

***Ship Creek Literature Review
Alaska Railroad Corporation April 2004
Anchorage, Alaska***

***Prepared for
Alaska Railroad Corporation***

***July 2004
8877***

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Prepared by
Hart Crowser, Inc.

A handwritten signature in black ink, appearing to read "B. Ream".

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Senior Associate

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Senior Associate

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**SHIP CREEK LITERATURE REVIEW
ALASKA RAILROAD CORPORATION APRIL 2004
ANCHORAGE, ALASKA**

1.0 INTRODUCTION

The purpose of the Ship Creek Literature Review is to locate and evaluate available published data that could be used as a resource for performing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) characterization and ecological and human health risk assessments for the portions of Ship Creek that are within the Alaska Railroad Corporation (ARRC) Anchorage Terminal Reserve in Anchorage, Alaska. This Literature Review is a component of Interim Action Number 1 under the July 2004 Administrative Order on Consent (AOC) between ARRC and Region 10 of the U.S. Environmental Protection Agency (EPA) regarding site investigation at the Anchorage Terminal Reserve.

The data needed for environmental characterization and risk assessment begins with identification of types and amounts of contaminants present. Data regarding chemical contaminants are compared against risk-based screening criteria to determine whether there is a potential for that chemical at that concentration to cause an adverse effect. If there is a potential for an adverse effect, further studies such as bioassays or benthic studies are conducted and background or ambient concentrations of that chemical are also determined. The purpose of this Literature Review is to catalog the existing data regarding water and sediment quality in Ship Creek, to evaluate those data to determine the extent to which they are usable, and identify data gaps that need to be filled to complete the Ship Creek characterization and risk assessment required under the AOC.

Tables 1 and 2 provide a summary of primary and additional agency personnel, researchers, and other knowledgeable individuals contacted during this study. Table 3 lists the known locations of previous macroinvertebrate sampling activities for Ship Creek. Table 4 summarizes the analytical results of previous macroinvertebrate sampling. Figure 1 is a vicinity map showing major locations and features discussed in this report.

Appendix A contains a list of acronyms used in this report. Individual documents collected during the literature review were assigned an arbitrary sequential catalog number (i.e., SC-001). This number is used to reference specific documents where mentioned in the following text. Annotated bibliographies for documents reviewed during this study are provided as Tables B-1 (Sediment and Surface Water Quality) and B-2 (Macroinvertebrates and

Fisheries) in Appendix B. An index of all documents obtained during this study is provided in Appendix C. Copies of these documents have been separately provided to ARRC for future use and reference.

2.0 DOCUMENT ACQUISITION AND REVIEW PROCESS

The following summarizes the efforts that were made to locate existing analytical data and evaluations relevant to the portions of Ship Creek within the ARRC Anchorage Terminal Reserve. Additionally, data on other creeks in the area were collected to identify regional background contaminant levels that may be usable for comparison purposes.

This Literature Review reflects extensive efforts to locate and summarize all the existing analytical data and environmental evaluations relevant to the portions of Ship Creek within the ARRC Terminal Reserve. However, there is no central repository for Ship Creek reports and most of the information collected during this project was gleaned from multiple sources and locations. There also are few studies concerning Ship Creek in the peer-reviewed literature. Most studies identified during this project were conducted by government agencies and private consulting firms either to investigate an environmental problem or evaluate a project that could impact the creek.

This review focused on Ship Creek research conducted after 1989. Earlier studies were also evaluated, however, where these provided historical background or useful comparison data.

2.1 *Review Approach*

This section presents the approach taken by Hart Crowser in obtaining documents for this project.

- Individual Hart Crowser researchers were assigned government agencies, personnel to contact and repositories to search based on their particular expertise and personal experience with various sources.
- Researchers identified and copied all useful information pertaining to Ship Creek. Researchers also discovered pertinent information concerning Campbell Creek, Chester Creek, Six Mile Creek and Eagle River.
- Potential sources of information were uncovered from bibliographies of collected research papers. Researchers contacted the authors of these papers to ascertain whether they could provide the names of additional persons who had studied Ship Creek. This proved to be a useful approach

for building a list of Ship Creek contacts. Only a small group of professionals has focused on Ship Creek, so the list of valuable contacts is relatively short. Table 1 lists those individuals. Additional contacts appear in Table 2.

2.2 Scientific Databases and Libraries Searched

Hart Crowser performed a comprehensive search of the following publicly available scientific databases and agency holdings.

- The Alaska Department of Fish & Game (ADF&G) online holdings and bibliography
- The Alaska Department of Environmental Conservation (ADEC) online holdings and information
- Aquatic Pollution and Environmental Quality - database
- Aquatic Science and Fisheries Abstracts - database
- Agriculture, Biosciences and Environmental Science Journals - database
- Arctic and Antarctic Regions - database
- U.S. Army Corps of Engineers - Alaska District online Library
- Cook Inlet Information Management and Monitoring System - database
- Digests of Environmental Impact Statements - database
- Elmendorf AFB online bibliography and resources
- Ecology Abstracts - database
- Environmental Engineering Abstracts - database
- Fish and Fisheries Worldwide - database
- Georef - database
- Polarpac - database
- Pollution Abstracts - database
- Risk Abstracts - database
- The State Hazardous Waste Sites - database
- Toxicology Abstracts - database
- United States Geological Survey (USGS) online database and public documents
- Water Resource Abstracts - database
- Wildlife and Ecology Studies Worldwide - database

The majority of searchable databases are located at individual libraries in Anchorage and Fairbanks. The remainder of the databases are available online. Hart Crowser researchers also obtained documents from the following libraries and agency holdings:

- ADF&G Raspberry Road holdings
- ADEC conference room library
- ADNR holdings

- ARRC holdings
- ARLIS Library - Anchorage
- Loussac Library - Anchorage
- University of Alaska Fairbanks (UAF) - Bioscience Library
- UAF Elmer E. Rasmussen Library
- University of Alaska Anchorage (UAA) Library
- USGS Anchorage holdings

2.3 Agencies and Organizations Contacted

All agencies and organizations visited during this project were helpful and open to researchers. They willingly provided all Ship Creek data in their possession and also to provided information concerning contacts and sources.

- **The Alaska Department of Environmental Conservation (ADEC)** - The ADEC holdings include reports and other materials relating to the CERCLA projects that have been conducted at Elmendorf AFB and Fort Richardson. Some of these military projects involve contaminant releases that could affect Ship Creek. ADEC documents can be located online, the Alaska Resource Library and Information Services (ARLIS) Library, the UAA Library, ADEC's Cordova Street office and with other agencies.
- **The Alaska Department of Fish & Game (ADF&G)** - ADF&G provided Ship Creek permit data and fishery information. Some reports and technical information are also located at the ARLIS Library, the UAA Library, the Raspberry Road office, the Elmendorf and Fort Richardson hatcheries, and online.
- **The Alaska Department of Natural Resources (ADNR)** - The ADNR provided numerous useful documents. They are also found in Anchorage libraries.
- **The Alaska Railroad Corporation (ARRC)** - The railroad has many Ship Creek studies in their possession that are pertinent to this study.
- **The Anchorage Water and Wastewater Utility (AWWU)** - The AWWU had little useful information regarding Ship Creek.
- **The Anchorage Waterways Council** - The Anchorage Waterways Council provided a bibliography to peruse and held some pertinent studies that we had already located. They may be a valuable future resource as they have some ongoing projects.

- **The U.S. Army Corps of Engineers - Alaska District (USACE-AK)** - Most of the USACE-AK documents can be located online.
- **The U.S. Environmental Protection Agency (EPA)** - The EPA has an extensive collection of documents concerning Ship Creek online. These are in PDF format.
- **The Municipality of Anchorage (MOA)** - The MOA provided documents concerning Ship Creek and water quality issues. Most MOA holdings are located at the Loussac Library.
- **The Port of Anchorage** - The Port of Anchorage did not have any specific Ship Creek information.
- **U.S. Geological Survey (USGS)** - The USGS has an extensive online library, as well as holdings at their Anchorage offices. They are continually performing studies on Anchorage streams and may be a valuable resource in the future. There are also numerous holdings in the ARLIS Library, the UAA Library and the Loussac Library.
- **The U.S. Fish and Wildlife Service (USF&WS)** - The USF&WS did not have much information concerning Ship Creek.
- **The Anchorage Museum of History and Art** - The Anchorage Museum of History and Art has historic photographs and archival holdings that provide a useful resource for researching the early history of Ship Creek.
- **National Archives** - The National Archives (Anchorage Regional Repository) collections contain photographs, plans, and documents associated with early Federal Railroad Administration and military development of Ship Creek.

2.4 Discussion

Overall, the literature search was successful in locating and assembling a diverse array of documents related to Ship Creek. Hart Crowser collected and recorded over 250 documents, most of which were directly applicable to Ship Creek characterization and risk assessment. Other non-project specific documents were collected for background and future reference. The collected documents cover a wide variety of issues including sediment analysis, water quality, macroinvertebrates, stream ecology, historical water rights, fisheries, past CERCLA investigations and public concerns. In addition to completed projects, the researchers also discovered at least three ongoing Ship Creek studies whose project leads may be valuable future references:

- Ms. Leanne Monk, a geologist from UAA, is currently analyzing Ship Creek sediments for metals. Her data were not ready for publication and, therefore, are not included in this summary. Ms. Monk works with many of the researchers that appear in the Ship Creek literature uncovered during this project.
- Ms. Mary Mauer from the ADNR, Division of Mining and Water Resources will be conducting a second research project. Mary's project is still in the design phase, but may coincide with the site investigation ARRC will be conducting under the AOC.
- A third group conducting ongoing research on Ship Creek is the Anchorage Waterways Council, specifically Ms. Meagan Boltwood. Ms. Boltwood's project centers on the consequences and benefits of removing the culverts in Ship Creek.

These three researchers represent just a few potential resources for future data. It is likely that the names of other researchers will be identified in the future.

At this point, Hart Crowser is confident we uncovered most of the pertinent Ship Creek research available from public sources. There may be a few projects still waiting to be discovered, but this is unlikely since we contacted those persons considered to be Ship Creek experts by their peers. We began the project anticipating an abundance of current research pertaining to the creek, but were surprised to find that much of the available information was widely scattered and often sparse. It required a somewhat exhaustive search to locate the data uncovered during this project. Although the data concerning Ship Creek seems relatively sparse in comparison to that available for other local drainages, we did assemble a substantial amount of valuable information from our combined sources.

3.0 SUMMARY OF INFORMATION OBTAINED DURING LITERATURE SEARCH

This section summarizes and evaluates the information contained in the reports Hart Crowser obtained during this literature search, and discusses whether

Their data are of sufficient quality for ARRC to incorporate in the RI/FS site characterization and risk assessments. The reports were also evaluated to identify data gaps that may need to be filled during the RI/FS. These gaps are discussed in Section 4.0.

The reports and report excerpts were categorized and separated based on the types and sources of the reports and, where practical, on the type of data the reports contain (e.g., sediment quality data, benthic community data, fisheries information). Additionally, data and literature that were obtained during the literature search, but are not specifically useful for site-specific risk assessment purposes, are also discussed and summarized in this section.

3.1 Site Investigation Type Reports

3.1.1 Arctic Cooperage Site

The Arctic Cooperage site is at 932 Whitney Road is on property located just north of Ship Creek that has not been leased since about 1985. During 1996, as part of the Phase II Site Assessment (SC-004B), four sediment samples and two surface water samples were collected from a former drainage ditch at the southern end of the site that flowed into two intervening properties and then discharged into Ship Creek. The drainage ditch was eliminated after the railroad performed track right-of-way (ROW) maintenance in about 1999. The length of the drainage ditch between the Arctic Cooperage site and Ship Creek is not presented in the report. Organics and metals were detected drainage ditch samples collected upgradient and downgradient of the Arctic Cooperage Site. The analytical sediment and surface water data in this report may be useful for an uplands risk assessment, though not necessarily useful for an evaluation of Ship Creek.

The EPA is the lead agency for this site and the site is listed in the Federal Agency Hazardous Waste Compliance Docket with the Federal Railroad Administration listed as the property owner. According to a February 11, 1997 letter from EPA to ARRC, EPA reviewed the 1996 Site Assessment report and subsequently included a "recommendation of no further remedial action planned (NFRAP)" in the Federal Agency Hazardous Waste Compliance Docket.

3.1.2 Knik Arm Power Plant

The Knik Arm Power Plant (KAPP) is located on Ship Creek approximately 0.5 mile from the confluence of Ship Creek and the Knik Arm of Cook Inlet. A Site Inspection (SI) of the ARRC Yard (SC-002B) evaluated six sediment and three surface water samples from Ship Creek in the vicinity of the KAPP. Two of the water samples were collected from storm water drain outfalls downstream of the KAPP cooling pond, while a surface water sample was collected from Ship Creek upstream of the cooling pond. SI results are discussed in Section 3.1.4.

The 1990 Environmental Assessment of the KAPP (SC-003B) discussed potential discharges to Ship Creek via floor/roof drains, storm/sewer systems, and/or the KAPP cooling pond system, which is connected to Ship Creek. All non-sewage wastes from the plant drain systems were discharged directly into Ship Creek.

The 1998 Ship Creek Brownfields Site Assessment, Final Sampling and Quality Assurance Project Plan (QAPP) (SC-075B) indicates that in April 1998 a transformer oil (with polychlorinated biphenyls [PCBs]) spill from two 1,200-gallon out of service electrical transformers was reported. Subsequent sampling of manholes and storm drain outfalls identified PCBs in one of the manhole sumps that receive wastewater from the KAPP floor drains. Additionally, "ADEC noted a sheen on Ship Creek when sediments below the Manhole 1 outfall were disturbed." Following cleanup, this site was closed by ADEC.

The 1999 Ship Creek Targeted Brownfields Assessment Report (SC-005B) presents the analytical results of soil, sediment, surface water, groundwater, and sludge sampling conducted at the KAPP. Background soil, sediment, and surface water samples (one each) were also collected. Surface water and sediment samples were collected in the cooling pond and in Ship Creek (above and below the dam). Surface water results were compared against National Recommended Ambient Water Quality Criteria (AWQC), and sediment results were compared against Oak Ridge National Laboratory sediment benchmarks, EPA Ecotox Thresholds, and Ontario Ministry of Environment Lowest Effects Levels. The report includes a quality assurance/quality control (QA/QC) review and data validation of the analytical data.

- **Cooling Pond.** Five collocated surface water and sediment samples were collected. No constituents were detected in surface water at concentrations above the AWQC. The following constituents detected in sediment exceeded their respective ecological screening benchmarks: benzo(g,h,i)perylene, 1-methylnaphthalene, naphthalene, 4-methylphenol, PCBs, toluene, arsenic, copper, lead, manganese, mercury, nickel, and zinc.
- **Ship Creek – Above KAPP Dam.** Two collocated surface water and sediment samples were collected. No constituents were detected in surface water at concentrations above the AWQC. The following constituents detected in sediment exceeded their respective ecological screening benchmarks: manganese and nickel.
- **Ship Creek – Below KAPP Dam.** Three collocated surface water and/or bluff stormwater drainage samples and sediment samples were collected. No constituents were detected in surface water at concentrations above the AWQC. The following constituents detected in sediment at the outfall of the cooling pond discharge exceeded their respective ecological screening

benchmarks: benzo(g,h,i)perylene, 1-methylnaphthalene, naphthalene, 4-methylphenol, benzyl alcohol, PCBs, toluene, arsenic, copper, manganese, mercury, nickel, and zinc.

