SUPERFUND
Proposed Plan
REYNOLDS METALS COMPANY
Troutdale, Oregon
EPA U.S. ENVIRONMENTAL PROTECTION AGENCY August 2002

Proposed Plan for Source Areas and Groundwater Interim Action Reynolds Metals Superfund Site

INTRODUCTION

This Proposed Plan identifies the Preferred Alternative for cleaning up contaminated waste, soil and groundwater at the Reynolds Metals Site located in Troutdale, Oregon. The Reynolds Metals Company (RMC), currently owned by Alcoa Inc., produced aluminum from the raw material alumina at the facility. This cleanup plan is an interim action for areas around and underneath the site. Permanent closure of the production facility was announced in July 2002, which enables additional cleanup work in this area. Cleanup actions for the production areas will be identified in a future plan.

The Proposed Plan identifies cleanup actions for specific contaminated areas, shown in Figure 1 (*see page 3*). EPA recommends the following actions:

- Removing contaminated process residue from Company Lake
- Excavating contaminated waste and soil from the south landfill area
- Excavating contaminated waste material from the eastern portion of the north landfill area, and installing a riprap (soil and rocks) cover over the western portion of the landfill
- Off-site disposal of excavated waste material at a permitted disposal facility
- Installing extraction wells in the east potliner and scrap yard areas to remove and contain groundwater contaminated with high levels of fluoride
- Modifying the operation of existing production wells to limit the further spread of fluoride in the groundwater
- Monitoring groundwater to evaluate the effectiveness of source removal and focused extraction
- Limiting future use (through the use of institutional controls) of shallow groundwater and portions of the property to ensure the remedy remains protective

This document provides the rationale for the sitewide Preferred Alternative and summarizes the other cleanup options evaluated for use at this site. It also describes cleanup actions that are underway and other cleanup actions that have already been completed to control sources and reduce risks.

This document is issued by EPA in consultation with the Oregon Department of Environmental Quality (DEQ). EPA and DEQ will select a final remedy after reviewing and considering information submitted during the 30-day public comment period. EPA and DEQ may modify the Preferred Alternative or select another alternative based on new information or public comments. The public is encouraged to review and comment on all of the alternatives included in this Proposed Plan.

TABLE OF CONTENTS

COMMUNITY PARTICIPATION

How You Can Participate: We invite you to participate in the decision-making process by commenting on this proposed plan. EPA will accept written comments during the public comment period from **August 28 to Sept 27, 2002.** Written comments should be addressed to:

Chip Humphrey
U.S. Environmental Protection Agency
811 SW Sixth Avenue, 3rd Floor
Portland, OR 97204
e-mail: humphrey.chip@epa.gov

EPA will host a public meeting if sufficient interest is expressed. To request a public meeting, contact Chip Humphrey at (503) 326-2678 before September 16, 2002.

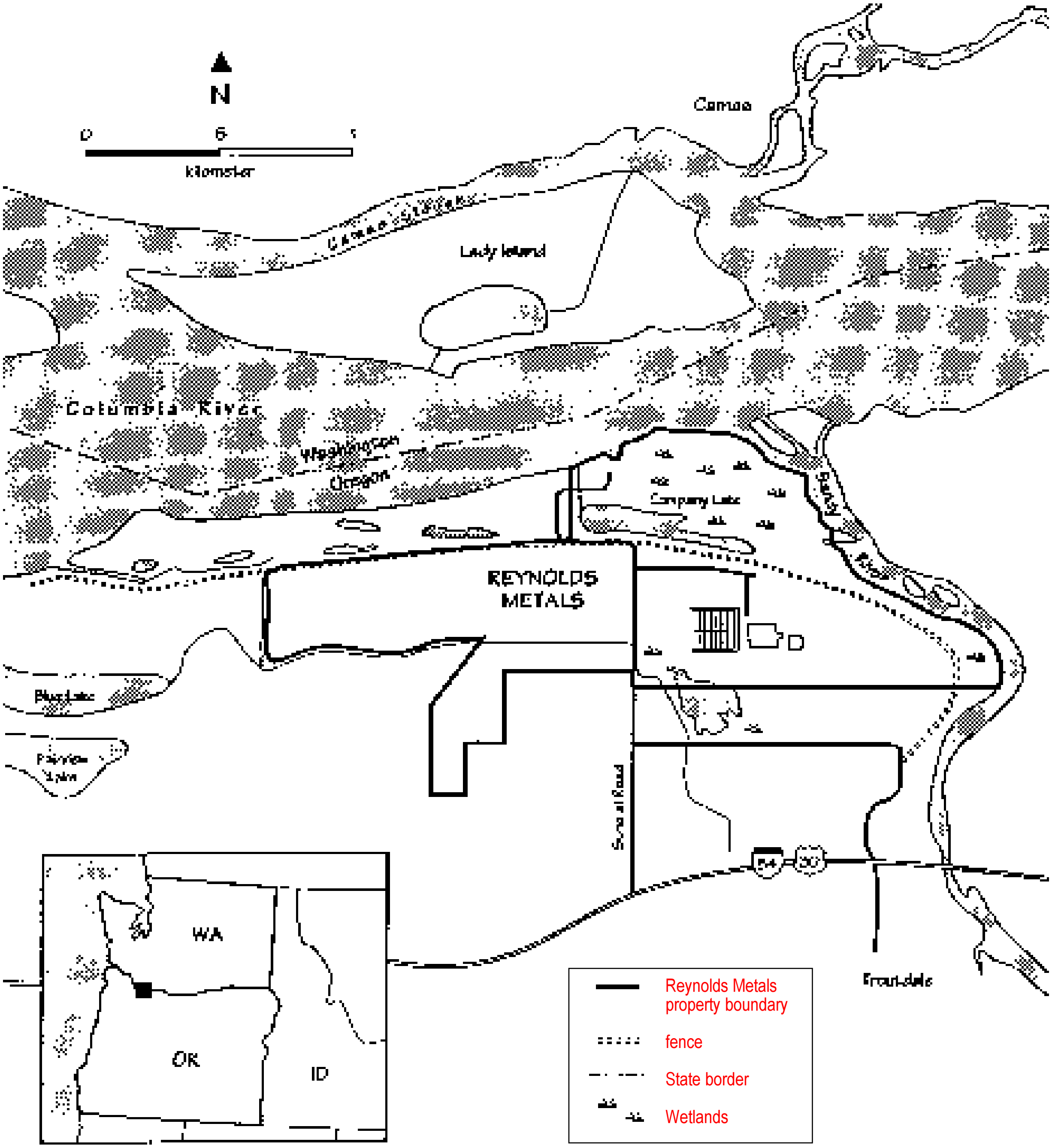
The Administrative Record contains information that will be the basis to select the final cleanup alternative; it is available at the following locations:

US EPA Region 10 Records Center
1200 6th Avenue, 7th Floor
Seattle, WA 98101
(206) 553-4494

Gresham Regional Library
385 NW Miller
Gresham, OR 97030
(503) 248-5387

Please call EPA's Records Center, 206 553-4494 to obtain the most current information on their office hours.

EPA will respond to public comments in a document called a Responsiveness Summary. A final Record of Decision will then be prepared by EPA. The Responsiveness Summary will be part of the Record of Decision and will be available for review at the locations listed above.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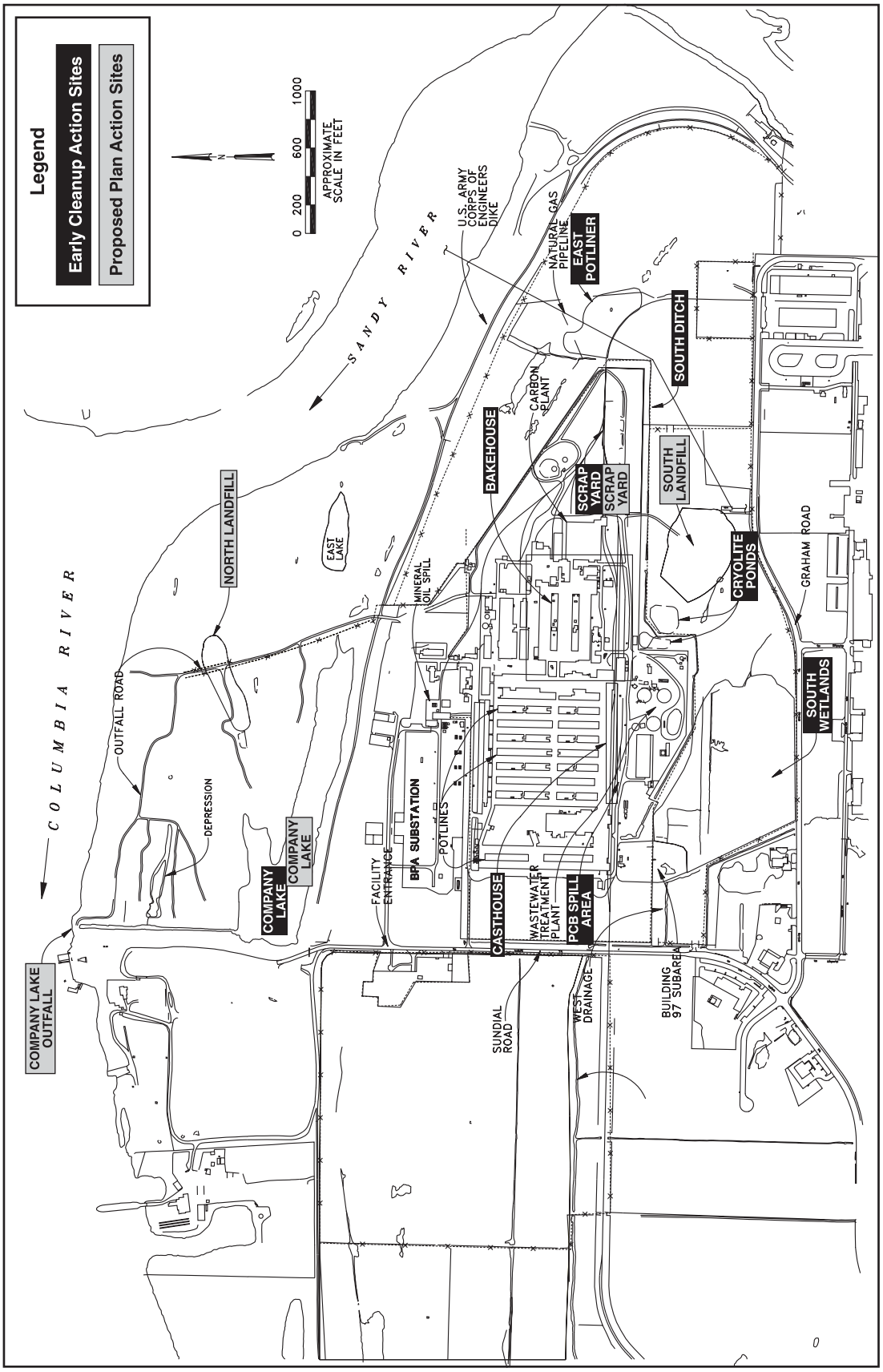
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OUTFALL ROAD
DEPRESSION
COMPANY LAKE
COMPANY LAKE
NORTH LANDFILL
EAST LAKE
FACILITY ENTRANCE
BPA SUBSTATION
POTLINES
MINERAL OIL SPILL
CASTHOUSE
WASTEWATER TREATMENT PLANT
PCB SPILL AREA
SUNDIAL ROAD
WEST DRAINAGE
BUILDING 97 SUBAREA
BAKEHOUSE
CARBON PLANT
SCRAP YARD
SCRAP YARD
U.S. ARMY CORPS OF ENGINEERS DIKE
NATURAL GAS PIPELINE
EAST POTLINER
SOUTH DITCH
SOUTH LANDFILL
CRYOLITE PONDS
GRAHAM ROAD
SOUTH WETLANDS

