This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

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Standard Guide for Use of Activity and Use Limitations, Including Institutional and Engineering Controls[1]

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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.

1. Scope

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 and screening and balancing criteria to select one or more *activity and use limitations* for a specific *site*. The guide also describes some "best practices" from a transactional, stakeholder involvement, and long-term stewardship perspective. The guide also emphasizes the importance of considering the need

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for, and potential applicability of, *activity and use limitations* EARLY in the *remedial action* process. This guide can be used to effectively implement risk based *corrective action*.

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 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

E1689 Guide for Developing Conceptual Site Models for Contaminated Sites

E1848 Guide for Selecting and Using Ecological Endpoints for Contaminated Sites

E2081 Guide for Risk-Based Corrective Action

E2205 Guide for Risk-Based Corrective Action for Protection of Ecological Resources

E2247 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property

E2435 Guide for Application of Engineering Controls to Facilitate Use or Redevelopment of Chemical-Affected Properties

E2616 Guide for Remedy Selection Integrating Risk-Based Corrective Action and Non-Risk Considerations

E2790 Guide for Identifying and Complying With Continuing Obligations

E2876 Guide for Integrating Sustainable Objectives into Cleanup

2.2 *USEPA Documents:*[3]

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

EPA, A Citizen's Guide to Understanding Institutional Controls at Superfund, Brownfields, Federal Facilities, Underground Storage Tank, and Resource Conservation and Recovery Act Cleanups (March 2005)

EPA, Long Term Stewardship: Ensuring Environmental Site Cleanups Remain Protective Over Time (September 2005)

EPA, National Strategy to Manage Post Construction Completion Activities at Superfund Sites (October 2005)

EPA, "Enforcement First" to Ensure Effective Institutional Controls at Superfund Sites (March 2006)

EPA. Ensuring Effective and Reliable Institutional Controls at RCRA Facilities, September 2007

Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance" OSWER Directive 9355.7-18, September 2011

Enforcement Discretion Guidance Regarding the Affiliation Language of CERCLA's Bona Fide Prospective Purchaser and Contiguous Property Owner Liability Protections, September 2011

Enforcement Discretion Guidance Regarding Statutory Criteria for Those Who May Qualify as CERCLA Bona Fide Prospective Purchasers, Contiguous Property Owners, or Innocent Landowners ("Common Elements"), (July 2019)

Superfund Liability Protections for Local Government Acquisitions after the Brownfields Utilization, Investment, and Local Development Act of 2018 (June 2020)

Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites; OSWER 9355.0-89 December 2012

Institutional Controls: A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77 December 2012

Implementing Institutional Controls in Indian Country, Office of Site Remediation Enforcement, Office of Enforcement and Compliance Assurance November 2013

State Brownfields and Voluntary Response Programs, EPA-42-F-14-215, December 2014

Cleaning Up Brownfields Under State Response Programs – Getting to No Further Action, EPA 560-K-16-002, August 2016

2.3 *Other Documents:*

American Bar Association Implementing Institutional Controls at Brownfields and Other Contaminated Sites (Edwards, 2nd ed., 2012)

NCCUSL (National Conference of Commissioners on Uniform State Laws), UECA Legislative Update[4]

ASTSWMO, State Approaches To Monitoring And Oversight of Land Use Controls (October 2009)[5]

[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 National Service Center for Environmental Publications (https://.nepis.epa.gov).

[4] Available at http://www.uniformlaws.org/LegislativeMap.aspx?title=Environmental%20Covenants%20Act

[5] Available from Association of State and Territorial Solid Waste Management Officials (ASTSWMO), 444 North Capitol Street, NW, Suite 315, Washington, DC 20001, http://www.astswmo.org.