These Brownfields Assessment sediment and surface water data may be useful in the RI/FS characterization and risk assessment regarding Ship Creek.

The May 2000 Site Investigation Report, KAPP Diversion Pond Sediment Sampling and Analysis (SC-239B) presents the analytical results from 10 sediment samples (collected in the dry) from six soil borings located in an area proposed for dredging behind the KAPP diversion dam. Four additional samples were collected, but not analyzed. The sediment samples were collected from depths ranging from 1 to 12 feet and were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs, pesticides, metals, diesel range organics (DRO), and residual range organics. The sediment results were initially compared to ADEC Method Two soil cleanup criteria, which are based on the protection of human health. The sediment data were also compared to two sets of Oak Ridge National Laboratory (1997) benchmarks: low-level benchmarks developed by the National Oceanic Atmospheric Administration (NOAA) and the Florida Department of Environmental Protection. Nickel and copper were the only constituents detected at concentrations exceeding their respective benchmarks. According to the report, the nickel sediment concentrations and all but one copper sediment concentrations were less than the background concentrations reported in the EPA's 1999 Brownfields Assessment. This report includes a QA/QC evaluation of the analytical data and the associated Laboratory Analytical Reports. These sediment data would be useful in conducting a risk assessment on Ship Creek, assuming that the sediment has not been dredged from the Diversion Pond.

3.1.3 Standard Steel and Metals Salvage Yard Site

The Standard Steel and Metals Salvage Yard (Standard Steel) is a CERCLA site located along Ship Creek, which bounds the Standard Steel site to the south. A record of decision (ROD) was completed for this site in 1996.

Hart Crowser evaluated four EPA Technical Assistance Team (TAT) or Emergency Response Team (ERT) reports for Ship Creek. These reports were prepared between 1986 and 1988. The Preliminary Site Assessment report (SC-215B) summarizes preliminary site assessment activities in 1985, including sediment and surface water sampling in Ship Creek. One sediment sample and one surface water sample were collected at each of two locations 100 yards upstream and downstream of the Standard Steel site. PCBs were detected at a concentration of 2.5 ppm in the downstream sediment sample and were not

detected in the upstream sediment sample or the two surface water samples. No useful figure showing sample locations or analytical laboratory data is included.

A 1987 ERT report (SC-098B) presents a summary of soil, groundwater, sediment, and surface water samples collected in May 1987. The summary tables indicate that Aroclor 1260 was detected in stream sediment and tetrachloroethene was detected in stream surface water. No useable figure showing sample locations, analytical laboratory data, and QA/QC information are included in this report. A 1986 TAT report (SC-216B, more complete version of SC-220B) includes a discussion of 1986 surface water and sediment samples collected from Ship Creek (note these samples were not collected for this report, but are discussed as historical data). Upstream and downstream sediment samples were collected at the locations used in the 1985 investigation. This sampling confirmed the presence of low-level PCB contamination downstream of the Standard Steel site (0.04 to 0.06 ppm). However, a 1998 On-Scene Coordinator's report (SC-223B) states that PCBs were not detected in sediment samples collected in July 1986 at a detection limit of 0.01 ppm. The 1998 report also discusses the results of a Ship Creek fish study conducted by the U.S. Fish and Wildlife Service. Rearing salmon and Dolly Varden were collected downstream of the site. No analytical laboratory data or QA/QC information are included in these reports.

The 1997 Conceptual Design Plan prepared for the Standard Steel site (SC-227B) includes discussion of remedial design activities focused on protecting Ship Creek.

The 1994 Remedial Action Objectives report for this site (SC-221B) appears to be excerpts of the ecological risk assessment for the Standard Steel site. Sediment data, Microtox © sediment toxicity data, and a benthic macroinvertebrate community analysis are included in these excerpts. The complete ecological risk assessment for the Standard Steel site would be very useful for a future risk-based assessment of Ship Creek.

3.1.4 Alaska Railroad Yard Site

The 1986 Site Inspection report (SC-002B; report also discussed in Section 3.1.2) included sediment and surface water samples that were collected in order to determine whether site-related contamination had migrated to Ship Creek. Surficial sediment metal concentrations from samples collected in Ship Creek are similar to background concentrations. Surface water samples collected adjacent to storm-drain outfalls contained elevated metals, and elevated metals were detected in on-site groundwater. Organic compounds detected in Ship Creek sediment samples include benzene, trans-1,2-dichloroethene, and Aroclor 1260.

The authors concluded that shallow groundwater contamination at the railroad yard may reach Ship Creek and that surface water runoff adversely affects Ship Creek only during periodic releases of petroleum products resulting from spills. No analytical laboratory reports are included in this report. A 1989 Shannon and Wilson report (SC-001B) refers to a 1986 Shannon and Wilson report titled "Ship Creek Oil Seep Investigation, Anchorage, Alaska." This 1986 report was not obtained by Hart Crowser, but may provide useful information that can be included in the RI/FS.

3.1.5 Elmendorf Air Force Base Site

Elmendorf AFB is a CERCLA site adjacent to the Alaska Railroad facility. This site is adjacent to and upgradient of Ship Creek.

Ship Creek Surface Water Sampling

Two years of monthly surface water sampling results are presented in eight quarterly reports from April 1995 to November 1996 (SC-085B, SC-121 through SC-129B, and SC-151B through SC-155B; note that these reports include partial and complete duplicate reports). The purpose of the surface water sampling is to determine whether upgradient groundwater contamination at Elmendorf AFB is impacting the water quality of Ship Creek via groundwater discharge. Eight or nine locations were sampled during the monthly sampling events, including one upstream location (please see referenced reports for figures showing sample locations). The remaining seven sample locations were placed directly downstream of identified inflows to Ship Creek. Surface water samples were analyzed for field parameters, inorganic constituents, metals, and VOCs. Samples were collected following a QAPP. The following summarizes the Ship Creek surface water finding reported in these documents.

- **Quarterly Report 1 (April 1995).** Low levels of 7 metals were detected above regulatory standards (not identified in report) and 12 VOCs were detected.
- **Quarterly Report 2 (May 1995).** Low levels of 6 metals were detected above regulatory standards (not identified in report) and 15 VOCs were detected.
- **Quarterly Report 3 (August 1995).** Low levels of 6 metals were detected above regulatory standards (not identified in report) and 6 VOCs were detected.

- **Quarterly Report 4 (November 1995).** Low levels of 6 metals were detected above regulatory standards (not identified in report) and 4 VOCs were detected. This report contains analytical laboratory data and a QA/QC results summary for the fourth quarter results.
- **Quarterly Report 5 (February 1996).** Low levels of 4 metals were detected above regulatory standards (not identified in report) and 12 VOCs were detected. This report contains analytical laboratory data and a QA/QC results summary for the fifth quarter results.
- **Quarterly Report 6 (May 1996).** Low levels of 4 metals were detected above regulatory standards (not identified in report) and 9 VOCs were detected. This report contains analytical laboratory data and a QA/QC results summary for the sixth quarter results.
- **Quarterly Report 7 (August 1996).** Low levels of thallium were detected above regulatory standards (not identified in report) and five VOCs were detected. This report contains analytical laboratory data and a QA/QC results summary for the seventh quarter results.
- **Quarterly Report 8 (November 1996).** No metals were detected above regulatory standards (not identified in report) and four VOCs were detected. This report contains analytical laboratory data and a QA/QC results summary for the eighth quarter results.

It is not clear whether the surface water data were compared against chronic AWQC for assessing potential ecological impacts.

Operable Units 1 through 6

The Cumulative Risk Evaluation for Operable Units (OU) 1 – 6 Work Plan (SC-140B) describes how the previous risk assessments conducted on six OUs at Elmendorf AFB will be qualitatively assessed and how cumulative risks posed to human health and the environment will be evaluated. The evaluation of potential impacts to Ship Creek will include potential impacts from OU-1 and OU-5 on the north side of Ship Creek, and three OU-6 source areas (SD73, LF02, LF03) on the south side. In addition to the risk assessments performed for the six OUs, the work plan also mentions an ecological survey prepared by Battelle Memorial Institute (1992), a NOAA Natural Resource Assessment, and Ship Creek benthic sampling conducted by Battelle Memorial Institute in 1994. Hart Crowser does not have copies of these reports, which may be useful for conducting a risk-based assessment of Ship Creek.

The report with Hart Crowser document number SC-086B contains an incomplete summary of investigations and risk assessments at the Elmendorf AFB OUs, but includes a reference to an ecological risk assessment of the aquatic ecosystem for the OU-1 RI. An ecological risk assessment that investigated environmental risks to Ship Creek in order to determine the environmental impacts from the OUs near the Creek (including OU-1) was conducted as part of the OU-6 RI. Hart Crowser does not have a complete copy of the OU-1 or OU-6 ecological risk assessments.

Operable Unit 1

The information obtained for OU-1 is of limited value for Ship Creek risk assessments. The Operable Unit 1 Management Plan (SC-080B) provides a summary of geologic and hydrogeologic conditions on Elmendorf AFB and historical data summaries of soil and groundwater sampling at OU-1 from late 1980s. Groundwater monitoring results for samples collected from 14 OU-1 wells in June 2000 were presented in the Groundwater Analytical Results for Operable Unit 1, Round 1 report (SC-141B). Analytical laboratory results and QA/QC information were not included in the Round 1 report.

Excerpts of the 1994 OU-1 remedial investigation/feasibility study (RI/FS) report are attached to Hart Crowser document number SC-119B. The complete OU-1 RI/FS, including the human health and ecological risk assessments should be obtained for use in the Ship Creek RI/FS characterization and risk assessments.

Operable Unit 5

Limited excerpts of the 1994 OU-5 RI/FS report (SC-119B) were reviewed. The complete OU-5 RI/FS, including the human health and ecological risk assessments should be obtained for incorporation as appropriate in the RI/FS characterization and risk assessments for Ship Creek. In the OU-5 RI/FS report, the authors conclude that human receptors, fish, and invertebrates "do not appear to be at significant risk from OU-5 contaminants" due to "lack of contamination in Ship Creek."

Four rounds of groundwater and surface water monitoring data for OU-5 were located by Hart Crowser (SC-142B through SC-145B), including Round 1: 1999, Round 2: 2000, and Rounds 1 and 2: 2001. It is not clear if Round 2: 1999 and Round 1: 2000 sampling took place or if the results are available. Sampling may also have been conducted in 1998. The surface water sample locations appear to be the same as those sampled in the eight rounds of surface water sampling conducted in 1995 and 1996. According to the reports, these data were collected following a QAPP and the contract laboratory conducted a QA/QC

review. Analytical laboratory data or QA/QC review of data are not included in these reports.

- **Round 1: 1999** - Trichloroethene (TCE) exceeded its groundwater Maximum Contaminant Level (MCL) (5 ug/L) at five wells, but at lower concentrations than what was detected in 1998. TCE was also detected in surface water at a concentration greater than its drinking water MCL, but only at one location (beaver pond; SC-3) and at similar concentration to 1998. Surface water from the beaver pond flows into Ship Creek. According to the Round 2: 2000 report, TCE was below its MCL in sample SC-3 collected in Round 2: 1999.
- **Round 2: 2000** - TCE exceeded its groundwater MCL at six wells, at similar concentrations to 1999. At sample location SC-3, TCE exceeded its MCL in Round 1: 2000 and was below its MCL in Round 2: 2000. The authors note "the natural beaver pond system downstream of SC-3 significantly degrades TCE levels to well below the MCL before reaching Ship Creek proper."
- **Round 1: 2001** - TCE exceeded its groundwater MCL in six wells, at similar concentrations to 2000. At sample location SC-3, TCE exceeded its drinking water MCL at a slightly higher concentration than in 2000.
- **Round 2: 2001** - TCE exceeded its groundwater MCL in seven wells, at similar concentrations to 2000. 1,1,2,2-tetrachloroethane exceeded its groundwater MCL in two wells, which also had TCE exceedences. TCE exceeded its MCL at sample location SC-3 at a concentration similar to Round 1: 2001.

It does not appear that the surface water data were compared against chronic AWQC.

Operable Unit 6

Limited excerpts of the 1995 OU-6 RI report are attached to Hart Crowser document number SC-119B. The complete OU-6 RI, including the human health and ecological risk assessments should be obtained for use as appropriate in Ship Creek characterization and risk assessments ARRC will conduct as part of the RI/FS.

3.1.6 Fort Richardson Site

Excerpts from the Preliminary Source Evaluation 2 report for OU-D (SC-091B) were reviewed. This report focused on two source areas potentially contributing contaminants to the Ship Creek drainage: the high frequency transmitter

site/cooling ponds at Building 35-752 and the stormwater outfall at Ship Creek. Sediment samples were collected from 6 inches to 1 foot below the surface of the cooling pond bottom. Sediments in the cooling ponds contained elevated levels of PCBs and DRO. An unlined culvert feeding into the stormwater outfall system drains the cooling ponds. Sediment and sidewall samples were collected upstream and downstream of the outfall in Ship Creek, from the outfall itself, and from the stormwater drainage ditch. Arsenic, barium, chromium, lead, nickel, DRO, and total petroleum hydrocarbons were reported detected in soil and sediment samples associated with the Ship Creek outfall. It would be useful for purposes of the ARRC RI/FS to obtain the full report for sampling locations and densities associated with the two Fort Richardson source areas.

3.2 Records of Decision

We identified three CERCLA sites in the Lower Ship Creek Watershed: Elmendorf AFB, Fort Richardson, and Standard Steel and Metals Salvage Yard. RODs were developed upon completion of RI, FS, and selection of remedial action for each site. These RODs were obtained during our literature search. The RODs for the OUs of the CERCLA sites relevant to Ship Creek are summarized below.

3.2.1 Elmendorf AFB

Elmendorf AFB was added to the CERCLA National Priorities List (NPL) in August 1990. The CERCLA site at Elmendorf AFB has been grouped into seven OUs. OU-1, OU-5, and OU-6 are of potential concern to Ship Creek because they are within 0.5 mile of the creek. OU-1 and OU-6 contain landfill sources, while OU-5 sources are primarily diesel and JP-4 jet fuel leaks. Our review of the Elmendorf AFB reports has concentrated primarily on these OUs.

Operable Unit 1 (SC-008B). This OU consists of five general waste disposal areas or landfills (source areas) adjacent to and directly north of Ship Creek. Material disposed of in OU-1 landfills included general refuse, scrap metal, used chemicals, construction debris, asbestos, shop wastes, drums of asphalt, empty drums, and quicklime. An RI/FS for OU-1 was conducted in 1991 and 1992. Arsenic, 1,2-dibromoethane, Aroclor 1260, lead, and manganese were detected in shallow groundwater at concentrations posing potential risk to human and ecological receptors. The Bootlegger Cove Formation is a layer of clay, silt, and silty clay that acts as a hydraulic aquitard and separates the upper and lower aquifer beneath the Anchorage Bowl. Of these five contaminants, only manganese was observed consistently throughout groundwater at the site, and the conclusion was contaminated shallow groundwater was not migrating to

Ship Creek. The RI report noted that several metals, including manganese, occur at naturally elevated concentrations throughout the Anchorage area.