SITE LOCATION AND HISTORY

The Reynolds Metals Company facility was a primary aluminum production plant where aluminum was made from the raw material alumina. The plant is located about 20 miles east of Portland, Oregon, and 1.25 miles north of the City of Troutdale, Oregon (*see Figure 2*). The Reynolds Metals site consists of the 80.25 acre plant area and approximately 715 acres of surrounding rural land. A U.S. Army Corps of Engineers (COE) dike runs through the north and eastern portions of the site.

The plant was constructed for the U.S. Government in 1941 to produce aluminum for wartime operations. RMC first leased the plant from the government in 1946 and purchased it in 1949. Alcoa Inc. recently acquired Reynolds Metals Company, including the Troutdale aluminum reduction facility. Operations at the Troutdale plant were suspended in the fall of 2000, and Alcoa recently announced permanent closure of the facility.

The site was placed on EPA's Superfund National Priorities List (NPL) in 1994. On September 29, 1995 EPA and RMC signed a Consent Order for preparation of a Remedial Investigation and Feasibility Study (RI/FS) and performance of early actions at the site under EPA's oversight. RMC has undertaken several early cleanup actions and recently completed the RI/FS, which provided the results of the site investigation and analysis of cleanup alternatives.

Previous Public Involvement: In January 1995, EPA interviewed people interested in the site to learn about local concerns and to explore the best ways to keep the community informed and involved in site cleanup activities. These interviews helped form the basis for the Community Involvement Plan that was developed in May 1995. EPA created a mailing list of interested parties and set up local information repositories. Over the next few years, the agency periodically mailed fact sheets to keep interested parties informed about progress at the Site.

SITE CHARACTERISTICS

Several waste disposal areas, soils and groundwater are contaminated as a result of past waste handling practices at the plant. The primary contaminants identified in soils at the site include fluoride, cyanide, polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). There is a significant plume of fluoride contamination in groundwater beneath the plant site.

Some important features at the site include the following:

The Columbia and Sandy Rivers border the site to the north and east and represent regional groundwater discharge points.

Company Lake – When the plant was operating, treated process and sanitary wastewater and stormwater runoff from the plant flowed through the south ditch to Company Lake prior to discharge to the Columbia River. Discharge to the Columbia River is regulated by an NPDES wastewater permit.

Salmon Creek – is a former natural waterway that has been rerouted several times and is now dredged and controlled. It receives stormwater runoff from the City of Troutdale, local drainage ditches, and west drainage on the company's property.

The portion of the RMC site that is located north of the COE dike is within the 10-year flood plain of the Columbia River. Company Lake and the north landfill are located north of the dike.

Two regional aquifer systems exist under the site. The Unconsolidated Sedimentary Aquifer (USA) is the uppermost aquifer, and the Sand and Gravel Aquifer (SGA) is the deeper unit. The unconsolidated sediments within the uppermost regional groundwater system beneath the facility were divided into four water-bearing zones for purposes of investigation.

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The four zones are the silt unit (generally 0–30 feet deep), the upper grey sand (up to 50 feet deep), the intermediate sand (up to 100 feet deep) and the deep sand/gravel. The silt unit exists in the southern portion of the site but does generally not occur in the northern portion of the site.

Groundwater Use – Onsite deep production wells supplied process water and drinking water for the aluminum reduction facility. Groundwater is also a source of water for drinking and industrial uses in the areas next to the RMC facility.

SCOPE AND ROLE OF THIS RESPONSE ACTION

The proposed action is part of an overall strategy for site cleanup. Since the site was listed in 1995, several removal actions have cleaned up immediate threats and high priority areas of contamination.

This proposed action addresses additional sources of contamination, including sludges and contaminated waste and soils that pose a risk to human health and the environment and are sources of contamination in groundwater. The proposed action also begins the cleanup of contaminated groundwater.

The groundwater remedy uses a phased approach to restoration. Highly-contaminated groundwater would be extracted to prevent further plume migration associated with specific sources. EPA will evaluate the effectiveness of source control and focused extraction of groundwater to confirm that intermediate and deep groundwater will be restored in a reasonable time frame.

The proposed action does not include the buildings and other structures in the plant process area. Alcoa is evaluating options for future use and recently announced that the plant will be closed permanently.

COMPLETED EARLY ACTION ITEMS

Several removal actions have been completed under EPA oversight in areas identified as high priority source areas of contamination. The following summarizes the cleanup actions undertaken at specific sources of contamination at the site.

The Cryolite Ponds

Three settling ponds south of the main production facility were used for storage and disposal of cryolite, a waste material containing high levels of fluoride and other metals. RMC has excavated and disposed of approximately 13,900 tons of cryolite at an off-site disposal facility.

East Potliner

An area located east of the main facility was formerly used to store spent potliner, a production waste containing high levels of fluoride, cyanide and polyaromatic hydrocarbons (PAHs). More than 11,000 tons of potliner and contaminated soil were excavated from this area and transported to an off-site disposal facility.

PCB Spill Area

Soil adjacent to the casthouse building was contaminated with PCBs. The concrete and siding outside the building were also contaminated by PCBs, and the casthouse contained PCB-contaminated dust. A cleanup inside and outside the building resulted in more than 580 tons of PCB-contaminated soil and debris being removed from the site and disposed at an off-site disposal facility.

