biological process (e.g., diffusion, dispersion, adsorption, chemical degradation and biodegradation).

3.1.36 *negative easement*—an easement where the owner of the servient estate is prohibited from doing something otherwise lawful upon his estate, because it will affect the dominant estate (e.g., a prohibition on excavation deeper than 10 ft).

3.1.37 *no significant risk*—risk which is deemed to be below a level of regulatory concern. This level may vary among states and federal agencies, among regulatory programs, among media and pathways of concern, and among receptors. The terminology may also vary from jurisdiction to jurisdiction, and from regulatory program to regulatory program (e.g., “acceptable risk level” or some similar term indicating that remedial measures have reached the target level for protecting human health and the environment).

3.1.38 *other relevant measurable criteria (ORMC)*—parameters used to define corrective action goals for chemical(s) of concern. The ORMC are concentration values, other numeric values, physical condition or performance criteria other than RBSL, RESC, SSTL or SSEC. Examples of ORMC are regulatory standards, consensus criteria, aesthetic criteria, and groundwater protection criteria. Technical policy decisions regarding ORMC may exist, or may need to be made to determine the appropriate values, conditions or performance criteria that are used for the corrective action goals.

3.1.39 *point(s) of demonstration*—a location(s) selected between the source area(s) and the potential point(s) of exposure where corrective action goals are met.

3.1.40 *point(s) of exposure*—the point(s) at which an individual or population may come in contact with a chemical(s) of concern originating from a site.

3.1.41 *potentially complete exposure pathway*—a situation with a reasonably likely chance of occurrence in which a receptor or relevant ecological receptor or habitat may become directly or indirectly exposed to the chemical(s) of concern.

3.1.42 *proprietary*—belonging to ownership; owned by a particular person; belonging or pertaining to a proprietor; relating to a certain owner or proprietor.

3.1.43 *proprietary controls*—controls based on the rights associated with private ownership, particularly ownership of a

limited interest in real property as specified in a legal instrument, such as an easement or a restrictive covenant.

3.1.44 *qualitative ecological screening evaluation*—a process conducted as part of the Tier 1 evaluation wherein relevant ecological receptors and habitats and exposure pathways are identified. The necessary information can be collected as part of the data gathering activities during the initial site assessment or the Tier 1 site assessment. Within Tier 1, this screening-level information, which is typically qualitative, may be used to evaluate potential exposure pathways to relevant ecological receptors and habitats and to identify potential chemical(s) of concern. If available, generic, non-site-specific ecological criteria and guidelines may be used to evaluate complete and potentially complete exposure pathways.

3.1.45 *qualitative risk analysis*—a non-numeric evaluation of the potential risks at a site as determined by the potential exposure pathways and receptors based on known or reasonably available information.

3.1.46 *reasonably anticipated future use*—future use of a site or facility that can be predicted with a reasonably high degree of certainty given historical use, current use, local government planning and zoning, regional trends and community acceptance.

3.1.47 *receptors*—the persons that are or may be affected by a chemical release. (See *relevant ecological receptors and habitats*, for non-human receptor.)

3.1.48 *registry act requirements*—requirements that are imposed by certain state statutes requiring that a list be maintained identifying properties that have been the site of hazardous waste disposal and that may have restrictions on use or transfer.

3.1.49 *relevant ecological receptors and habitats*—the ecological resources that are valued at the site. Because of the variety of ecological resources that may be present, focusing upon those relevant to a site is an important part of the problem formulation phase of ecological evaluation. Identification of relevant ecological receptors and habitats is dependent upon site-specific factors and technical policy decisions. Examples may include species or communities afforded special protection by law or regulation; recreationally, commercially or culturally important resources; regionally or nationally rare communities; communities with high aesthetic quality; habitats, species or communities that are important in maintaining the integrity and bio-diversity of the environment.

3.1.50 *relevant ecological screening criteria (RESC)*—generic, non-site-specific ecological criteria or guidelines that are determined to be applicable to relevant ecological receptors and habitats, exposure pathways and site conditions utilized during the Tier 1 evaluation. These may include chemical concentrations, biological measures or other relevant generic criteria consistent with the technical policy decisions.

3.1.51 *remedial action*—activities conducted to reduce or eliminate current or future exposures to receptors or relevant ecological receptors and habitats. These activities include monitoring, implementing activity and use limitations, and designing and operating clean-up equipment. Remedial action includes activities that are conducted to reduce sources of

exposures to meet corrective action goals, or to sever exposure pathways to meet corrective action goals.

3.1.52 *response action*—an immediate course of action, including monitoring, abatement or containment measures to mitigate known or potential hazards to human health, safety and the environment, taken before interim remedial action or remedial action.

3.1.53 *response action evaluation*—a qualitative evaluation of a site based on known or readily available information to identify the need for interim remedial actions and further information gathering. Response action evaluation is intended to prioritize sites and identify whether there are any appropriate early risk reduction steps.

