Glossary

This section presents definitions of terms in this report.

Baseline. The condition of a natural resource that would have existed but for the release of hazardous substances. Baseline conditions are not necessarily pristine or optimal conditions. See 43 CFR § 11.14(e).

CDPHE. The Colorado Department of Public Health and Environment, the State agency responsible for hazardous waste site compliance and oversight.

CERCLA. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 USC § 9601 to § 9675). This Act, commonly referred to as "Superfund," is the statutory basis for natural resource damage assessment.

Compensable value. The amount of money required to compensate the public for the loss in services provided by the injured resources between the time of the release and the time the resources and the services those resources provided are fully returned to their baseline conditions. The compensable value includes the value of lost public use of the services provided by the injured resources, plus lost nonuse values such as existence and bequest values. See 43 CFR § 11.83(c).

Damages. The amount of money needed to assess injury and to restore injured natural resources. Damages are sought from the responsible parties. Past damages accrue from the earliest point that injuries from releases can be determined, or authorization of the statute (December 1980 for CERCLA), to the present. Future damages include interim damages, which run from the present until restoration actions return injured resources to baseline conditions. Residual damages, a component of interim damages, accrue after remedial activities have ceased, if the remediation did not fully restore natural resources services to baseline levels.

Discounting. An economic procedure that weights past and future benefits or costs such that they are comparable with present benefits and costs. Discounting converts benefits or costs from different years so that they are mutually comparable.

Discount rate. The rate at which the future is discounted, i.e., the rate at which the future does not count as much as the present. Economists generally agree that the discount rate on social investments such as natural resource services is 3%.

DOI NRDA Regulations. Regulations promulgated by the U.S. Department of the Interior, pursuant to CERCLA, at 43 CFR Part 11.

Exposure. Contact between a hazardous substance or oil and a natural resource. Exposure alone does not constitute an injury, but exposure to a hazardous substance (or byproduct) is necessary to cause an injury. Pursuant to the DOI Regulations, 43 CFR § 11.14(q), exposure occurs when all or part of a natural resource is, or has been, in physical contact with oil or a hazardous substance, or with media containing oil or a hazardous substance.

Groundwater. Groundwater is defined as any water not visible on the surface of the ground under natural conditions; CRS 37-90-103(19).

- Tributary groundwater is hydraulically connected to the surface waters of a stream, and is classified as if it were surface water, subject to the constitutional right of prior appropriation (see below). Colorado Ground Water Com'n v. North Kiowa-Bijou Groundwater Management Dist., 2003, 77 P.3d 62.
- Nontributary groundwater means groundwater having no hydrological connection to surface water; it is administered on the basis of overlying land ownership and is exempt from the doctrine of prior appropriation. See State Dept. of Natural Resources v. Southwestern Colorado Water Conservation Dist., 671.P.2d 1294 (Colo. 1983).
- Not-nontributary groundwater means "... ground water located within those portions of the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers that are outside the boundaries of any designated groundwater basin... the withdrawal of which will, within one hundred years, deplete the flow of a natural stream... at an annual rate of greater than one tenth of one percent of the annual rate of withdrawal" CRS 37-190-103(10.7).

Habitat. The physical, chemical, and biological attributes that together provide basic needs for plant and animal species and communities of organisms. Habitat includes temperature, moisture, light, structural features such as stream banks and trees, food sources, and nesting, hiding, and thermal cover. The term can be used to define surroundings on almost any scale from very large regions to very small microhabitats.

Habitat equivalency analysis (HEA). An accounting model used to calculate the service losses from past, ongoing, and future injuries (the debit side of the model) and the future service gains from proposed restoration needed to equal the debit (the credit side of the model). HEA is used in cases of habitat injury when the service loss of the injured habitat is comparable to the service gain that will be provided by the replacement habitat.

Harmonic mean. The harmonic mean is calculated by dividing the number of values in a data set by the sum of the reciprocals of those values. It is a more representative central tendency value for skewed data sets than is the geometric mean.