The Bakehouse Sumps

A network of 21 dewatering sumps located around the bakehouse to keep shallow groundwater out of the subsurface bake pits, contained fluoride, cyanide and PAHs. RMC cleaned out the contaminated sumps and disposed the

waste material off-site. Surface water runoff was redirected to prevent further contamination from surface sources.

Diesel Spill Area

Two acres east of the main facility were heavily contaminated with diesel fuel and oil. Reynolds has excavated and disposed of more than 2,600 tons of contaminated soil from this area.

Production Well Abandonments

Nine wells located at the plant site were decommissioned to prevent them from acting as conduits for the spread of shallow groundwater contamination. Seven wells were decommissioned in 1997 and the last two wells were decommissioned in early 1999.

Company Lake Process Residue

An estimated 3,300 cubic yards of contaminated process residue was excavated from a portion of Company Lake and transported to a permitted off-site disposal facility in October 2001. The removal was conducted in the northeastern "thumb" of Company Lake. The removal provided information about the feasibility of dewatering Company Lake and removing the process residue using conventional mechanical equipment.

Scrap Yard

Removal of contaminated waste material from the scrap yard area will be completed this fall. An estimated 3,800 cubic yards of waste material that is contaminated with fluoride, metals and PAHs will be excavated from the north side of the scrap yard area. The waste material is a primary source of fluoride contamination in groundwater in the South Plant area.

Other early actions completed during the remedial investigation include removal of PCB-contaminated soil from the South Wetlands area and removal of contaminated sediments and process residue from the south ditch. Waste from these areas were transported to a permitted off-site facility for disposal.

NATURE AND EXTENT OF CONTAMINANTS

The remedial investigation was a comprehensive data gathering and analysis program that identified and evaluated contamination in soil and debris, surface water and sediment, wastewater discharge, and sitewide groundwater. The following describes the findings of the investigation by source area.

Soil and Debris Areas

North Landfill – is a 2.4-acre landfill located north of the COE dike. The landfill contains mostly carbon waste, refractory brick, demolition waste, solid waste and miscellaneous debris. Constituents identified include fluoride, cyanide, metals, PAHs, total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs) and PCBs. An access road passes through the landfill. The eastern portion of the landfill has significantly higher levels of PAHs and a higher proportion of black carbon material compared to the western portion of the landfill.

South Landfill – is a 5.8-acre landfill used for general plant waste disposal from the early days of operation until about the late 1960s. Constituents identified include fluoride, cyanide, metals, PAHs, PCBs and TPH. Fluoride has migrated from the south landfill to shallow groundwater. A low permeability silt layer beneath the landfill provides a natural barrier that limits leaching of contaminants to intermediate and deep groundwater.

Scrap Yard – is a 5.7-acre former storage area. Soil samples collected from the scrap yard area identified fluoride, cyanide, PAHs, PCBs and metals. Fluoride levels averaged over 30,000 mg/kg in the waste material, with the concentrations decreasing with depth. The scrap yard is the source of fluoride and metals contamination in the intermediate-depth sand and deep sand/gravel units lying between the scrap yard and the production wells.

Surface Water and Sediment Areas

Columbia River – During normal facility operations, the plant discharged treated wastewater and stormwater to the Columbia River under an NPDES permit. Wastewater from facility operations is not being produced or discharged since the plant ceased operations in the fall of 2000. Stormwater runoff discharges to the Columbia River via Company Lake. Groundwater with elevated levels of fluoride reaches the Columbia north of the plant site.

Sandy River – Approximately 300 feet of the western shore of the Sandy River contained refractory brick. Concentrations of constituents detected in soil and sediments adjacent to the brick were not significantly elevated. Surface water sampling adjacent to the brick did not show contamination. The groundwater fluoride plume that has spread from several source areas has been detected in a monitoring well adjacent to the Sandy River. The groundwater data suggests that a portion of the fluoride plume is discharging to the river.

Salmon Creek – Salmon Creek flows along a section of the southwest border of the RMC property and is pumped into the Columbia River from an equalization pond. Salmon Creek provides stormwater conveyance for the City of Troutdale, the City of Wood Village and the City of Fairview. Past wastewater overflows and stormwater runoff from the south wetlands area of the RMC facility discharged to Salmon Creek.

Wastewater Discharge Areas

Company Lake – is a 14-acre lake north of the COE dike. During normal plant operations, stormwater and treated wastewater enter the lake from a discharge pipe at the southern end. The outfall ditch drains from the northwestern corner of Company Lake into the Columbia River. Process residue (up to 4 ft thick) from historical discharges have accumulated in the bottom of Company Lake and contains fluoride, PAHs, TPH, cyanide and low levels of PCBs. Elevated fluoride concentrations exist in the shallow and intermediate zone groundwater beneath and adjacent to Company Lake.

South Ditch – has been part of the plant's wastewater conveyance system. The eastern part of the ditch has been used to transport stormwater, and the west portion received facility wastewater, cooling water, groundwater and stormwater. Constituents detected in south ditch include fluoride, cyanide, metals and PAHs. Sediments were removed from portions of the ditch as part of an early action.

Sitewide Groundwater

There is a system of 50 groundwater monitoring wells (shallow, intermediate and deep) on or adjacent to RMC property. Direct push sampling also measured fluoride in groundwater at depths up to 50 feet below ground. Semi-annual monitoring shows groundwater is contaminated with fluoride, with localized areas of elevated metals, volatile organic compounds and cyanide. The primary contaminant of concern is fluoride. Contaminated groundwater has been linked to Company Lake, north landfill, south landfill, the scrap yard area and east potliner area.

