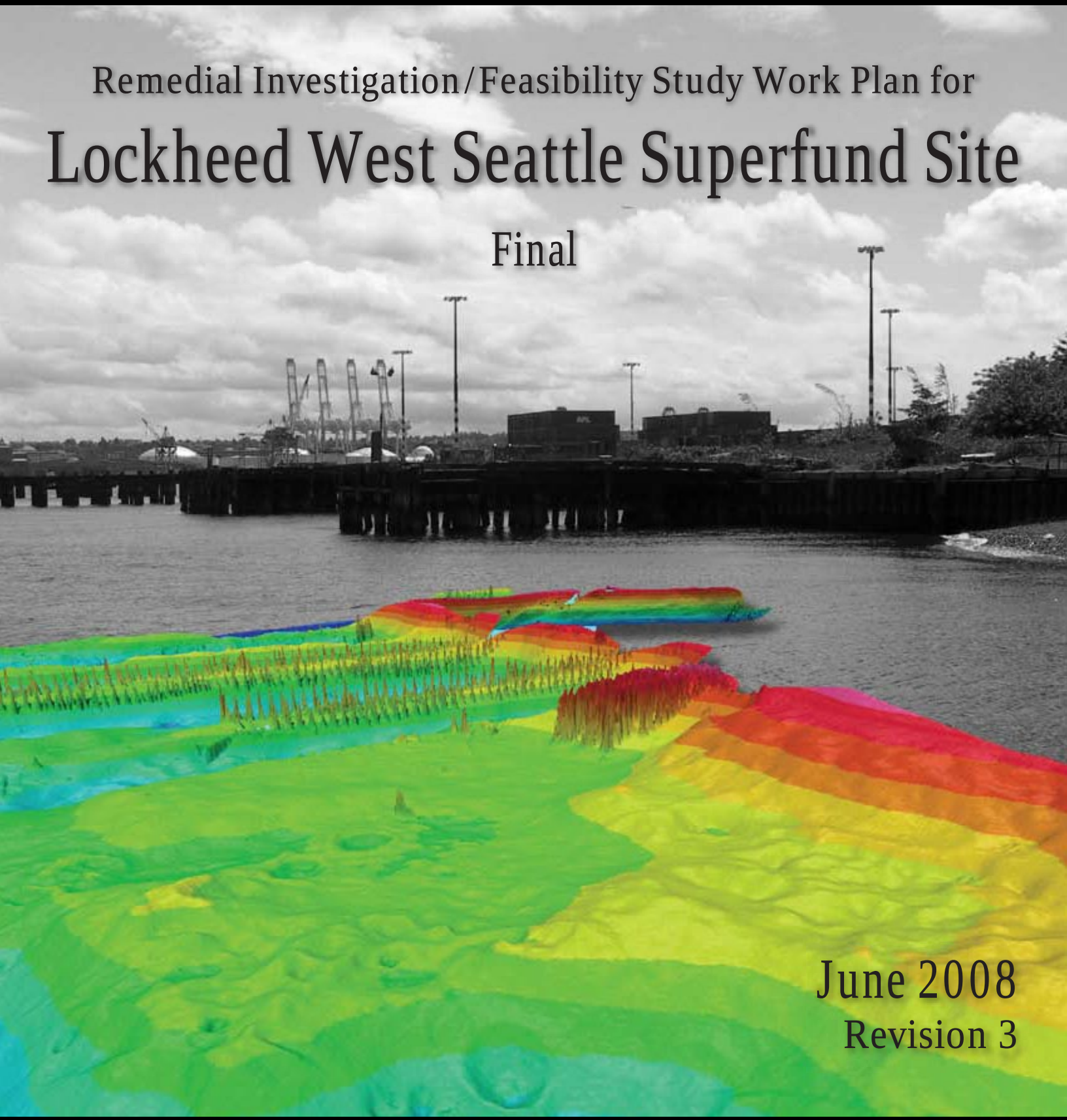
Remedial Investigation/Feasibility Study Work Plan for

Lockheed West Seattle Superfund Site

Final



June 2008
Revision 3

Prepared for LOCKHEED MARTIN

Prepared by TETRA TECH

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORK PLAN FOR LOCKHEED WEST SEATTLE SUPERFUND SITE

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CONTENTS

CONTENTS (CONTINUED)

CONTENTS (CONTINUED)

CONTENTS (CONTINUED)

CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (CONTINUED)