3.1.54 *restricted use level*—a corrective action cleanup level where one or more activity and use limitations would be needed to eliminate or mitigate potential exposures to chemicals of concern, or to prevent activities that could interfere with the effectiveness of a response action, to ensure maintenance of a level of “acceptable risk” or “no significant risk.”

3.1.55 *restrictive covenant*—provision in a deed or lease limiting the use of the property and prohibiting certain uses. In the context of property law, the term describes a contract between the grantor and the grantee that affects the grantee’s use and occupancy of land.

3.1.56 *risk assessment*—an analysis of the potential for adverse effects on receptors and relevant ecological receptors and habitats, caused by a chemical(s) of concern from a site. The risk assessment activities are the basis for the development of corrective action goals and determination of where interim remedial or a combination of actions are required.

3.1.57 *risk reduction*—the lowering or elimination of the level of risk posed to human health or the environment through response action, interim remedial actions, remedial action or a combination of actions.

3.1.58 *risk-based corrective action*—a consistent decision-making process for the assessment and response to chemical releases based upon protection of human health and the environment. Assessment and responses to chemical releases may consider the use of activity and use limitations.

3.1.59 *risk-based screening level/screening levels (RBSL)*—non-site-specific human health risk-based values for chemicals of concern that are protective of human health for specified exposure pathways utilized during the Tier 1 evaluation.

3.1.60 *servient estate*—an estate burdened by an easement.

3.1.61 *site*—the area(s) defined by the likely physical distribution of the chemical(s) of concern from a source area. A site could be an entire property or facility, a defined area or portion of a facility or property, or multiple facilities or properties. One facility may contain multiple sites. Multiple sites at one facility may be addressed individually or as a group.

3.1.62 *site assessment*—the characterization of a site through an evaluation of its physical and environmental context (e.g., subsurface geology, soil properties and structures, hydrology and surface characteristics) to determine if a release has occurred, the levels of the chemical(s) of concern in environmental media, and the likely physical distribution of the chemical(s) of concern. As an example, the site assessment

collects data on soil, ground water and surface water quality, land and resource use, and potential receptors, and generates information to develop a site conceptual model and support risk-based decision-making. The site assessment may be conducted using Guide E1912.

3.1.63 *site conceptual model*—the integrated representation of the physical and environmental context, the complete and potentially complete exposure pathways, and the potential fate and transport of chemical(s) of concern at a site. The site conceptual model should include both the current understanding of the site and the understanding of the potential future conditions and uses for the site. It provides a method to conduct the exposure pathway evaluation and to inventory the exposure pathways evaluated and the status of the exposure pathways as incomplete, potentially complete or complete.

3.1.64 *site conditions*—a general description of a site’s chemical, physical or biological characteristics that relate to potential exposures to receptors or relevant ecological receptors and habitats.

3.1.65 *site specific*—activities, information and data unique to a particular site.

3.1.66 *site-specific ecological criteria (SSEC)*—risk-based qualitative or quantitative criteria for relevant ecological receptors and habitats identified for a particular site under the Tier 2 or Tier 3 evaluations. These criteria may include chemical concentrations, biological measures or other relevant generic criteria consistent with the technical policy decisions. SSEC may be revised as data are obtained that better describe the conditions and the relevant ecological receptors and habitats.

3.1.67 *site-specific target level(s) (SSTL)*—risk-based values for chemicals of concern that are protective of human health for specific exposure pathways developed for a particular site under the Tier 2 or Tier 3 evaluations.

3.1.68 *source area(s)*—the source area(s) is defined as the location of non-aqueous phase liquid (NAPL) chemical, the locations of highest soil or ground water concentrations of the chemical(s) of concern, or the location releasing the chemical(s) of concern.

3.1.69 *stakeholders*—individuals, organizations, or other entities that directly affect or may be directly affected by the corrective action. Stakeholders include, but are not limited to, owners, purchasers, developers, lenders, tenants, utilities, insurers, government agencies, Indian tribes, community groups, and members.

3.1.70 *stigma*—the residual loss in value above and beyond the actual cost to cure or control the environmental condition of concern if such extraordinary loss is evident in the marketplace. Stigma generally is a result of uncertainty as to the cost, effectiveness or permanency of the methodology of cure/control, or uncertainty concerning the environmental regulatory agencies’ endorsement of such methodology or results. Stigma is a time-dependent phenomena and as such may be only temporary in effect.

3.1.71 *technical policy decisions*—the choices specific to the User that are necessary to implement the risk-based corrective action framework described in Guide E2081, or any

replacement standards thereto, at a particular site. The decisions involve regulatory policies, value judgments, different stakeholder decisions and using professional judgment to evaluate available information; therefore, there may be more than one scientifically supportable answer for any particular technical policy decision. The choices represent different approaches. The User should consult the regulatory agency requirements to identify the appropriate technical policy decisions prior to implementing the risk-based corrective action process. Examples of technical policy decisions are: data quality objectives, target risk levels, land use, reasonably anticipated future use, ground water use, natural resource protection, relevant ecological receptors and habitats, stakeholder notification and involvement, and exposure factors.