Hazardous substances. Hazardous substances include metals, solvents, pesticides, and other contaminants as specified in Section 101.14 of CERCLA.

Injury. Injury to natural resources is a measurable adverse effect on a physical, biological, or chemical quality of a natural resource. Injuries can occur directly or indirectly. Categories of injury include, but are not limited to, adverse changes in survival, growth, and reproduction; health, physiology and biological conditions; behavior; community composition; ecological processes and functions; physical and chemical habitat quality or structure; and public services. Injury means a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a discharge of oil or release of a hazardous substance, or exposure to a product of reactions resulting from the discharge of oil or release of a hazardous substance. As used in this part, injury encompasses the phrases "injury," "destruction," and "loss." See 43 CFR § 11.14(v) and 43 CFR § 11.62.

Integrated Endangerment Assessment/Risk Characterization (IEA/RC). The combined human health risk assessment and ecological risk assessment performed as part of the RI/FS at the Arsenal. The report estimated the magnitude of possible exposure and risk to human and ecological receptors. The Army issued the final report in July 1994.

Interim losses. Interim losses accrue from the time of release of the hazardous substance or 1981, whichever is later, until restoration is complete. See 43 CFR § 11.80(b).

Interim Response Action (IRA). A series of 14 response actions at the Arsenal that were identified before the final On-Post FS or Record of Decision. The IRAs were intended to clean up areas of serious contamination before the final remedy was selected or implemented but were intended to be consistent with the final remedy.

Natural resource. Surface water, groundwater, air, geologic resources, and biological resources. See 43 CFR § 11.14(z). Biological resources include those natural resources referred to in section 101(16) of CERCLA as fish and wildlife and other biota. Fish and wildlife include marine and freshwater aquatic and terrestrial species; game, nongame, and commercial species; and threatened, endangered, and State sensitive species. Other biota encompass shellfish, terrestrial and aquatic plants, and other living organisms not otherwise listed in this definition. See 43 CFR § 11.14(f).

Natural resource damage assessment (NRDA). The process of collecting, compiling, and analyzing information to determine damages for injuries to natural resources due to the release of hazardous substances. The purpose of NRDA is to determine the amount of damages necessary to compensate the public for loss of resources and services provided by natural resources resulting from releases of hazardous substances. This compensation comes in the form of

restoration or replacement of injured resources, or acquisition of equivalent resources, paid for by the parties who caused the contamination.

NPL (**National Priorities List**). A list of the hazardous waste sites eligible for long-term remedial action under CERCLA (Superfund). Sites are added to the list through a formal process that evaluates the hazards associated with each site.

Pathway. The route or medium through which a hazardous substance travels from the source of discharge or release to the injured resource. See 43 CFR § 11.14(dd).

Preassessment Screen Determination (PASD). The PASD is a document containing determinations about whether a discharge or release of a hazardous substance warrants conducting a NRDA; it "ensure[s] that there is a reasonable probability of making a successful claim." 43 CFR § 11.23(a)(b). The PASD is not intended to serve as an actual assessment of natural resource injuries or damages.

Prior appropriation. The doctrine of prior appropriation is constitutionally mandated and codified in Colorado statutes. See COLO. CONST. art. XVI § 5 and CRS § 37-92-102, and simplistically means first in time is first in right. The doctrine has its origins in the mining industry and the arid climate of the west.

Record of Decision (ROD). The document that details the decision-making process and the final selected remedy for an operable unit. The ROD describes the components of the remedy and includes regulatory determinations as required by CERCLA. See 42 USC §§ 121 *et seq.* and, generally, 40 CFR § 300.430.

Release. This term refers specifically to the release into the environment of a hazardous substance. It can mean a leak, a spill, an intentional disposal, the migration of contaminants (e.g., through wind dispersion).

Remedial Investigation/Feasibility Study (RI/FS). The remedial investigation and feasibility study process pursuant to the NCP that forms the basis for selection of a final remedy documented in a ROD. The RI/FS generally occurs before the NRDA process begins.