Fluoride concentrations exceed the 4 mg/liter federal and state Safe Drinking Water Act standards, known as maximum contaminant levels (MCL), beneath the RMC facility, with peak values up to 1,100 mg/liter in the silt unit beneath south landfill. The highest concentrations were measured in the South Plant area beneath and adjacent to the scrap yard, south landfill and east potliner areas. Six metals (antimony, arsenic, beryllium, chromium, lead and nickel) were detected above MCLs. Recent groundwater data shows that metals and cyanide above the MCL are not widespread and generally limited to the shallow silt unit. The distribution of metals above the MCL suggests that east potliner, scrap yard, and south landfill are the sources of these contaminants in groundwater.

Groundwater flow direction in the Upper Gray Sand (UGS) layer and deeper zones in the aquifer beneath the RMC facility is from the south and southeast to the north and northwest, with groundwater discharging to the Columbia and Sandy Rivers. Groundwater flow is strongly influenced by pumping from the RMC production wells and surface water features.

SUMMARY OF SITE RISKS

RMC conducted a baseline risk assessment as part of the RI/FS to determine the potential current and future effects of contaminants on human health and the environment. The baseline risk assessment estimated the likelihood of health or environmental problems if no cleanup action was taken at the site.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, present a current and future threat to public health and the environment.

Human Health Risks

The site is currently zoned for heavy industrial use for the area south of the dike and east of Sundial Road. Land use is reasonably expected to remain industrial for this area. Other surrounding property to the south and west is zoned "urban future and heavy manufacturing." Property to the west and south of the site is currently used for a variety of commercial and industrial purposes. RMC property north of the dike is zoned "urban future/significant environmental concern." Further development of the RMC property north and east of the COE dike is not likely because the area is subject to flooding.

The human health risk assessment assumed that most of the site will have industrial uses. Residential use also was evaluated for the Fairview Farms area, which is located west of the main plant area.

Groundwater extracted from the intermediate/deep zone beneath the site was used for industrial purposes and drinking water prior to the plant shutdown in the fall of 2000.

Cancer Risks for Current Exposures

The likelihood of any kind of cancer resulting from a Superfund site is expressed as a probability. For example, a "1 in 10,000" chance would mean that for every 10,000 people in the area, an extra cancer case may occur as a result of long-term exposure to site contaminants. EPA generally requires remedial action at sites where the excess cancer risk from exposure to contaminants exceeds 1 in 10,000. DEQ's target risk levels are exceeded when the total lifetime excess cancer risk exceeds 1 in 100,000 for cumulative exposure to all carcinogens, or 1 in 1,000,000 for individual carcinogens.

The baseline risk assessment for the RMC site indicates that the human population with the highest potential for increased cancer risk would be maintenance workers, trespassers and trench workers. The risk was estimated at individual source areas. Reasonable maximum exposure (RME) risk estimates exceed a cumulative lifetime cancer risk target of 1 in 100,000 for north landfill, south landfill, scrap yard, Company Lake and the eastern portion of south ditch. The RME portrays the highest level of human exposure that could reasonably be expected to occur from site contaminants. The cancer risk for exposure to contaminated soil is primarily from PAHs.

Cancer Risks for Future Exposures

The future population with the highest potential for increased cancer risk are trench workers who would be working at south landfill and scrap yard, and on-site maintenance workers who may come in direct contact with contaminated soil and waste material on the site. The risk assessment estimated that approximately 1 person out of 10,000 with highest exposure, such as a trench worker, may develop cancer due to the contamination. These cancer risks for exposure to soil are primarily due to carcinogenic PAHs.

Non-Cancer Risks

Non-cancer risks are measured by an evaluation system called the Hazard Index (HI) that generates a numeric value. Any HI value greater than 1.0 may indicate a need for action. The increased risk of noncancer health impacts for current or future industrial workers on the site did not exceed 1.0 for the individual source areas.

Risk associated with current exposure to groundwater did not exceed the HI of 1.0. Risk estimates for potential future exposure to groundwater showed that the future offsite residential exposure scenario resulted in an HI of 3.3. The future offsite residential exposure was based on a hypothetical well located in the northeast portion of the Fairview Farms area.

Ecological Risks

The ecological risk assessment is an appraisal of the actual or potential effects of contamination at the site on plants and animals. The baseline ecological risk assessment concluded that ecological hazard quotients (HQs) for fluoride (for mallards and heron) and PAHs (for mink) exceed corresponding background levels by at least 1. Company Lake contributes the greatest percentage of the estimated site-wide risk for fluoride and PAHs. Based on the estimated home ranges and the availability of suitable offsite habitat for the mallard and mink in the Sandy delta, the risks may be acceptable. The smaller home range for the heron, however, makes the fluoride in Company Lake a potentially unacceptable risk.

The baseline risk assessment included ecological risk estimates for groundwater discharging to the Columbia and Sandy Rivers. There are no ambient water quality criteria for fluoride available, so water aquatic toxicity data from literature sources were used to estimate toxicity potential. RMC also recently submitted a technical memorandum on the "no pumping" scenario, which included an analysis of updated projections of fluoride concentrations in groundwater and estimated future discharges of fluoride-contaminated groundwater to the Columbia and Sandy Rivers. The analysis showed that fluoride discharges to the Sandy River would be expected to increase over the next few years. Discharges above literature-derived aquatic toxicity values would continue for several decades if pumping were discontinued.

REMEDIAL ACTION OBJECTIVES

EPA has established the following Remedial Action Objectives to prevent unacceptable exposure to contaminated soil, waste and groundwater at the site:

- ***Prevent human exposure through direct contact (ingestion, inhalation and dermal contact) with contaminated soil and debris that would result in unacceptable excess lifetime cancer risk or exceeding a Hazard Index of 1.***
- ***Restore and maintain use of the intermediate and deep groundwater as a drinking water source. The goal for restoration is the federal and state safe drinking water standard.***
- ***Minimize the migration of contaminants from waste and soils to groundwater, reduce fluoride in shallow and intermediate groundwater.***
- ***Control migration of plumes to reduce and control the migration of fluoride to the Sandy River.***

Cleanup levels for waste, soil and debris will be based on human and ecological risks, including the state of Oregon's environmental cleanup law which requires no more than one in 1,000,000 excess cancer risk for individual contaminants and above 1 in 100,000 for additive carcinogenic contaminants. Cleanup levels will also be based on reducing the volume of wastes leaching to groundwater. The contaminants that represent the highest direct contact risks in the waste areas being addressed, are commingled with fluoride, the primary contaminant in groundwater.