3.1.72 *unrestricted use level*—a corrective action level where residential uses would be permissible without the need for any activity and use limitations.

3.1.73 *user*—An individual or group involved in remediation involving risk-based decision-making principles, and involving the use of activity and use limitations. Users include owners, operators, regulators, underground storage tank fund managers, attorneys, consultants, legislators and other stakeholders. Two specific types of users are envisioned. The first is the individual or group addressing a site or sites under the circumstances where an activity and use limitation is part of the proposed or final remedial action. The second is a regulatory agency that is developing regulations or guidance regarding the use of activity and use limitations as part of its corrective action program, whether conducted pursuant to a voluntary corrective action, brownfields, Superfund, Resource Conservation and Recovery Act, underground storage tank, or other type of program.

4. Significance and Use

4.1 Activity and use limitations are typically used in conjunction with risk-based decision-making principles in Federal, state, tribal and local remediation programs, or where residual chemicals of concern remain following an evaluation of risk or following the implementation of a remedial action (see ABA's Implementing Institutional Controls at Brownfields and Other Contaminated Sites, EPA's Institutional Controls: A Reference Manual, EPA's Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups; EPA's Interim Guidance Regarding Criteria Landowners Must Meet in Order to Qualify for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA Liability (Common Elements Guide), and EPA's Strategy to Insure Institutional Control Implementation at Superfund Sites). The principal purposes of activity and use limitations are to:

4.1.1 Eliminate exposure pathways for, or reduce potential exposures to, chemicals of concern;

4.1.2 Provide notice to property owners, holders of interests in the property, title companies, utilities, tenants, realtors, lenders, developers, appraisers and others of the presence and location of chemicals of concern that may be present on the site;

4.1.3 Identify the objectives and goals of each activity and use limitation;

4.1.4 Identify the exposure assumptions upon which each activity and use limitation is based;

4.1.5 Identify the site uses and activities which, if they were to occur in the future, would be appropriate and consistent with maintaining a condition of "acceptable risk" or "no significant risk";

4.1.6 Identify the site uses and activities which should NOT occur in the future (unless further evaluation and remedial action, as appropriate, are undertaken), as those activities and uses may result in the exposure of persons or ecological receptors to chemicals of concern at or near the site in a manner that is inconsistent with a condition of "acceptable risk" or "no significant risk";

4.1.7 Specify long-term stewardship objectives, and the entity which has responsibility for developing stewardship programs and paying for achieving those objectives; and

4.1.8 Specify long-term performance standards, such as operation and maintenance obligations, or monitoring of an engineering control, that are necessary to ensure that the objectives and goals of activity and use limitations continue to be met.

4.2 Activity and use limitations should be implemented to eliminate exposure pathways for, or reduce potential exposures to, chemicals of concern. The following are some examples of situations where an activity and use limitations may be appropriate:

4.2.1 Impacted ground water exists at a site where an alternative water supply is available. A restriction may be placed on the use of ground water for any purpose other than monitoring, or a restriction may place requirements for well construction or evaluation of treatment of ground water.

4.2.2 A site is remediated to levels appropriate only for industrial or commercial uses with respect to the direct contact pathway. The use of the property will then be restricted to those land uses, unless further remedial activities are conducted (that is, the site may not be developed for residential use).

4.2.3 Residual chemicals of concern remaining on a site are covered with some type of barrier (e.g., cap, pavement, etc.) The barrier constitutes one type of activity and use limitation. In addition, a restriction may be placed on the deed or lease prohibiting excavation in areas where the chemicals of concern exceed certain risk levels. The restriction may include prohibiting the disturbance of the cap. Monitoring and maintenance of the integrity of the cap or barrier may be a requirement as well.

4.2.4 Operation and maintenance of an ongoing remedial action may be required and may be specified in a restriction. In this case, an easement or property access right may be given to the former owner (as the responsible party) or to his/her agent.

4.2.5 Also, activities interfering with operations and maintenance may be restricted. These restrictions may include limitations on construction or other activities in areas where remediation system controls, extraction wells, monitoring wells, or other ongoing remedial or monitoring systems are located.

4.3 *Due Diligence*—When a property transaction is involved, the prospective purchaser, lender, title company, real estate appraiser and others need to be aware of the possibility that restrictions have been placed on permissible activities and uses of the property. Knowledge of prior land uses is an important indicator of the potential for such restrictions to exist. The user is cautioned that, under Practice E1527, it is the user’s responsibility to provide information about AULs to the environmental consultant unless the parties have contracted otherwise (see Practice E1527, section 6.2). AUL information is frequently contained in the restrictions of record on the title, rather than in a typical chain of title. The user should be seeking the recorded land title records, sometimes referred to as a historical environmental title search, and information from relevant regulatory databases, to the extent that such databases exist.