ACRONYMS AND ABBREVIATIONS

AKART	all known, available, and reasonable technologies
ANSI	American National Standards Institute
ARAR	applicable or relevant and appropriate requirements
ASAOC	Administrative Settlement Agreement and Order on Consent
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWQC	Ambient Water Quality Criteria
BCF	bioconcentration factor
BEHP	bis(2-ethylhexyl)phthalate
BSAF	biota-sediment accumulation factor
BW	body weight
CAP	Cleanup Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CFS	cubic feet per second
CHE	Coast and Harbor Engineering, Inc.
COC	chemical of concern
COI	chemical of interest
COPC	chemical of potential concern
CPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	cleanup screening level
CSM	Conceptual Site Model
CST	Column Settling Test
CWA	Clean Water Act
CY	cubic yard
DFC	daily food consumption
DMMP	Dredged Material Management Program
DNR	Washington State Department of Natural Resources
DQO	Data Quality Objective

ACRONYMS AND ABBREVIATIONS (CONTINUED)

DRET	Dredging Elutriate Test
DSC	daily sediment consumption
dw	dry weight
DW/HW	dangerous waste/hazardous waste
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ER	exceedance ratio
ERA	Ecological Risk Assessment
Framework	tribal framework
FWM	food web model
g/cm^3	grams per cubic centimeter
g/day	grams per day
GIS	Geographic Information System
GRA	general response actions
GWCMP	Groundwater Confirmation Monitoring Program
H	horizontal
HASP	Health and Safety Plan
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	hazard index
HPAH	high-molecular weight polycyclic aromatic hydrocarbon
HQ	hazard quotient
IRIS	Integrated Risk Information system
LAET	lowest apparent effects threshold
LDW	Lower Duwamish Waterway
LMC	Lockheed Martin Corporation
LOAEL	lowest-observed-adverse-effect-level
LPAH	low-molecular weight polycyclic aromatic hydrocarbon

ACRONYMS AND ABBREVIATIONS (CONTINUED)

LSSOU	Lockheed Shipyard Sediment Operable Unit
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MCUL	minimum cleanup level
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
mg/kg-OC	milligrams per kilogram organic carbon normalized
mg/L	milligrams per liter
mL	milliliters
MLLW	mean lower low water
MNR	monitored natural recovery
MS/MSD	matrix spike/matrix spike duplicate
MTCA	Model Toxics Control Act
NAD	North American Datum
NAPL	non-aqueous phase liquid
NCP	National Contingency Plan
NOAA	National Oceanic Atmospheric Association
NOAEL	no-observed-adverse-effect-level
NPL	National Priorities List
O&M	operation and maintenance
OC	organic carbon
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
PAH	polycyclic aromatic hydrocarbons
Pb	lead
PCB	polychlorinated biphenyls
Port	Port of Seattle
ppm	part per million
PRG	preliminary remediation goal
PROPWASH	propeller wash modeling

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PSAMP	Puget Sound Ambient Monitoring Program
PSDDA	Puget Sound Dredge Disposal Analysis
PSEP	Puget Sound Estuary Program
PSR	Pacific Sound Resources
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSAR	Qualitative Structure Information System
RA	risk assessment
RAO	remedial action objective
RBACG	risk-based analytical concentration goal
RBC	risk-based concentration
RBG	risk-based goal
RBTC	risk-based threshold concentration
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RfD	reference dose
RG	remediation goal
RI/FS	Remedial Investigation/Feasibility Study
RL	reporting limit
RM	river mile
RME	reasonable maximum exposure
ROC	receptor of concern
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SEDQUAL	Sediment Quality Information System
SHIPWAVE	ship-induced waves
Site	Lockheed West Seattle Superfund Site
SMS	Washington State Sediment Management Standards
SMU	sediment management unit

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SOW	statement of work
SQS	sediment quality standard
SRI	Supplemental Remedial Investigation
SVOC	semivolatile organic compound
SWAC	spatially weighted average concentration
SWH	Southwest Harbor
SWHCRP	Southwest Harbor Cleanup and Redevelopment Project
TBC	to be considered
TBT	tributyltin
TCLP	toxicity characteristic leaching procedure
TEQ	toxic equivalency quotient
TM	Technical Memorandum
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington Department of Wildlife
WDOH	Washington State Department of Health

1. INTRODUCTION

This Remedial Investigation/Feasibility Study (RI/FS) Work Plan describes the procedures and activities that will be completed by the Lockheed Martin Corporation (LMC) for the RI/FS of sediment areas at the Former Lockheed Shipyard No. 2, located in Seattle, Washington (henceforth referred to as the Lockheed West Site or Site). This Work Plan was prepared as required by the Administrative Settlement Agreement and Order on Consent (ASAOC) (U.S. Environmental Protection Agency [EPA] Docket No. CERCLA-10-2006-0321/Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]) and accompanying Statement of Work (SOW) for the Lockheed West Seattle Superfund Site.