Human Health Risk Assessment (HHRA) and ecological risk assessments (ERA) were completed for OU-1 (The following summary is based on the ROD, which contains a summary of the HHRA and ERA, since complete risk assessments were not obtained). The HHRA was based on two hypothetical exposure scenarios: future residential land use and future commercial/industrial land use. Manganese was the only contaminant determined to pose a risk to human health in shallow groundwater; the Bootlegger Cove formation was reported to effectively confine contamination to the shallow aquifer, and the RI report stated that no evidence of contamination was found in the deep aquifer. The ERA for OU-1 deferred assessment of risks to aquatic receptors to the OU-6 investigation. The selected remedy to manage risks posed by elevated manganese concentrations in shallow groundwater was Limited Action with Long-Term Monitoring of Groundwater. Long-term monitoring was selected with the goal of tracking migration and fluctuations in manganese concentrations, while land use controls would prohibit current and future exposure to shallow groundwater. Elevated levels of manganese were reported to be isolated to a limited area and were not anticipated to migrate.

Operable Unit 5 (SC-009B). Aircraft are regularly refueled at Elmendorf AFB, and many of the fuel lines are located in OU-5. OU-5 is located north of Ship Creek, west-southwest of and downgradient from OU-1 and OU-2. Soil and groundwater contamination has occurred from fuel line leaks. Six sources were identified on OU-5 based on the location of hydrocarbon seeps and known leaks of diesel and JP-4 jet fuel. Solvent constituents, primarily TCE, were also detected in groundwater of the upper aquifer beneath OU-5. Solvent plumes have migrated in groundwater from upgradient sources including shop drains (OU-3) and sanitary landfills (OU-1 and OU-2) to OU-5. An RI/FS for OU-5 was completed from 1992 through 1994. Diesel, gasoline, jet fuel, VOCs, TCE, barium, and manganese were detected in groundwater at this OU. Surface waters in the OU (ditch, beaver pond wetlands, snowmelt pond) were also impacted by VOCs. Sediment in the beaver pond and snowmelt pond was impacted by SVOCs, PCBs, VOCs, and fuel hydrocarbons. PCBs were not detected in any surface water samples. The RI report concluded that OU-5 contaminants were not migrating from the groundwater or surface water into Ship Creek.

An HHRA and ERA were conducted for OU-5 (The following summary of these studies is based on their description in the ROD since complete copies of these risk assessments were not obtained). The HHRA evaluated four potential exposure scenarios: residential (current and future); short-term worker (current

and future); recreational ingestion, inhalation, and dermal absorption (children, current and future); and recreational fish consumption. The HHRA found that only arsenic and manganese posed significant threats to human health through ingestion of shallow groundwater; as noted above, these elements naturally occur at elevated concentrations in the Anchorage Bowl. The ERA found potential risk to dabbling ducks from PCBs in snowmelt pond sediment as they foraged for food; no fish were found in the snowmelt pond. The selected remedy was Natural Attenuation with Institutional Controls for Groundwater and Beaver Pond Wetlands Area/Passive Extraction with a Constructed Wetland for Groundwater Seeps/Isolation of Snowmelt Pond Sediments/Excavation, Biopiling, and Backfilling for Soil. Existing wetlands were preserved and contaminant concentrations monitored, and the snowmelt pond was converted to wetlands for degradation of PCBs in sediment.

Operable Unit 6 (SC-012B). OU-6 is divided into two general areas. One area is on a bluff overlooking the Knik Arm of Upper Cook Inlet on the western boundary of Elmendorf AFB. The other area is south of Ship Creek and OU-1, near the southeastern boundary of the AFB. OU-6 is composed of six sources including three landfills, two sludge disposal pits, and a surface disposal area around a rock testing lab. Groundwater contamination on site was attributed to fuel line leaks, sludge weathering pads, and solvent waste disposal practices. An RI/FS was completed for OU-6 in 1994 to 1996. Contaminants of concern (COCs) in groundwater included fuel constituents, VOCs, halogenated VOCs, SVOCs, and metals.

An HHRA and ERA were conducted for OU-6 (The following summary of these reports is based on their description in the ROD since complete risk assessments were not obtained). The HHRA was evaluated using four exposure scenarios: future residential, construction (trench) worker, visitor, and child lead uptake. Human health risk from contaminated groundwater was found to be primarily driven by benzene and toluene. The ERA focused on risks to small mammal and passerine bird indicator species from soil contamination. No significant impacts to plants or animals warranting action were determined to be present based on the results of the ERA. The selected remedy for OU-6 included institutional controls on land and water use, groundwater monitoring, free product recovery, landfill debris removal, groundwater vacuum extraction, shallow soil excavation, deep soil air stripping, and soil cover.

Five-Year Review (SC-146B). The purpose of the September 1998 five-year review was to ensure that the remedial actions selected in the RODs described above remained protective of public health and the environment and were functioning as designed. This report states that in the vicinity of Elmendorf AFB, the majority of the shallow groundwater aquifer discharges into wetlands

adjacent to Ship Creek. Monthly surface water monitoring of Ship Creek was conducted from 1994 to 1996 to evaluate its condition with respect to Elmendorf AFB source sites. No evidence of any COCs impacts to Ship Creek was found. Furthermore, modeling for the shallow aquifer was conducted in 1994, 1997, and spring 1998 to evaluate contaminant migration and the potential for impacts to downgradient receptors (that is, downgradient of Elmendorf AFB source sites), including those in Ship Creek. This modeling concluded that contaminant plumes were not migrating far from source areas or reaching downgradient receptors. Data suggested that natural attenuation would reduce contaminant levels to cleanup goals within the specific timeframes in each ROD. Groundwater monitoring at OU-1 indicated that two COCs, manganese and TCE, were migrating downgradient. However, levels decreased with distance, consistent with natural attenuation, and were not expected to impact downgradient receptors including those in Ship Creek. At the time of the five-year review, all remedies were protective of human health and the environment, and no further modifications to selected remedial actions were recommended.

3.2.2 Fort Richardson

Fort Richardson was placed on the CERCLA NPL in 1994. Sources at this site have been grouped into four OUs. Operable Unit D (OU-D) was the focus of the ROD (SC-017B). Source areas at OU-D included: a drum disposal site, a road-oiling area, a fire training pit, grease pits/landfill, a stormwater outfall to Ship Creek, a laundry facility, a maintenance/paint shop, a drum staging, a former sludge bin, an armored vehicle maintenance, and battery shop. One OU-D source, Building 35-752, a high frequency transmitter site, was a particular source of concern regarding potential PCB contamination because of potential surface runoff from this area to Ship Creek. Eight of the 12 sources were granted "no further action" (NFA) status, and an RI/FS was completed for the four remaining sources in 1998. One notable source granted NFA status was the stormwater outfall to Ship Creek. Sediments and soil from channel sidewalls were collected from the outfall drainage ditch and Ship Creek itself. Background metals and low level petroleum were detected in the samples below acceptable risk levels and State of Alaska soil cleanup criteria. No impacts to Ship Creek were documented.

A site-wide (referred to as "Post-Wide") HHRA and ERA was completed for the entire Fort Richardson Army Post to supplement the individual risk assessments conducted for each site in each of the four OUs and other designated source areas. The Post Wide ERA did not find unacceptable risks to aquatic or terrestrial wildlife. Both the selected remedy for Building 35-752 and the results

of the Post Wide risk assessment were to be summarized in the ROD for the newly created OU-E.

3.2.3 Standard Steel and Metals Salvage Yard

Record of Decision (SC-016B). Standard Steel and Metals Salvage Yard was added to the CERCLA NPL in August 1990. The site stored and salvaged transformers, drums, and batteries containing PCBs. An RI/FS was conducted from 1992 through 1994 for the Standard Steel site. Lead, Aroclor 1260, VOCs, SVOCs, and metals were detected in site groundwater. Ship Creek sediment quality was evaluated in the RI as well. According to the ROD, "the RI data revealed no significant impacts to Ship Creek sediment immediately adjacent to the site as far as 500 feet below the site from ongoing or current releases from the site." The scope of the RI did not include sampling further downstream because there were reported, non-site related PCB spills into Ship Creek, and sediments are periodically dredged from Ship Creek. The general lack of lead and PCB detections at significant concentrations in Ship Creek sediment samples adjacent to the site, the lack of observed surface water runoff from the site, and relatively low levels of lead and PCBs in soils that would be submerged during flooding suggested impacts to creek sediment would not be significant.

A Baseline HH and ERA was conducted by EPA for the site and assumed no further site cleanup (note that the ROD contains a summary of the HHRA and ERA, complete risk assessments were not obtained). The HHRA considered two exposure scenarios: long-term workers and potential future residents. Groundwater pathways were found to not contribute significantly to risk if inorganic risk was not considered, because of high background concentrations of metals in the Anchorage Bowl. The ERA concluded that the most sensitive ecological habitat in the site vicinity was found in Ship Creek. It further concluded based on the data that conditions within the Ship Creek study area were not significantly impacted by contamination from the Standard Steel site. In selecting the remedial action, neither groundwater nor sediment was retained as contaminated media of concern; only surface and subsurface soil were considered for developing remedial action objectives. The selected remedy included stabilization and solidification of contaminated soils, installation of a protective cover over upland areas of the site, institutional controls, and groundwater monitoring.

Five-Year Review (SC-015B). The purpose of the April 2003 five-year review was to summarize previous RI/FS reports, the implemented remedial actions, and ongoing maintenance and monitoring activities at the Standard Steel site. Immediate threats to human health and the environment from contaminated site

media were addressed, and the selected remedy is expected to continue this protection. Remedial activities have been completed and cleanup goals have been achieved at the site in accordance with Close Out Procedures for NPL sites (SC-093B). Groundwater monitoring will continue to ensure offsite migration does not occur that could potentially impact Ship Creek. No unacceptable impacts to Ship Creek were documented in either the original RI/FS or the five-year review.

3.3 General Information Including Agency Watershed Reports

This section summarizes the reports/data that have been reviewed and contains information that may be useful to provide regional background levels of various constituents in local surface waters, sediments, and tissues of aquatic organisms but not directly applicable to the RI/FS ARRC will conduct under the AOC. In addition, several reports that summarize water use and water rights data for Ship Creek were reviewed and summarized.

3.3.1 General Water Quality Information

The USGS in 1970 (SC-045B) prepared a report entitled "The Relationship Between Surface Water and Ground Water in Ship Creek Near Anchorage, Alaska." The report discusses seepage measurements (at two gauge stations) established in Ship Creek from 1959 to 1969. This report provides historical information on groundwater surface water relationships in Lower Ship Creek that may be useful for site-specific characterization and risk assessments. However, the hydrogeologic conditions of Ship Creek may have been characterized more recently and this information should be reviewed.

General water quality data for several creek basins in and around Ship Creek were collected by USGS and ADEC in the early to mid-1980's (SC-236B, SC-237B, and SC-116B). The water quality data collected in these studies were limited to conventional water quality parameters such as stream flows, nutrient concentrations, specific conductance, turbidity, bacterial indicators, and trace metal concentrations. While these studies may provide some data that could be used to establish regional background conditions in and around Ship Creek, the historical nature of the data and the limited parameters that were analyzed for, restricts the use of this data for site-specific characterization and risk assessments.

ADEC prepared a nonpoint source water quality assessment of Ship Creek in 1989 (SC-219B). This is basically a checklist of potential nonpoint sources in Ship Creek. Because of the historical nature of this information, this report will not be useful for any site-specific characterization and risk assessments. In 1996,

ADEC prepared a report summarizing annual stream flow measurements in the Ship Creek drainage (SC-046B). This report had very limited discussion on the Ship Creek setting, stream flow characteristics, and shallow groundwater information. There is little new information here, and therefore, this report would not be useful for any site-specific characterization and risk assessments.

An ADEC "Request for Quotation" (SC-070B) was reviewed that requested laboratory analyses for eight sediment samples from Ship Creek for a TMDL water body assessment in 1997. No data are presented and this report does not contain information that would be useful for site-specific characterization and risk assessments.

The ADNR (SC-200B) and the UAA (SC-072B) conducted a two-phased water quality assessment of Ship Creek in 1997. The Phase I report (SC-200B) provides a summary of available data (1970s to 1990s) for fecal coliform, biological communities, and petroleum products/organic contaminants in Lower Ship Creek. The report provides a qualitative description of the available data but no analytical results are presented, however, possible sources of water quality impairments were identified. The Phase II Report (SC-072B) has analytical data from 12 sediment and three surface water samples collected from Lower Ship Creek between Elmendorf Hatchery and KAPP Dam in October 1997. In addition, one sediment and one surface water sample were collected above Glenn Highway Bridge as a background sample. Surface water and surface sediment samples were analyzed for VOCs, polycyclic aromatic hydrocarbons (PAHs), PCBs, total metals, fecal coliform, nitrates, and turbidity. Sediment samples were collected from depositional areas, which should exhibit the highest levels of contamination in sediment, if present. Additionally, because of concerns regarding the presence of PCBs in Lower Ship Creek sediments, three of the sediment samples were collected immediately upstream of the KAPP Dam to investigate whether PCB contaminated sediment was being trapped behind the dam. Results indicated elevated levels of lead, copper, and zinc in sediment in the vicinity of the Yakatat Street outfall. No PCBs were detected in any of the sediment or water samples. Low-level PAHs were detected in sediment above the KAPP Dam. No PAHs were detected in any of the surface water samples and the metals that were detected were all below their corresponding Chronic AWQC.

In 1997, ADEC prepared two reports entitled "Watershed Activity Checklist and Reports" (SC-050B and SC-033B) for Ship Creek. These reports provide good historical information on watershed activity in Ship Creek and include a preliminary listing of six data gaps identified for Lower Ship Creek. The reports discuss future work for this watershed assessment, which include sampling to fill in data gaps. The water quality assessment of Ship Creek conducted by the

UAA (SC-072B; discussed earlier in this section) was a follow-up study to the ADEC watershed assessment.

A reconnaissance trip of Ship Creek was conducted in 1997 by federal, state, and municipal workers including the Mayor's Ship Creek Task Force representative (SC-087B). The report is a three-page narrative summary of the reconnaissance trip. General descriptions of habitat and wildlife observed are provided. This information is of limited usefulness for site-specific characterization and risk assessment.

In 1998 (SC-035B) and 2000 (SC-037B), ADEC listed Ship Creek as not supporting its designated use category because of pathogens and oil and grease. These ADEC listings were done under Sections 303(d) and 305(b) of the Clean Water Act (CWA). Sources for these water impairments were identified as Urban Runoff and Storm Runoff, Non-industrial Permitted Discharges and Other Urban Runoff.

