Anaconda Aluminum Co. Columbia Falls Reduction Plant (Columbia Falls Aluminum) Superfund Site

DRAFT NATURAL RESOURCE DAMAGE ASSESSMENT PLAN

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Prepared with assistance from

Industrial Economics, Incorporated (IEc)

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Executive Summary

The Anaconda Aluminum Company Columbia Falls Reduction Plant Superfund Site (the "Site"), in Flathead County, Montana, began operations as an aluminum reduction facility in 1955. Operations resulted in releases of hazardous substances including metals, organic contaminants, and other compounds into the environment. During operations (which ceased in 2009) and since operational closure, these contaminants have continued to be re-released and re-mobilized in the environment through a variety of physical, chemical, and biological processes.

Natural resources such as surface waters, sediments, soils, and biota have been exposed to these hazardous substances, causing potential natural resource injuries and losses to the services these resources provide (Trustees 2023). Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 United States Code §§ 9601, *et seq.*) and other applicable authorities, representatives from the State of Montana, the Confederated Salish and Kootenai Tribes, the U.S. Department of the Interior, and the U.S. Department of Agriculture (collectively, the Trustees) are conducting a Natural Resource Damage Assessment and Restoration process for the Site. The goal of that process is to restore, rehabilitate, replace, and/or acquire the equivalent of injured natural resources and associated services lost because of the release of hazardous substances, on behalf of the public. Such compensation may take the form of environmental restoration projects or monetary payments to be used by the Trustees to conduct environmental restoration.

Pursuant to the regulations at 43 C.F.R. Part 11 to conduct a Natural Resource Damage Assessment and Restoration process, the Trustees have prepared this Draft Assessment Plan, which describes how the Trustees intend to complete an assessment of potential natural resource injuries and determine natural resource damages (i.e., the amount of money potentially responsible parties will be required to pay for the costs of planning and implementing restoration projects to make the public whole for the injuries and service losses caused by their hazardous substance releases). The purpose of an Assessment Plan is to ensure that the assessment is performed in a planned and systematic manner and the proposed assessment activities can be conducted at a reasonable cost (43 C.F.R. § 11.30(b)).

This Plan provides introductory and background information about the Site, the Natural Resource Damage Assessment and Restoration process, the scope of the assessment, and the natural resources and resource services that are the focus of the assessment (Chapters 1-2). In addition, this Plan details the specific approaches the Trustees anticipate using to determine and quantify natural resource injuries and determine damages (Chapters 3-6). Appendix A presents a quality management plan to guide the Trustees and to ensure that decisions made in the Natural Resource Damage Assessment and Restoration process are based on information of which the quality is well understood and scientifically valid for its intended use.

The Trustees are seeking public comment on this Plan. The Trustees encourage active participation of the public in the assessment through the public comment process. After the public comment period, the Trustees will review all public comments received and address and respond to those comments, as applicable, in the Final Plan. The Final Plan will serve to guide the Trustees as they implement the assessment. Additional opportunities for public engagement are further described in Chapter 1.

CHAPTER 1 | Introduction

The Anaconda Aluminum Company Columbia Falls Reduction Plant (Columbia Falls Aluminum Company or "CFAC") Superfund Site (the "Site") is located approximately two miles northeast of the center of Columbia Falls in Flathead County, Montana. The Site includes Cedar Creek Reservoir to the north, Teakettle Mountain and the Cedar Creek Reservoir Overflow Ditch to the east, Flathead River to the south, and Cedar Creek to the west (Roux 2020a). Operations as an aluminum reduction facility began in the 1950s and continued until 2009. The CFAC industrial site property covers approximately 1,340 acres and included several buildings and industrial facilities, laboratories, landfills, leachate ponds, and percolation ponds – many of which were decommissioned in the 2010s as part of remedial efforts.

Operations at the Site resulted in releases of hazardous substances including metals and other inorganic ions and compounds, such as barium, flouride, and cyanide, respectively, as well as organic contaminants including phthalates, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs). As used in this Assessment Plan, "hazardous substances" also refers to "hazardous or deleterious substances" under Comprehensive Environmental Cleanup and Responsibility Act (CECRA), §§ 75-10-701(8), MCA. During operations and since operational closure, these contaminants have continued to be re-released and re-mobilized in the environment through a variety of physical, chemical, and biological processes resulting in the exposure of natural resources such as surface waters, groundwater, sediments, soils, and biota. This exposure to hazardous substances has resulted in short- and long-term natural resource injuries and potential losses to the services these resources provide including services to other natural resources in the ecosystem and services to humans who rely on, use, and value these resources (Trustees 2023).

WHAT IS NRDAR?

Natural Resource Damage Assessment and Restoration is a process to determine the appropriate amount and type of restoration needed to compensate the public for any harms (i.e., "injuries") to natural resources or the loss of ecological services resulting from the release of hazardous substances into the environment.

This document represents the CFAC Natural Resource Trustees' ("Trustees") Draft Natural Resource Damage Assessment Plan ("Plan"). This Plan describes the Trustees' approach to conducting a Natural Resource Damage Assessment and Restoration (NRDAR) for this Site, which includes assessing hazardous substance releases and the associated adverse impacts to natural resources and resource services. The Assessment Area will include anywhere that the contamination has come to be located from Site operations.

Separate and distinct from the environmental remediation of the Site, which is conducted by the United States Environmental Protection Agency (EPA), in consultation with the Montana Department of Environmental Quality (DEQ), this NRDAR process conducted by the Trustees will be performed in accordance with relevant federal, state, and tribal laws and regulations, discussed in the sections that follow, addressing compensation for the public for natural resource injuries and associated losses. Specifically, this Plan summarizes existing information available for the Site; describes the Trustees' approach to injury determination, injury quantification, and damages determination; and outlines ongoing and proposed activities to evaluate Site-related hazardous substance releases and subsequent effects on natural resources and the services they provide.

1.1 Authority to Conduct a Natural Resource Damage Assessment and Restoration

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authorizes federal, state, and tribal representatives to serve as trustees of public natural resources. In this role, trustees may assess and recover damages for natural resource injuries resulting from releases of hazardous substances or oil to the environment. Trustee entities for natural resources in and around the CFAC Site include:

- the Governor of the State of Montana, with the Montana Natural Resources Damage Program (NRDP) acting as his representative,
- the Confederated Salish and Kootenai Tribes (CSKT),
- the U.S. Department of the Interior (DOI), acting through the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Indian Affairs, and
- the U.S. Department of Agriculture (USDA), acting through the U.S. Forest Service (USFS).

Together, representatives from these entities constitute the CFAC NRDAR Trustee Council, or the Trustees. The Trustees' decision to conduct a NRDAR was detailed previously in the 2022 Pre-Assessment Screen Determination (Trustees 2023). The NRDAR will be conducted pursuant to CERCLA, as well as the federal Water Pollution Act (the "Clean Water Act" (CWA), 33 U.S.C. §§ 1251, *et seq.*), the Oil Pollution Act, 33 U.S.C. §§ 2701 *et seq.,* and CECRA.

Further, regulations have been promulgated to guide trustees in the assessment of natural resource injuries and damages. Under the authority of CERCLA and CWA, DOI issued regulations (43 C.F.R. Part 11; hereafter "CERCLA NRDAR regulations") for conducting NRDAR following the discharge of oil and/or the release of hazardous substances. The purpose of the regulations is "to provide standardized and cost-effective procedures for assessing natural resources damages" (43 C.F.R. § 11.11). When trustees complete an assessment according to these procedures, the results "shall be accorded the evidentiary status of a rebuttable presumption" (43 C.F.R. § 11.11). It is the Trustees' intent to pursue the damage assessment described in this Plan in accordance with the regulations at 43 C.F.R. Part 11.

KEY DEFINITIONS FROM THE CERCLA NRDAR REGULATIONS (43 C.F.R. § 11.14)

"**Natural resources** … means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States…, any State or local government, any foreign government…. These natural resources have been categorized into the following five groups: Surface water resources, ground water resources, air resources, geologic resources, and biological resources" (43 C.F.R. § 11.14(z)).

"**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" (43 C.F.R. § 11.14(v)).

"**Damages** means the amount of money sought by the natural resource trustee as compensation for injury, destruction, or loss of natural resources" (43 C.F.R. § 11.14(l)).

1.2 Site History

CFAC's total landholdings amount to approximately 3,196 acres. Of this, the area historically utilized for operations, along with a surrounding buffer zone, covers approximately 1,340 acres. The Site is bounded by and may include Cedar Creek Reservoir to the north, Teakettle Mountain to the east, Flathead River to the south, and Cedar Creek to the west (Figure 1). The Site is in the Flathead watershed approximately two miles northeast of the center of Columbia Falls, Montana, and 0.8 miles from the nearest residences. The Site generally slopes from the north to southwest direction towards the Flathead River, and ranges from approximately 3,020 to 3,535 feet above mean sea level (Roux 2020a).

The Site was used primarily as an aluminum reduction plant from 1955 to 2009, when all manufacturing or commercial activities stopped. The Site used the Hall-Héroult process and the Vertical Stud Soderburg technology to produce aluminum from alumina using an electrolytic reduction process in a series of cells, or pots, called potlines. The Site operations included offices, warehouses, laboratories, mechanical shops, a paste plant, coal tar pitch tanks, pump houses, a casting garage, and the building that housed the potlines (Roux 2020a).

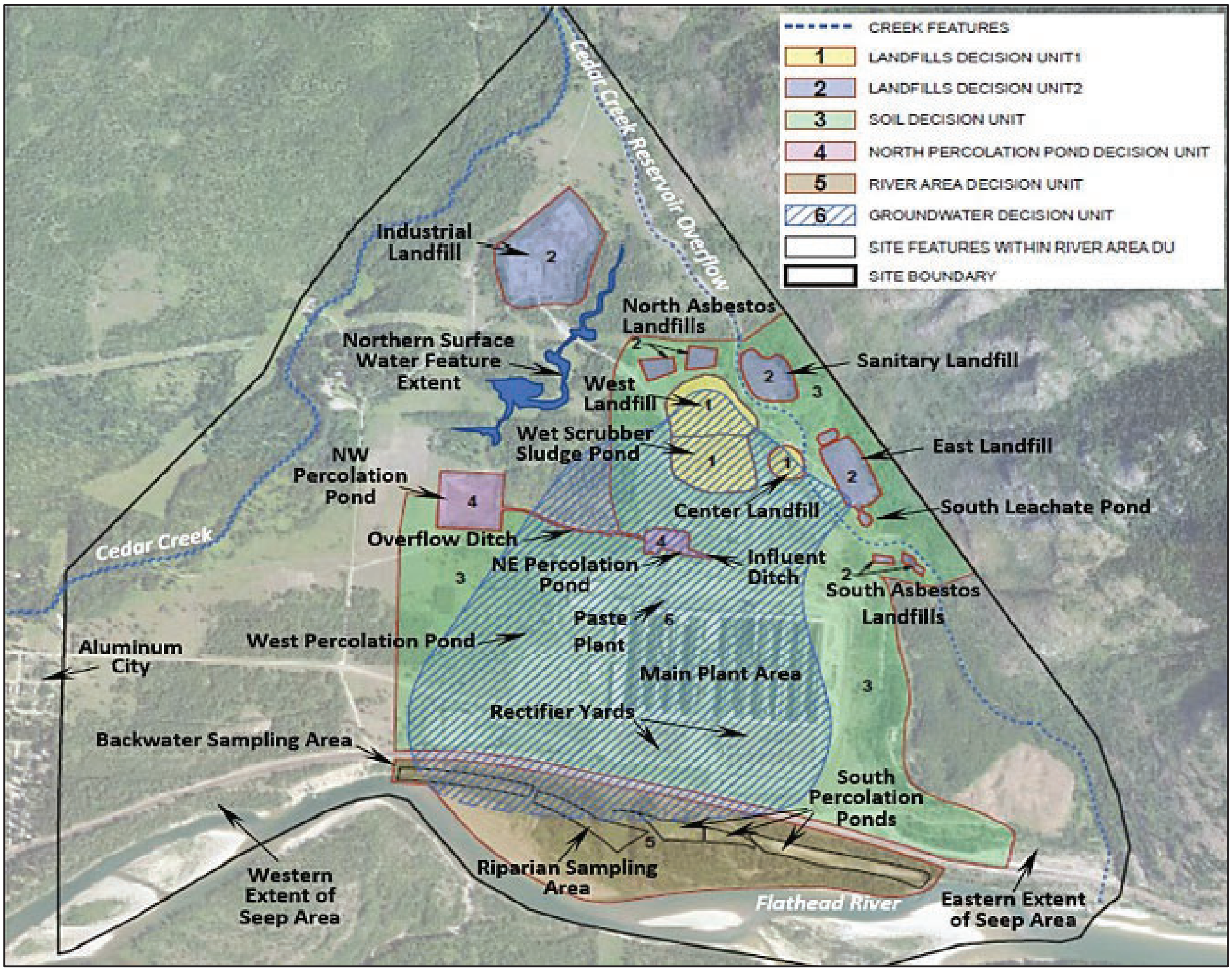
Prior to the 1950s, a lack of written documentation makes it difficult to determine the level of agricultural or residential activities that occurred in the area. The land the Site currently sits on was originally part of the aboriginal territory occupied by the Selis (Bitterroot Salish) Qlispe (Pend d'Oreilles) and Ksanka Band of the Ktunaxa Nation (Kootenai) Tribes. The land was ceded by the Tribes to the United States under the Hellgate Treaty of 1855, but the Tribes reserved the right to continue hunting, fishing, and gathering on the rivers and open and unclaimed lands within their aboriginal territory. This would include the Flathead River near the site and any USFS lands adjacent or near the site.

In 1955, the Anaconda Aluminum Company (AAC) acquired the Site and began industrial activity with two potlines, giving the Site an annual capacity of 67,500 tons of aluminum per year (Roux 2015). According to the U.S. Forest Service, AAC officials insisted minimal environmental harm would be caused by the emission of fluorides, but in 1957, the Supervisor of the Flathead National Forest wrote a letter describing an area of dying ponderosa pines in proximity to the reduction plant (Carlson and Dewey 1971). No further research was initiated until an additional three potlines were added sometime before 1968, increasing total aluminum production to 180,000 tons per year (Roux 2015). During this time, the U.S. Forest Service hired Clinton Carlson and Jerald Dewey to determine the cause and extent of vegetation impacts on forested lands near the CFAC property. Their report "Environmental Pollution by Fluorides in Flathead National Forest and Glacier National Park" cites the AAC as the primary cause of injury to vegetation via arial deposition of fluorides (Carlson and Dewey 1971). In 1970, growing public concern led to local residents filing a class action lawsuit against the AAC. It was dismissed without prejudice in 1973, but not before 600 plaintiffs joined the case, and the AAC invested in environmental controls to reduce fluoride emissions from 10,000 pounds per day to 861 (Tabish 2016). In November 1973, the EPA completed a Field Investigation of Fluoride in Glacier National Park (EPA-908/1-73-001). The EPA investigation found floral necrosis in Columbia Falls, on Teakettle Mountain, and in Glacier National Park (EPA 1973). In May 1977, the USDA requested that the United States Department of Justice (USDOJ) initiate litigation against Anaconda for the emission of fluorides onto the Flathead National Forest (USDA 1977). The letter requesting litigation stated potential recovery between $2,000,000 and $80,000,000. In 1978, the Atlantic Richfield Company acquired the Site. In November 1978, the United States filed suit to stop fluoride emissions from the Columbia Falls smelter at harmful levels onto Flathead National Forest and Glacier National Park. (Hanners 2017b). An Amended Complaint was filed in the suit on January 3, 1979, seeking: 1) an injunction against emitting fluorides at levels which result in floral injury or death; 2) damages for diminution in property value as a result of the past pollution; 3) treble damages for loss of timber; and, 4) damages for costs to address fire hazards on the relevant federal lands. The suit was dismissed in August 1980, with a preliminary agreement to settle the dispute via an acre-for-acre land swap (Hanners 2017b and Hanners 2017c). By 1982, the details of the settlement were still being negotiated, with the terms evolving to either a land exchange or a payment of $75,000. The exact terms of the settlement of the dispute are not known, however, on July 26, 1982, the U.S. Attorney's Office for the District of Montana received a check for $75,000 from ARCO labeled "payment in full of the compromise settlement agreement." Though certain environmental liabilities due to fluoride emissions may have been resolved through this settlement, aerial deposition of other hazardous substances and resuspension or migration of these hazardous substances may have occurred during operations and may have injured natural resources in the surrounding area.