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10 CFR 20.1402 and 20. 1403 Energy—Radiological Criteria for Unrestricted Use; Criteria for License Termination under Restricted Conditions[3]

10 CFR 30.36(d), 40.42(d), 50.82(a) and (b), 70.38(d), and 72.54 Energy—Expiration and Termination of Licenses[3]

10 CFR 830 Energy—Nuclear Safety Management[3]

40 CFR 300.430(a)(1)(iii)(D) Protection of Environment National Oil and Hazardous Substances Pollution Contingency Plan[3]

40 CFR 761.61(a), 761.61(a)(3)(i), 761.61(a)(7), and 761.61(a)(8) Protection of Environment—Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions—PCB Remediation Waste[3]

40 CFR 761.75(b)(1)(ii) through (b)(1)(v) Protection of Environment—Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions—Chemical Waste Landfills[3]

42 USC 9620(h)(3) Comprehensive Environmental Response, Compensation, and Liability Act[3]

Department of Defense Defense Environmental Restoration Program (DERP) Management Department of Defense MANUAL NUMBER 4715.20 March 9, 2012

Department of Energy Guidance for Developing and Implementing Institutional Controls for Long-Term Surveillance and Maintenance at DOE Legacy Management Sites, January 2015

Interstate Technology and Regulatory Council , Long-Term Contaminant Management Using Institutional Controls, December 2016

Weissman & Sowinski , Revitalizing the Brownfields Revitalization and Restoration Act: Harmonizing the Liability Defense Language to Achieve Brownfield Restoration, 33 VA. ENVTL. L.J. 257 (2015)

3. Terminology

3.1 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, E2205, E2790 and Practice E1527. 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.

3.2 *Definitions of Terms Specific to This Standard:*

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

3.2.2 *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, or environmental receptors that may be exposed to *chemicals of concern*.

3.2.3 *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.

3.2.4 *all appropriate inquiries*—an inquiry conducted prior to the date of acquisition of the *property* constituting "*all appropriate inquiries* into the previous ownership and uses of the *property* consistent with good commercial and customary practice" as defined in CERCLA, 42 U.S.C. 9601(35)(B), and in EPA's regulations, 40 C.F.R. Part 312, that will qualify a party to a commercial real estate transaction for one of the threshold requirements that an owner of commercial real estate must satisfy in order to be eligible for any of the *Landowner Liability Protections* under CERCLA (42 U.S.C. 9601(35)(B), 9607(b)(3), 9607(q), and 9607(r)), assuming compliance with other elements of the defense.

3.2.5 *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*.

3.2.6 *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 (for example, the attributes of a well might include depth and gallons per minute). A column in a *database* table.

3.2.7 *bona fide prospective purchaser (BFPP)*—a person who meets the criteria set forth in CERCLA 101(40) (42 U.S.C. 9601(40)) qualifies as a *bona fide prospective purchaser*. Generally, a *BFPP* can be a person who purchases property knowing that it is already contaminated. Among other requirements, *BFPPs* must make *all appropriate inquiries* into the previous ownership and uses of the *property* prior to acquiring the *property* and all disposal of *hazardous substances* at the property must have occurred prior to acquisition. The *property* must have been acquired after January 11, 2002.

3.2.8 *Brownfields Amendment of 2002*—amendments to CERCLA contained in the Small Business Liability Relief and Brownfields Revitalization Act, Pub. Law No. 107–118 (2002), 42 U.S.C 9601 *et seq*.

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

3.2.10 *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 human health risk.

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

3.2.12 *contiguous property owner (CPO)*—a person who meets the criteria set forth in CERCLA 107(q)(1)(A) (42 U.S.C. 9607(q)(1)(A)) qualifies as a *contiguous property owner*. *Contiguous property owners* are persons who own *commercial real estate* that is contiguous to and that is or may be contaminated by *hazardous substances* from other *property* not owned by that person.

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

3.2.14 *continuing obligations*—those obligations that a purchaser must satisfy post-closing in order to maintain one of the *Landowner Liability Protections (LLPs)* offered under the Brownfields Amendments of 2002. These obligations include the requirement to (*1*) be in compliance with any *land use restrictions* established or relied on in connection with the *response action* at the *facility*, (*2*) not impede the effectiveness or integrity of any *institutional controls* employed in connection with a *response action*, (*3*) take *reasonable steps* with respect to releases of *hazardous substances*, including stopping continuing releases, preventing threatened future releases, and preventing or limiting human, environmental or natural resource exposure to prior releases of *hazardous substances*, (*4*) provide full cooperation, assistance and access to persons who are authorized to conduct *response actions* or natural resource restoration at a property, (*5*) comply with information requests and administrative subpoenas, and (*6*) provide legally required notices with respect to releases of any *hazardous substances* at a *property*. (See Guide E2790.)