4.4 At the present time, several states provide in their voluntary corrective action programs that liability releases provided in their “No Further Action” letters (“NFA”) or “Certificates of Completion” (“Certificates”) will be of no effect if any of the conditions in the final letter or certificate are violated. In other words, in these states, the releases from liability may be void or voidable if an activity and use limitation is violated. The activity and use limitation is typically described in, or attached to, the NFA letter or Certificate. Accordingly, it is critically important for owners, prospective purchasers, lenders, tenants and others who are counting on the liability releases provided in the NFA letter or Certificate to be sure that they understand what limitations or restrictions may have been imposed on the site and to understand who bears primary responsibility for ensuring that those limitations or restrictions are not violated.

4.5 The user is cautioned that activity and use limitations are not to be used to encourage or condone “secured abandonment”. In general, “secured abandonment” is the practice of physically securing the site and blocking exposure pathways while taking minimal steps to ensure that chemicals of concern do not spread beyond the property boundaries or taking minimal steps to put the property back into productive use. In most cases, the property is not placed back into productive use and does not meet its “highest and best” use. There may be instances where activity and use limitations are used to completely restrict access to a site (e.g., during remediation), but the expectation is that sites will be remediated to allow some productive use and therefore some potential exposure.

4.6 As a general rule, Federal or state governmental authorities have primary responsibility for determining applicable and appropriate remediation standards for chemicals of concern, and either the Federal, state, tribal or local government authority may have primary responsibility for inspecting and enforcing any activity and use limitations that may be imposed. It is important for all affected stakeholders (that is, Federal, state, tribal and local authorities; potentially responsible parties; utilities; residents; tenants; the financial community; the environmental community; and others) to have an open dialogue about the goals and objectives of any activity and use limitations; the exposure assumptions underlying any activity and use limitations; applicable and relevant legal authorities for

implementing any activity and use limitations; and the entity which will have responsibility for maintaining and enforcing the activity and use limitations over time.

4.7 The language used in activity and use limitations may be drafted broadly or have very focused statements about the purpose. The language may specify activities to be conducted, including operation and maintenance or a performance standard, or activities that are prohibited, or land uses that are allowed or disallowed. There may be a requirement for notice to various individuals or entities, such as tenants, lenders, utilities, or local government officials. There may also be language describing who enforces the restriction, and the conditions under which, and the procedure for removal or termination of the restriction.

5. Activity and Use Limitations As a Component of Site Assessment and Remedial Action Selection

5.1 *General Considerations:*

5.1.1 The user may evaluate the feasibility and appropriateness of activity and use limitations at many different points in the risk-based corrective action process (or other type of remedial action program). These points may include the initial site assessment stage, where existing and reasonably anticipated future uses are identified, or later in the response action evaluation and response action stages. See Fig. 1. If possible, the user should consider the screening and balancing criteria, as discussed in 5.3.

5.1.2 If the site is remediated to a restricted use level, the user is cautioned that an activity and use limitation will likely need to be implemented and maintained for as long as the concentrations of the chemicals of concern exceed levels appropriate for unrestricted use.

5.1.3 Activity and use limitations should be considered to be part of the remedial action selection process and should be documented in the remedial action selection document (e.g., the Record of Decision, RCRA permit, certificate of completion). Like any other component of remedial action selection, the User must evaluate whether the activity and use limitation(s) under consideration is feasible and appropriate.

5.1.4 In addition, selection of one or more activity and use limitations may lead to an interactive reconsideration of appropriate response actions. If the user determines after an evaluation of potentially applicable activity and use limitations, as described below, that none are feasible or appropriate, the user may need to conduct additional response actions to achieve an acceptable risk level. See Fig. 2.

5.1.5 Before evaluating the potential applicability of activity and use limitations, the user must have a good understanding of the chemicals of concern; the sources of exposure; the likely exposure routes (e.g., dermal, ingestion, inhalation); the pathways of exposure (e.g., air, surface water, ground water, soil); the likely receptors (both human and ecological); and the reasonably anticipated future use of the site (e.g., industrial; commercial; mixed use; residential; day care). See Fig. 3. The user is advised to review Guide E2081, or any replacement standard thereto, for further guidance on these issues. The user is also cautioned that, while activity and use limitations may be one possible component of remedial action selection, they generally should not be considered to be the sole component of