Then, in 1985, the Montana Aluminum Investor's Corporation purchased the Site. Finally, CFAC acquired the Site in 1999 (Roux 2015). Glencore is CFAC's parent company. *Columbia Falls Aluminum Company, LLC v. Atlantic Richfield Co.* (No. 21-36042, 2023).

Site operations generated several waste products including spent potliner (SPL), described as a layer of "thick carbon bonded to an insulating layer containing fluoride, sodium, aluminum, and small amounts of cyanide" (Roux 2020a). The Site also generated emissions of particulate fluoride, hydrogen fluoride, and PAHs, mainly from the Paste Plant and potlines within the aluminum reduction facility (EPA 1989). Air pollution from aluminum production was initially controlled using wet scrubbers until 1976 when they were replaced with dry scrubbers. Sludge produced by the wet scrubbers was disposed of on-Site at the Wet Scrubber Sludge Pond. Operators disposed of solid waste primarily in eight on-Site landfills, seven of which are closed and one of which is still open but has not been used for industrial purposes since 2009 (note that the Industrial Landfill was used in 2021 for on-Site disposal of soil and sediment from the South Percolation Pond removal action (Roux 2021). In addition, there are two closed leachate ponds and several percolation ponds (Roux 2020a).

Figure 1. Map of the CFAC Site (EPA 2023)



Remedial investigations began in the 1970s and preliminary cleanup efforts began in the 1990s. In 1980, Hydrometrics, Inc. conducted an initial evaluation, which was followed by a preliminary Site assessment, conducted by Ecology and Environment, Inc. in 1984. After 4,000 gallons of dielectric fluid were released in the West Rectifier Yard in 1991, Olympus Environmental excavated soil and shipped it to an approved off-Site disposal facility. In 1994, additional remedial efforts took place after an estimated 3-4 gallons of PCBs were released from two capacitors in the West Rectifier Yard.

HISTORY OF DISCHARGE PERMIT VIOLATIONS AT THE SITE

In 1984, the Montana Department of Health and Environmental Sciences (MDHES) issued a permit allowing specific monitored discharges of groundwater, but not groundwater degradation beyond the Site. Under this permit, leachate from the aluminum reduction process was discharged into the Wet Scrubber Sludge Pond five times. In 1994, MDHES issued a Montana Pollutant Discharge Elimination System (MDPES) permit for processed wastewater discharges to specific ponds and groundwater and requiring tracking of cyanide concentrations. However, the Montana Department of Environmental Quality (DEQ) subsequently identified groundwater contamination and elevated cyanide levels in seeps discharging to the Flathead River from the Site, which DEQ classified as unauthorized discharges. In 1996, the U.S. Environmental Protection Agency (EPA) issued a Notice of Violation under the CWA, followed by DEQ's Notice of Violation under the Montana Water Quality Act in 1997. In response, DEQ allowed CFAC to modify its permit to create a "mixing zone" allowing higher cyanide levels in the Flathead River and reissued the permit in 1999. The mixing zone was effectively eliminated in 2014 with another revised MPDES permit. Although CFAC appealed, the permit was terminated in 2019 due to the Site's closure (Trustees 2023). All industrial facilities were decommissioned completely by the third quarter of 2019, but seepage from the Site into the Flathead River continues today (Roux 2020a, Trustees 2023).

In 2013, Weston Solutions, Inc. determined the nature and extent of contamination at the Site on behalf of the EPA Region 8. A total of 68 groundwater, surface water, sediment, and soil samples were used to establish potential source areas as:

- Landfills (including the closed Wet Scrubber Sludge Pond and the closed leachate ponds),
- Former Drum Storage Area,
- Percolation ponds,
- Waste and raw materials storage and handling areas,
- Plant drainage system including drywells and associated discharge points, and
- Underground storage tanks and aboveground storage tanks.

Primary constituents of potential concern were identified as cyanide, fluoride, and PAHs (EHS Support 2018b). Since 2015, CFAC has continued to assess conditions at the Site and plan remedial or cleanup efforts, under the oversight of the EPA, in consultation with DEQ. In November 2015, CFAC signed an administrative order on consent with EPA (EPA 2015). Demolition efforts at the Site were completed in September 2019. In 2020, EPA approved the Remedial Investigation Report (Roux 2020a) and in 2021, EPA approved the Feasibility Study Report. Most recently, EPA issued its proposed plan for cleanup of the CFAC Site in June 2023 (EPA 2023). After the public comment period closed in August 2023, the EPA reviewed public comments and issued a response to comments and a Record of Decision in January 2025, documenting the plan for cleanup of the Site.

Key events in the history of the Site are detailed in Table 1, below.

Table 1. Key Events in CFAC's Site History

Year	Category	Event
Prior to 1950s	• Commerce	Site is used for agricultural and residential activities.
1950-1978	• Commerce	Industrial development begins with purchase of property by Harvey Machine Co. in 1950. Shortly thereafter, the Site is acquired by Anaconda Copper Mining Company and two potlines are constructed in 1955.
Beginning in 1955	• Releases	West Landfill is used to dispose of generated spent potliner (SPL), sanitary, municipal solid waste (MSW), and scrap (steel, wood, strapping, scrap from shops) waste; unlined until an earthen cap is placed in 1981; clay cap placed in 1992, and synthetic cap placed in 1994. Wet Scrubber Sludge Pond is originally used as a landfill (1955-1963), then to dispose of sludge from wet scrubber (until 1976 when wet scrubber is replaced with dry scrubbers that produce less waste); briefly used to dispose of SPL leachate (1994-1998).
1965-68	• Commerce • Releases	Third, fourth, and fifth potlines are added to the Site.
1970	• Releases	Center Landfill used to dispose of SPL, sanitary, and scrap waste; unlined, clay cap.
1970	• Releases	Industrial Landfill used to dispose of scrap metal, wood and MSW; unknown cap and lining.
1973	• Releases	EPA completes a Field Investigation of Fluoride in Glacier National Park, finding floral necrosis in Columbia Falls, on Teakettle Mountain, and in Glacier National Park.
1978-1985	• Commerce	Atlantic Richfield Company purchases existing aluminum reduction facility.
1980	• Releases	East Landfill used to dispose of SPL; clay liner, synthetic cap.
1981	• Releases	Sanitary Landfill used to dispose of MSW and sanitary waste; clay Liner, cap type unknown.
1980s	• Releases	Asbestos Northern and Southern Landfill is used to dispose of asbestos; unknown liner and cap.
1984	• Remedy	The Montana Department of Health and Sciences (MDHES) conducts Preliminary Assessment of Site via Ecology and Environment, Inc.
1984	• Commerce • Releases	MDHES issues a permit allowing specific monitored discharges to surface impoundments (and indirectly to groundwater) but prohibiting degradation of groundwater beyond the property boundary.
1985-1999	• Commerce	Montana Aluminum Investor's Corporation purchases existing aluminum reduction facility.
1991-92	• Releases • Remedy	Transformer fire released an estimated 4,000 gallons of dielectric fluid on September 10, 1991. Remediation completed by Olympus Environmental who excavated soil in West Rectifier Yard and shipped to approved off-Site disposal facility.
1991	• Releases	MDHES issues a violation letter to Columbia Falls Aluminum Company for unauthorized discharge of cyanide in seeps to the Flathead River.
1994	• Releases • Remedy	Three to four gallons of PCBs spill from explosion of two capacitors in the West Rectifier Yard. Contaminated soil is removed and disposed of off-Site, and equipment is cleaned.
1994	• Commerce • Releases	MDHES issues a MPDES permit for processed wastewater discharges to specific ponds and groundwater and required tracking of cyanide concentrations.
1996	• Releases	EPA issues a Notice of Violation under the CWA after elevated cyanide concentrations were found in Site groundwater and seeps.
1997	• Releases	DEQ issues a Notice of Violation under the Montana Water Quality Act after finding elevated cyanide concentrations in Site groundwater and seeps.

1999	● Commerce	DEQ reissues the MPDES permit, modified to create a mixing zone that allowed higher cyanide concentrations in the Flathead River.
1999-present	● Commerce	CFAC purchases existing aluminum reduction facility.
2001	● Remedy	EPA and DEQ perform a Waste Characterization Investigation where samples were collected.
2014	● Remedy	EPA Site Reassessment completed by Weston Solutions, Inc.
2014	● Commerce	DEQ issues a revised MPDES permit, eliminating the mixing zone. CFAC appeals this permit, but the permit is terminated in 2019 with closure of the Site.
2015	● Remedy	EPA and CFAC agree to conduct a Remedial Investigation/Feasibility Study (RI/FS).
2016	● Remedy	EPA adds Site to National Priorities List.
2020	● Remedy	CFAC completes the Remedial Investigation and submits the report to EPA.
2021	● Remedy	CFAC completes removal action agreed to with EPA to remove sediments from the South Percolation Ponds and returns the flow of the Flathead River to its northern channel.
2021	● Remedy	CFAC completes the Feasibility Study and submits the report to EPA.
2023	● Liability	Ninth Circuit upholds the CERCLA liability apportionment between Columbia Falls Aluminum Company and Atlantic Richfield Company in the case *Columbia Falls Aluminum Company, LLC v. Atlantic Richfield Co.* (No. 21-36042, 2023).
2023	● Remedy	EPA issues a Proposed Plan for the remedy for the Site.
2025	● Remedy	EPA issues a Record of Decision, documenting the cleanup plan for the Site.

Sources: Roux 2015; Roux 2020a; Roux. 2020b; EHS Support 2018b; CFAC 2021; MDHES 1984; MDHES 1991; MDHES 1994; DEQ 1999; DEQ 2014; EPA 1973; EPA 2023; EPA 2025. Hanners 2017a.

● Commerce: Events related to land use, ownership, and operations. ● Releases: Known releases of hazardous substances.

● Remedy: Sampling and cleanup related to remedial investigation efforts.

1.3 Overview of Natural Resource Damage Assessment and Restoration

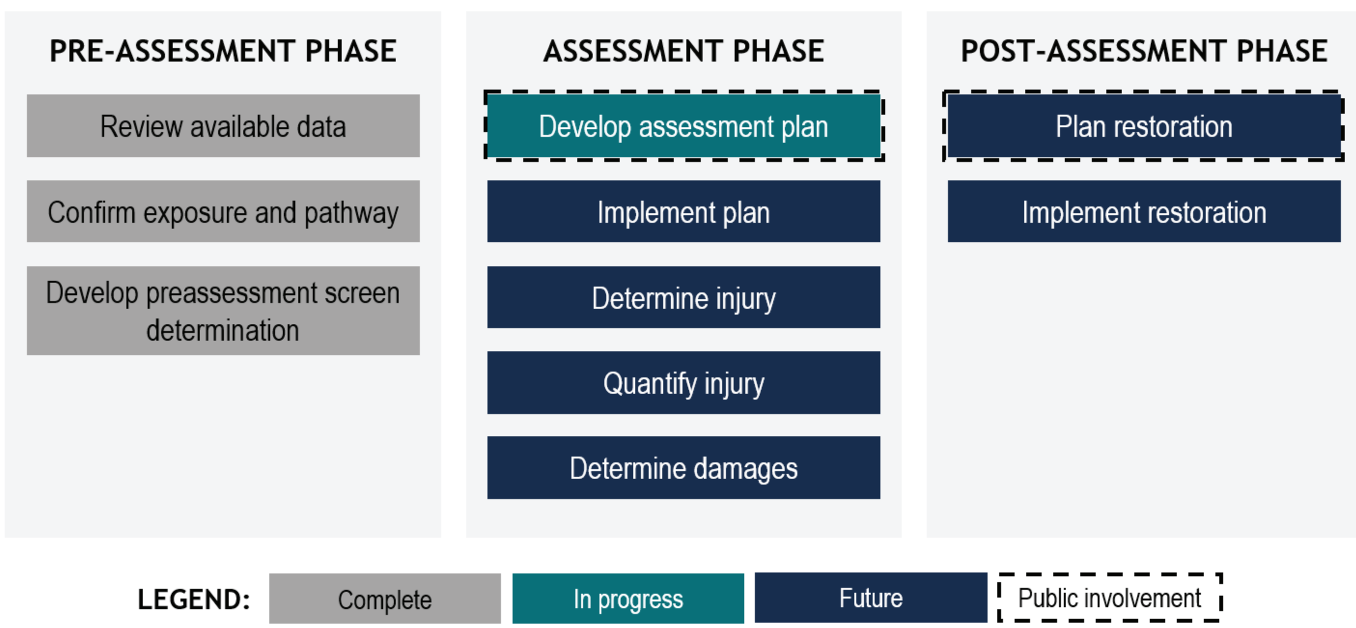
The CERCLA NRDAR regulations at 43 C.F.R. Part 11 outline two processes by which natural resource trustees may conduct a NRDAR: Type A and Type B assessments. Type A assessments utilize a standardized methodology based on inputs such as the mass or volume of the substance released, the duration of the release, the location of the release, and environmental conditions. These assessments are generally limited by the regulations to the evaluation of relatively minor hazardous releases in coastal and marine environments. Whereas, Type B assessments are conducted through the review of existing data and/or the collection of additional data to address information gaps. Type B assessments are typically selected when a hazardous substance release occurs over a long timeframe, consists of multiple contaminants, or occurs in a complex system that cannot be simplified. These assessments allow for a wider range of scientific and economic methodologies to address data gaps.

The Trustees have determined that damages from the release of hazardous substances are likely to exceed $100,000 and are not encompassed within the geographic scope of the NRDAM/CME or NRDAM/GLE models. Therefore, the Trustees intend to conduct a Type B assessment. The Type B process includes the following three phases: pre-assessment, assessment, and post-assessment (Figure 2). Public engagement is an important part of implementing a NRDAR, and occurs throughout the process, as illustrated in Figure 2 and described in the text below. Public participation in this Plan is further detailed in Section 1.5. Consistent with 43 C.F.R. § 11.31(c)(4), the Trustees have not included a Restoration and Compensation Determination Plan (RCDP) in this Plan, but may develop an RCDP as part of the assessment or post-assessment process, as warranted.[1]

CONFIRMATION OF EXPOSURE

The CERCLA NRDAR regulations stipulate that, as part of an Assessment Plan under the Type B procedures, trustees must confirm that at least one of the natural resources identified as likely adversely affected in the Preassessment Screen has in fact been exposed to the released substance (43 C.F.R. § 11.37(a)). In this case, the 2022 Preassessment Screen went above and beyond identifying likely adversely affected resources and releases of hazardous substances at concentrations sufficient to potentially cause injury and in fact documented pathways, exposure, and, in some cases, injury of natural resources. This included documentation of surface water and groundwater injury based on exceedance of DEQ-7 numeric water quality standards. It also confirmed exposure and the likelihood of injury to soil, sediment, and aquatic habitat-associated biological resources, including birds, through the evaluation of surface water, groundwater, sediment, and soil contaminant concentrations. Specific hazardous substances highlighted as being injurious within the Assessment Area included arsenic, cyanide, fluoride, PAHs, and PCBs (Trustees 2023). Therefore, natural resources within the Assessment Area have been documented to have been exposed and injured. Nevertheless, formal determination of injury will be undertaken as part of the NRDAR (see Chapter 3).