3.2.15 *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*.

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

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

3.2.18 *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 *GISdatabase* 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.

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

3.2.20 *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.

3.2.21 *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 (for example, utility easements).

3.2.22 *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.

3.2.23 *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.

3.2.24 *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; see Guides E1848, E2205, E2616.

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

3.2.25.1 *Discussion*—Some states define this term differently. For example, Pennsylvania includes within its definition of *engineering controls* only those measures which control the movement of *chemicals of concern* through the environment (such as slurry walls, liner systems, caps, leachate collection systems and groundwater recovery trenches; See Guide E2435).

3.2.26 *environmental covenant*—a covenant adopted pursuant to a state's version of the *Uniform Environmental Covenants Act*. An *environmental covenant* has certain attributes, created by statute, that make it more reliable, durable and enforceable than most other types of *AULs*.

3.2.27 *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.

3.2.28 *exposure*—contact of an organism with *chemicals of concern* at the exchange boundaries (for example, skin, lungs,

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and liver) when the *chemicals of concern* are available for absorption or adsorption.

3.2.29 *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.

3.2.30 *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 (for example, air or water) are also included.

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

3.2.32 *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.

3.2.33 *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.

3.2.34 *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.

3.2.35 *global positioning system (GPS)*—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.

3.2.36 *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.

3.2.37 *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* (for example, *chemicals of concern* from soil through ground water to the *point(s) of exposure*).

3.2.38 *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.

3.2.39 *institutional control*—a legal or administrative mechanism designed to limit, prohibit, or condition the use of, or access to a *site* or *facility* (for example, *restrictive covenant*, *environmental covenant*, *easement* and zoning) to eliminate or minimize potential *exposure*(s) to *chemical(s) of concern*.

3.2.40 *land use restriction (LUR)*—a limitation placed on the use or enjoyment of real property. This term was used, but not defined, in the *Brownfields Amendments of 2002* ((42 U.S.C. 9601(35(A), 9601(40), 9607(q)(1)(A)(v)(I)) as one of the criteria with which a person must be in compliance in order to qualify for one of the *LLPs*. Specifically, a property owner must be "in compliance with any *land use restrictions* established or relied on in connection with the *response action* at the facility."

3.2.40.1 *Discussion*—See, for example, Edwards, *Land Use Restrictions and Institutional Controls under the Brownfields Amendments of 2002*, in American Bar Association, IMPLEMENTING INSTITUTIONAL CONTROLS AT BROWNFIELDS AND OTHER CONTAMINATED SITES, at pp. 119-20 (Amy L. Edwards ed.) (2d ed. 2012); Weissman & Sowinski, Revitalizing the Brownfields *Revitalization and Restoration Act: Harmonizing the Liability Defense Language to Achieve Brownfield Restoration*, 33 VA. ENVTL. L.J. 257, 279-307 (2015); EPA Interim Guidance Regarding Criteria Landowners Must Meet in Order to Quality for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA Liability (Common Elements).

3.2.41 *landowner liability protections (LLPs)*—the *landowner liability protections* established or modified by Congress under the 2002 Amendments to CERCLA, which include the *bona fide prospective purchaser*, *contiguous property owner*, and *innocent landowner* liability protections. See §§ 42 U.S.C. 9601(35)(A)-(B), 9601(40), 9607(b), 9607(q), and 9607(r).

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

3.2.42.1 *Discussion*—Spatial query is the process of selecting features based on location or spatial relationship (for example, select all monitoring wells within 300 ft of the river). Logical query is the process of selecting features whose attributes meet specific logical criteria (for example, 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.

3.2.43 *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 (for example, diffusion, dispersion, adsorption, chemical degradation and biodegradation).

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3.2.44 *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 (for example, a prohibition on excavation deeper than 10 ft).

3.2.45 *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 (for example, "*acceptable risk* level" or some similar term indicating that remedial measures have reached the target level for protecting human health and the environment).

3.2.46 *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 (see Guides E2616 and E2876). *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*.