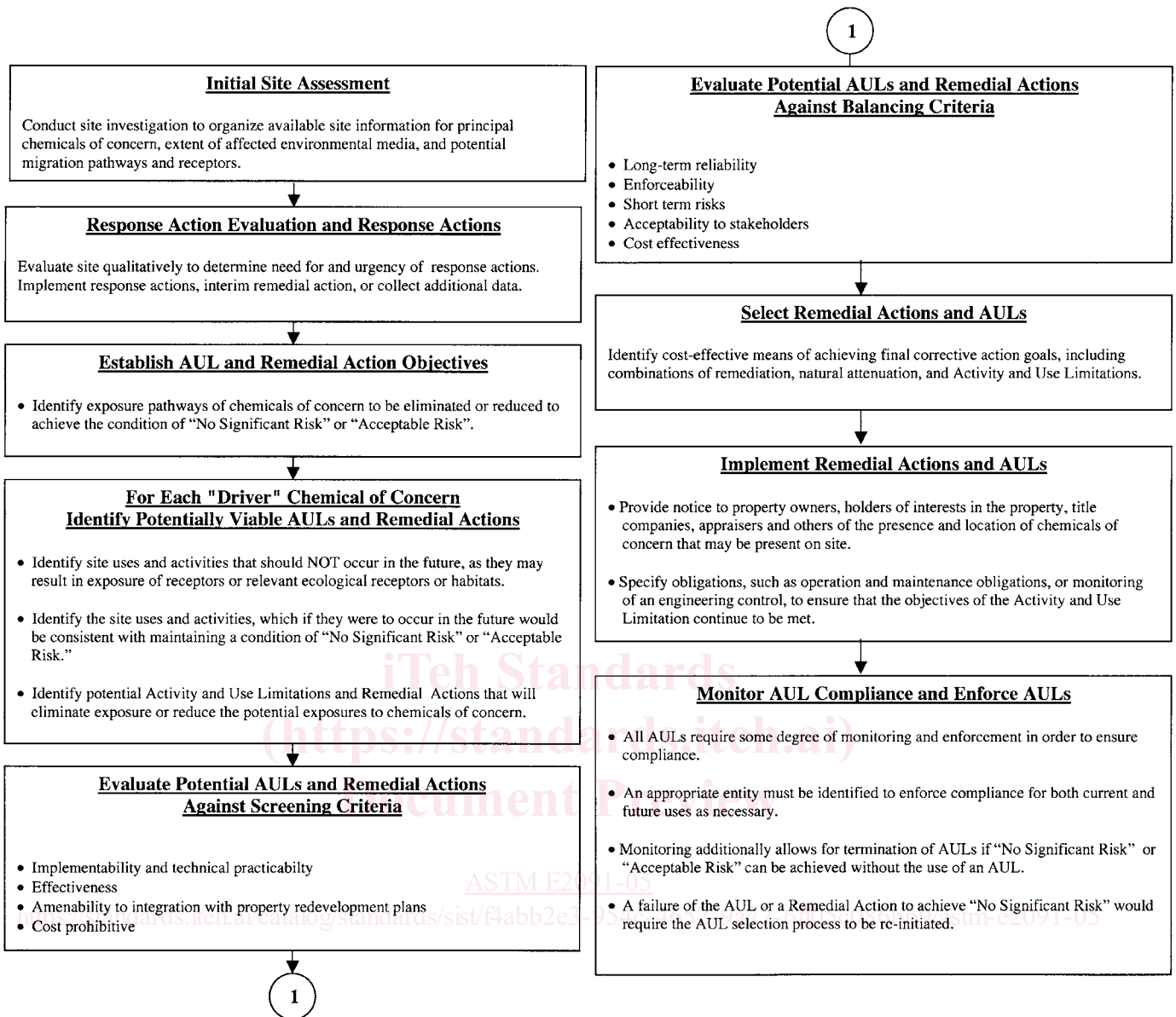


FIG. 1 Activity and Use Limitation Selection Process Flowchart

remedial action selection. The user is further cautioned to consult with the appropriate regulatory authorities and to determine whether other statutory or administrative requirements may apply.

5.2 *Goals and Objectives*—The user must identify the goals and objectives that the activity and use limitation is intended to achieve.

5.3 *Screening and Balancing Criteria*. The User is cautioned to examine the eight following criteria EARLY in the remedial action selection process: effectiveness; amenability to integration with property redevelopment plans; implementability; technical practicability; cost prohibitiveness; reliability over the long-term; acceptability to stakeholders; and cost-effectiveness.

5.3.1 *Introduction*—Initially, the user must determine which activity and use limitation (as part of a remedial action) is potentially applicable for each chemical of concern; for each

exposure pathway; for each exposure route; and for each potential receptor. For each of these potential scenarios, the user should apply the following screening and balancing criteria to determine which activity and use limitation, or combination of activity and use limitations, best addresses each exposure pathway, route of exposure, and likely receptors to achieve an “acceptable risk” or “no significant risk” level. The activity and use limitation, or combination of activity and use limitations, should be selected that best addresses the “driver” chemical(s) of concern, or principal receptor(s) for each exposure scenario. These “best” solutions should then be compared to determine whether redundant controls are necessary and appropriate, or whether a single type of activity and use limitation will address all significant exposure scenarios. See Fig. 4(a) and 4(b). These examples are intended to be illustrative only and should not be considered to be applicable to every evaluation.