Figure 2. Phases of a Type B Natural Resource Damage Assessment



1.3.1 Pre-Assessment Phase

During the Pre-Assessment Phase, which was completed in October 2023, the Trustees reviewed readily available information and existing data related to releases of hazardous substances and the potential impacts of

[1] An RCDP is developed as a part of NRDAR activities, and it serves to identify possible alternatives for restoring, rehabilitating, replacing, or acquiring the equivalent of injured resources. RCDPs are subject to public review and comment, and the findings and recommendations presented in an RCDP are ultimately used to develop a restoration plan consistent with CERCLA requirements.

those substances on natural resources. The review led to the Trustees' determination that there is sufficient evidence to support claims for natural resource damages against parties responsible for releasing the hazardous substances to the environment. Documentation of the Trustees' determination that further assessments are warranted (i.e., that a NRDAR could and should be performed) was published in the Preassessment Screen (PAS; Trustees 2023). This phase is a prerequisite to conducting a formal assessment pursuant to 43 C.F.R. § 11.23(a).

1.3.2 Assessment Phase

In the assessment phase, the Trustees continue their review of readily available information and existing data to identify the activities necessary to determine and quantify natural resource injuries and determine associated damages. These activities are documented in an Assessment Plan (this Plan), which is developed and implemented as the first step in this phase of the NRDAR. The purpose of an Assessment Plan is to ensure that the assessment is performed in a planned and systematic manner and the proposed assessment activities can be conducted at a reasonable cost (43 C.F.R. § 11.30(b)).

After the Assessment Plan has been finalized, subsequent steps of the Assessment Phase include:

- **Injury determination,** which encompasses documentation that natural resource injuries have occurred.
- **Injury quantification,** wherein the magnitude of injuries and service losses are quantified.
- **Damages determination,** which involves monetizing quantified injuries, most often through the identification, scaling, and costing of relevant restoration projects.

There are several opportunities for public engagement during the Assessment Phase. The first is with the release of this Plan. The public is encouraged to review and provide comments on this Draft Plan, as described in Section 1.5, below. Secondly, during the damages determination step, or subsequent restoration planning, the Trustees may solicit restoration project ideas from the public to identify relevant projects that are priorities for the community(ies) impacted by the contamination from the Site. These project ideas would then be compared to Trustee-specific screening and evaluation criteria and NRDAR factors (43 C.F.R. § 11.82(d)) before the Trustees select any projects for implementation.

In addition to soliciting restoration ideas from the public during damages determination, the Trustees may identify early restoration opportunities—that is, opportunities to begin a restoration project before the assessment has proceeded completely through all the NRDAR phases. Early restoration undertaken or funded by a potentially responsible party (PRP; see Section 1.4) may result in settlement of some or all of the PRP's natural resource damage liability but not fully resolve all liability, or it may generate a credit towards future settlement of natural resource damage liability. Since these opportunities may be short-lived in duration, or there may be a benefit to earlier implementation (e.g., restoration of natural resources earlier than may otherwise be achieved), the Trustees may agree to pursue early restoration. To allow for such opportunities, the Trustees may engage in early restoration planning as part of the Assessment Phase. Early restoration planning can include the development of a programmatic or specific Restoration Plan or components of the RCDP that describe Trustee priorities regarding identification and selection of projects. This could include efforts to estimate restoration credits for early restoration projects and identify offsets against future quantification of natural resource damages. Restoration Plans and RCDPs are also released for public review and comment.

1.3.3 Post-Assessment Phase

The Post-assessment Phase involves implementation of restoration and has a reporting component. If not completed sooner, the RCDP, if necessary, may be completed during the Post-assessment Phase. The RCDP will undergo public review and comment at that time. The Post-assessment Phase may also include a Report of Assessment and project-specific Restoration Plan(s) if the assessment proceeds to that stage. The former describes the results of the Assessment Phase and includes all the documentation supporting determinations made in the Pre-Assessment and Assessment Phases (e.g., the PAS; the Final Assessment Plan and documentation used in the Injury Determination, Quantification, and Damage Determination phases; and the RCDP and/or project-specific Restoration Plan(s)).

1.3.4 Remediation versus Natural Resource Damage Assessment and Restoration

BASELINE IN NRDAR

In the context of NRDAR, baseline is defined as the "condition or conditions that would have existed at the Assessment Area had the discharge of oil or release of the hazardous substance under investigation not occurred" (43 C.F.R. § 11.14(e)). Consideration of baseline in the NRDAR will account for the affected natural resources and the level of services that they would have provided in the absence of hazardous substance releases from the Site. In many cases, low concentrations of contaminants of concern are present in the environment even absent a release of hazardous substances, because they either occur naturally in the environment or are ubiquitous due to a combination of anthropogenic activities and environmental processes that can distribute contaminants across regions.

NRDAR is a process that occurs *in addition to* the remedial process (i.e., hazardous substance cleanup) conducted by regulatory agencies such as EPA, in consultation with DEQ. These two processes have different goals. Remedial action objectives are risk-based and developed to protect human health and the environment from unacceptable risk. Remedies are selected based on evaluation criteria that are used to compare remedial alternatives and may result in contamination remaining in the environment above levels that existed prior to its release. In contrast, the goal of NRDAR is to restore injured resources to their baseline condition. Losses resulting from natural resource exposure to hazardous substances are estimated over time, including past losses and, if post-remedy contaminant concentrations remain at levels sufficient to cause injury to natural resources, future losses.

However, there are components of NRDAR and remediation that overlap. For example, NRD-related restoration must account for remedial responses that are underway or planned. That is, the extent to which remediation returns natural resources and the services they provide to their baseline condition should be considered in the NRDAR process. For example, work to remedy a site may partially or completely restore injured natural resources. In addition, remedial actions may injure natural resources (e.g., physical disturbance or destruction of habitat), and assessment and restoration of this remediation-induced injury is also evaluated and compensated for within the NRDAR process.

1.4 Cooperation with Responsible Parties

The CERCLA NRDAR regulations at 43 C.F.R. § 11.32(a)(2)(ii) direct trustees to "use reasonable efforts to proceed against most known potentially responsible parties" or PRPs. 43 C.F.R. § 11.32(a)(2)(iii)(A) requires trustees to send a Notice of Intent to Perform a NRDAR (NOI) to all identified PRPs, which invites the PRPs to participate in the assessment and restoration process. The Trustees sent a notice of intent to perform a natural resource damage assessment, pursuant to 43 C.F.R. § 11.32, in January 2024, to the identified PRPs. The PRPs declined to participate.

PRPs identified to-date, as documented in the PAS (Trustees 2023), include:

- CFAC, and
- Atlantic Richfield Company.

1.5 Public Participation

Public participation and review are an integral part of the assessment planning process and are required by the CERCLA NRDAR regulations (e.g., 43 C.F.R. § 11.32(c)). To facilitate public involvement in the NRDAR planning process, the Trustees encourage the public to review and comment on this Draft Plan. The review period is for 30 days (in accordance with 43 C.F.R. § 11.32(c)(1)) from the date of public release of the Draft Plan. Following comment submittal by the public, the Trustees will review the public comments received. Public comments and the Trustees' responses to those comments will be summarized in the Final Plan.

> The Trustees are seeking public comment on the Draft Plan. NRDP advertised the public comment period in the Missoulian and Hungry Horse News and on NRDP's website and sent it to NRDP's mailing list. The public comment period is open for thirty-four days, from May 21 to June 23, 2025. The Draft Assessment Plan is available on NRDP's website at: NRDP Notices of Public Comment – Montana Department of Justice addition, copies of the Draft Plan are available at NRDP's office (see address below). Information can also be obtained by calling NRDP at (406) 444-0205. Please submit comments via email to nrdp@mt.gov. The subject line must contain, "CFAC Draft Assessment Plan." Comments may also be submitted by mail at: Montana Natural Resource Damage Program 1720 9th Ave. P.O. Box 201425 Helena, MT 59620-1425. To be considered, comments must be received by the deadline.

As the Trustees move forward with the NRDAR, there will be additional opportunities for public participation. Examples (described further in Section 1.3) include reviewing any significant changes to the Assessment Plan, any restoration plans, and proposed settlements.

1.5.1 Administrative Record

Pursuant to 43 C.F.R. § 11.91(c), the Trustees are compiling information relied upon to plan and conduct the assessment, including information relied upon to prepare this Draft Plan, in a publicly available Administrative Record. The Administrative Record is available upon request.

1.6 Assessment Timeline

The Trustees do not have a firm timeline for the completion of the NRDAR process. As called for in the CERCLA NRDAR regulations, the Trustees intend, where possible, to coordinate the assessment with the remedial processes, ensuring any changes in natural resources and their services due to implementation of remedial actions within the Assessment Area are appropriately considered in the NRDAR. The timeline of the assessment will also be adjusted to accommodate public participation and environmental conditions, if relevant (e.g., assessment of resources, including any field studies, which may be limited by weather, seasons, and/or other factors).

1.7 Geographic and Temporal Scope of the Assessment

The Assessment Area is defined in the CERCLA NRDAR regulations as: "… the area or areas within which natural resources have been affected directly or indirectly by the discharge of oil or release of a hazardous substance and that serves as the geographic basis for the injury assessment" (43 C.F.R. § 11.14(c)). In this case, the geographic scope of this assessment encompasses the 1,340 acres of the CFAC Site, as well as any areas surrounding, downstream, or downgradient of the Site that may have been contaminated by Site releases. A map of the Site and preliminary Assessment Area is presented in Figure 1, above. As the assessment proceeds, the Trustees reserve the right to expand or further constrain its geographic scope.

The temporal scope of this assessment is based on the duration of injury to natural resources and corresponding damages. Due to the industrial history of the Site, natural resources likely have been exposed to and injured by hazardous substance releases since at least the early 1950s. The re-release and remobilization of contamination and associated injuries are expected to continue into the future. The NRDAR will therefore consider the full scope of these injuries.

However, in accordance with the promulgation of CERCLA in December of 1980, when injuries pre- and post-CERCLA are distinguishable, damages will be calculated based on injuries and service losses occurring after the enactment of CERCLA. When injuries are indistinguishable prior to and after the enactment of CERCLA, damages will be calculated beginning at the start of injury. Damages calculations will include losses through the reasonable expected recovery of the injured natural resources and their services. Therefore, emphasis will be placed on information regarding natural resource injuries and service losses beginning in 1981 and into the future. The rate of recovery will be based on the best available information regarding proposed or implemented remedial and restoration activities, natural attenuation, and expected resource recoverability. If a resource is not expected to fully recover, the injuries will be considered permanent.

1.8 Hazardous Substances in the Assessment Area

Contaminants of concern documented in the PAS (Trustees 2023) are listed below in Table 2. When implementing the assessment (as described in Chapter 6), the Trustees may refine or expand the list of contaminants of concern for purposes of the NRDAR based on information reviewed and/or analyses performed.

Table 2. Contaminants of Concern from the PAS (Trustees 2023)

Inorganic compounds	Organic compounds
Cyanide	Bis(2-ethylhexyl)phthalate (BEHP)
Fluoride	PAHs
Arsenic	PCBs (Aroclor 1254)
Aluminum	
Barium	
Cadmium	
Copper	
Iron	
Manganese	
Nickel	
Selenium	
Thallium	
Vanadium	
Zinc	

1.9 Plan Organization

The remainder of this Plan is organized as follows:

- **Chapter 2 – Natural Resources and Resource Services**: This chapter provides an overview of the natural resources within the Assessment Area, including the geographic scope and a summary of natural resources and the services they provide.
- **Chapter 3 – Injury Determination**: This chapter outlines the potential pathways of hazardous substances released from operations at the Site to natural resources (11 C.F.R. § 11.63), describes information demonstrating injury to natural resources (11 C.F.R. § 11.63), and provides an overview of the Trustees' approach to determining injury as a result of these releases. The guidance provided in 43 C.F.R. § 11.64 will be followed for selecting methodologies for the Injury Determination phase.
- **Chapter 4 – Injury Quantification**: This chapter discusses the framework for quantifying injury to natural resources and the services they provide (accounting for baseline). The Quantification phase consists of service reduction quantification (43 C.F.R. §11.71); baseline services determination (43 C.F.R. §11.72); and resource recoverability analysis (43 C.F.R. §11.73).
- **Chapter 5 – Damages Determination and Restoration**: This chapter describes the Trustees' proposed approach to determining the damages required to compensate for the quantified losses and planning restoration pursuant to 43 C.F.R. §§ 11.81-11.84.
- **Chapter 6 – Proposed Assessment Activities**: This chapter outlines the assessment activities that the Trustees have determined to be potentially necessary to identify and quantify injuries to natural resources and resource services for the overall NRDAR.
- **Appendix A – Quality Management Plan** (consistent with 43 C.F.R. § 11.31(c)(2)): This appendix provides the Trustees' Quality Management Plan, documenting the Trustees' Quality Systems and how they will plan, implement, and assess their Quality Systems for NRDAR data analysis and/or data collection.

CHAPTER 2 | Natural Resources and Resource Services

This chapter provides information on the natural resources present within the Assessment Area and the types of services those natural resources provide, which will be the focus of the NRDAR.

2.1 Natural Resources

Under the CERCLA NRDAR regulations, natural resources include the "land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States…any State or local governments, any foreign government, any Indian tribes…[or] any member of an Indian tribe" (43 C.F.R. § 11.14(z)). CECRA includes a similar definition, "Natural resources" means land, fish, wildlife, biota, air, surface water, ground water, drinking water supplies, and any other resources within the state of Montana owned, managed, held in trust, or otherwise controlled by or appertaining to the state of Montana or a political subdivision of the state." § 75-10-701(12), MCA. CERCLA organizes these resources into five categories: surface water (including sediments), groundwater, air, geological (including soil), and biological resources.

The Trustees intend to focus assessment efforts on groundwater, surface water, geological, and biological resources in the Assessment Area. At this time, the Trustees do not plan on quantifying distinct injuries to air resources. However, the Trustees intend to evaluate resource injuries resulting from the deposition of hazardous substances via various pathways within the Assessment Area, including through the air, as opposed to quantifying volumes of injured air. Therefore, air monitoring data may be considered in the context of pathway and/or background evaluations.

2.1.1 Surface Water (and Sediment) Resources

Surface water resources are defined in the CERCLA NRDAR regulations as:

> *The waters of the United States, including the sediments suspended in water or lying on the bank, bed, or shoreline and sediments in or transported through coastal and marine areas* (43 C.F.R. § 11.14(pp).

The State of Montana defines "State waters" to include surface waters, "…a body of water, irrigation system, or drainage system, either surface or underground." It excludes ponds or lagoons used solely for treating, transporting, or impounding pollutants; or irrigation waters or land application disposal waters when the waters are used up within the irrigation or land application disposal system and the waters are not returned to state waters." § 75-5-103(32), MCA. Surface water resources in the Assessment Area include waters flowing through the Site, perennially wetted habitats, the Flathead River and riparian area, Cedar Creek, and the intermittent Cedar Creek Reservoir Overflow Ditch (EHS Support 2018a). Although not included in past remedial investigation reports, USFWS' National Wetlands Inventory (NWI) identifies two additional wetlands outside of the riparian area associated with the Flathead River on the Site, as seen below in Figure 3. Both are classified as "PSS1A," meaning the area is palustrine (nontidal wetland dominated by trees, shrubs, persistent emergent; or wetlands without vegetation with water depth in the deepest part of the basin less than 2.5 meters at low water), dominated by woody vegetation less than six meters tall, broad-leaved deciduous, and temporarily flooded during the growing season. Both areas are in the northwest of the Site, with one covering 18.4 acres, and the other covering just over one acre. The NWI also classifies the "Riparian Sampling Area" seen in Figure 1 into separate categories based on vegetation: herbaceous riparian, forested/shrub wetland, or freshwater pond (see Figure 3; NWI 2019).