3.2.46.1 *Discussion*—Culturally-important tribal resources may also drive *ORMC*, see EPA *Implementing Institutional Controls in Indian Country*, November 2013.

3.2.47 *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.

3.2.48 *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*.

3.2.49 *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.

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

3.2.51 *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*.

3.2.52 *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*.

3.2.53 *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.

3.2.54 *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.

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

3.2.56 *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.

3.2.57 *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.

3.2.58 *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*. (See Guide E2205.)

3.2.59 *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*.

3.2.60 *response action*—means action to respond or a response, as those terms are defined in CERCLA §101(25), 42 U.S.C. 9601(25), to releases of hazardous substances. Generally, *response action* operates as an umbrella term to cover any type of hazardous substance cleanup at a property, including "removal actions" and "remedial actions" as those terms are defined in CERCLA §§101(23)-(24), 9601(23)-(24). *Response action* also covers *corrective action measures*, including *risk-based corrective action* measures, taken to address *chemicals of concern* in general, or under state cleanup programs or voluntary cleanup programs.

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3.2.61 *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.

3.2.62 *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*."

3.2.63 *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.

3.2.64 *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.

3.2.65 *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.

3.2.66 *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*.

3.2.67 *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.

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

3.2.69 *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.

3.2.70 *site assessment*—the characterization of a *site* through an evaluation of its physical and environmental context (for example, 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.

3.2.71 *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. This model may be developed using Guide E1689.

3.2.72 *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*.

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

3.2.74 *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*.

3.2.75 *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.

3.2.76 *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.

3.2.77 *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.

3.2.78 *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.

3.2.79 *technical policy decisions*—the choices specific to the User that are necessary to implement the risk-based *corrective action* framework described in Guides E2081 and E2205, 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,

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there may be more then 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.

3.2.80 *Uniform Environmental Convenant Act*—a model law adopted by the National Conference of Commissioners on Uniform State Laws in 2003. The model law must be enacted in individual states before a person can enter into an *environmental covenant* in that state.

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

3.2.82 *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* American Bar Association's *Implementing Institutional Controls at Brownfields and Other Contaminated Sites; 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 *Enforcement Discretion Guidance Regarding Statutory Criteria for Those Who May Qualify as CERCLA Bona Fide Prospective Purchasers, Contiguous Property Owners, or Innocent Landowners ("Common Elements")*; EPA's *Superfund Liability Protections for Local Government Acquisitions after the Brownfields Utilization, Investment, and Local Development Act of 2018*); 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* identified in the conceptual *site* model.

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*, as an integral component of the *corrective action* plan for *site* remediation plan;

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, including any periodic statements or certification(s) of compliance; 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 (for example, 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 or her agent.

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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 and E2247, 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, and E2247, 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. In Alabama, the statutory limitation of liability is contingent upon the applicant's good faith implementation of the Voluntary Property Assessment ("VPA") and/or Voluntary Cleanup Plan ("VCP") as approved by the Alabama Department of Environmental Management ("ADEM"). See ALA. CODE § 22-30E-10 (current through the end of the 2010 Regular Session). However, such limitation of liability in Alabama's *corrective action* program will not apply to any activities conducted before ADEM's approval of the VPA, VCP, or Letter of Concurrence with a Certification of Compliance, whichever occurs first. See also ALA. CODE §§ 22-30E-1 to -13 (current through the end of the 2010 Regular Session). Georgia has a similar exception to a statutory limitation of liability. See GA. CODE ANN. § 12-8-207 (current through the 2010 Regular Session). Georgia's limitation is contingent upon the prospective purchaser's good faith implementation of the *corrective action* plan as approved by the Georgia Environmental Protection Division ("EPD") as well as the certification of compliance with the risk reduction standards and *corrective action* requirements. See also GA. CODE ANN. §§ 12-8-100 to -108, 12-8-200 to -210 (current through the 2010 Regular Session). In Mississippi, liability protection is afforded to a brownfield party engaged in voluntary remediation. See MISS. CODE ANN. § 49-35-15(5) (current through the 2009 3rd Extraordinary Session). However, the liability protection in Mississippi applies as long as the brownfield party does not violate its brownfield agreement with the Mississippi Department of Environmental Quality ("MDEQ"). See also MISS. CODE ANN. § 49-35-1 to -53 (current through the 2009 3rd Extraordinary Session).