The USGS (SC-039B) sampled six streams in Anchorage, in 2001 including Ship Creek, using lipid-containing semi-permeable membrane devices (SPMDs) to mimic bioconcentration of lipophilic contaminants by fish. The SPMDs were analyzed for PAHs and organochlorine pesticides to evaluate the presence and potential toxicological significance of waterborne contaminants to fishery resources in urban streams of Anchorage. There was one sampling location in Ship Creek though the exact location on Ship Creek was not presented. There were no detectable concentrations of priority pollutant PAHs in the Ship Creek sample. Priority pollutant PAHs were only detected in one of the six urban streams (Chester Creek). While not a primary objective of the study, the gas chromatograph with electron capture detection (GC-ECD) chromatograms were screened for the presence of several organochlorine pesticides. Trace levels of several organochlorine pesticides were found in all samples but the authors of the study report that more sophisticated analytical techniques would be required to conduct a definitive assessment of the organochlorine residues. These results indicate that priority pollutant PAHs are not present at levels sufficient to cause bioaccumulation in aquatic organisms in Ship Creek.

Additionally, in 2001, the USGS (SC-041B) prepared a report that compiles available water-temperature data from Cook Inlet and analyzes the data to determine differences between individual streams and rivers. This data would not be useful for any site-specific characterization and risk assessment purposes.

The Anchorage Waterways Council Annual Report for 2000 - 2001 (SC-107B) entitled "State of the Creeks" provides limited water quality data for various watersheds in Anchorage. There was one monitoring station located on Ship

Creek (Ship Creek at Reeve Boulevard) but the water quality data collected were very limited and would not be useful for any site-specific characterization and risk assessment purposes.

3.3.2 General Sediment and Tissue Quality Information

Excerpts from the "National Bioaccumulation Study" (SC-068B and SC-217B) were reviewed that included fish tissue data collected between 1984 and 1987 in various streams and rivers in Alaska. There were five Dolly Varden collected and analyzed from Ship Creek as well as fish tissue samples from other water bodies in the Anchorage area. However, because of the historical nature of this data, it would be of limited usefulness to any site-specific risk assessments due to changes in recommended sampling, analytical, and quality control procedures.

In 1989, Dr. Jennifer Christian (Medical Officer, Department of health and Human Services for Anchorage) wrote an opinion piece (SC-138B) that stated that fish in Ship Creek are safe to eat. The historical nature of the data and article make this information of limited usefulness for any site-specific characterization and risk assessments.

The U.S. Fish and Wildlife Service in 1994 (SC-038B) prepared a report presenting analytical data on sediment, fish tissue, and eggs from four avian species from Chester Creek collected in 1991. Chester Creek sediment samples included grab samples at 10 in-stream and eight impoundment sites, whole fish tissue samples (Rainbow Trout and Dolly Varden), and avian eggs from three impoundments. The report presents analytical data for metals, PAHs, organochlorine pesticides, and PCBs. This data is potentially useful for site-specific characterization and risk assessments to establish regional background levels for these constituents in the media sampled.

CH2M Hill in 1996 (SC-034B) conducted a literature review to produce a "Summary of Information on the Natural Occurrence (Background) of Mercury in Soil and Stream Sediments in Alaska and the Seward Quadrangle" and "Summary of Information on the Natural Occurrence (Background) of Select Metals in Surface Soil and Stream Sediments: Ship Creek and Throughout Alaska." This data is useful for site-specific characterization and risk assessments to establish background concentrations of metals in these environmental media.

The USGS in 2000 (SC-059B) prepared a report entitled "Selected Organic Compounds and Trace Metals in Streambed Sediments and Fish Tissues, Cook Inlet Basin, Alaska." This report presents data from 15 composite sediment samples, 12 fish tissue samples (Slimy Sculpin, whole fish tissue) collected from 15 sites in the Cook Inlet Basin, including the Anchorage area. No samples were

collected in Ship Creek. Samples were analyzed for SVOCs, organochlorines pesticides, and trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc). Arsenic, chromium, copper, and nickel were determined to be present at elevated background concentrations in this region. This data would be useful for establishing regional background levels for these constituents.

The USGS in 2002 (SC-040B) collected 48 streambed sediments from 47 locations in the Cook Inlet Basin for analyses for priority pollutant trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc). The study found elevated background levels of arsenic, chromium, mercury, and nickel in sediments of Cook Inlet. This data would be useful for establishing regional background levels for these constituents.

3.3.3 Water Use or Rights Summaries for Ship Creek

In March 1997 (SC-120B), the U.S. Army Alaska Environmental Resources Department prepared a "Chronology of Water Use and Water Rights on Ship Creek." The information presented in this report could be useful for an HHRA as it summarizes water rights and uses in Ship Creek prior to 1997.

The ADNR prepared a "Ship Creek Water Balance/Water Use Report" (SC-207B) in 1997. The information on the hydrology of Ship Creek and additional information on water uses/water rights, is potentially useful for an HHRA.

The Anchorage Waterways Council in 2000 (SC-020B) held a panel discussion on water rights in the Ship Creek Watershed, and this discussion is summarized in this report. It was concluded that the available water in Ship Creek has been over-allocated and certain reaches of the streambed are dry at times. This information is of limited use for site-specific risk assessments.

ADEC in 2001 (SC-071B) prepared a report entitled "Hydrologic Susceptibility and Vulnerability Assessment for Municipality of Anchorage – Ship Creek Public Drinking Water Source, Anchorage, Alaska." The objective of this report was to evaluate the overall vulnerability of the public drinking water source to contamination. As the drinking water source intake is located a considerable distance upstream of Lower Ship Creek, this report does not provide useful information for site-specific risk assessments.

3.4 Macroinvertebrate Reports

Benthic macroinvertebrates are indicators of water and sediment quality because the communities are relatively sedentary, are composed of a range of species with varying tolerances to pollution, and have important roles in ecosystem

functioning. Stream macroinvertebrates respond to a wide range of stream disturbances, including sedimentation, thermal pollution, organic loading, flow disturbances, and toxic chemicals (Milner and Oswood 1995). As an indicator of ecological risk, however, care and considerable assessment must be used to differentiate changes in species composition caused by contamination from those changes caused by other physical and biological perturbations, particularly in an urbanized or degraded stream.

Ship Creek is a highly urbanized stream, flowing along the northern edge of the City of Anchorage, receiving runoff from the city and adjacent Elmendorf AFB and Fort Richardson. Four dams are also present on the stream, three of which are downstream of Fort Richardson. The lowermost dam is located within tidal portions of the project area and acts to reduce intertidal mixing (Conservation Fund Freshwater Institute 2002a,b). This would likely cause an abrupt change in macroinvertebrate species composition downstream of the dam because of estuarine/marine conditions.

3.4.1 Studies Evaluated

A substantial number of macroinvertebrate studies have been conducted in Ship Creek, most associated with agency efforts to create bioassessment protocols in Alaska. Twelve separate studies were gathered and reviewed that collected macroinvertebrate data in streams draining the Anchorage area, seven of which collected samples in Ship Creek. Macroinvertebrate sampling has been clustered around the Glenn Highway Bridge, Fort Richardson Dam, Walton Road Bridge, Davis Highway Bridge, Elmendorf Dam, Post Road Bridge, and the KAPP Dam (also referred to as Chugach Dam) (see Table 3 for details).

Samples collected near the Glenn Highway Bridge are reference samples upstream of most influences of urban development. The remaining six general sampling locations are within the influence of Fort Richardson, Elmendorf Air Force Base, or the City of Anchorage. No sampling has occurred below the KAPP Dam, the lowermost dam located within the project area.

Several bioassessment techniques have been used in the evaluation of macroinvertebrate data in Ship Creek and other Alaska streams. One emerging bioassessment method that appears to be gaining the most use is the Alaska Stream Condition Index (ASCI) developed by the UAA for the ADEC. ASCI values were developed by normalizing the numerical scores for seven benthic macroinvertebrate metrics into a unit-less number, allowing all metrics to be expressed on the same scale. Assigned scores of 6, 4, 2, and 0 result, where 6 is equivalent to the expectations of unimpaired conditions, and 4, 2, and 0 are

progressive diminishing values. These scores are also assigned the qualitative designations of 'very good', 'good', 'poor', and 'very poor' (Major et al. 2000).

3.4.2 Results

Results of the seven macroinvertebrate studies that collected or reported on samples in Ship Creek varied somewhat, but most found macroinvertebrate populations that indicated a gradual decrease in water quality in the lower reaches of the streams, as presented in Table 4. The studies that collected samples at reference areas upstream of Fort Richardson found macroinvertebrate populations indicating good to very good stream quality using ASCI protocols. Most studies also found good ratings as low as the Elmendorf Hatchery, located just upstream of the project area. Sample stations at Post Road and just above the KAPP Dam, within the project area found both good and poor ratings

It was somewhat surprising to observe good ratings as low as the Elmendorf Hatchery and dam, which is downstream of the two military installations. In a study conducted by Cushing et al. (1994), six stations were sampled between Fort Richardson and Post Road, which would include all influences of Fort Richardson, the Fort Richardson Hatchery, Elmendorf Hatchery and three dams. These six stations found no indications of localized impacts to the macroinvertebrate community within this reach of Ship Creek. The lower-most station, near the outskirts of Anchorage did exhibit some signs of water quality degradation.

It is also surprising that the macroinvertebrate data do not appear sensitive to dams on Ship Creek. Although three of the four are low head dams that do not produce large reservoirs behind them, all four are situated within the first 12 miles of the stream. The reference samples collected near Glenn Highway well upstream of the Anchorage, Elmendorf AFB and Fort Richardson, are below the upper most dam. No samples were collected downstream of the KAPP Dam, situated in tidal areas of the stream within the project area. It is expected that a marked shift in the macroinvertebrate community would be found downstream of the KAPP Dam caused by the intrusion of marine waters during higher tidal periods.

3.5 Fisheries and Habitat Reports

Numerous documents produced by the ADF&G and other agencies have been reviewed; most documented the nature and degree of fisheries activities on Ship Creek (see Appendix B, Table B-2). These documents were valuable in providing

background information and a summary of existing habitat conditions in Ship Creek.

The principal habitat information presented in documents regarded the dams on Ship Creek. Four dams are located on Ship Creek at approximate river miles 0.7, 2.3, 9.0, and 12.0. Consistent fish passage occurs only at the first dam, limiting anadromous access to about the lower two miles of stream. These four dams have impacted Ship Creek by:

- Restricting and blocking fish passage;
- Reducing the intertidal mixing area and the size of the estuary zone near the mouth of Ship Creek; and
- Producing more pool habitats that are depositional and limit the transport of sands and gravels to the mouth of Ship Creek (Conservation Fund Freshwater Institute 2002a, b)
- Reducing flow to near zero during late-winter in upper reaches of the stream between Glenn Highway and Elmendorf AFB (Anchorage Aquatic Resources Commission 1994).

The dams were built during the 1940s, eliminating all but remnant natural anadromous salmonid populations in Ship Creek.

The Elmendorf and Fort Richardson hatcheries are situated near the middle two dams and are used to seed chinook and coho salmon runs on several central Alaska streams including Ship Creek. These hatcheries are responsible for over an order of magnitude increase in recreational fishing effort in Ship Creek, increasing from 1,844 angler days in 1983 to nearly 46,955 angler days in 2002. This effort is second to the Kenai River basin in Alaska (Anchorage Aquatic Resources Commission 1994; Alaska Department of Fish and Game ([ADFG unpublished data])). The great majority of this fishing effort occurs on the lower reaches of Ship Creek near the project area, downstream of the KAPP Dam.

4.0 DATA GAP ANALYSIS

The results of the review of the literature and reports discussed above were critically evaluated to identify any potential data gaps that would need to be addressed to complete the RI/FS characterization and risk assessment for the portions of Ship Creek that are within the ARRC Anchorage Terminal Reserve.

4.1 Standard Steel and Metals Salvage Yard Site

Hart Crowser evaluated four EPA TAT or ERT reports for Ship Creek. These reports do not have useable figures showing sample locations, analytical laboratory data, nor QA/QC information. Such information will be useful for Ship Creek characterization and risk assessments..

The 1994 Remedial Action Objectives report (SC-221B) does not have the complete ecological risk assessment for the Standard Steel site. The ecological risk assessment would be very useful for characterization and risk assessment of Ship Creek.

4.2 Elmendorf Air Force Base

Two years of monthly surface water sampling results are presented in eight quarterly reports from April 1995 to November 1996 (SC-085B, SC-121 through SC-129B, and SC-151B through SC-155B; note that these reports include partial and complete duplicate reports). These reports do not include analytical laboratory data and QA/QC results summaries for first through third quarters. It is also not clear whether the surface water data were compared against chronic AWQC to evaluate potential ecological impacts. This information (analytical laboratory data and QA/QC results) would be useful for a future characterization and risk assessment of Ship Creek.

4.2.1 Operable Units 1 through 6

The Cumulative Risk Evaluation for Operable Units 1 – 6 Work Plan (SC-140B) did not include the following reports - an ecological survey prepared by Battelle Memorial Institute (1992), a NOAA Natural Resource Assessment, and the Ship Creek benthic sampling conducted by Battelle Memorial Institute in 1994. In addition, we were unable to review the complete ecological risk assessments for OU-1, OU-5, and OU-6. These reports, including the ecological risk assessments, would be useful for future characterization and risk assessment of Ship Creek.

4.2.2 Operable Unit 5

Hart Crowser located four rounds of groundwater and surface water monitoring data from OU-5 (SC-142B through SC-145B). It is not clear if the 1998, Round 2: 1999, and the Round 1: 2000 groundwater samplings were completed and whether these results are available. The analytical laboratory data and QA/QC review of data were not included in the reports reviewed by Hart Crowser. It is not known whether the surface water data were compared against chronic

AWQC to evaluate potential ecological impacts. This information would be useful for a future characterization and risk assessment of Ship Creek.

4.3 Knik Arm Power Plant

The May 2000 Site Investigation Report, KAPP Diversion Pond Sediment Sampling and Analysis (SC-239B) did not state whether the diversion pond sediment was dredged following this report. We should follow up with KAPP to determine whether the dredging was completed. This information would be useful for future characterization and risk assessment of Ship Creek.

Historical sediment sampling in Ship Creek, both below the KAPP Dam at the cooling pond outfall and in the KAPP cooling pond (hydraulically connected to Ship Creek), has shown low level detections of VOCs, SVOCs, PCBs, and mercury. These detections were localized to the cooling pond and below the dam (but not above it). The low levels suggest the detections are not an imminent ecological issue, but may represent localized impacts to be further investigated unless it is determined to be the result of permitted storm water discharges.

4.4 Alaska Railroad Yard

The 1986 Site Inspection report (SC-002B) did not include the analytical laboratory reports, which would be useful for future characterization and risk assessment of Ship Creek. The analytical laboratory reports, along with the QA/QC validation report that was part of the SI report, will allow an evaluation of data quality. As discussed in Section 4.3, it needs to be determined whether the detections adjacent to KAPP and the Alaska Railroad Yard that are discussed in this report are the result of permitted storm water discharges.