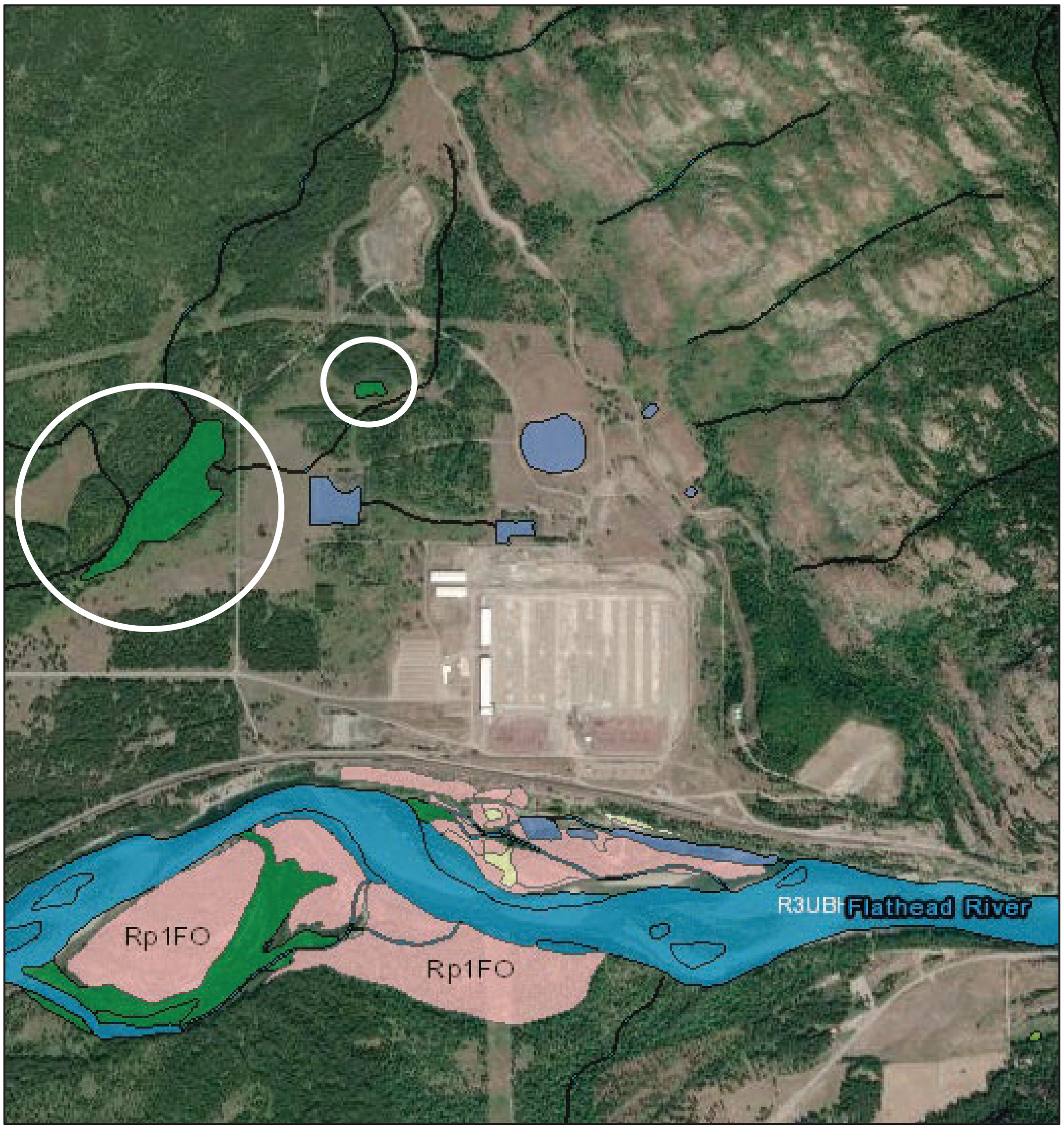
The Flathead River, known by the CSKT as Ntx̣ʷe(tkʷ), meaning “River”, is a tributary to the Columbia River that flows into the Pacific Ocean. The Flathead River runs along the southern border of the Site and flows westward from Badrock Canyon, past the Site to the City of Columbia Falls, and then south toward Flathead Lake. The State of Montana classifies the part of the Flathead River that borders the Site, as well as all of the water bodies in the drainage as class “B-1,” meaning that they should be maintained suitable for “drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply” (Administrative Rules of Montana [ARM] 17.30.608(1)(a)), 17.30.623).

At the Site, the drainage area of the Flathead River is approximately 4,470 square miles, which includes the drainage area of Cedar Creek to the west (EHS Support 2018a). Cedar Creek begins north of the Site, near the Cedar Creek Reservoir, and flows along the western Site boundary towards the City of Columbia Falls. The creek’s elevation is higher than the groundwater levels at the Site, indicating it is a losing stream under normal flow conditions (Roux 2020a).

According to the USGS National Hydrography Dataset, a tributary to Cedar Creek bisects the northern area of the Site along the eastern side of the Industrial Landfill. Although not observed during Site reconnaissance, this feature was mapped by Roux field personnel as the Northern Surface Water Feature because of its wetland vegetation. Water ponding has also been observed as a result of runoff from a nearby cliff (EHS Support 2018a).

The Cedar Creek Reservoir Overflow Drainage (referred to as the “Cedar Creek Reservoir Overflow Ditch” in Roux 2020b) flows intermittently in spring and helps regulate the flow of Cedar Creek and its reservoir. Surface water runoff from the Sanitary Landfill, the Center Landfill, the southern Asbestos Landfill, and the East Landfill and associated leachate ponds collect in this area before discharging into the Flathead River (Roux 2020a). The catchment area for the Cedar Creek Reservoir Overflow is approximately 2.0 square miles, with about 20 percent of that area located on-Site, extending to Teakettle Mountain’s peak to the east. Similar to Cedar Creek, the Overflow Ditch has been reported to be a losing stream (EHS Support 2018a).

Figure 3. Classified Wetlands at the Site according to the National Wetlands Inventory



2.1.2 Groundwater Resources

Groundwater resources are defined in the CERCLA NRDAR regulations as:

> *Water in a saturated zone or stratum beneath the surface of land or water and the rocks or sediments through which ground water moves. It includes ground water resources that meet the definition of drinking water supplies* (43 C.F.R. § 11.14(t)).

The State of Montana's Ground Water Management regulations define groundwater as:

> *Any water that is beneath the ground surface* (§ 85-2-501, MCA).

Groundwater elevations measured in monitoring well clusters reveal two water-bearing zones: an upper hydrogeologic unit and a deeper zone, with remedial investigations finding limited (if any) hydraulic connectivity between the two (EHS Support 2018a). The elevation of groundwater flow in the upper hydrogeologic unit varies from a minimum of approximately 14 feet below ground surface to a maximum of approximately 126 feet below ground surface and generally moves in a south-southwest direction towards the Flathead River (Roux 2015). This southerly flow is consistent, but the hydraulic gradient varies across three distinct areas. Near Teakettle Mountain and the landfills, the gradient is steep, at approximately 0.059 ft/ft, reflecting the area's topography. In the center of the Site, near the North Percolation Ponds and the northern half of the Main Plant Area, groundwater elevations remain consistent over long distances—typically within 1 foot over more than 1,000 feet—resulting in a relatively flat gradient of about 0.0045 ft/ft. In the southern area between the Main Plant Area and the Flathead River, the gradient increases to approximately 0.031 ft/ft, aligning with the steeper topography in that area. Overall, these gradients, along with the elevations measured in the Flathead River, suggest that groundwater in the upper hydrogeologic unit discharges into the river (EHS Support 2018a). The groundwater elevation measured in wells from the upper hydrogeologic unit and the deeper zone usually differed by more than 25 feet, and in some instances, the difference exceeded 50 feet (Roux 2020a). This significant disparity suggests that there is limited connectivity between the two zones. Therefore, the deeper water bearing zone spans from 25 ft below the upper hydrogeologic unit to the top of bedrock, which varies from 150 feet below ground surface to 300 feet below ground surface (Roux 2015).

Groundwater in the vicinity of the Site is identified as Class I, with a specific conductance of less than 1,000 µS/cm at 20 °C, so is thus considered "suitable for public and private water supplies, food processing, irrigation, drinking water for livestock and wildlife, and commercial and industrial purposes, with little or no treatment required" (Montana State Library Natural Resource Information System 2024). During prior assessments of the Site, 44 monitoring wells were added to the existing 20 monitoring wells that were installed to evaluate groundwater quality in potential source areas (Roux 2020a).

2.1.3 Geologic Resources

Geologic resources are defined in CERCLA NRDAR regulations as:

> *Those elements of the Earth's crust such as soils, sediments, rocks, and minerals, including petroleum and natural gas, that are not included in the definitions of ground and surface water resources* (43 C.F.R. § 11.14(s)).

Within the larger Northern Rocky Mountain Physiographic Province, the Site is located within the northeast section of the Kalispell Valley. This valley was formed by late Paleocene to Eocene folding and thrust faulting combined with the middle Wisconsin Cordilleran and Alpine Glaciation. Receding glaciers formed features in the valley including the Flathead River. On the east border of the Site, Teakettle Mountain is comprised of primarily Precambrian sedimentary strata of the Ravalli Group. The stratigraphy beneath the Site varies locally because of the diverse characteristics of glacial and alluvial deposits. Previous studies indicate that the region near Columbia Falls is primarily composed of glacial till and lake sediments left by the Cordilleran Ice Sheet. Additionally, many valleys in western Montana feature glacial deposits from smaller, local glaciers, resulting in a mix of clay, sand, silt, cobbles, and boulders. Close to the Flathead River, alluvial deposits overlay the glacial stratigraphy. Estimated bedrock depth varies from 150 feet to greater than 300 feet across most of the Site (EHS Support 2018a).

The Site has three major stratigraphic units: glaciofluvial and alluvial deposits, Pleistocene glacial till, and Precambrian bedrock. The upper hydrogeologic unit is found in the glaciofluvial and alluvial deposit layer, characterized by its coarse-grained soils. These deposits form a heterogeneous layer with varying porosity and permeability, featuring lenses of high-porosity sand and gravel that can range from a few feet to over a hundred feet thick (Roux 2020a). Below it, the glacial tills contain a higher percentage of fines that are denser and drier than the layer above but hold the deeper water bearing zone (EHS Support 2018a). Beneath the glacial till lies the Precambrian bedrock, which is tightly compacted, low in porosity, and low in permeability, typically containing little groundwater except in fractures. The western flank of Teakettle Mountain exposes this bedrock, with depth to bedrock increasing southwesterly from the mountain, although most Site borings did not reach it. Available data suggest the depth to bedrock near the Flathead River is likely over 300 feet (Roux 2020a).

2.1.4 Biological Resources

Biological resources are defined in the CERCLA NRDAR regulations as:

> *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* (43 C.F.R. § 11.14(f)).

The Site contains aquatic, terrestrial, and transitional habitats. Aquatic habitats are characterized by perennial or near-perennial water inundation that support aquatic species. Most of the river side seep areas that receive cyanide groundwater are wet all year (e.g. the backwater seep mixing zone). The two lotic habitats on the Site, which support fish and semi-aquatic mammals or birds, are the Flathead River and Cedar Creek. The Flathead River provides critical year-round subadult residential/juvenile rearing and cold water refugia fish habitat (Isaak and Young 2023), and serves as the only migration corridor to spawning tributaries for Bull Trout (Muhlfeld et al. 2003; Muhlfeld and Marotz 2005). The Flathead River is considered oligotrophic due to the lack of non-anthropogenic nutrient sources, but does receive numerous pollutants from impaired tributary streams due to sewage, domestic development of groundwater wells, septic, and numerous leach fields (DEQ 2014). Cedar Creek is also typically oligotrophic and characterized by high flows in spring and early summer due to snowmelt. Terrestrial habitats are dry, upland areas that support various flora and fauna and are defined by their vadose (shallow unsaturated) zone soils. The Site has four primary terrestrial habitats: mixed conifer forest, riparian forest, deciduous shrubland, and open grassland, each distinguished by its vegetation type. Transitional habitats experience intermittent or seasonal water inundation and can support aquatic species during certain life stages (e.g., benthic invertebrates, juvenile amphibians, juvenile and adult fish, migratory and breeding birds) as well as terrestrial species during dry periods (e.g., soil invertebrates, plants) (Roux 2020a).

Past studies of the Site have suggested seven threatened, endangered, or candidate species that may exist within the Site (Table 3). As reported in Roux (2020), according to the USFWS Environmental Conservation Online System (ECOS) and the Montana Fish, Wildlife, and Parks (FWP), there are 37 Animal Species of Concern found in Flathead County (Table 4) and 19 migratory bird species of concern present within the Site area (Table 5).

Table 3. Threatened, Endangered, or Candidate Species according to ECOS

Species Type	Species Name	Species Status
Bird	Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened
Conifers and Cycads	Whitebark Pine (*Pinus albicaulis*)	Candidate
Fishes	Bull Trout (*Salvelinus confluentus*)	Threatened
Flowering Plants	Spalding's Catchfly (*Silene spaldingii*)	Threatened
Insects	Monarch Butterfly (*Danaus plexippus)*	Proposed Threatened
Insects	Suckley's Cuckoo Bumblebee (*Bombus suckleyi*)	Proposed Endangered
Mammals	Grizzly Bear *(Ursus arctos horribilis)*	Threatened
Mammals	Canada Lynx *(Lynx canadensis)*	Threatened
Mammals	North American Wolverine (*Gulo gulo luscus*)	Threatened

Table 4. Species of Concern in Flathead County according to FWP

Species Type	Species Scientific Name	Species Common Name
Mammals	*Corynorhinus townsendii*	Townsend's Big-eared Bat
Mammals	*Gulo gulo*	Wolverine
Mammals	*Lasiurus cinereus*	Hoary Bat
Mammals	*Lynx canadensis*	Canada Lynx
Mammals	*Myotis lucifugus*	Little Brown Myotis
Mammals	*Myotis thysanodes*	Fringed Myotis
Mammals	*Pekania pennanti*	Fisher
Mammals	*Sorex hoyi*	Pygmy Shrew
Mammals	*Synaptomys borealis*	Northern Bog Lemming
Mammals	*Ursus arctos*	Grizzly Bear
Reptiles	*Elgaria coerulea*	Northern Alligator Lizard
Amphibians	*Anaxyrus boreas*	Western Toad
Amphibians	*Lithobates pipiens*	Northern Leopard Frog
Fish	*Cottus rhotheus*	Torrent Sculpin
Fish	*Oncorhynchus clarkii lewisi*	Westslope Cutthroat Trout
Fish	*Oncorhynchus mykiss gairdneri*	Columbia River Redband Trout
Fish	*Prosopium coulteri*	Pygmy Whitefish
Fish	*Salvelinus confluentus*	Bull Trout
Invertebrates – Insects	*Euphydryas gillettii*	Gillette's Checkerspot

Species Type	Species Scientific Name	Species Common Name
Invertebrates – Insects	*Rhyacophila ebria*	A Rhyacophilan Caddisfly
Invertebrates – Insects	*Rhyacophila glaciera*	A Rhyacophilan Caddisfly
Invertebrates – Insects	*Rhyacophila potteri*	A Rhyacophilan Caddisfly
Invertebrates – Insects	*Rhyacophila rickeri*	A Rhyacophilan Caddisfly
Invertebrates – Insects	*Coenagrion interrogatum*	Subarctic Bluet
Invertebrates – Insects	*Somatochlora walshii*	Brush-tipped Emerald
Invertebrates – Insects	*Parameletus columbiae*	A Mayfly
Invertebrates – Insects	*Isocapnia crinita*	Hooked Snowfly
Invertebrates – Insects	*Lednia tumana*	Meltwater Lednian Stonefly
Invertebrates – Insects	*Zapada cordillera*	Cordilleran Forestfly
Invertebrates – Mollusks	*Acroloxus coloradensis*	Rocky Mountain Capshell
Invertebrates – Mollusks	*Magnipelta mycophaga*	Magnum Mantleslug
Invertebrates – Mollusks	*Pristiloma wascoense*	Shiny Tightcoil
Invertebrates – Mollusks	*Prophysaon andersoni*	Reticulate Taildropper
Invertebrates – Mollusks	*Prophysaon humile*	Smoky Taildropper
Invertebrates – Mollusks	*Zacoleus idahoensis*	Sheathed Slug
Invertebrates – Other	*Salmasellus steganothrix*	A Cave Obligate Isopod
Invertebrates – Other	*Stygobromus glacialis*	Glacier Amphipod