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* (for example, 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 (see *Institutional Controls: A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites, December 2012*).

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, the conditions under which the restriction may be removed or terminated, 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:*

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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 (for example, 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* (for example, dermal, ingestion, inhalation); the pathways of *exposure* (for example, air, surface water, ground water, soil); the likely *receptors* (both human and

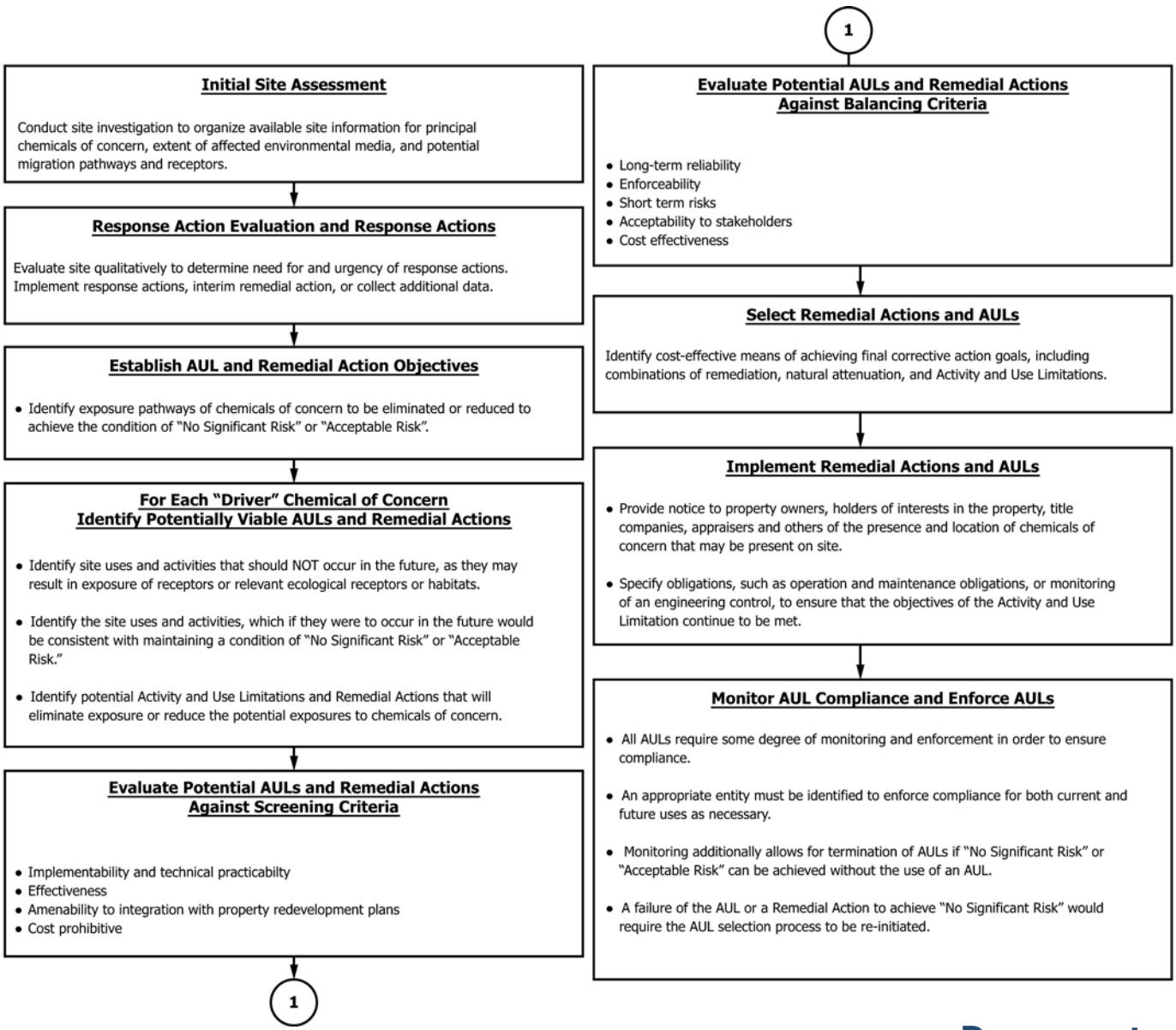