SOIL AND GROUNDWATER CLEANUP

Remedial options for each source area were evaluated in the feasibility study. These remedial options were grouped into three sitewide alternatives. The feasibility study, which describes these options in detail, is available at the site information repository. Reynolds Metals Company also submitted information following completion of the draft feasibility study to support a "no pumping" scenario for groundwater.

Several of the remedial options and sitewide alternatives contained some common elements of institutional controls and waste consolidation and disposal:

Institutional controls are actions such as restrictive easements, fencing and warning signs, or use restrictions and use of personal protective equipment for workers. Institutional controls will prevent use of contaminated groundwater until cleanup levels are achieved. The groundwater use restrictions are expected to be permanent for shallow contaminated groundwater (the silt unit) in the south plant area. There are no current or projected uses of shallow groundwater at this site.

Consolidation and disposal of excavated waste material will be accomplished by construction of a new landfill on the Reynolds Metals Company site or off-site disposal at a permitted or licensed hazardous waste disposal facility. The onsite landfill would be located inside the Corps of Engineers dike. The actual location and sizing of the onsite disposal facility would be designed later. For cost estimating purposes, the feasibility study assumed that all waste would be disposed in a new on-site waste disposal facility that would be constructed on RMC property.

Sitewide Alternatives

Cleanup options for the individual sources of contamination were combined into three sitewide alternatives in the feasibility study. Following the initial EPA and DEQ review, alternatives were expanded to allow further evaluation of a partial excavation option for north landfill.

The no action alternative and the sitewide alternatives are described below.

EPA also evaluated cleanup alternatives for the scrap yard area, a significant source of groundwater contamination, and decided it was appropriate to proceed with an early removal action. The scrap yard alternatives considered in the feasibility study are included in the discussion below, even though this portion of the cleanup is nearing completion.

Costs for alternatives are displayed below in Table 1.

TABLE 1: Costs Associated with the Alternatives

ALTERNATIVE	CAPITAL COST	ANNUAL OP. & MAINT. COST	NET PRESENT VALUE*
No Action	N/A	N/A	N/A
No Pumping Scenario	$17,376,000	$ 46,000	$17,951,000
Alternative A	$ 6,078,000	$207,000	$ 8,111,000
Alternative B	$10,463,000	$229,000	$12,637,000
Alternative C	$19,196,000	$416,000	$23,998,000
Preferred Alt.	$17,751,000	$284,000	$21,282,000

*based on 30 years operation and maintenance and 7 per cent discount rate

No Action Alternative

The no action alternative provides a baseline for comparing other alternatives. It establishes the risk levels and site conditions if no remedial actions are implemented. No changes or restrictions would be made that would affect activities at the site. No engineering or institutional controls would be put in place and no actions would be initiated to reduce hazard levels at the site.

No Pumping Scenario

All of the sitewide alternatives in the feasibility study included continued pumping of specific production wells to provide hydraulic containment of contaminated groundwater. RMC recently submitted an evaluation of a "no pumping" scenario as an additional alternative for groundwater. This scenario would include groundwater monitoring but would discontinue operation of the production wells.

Alternative A

Alternative A includes a permeable cap or riprap cover at the north landfill, a soil and vegetation cap at south landfill areas, a gravel cap in the north area of scrap yard, and a permeable multilayer cap for Company Lake sediments.

To contain groundwater, the production wells would be operated to maintain a "capture zone" for contaminated groundwater. Wells PW07 and PWO8 will be pumped at an estimated 600 gallons per minute to keep fluoride and other chemicals of concern in the intermediate and deep zones under the facility. This alternative also includes institutional controls for groundwater and land use.

Alternative B

Alternative B would construct a permeable cap/riprap cover at north landfill, excavate the waste layer in the north portion of scrap yard, dredge process residue at Company Lake, and place institutional controls for south landfill. The Feasibility study assumed that excavated and dredged material would be consolidated in a new onsite landfill.

The groundwater action includes operating production wells as described in Alternative A, and installs and operates one extraction well on the north side of scrap yard and one extraction well on the western portion of east potliner. The Feasibility study assumed that the wells would pump approximately 20 gallons per minute each from the UGS zone. The Feasibility study also assumed that extracted groundwater would be treated by calcium fluoride precipitation in the plant's wastewater treatment facility and discharged to the Columbia River.

This alternative also includes institutional controls for groundwater and land use.

Alternative C

This alternative consists of excavation of the waste layers from north and south landfills, the northern portion of scrap yard, and the process residue at Company Lake. The feasibility study assumed that excavated and dredged material would be disposed in a new onsite landfill.

The groundwater action includes production well operation and focused extraction as described in Alternative B, plus an additional extraction well at south landfill and three extraction wells adjacent to Company Lake. Treatment of groundwater would be by reverse osmosis, followed by treatment by calcium fluoride precipitation in the wastewater treatment system prior to discharge with plant wastewater.

This alternative also includes institutional controls for groundwater and land use.

The Preferred Alternative

EPA's preferred alternative modifies and combines options from Alternatives B and C. It includes excavation of the eastern portion of north landfill, excavating the waste material from south landfill, and excavating the process residue from Company Lake by dewatering and mechanical removal. Excavated material would be transported to a permitted off-site disposal facility.