Table 5. Migratory Birds of Concern according to ECOS

Species Name	Species Occurring in Site Area
American Bittern (*Botaurus lentiginosus*)	Breeding
Baird's Sparrow (*Ammodramus bairdii*)	Breeding
Bald Eagle (*Haliaeetus leucocephalus*)	Year-round
Black Swift (*cypseloides niger*)	Breeding
Brewer's Sparrow (*Spizella breweri*)	Breeding
Calliope Hummingbird *(Stellula calliope)*	Breeding
Cassin's Finch *(Carpodacus cassinii)*	Breeding
Common Tern *(Sterna hirundo)*	Breeding
Fox Sparrow *(Passerella liaca)*	Breeding
Golden Eagle *(Aquila chrysaetos)*	Year-round
Grasshopper Sparrow *(Ammodramus savannarum)*	Breeding
Lewis's Woodpecker *(Melanerpes lewis)*	Breeding
Olive-Sided Flycatcher *(Contopus cooperi)*	Breeding
Peregrine Falcon *(Falcon peregrinus)*	Year-round
Rufous Hummingbird *(selasphorus rufus)*	Breeding
Short-eared Owl *(Asio flammeus)*	Year-round
Swainson's Hawk *(Buteo swainsoni)*	Breeding

Upland Sandpiper *(Bartramia longicauda)*	Breeding
Willow Flycatcher (*Empidonax traillii*)	Breeding

2.2 Natural Resource Services

Natural resource services are the physical and biological functions performed by the natural resources, including the human uses of those functions, and are a result of the quality of the resource (43 C.F.R. § 11.14 (nn)). Further, services also can be used as "… a metric for measuring resource conditions and resource restoration" and are "restored or replaced by actions related to the quality, quantity, or availability of natural resources" (73 Fed. Reg. 57,259). In defining services in this way, the CERCLA NRDAR regulations and associated literature specifically document that the services one component of an ecosystem provides to another, such as through a food chain, as well as the human uses of the resource, are compensable if those services are reduced as a result of a release of hazardous substances. The CERCLA NRDAR regulations further describe services as the metric by which the benefits of natural resources may be quantified. The subsections below highlight some of the key services provided by the resources of focus for the Trustees, which will be the subject of the NRDAR. This discussion is not intended to be exhaustive of all potential services provided by natural resources in the Assessment Area.

CULTURAL SERVICES IN THE CONTEXT OF NRDAR

The CSKT may use and interact with natural resources to an extent and in ways that are different from the general public. Further, the role that natural resources play in tribal culture may differ from that of the general public. As a result of these differences, the services that natural resources provide to tribal members may be considered unique. To ensure that the full range of natural resource services, and potential service losses, are investigated as part of this NRDAR, the specific suite of services that natural resources provide to these tribal communities are being specifically considered and evaluated.

2.2.1 Surface Water (and Sediment) Services

The aquatic habitat at the Site provides a variety of ecological and human use services. Surface water provides habitat for aquatic animals and plants and a source of drinking water for biological resources (Roux 2020a). The Flathead River is the sole migration corridor and critical habitat for trout to move from Flathead Lake to tributaries in the North and Middle Forks of the Flathead River (EHS Support 2018a). Cedar Creek Reservoir Overflow Drainage flows intermittently in the spring and regulates seasonal variations in flow for Cedar Creek and the Cedar Creek Reservoir (Roux 2020a). Sediment can have both positive and negative effects on aquatic-terrestrial food webs. Elevated levels of fine sediment can have negative impacts on fish and aquatic invertebrate survival and fitness, including reducing oxygen flow, damage to respiratory systems, and binding to various contaminants (Kemp *et al*. 2011). However, sediment deposition provides habitat and prey resources for fish, invertebrates, birds, and mammals. It also provides nutritive substrate for plant growth, and filtration of surface water as it passes into the ground (EHS Support 2018a, Roux 2020a).

Surface water and sediment resources (depending on the type and level of sedimentation) also provide multiple services including provisioning services (e.g., food fiber, direct use), regulating services (e.g., biological self-purification, hydrology, climate), cultural services (recreation, educational and aesthetic values), and supporting services (e.g., soil formation, nutrient cycling) (Rinke *et al.* 2019). Based on the designated use of the Flathead

River (see Section 2.1.1) as well as local recreational use, the Flathead River is understood to support recreational human use services (Roux 2020a). The Flathead River has been a popular destination for fishing, boating, and hiking for residents and tourists (*Recreation* 2024). Cedar Creek may also provide recreational services. Lastly, the River also holds particular cultural value for the CSKT. Surface water resources support Flathead Valley resident fish populations, which in turn provide specific cultural and provisioning services to the tribal communities (see Section 2.2.4 below).

2.2.2 Groundwater Services

A wide range of services provided by groundwater have been documented in the literature. These include services that can accrue to people (e.g., drinking water), as well as ecological services (e.g., clean groundwater discharging to surface waters, aquatic invert habitat (Stanford 1988)). For example, the National Research Council states:

> *The total economic value (TEV) of ground water is a summation of its values across all of its uses. Sources of values have been classified into use values (sometimes called direct use values) and nonuse values (also known as passive use values, existence values). The use values arise from the direct use of a good or asset by consuming it or its services. For ground water, these would include consumption of drinking water and other municipal or commercial uses. Nonuse values arise irrespective of such direct use. Thus in the economist's jargon the TEV of a given resource asset includes the summation of its use and nonuse values across all service flows. The notion of TEV is fundamental to ground water valuation and should enter into management decisions regarding use of water resources. Valuation is a useful tool if the values can help inform decision-makers. The relevant issue is how the TEV of ground water will change when a policy or management decision is implemented.* (NRC 1997, p. 48)

Other researchers (e.g., EPA 1995, Bergstrom *et al.* 1996) also have documented the range of services provided by groundwater, including both use and nonuse services. Additionally, published studies have demonstrated the economic value the public holds for these various services (e.g., Bergstrom *et al.* 2001). For example, the public likely holds an option value for groundwater that represents an individual's willingness-to-pay to reduce or eliminate uncertain future risks associated with groundwater resources. "Option price," which includes such option values, is well established in the economics literature generally (see Freeman 2003), and specifically with respect to groundwater protection (see Sun *et al.* 1992, Bergstrom *et al.* 2001). Option prices may reflect both use and nonuse values; that is, the option price an individual is willing to pay reflects all of the values that an individual may hold for a groundwater resource.

At the Site, for example, groundwater serves as a source of recharge of surface water and aids in nutrient recycling, purification of water, and water storage, helping to mitigate drought. It also provides assimilative capacity and can promote degradation of anthropogenic contaminants (Griebler and Avramov 2015). The EPA has predicted that climate change is likely to increase the demand for water in areas that depend on melting snow in Montana, but more research is needed to determine how impactful this will be in the areas surrounding the Site (Hicke *et al.* 2022). Importantly, groundwater serves as the primary drinking water source for the closest residential community, Aluminum City, as well as for the City of Columbia Falls (EHS Support 2018b).

2.2.3 Geologic Resource Services

Geologic resources provide storage for groundwater and filter and clean surface water as it passes into the ground. Additionally, geologic resources provide a nutritive substrate for plant growth and shelter for burrowing animals while helping to regulate erosion and retain water, which prevents flooding. These resources store carbon dioxide and create habitats for microorganisms that enhance biodiversity above the subsurface. Furthermore, they play a crucial role in regulating limnological chemistry and groundwater levels, helping to prevent landslides. Geologic resources also provide direct benefits to humans in several ways. They serve as a repository for cultural and geological heritage, retain water, and replenish nutrients in soils for agriculture. Additionally, geologic resources provide space and stability for development, life, and infrastructure (Frisk *et al.* 2022). Recreationally, geologic resources create sites for rock-climbing, trail-running, and hiking (*Recreation* 2024).

2.2.4 Biological Resource Services

Biological resources are vital for maintaining the ecological health and resilience of an area. Vegetation in the Assessment Area provides not only habitat, but breeding, loafing, and denning services for migratory birds, mammals, and other wildlife. Vegetation also enhances soil health by preventing erosion, improving nutrient cycling, and promoting water retention. Plants moderate local temperatures and humidity, creating more favorable conditions for various organisms. Air quality is also improved by plant life, and vegetation facilitates movement and migration for various species, promoting biodiversity. Pollination, carried out by various insects and birds, enhances agricultural productivity and contributes to biodiversity by enabling the reproduction of numerous plant species. Soil-dwelling invertebrates cycle nutrients and serve as food resources for mammals and small birds. Small mammals and birds are prey for higher trophic level organisms. Fish contribute to nutrient cycling, control insect populations, and serve as a food resource for birds and mammals. Birds serve as pollinators, scavengers, and seed dispersers and some small birds serve as a food source for larger birds of prey (Granek *et al.* 2020).

Biological resources also provide direct benefits to humans including subsistence, food, and fiber; recreation in the form of hiking, hunting, horseback riding, and fishing; ecotourism; aesthetic values; educational values; inspiration; and sense of place (Xu *et al.* 2020, *Recreation* 2024). Additional benefits include the buffer from pollutants that vegetation provides and temperature regulation (Granek *et al.* 2020).

Finally, members of the CSKT hold unique values and derive cultural services from the biota and habitats they comprise. Pursuant to the Hellgate Treaty of 1855, the Tribes hold reserved rights to hunting, gathering, and fishing within their usual and accustomed places, which include lands and resources within the Assessment Area. The CSKT hold particular values for the fishing rights they hold within the Flathead River, which flows to and through their Reservation, as well as cultural values for the native trout inhabiting that system and the surface water that supports them.

CHAPTER 3 | Injury Determination

Determination of injury to natural resources under the CERCLA NRDAR regulations is based on documentation that: (1) there is a pathway for the released hazardous substance from the point of release to a point at which natural resources are exposed to the released substance, and (2) injury of a natural resource of interest (i.e., surface water, sediment, soil, groundwater, biota) has occurred, as defined in 43 C.F.R. § 11.62.

Pathway is defined as:

> *The route or medium through which…a hazardous substance is or was transported from the source of the discharge or release to the injured resource* (43 C.F.R. § 11.14(dd)).

Injury is defined as:

> *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…release of a hazardous substance* (43 C.F.R. § 11.14(v)).

For certain resource categories, the CERCLA NRDAR regulations provide more specific definitions for what constitutes injury to that particular resource, as well as specific considerations and acceptance criteria for documenting injury. For several resource categories, for example, exceedance of a federally- or state-promulgated criterion (e.g., an ambient water quality criterion or a maximum contaminant level established in the Circular DEQ-7 Montana Numeric Water Quality Standards (DEQ-7 Standards) criteria [DEQ 2019]) is determined to be a *per se* injury. Additionally, the presence of a governmental advisory limiting or banning consumption of fish or wildlife due to the presence of hazardous substances is also considered a *per se* injury. Readers are referred to 43 C.F.R. § 11.61, *et seq.* of the CERCLA NRDAR regulations for additional details in this regard. Finally, if concentrations of hazardous substances in one resource are sufficiently elevated to cause injury to another resource, then that resource can also be considered injured. For example, if concentrations of hazardous substances in surface water are high enough to cause injury to biota, then both surface water and biota may be considered injured.

The CFAC Trustees anticipate applying a variety of approaches to determine if an injury to a natural resource has occurred, including comparing observed hazardous contaminant concentrations to promulgated thresholds and identifying measurable adverse changes in resources attributable to hazardous substance exposure. As part of the assessment, the Trustees will decide upon appropriate adverse effects endpoints or criteria to use when quantifying service losses based on a variety of factors (e.g., nature of the contaminants, potentially exposed receptors, and review of available toxicity information). In addition, as noted further below, the Trustees will also evaluate collateral injuries to natural resources caused by remedial actions (see 43 C.F.R. § 11.15(a)(1)).

3.1 Pathway and Confirmation of Exposure

As noted above, a precursor to determining injury to natural resources is to establish a pathway from a known release of a hazardous substance to exposure of a trust natural resource. Pathways for Site resources have already been established in the PAS. Specifically, the PAS identified:

- Aerial pathways through which hazardous substances were emitted via stack emissions—although the extent of aerial emissions is unknown—and subsequently deposited on surrounding habitats containing soil, surface water, and biological resources, as well as aerial emissions from resuspension of hazardous substances that were deposited on the ground.

- Fluvial pathways through which hazardous substances leached through unlined landfills, storage areas, and ponds into groundwater.
- Fluvial pathways through which hazardous substances were discharged directly to terrestrial and transition habitats via runoff.
- Fluvial pathways through which hazardous substances were discharged via groundwater to surface water.
- Biological uptake pathways through which biota came into direct contact with natural resources contaminated by Site hazardous substances, including ingestion and dermal contact.
- The remedial documents identified other pathways, including direct deposition of hazardous substances into landfills, storage areas, and ponds.

A natural resource has been exposed to a hazardous substance if all or part of it is, or has been, in physical contact with a hazardous substance, or with media containing a hazardous substance (43 C.F.R. § 11.14(q)). Consistent with 43 C.F.R. § 11.31(c)(1) and § 11.37, and as noted in Chapter 1, the PAS documented that natural resources within the Assessment Area have been exposed to hazardous substances, thereby supporting the Trustees' decision to proceed with assessment planning. However, as part of injury determination, the Trustees will determine the areal extent of injury to each potentially injured resource in accordance with 43 C.F.R. § 11.63. Additional resource-specific considerations for injury determination are detailed below.

3.2 Surface Water (and Sediment) and Groundwater Injury Determination

Injury to surface water and groundwater resources has occurred from a release of hazardous substances if the concentrations and duration of substances measured are sufficient to exceed water quality criteria established in the Safe Drinking Water Act (42 U.S.C. §300f, *et seq*.) or CWA (33 U.S.C. §1251, *et seq*.) or if concentrations are sufficiently elevated to cause injury to other natural resources. Additionally, since sediment is considered a component of surface water, if concentrations of hazardous substances in sediment exhibit certain characteristics in the Solid Waste Disposal Act (42 U.S.C. Chapter 82) surface water can also be considered injured (43 C.F.R. §§ 11.62(b),(e)). Injury to surface water and groundwater can also be demonstrated generally through documentation of measurable, adverse, change in the resource (43 C.F.R. § 11.14(v)).

Given the availability of applicable promulgated thresholds for water quality in the State of Montana (i.e., DEQ-7 Standards [DEQ 2019]), the Trustees intend to utilize existing data, as well as any additional data to be collected as part of this assessment, to document whether concentrations of hazardous substances in Assessment Area surface water and/or groundwater are sufficient to cause injury. Comparison of these data to the promulgated thresholds will allow for such a determination.

In addition, the Trustees may also evaluate sediment data to assess potential injury to surface water. Although there are no promulgated sediment quality thresholds, thresholds indicative of measurable adverse changes to freshwater sediments, including thresholds indicative of likely harm to resident aquatic biota, are readily available in the peer reviewed literature, and may be used to establish injury. Further, to the extent that existing

Site-specific surface water or sediment toxicity testing has been performed, these data may also be used to establish surface water injury.

Other studies to further determine injury to surface water and groundwater may be developed as necessary. Final documentation of injury to surface water and groundwater in the Assessment Area will follow specific guidance and acceptance criteria detailed in 43 C.F.R. § 11.62, *et seq*.