Remediation/remedy. An action that alleviates contamination or injury; cleanup actions.

Replacement or acquisition of the equivalent. The substitution for injured resources with other resources that provide the same or substantially similar services, when such substitutions are in addition to any substitutions made or anticipated as part of response actions, and when such substitutions exceed the level of response action determined appropriate to the site as described in the ROD. See 43 CFR § 11.82(b)(ii).

Resource equivalency analysis (REA). Similar to HEA but specifically used for scaling losses of resources such as fish, birds, and other wildlife, rather than losses of habitat.

Response actions. Activities taken to reduce threats from contaminants to acceptable levels. Short-term actions are generally termed *removals*, and long-term, final response actions are considered *remedial actions* [42 USC § 9601(23) and (24)]. Short-term response actions include initial response actions such as spill containment. Longer-term actions include permanent treatment or containment of contamination. Under CERCLA, remedial actions must be protective of human health and the environment.

Responsible party. Responsible parties (and potentially responsible parties) mean a person or persons described in or potentially described in one or more of the categories set forth in section 107(a) of CERCLA. 43 CFR § 11.14(kk). Responsible parties may be owners, operators, transporters, or generators of the hazardous substances that cause the contamination at a CERCLA site and that may cause injury to natural resources.

Restoration. Actions that help return injured resources to baseline conditions. Restoration can be accomplished by actual restoration or rehabilitation of resources, or by replacing or acquiring the equivalent of the injured resources and their services. The term "restoration" is shorthand for any such actions. Restoration should be distinguished from "remediation" or "response actions" undertaken pursuant to CERCLA to protect human health and the environment from the threat of hazardous substance releases. See 43 CFR § 11.14(ll).

Restoration and Compensation Determination Plan (RCDP). A document that describes possible alternatives for restoration, rehabilitation, replacement, and/or acquisition of equivalent resources and related services lost to the public. In the RCDP, the Trustees select an alternative, provide justification for the selection of that alternative, and identify the methodologies that will be used to determine the costs and the compensable value of the alternative to the public.

Section. A land section, one square mile, according to the Public Land Survey System for lands in the public domain, which began with the Land Ordinance of 1785 and the systematic survey of public lands, and the Northwest Ordinance of 1787, which established a rectangular survey system designed to facilitate the transfer of Federal lands to private citizens. At its largest extent, the Arsenal comprised sections numbering 1 through 12, 19 through part of 22, 23 through part of 28, and 29 through 36. Section 10 was later ceded to the City and County of Denver for the north-south runway of the old Stapleton International Airport, and since the cleanup, portions of the western tier 9 Section 9, 4, 33, and part of 28 have been sold.

Service flows. The services provided by a resource over time. For example, remediation and restoration activities can increase the service flows provided by a resource.

Services. The physical and biological functions performed by the resource, including any human use of those functions. 43 CFR § 11.14(nn). Natural resources provide ecological and human use and non-use services. Examples of ecological services include nutrient cycling, habitat, water storage and release, and erosion control. Examples of human use services include recreational use such as fishing, hiking, or bird watching, and extractive and consumptive uses, such as mining or grazing. Human non-use services include, for example, the appreciation people feel knowing that habitat is protected for wildlife and for enjoyment by future generations of humans.

Superfund. See CERCLA.

Target analytes. Chemicals or compounds selected for possible monitoring during the Arsenal RI and endangerment assessment. Initially, 666 chemicals and compounds were identified as related to Arsenal activities. Of these, a select subset of 88 compounds served as *target analytes* for the RI.

Trophic level. A group of organisms that occupy the same position in a food chain, or the position of an organism in the food chain. Levels are typically ranged according to how far particular organisms are along the chain from the primary producers (plants) at level 1, to herbivores (level 2), to predators (level 3), to carnivores or top carnivores (level 4 or 5).

Trustee. Any federal agency, state agency, or Indian Tribe that may prosecute a natural resource damage claim.

Water year. October 1 through September 30. October 1, 2007 is the start of water year 2008.