Groundwater would be addressed by hydraulic containment through production well operation and enhanced focused extraction of groundwater in the south plant area. Two groundwater extraction wells would be installed as described in Alternative B. The combined flow from the production wells and focused extraction wells would be discharged without additional treatment to the Columbia River. The anticipated flow would be approximately 1250 gallons per minute with an initial fluoride concentration of about 4 to 5 mg/liter. The fluoride concentration would decrease over time as concentrations in groundwater in the south plant area decreased.

Institutional controls would be required to ensure appropriate land use and groundwater use would continue and to protect the remedies that are put in place.

EVALUATION CRITERIA

THRESHOLD CRITERIA

These two criteria must be met by the chosen alternative.

- Overall Protection of Human Health and the Environment addresses whether or not adequate protection of health and the environment is provided during and after construction of the remedy.
- Compliance with Applicable or Relevant and Appropriate Requirements addresses whether or not the alternative would meet requirements of federal and state laws and regulations that apply or that are relevant and appropriate to the actions.

BALANCING CRITERIA

These criteria are the primary factors that are taken into account in comparing the alternatives and choosing the preferred alternative.

- Long-term Effectiveness and Permanence refers to the ability of the alternative to reliably protect human health and the environment over time once the cleanup actions have been implemented.
- Reduction of Toxicity, Mobility or Volume through Treatment addresses the expected performance of treatment technologies that may be used and whether treatment is a main element of the proposed actions.
- Short-term Effectiveness evaluates the potential to adversely affect human health and the environment during the time when cleanup actions are taking place, and how quickly the alternative achieves protection of human health and the environment.
- Implementability refers to the technical and administrative difficulties for carrying out the alternative, including the availably of special materials or services, the need for regulatory approvals, and how hard it would be to construct and operate a particular remedy at this site.
- Cost is an estimate of the construction costs plus the operating and maintenance costs of the alternative.

MODIFYING CRITERIA

These two criteria involve consideration of state and public concerns that may modify the alternative picked for the site.

- State Acceptance refers to whether the alternative addresses the concerns of the state.
- Community Acceptance pertains to whether or not the alternative adequately addresses the concerns of the local community.

EVALUATION OF ALTERNATIVES

This section summarizes and compares the cleanup alternatives based on the nine criteria described in the box on page 13. This proposed plan focuses on the primary distinguishing factors EPA considered in selecting its Preferred Alternative. The "no action" alternative is not described in detail because it does not provide overall protection of human health and the environment and EPA cannot select an alternative that does not satisfy this threshold criteria.

1. Overall Protection of Human Health and the Environment

All alternatives, except the "no action" alternative, would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risks to people and wildlife. Exposure to contamination will be prevented through engineering and institutional controls. Alternative A addresses surface exposure risk by capping north landfill, south landfill, scrap yard and Company Lake sediments.

The permeable caps proposed would not prevent leakage of contaminated source materials to groundwater, however, and restoration of beneficial uses of groundwater would take hundreds of years. Excavating the waste layers under Alternatives B and C would eliminate exposure for workers and trespassers by eliminating direct surface contact with chemicals of concern in surface soils/waste and it would also reduce sources of groundwater contamination. The Preferred Alternative would provide overall protection similar to Alternatives B and C.

2. Compliance with ARARS

All soil alternatives would meet their respective Applicable Relevant and Appropriate Requirements (ARAR's) from Federal and State laws. Achieving compliance with the maximum contaminant levels for intermediate and deep groundwater is estimated to take 5 to 10 years after the source control actions have been completed.

3. Long-term Effectiveness and Permanence

Alternative C and the Preferred Alternative provide the best long-term effectiveness and permanence by maximizing contaminant removal and minimizing maintenance for source areas. Groundwater remediation is improved by addition of focused extraction wells.

Alternative A is lower in long-term effectiveness because several landfill caps would need to be maintained, and there is potential for exposure if the cap fails. Additionally, the caps would not prevent further leaching of fluoride to groundwater. For north landfill and Company Lake there would be a greater likelihood of washout of contaminants during severe flooding events. Groundwater remediation would rely on effectiveness of production well optimization but sources of groundwater contamination would not be addressed.

Alternative B includes removal of the waste layer in Company Lake, which provides more long term protection than capping. Alternative B also provides greater protection of groundwater than Alternative A by removing source material from scrap yard and Company Lake, and removing of contaminated groundwater from the upper grey sands in the south plant area. The Preferred Alternative adds another measure of long-term protectiveness by removing additional north landfill waste material from the floodplain of the Columbia and Sandy Rivers. Both on-site and off-site disposal would be effective, but off-site disposal has the advantage of reducing future maintenance and monitoring at the site.

4. Reduction of Toxicity, Mobility and Volume of Contaminants through Treatment

The alternatives for soil cleanup do not include treatment of waste material to reduce toxicity, mobility or volume of contaminants. EPA has a policy that principal threats, highly concentrated waste that cannot be reliably contained, should

be treated. Highly concentrated waste was excavated and disposed off-site as part of early cleanup actions, and the contaminated material being addressed by the proposed action is not considered to be principal threat waste. All of the alternatives, except for Alternative A, include removal of source material to reduce leaching of contaminants to groundwater. Alternative A includes capping, which would be less effective than source removal in reducing migration of contamination to groundwater.

All of the groundwater alternatives use plume containment to reduce the mobility of contaminants, except for RMC's "no pumping" scenario. Alternatives B and C assumed treatment of fluoride in extracted groundwater to reduce toxicity, but the treatment processes evaluated have not been shown to be effective in treating the concentrations. EPA will continue to evaluate potential treatment options as part of predesign for the focused extraction system.