3.3 Geologic Resources Injury Determination

Injury to geological resources has occurred if the released hazardous substances are of sufficient concentration and duration to cause injury to other natural resources, including biota (typically in surface soils), surface water (via runoff), or groundwater (typically in deeper geologic units). The CERCLA NRDAR regulations specifically identify a suite of *per se* injury criteria that constitute such injury, including when concentrations of substances are sufficient to: reduce or increase soil pH below or above certain thresholds, exhibit characteristics identified in the Solid Waste Disposal Act (42 U.S.C. Chapter 82), impede soil microbial respiration, decrease water holding capacity or inhibit carbon mineralization, restrict the ability to use mineral resources, or cause toxicity to biota (43 C.F.R. § 11.62(e), *et seq.*). The Trustees anticipate applying thresholds published in the peer reviewed literature or by environmental regulatory agencies (e.g., ecological soil screening levels developed by the EPA, soil screening criteria developed by Efroymson *et al.* (1997) that correspond to the likelihood of observing adverse effects to soil-dwelling biota to demonstrate injury to soil resources). These thresholds will be compared to any readily available Site soils data, or soils data collected as part of the assessment, to document injury to geologic resources within the CFAC Assessment Area.

3.4 Biological Resources Injury Determination

Biological resource injury has occurred if a hazardous substance release is of a sufficient concentration to cause a biological resource or its offspring to experience death, disease, behavioral changes, cancer, mutations, or adverse reproductive effects, among other adverse measurable changes. Biological injury can also be established through the exceedance of an action or tolerance level under section 402 of the Food, Drug, and Cosmetic Act (21 U.S.C. Chapter 9) or if hazardous substance concentrations are sufficiently elevated for a state health agency to issue a consumption advisory for the consumption of that organism 43 C.F.R. § 11.62(f). The CERCLA NRDAR regulations also identify 18 specific circumstances that constitute injury (see 43 C.F.R. § 11.62(f)(4)) which range from eggshell thinning to enzyme inhibition. The Trustees intend to determine biological resource injury based on readily available data on concentrations of hazardous substances in various environmental media at the Site (e.g., surface water, sediment, and soil) compared to thresholds identified in the peer reviewed literature that are indicative of measurable adverse changes to biota exposed to such concentrations. Depending on the results of evaluations of these readily available environmental media data, additional studies may be implemented (Table 6; Resource-specific Primary Data Collection) to address specific data gaps.

3.5 Remedial Injury

Direct and indirect collateral injuries to natural resources occurring as a result of remedial actions are also compensable in NRDAR. Specifically, damages can include "injuries occurring from the onset of the release through the recovery period, less any mitigation of those injuries by response actions taken or anticipated, plus any increase in injuries that are reasonably unavoidable as a result of response actions taken or anticipated" (43 C.F.R. § 11.15(a)(1)). Therefore, in documenting injury to natural resources, the Trustees will also consider the effects of remedial actions.

CHAPTER 4 | Injury Quantification

The ultimate goal of NRDAR is to restore, replace, or acquire the equivalent of natural resources and resource services injured or lost as a result of a release of hazardous substances. Therefore, once natural resources have been determined to have been injured, the Trustees must undertake a quantification of losses to determine how much restoration, replacement, or acquisition is required to make the public whole. The CERCLA NRDAR regulations describe damages as the restoration costs required to return the injured natural resources to their baseline condition plus, at the Trustees' discretion, the compensable value of all, or a portion of, the services lost to the public for the time period from the release until the attainment of the restoration, replacement, and/or acquisition of equivalent of baseline (43 C.F.R. §§ 11.13(e)(3), 11.83, *et seq.*). Compensable value for interim losses includes both past losses and losses that will occur until the injured resources and services are returned to baseline. The CERCLA NRDAR regulations provide trustees with a range of alternative approaches to determine the compensable value, including restoration cost-based approaches for compensating for interim losses as well as economic valuation approaches used to estimate public use and nonuse values (43 C.F.R. § 11.83(c)). The Trustees intend to use restoration cost-based approaches to quantify injuries, scale restoration, and ultimately determine damages.

Specifically, to quantify natural resource injuries, the Trustees will (1) measure the extent of the injury, (2) identify the baseline condition and services provided by the injured resources, (3) assess the recoverability of the injured resources, and (4) quantify the reduction in services resulting from the contamination of the resources by the released hazardous substances. Injuries and losses will be quantified in terms of the actual measured loss of specific resources and/or the services that the injured resources would have provided had the release not occurred. Further, the Trustees will aim to quantify natural resource injuries and service losses in a manner that facilitates the selection and scaling of restoration (i.e., losses will be quantified using units useful for measuring lost services as well as the benefits provided by restoration actions). To accomplish this, the Trustees anticipate using equivalency analyses (see below). Any injuries or service losses the Trustees are unable to quantify may be addressed qualitatively by targeting restoration activities that compensate for those losses in a general way.

4.1 Ecological Losses

The Trustees anticipate using equivalency-based methods (see text box on Equivalency Analyses in NRDAR below), which are specifically approved valuation methodologies in the CERCLA NRDAR regulations (43 C.F.R. § 11.83(c)(2),(3)). Equivalency analyses quantify resource losses from contamination over the spatial and temporal extent of injury and quantify resource gains from restoration over the spatial and temporal extent of the restoration project(s).

For this assessment, the Trustees anticipate quantifying ecological injury in terms of lost services on a habitat basis by focusing on representative species (i.e., components of a habitat) using habitat equivalency analysis (HEA). While habitat sub-types may be quantified separately, it is likely that the habitats of focus will be aquatic habitat (broadly including in-stream as well as any hydrologically connected wetland habitat), and terrestrial habitats (encompassing the upland portions of the Assessment Area). However, the Trustees also may consider quantifying injury to specific resources (e.g., threatened or endangered species, or individual biological species found to be disproportionately harmed) using resource equivalency analysis (REA).

EQUIVALENCY ANALYSIS IN NRDAR

Equivalency analyses are methods for scaling the amount of restoration needed to offset a certain amount of natural resource injury. They consider resource losses, as well as the gains, from compensatory restoration over time, employing the concept of discounting. Two common variants of these types of analyses are resource and habitat equivalency analysis. A third method, habitat-based resource equivalency method (HaBREM), has also emerged in recent years (Baker et al. 2019).

Resource Equivalency Analysis (REA)

REA is commonly used to quantify lost ecosystem services when the injury is specific to a particular resource or biological species or species group, particularly when the nature of the injury lends itself to quantification in terms of units of the resource. For example, for a biological resource REA, the unit of injury may be the number of organisms lost (or their biomass) and may also potentially include their lost future somatic (i.e., physical) growth and/or reproductive potential. For a groundwater REA, the unit of injury may be unit volumes of groundwater (e.g., gallons or acre-feet). REA then applies modeling to quantify unit losses over time with discounting to put past and future changes in the selected measurement unit into a common present value. One advantage of REA is its targeted focus on a resource specifically identified as having been adversely affected by a release of a hazardous substance. Once resource losses have been quantified, resource gains provided through restoration are similarly quantified, and restoration projects are scaled to ensure the quantity of resources restored is equivalent to the quantity that was lost.

Habitat Equivalency Analysis (HEA)

HEA is most commonly undertaken when injury or service losses can more reasonably be said to accrue to a geographic area. Instead of evaluating resource losses to one specific resource, as is done in REA, resource losses are evaluated more holistically on a habitat basis. Service loss estimates across multiple species (or species groups or habitat components) are combined to generate an overall service loss estimate for a given area. Discounting is then used to scale past and future losses, which are typically measured in present value units of “area-time” (e.g., discounted service acre-years). Similar to REA, the benefits of a given restoration project(s) are also quantified, using the same units (e.g., discounted service acre-years provided by restoration), and the amount of restoration needed to compensate for losses is identified.

Habitat-Based Resource Equivalency Method (HaBREM)

HaBREM is a variant of HEA that employs resource-based metrics (e.g., biological abundance, plant cover, etc.) to explicitly quantify service losses and scale resource gains within a habitat equivalency framework. It similarly uses modeling and discounting, like both methods above, but aims to scale habitat losses and gains based on specific resource-focused metrics that may be objectively quantified using standard scientific field research methods.

4.2 Groundwater Losses

It is anticipated that a REA approach will be used for assessing and scaling restoration for groundwater losses. REA methods are based on balancing the injury to natural resources that has occurred over time with an equivalent amount of restoration, taking into account the nature and duration of the injury (including remediation) and the nature and timing of the restoration. Thus, for a groundwater REA, it will be necessary to characterize the baseline quality of the groundwater, quantify the amount of injured groundwater, and delineate the time frame of the injury.

The quantity of injured groundwater may be quantified either as a stock volume or a flow (i.e., flux) of groundwater passing through the aquifer over a unit of time (e.g., on an annual basis). Either approach will require information about the spatial extent of the groundwater contamination and the physical properties of the aquifer. For example, to calculate flow, the surface area and the recharge rate of the groundwater contaminant plume will be needed. Delineating the time frame of injury will include determining when it began, how it may have changed over time, and when (or if) it will end.

4.3 Tribal Cultural Use Losses

The CSKT have inhabited the area surrounding the Site for generations and have a unique cultural connection to the landscape and associated natural resources that are potentially adversely affected by Site-related hazardous substance releases. As such, it may be necessary to describe and quantify natural resource injuries and service losses to CSKT tribal members separately from losses to the general public. This may require an evaluation of information on the natural resources of importance to the CSKT, associated tribal uses and values, and any environmental contaminant data specific to those resources as well as an identification of pertinent data gaps. Further, specific restoration actions may also be required to fully compensate for tribal community service losses.

Cultural service loss assessments will focus on (1) documenting adverse impacts in natural resources of importance to tribal members and/or uses and values of those natural resources; (2) determining or describing the adverse impacts to natural resource uses or values experienced by tribal members that are attributable to hazardous substance releases; and (3) generating information relevant for both primary and compensatory restoration identification and scaling.

Damage assessments involving tribal cultural use loss claims have generally relied on similar methods to other natural resource claims, with modifications or additions to reflect the unique circumstances of tribal uses and values. Alternatively, methods used to assess impacts on Indigenous cultures in other contexts have also been relied upon, such as land claims or cultural impact assessments. Examples of options available include:

- Conducting surveys (e.g., stated preference),
- Assessing hazardous substance release-related changes in cultural practices, traditional knowledge, language, or other cultural services and,
- Quantifying use of resource-specific losses as a direct proxy for tribal service losses.

In this case, the Trustees anticipate compiling and reviewing any existing information on natural resources utilized by CSKT tribal members, tribal values and services related to those natural resources, potential impacts from CFAC-related releases of hazardous substances, and any sampling data related to resources of concern for the CSKT. After a review of available information, the Trustees will determine the need for additional data collection to inform any data gaps. Additional data collection may include conducting interviews, focus groups, or a similar approach to collecting information from tribal community members pertaining to tribal uses of natural resources and potential service losses experienced by tribal community members.

4.4 Accounting for Baseline in Injury Quantification

As noted in Section 1.3.4 above, baseline is defined as the condition(s) that would have existed if the hazardous substances had not been released in the Assessment Area (43 C.F.R. §11.14(e)). Therefore, baseline data should reflect expected conditions in the Assessment Area had the release of hazardous substances not occurred, taking into account natural processes and changes that result from human activities (e.g., structural alterations). Site-specific historical data applicable to establishing baseline have not been identified to date. If the Trustees do not identify relevant Site-specific historical data, the Trustees plan to use, in order of priority, data from reference/control areas (43 C.F.R. § 11.72(d)), relevant literature and historical data (43 C.F.R. § 11.72(c)), and/or Site-specific studies (43 C.F.R. § 11.72(c)(5)).

4.5 Resource Recoverability

Recovery period is defined as the time required for the injured resources and their services to return to their baseline condition, as defined by the Trustees (43 C.F.R. § 11.14(gg)). The rate of resource recovery will be determined based on information on the nature, scope, and severity of natural resource injuries; the nature, extent, and timing of remedial activities; the expected natural attenuation of contamination; and estimates of resource recoverability implied by trends in resource monitoring data or derived from the literature. If available, Site-specific time-series data may be used to estimate trends in natural resource recovery; or, for remediated areas, pre- and post-remedial monitoring data may be used. In some cases, however, the Trustees may apply assumptions related to the time frame or extent of resource recoverability.

4.6 Information Sources

The Trustees anticipate using a variety of information sources to determine natural resource injuries and service losses, and to develop the input parameters for equivalency analyses that will be used as part of injury quantification. These information sources include published and gray literature (e.g., on natural resources relevant to the Site and surrounding area, ecological toxicity, and human uses of the natural resources), Site-specific remediation reports and evaluations, and Site-specific environmental samples.

As part of assessment planning efforts, the Trustees compiled readily available electronic sampling data from the site and surrounding areas into a NRDAR Database. These data include samples collected or required by EPA and DEQ, and associated contractors, as part of the remedial and permitting processes. Samples exist for groundwater, porewater, surface water, sediment, and soils as well as for wastewater, collected between 1999 and 2021. The Trustees compiled the electronically available data into a single NRDAR Database for ease of analyzing the available data and conducted preliminary data processing. As part of data processing, the Trustees standardized field values, removed duplicates, and added metadata for the samples, where available, such as well depth information and sample location coordinates from Site reports or communications with EPA and CFAC.

The Trustees plan to continue to refine the NRDAR Database during the assessment. For example, the Trustees anticipate transcribing historical sampling data from Site reports (e.g., Hydrometrics, Inc. 1980, *Site Location and Evaluation for Disposal of Hazardous Wastes at Columbia Falls Reduction Plant*; Hydrometrics, Inc. 1985, *Hydrogeological Evaluation of ARCO Aluminum Primary Operation*; Ecology and Environment, Inc. 1988, *Analytical Results Report, Columbia Falls Aluminum Company*), to expand the NRDAR Database, focusing on information that may address temporal, spatial, and media-specific data gaps. Additional data collected in the future may also be added to the NRDAR Database as part of the assessment.

CHAPTER 5 | Damages Determination and Restoration

The purpose of a damage determination is to "establish the amount of money to be sought in compensation for injuries to natural resources resulting from a ... release of a hazardous substance" (43 C.F.R. § 11.80(b)). This chapter addresses how damages will be determined using methods described in the CERCLA NRDAR regulations, where applicable (43 C.F.R. § 11.80). As noted in Chapter 4, the Trustees will determine damages using restoration cost-based approaches, and the total amount of natural resource damages will include both the cost of restoration to baseline and the compensable values for interim losses (43 C.F.R. §§ 11.13(e)(3), 11.83, *et seq.*). Damages that are recovered under the CERCLA statute and the NRDAR regulations must be used for natural resource restoration (42 U.S.C. 9601, *et seq.*; 43 C.F.R. Part 11), including restoring both the injured resources as well as the services those resources provide.

5.1 Restoration Focus

The CERCLA NRDAR regulations emphasize that for Type B assessments, damages should be based on actions that "restore, rehabilitate, replace, or acquire the equivalent of" the injured resources and resource services (see 43 C.F.R. §§11.13(e)(3), 11.82, *et seq.*). Such actions are broadly referred to as "restoration." Restoration is intended both to return injured resources to their baseline condition and to compensate for resource service losses during the period of injury.

As noted in Chapter 1, the CERCLA NRDAR regulations describe the development of an RCDP as part of the Assessment Plan (43 C.F.R. § 11.81(d)(1)). An RCDP lists a reasonable number of possible alternatives for restoration, rehabilitation, replacement, and/or acquisition of equivalent resources and their related services, selects one or more of the alternatives based on general criteria set forth in the CERCLA NRDAR regulations and site-specific criteria established by the trustees, and provides a rationale for the selected alternative(s) (43 C.F.R. § 11.81(a)). If existing data are not sufficient to develop an RCDP at the time that the Assessment Plan is released, the CERCLA NRDAR regulations allow trustees to defer development and public release of an RCDP until after completion of the injury determination or quantification phases (43 C.F.R. § 11.81(d)(1)). In the CFAC case, information needed to complete an RCDP is insufficient at this time. The Trustees may develop an RCDP later in the assessment process.