FIG. 1 Activity and Use Limitation Selection Process Flowchart

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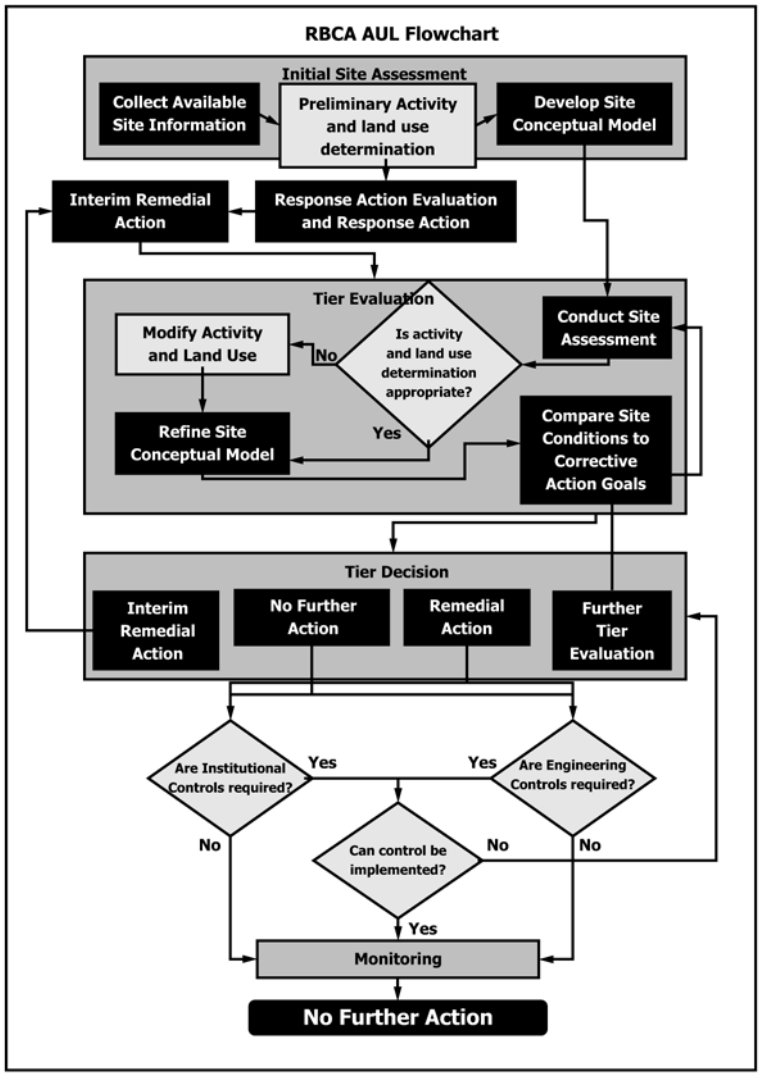

FIG. 2 RBCA AUL Flowchart

ecological); and the *reasonably anticipated future use* of the *site* (for example, industrial; commercial; mixed use; residential; day care). *See* Fig. 3. The *user* is advised to review Guides E2081 and E2205, 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 *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 (See Guide E2616 as well as USEPA's *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites; December 2012* and *Institutional Controls: A Guide to Preparing Institutional Control Implementation and Assurance Plans at Contaminated Sites; December 2012*).