5. Short-term Effectiveness

Alternatives B, C, and the Preferred Alternative involve excavation, handling and transport of contaminated waste and present a potential for short-term exposure. The contaminants of concern are not volatile, so the risk of release is principally limited to wind blown waste material or surface water runoff containing site contaminants. Releases can be controlled by careful materials handling, and appropriate engineering controls. Short-term risks to workers can be further eliminated by adherence to proper health and safety protocols.

Company Lake will be drained under the Preferred Alternative to allow excavation of the contaminated process residue by mechanical equipment. During normal facility operations, process wastewater and stormwater from the RMC facility is discharged to Company Lake prior to discharge to the Columbia River. Process wastewater is not currently being discharged to Company Lake because the plant is shut down. Stormwater would bypass Company Lake and discharge directly to the Columbia River under the Preferred Alternative.

6. Implementability

All soil remedies use available and proven technologies. Alternative A is the easiest to implement because it does not involve excavation and transport of contaminated materials. Excavating the process residue from Company Lake will require draining the lake to allow mechanical removal. Reynolds Metals Company conducted a pilot removal from a portion of the lake in September, 2001. The pilot demonstrated that dewatering can be achieved by a combination of eliminating inflow to the lake and limited pumping from the lake to the Columbia River.

The effectiveness of groundwater extraction will need to be determined by future monitoring and evaluation. Changes to the groundwater extraction system, including increasing pumping rates, adding more wells and pretreatment of contaminated groundwater, may be needed based on future evaluations.

7. Cost

Alternative A is the least-cost alternative, with an estimated present value cost of approximately $8,111,000. Alternative B is the next lowest cost alternative, with an estimated present value cost of $12,637,000. Alternative C is the highest cost, with an estimated present value cost of $23,998,000. EPA's Preferred Alternative combines elements from alternatives B and C and has an estimated present value cost of $21,282,000.

8. State/Support Agency Acceptance

The State of Oregon has been consulted in the development of this proposed plan. EPA will request that the State concur in the remedy that is selected in the Record of Decision.

9. Community Acceptance

Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the ROD for the site.

SUMMARY OF THE PREFERRED ALTERNATIVE

The Preferred Alternative for cleaning up the Reynolds Metals Company site combines elements from Alternatives B and C. It includes the following:

- Excavating waste from the eastern portion of north landfill and constructing a riprap cover on the western portion
- Excavating the process residue from Company Lake
- Excavating the waste layer from the south landfill area
- Offsite disposal of contaminated waste at a permitted waste disposal facility
- Extracting contaminated groundwater in the south plant area
- Modifying the operation of existing production wells to contain and extract fluoride-contaminated groundwater

The Preferred Alternative also includes institutional controls to ensure that the remedy remains protective. Institutional controls will include protective easements to ensure that future use is consistent with the exposure assumptions used to evaluate risk and select the appropriate remedial action.

The Preferred Alternative was selected over the other alternatives because it is expected to achieve substantial and long-term risk reduction. EPA's preference for this alternative is based on the evaluation of the sitewide alternatives against the established criteria. It meets EPA's threshold criteria for protection of human health and the environment. Based on current information, EPA believes that contaminated soil and debris can be reliably removed from the Site, and treatment of soil and debris was not found to be practicable or cost effective.

Removing the waste sources described above are expected to meet the objectives of preventing unacceptable human exposure through direct contact and minimizing the migration of contaminants to groundwater.

The proposed groundwater remedy uses a phased approach to groundwater restoration. Groundwater response activities will be implemented in a series of steps so that information gathered in earlier phases can be used to refine subsequent objectives or actions. Containment of the fluoride plume will be confirmed by sampling of monitoring wells, including new wells that will be installed to assess progress.

The beneficial use of the aquifer is as a source of water for industrial uses and for drinking. Groundwater extracted from the deep portions of the aquifer has been used for this purpose both on and off site. Based on the information obtained during the RI/FS, EPA and DEQ believe that the Preferred Alternative will restore beneficial uses in the intermediate and deep portions of the aquifer and significantly reduce the mass of fluoride in a reasonable time frame. It is also expected to reduce and control the discharge of the fluoride plume to the Sandy River.

After construction of the proposed action, the focused extraction system will be monitored on a regular basis and its performance will be evaluated. Operation and monitoring for several years after completion of the source control actions may be necessary to provide enough information to determine if the groundwater extraction system is adequate to maintain hydraulic control of the contaminated plume. Some adjustments of the extraction system may be needed to enhance remedy performance, including adjusting the rate of extraction or installing additional groundwater extraction wells.

EPA will also require groundwater monitoring to ensure that source control (removal of contaminated waste) is effective. Verification sampling will also be conducted to confirm removal of contaminated waste in the areas addressed by this proposed action.

Based on the information available at this time, EPA and the State of Oregon believe the Preferred Alternative would protect human health and the environment, would comply with ARARs, and would be cost-effective.

The Preferred Alternative can change in response to public comment or new information.

ADDITIONAL INFORMATION

If you have any questions about this Proposed Plan, please contact Chip Humphrey or Judy Smith:

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EPA Website: www.epa.gov/r10earth, click "index" at bottom, click "R" for Reynolds Metals

For people with disabilities: Please contact Judy Smith if you have any requests for reasonable accommodations. For TTY users: Please call the Federal Relay Service at 1-800-877-8339. Please provide one week advance notice for your request.

Place Stamp Here

EPA *U.S. ENVIRONMENTAL PROTECTION AGENCY*

ATTN: JUDY SMITH, ECO-081
1200 Sixth Avenue
Seattle, Washington 98101-1128

Use this space to write your comments

Your opinions on the recommended plan for the Reynolds Metals Company Proposed Plan are important to EPA. Comments provided by the public are valuable in helping EPA select a final remedy for the site.

You may use the space below to write your comments, then fold, add postage, and mail. Comments must be postmarked by September 27, 2002.

Name: _____

Address: _____

City: _____

State: _____ Zip: _____