The Trustees' overall approach to restoration, however, will be to target restoration actions that directly benefit natural resources and the public. Where timely restoration of injured natural resources is not feasible (e.g., removal of contaminated sediments to restore all the services that would be provided absent the release of hazardous substances), projects that replace or offset service losses may be undertaken. However, DOI, in discussing the intent of the CERCLA NRDAR regulations, noted:

> *…[t]he Department does not believe that Congress intended to allow Trustee agencies to simply restore the abstract services provided by a resource, which could conceivably be done through an artificial mechanism. For example, nothing in the language or legislative history of CERCLA suggests that replacement of a spring with a water pipeline would constitute 'restoration, rehabilitation, replacement, and/or acquisition of equivalent resources.' CERCLA requires that natural resource damages be based on the cost of restoring, rehabilitating, replacing and/or acquiring the equivalent of an actual natural resource* (Federal Register, Volume 58, Number 139, 22 July 1993).

The Trustees intend, therefore, to address restoration at the habitat scale by focusing on restoration projects that will compensate the public by providing resource services in or near the Assessment Area.

Ultimately, as part of restoration planning, the Trustees anticipate identifying a range of potential restoration alternatives, evaluating the suitability of those alternatives in accordance with the CERCLA NRDAR regulations (see 43 C.F.R. § 11.82(d)), and implementing the restoration alternatives. In considering restoration alternatives, the Trustees will also take into consideration any regional or community restoration plans and priorities. The Trustees may also establish additional restoration criteria for purposes of screening or prioritizing specific restoration alternatives. For example, priority may be given to projects that provide additional benefits to the public that go above and beyond restoration of natural resources and resource services, which are the focus of the NRDAR process. As noted above, selected restoration alternatives will be made available to the public for review and comment.

5.2 Ecological Damages Determination

As indicated in Chapter 4, the Trustees anticipate using habitat- and resource-based equivalency methods to quantify ecological losses. The Trustees, therefore, also anticipate using these approaches when scaling restoration to ensure sufficient ecological benefit is provided to compensate for losses. When possible, losses and gains will be measured in the same unit (e.g., number of organisms, biomass, acres of habitat). Damages will be calculated as the cost to implement that restoration.

The Trustees will ensure that there is no "double counting" of losses in the scaling process (43 C.F.R. § 11.84(c)). This will require evaluation of whether restoration scaled to the losses experienced by one resource will also compensate (fully or partially) for the losses associated with another injured resource. Specifically, use of equivalency-based scaling approaches will mean that the Trustees will identify and quantify the services provided by proposed restoration projects as part of the scaling process. As restoration projects are identified and evaluated, attention will need to be paid to the particular suite of services the restoration projects are anticipated to provide. Whenever possible, the Trustees will endeavor to target restoration that will restore, replace, rehabilitate, or acquire the equivalent of those resources and the services they provide that were found to be injured (i.e., in-kind replacement). In some cases, the Trustees may choose to engage in environmental restoration that is deemed worthwhile (but is not in-kind in nature) if it restores similar resources or resource services as those that were injured, or restores resources or services deemed highly important ecologically, when restoration of the same type and quality is unavailable or not possible. In these circumstances, the Trustees will evaluate the relative differences between the type and quality of the injured resources and the resources to be restored and may adjust the scope or scale of required restoration accordingly. For example, the Trustees may develop compensation ratios to account for potential differences in ecological services provided by different habitat types (e.g., wetland versus open water habitat). Such ratios may be applied to ensure that any tradeoffs in the habitats, resources, or resource services targeted for restoration result in restoration projects that are sufficient to make the public whole.

5.3 Groundwater Damages Determination

As with the damages determination approach for ecological losses described above, the Trustees anticipate identifying, scaling, and determining the cost (as necessary) of restoration projects required to compensate the public for groundwater injuries. There are a wide range of restoration projects that could be performed to restore lost groundwater services, such as prevention of groundwater contamination, groundwater preservation initiatives, and promotion of groundwater infiltration, among other concepts. Replacement projects are also widely available. Projects will be chosen based on restoration criteria, and will be scaled using REA—that is, restoration actions will be selected and scaled to replace the present value of the quantity (e.g., either as a static volume or flow) of groundwater shown to be injured in the injury quantification phase of the assessment.

5.4 Tribal Cultural Damages Determination

As noted in Chapter 4, there are a range of injury quantification approaches available to assess the type and scale of lost cultural services. The damages determination approach for tribal cultural use losses may depend on the injury quantification approach utilized. However, similar to ecological and groundwater damages determination, damages determination for cultural service losses will be based on the cost of restoration actions identified to compensate for the losses.

The Trustees will identify and evaluate relevant restoration projects. A suite of restoration actions may be scaled as needed to ensure the adversely affected CSKT tribal members are compensated with services of the same nature and scope as those services determined to have been lost during injury quantification. While it is possible that ecological-focused restoration actions may serve to restore some cultural service losses, it is possible, if not likely, that specific actions targeting the restoration of tribal cultural practice, language, or resource access may need to be conducted. As with scaling restoration and damages to the resources themselves, care will be taken to avoid double counting the cultural service losses when scaling restoration actions.

CHAPTER 6 | Proposed Assessment Activities

6.1 Introduction

The preceding chapters describe the framework and general approaches the Trustees plan to apply to the CFAC NRDAR to assess the severity and magnitude of natural resource injuries resulting from hazardous substance releases to the Assessment Area. To facilitate the injury assessment process outlined in Chapters 3 and 4 of this Plan, the Trustees plan to leverage existing information and desktop analyses to the extent possible to maximize use of available information and complete the assessment activities as cost-effectively as possible per the guidance provided in the CERCLA NRDAR regulations. However, through implementation of this Plan, the Trustees may determine that additional primary data collection is necessary to address data gaps and to most effectively identify and quantify injuries and scale restoration.

This chapter describes the proposed activities that the Trustees have determined may be necessary based on the current understanding of assessment needs. However, this Plan is not intended to limit additional or alternative studies that may be undertaken during the course of the assessment, as the Trustees recognize that different studies may become necessary or advisable as new information becomes available or as new data gaps are identified. Furthermore, the inclusion of an activity within this Plan does not guarantee that it will be undertaken. For instance, the Trustees may determine that reasonable assumptions may be utilized to address data gaps without further data collection. Rather, this Plan provides a framework within which the Trustees will begin to implement the assessment. As these efforts progress and additional substantive information is generated, the Trustees may provide amendments to this Plan for public review.

6.2 Assessment Activities

The Trustees' proposed assessment activities are described in Table 6, below. This table summarizes the objective and description of each activity and is organized by the stage of the assessment in which the activity would occur. These activities are designed to support (1) the determination and quantification of injury to natural resources and lost services resulting from Site-related contamination, and (2) the identification and scaling of restoration projects that will compensate for natural resource injuries (including the cost of such restoration). These studies would build on existing data collected during previous investigations (e.g., remedial investigations), and would be coordinated to the extent possible with ongoing efforts initiated by other entities (e.g., EPA). Assessment activities may be implemented in a phased approach based on factors such as: the availability of existing information specific to the Assessment Area; the activity's cost-effectiveness; the planned technical sequencing of activities that may help inform future studies; or the activity's likelihood of clarifying the existence or extent of an injury or scaling of required restoration.

The specific approach to conducting these activities will be developed further before each activity is implemented. Specific study plans may be drafted, which would further outline the Trustees' approach and ensure the data type and quality resulting from the activity are sufficient to meet the goals of the investigation. A Quality Management Plan (QMP) for the assessment is included in Appendix A, which will be used as a guide in the implementation of each assessment activity; however, as detailed in the QMP, individual Work Plans and Quality Assurance Project Plans may also be drafted for a specific study, if necessary.

Table 6. Summary of Proposed Assessment Activities

Assessment Activity	Objective(s)	Description and Rationale
Compilation and Evaluation of Existing Information		
Compile, review, and evaluate relevant contaminant chemistry data	• Continue assessment planning efforts to compile available environmental data into a single, standardized database. • Process available data as needed for evaluation purposes and to ensure data are usable to meet assessment goals. • Assess the quality of available data records, identify data gaps, and evaluate data sufficiency for injury quantification purposes, including evaluating the need for primary data collection studies.	Contaminant chemistry data, collected under various remedial efforts, exist for a range of relevant media including soil, sediment, surface water, porewater, and groundwater. The Trustees have preliminarily compiled and reviewed these existing data sources as part of assessment planning efforts. However, additional historical data sources exist (e.g., historical Site documents, Forest Service reports) with potentially relevant data that the Trustees intend to review further to supplement the Trustees' existing data compilation. This may include transcribing additional data sources to expand the Trustees' database. This activity may also include further compilation, standardization, processing, and evaluation of the existing data to enable efficient analysis of the relevant data. Data processing involves evaluating non-detect sample results, laboratory replicates, field duplicates, and data qualifiers, and developing and refining an analytical methodology that includes protocols for processing and use of data to meet assessment goals. The Trustees will also refine their understanding of data gaps and determine the need for any studies or approaches to address data gaps.
Confirm contaminant pathways and exposure of resources	• Evaluate existing information on physical and chemical transport mechanisms within the Assessment Area to document contaminant pathways and natural resource exposure. • Summarize substance release histories and data for various environmental media. • Assess the quality of available data, identify data gaps, and evaluate data sufficiency for confirming pathways of exposure.	Documentation of a complete pathway and exposure of natural resources is a requirement under the CERCLA NRDAR regulations for natural resource injury determination. As part of this effort, the Trustees will review existing pathway information (compiled in the previous activity) and confirm pathways and exposure prior to determining the need to undertake further sampling or studies to maximize the use of existing data and ensure a cost-effective assessment. Information reviewed would include, but may not be limited to, any data on physical and chemical transport mechanisms in the Assessment Area, hazardous substance release histories, and resource data. Summaries would be developed to document release histories and data on soil, sediment, surface water, porewater, groundwater, and flow-through infrastructure (i.e., outfalls), as applicable. Data sufficiency for the purposes of establishing pathway and exposure, and any data gaps, would be documented for further consideration.
Compile and review literature-based information on adverse impacts to natural resources	• Compile and summarize available information from published literature regarding adverse effects of Site-specific, relevant contaminants to natural resources. • Conduct a preliminary comparison of Site-specific data to compiled adverse effects	This activity will first use screening/cleanup levels identified as part of the Trustees' evaluation of the data. If there is not a relevant screening level already identified, this activity will include the compilation, review, and summary of published literature-based information regarding adverse effects of Site-specific, relevant hazardous substances to natural resources. Trustees will evaluate the sufficiency of existing information for evaluating service losses to resources and determine the need for additional efforts to address any data gaps. Finally, dependent on the sufficiency of

Assessment Activity	Objective(s)	Description and Rationale
	thresholds to confirm resources and contaminants of concern for purposes of the assessment.	available information, the Trustees will conduct a comparison of Site-specific data to compiled adverse effects thresholds to confirm resources and contaminants of concern for the assessment.
Compile and review available Site-specific information on adverse impacts to natural resources	• Compile and summarize historic information on any adverse impacts on natural resources, such as fish kills, avian mortality events, impacts to Teakettle Mountain, etc.	As part of the historic review of available information, this compilation will evaluate reported fish kills, and any avian mortality events, Teakettle Mountain, and available historic information regarding impacts from hazardous substances from the Site.
Compile and review available information on tribal uses of natural resources and potential service losses	• Conduct primary data collection efforts with Tribal community members to better understand potential adverse impacts resulting from releases of hazardous substances from the Site. • Document natural resources and their services, the relationships between resources and Tribal communities, and any risks or perceptions of risks.	Members of the CSKT use natural resources in the Assessment Area in ways that are unique compared to the general public. This activity will include a compilation and review of available information on uses of natural resources specific to the CSKT, any sampling data related to resources of concern to the Tribes, and potential losses they may have experienced as a result of the releases of hazardous substances. Through this activity, the Trustees may identify data gaps that require further study, and this activity may also inform the scale and scope of cultural services provided by natural resources.
Compile and review available Site-specific information on recreational and other human use losses	• Describe the types of human uses of natural resources present in the Assessment Area and those that may have been (or continue to be) adversely impacted. • Assess potential scope and magnitude of recreational and other human use losses and identify any data gaps.	Lost human use opportunities may be associated with the presence of contaminants in the Assessment Area, which could result in service losses. This activity will involve inventorying recreational and other human uses in the Assessment Area and any potential adverse effects stemming from releases of hazardous substances (e.g., advisories, institutional controls, changes in recreational behavior). This will help inform potential human use losses, the scale and scope of human services provided by natural resources and help determine if additional human-use studies are necessary.
Compile and review available Site-specific remedial information	• Compile information on planned or expected remedial activities including timing, location, spatial extent, and type. • Evaluate the severity and magnitude of impacts to resources and resource services.	Remedial actions may cause collateral injuries and must be considered during injury quantification. Compiling data on the geographic extent and time frame of remedial activities will allow the Trustees to incorporate remedial impacts into subsequent analyses. This activity will include a review, compilation, and documentation of existing information on remedial actions that have occurred and are planned for the Site. The Trustees will then evaluate the adverse impacts on natural resources that may have resulted from the remedial actions.
Resource-specific Primary Data Collection		
Soil and/or sediment data collection	• Collect soil and/or sediment samples to further document contaminant concentrations (e.g., to	Depending on the findings from the *Compilation and Evaluation of Existing Information* assessment activities (listed above), the Trustees may determine the need to collect additional

Assessment Activity	Objective(s)	Description and Rationale
	address any data gaps identified during the compilation of available information). • Evaluate samples, and other existing data, to help inform pathways, exposure, and potential natural resource injury resulting from releases of hazardous substances.	environmental soil or sediment samples. In the event of primary data collection, the Trustees would develop a sampling design (and any necessary Quality Assurance Project Plans) to target resources, contaminants, and geographic areas of concern. Data would be utilized to document complete pathways and/or to help determine and quantify natural resource injuries. For example, during assessment planning efforts, the Trustees identified a potential need for additional soil/sediment samples around the perimeter of the Site to fully delineate the extent of existing contamination. In addition, spatial data gaps exist in the available soil data, particularly near culturally significant areas such as Teakettle Mountain.
South Percolation Ponds Removal Action Area/North Channel of Flathead River	• Evaluate samples, and other existing data, to determine presence of hazardous substances remaining after the South Percolation Ponds removal action, including potential contamination in and along the floodplain of the northern channel of the Flathead River. • Collect sediment and porewater samples to further document contaminant concentrations in this area.	Samples collected after the removal action show exceedances of relevant screening levels in the porewater and surface water, suggesting there may be contamination remaining in this area. The Trustees view additional confirmation sampling as an obligation of response, but may consider additional sampling as appropriate if EPA, in consultation with DEQ, does not require additional sampling.
Macroinvertebrate toxicity study	• Evaluate effects of field-related contamination on biologically relevant endpoints (e.g., survival) for Site-specific benthic macroinvertebrates through laboratory bioassays.	Exposing benthic macroinvertebrates to Site-specific sediment can directly inform the severity and magnitude of contaminant-related injury to benthic invertebrates and confirm pathway of exposure to higher trophic level organisms (e.g., fish, birds). This activity may help the Trustees understand the severity and magnitude of effects of contaminants on the benthic invertebrate community and other biota.
Groundwater data collection	• Conduct additional groundwater-related sampling to better understand discharge to surface water and/or current contaminant concentrations in groundwater. • Utilize any data collected to help evaluate pathway and the extent of potential groundwater injuries.	Depending on the findings, and any data gaps identified, through implementation of the *Compilation and Evaluation of Existing Information* assessment activities (listed above), the Trustees may determine the need to collect additional environmental data. This could include groundwater samples from established wells as well as hydrological data related to groundwater discharge zones (e.g., discharge rate from seeps) to better understand current and potential future conditions. The Trustees may also identify the need to measure contaminant concentrations in seeps samples. The Trustees would develop a sampling design to target physical measurements, contaminants, and geographic areas of concern, particularly associated with any identified data gaps. Data would be utilized to document complete pathways and/or to help determine and quantify natural resource injuries, such as the extent and magnitude of current and future groundwater injuries.