4.5 Historical Risk Assessment Reports from Adjacent CERCLA Sites

In order to evaluate methodologies and screening levels used for human health and ecological risk assessments conducted in the Ship Creek watershed, it would be useful to obtain HHRA, ERA, or other reports referenced or cited in the literature reviewed. Two of the CERCLA sites reviewed (Elmendorf AFB OU-1, OU-5, OU-6; Fort Richardson) are upgradient of ARRC and its leased properties on Ship Creek and therefore are a potential source of contaminant that may be found at the ARRC Anchorage Terminal Reserve. Releases from these upgradient sites also could pose a potential threat at the ARRC site. The third CERCLA site (Standard Steel) is on ARRC-leased property.

For the three CERCLA sites reviewed above, baseline HHRAs and ERAs were conducted based on the RI/FS and used to select remedial actions. Exposure

scenarios and parameters, chemicals driving the risk, reference doses and cancer slope factors, and assessment/measurement endpoints are relevant pieces of information contained in the referenced risk assessments. Review of the following HHRA and ERA reports would provide a relevant framework around which to develop a Ship Creek Characterization and risk assessment for ARRC:

- Elmendorf AFB OU-1 Baseline Human Health and Ecological Risk Assessment;
- Elmendorf AFB OU-5 Human Health and Environmental Risk Assessment;
- Elmendorf AFB OU-6 Human Health and Ecological Risk Assessment;
- Risk Assessment Report, OU-D, Fort Richardson (ENSR, September 1997);
- Post Wide Risk Assessment, Fort Richardson, Alaska (April 1998); and
- Baseline Human Health and Ecological Risk Assessment, Standard Steel and Metals Salvage Yard (EPA).

Though we reviewed the first five-year review for Elmendorf AFB, the latest five-year review document (expected August 2003) would also be important to determine whether contaminated groundwater had recently migrated offsite and or was posing a potential threat to Ship Creek.

Our review of site investigation reports for contaminated sites in the Ship Creek watershed provided limited information on actual sampling locations and density (sampling plans, types, depths, etc.). This information is significant to delineation of potential contamination areas in Ship Creek surface water and sediment within the ARRC Anchorage Terminal Reserve. In addition to sampling plans, it would be prudent to review associated QA/QC data provided by the analytical laboratories conducting sample analyses. QA/QC data is typically appended to RI/FS and other investigation reports. Performing a QA/QC review of sample data would provide ARRC with an estimate of reliability of the lab analysis results.

4.6 *Macroinvertebrate Data and Ecological Risk Assessment*

Currently, there is insufficient macroinvertebrate data to conduct an ecological risk assessment of the Alaska Railroad site. Although macroinvertebrate metrics indicate poor water quality at the Post Road Bridge and near the KAPP Dam, which are both adjacent to the project area, the cause of the poor rating cannot be ascertained by macroinvertebrate data alone. The need for additional macroinvertebrate data will be determined following preliminary ecological risk assessment tasks.

4.7 Fisheries and Habitat Data Gaps

A principal data gap regarding fisheries and habitats within Ship Creek is a lack of detailed information on habitat modifications in the stream (other than the dams). Urban and military development since the mid-20th century has produced areas of stream channelization, bank clearing, bank stabilization, and filling or draining wetlands habitats.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the literature search and reviews of existing information relevant to completing probable AOC requirements for characterizing and conducting site-specific risk assessment with respect to Ship Creek, the following general conclusions emerge:

- As part of this task under the Statement of Work for the Administrative Order of Consent for the site, five surface water and sediment samples were collected in Ship Creek in Spring 2004. No organic contaminants (VOC, SVOC, or PCB) were detected in any sample. The final Ship Creek Surface Water and Sediment Assessment Report was submitted to ARRC dated May 2004. In addition, as part of this project a stream reconnaissance survey within the active stream channel was conducted to inventory and map (using Global Positioning System coordinates) open pipes, ditches, culverts, and other probable discharge points exposed along the banks.
- There is no evidence of extensive or severe contamination of Ship Creek media. While this does not preclude localized or ephemeral contamination, the apparent absence of generalized contamination or obvious sources suggests no imminent risk to human health or the environment currently exists.
- There is a fair amount of data collected by a variety of agencies and stakeholders over the last 20 years. While not very extensive, there is some data available for surface water and sediment quality, on bioaccumulation potential, on tissue concentrations, and on aquatic community structure and abundance available. Collectively, these data do not point to any specific concerns. However, it was often difficult to evaluate exact methods, location and quality for much of this data, and their adequacy for risk assessment are not yet fully determined.
- There is some evidence for localized and low level contamination resulting from known source areas, e.g. KAPP, Arctic Cooperage, Alaska Railroad

Yard, the military installations, and Standard Steel. As for much other data, full data adequacy could not be evaluated, as original reports appear to be still missing. Further review may indicate a localized problem to be further investigated as part of the RI, or may indicate the data to be of no further concern (e.g. lower than background or conservative toxicity thresholds, due to non-site related sources, or due to sources such as permitted wastewater discharges not under the purview of the RI/FS).

Specific recommendations emerging from this review are:

- Locate and review the full risk assessment documents and sample QA documentation for Elmendorf AFB, Fort Richardson, and Standard Steel CERCLA sites.
- Determine if the KAPP diversion pond sediment has been dredged (per 2000 SI Report).
- Conduct a preliminary habitat assessment of Ship Creek, consisting of review of fisheries data and field documentation of key habitat parameters: riffle/pool ratios, embeddedness, riparian vegetation, woody debris, off-channel habitat, etc. This information can be collected as part of a wider site-wide habitat survey for the RI/FS.
- Identification of type and nature of source areas to the creek, particularly permitted point sources, and their relation to the reported localized contamination.

5.1 2004 Proposed Field Studies

Section 2.2.2.1 of the June 29, 2004 Statement of Work for the Administrative Order of Consent requires this literature survey report to (a) summarize existing analytical data regarding Ship Creek, (b) identify any significant data gaps regarding potential contamination and biological impacts at Ship Creek that can be addressed by field sampling and assessment in 2004, and (c) include a proposal for such field studies, including potential sediment and detritus sampling, bioassays, benthic macroinvertebrate work and/or other field work. The preceding sections of this report summarize the existing information and identify apparent data gaps. The following presents ARRC's proposal for additional field studies that ARRC believes could be conducted during the 2004 field season to fill some of these data gaps. Following EPA's approval of this proposed field work, ARRC will prepare an Interim Action work plan for this work, submit that to EPA for review and approval as specified in the AOC, and commence this field work upon receiving work plan approval.

ARRC's proposes the following additional field studies under SOW Section 2.2.2.1:

- Conduct a preliminary habitat assessment of Ship Creek. This task is proposed for late August or early September prior to the onset of freezing conditions.. The preliminary habitat assessment will be conducted as part of a larger preliminary habitat assessment to be conducted site-wide (i.e. including upland areas). The preliminary habitat assessment will be conducted by a trained biologist and will consist of:
- Survey of Ship Creek from 0.5 mile upstream of site boundary to the intertidal mixing area at the mouth. The survey will identify basic channel characteristics, streambed conditions, frequency of riffles and pools, bank stability, presence of backwaters, wetlands or other valuable sub-habitats, as well as qualitative riparian conditions.
- In addition the survey will identify obvious anthropogenic influence (debris, garbage, inflows of water, etc.) that may affect aquatic life conditions in the creek

These field studies are suitable initial data gathering tasks aimed at developing an understanding of the site conceptual model. The site conceptual model will then guide subsequent data need identification for the overall site RI/FS.

6.0 REFERENCES

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Conservation Freshwater Conservation Fund 2002a. Fisheries Bioengineering Services for Hatchery Evaluation and Water Use/Water Treatment Recommendations. Elmendorf State Fish Hatchery, Alaska Department of Fish and Game, Sport Fish Division. Technical Paper Prepared for The State Of Alaska.

Conservation Freshwater Conservation Fund 2002b. Fisheries Bioengineering Services for Hatchery Evaluation and Water Use/Water Treatment Recommendations. Fort Richardson Fish Hatchery, Alaska Department of Fish and Game, Sport Fish Division. Technical Paper Prepared for The State Of Alaska.

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www.anchoragewaterwayscouncil.org/docs/shipdams/scuadfg.htm.

DOCUMENT- SHIP CREEK INFORMATION. Alaska Fish And Game For The Anchorage Waterways Council. Reviewed May 2004.



**Table 1 - Primary Interview Contact List
Ship Creek Literature Review**

Name	Organization	Position	Contact Information
Dan Bosch	ADF&G	Biologist	907-267-2415
Meagan Boltwood	AWC	Scientist	907-277-9287
Tim Brabets	USGS	Geologist	907-786-7100
Jim Frechione	ADEC	Contaminated Sites	907-269-7558
Louis Howard	ADEC	Contaminated Sites	907-269-7552
Darrel Keifer	ADF&G	Elmendorf Hatchery	907-274-0065
Mary Mauer	ADNR	Water Quality Scientist	907-269-8640
Leanne Monk	UAA	Geology	907-786-6895
Mark Oswood	UAF	Limnologist	?907-474-7211?
Kent Patrick Riley	ADEC	Water Quality	907-269-7554
Stewart Seaberg	ADNR	Permitting	907-269-6987
Scott Weaton	MOA	Env. Engr.	907-343-4200
Matt Whitman	BLM		907-271-5960

**Table 2 - Secondary Interview Contact List
Ship Creek Literature Review**

Name	Organization	Position	Contact Information
William Abadie	Corp of Engineers	Engineer	907-753-5608
Steve Albert	ADF&G	Habitat Biologist	907-267-2100
Dan Bogen	UAA		907-257-2744
Dianne Brake	ADEC	Wastewater	907-269-7517
Laura Eldred	ADEC	Environmental Specialist	907-269-7517
Gary Fink	EAFB	CERCLA Program	907-552-7229
Steve Frenzel	USGS	Geologist	907-786-7107
Mark Goodwin	US Air Force, 3 rd CES	RCRA Manager	907-552-4157
William Gossweiler	DPW Fort Richardson	Remedial Projects	907-384-3017
Robert Graves	POA	Operations Manager	907-343-6200
Kathleen Hertel	Museum of History and Art		907-343-6189
Mark Inghram	ADNR	Director	907-269-8600
Holly Kent	Anchorage Waterways Council	Director	907-277-9287
Elaine Major	UAA		907-257-2731
Marc Marlow	Marlow Power and Steam	Owner	907-258-9662
Sue Mauger	Cook Inlet Keepers	Stream Ecologist	907-235-4068
Matt Miller	ADF&G	Biologist	907-267-2100
Matt Mobley	National Archives		907-261-7820
Robert Ourso	USGS	Geologist	907-786-7148
Ann Rappaport	USF&WS	Field Supervisor	907-271-2888
Tim Scott	ADEC	Environmental Specialist	907-269-7554
Jon Scudder	US Air Force	Public Affairs	907-552-8970
Mark Spano	AWWU	Water Quality	907-751-7339
Andrea Tesch	ADF&G	Fort Richardson Hatchery Manager	
Joanne Walls	USACE-AK	Environmental Specialist	907-753-5608
Mike Walsh	USACE-AK Cold Regions Research and Engineering Lab.	Environmental Specialist	mwalsh@crrel.usace.army.mil

Table 3 - Ship Creek Documented Macroinvertebrate Sampling Locations

Station	Approximate River Mile	Potential Sources
Glenn Highway	10	Upstream Reference
Fort Richardson Dam	9	Fort Richardson, Fort Richardson Hatchery
Walton Road Bridge	5.5	Elmendorf AFB CERCLA Operable Unit
Davis Highway Bridge	4	Elmendorf AFB CERCLA Operable Unit
Elmendorf Dam	2.3	Elmendorf AFB, Elmendorf Hatchery
Post Road Bridge	1.2	City of Anchorage, Alaska Railroad
Chugach Dam	0.7	City of Anchorage, Alaska Railroad

Table 4 - Ship Creek Documented Macroinvertebrate Analytical Results

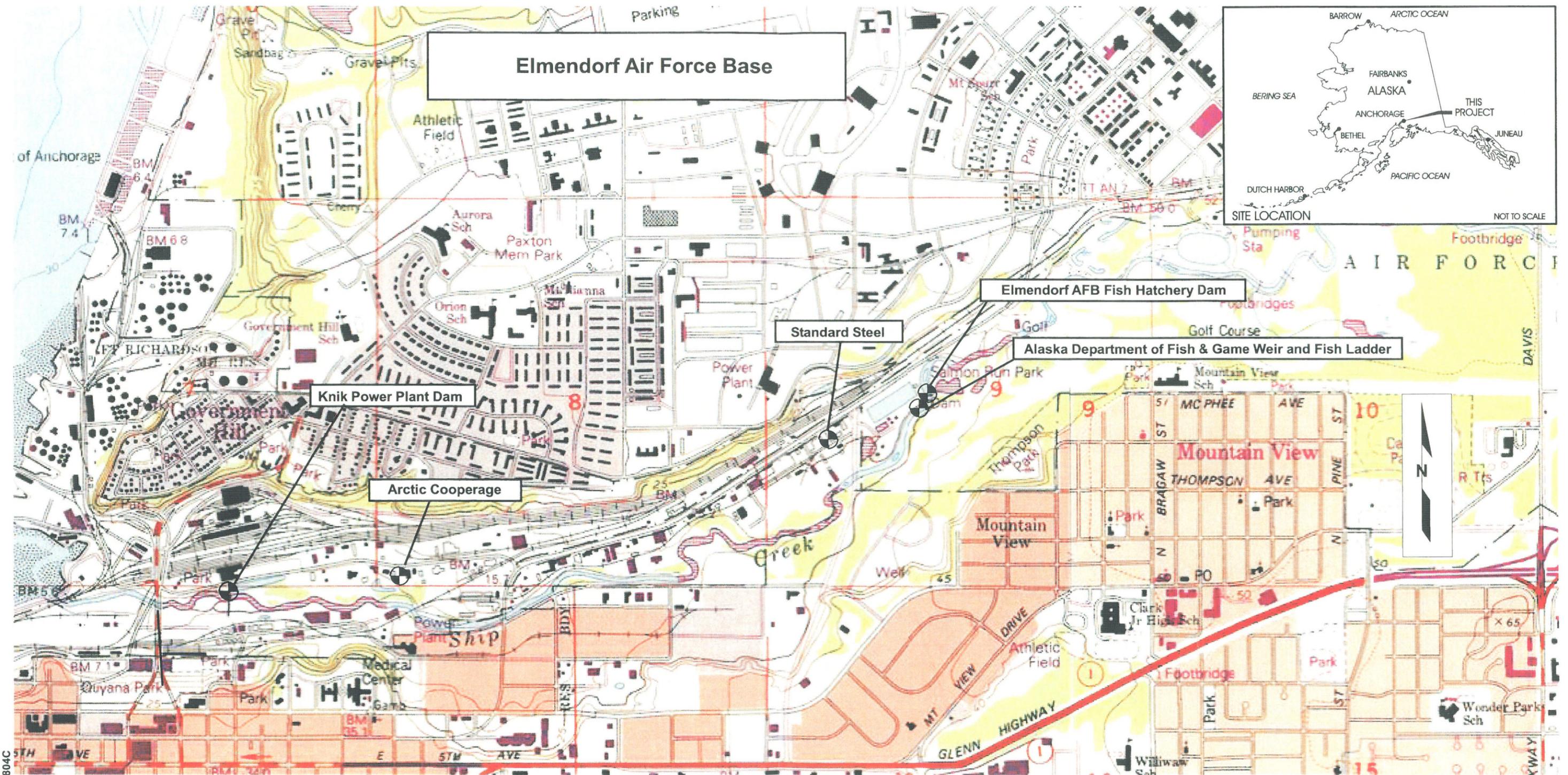
Study	Locations Sampled	ASCI Rating
Major et al. 2001	Post Road	Poor
Milner and Oswood	Glenn Highway	Good
	Elmendorf Hatchery	Good
Love 1999	Glenn Highway	Good-Very Good
	Elmendorf Hatchery	Good
	Post Road	Good
	Chugach Dam	Good-Poor
Milner and Oswood 1989	Did not differentiate stations	--
Cushing et al. 1994	Fort Richardson Hatchery	No localized impacts. Very little difference between station results. ASCI ratings not produced.
	Walton Road	
	Davis Highway (2 stations)	
	Elmendorf Hatchery	
	Post Road	
CH2M Hill	Post Road	Poor
USGS 2001	Glenn Highway	Station data not analyzed separately
	Elmendorf Hatchery	

Notes:

ASCI - Alaska Stream Condition Index



Ship Creek Feature Locations and Vicinity Map
Lower Ship Creek Basin
Anchorage, Alaska



804C Source: Base map prepared with TOPO!