The RI/FS described in this Work Plan will be completed in accordance with the ASAOC. The RI/FS process for the Lockheed West Site described in this Work Plan and diagramed on Figure 1-1 is based on flexible and cooperative effort between EPA and LMC. This effort aims to produce a protective, timely, and cost-effective remediation strategy for the Site.

EPA approval of this Work Plan will fulfill the requirements specified in Section II, Task I of the SOW. During the development of this Work Plan, EPA approved the Site Characterization Sampling and Analysis Plan (Appendix C) and Quality Assurance Project Plan (Appendix D) in January 2007 to allow LMC to expedite investigation of the site, including: sediment sampling, site surveying, and reconnaissance activities. Sampling plans for these activities are referred to as proposed, including those that will have been completed by the time of EPA's final approval. Data resulting from implementation of these activities are described in the past tense in Chapter 8 of this Work Plan.

1.1 PURPOSE OF THE LOCKHEED WEST RI/FS

The purposes of completing an RI/FS for the Lockheed West Site are to (a) determine the nature and extent of contamination (i.e., define the site cleanup boundary) and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants or contaminants at or from the Site, by conducting an RI; and (b) identify and evaluate remedial alternatives to prevent, mitigate, or otherwise respond to or remedy any release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site, by conducting a FS. The Lockheed West RI/FS will be conducted in accordance with the provisions of the ASAOC, SOW, CERCLA, National Contingency Plan (NCP), and EPA guidance, including, but not limited to, the "Interim

Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (Office of Solid Waste and Emergency Response [OSWER] Directive #9355.3-01, October 1988 or subsequently issued guidance), "Guidance for Data Usability in Risk Assessment" (OSWER Directive #9285.7-05, October 1990 or subsequently issued guidance) and guidance referenced therein, and guidance referenced in the SOW, as may be amended or modified by EPA. A project roadmap, diagramming the primary project phases, key considerations, and SOW is presented in Figure 1-1.

1.2 DESCRIPTION OF THE LOCKHEED WEST SEATTLE SUPERFUND SITE

The area of investigation for this RI/FS (henceforth referred to as the Site) is located in the southwest corner of Elliott Bay, and consists of the areal extent of sediment contamination (as determined by environmental sampling) and sources thereto from the former shipyard facility also known as Lockheed Shipyard No. 2, which was located at 2330 Southwest Florida Street in West Seattle, Washington. For purposes of illustration, the historical property boundaries are shown on the figures but are not intended to represent the cleanup boundary which will be determined following the completion of the RI/FS and based on extent of historical shipyard contamination. The area of investigation includes both the property occupied by the former shipyard and the areas of Elliott Bay and the West Waterway immediately adjacent to the former shipyard property.

The Site is bounded by Elliott Bay on the north, Harbor Island West Waterway on the east, and Pacific Sound Resources (PSR) Superfund Site on the west (Figure 1-2). It includes approximately 7 acres of aquatic land now owned by the Port of Seattle (Port) (formerly owned by LMC) and approximately 20 acres owned by Washington Department of Natural Resources (DNR) and historically leased to LMC.

LMC discontinued operations at Lockheed Shipyard Number 2 in 1987 after approximately 45 years of continuous operations by Lockheed and others that included shipbuilding, ship repair, and ship maintenance. Past industrial practices at or adjacent to the facility have resulted in contamination of aquatic sediments. The contaminants found in the aquatic area include hazardous substances associated with shipbuilding, repair, and maintenance activities, consistent with the historical uses of the facility. Other contaminants not directly associated with shipyard activities may be present at the Site.

Historical shipyard contaminants of potential concern (COPCs) include, but are not limited to, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), mercury, other metals, and other organic compounds.

Associated sediments are habitat to numerous fish and other aquatic species, and are within a migratory corridor for endangered, threatened, and other anadromous fish.

Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA proposed the Site for inclusion on the National Priorities List (NPL) on September 26, 2006. The Lockheed West Seattle Site was listed on the NPL on March 7, 2007.

1.3 WORK PLAN ORGANIZATION

This Work Plan is organized into the following sections:

- Section 1 – Introduction
- Section 2 – Project Approach, Team, Deliverables, and Schedule
- Section 3 – Listing of Applicable Standards
- Section 4 – Summary of Existing Information
- Section 5 – Preliminary Identification of Remedial Action Objectives and Potential Remedial Alternatives
- Section 6 – Preliminary Remediation Goals
- Section 7 – Sediment Stability
- Section 8 – Sampling and Analysis
- Section 9 – Data Management
- Section 10 – Field Data Collection and Data Reporting
- Section 11 – Risk Assessment Work Plan
- Section 12 – Source Control Evaluation
- Section 13 – Remedial Investigation and Feasibility Study
- Section 14 – Community Involvement Activities
- Section 15 – References

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