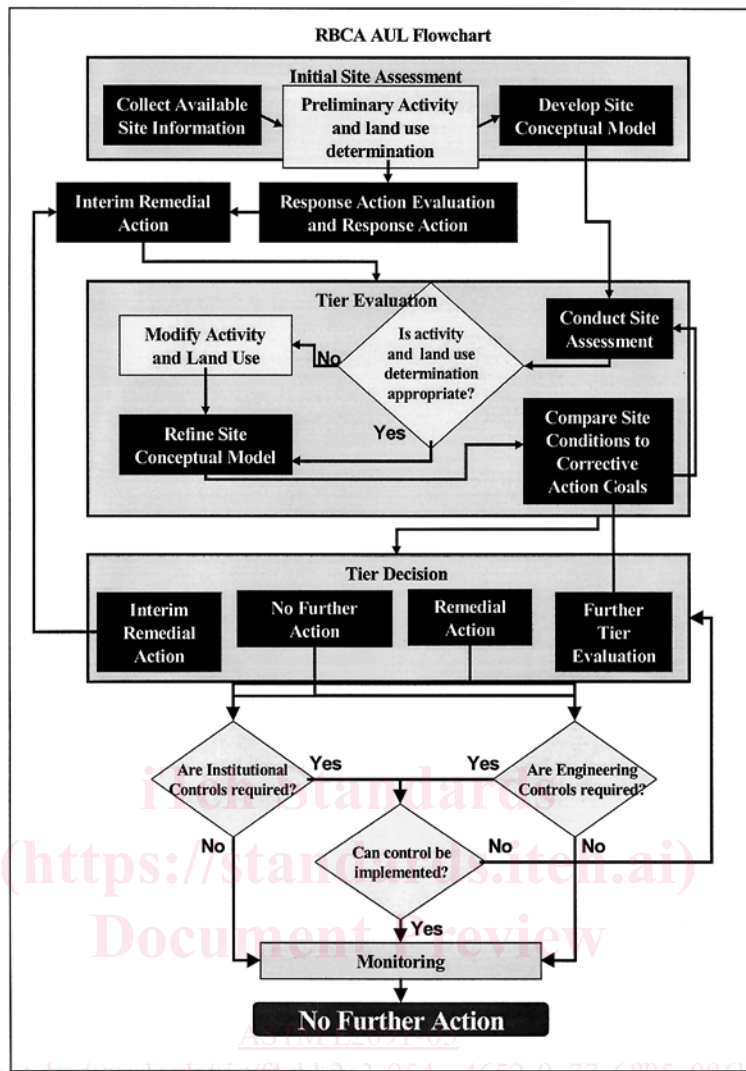


FIG. 2 RBCA AUL Flowchart

5.3.2 Suggested Screening Criteria:

5.3.2.1 *Effectiveness*—The user must determine whether the proposed activity and use limitation is likely to be effective, in both the short term and the long term, in eliminating or minimizing potential exposures to chemicals of concern, or in preventing activities that could interfere with the effectiveness of a response action, and to thereby maintain a condition of “acceptable risk” or “no significant risk”. For example, if potential exposure to chemicals of concern in the soil is the potential exposure pathway, an engineering control such as a cap may not be effective by itself and may need a complimentary institutional control to be effective over time.

5.3.2.2 *Amenability to Integration with Property Redevelopment Plans*—The user should determine the reasonably anticipated future use of the property, as well as regional and site-specific ground water uses, to be sure that any potentially applicable activity and use limitations are amenable to integration with property redevelopment plans. For example, if an area is being developed as residential or high-density residen-

tial, a restriction on residential use, or a limitation to industrial use, would not be amenable with the property’s redevelopment in that area.

5.3.2.3 *Implementability*—The user should evaluate early in the remedial action selection process whether a particular type of activity and use limitation can be implemented under applicable state and local law. For example, if there is off-site migration of ground water containing chemicals of concern, and the state does not have a statutory mechanism for implementing restrictions on ground water usage, there may be no practical way to implement activity and use limitations on numerous neighboring properties.

5.3.2.4 *Technical Practicability*—The user should determine whether the activity and use limitation is technically practicable. For example, an activity and use limitation that includes an engineering control, such as an impermeable cap that causes chemicals of concern to migrate onto an adjoining property, would not be technically practicable to limit the migration of impacted ground water.