Assessment Activity	Objective(s)	Description and Rationale
Biota data collection	• Conduct biota sampling to better understand contaminant concentrations in biological organisms. Data on biota exposure to contaminants would inform Trustees' understanding of the pathways and level of exposure and impact to biota. • Utilize any data collected to help evaluate exposure and the extent of potential biota injuries.	Depending on the findings from the *Compilation and Evaluation of Existing Information* assessment activities (listed above), the Trustees may determine the need to collect biological samples. For example, few direct measurements of contaminants in biological organisms (e.g., invertebrates, fish, birds, mammals) are currently available. The Trustees would develop a sampling design(s) to target specific species and geographic areas of concern, particularly those with any data gaps. Data on biota exposure to contaminants would be utilized to document complete pathways and/or to help determine and quantify natural resource injuries.
Laboratory toxicity studies	• Evaluate effects of field-related contamination on biologically relevant endpoints (e.g., survival) on Site-specific organisms through laboratory bioassays.	Exposing organisms to Site-specific contaminated media can directly inform the severity and magnitude of contaminant-related injury to specific organisms or groups of organisms and confirm pathway of exposure to higher trophic level organisms (e.g., birds, fish). The Trustees may determine the need to evaluate the effects of field-related contamination on biologically relevant endpoints through laboratory studies.
Injury Quantification		
Cultural use assessment studies	• Conduct primary data collection efforts with CSKT tribal members to better understand potential adverse impacts to natural resource uses or values resulting from releases of hazardous substances from the Site. • Document natural resources and their services, CSKT uses and values for natural resources, and any adverse impacts, risks or perceptions of risks, to uses and values of natural resources.	This activity would build upon any findings and data gaps identified through implementation of the *Compile and review available information on tribal uses of natural resources and potential service losses* assessment activity (see above). To address data gaps, the Trustees may conduct interviews, surveys, or implement other similar efforts to collect information from CSKT tribal members. Goals may include identifying and documenting natural resources of importance to the CSKT and associated natural resource services, documenting the relationship between the CSKT tribal members and potentially injured natural resources, and documenting any risks or perceptions of risks associated with exposure to potentially injured natural resources.
Quantify ecological injuries and service losses	• Rely on information and findings from previous assessment activities to quantify resource-specific lost ecological services, accounting for baseline.	To determine the type and scale of restoration actions required to compensate the public for natural resource losses, the Trustees need to understand the nature and extent of natural resource injuries and associated ecological service losses. This activity will involve utilizing outcomes from the previous assessment activities to quantify resource-specific injuries and ecological service losses, accounting for baseline conditions. Losses may be quantified for surface water, geologic, and biological resources.

Assessment Activity	Objective(s)	Description and Rationale
Quantify groundwater injuries and service losses	• Rely on information and findings from previous assessment activities to quantify groundwater-specific injuries and lost services, accounting for baseline.	To determine the type and scale of restoration actions required to compensate the public for groundwater resource losses, the Trustees need to understand the nature and extent of groundwater injuries and associated service losses. This activity will involve utilizing outcomes from the previous assessment activities to quantify groundwater injuries and losses, accounting for baseline conditions.
Quantify tribal service losses	• Rely on information and findings from previous activities to determine and quantify natural resource injuries and associated tribal service losses relevant to the CSKT.	The Trustees would rely on information and findings from previous activities (including the *Compile and review available information on tribal uses of natural resources and potential service losses* and *Resource-specific Primary Data Collection* assessment activities) to complete this activity. As part of this activity, the Trustees would determine and quantify any adverse impacts to natural resources of relevance to the CSKT and document any associated tribal service losses resulting from the release(s) of hazardous substances from the site.
Quantify human use losses (e.g., recreational)	• Rely on information and findings from previous assessment activities to quantify lost recreational trips and human use losses, accounting for baseline.	To determine the scale and type of restoration actions required to compensate the public for human use losses, the Trustees need to understand the scale and scope of injuries and human use service losses. This activity will involve utilizing outcomes from the previous assessment activities to quantify human use injuries and losses, accounting for baseline conditions.
Damages Determination and Restoration Planning		
Identify restoration options and determine damages	• Identify restoration options to compensate for quantified losses. • Evaluate the cost of those restoration actions to estimate damages.	Based on the nature and extent of injuries quantified in previous steps, the Trustees will identify appropriate and relevant restoration options. Restoration actions will be scaled to compensate for the quantified losses and costs will be developed to estimate damages. The Trustees intend to utilize equivalency analyses and restoration-cost based approaches to determine damages.

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Appendix A | Quality Management Plan

This appendix documents the Trustees' quality assurance approach for the NRDAR. The CERCLA NRDAR regulations require that natural resource trustees develop a Quality Management Plan (QMP) that "satisfies the requirements listed in the National Contingency Plan and applicable [United States Environmental Protection Agency] guidelines for quality control and quality assurance plans" (43 C.F.R. § 11.31(c)(2)). As such, the purpose of this QMP is to document the Trustees' Quality Systems and provide a blueprint for how the Trustees will plan, implement, and assess their Quality Systems for NRDAR work performed by or on behalf of the Trustees.[2] Consistent with EPA guidance (EPA 2002a), this QMP presents the organizational structure, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, and assessing all activities conducted under this NRDAR.

The Trustees intend to rely predominantly on existing (secondary) data but may develop project-specific quality assurance project plans (QAPPs), as applicable (e.g., for any assessment activities that entail the collection of primary data).

This guidance is driven by the need to (1) ensure consistency with any applicable federal and state-level quality assurance requirements, and (2) the need to collect any primary data in a manner suitable for generating litigation-quality data.

A.1 Data Management and Organization

A.1.1 Importance of Data Quality

The Trustees recognize the importance of data quality, given the many management decisions involved in accomplishing the NRDAR that require the use of environmental data, including analytical chemistry data, non-analytical environmental data (e.g., abundance, species diversity), and other related information. The collection, compilation, evaluation, and reporting of environmental data are necessary to perform the assessment. The Trustees must therefore properly document the origin and quality of the data used to make decisions so that data limitations may be identified, and assessments of the severity, location, and extent of injury are accurate. This assists the Trustees in making appropriate decisions regarding the type and scale of restoration actions necessary to compensate for natural resource injuries.

A.1.2 Quality System Description

The purpose of the Quality System is to ensure that environmental data and related information collected and used for the assessment are adequate to meet project goals. In particular, the Quality System identifies planning, acquisition, and review processes that are necessary to ensure the adequacy of collected data and information. One aim of the Quality System is to ensure that all available data have sufficient supporting documentation for data users to evaluate whether the data meet the needs of their intended use. This is achieved by ensuring that adequate quality assurance/quality control (QA/QC) tools are used throughout the entire data collection and assessment process (from initial planning through data usage). The tools that may be used in the Quality System include:

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[2] Serving as Trustees for natural resources in and around CFAC Site include, the Governor of the State of Montana, with the Montana NRDP acting as his representative, the CSKT, the DOI, acting through the USFWS and the Bureau of Indian Affairs, and the USDA (collectively referred to as "the Trustees").

- This QMP.
- Work plans including associated QAPPs that may be developed to support NRDAR activities.
- Standard Operating Procedures.
- Technical systems audits.
- Field and laboratory audits.
- Data verification and validation.

However, in the case of NRDARs, historical data may be relied upon to establish past conditions. Historical, or other data, may not always have sufficient supporting documentation. In these cases, the Trustees would describe any available supporting documentation, any limitations on the use(s) of the data, and any related uncertainties.

A.1.3 Goals and Objectives of the Quality System

The primary goal of this QMP is to ensure that all environmental data and related information relied upon in this NRDAR are scientifically valid for their intended use and/or that any uncertainties are documented. This QMP includes analyses that evaluate existing datasets as well as studies that generate new information.

With respect to the evaluation of existing data, the principal investigator (PI) for each analysis will carefully document the source(s) of all data, available information about QA/QC procedures used by the original investigator, and any data qualifiers or other information restricting application of the data.

This approach will also be applied to new data and analyses developed by federal and state agencies, academics, and information developed under the auspices of other activities or programs. For new studies that are specifically undertaken to support the NRDAR process, appropriate study-specific QAPPs will be developed according to the general principles described below.

Quality Assurance Project Plans

As noted in EPA 2002a, QAPPs will "vary according to the nature of the work being performed and the intended use of the data" and as such need to be tailored to match the specific data-gathering needs of a particular project (40 C.F.R. § 300.5) The NRDAR effort will likely entail a variety of different data-gathering efforts; therefore, it is not appropriate to develop a single QAPP to cover all these activities. Instead, the Trustees will ensure that individual study plans adequately address project-specific QA issues. The discussion in this document therefore focuses on the required elements of an acceptable study plan.

In general, a study-specific QAPP must provide sufficient detail to demonstrate that:

- The project's technical and quality objectives are identified and agreed upon;
- The intended measurements, data generation, or data acquisition methods are appropriate for achieving project objectives;
- Assessment procedures are sufficient for confirming that data of the type and quality needed and expected are obtained; and
- Any limitations on the use of the data can be identified and documented (EPA 2002a).

Accordingly, study-specific QAPPs developed for this assessment will include the four elements called for by EPA:

- **Project Management** − Documents that the project has a defined goal(s), that the participants understand the goal(s) and the approach to be used, and that the planning outputs have been documented;

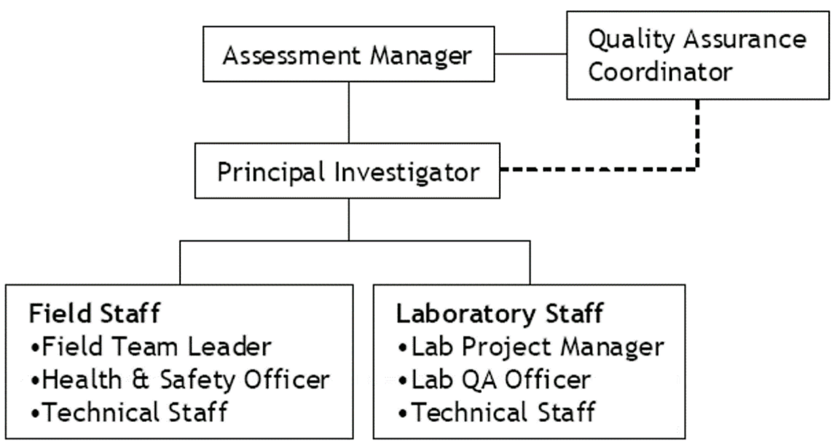
- **Data Generation and Acquisition** − Ensures that all aspects of project design and implementation including methods for sampling, measurement and analysis, data collection or generation, data compiling/handling, and QC activities are documented and employed;
- **Assessment and Oversight** − Assesses the effectiveness of the implementation of the project and associated QA and QC activities; and,
- **Data Validation and Usability** − Addresses the QA activities that occur after the data collection or generation phase of the project is completed.

A.2 Study Management and Personnel

A.2.1 Project Organization

Effective implementation of project objectives requires clear project organization, which includes carefully defining the roles and responsibilities of each project participant. Unambiguous personnel structures help ensure that each individual is aware of their specific areas of responsibility, as well as clarify internal lines of communication and authority, which are important for decision-making purposes as projects progress. Individuals' and organizations' roles and responsibilities may vary by study or task, but each person's role and responsibility should be clearly described in the project's study plan. Figure A-1. The NRDAR Personnel Plan below, presents a generic personnel plan for a NRDAR study as an example.

Figure A-1. NRDAR Personnel Plan



The **Assessment Manager** is the designated Trustee representative with responsibility for the review and acceptance of the project-specific study plan. This individual is also responsible for ensuring that the project's goals and design will meet the broader requirements of this NRDAR. The Assessment Manager coordinates efforts with the Quality Assurance Coordinator and oversees the PI for the study.

The **QA Coordinator** oversees the overall conduct of the quality system. Appointed by the Trustees, this individual's responsibilities include but are not limited to: reviewing/assisting the PI with the development of project-specific study plans; conducting audits and ensuring implementation of both project-specific and overall plans; archiving samples, data, and all documentation supporting the data in a secure and accessible form; and reporting to the Trustees. To ensure independence, the person serving as QA Coordinator will not serve as either the Assessment Manager or as a PI for any NRDAR study.

Study-specific PIs oversee the design and implementation of particular NRDAR studies. Each PI has the responsibility to ensure that all health, safety, and relevant QA requirements are met. If deviations from the

QAPP occur, the PI (or their designee) will document these deviations and report them to the Assessment Manager and the QA Coordinator.

The **Field Team Leader** supervises day-to-day field investigations, including sample collection, field observations, and field measurements. The Field Team Leader is generally responsible for ensuring compliance with all field quality assurance procedures defined in the study specific QAPP. Similarly, the Laboratory Project Manager is responsible for monitoring and documenting the quality of laboratory work. The Health & Safety Officer (who may also be the Field Team Leader) is responsible for ensuring adherence to specified safety protocols in the field.

A.2.2 Sharing Data, Split Samples, and Analytical Results

Section 11.31(a)(4) of 43 C.F.R. states, "The Assessment Plan shall contain procedures and schedules for sharing data, split samples, and results of analyses, when requested, with any identified potentially responsible parties and other natural resource trustees."

If the Trustees determine that a study should be implemented, a study plan may be developed in collaboration with a PI and will be made available to the public. These study plans will discuss study objectives, approaches for sharing and publishing data and analytical results with relevant parties and the public, and conditions and procedures for sharing split samples with PRPs.

A.2.3 Data Generation and Acquisition

All studies under the direction of the Trustees that are specifically undertaken in support of the NRDAR will have a prepared QAPP that will be completed prior to the initiation of any work. These QAPPs will be submitted to, and approved by, the QA Coordinator or designee and generally include:

- Rationale for generating or acquiring the data;
- Proposed method(s) for generating or acquiring the data, including descriptions of (or references to) standard operating procedures for all sampling or data-generating methods and analytical methods;
- Types and numbers of samples required;
- Analyses to be performed;
- Sampling locations and frequencies;
- Sample handling and storage procedures;
- Chain-of-custody procedures;
- Data quality requirements (for instance, with respect to precision, accuracy, completeness, representativeness, comparability, and sensitivity);
- Description of the procedures to be used in determining if the data meet these requirements;
- Description of the interpretation techniques to be used, including statistical analyses; and
- Split sample protocols and procedures for archiving samples and management of residuals.

In addition, to the extent practicable, laboratories will be required to comply with laboratory best practices as applicable (e.g., EPA and/or DEQ best practices and QA protocols). This includes descriptions and documentation of maintenance, inspections of instruments, and acceptance testing of instruments, equipment, and their components, as well as the calibration of such equipment and the maintenance of all records relating to these exercises. Documentation to be included with the final report(s) from each study will include field logs for the collection or generation of the samples, chain of custody records, and other QA/QC documentation as applicable.

A.2.4 Assessment and Oversight

To ensure that the study plan for each project is implemented effectively, the QA Coordinator will review QAPPs for all Trustee studies that generate new environmental data. The QA Coordinator or designee will also audit all such studies. Audits will include technical system audits (e.g., evaluations of operations) as well as scrutinizing data and reports (e.g., evaluations of data quality and adequacy of documentation).

If, in the professional opinion of the QA Coordinator, the results of an audit indicate a compromise in the quality of the collection, generation, analysis, or interpretation of the data, the QA Coordinator has the authority to stop work by oral direction. Within two working days of this direction, the QA Coordinator will submit to the Trustees a written report describing the necessity for this direction. The Assessment Manager will consult with the Trustees regarding measures to be taken in response to the QA Coordinator's report.

A.2.5 Data Validation and Usability

In addition to the assessment and oversight activities described previously, analytical data may be considered for validation by an independent third party. Prompt validation of analytical data can assist the analyst or analytical facility in developing data that meet the requirements for precision and accuracy. If undertaken, it is expected that data validation will use the study-specific study plans, EPA Guidance on Environmental Verification and Validation (EPA 2002b), and any applicable DEQ guidance.

Appendix A References

EPA (United States Environmental Protection Agency). 2002a. Guidance for Quality Assurance Project Plans, EPA QA/G-5. Office of Environmental Information. EPA/240/R-02/009. Washington, DC. December.

EPA. 2002b. Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8. Office of Environmental Information. EPA/240/R-02/004. Washington, DC. November.