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

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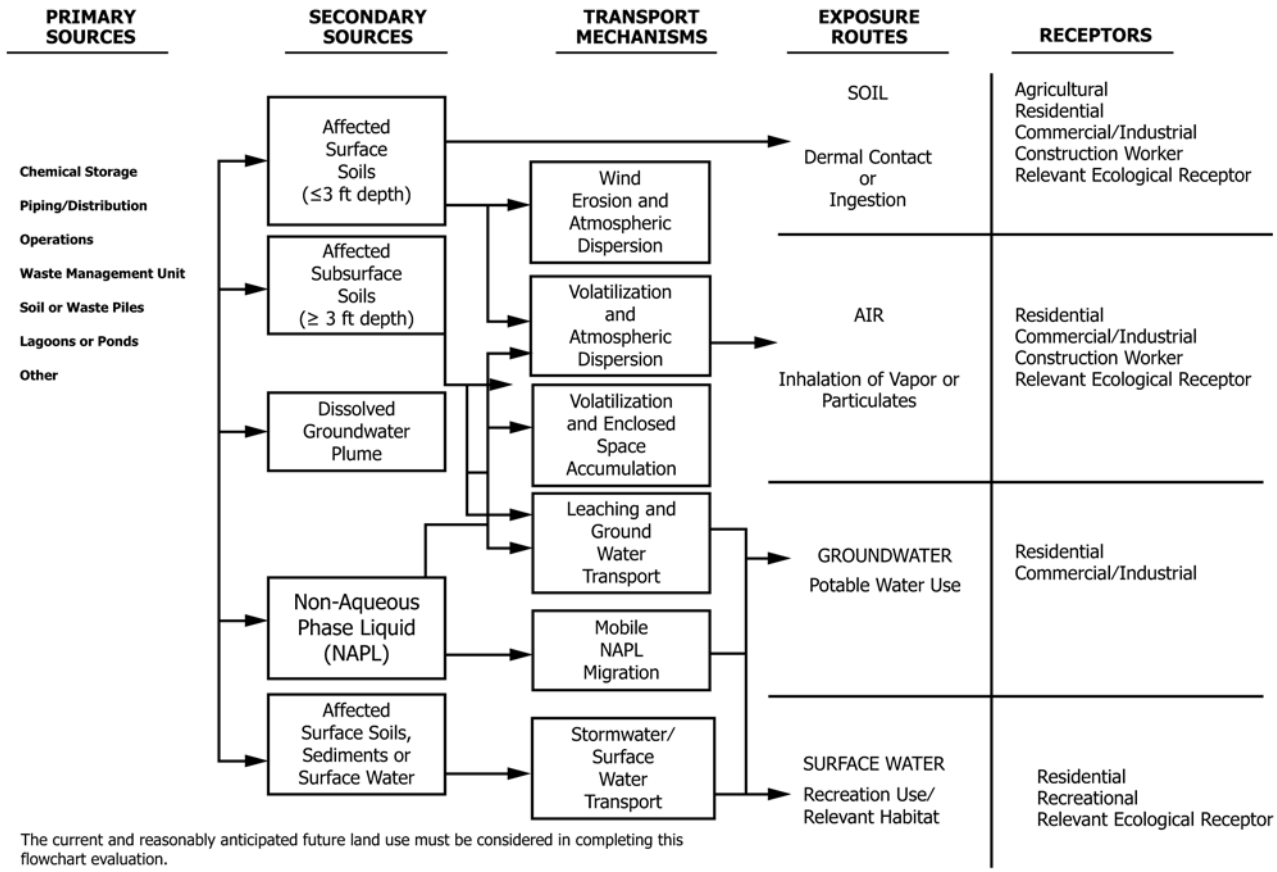

FIG. 3 Example Exposure Scenario Evaluation Flowchart

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.

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 residential, 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.