⊙--Outfall



**APPENDIX A
ACRONYM LIST**

APPENDIX A ACRONYM LIST

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AFB	Air Force Base
AOC	Administrative Order on Consent
ARLIS	Alaska Resource Library and Information Services
ARRC	Alaska Railroad Corporation
ASCI	Alaska Stream Condition Index
AWQC	Ambient Water Quality Criteria
AWWU	Anchorage Water and Wastewater Utility
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	Contaminant of Concern
CWA	Clean Water Act
DRO	diesel-range organics
EPA	US Environmental Protection Agency
ERA	ecological risk assessment
ERT	Emergency Response Team
GC-ECD	gas chromatograph with electron capture detection
HHRA	Human Health Risk Assessment
ICRC	Integrated Concepts and Research Corporation
KAPP	Knik Arm Power Plant
LC ₅₀	Concentration lethal to 50 percent of the sample population
MCL	Maximum Contaminant Level
MOA	Municipality of Anchorage
NFA	No Further Action
NOAA	National Oceanic Atmospheric Administration
NFRAP	No Further Remedial Action Planned
NPL	National Priorities List
OU	Operable Unit
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROW	Right of Way
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
SI	Site Investigation
SPMDS	semi-permeable membrane devices
SVOC	semivolatile organic compound
TAT	Technical Assistance Team
TCE	Trichloroethene

TPH	Total Petroleum Hydrocarbons
UAA	University of Alaska, Anchorage
UAF	University of Alaska, Fairbanks
USACE-AK	U.S. Army Corps of Engineers – Alaska District
USF&WS	U.S. Fish and Wildlife Service
USGS	US Geological Survey
VOC	volatile organic compound



APPENDIX B
ANNOTATED BIBLIOGRAPHIES

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Monitoring Well and Oil Collection Gallery; Ship Creek Railroad Yard, Anchorage, AK. Shannon & Wilson, 1989.	SC-001B	TTF	5/12/2004	Soil borings from monitoring well installation at north side of Ship Creek.	Follow up work to 1986 Ship Creek Oil Seep Investigation; Shannon and Wilson. Described installation of monitoring wells and an oil collection gallery (July, 1989) by Monitoring Well B-9. Includes groundwater quality data from 1989.
Site Inspection Report, Alaska Railroad - Anchorage, AK; EPA Region 10, Ecology & Environment, 1986.	SC-002B	TTF	5/7/2004	1986 Preliminary Site Inspection Report for railroad yard proper. Stormwater maps from 1986. Environmental setting and hydrogeology summary. Facility processes and waste disposal practice summary. Seven sediment and five water samples collected.	Old data, circa 1985. Surficial sediment metal concentrations similar to background levels. Surface water samples collected adjacent to storm drain outfalls contained elevated metals. Elevated metals found in on-site groundwater as well as gasoline product. Very few organic compounds detected in sediment samples.
Environmental Assessment of the Knik Arm Power Plant (KAPP) and Associated Properties; Environmental Services, Ltd. 1990.	SC-003B	PTP	5/10/2004	Summary of site history and potential contaminants (petroleum hydrocarbons, trichloroethylene [TCE], phenol, methylene chloride, chlorinated solvents, polychlorinated biphenyls [PCBs], Pb and heavy metals). Potential off-site migration of contaminants from discharges into Ship Creek (floor/roof drain systems) from original diesel plant. Sediment contamination possible from plant discharge into KAPP cooling pond, which is connected to Ship Creek. All non-sewage wastes from the plant drain systems were discharged directly into Ship Creek.	Ship Creek was diverted in the early 1950s for construction of the power plant and cooling pond. Report not particularly useful for risk assessment purposes.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Arctic Cooperage Phase II Site Assessment; ARRC, ENSR Corporation. 1996.	SC-004B	PTP	5/10/2004	Data from 5-7/1996. Collected 13 surface soil samples, 12 soil borings, 3 groundwater samples, 4 stream sediment samples from drainage ditch south of site, 2 surface water samples from drainage ditch. Drainage ditch leads to Ship Creek. Analyses for diesel and gasoline range organics (DRO/GRO), volatile organic compounds (VOCs), PCBs, metals, semi-volatile organic compounds (SVOCs), dioxins.	Detected diesel-range organics, metals, and dioxins in sediment samples at background concentrations or below risk-based concentrations. Data summarized in tables.
Ship Creek Targeted Brownfields Assessment Report; EPA Region 10 START, Ecology & Environment, 1999.	SC-005B	PTP	5/11/2004	history, contaminants, and previous site investigations. Sampled site soil, sediment, surface water, groundwater, and sludge; also collected background samples. Analyses for gasoline and diesel range organics, benzene, toluene, ethylbenzene, xylene (BTEX), residual range organics, metals, pesticide/ PCBs, VOCs, SVOCs, dioxins/furans.	5 collocated surface water/sediment samples collected from cooling pond. Detected VOCs, SVOCs, pesticides, PCBs, DRO, metals. 5 collocated surface water/ sediment samples collected from Ship Creek above and below KAPP dam. Detected VOCs, SVOCs, PCBs, metals, DRO, RRO but all below National Recommended Ambient Water Quality Criteria.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
EPA Superfund Record Of Decision (ROD): Elmendorf Air Force Base, Operable Unit (OU) 1, Anchorage, AK, 1994.	SC-008B	PTP	5/6/2004	Summary of investigation & remedial action at OU1 (5 waste disposal areas/landfills from 1950s-1983). Collected soil, sediment, groundwater, surface water data from late 1980s to early 1990s. Selected limited action alternative with long-term monitoring of groundwater.	5 groundwater chemicals of potential concern (COPCs): As, 1,2-dibromoethane (EDB), PCBs, Pb, Mn. Mn concentrations consistent with background levels and do not appear to be migrating. Ecological risk assessment for Ship Creek to be conducted under OU6 studies.
EPA Superfund ROD: Elmendorf Air Force Base, OU5, Anchorage, AK, 1995.	SC-009B	PTP	5/6/2004	Summary of investigation & remedial action at OU5 (light industrial, fuel storage and refueling). Collected soil, soil gas, groundwater, sediment, surface water data from mid-1980s to early 1990s. Selected natural attenuation with institutional controls as alternative for remediation.	RI sampling indicated contamination was not affecting Ship Creek. COPCs included fuel products (benzene), VOCs, inorganics (metals), SVOCs.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
<p>EPA Superfund ROD: Elmendorf Air Force Base, OU6, Anchorage, AK, 1997.</p>	<p>SC-012B</p>	<p>PTP</p>	<p>5/7/2004</p>	<p>Summary of investigation & remediation. Site sources include three landfills, two sludge disposal pits, surface disposal area around rock testing lab. Soil contamination from fueling activities, Pb from landfill debris. Groundwater contamination from fuel lines, sludge weathering pads, solvent use. Also removed pesticide-contaminated soils from bunker in NE corner of base. Selected institutional controls on land/water use, product recovery, landfill debris removal, groundwater extraction, shallow soil excavation, deep soil air stripping, soil cover as remedial actions.</p>	<p>COPCs mentioned included BTEX, chlorinated solvents, SVOCs, and metals for WP14. Eco risk assessment for WP14 indicated no significant impacts to plants or animals from high selenium concentration in soils. Report missing other source area sections (incomplete ROD).</p>
<p>EPA Superfund Explanation of Significant Differences (ESD): Standard Steel & Metal Salvage Yard (USDOT), OU01, Anchorage, AK; EPA Region 10, 1999.</p>	<p>SC-014B</p>	<p>PTP</p>	<p>5/7/2004</p>	<p>Explains why the need for 6-foot woven mesh fence, wall, or similar was waived from site. Summarized site history, contaminant levels, cleanup levels, and remedial activities. The ESD explains that geomembrane cover system on top of TSCA landfill satisfies the intent of the fence, exceeding ROD design requirements.</p>	<p>Not particularly useful for risk-based assessment.</p>