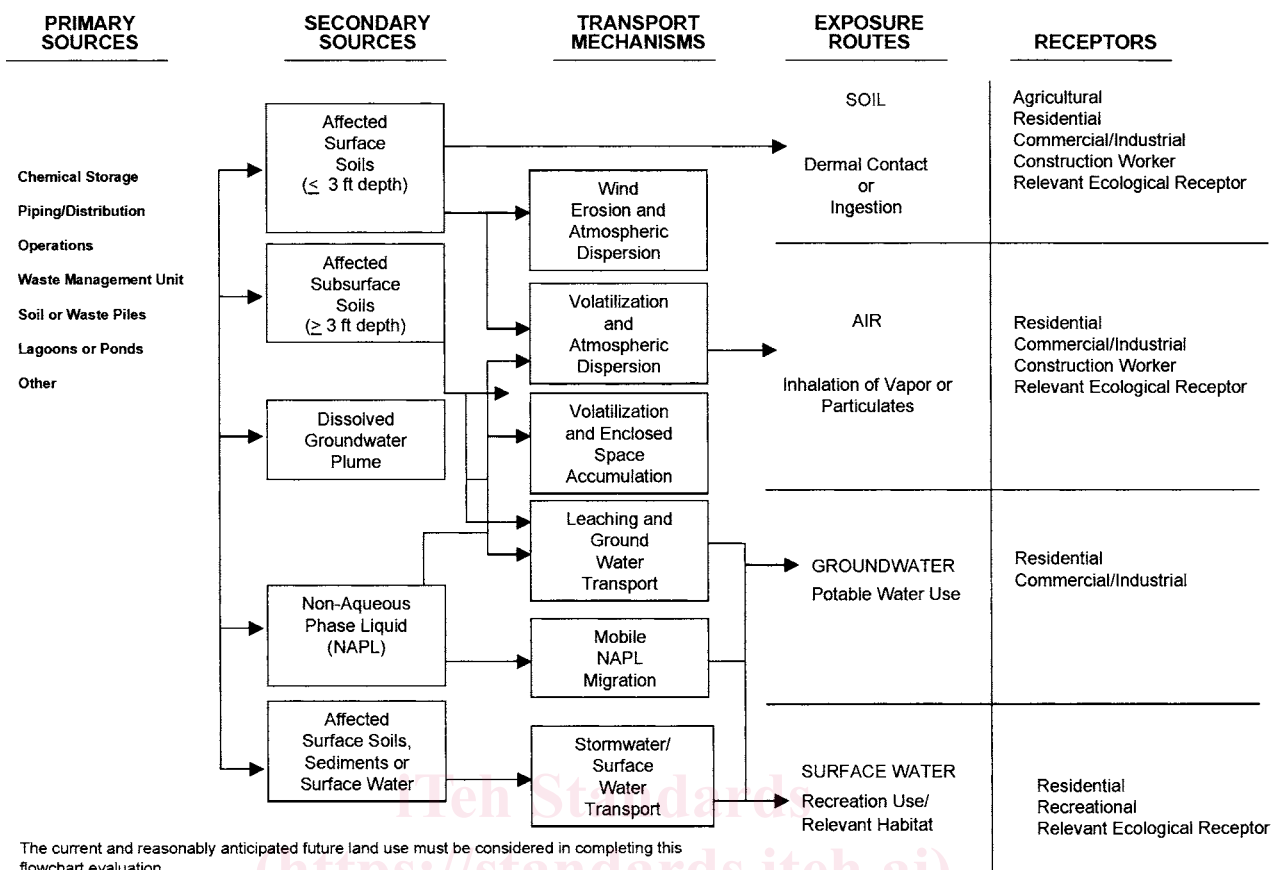


FIG. 3 Example Exposure Scenario Evaluation Flowchart

5.3.2.5 *Cost Prohibitiveness*—The user should examine both the short term and long term costs of a potentially applicable activity and use limitation to determine whether that restriction would be cost prohibitive to implement and maintain compared to the cost of doing additional active remediation. The costs of both implementing and maintaining the activity and use limitation should be weighed against the cost of conducting additional remediation. The potential for liability should also be considered. For example, if the property has already been subdivided and sold to numerous new owners, it may be cost prohibitive to impose restrictive covenants on each parcel that would need to be burdened with a soil excavation prohibition or a ground water use restriction.

5.3.3 *Suggested Balancing Criteria*—If the potentially applicable activity and use limitation survives the suggested screening criteria identified above, it is recommended that the activity and use limitation be evaluated against the balancing criteria identified below.

5.3.3.1 *Long-Term Reliability and Durability*—Certain activity and use limitations are viewed as being more reliable over the long term than others. For example, many people have expressed concern that zoning may not be reliable over the long term to eliminate or minimize potential exposures to chemicals of concern, or to prevent activities that may interfere with the effectiveness of a response action. In addition, state laws may limit the durability and enforceability of specific types of activity and use limitations. Some governmental jurisdictions have renewal clauses in rules where a restriction

expires or must be rewritten within a given time frame. For example, in Iowa, restrictive covenants must be renewed every 21 years. In addition, title searches typically go back only 40 to 60 years unless a request is made to look back further in time in the property records. Therefore, if activity and use limitations are expected to remain in effect over a long period of time, this issue needs to be considered and addressed in the title search context. The greater the risk of exposure to chemicals of concern over a long period of time (e.g., exposure to chemicals of concern that do not attenuate naturally, or that are persistent chemicals of concern, or that otherwise present a substantial risk to human health or the environment), the greater the need to address these issues.