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 is

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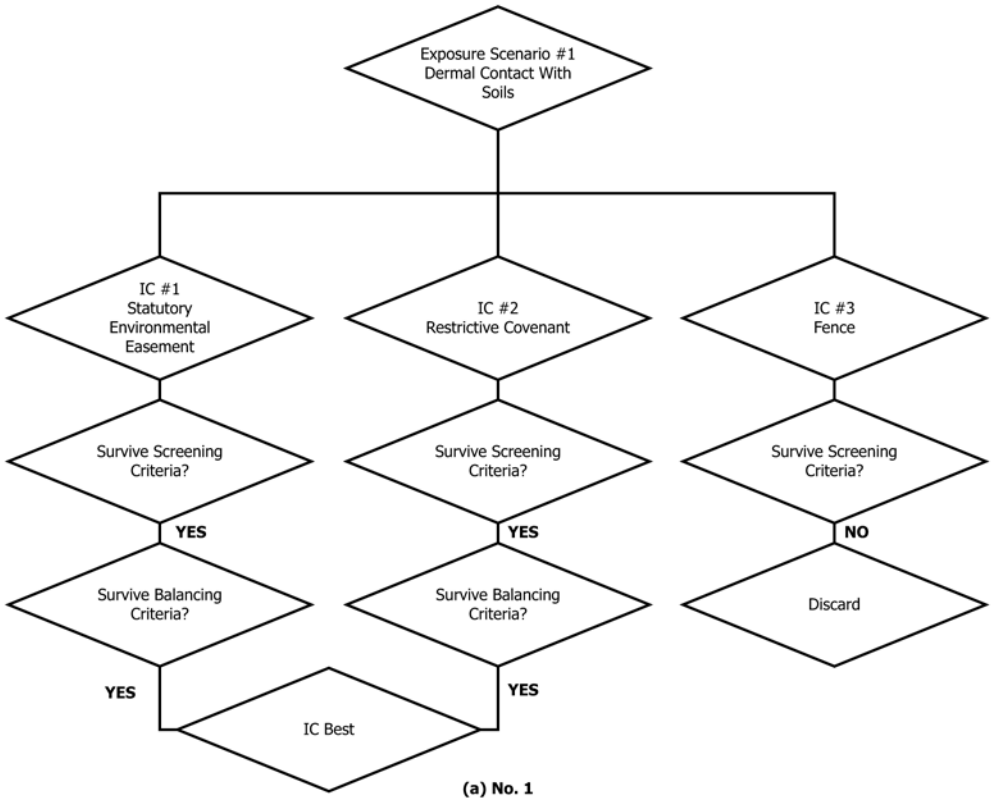

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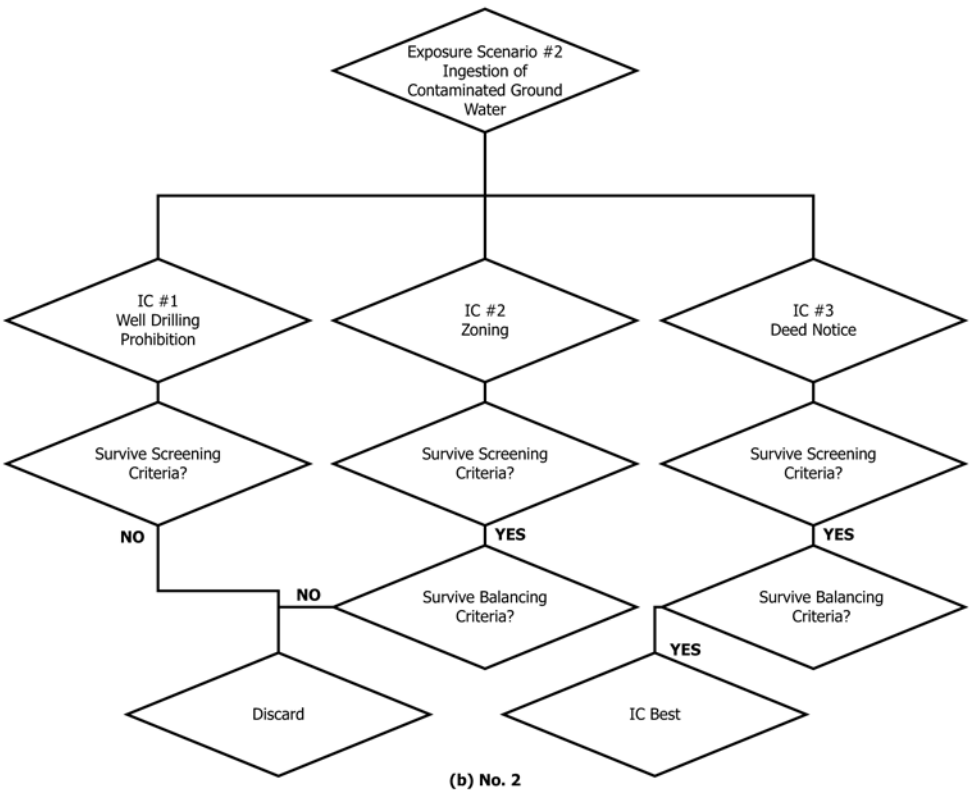

(b) No. 2

FIG. 4 Exposure Scenarios

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