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Memorandum: Standard Steel Five Year Review Report; EPA Region 10, 2003.	SC-015B	NFM	5/5/2004	Report contains a brief summary of site RI/FS activities, the remedial actions implemented at the site, and the ongoing operations and maintenance activities. The five-year review evaluates the protectiveness of the remedy. Post-ROD groundwater data are summarized.	These groundwater data not useful for a Ship Creek risk-based assessment.
EPA Superfund ROD: Standard Steel and Metal Salvage Yard, Anchorage, AK. July, 1996.	SC-016B	PTP	5/6/2004	Summary of investigation & remedial action at site used for construction equipment storage, metal recycling, and salvage of batteries/lead/transformers from 1950-1986. Collected soil, groundwater, surface water, sediment, and air samples from mid-1980s to early 1990s. Selected soil excavation and stabilization/solidification as remedial alternative.	COPCs (primarily in soils) were PCBs and Pb. Other COPCs were inorganics (metals), dioxins/furans, VOCs, SVOCs. RI data showed no significant impacts to Ship Creek sediment adjacent to site, up to 500 feet downstream. Ship Creek not significantly impacted by site contamination.
EPA Superfund ROD: Fort Richardson (US Army), Anchorage, AK, 2000.	SC-017B	PTP	5/7/2004	Ship Creek data from 11/1994. Summary of site history, contaminants, and remedial activities at Operable Unit D. OU-D consisted of 12 sites with different activities, including stormwater outfall to Ship Creek. Sampled soil, sediment, and groundwater. Analyses for BTEX, chlorinated solvents, metals, chlorinated pesticides/PCBs, PAHs, diesel & gasoline range organics.	Conducted Post Wide Ecological Risk Assessment (see Administrative Record). Results found no risk to aquatic or terrestrial wildlife. Sampled Ship Creek sediments and soil from channel sidewalls. Detected background metals and low level petroleum. Quantitative data summarized in table for Ship Creek stormwater outfall soil samples. Appendix C provides average background metal concentrations on Fort Richardson.
Discussion on Water Rights in the Ship Creek Watershed; Anchorage Waterways Council, 2000.	SC-020B	TTF	5/12/2004	Limited information for our purposes. Some background information on history of Ship Creek.	Basically a summary of water rights issues on Ship Creek.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Phase I, Storm Sewer System Evaluation, Anchorage Railroad Yard; ARRC, CRW Engineering Group, 1994.	SC-023B	TTF	5/12/2004	Storm Sewer System Evaluation as of 1994. Good map of 1994 storm sewer system and evaluation of conditions that may contribute contamination to Ship Creek.	Presents list of 7 recommendations to improve storm sewer system. Need to determine which ones have been implemented.
Lateral Movement of Contaminated Ground Water From Merrill Field Landfill, Anchorage, Alaska; USGS/MOA, 1990.	SC-029B	PTP	5/12/2004	Investigation of landfill leachate and impacts on groundwater and Chester Creek to south. Groundwater flow generally to southwest. Concentration of contaminants in groundwater generally below EPA drinking water standards. Minor amounts of leachate may be entering Chester Creek. COPCs include BTEX, VOCs, metals.	No mention of impacts from landfill on Ship Creek.
Transmittal of Site Investigation Sampling and Analysis Plan. KAPP Repowering Project, Marlow Power and Steam, Inc. Steigers Corporation. 2000.	SC-030B	PTP	5/11/2004	Sampling and Analysis Plan for proposed dredging of sediment upstream of KAPP diversion dam. 5 hollow stem auger soil/subsurface soil samples collected at 4 sites. Concern over dredging stirring up potentially contaminated sediment accumulated behind dam. Analyses for VOCs, SVOCs, PCBs, pesticides, metals, DRO/RRO, TCLP (toxicity characteristic leaching procedure) metals.	Proposed sampling in 4/2000. Data results more useful and presented in SC-239B.
Ship Creek Brownfields Site Assessment, Final Sampling and Quality Assurance Plan; EPA Region X START, Ecology & Environment, 1998.	SC-032B	PTP	5/10/2004	Duplicate of SC-075B.	Duplicate of SC-075B.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Alaska's Watershed Framework, Watershed Activity Checklist & Report, Ship Creek, Anchorage, ADEC, March to September 1997.	SC-033B	TTF	5/13/2004	Good historical information on watershed activity in Ship Creek and includes preliminary listing of data gaps in Lower Ship Creek. Lists stakeholders involved in Ship Creek Enhancement Task Force.	The 6 data gaps identified should be evaluated further. The report discusses future work for this watershed assessment which includes sampling to fill in data gaps. We should determine if this happened and get the latest watershed reports.
Summary of Information on the Natural Occurrence of Mercury in Soil and Stream Sediments in Alaska and the Seward Quadrangle, CH2MHill 1996.	SC-034B	PTP	5/4/2004	Summarizes naturally occurring Hg data (1970-1990) from stream sediments throughout AK. Summarizes naturally occurring metals data (1976-1996) from stream sediments in Ship Creek and throughout AK.	Small sample sizes for Ship Creek metals data. Other data may be useful for regional background levels of metals in stream sediments.
Alaska's 1998 Final Section 303(d) List, Water Quality-Limited Waterbodies; ADEC, 1999.	SC-035B	TTF	5/12/2004	Limited. Presents the reason for the Tier I Section 303 (d) listing for water quality limited waterbodies in Alaska as of 1998.	Ship Creek is listed due to fecal coliform and petroleum products.
Watershed Assessment Tracking & Environmental Results System, 305(b) Lists/Assessment Unit Information; EPA, 2000.	SC-037B	TTF	5/13/2004	Limited.	State Water Use Designation Attainment Status as of 2000 for Ship Creek. Water use impairment due to pathogens and oil and grease over 100% of lower 11 miles. Sources listed as Urban Runoff/Storm Water, Non-industrial permitted, and other urban runoff.
Urban Contaminants Project: Data for Sediment, Fish, and Eggs Collected from Chester Creek, Anchorage, AK. USFW, 1994.	SC-038B	PTP	5/4/2004	Data from 7-10/1991. Chester Creek sampled for sediment (grabs at 10 in-stream, 8 impoundment sites), fish (whole using gill nets), avian eggs (3 impoundments). Data for metals, PAHs, pesticides, PCBs.	Small sample size not statistically useful, provided qualitative trends. Potential use as regional background levels.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Evaluation of Contaminant Exposure and the Potential Impacts on Aquatic Habitat Quality in the Anchorage Area of the Cook Inlet Basin; USGS CERC, USGS, 2001.	SC-039B	PTP	5/6/2004	Data from 5-7/2000. Sampled 6 streams for 56 days in Anchorage, including Ship Creek, using lipid-containing semi-permeable membrane devices (SPMDs) to mimic bioconcentration of lipophilic contaminants by fish. Analyses for PAHs and organochlorine pesticides.	No detections of PAHs in Ship Creek. Numerous pesticides detected in Ship Creek, relatively high concentrations of DDT and analogs. Potentially useful as regional background data.
Priority-Pollutant Trace Elements in Streambed sediments of the Cook Inlet Basin, AK, 1998-2000. USGS, 2002.	SC-040B	PTP	5/5/2004	Data from 1998-2000. 48 sediment samples collected from 47 sites in Cook Inlet Basin, AK (including Ship Creek). Analyses for metals As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn.	Results for Ship Creek consistent with other sites around Municipality of Anchorage. Potentially useful as regional background levels for metals in sediments.
Water Temperature of Streams in the Cook Inlet Basin, Alaska, and Implications of Climate Change; USGS, 2001.	SC-041B	TTF	5/12/2004	None.	Regional water temperature in Cook Inlet Basin.
The Relationship Between Surface Water and Ground Water in Ship Creek Near Anchorage, Alaska; USGS, 1970.	SC-045B	KAK	4/29/2004	Seepage measurements (at two gage stations) recorded in Ship Creek from 1959 to 1969. Limited discussion of recharge to underlying aquifer and groundwater return flow.	Information on groundwater surface water relationships in lower Ship Creek.
Ship Creek, Annual Flow Frequency Analysis; USGS, 1996.	SC-046B	TTF	5/12/2004	Very limited summary of Ship Creek setting, streamflow, and shallow groundwater.	Nothing new here.
Framework, Watershed Activity Checklist & Report, Ship Creek, Anchorage; ADEC, Historical to March 1997.	SC-050B	TTF	5/13/2004	Same information as in SC-033B.	Same information as in SC-033B.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
A Petition to Reclassify Portions of Ship, Chester, Campbell, and Fish Creeks. Municipality of Anchorage. 1980.	SC-051B	TTF	5/12/2004	No relevant information for ecological risk assessment. We should check to see whether this reclassification occurred or not. Data from 1998. 15 composite sediment samples, 12 fish tissue samples (slimy sculpin, whole) collected from 15 sites in Cook Inlet Basin, including Anchorage, AK area. No samples collected in Ship Creek. Analyses for SVOCs, organochlorines, trace metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn).	Proposal to reclassify Ship Creek to exclude the following protected uses: Drinking water supply, culinary and food processing water supply; Water supply for agriculture and aquaculture, and water contact recreation.
Selected Organic Compounds and Trace Elements in Streambed Sediments and Fish Tissues, Cook Inlet, AK. USGS, 2000.	SC-059B	PTP	5/5/2004	1984 and 1987 fish tissue data (whole fish & filets) from Ship Creek and other AK waterbodies. Analyses for dioxins, furans, halogenated organic compounds, pesticides/herbicides, PCBs, Hg.	Organochlorines at levels not considered to be toxic. SVOCs rarely detected above MRLs of 50 ug/kg. As, Cr, Cu, Ni at naturally large concentrations in Cook Inlet Basin. Potentially useful for regional background levels, especially Anchorage area streams.
National Bioaccumulation Study Summaries; EPA/Duluth or Wright State University, 1989.	SC-068B	PTP	5/4/2004	Dated 10/1997. Request For Quotation/ Scope of Work for lab analysis of water and sediment samples from lower Ship Creek. Analyses for PAHs, VOCs, and metals. No data presented here.	Detected compounds for Dolly Varden in Ship Creek included dioxins, furans, DDE, PCBs, Hg.
Water/Sediment Sample Lab Analyses, TMDL Waterbody Assessment, Ship Creek, Anchorage, AK; ADEC, Columbia Analytical Services (CAS), 1997.	SC-070-B	PTP	5/4/2004		Looks like CAS did the analyses. ADEC anticipated analytes would be absent or at very low levels.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
<p>Hydrologic Susceptibility and Vulnerability Assessment for Municipality of Anchorage - Ship Creek Public Drinking Water Source, Anchorage, Alaska; ADEC, 2001.</p>	<p>SC-071B</p>	<p>PTP</p>	<p>5/5/2004</p>	<p>Qualitative summary of water quality in Ship Creek related to drinking water for Anchorage, AK. Contaminants include bacteria/viruses, nitrates/nitrites, VOCs, heavy metals, cyanide, inorganics, organics.</p>	<p>Overall vulnerability of Anchorage drinking water supply to contamination rated Medium. Not particularly useful for Ship Creek risk assessment purposes.</p>
<p>Ship Creek Water Quality Assessment - Phase II, M.S. Project Paper; Boden, K., Univ. of Alaska-Anchorage, 1997.</p>	<p>SC-072B</p>	<p>PTP</p>	<p>5/5/2004</p>	<p>Data from 10/1997. Twelve sediment and three surface water samples from lower Ship Creek between Elmendorf Hatchery and KAPP Dam. one sediment and one surface water sample collected above Glenn Highway Bridge as background. Analyzed for VOCs, PAHs, PCBs, total metals, fecal coliform, nitrates, turbidity.</p>	<p>Results included elevated levels of Pb, Cu, Zn in sediment at Yakutat St. outfall. No PCBs detected in sediment or water. Low-level PAHs in sediment above KAPP Dam. Acetone in Wrangell St. outfall sample at low level. Lab certifications from CAS in Appendix A. Sampling/QA Plan in Appendix B.</p>
<p>Ship Creek Brownfields Site Assessment, Final Sampling and Quality Assurance Plan; EPA Region X START, Ecology & Environment, 1998.</p>	<p>SC-075B</p>	<p>PTP</p>	<p>5/10/2004</p>	<p>Final sampling plan for KAPP site. Reviewed site history and previous site assessments. Proposed collecting: 5 collocated surface water/sediment samples in cooling pond; 2 surface water/sediment samples above KAPP weir; 3 surface water/sediment samples below weir near storm drain and cooling system discharge. Analyses for diesel and gasoline range organics, BTEX, residual range organics, metals, pesticides/PCBs, VOCs, SVOCs.</p>	<p>Previous (1986) investigation concluded sediments in Ship Creek not being impacted on regular basis by surface water drainage from railroad yard. Infrequent spills of petroleum at railroad yard are likely affecting Ship Creek. Because groundwater from lower Ship Creek valley aquifer is not used, elevated contaminant concentrations do not pose a direct threat to human health or the environment.</p>

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Draft Cumulative Risk Evaluation for Operable Units 1-6 Work Plan; USAF Elmendorf AFB, Alaska, 1995.	SC-079B	PTP	5/7/2004	See SC-140B for full report.	See SC-140B for full report (only 1 page).
Operable Unit 1 Management Plan, Elmendorf AFB, Alaska; Elmendorf AFB, Alaska, Jacobs Engineering Group, 1992.	SC-080B	PTP	5/14/2004	Limited.	Summary of geologic and hydrogeologic conditions on Elmendorf AFB. Historical data summaries of soil and groundwater sampling from late 1980s.
Excerpts: Final Operable Unit 5 RI/FS, Volume 1 - Text; USAF Elmendorf AFB, Alaska, Radian Corporation., 1994.	SC-083B	PTP	5/14/2004	Excerpts of RI for OU5. Historical data summaries and previous field investigations. Groundwater in upper confined aquifer contained halogenated VOCs, fuel hydrocarbons. Surface water in Ship Creek proper only had DRO--organic contaminants confined to off-channel ponds and are biodegraded/ absorbed/diluted before reaching Ship Creek. Sediment contamination also confined to off-channel ponds--PCB detected in snowmelt pond.	Baseline risk assessment conducted for OU5 referenced. Fish and invertebrates in Ship Creek did not appear to be at significant risk from OU5 contamination.
Sampling and Analysis of Ship Creek, Seventh Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1996	SC-085B	PTP	5/14/2004	Data from 4-6/1996. 8 surface water samples collected (7 in Ship Creek, 1 in upgradient beaver pond that flows into creek) to determine whether upgradient groundwater contamination was affecting creek water quality. Analyzed inorganics, metals, VOCs.	1 metal detected at low levels, 5 VOCs detected at low levels. Lab analytical data and QA/QC summary in appendices.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
<p>CERCLA Program Sources, Elmendorf AFB, Alaska, Final Revision No. 2; USAF Elmendorf AFB Environmental Staff, 1994.</p>	<p>SC-086B</p>	<p>PTP</p>	<p>5/14/2004</p>	<p>Summary of CERCLA sources on Elmendorf AFB, primarily OU1 and OU5 and individual source areas. Previous investigations summarized and COPCs identified at detected concentrations.</p>	<p>Table of source area contaminants, maximum concentrations, and standard exceedances. Human health/eco risk assessment performed at OU1 identified no constituents for soils, sediments, or surface water exceeding EPA cancer criteria. 1,2-dibromoethane identified in groundwater. Mn identified for chronic exposure. OU6 investigated environmental risks to Ship Creek to determine full impact from all nearby OUs.</p>
<p>Reconnaissance and Biological Sketch of Lower Ship Creek; Quirk, W.A. III, 1997.</p>	<p>SC-087B</p>	<p>TTF</p>	<p>5/13/2004</p>	<p>Limited. Basically a summary of a reconnaissance trip taken in Lower Ship Creek in April, 1997. General descriptions of habitat and wildlife observed.</p>	<p>3 page narrative.</p>
<p>Excerpts: Geotechnical Report for Groundwater Monitoring Network, Ft. Richardson, Alaska; USACE-Alaska District, 1996.</p>	<p>SC-090B</p>	<p>PTP</p>	<p>5/11/2004</p>	<p>Groundwater contour maps. Groundwater flow generally to the northwest north of Ship Creek, southwest south of the creek, and west directly adjacent to the creek. Potentiometric surface flow direction primarily northwest.</p>	<p>Not particularly useful for risk-based assessment.</p>

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Excerpts: Preliminary Source Evaluation 2, Operable Unit D, Redline Final; USACE Ft. Richardson, Alaska, ENSR Consulting, 1995.	SC-091B	PTP	5/11/2004	Data from 11/1994. Collected 10 total: sediment samples from cooling ponds; sediment & sidewall samples upstream, downstream, and at the stormwater outfall to Ship Creek. Collected background sediment & sidewall samples upstream of outfall. Analyses for total petroleum hydrocarbon (TPH), GRO, DRO, VOCs, PCBs/organochlorine pesticides, and metals.	Data summarized in tables. Concentration of all organic compounds (except DRO & TPH) were below MRLs. Only 1,2-dibromoethane exceeded residential RBC for soil. Probably more appropriate to screen against ecological RBCs.
Superfund Final Site Close Out Report, Standard Steel & Metals Salvage Yard, Anchorage, Alaska; EPA, 2002.	SC-093B	NFM	5/5/2004	This report documents that remedial activities are complete and cleanup goals have been achieved. Report summarizes RI/FS and selected remedy, groundwater monitoring requirements, institutional controls and operations and maintenance procedures. No data included in this report.	Prevention of future migration of contaminants into Ship Creek was a criterion in the design and construction of the remedial action. To this end, residential cleanup levels for lead and PCBs were incorporated and stormwater controls were enacted to prevent the direct discharge of sediments into Ship Creek. Sediment was not a media of concern for this site.
Environmental Response Team Investigation of the Extent of Groundwater and Soils Contamination at the Standard Steel Site, Anchorage, Alaska; Prince et. al, 1987.	SC-098B	NFM	5/5/2004	Report includes an executive summary of soil, groundwater, sediment, and surface water sampling activities. Figure showing sampling locations is not useful.	Summary tables indicate that Aroclor 1260 was detected in stream sediment and tetrachloroethene was detected in stream surface water. It is not clear if the sediment and surface water samples were collected from Ship Creek. No QA/QC information are included in this report.
Nitrate Testing for Ship Creek; U.S. Army Public Works, Ft. Richardson, Alaska, 1994.	SC-099B	PTP	5/4/2004	Data from 4/1994. 2 stormwater outfalls to Ship Creek below Ft. Richardson sampled for nitrate.	1 detection at Moose Run Golf Course = 0.15 mg/l. 1 detection ~ 1800 ft. downstream of powerplant = 0.31 mg/l.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
State of the Creeks, Annual Report 2000-2001; Anchorage Waterways Council, 2001.	SC-107B	TTF	5/13/2004	Limited.	Provides summary of Anchorage Waterways Council reports on watersheds in Anchorage. Some information on Ship Creek including results of volunteer monitoring activities for basic water quality parameters and coliform bacteria.
An Investigation of Surface Water Quality of Four Selected Streams Within the Anchorage Urban Area, Anchorage, Alaska; ADEC, 1981.	SC-116B	PTP	5/4/2004	Data from 7/1981. Surface water grab samples from Campbell, Chester, Little Campbell, Fish, Ship Creeks. Analyses for physical, chemical, microbiological parameters. Chemistry noted for metals & total purgeable halocarbons.	Report concluded Ship Creek, with 15-100 times flow volume of any other creek studied, had no notable impacts from urbanization. No AWQS violations noted. Ship Creek had good water quality. Regional water quality data may not be useful since from 1981.
Anchorage, AK - Reconnaissance Report and Feasibility Phase Project Study Plan; Tryck Nyman Hayes, Inc. and Tetra Tech/ Simons, Li & Assoc., Inc., 1999.	SC-117B	TTF	5/13/2004	Limited useful data.	Project study plan for conducting a watershed ecosystem restoration feasibility study by USACE. It would be good to find out whether this project was initiated.
Final Operable Unit 5 RI/FS, Volume 1 - Text; USAF Elmendorf AFB, Alaska, Radian Corporation., 1994.	SC-119B	PTP	5/14/2004	SC-119B is a duplicate of SC-083B. Other reports included summary of investigation at OU6 source area LF02. Summary of previous investigations at OU1. Potential risk to aquatic ecological receptors from TPH in surface water and TFH in sediments. Full ecological risk assessment conducted under OU6.	3 other reports attached, including: duplicate of SC-079B, Excerpts: Draft RI Report OU6 Elmendorf AFB (Radian, 1995), and Final OU1 RI/FS Report Elmendorf AFB (Jacobs, 1994).
Human Health Risk Assessment for Ship Creek; U.S. Army Alaska, 1997.	SC-120B	TTF	5/12/2004	Limited.	Could be useful for Human Health Risk Assessment as it summarizes water rights and uses in Ship Creek prior to 1997.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Sampling and Analysis of Ship Creek, Eighth Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1996.	SC-121B	PTP	5/14/2004	Data from 7-8/1996 (8th and final report). 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs. Assessment of Ship Creek water quality on Elmendorf AFB. Table of National and Alaska State Drinking Water Standards.	No metals detected above criteria, low levels of 4 VOCs detected for 7-8/1996. Lab analytical data and QA/QC summary in appendices. In summary, quality of Ship Creek water on AFB generally very good because it chemically resembles local groundwater quality. During 2-year study, no VOCs detected above drinking water criteria. Analytes of concern were nitrate and several metals exceeding State/ federal MCLs. Nitrate exceedances in beaver pond only. Sb, As, Pb present at elevated levels exceeding MCLs in background groundwater for Anchorage Bowl.
Sampling and Analysis of Ship Creek, Sixth Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1996	SC-122	PTP	5/14/2004	Data from 1-3/1996. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Low levels of 4 metals and 9 VOCs detected. Lab analytical data and QA/QC summary in appendices.
Sampling and Analysis of Ship Creek, Fifth Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1996.	SC-123B	PTP	5/13/2004	Data from 10-12/1995. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Low levels of 4 metals and 12 VOCs detected. Lab analytical data and QA/QC summary in appendices.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Excerpts: Sampling and Analysis of Ship Creek, Fifth Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1996.	SC-124B	PTP	5/7/2004	See SC-123B for full report.	Excerpts from same report as SC-123B.
Excerpts: Sampling and Analysis of Ship Creek, Fourth Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1995.	SC-125B	PTP	5/7/2004	See SC-154B for full report.	Excerpts from same report as SC-154B.
Excerpts: Sampling and Analysis of Ship Creek, Third Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1995.	SC-126B	PTP	5/7/2004	See SC-153B for full report.	Excerpts from same report as SC-153B.
Excerpts: Sampling and Analysis of Ship Creek, Second Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1995.	SC-127B	PTP	5/7/2004	See SC-152B for full report.	Excerpts from same report as SC-152B.
Sampling and Analysis of Ship Creek, First Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1995.	SC-128B	PTP	5/7/2004	See SC-151B for full report.	Excerpts from same report as SC-151B.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Excerpts: Sampling and Analysis of Ship Creek, Sixth Quarterly Report of Results; USAF Elmendorf AFB, Alaska, Radian Corporation., 1996.	SC-129B	PTP	5/7/2004	See SC-122 for full report.	Excerpts from same report as SC-122.
Opinion Piece from Alaska Medicine, March/April 1989; Christian, J.H., M.D.	SC-138B	TTF	5/13/2004	Limited.	Discussion of rationale for lifting fish consumption advisory for Ship Creek in 1989 (?) based on recent fish tissue testing. Old data.
Final Work Plan, Cumulative Risk Evaluation for Operable Units 1-6, USAF Elmendorf AFB, Alaska; Radian Corporation., 1995.	SC-140B	PTP	5/13/2004	Work plan describing qualitative assessment of previous risk assessments conducted on 6 OUs at Elmendorf AFB, and cumulative risk posed to human health & environment.	Evaluation of potential impacts from OU1 and OU5 on north side of Ship Creek, and 3 OU 6 source areas (SD73, LF02, LF03) on south side. Mentioned 1995 Battelle benthic sampling report.
Basewide Environmental Monitoring Program, Groundwater Analytical Results for Operable Unit 1, Round 1, USAF Elmendorf AFB, Alaska; Radian Corporation., 2000.	SC-141B	PTP	5/13/2004	Data from 6/2000. Tabulated groundwater monitoring results from 14 wells on OU1. Analyses for GRO, DRO, VOCs, PCBs, pesticides, herbicides.	Mn exceeded secondary MCL of 0.05 mg/L in 8 wells, and at similar concentrations to 1999. TCE exceeded MCL at 1 well, at similar concentration to 1999.
Basewide Environmental Monitoring Program, Groundwater and Surface Water Analytical Results for OU5, Round 2, USAF Elmendorf AFB, Alaska; Radian Corporation., 2000.	SC-142B	PTP	5/13/2004	Data from 7-8/2000. Tabulated groundwater monitoring data from 20 wells and surface water data from 8 locations (7 in Ship Creek, 1 in upgradient beaver pond that flows into creek) in OU5. Groundwater analyses for Fe, VOCs, PAHs. Surface water analyses for inorganics, metals, VOCs, PAHs. COPCs were BTEX and TCE.	TCE exceeded groundwater MCL (5 ug/L) at 6 wells, and at similar concentrations to 1999. "Natural beaver pond system significantly degrades TCE levels to well below MCL before reaching Ship Creek proper."