5.3.3.2 *Acceptability to Stakeholders*—The user should consider the advantages of involving affected stakeholders early in the remedial action selection process in the decision to implement and maintain activity and use limitations at a site. Stakeholders may include, but are not necessarily limited to, Federal agency officials; Indian tribes; state agency officials; local government officials; all potentially responsible parties; the environmental community; the business community (local businesses, tenants, lenders, etc.); utilities; and residents. The potentially affected stakeholders need to understand the exposure assumptions underlying the potentially applicable activity and use limitations; why activity and use limitations may be appropriate; and how those restrictions will be implemented and maintained over time. The local community, including local government officials, local businesses, and residents, may

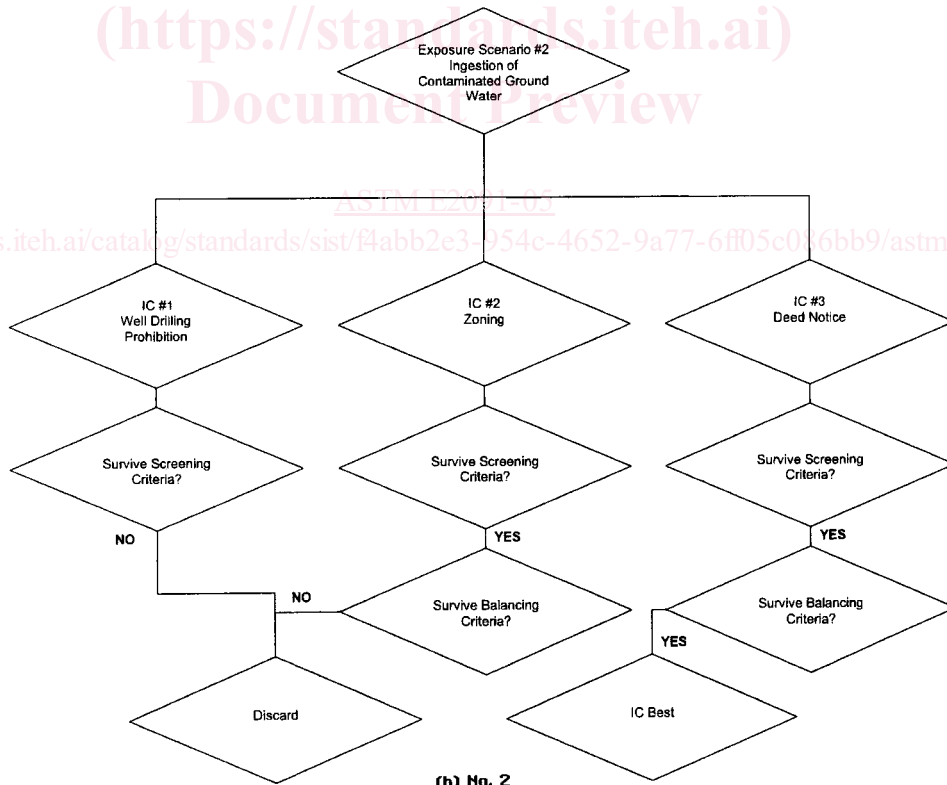
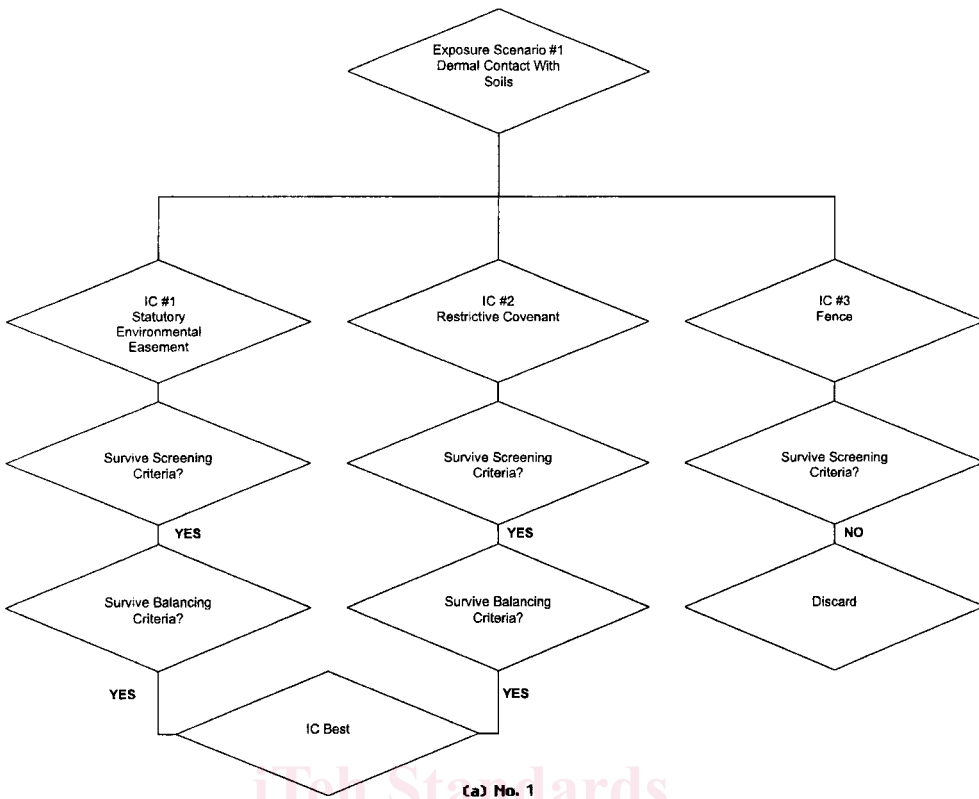


FIG. 4 Exposure Scenarios