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
<p>Basewide Monitoring and Well Maintenance Program, Groundwater and Surface Water Analytical Results for OU5, Round 1, USAF Elmendorf AFB, Alaska; Radian Corporation., 1999.</p>	<p>SC-143B</p>	<p>PTP</p>	<p>5/13/2004</p>	<p>Data from 5/1999. Tabulated groundwater monitoring data from 20 wells and surface water data from 8 locations (7 in Ship Creek, 1 in upgradient beaver pond that flows into creek) in OU5. Groundwater analyses for Fe, Mn, VOCs, PAHs. Surface water analyses for inorganics, metals, VOCs. COPCs were benzene, gasoline, diesel, and TCE.</p>	<p>TCE exceeded groundwater MCL (5 ug/L) at 5 wells, but at lower concentrations than in 1998. TCE also exceeded surface water MCL but only at 1 location (beaver pond), at similar concentration to 1998.</p>
<p>Basewide Environmental Monitoring Program, Groundwater and Surface Water Analytical Results for OU5, Round 2, USAF Elmendorf AFB, Alaska; Radian Corporation., 2001.</p>	<p>SC-144B</p>	<p>PTP</p>	<p>5/13/2004</p>	<p>Data from 7-8/2001. Tabulated groundwater data from 17 wells and surface water data from 8 locations (7 in Ship Creek, 1 in upgradient beaver pond that flows into creek) in OU5. Groundwater analyses for Fe, VOCs, PAHs. Surface water analyses for inorganics, metals, VOCs, PAHs. COPCs were BTEX and TCE.</p>	<p>TCE exceeded groundwater MCL (5 ug/L) in 7 wells, at similar concentrations to 2000. 1,1,2,2-tetrachloroethane exceeded groundwater MCL in 2 wells. TCE exceeded MCL in 1 surface water location (beaver pond).</p>
<p>Surface Water Sampling Ship Creek for OU5, USAF Elmendorf AFB, Alaska; Radian Corporation., 2001. (Results for OU5, Round 1, 2001 - missing cover page)</p>	<p>SC-145B</p>	<p>PTP</p>	<p>5/13/2004</p>	<p>Data from 5-6/2001. Tabulated groundwater monitoring data from 17 wells and surface water data from 8 locations (7 in Ship Creek, 1 in upgradient beaver pond that flows into creek) in OU5. Groundwater analyses for Fe, VOCs, PAHs. Surface water analyses for inorganics, metals, VOCs, PAHs. COPCs were BTEX and TCE.</p>	<p>TCE exceeded groundwater MCL (5 ug/L) in 6 wells, at similar concentrations to 2000. TCE exceeded MCL in 1 surface water location (beaver pond) at slightly higher concentration than in 2000.</p>

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Environmental Restoration Five Year Review, Elmendorf Air Force Base, Alaska; USAF, 1998.	SC-146B	PTP	5/13/2004	Qualitative summary of 6 OUs, site histories, remedial activities executed per the RODs. General geologic and hydrogeologic description of basin. Data from 9-12/1994. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Monthly surface water monitoring of Ship Creek from 1994-1996 found no evidence of COPCs. Groundwater modeling concluded contaminant plumes are not migrating far from source areas or reaching downgradient receptors. Mn is naturally-occurring in soil around Anchorage.
Draft Sampling and Analysis of Ship Creek, USAF Elmendorf AFB, Alaska, First Quarterly Report of Results; Radian Corporation., 1995.	SC-151B	PTP	5/13/2004	Data from 1-3/1995. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Low levels of 7 metals and 12 VOCs detected.
Draft Sampling and Analysis of Ship Creek, USAF Elmendorf AFB, Alaska, Second Quarterly Report of Results; Radian Corporation., 1995.	SC-152B	PTP	5/13/2004	Data from 4-6/1995. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Low levels of 6 metals and 15 VOCs detected.
Sampling and Analysis of Ship Creek, USAF Elmendorf AFB, Alaska, Third Quarterly Report of Results; Radian Corporation., 1995.	SC-153B	PTP	5/13/2004	Data from 9-12/1995. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Low levels of 6 metals and 6 VOCs detected.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Sampling and Analysis of Ship Creek, USAF Elmendorf AFB, Alaska, Fourth Quarterly Report of Results; Radian Corporation., 1995.	SC-154B	PTP	5/13/2004	Data from 7-9/1995. 8 surface water samples (7 in Ship Creek, 1 in upgradient beaver pond that flows into the creek) collected to determine whether upgradient groundwater contamination was affecting creek water quality. Analyses for inorganics, metals, VOCs.	Low levels of 6 metals and 4 VOCs detected.
Sampling and Analysis of Ship Creek, USAF Elmendorf AFB, Alaska, Eighth Quarterly Report of Results and Overall Water Quality Assessment; Radian Corporation., 1996.	SC-155B	PTP	5/7/2004	Duplicate of SC-121B.	Duplicate of SC-121B.
Ship Creek Water Quality Information; Municipality of Anchorage Heritage Land Bank, Alaska DNR, 1997.	SC-200B	PTP	5/5/2004	Summary of available data (1970s-1990s) for fecal coliform, biological communities, and petroleum products/organics in lower Ship Creek.	Qualitative descriptions of data, no raw data present. Referenced 1994 eco-risk assessment by PRC Environmental Management, Inc. for Standard Steel/ Ship Creek sediments.
Ship Creek Water Balance/Water Use Report; Municipality of Anchorage Heritage Land Bank, Alaska DNR, 1997.	SC-207B	TTF	5/12/2004	Some useful information.	Updated information of Ship Creek hydrology (1997) and additional information on water uses, potentially useful for Human Health Risk Assessment.
Ship Creek Bridge and North "C" Street Realignment, Final Environ. Assessment; Municipality of Anchorage Dept. of Public Works, Peratrovich, Nottingham & Drage, Inc., 1991.	SC-209B	TTF	5/12/2004	None.	EA for a Bridge Realignment on Ship Creek.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
TAT Activities Report, Preliminary Site Assessment, Standard Steel and Metals Salvage Yard, Anchorage, Alaska; EPA Region X, Tech. Assistance Team, 1986.	SC-215B	NFM	5/5/2004	Report summarizes preliminary site assessment activities in 1985, including sediment and surface water sampling in Ship Creek. Sediment and surface water samples were collected 100 yards upstream and downstream (no useful figure included).	PCBs were detected (2.5 ppm) in the downstream sediment sample. No PCBs were detected in the upstream sediment sample or either surface water sample. A quality assurance discussion is included; however laboratory data reports are not included.
Interim Federal On Scene Coordinator's Report, Hazardous Waste Site Cleanup, Standard Steel and Metals Salvage Yard, Anchorage, Alaska; EPA Region X, Tech. Assistance Team, 1987.	SC-216B	NFM	5/5/2004	Appears to be a more complete update of SC-220B. Includes a discussion of 1986 surface water and sediment samples collected from Ship Creek. Primarily concerns implementation of remedial alternative.	Low levels of PCBs detected (0.04 - 0.06 ppm) at same location where PCBs were detected in 1985. No laboratory data reports included.
National Bioaccumulation Study Summaries; EPA/Duluth or Wright State University, 1989.	SC-217B	PTP	5/4/2004	Duplicate of SC-068B.	Duplicate of SC-068B.
1989 Nonpoint Source Water Quality Assessment, Ship Creek at Anchorage; ADEC, 1989.	SC-219B	NFM	5/5/2004	Checklist concerning water quality in Ship Creek. No data included.	Not useful for risk-based assessment.
TAT Activities Report, Hazardous Waste Site Cleanup, Standard Steel and Metals Salvage Yard, Anchorage, Alaska; EPA Region X, Tech. Assistance Team, 1986.	SC-220B	NFM	5/5/2004	Report discusses EPA site activities in June and July 1986. No new data discussed in this report.	Not useful for risk-based assessment.

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Excerpts: Draft Tech. Memo, Remedial Action Objectives, Standard Steel & Metals Salvage Yard Superfund Site, Anchorage, AK; Woodward-Clyde, 1994.	SC-221B	NFM	5/5/2004	Text appears to be excerpts of the ecological risk assessment for the Standard Steel site. Sediment data, Microtox © sediment toxicity data, and a benthic macroinvertebrate community analysis are included in these excerpts.	The complete ecological risk assessment for the Standard Steel site would be very useful for a future risk-based assessment of Ship Creek. These excerpts only include summary tables and text.
Excerpts: Final Management Plan, RI/FS, Standard Steel & Metals Salvage Yard Superfund Site, Anchorage, AK; Woodward-Clyde, 1993.	SC-222B	NFM	5/5/2004	Excerpts of the sediment sampling plan for the sediment samples collected for the ecological risk assessment at the Standard Steel site (SC-221B).	Not useful for risk-based assessment. There is nothing new here that isn't also included in the ecological risk assessment excerpts.
On-Scene Coordinator's Report For Standard Steel & Metals Salvage Yard, Anchorage, Alaska; EPA Region X, Ecology & Environment, Inc., 1988.	SC-223B	NFM	5/5/2004	Excerpts of this report only. Discusses 1985 and 1986 Ship Creek sediment sampling and 1986 fish sampling. Rearing salmon and Dolly Varden were collected downstream of the site.	No PCBs were detected in the sediment samples collected in 1986. 1985 sample results discussed in SC-215B. Aroclor 1260 was detected in a composite sample of salmon smolts at a concentration greater than the LC ₅₀ for salmonids.
Conceptual Design Plan, RD/RA, Standard Steel & Metals Salvage Yard Superfund Site; Standard Steel RD/RA PRP Group, Alta Geosciences, Inc., 1997.	SC-227B	NFM	5/5/2004	Report includes discussion of remedial design activities focused on protecting Ship Creek.	Not useful for risk-based assessment.
An Investigation of Sedimentation Processes in the Vicinity of the Ship Creek Development; Draft Report, Woodward-Clyde, 1990.	SC-231B	TTF	5/13/2004	Limited useful information.	Good summary of physical setting and sedimentation processes in Knik Arm and also summary of dredging activities at Port of Anchorage. However, this report's objective was to evaluate several waterfront development options as to impacts on sedimentation processes.

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Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Surface-Water Quality in the Campbell Creek Basin, Anchorage, Alaska; USGS, 1983.	SC-236B	TTF	5/13/2004	Limited. 1983 USGS Report to determine the quality of surface water in the Campbell Creek basin, south of the Ship Creek Watershed.	Could provide regional background surface water quality data for an urbanized stream. Trace metals data available, no organics.
Quantity and Quality of Urban Runoff from the Chester Creek Basin, Anchorage, Alaska; USGS, 1986.	SC-237B	TTF	5/13/2004	Limited. 1986 USGS Report to determine the quality of surface water in the Chester Creek basin, south of the Ship Creek Watershed.	Could provide regional background surface water quality data for an urbanized stream. Trace metals data available, no organics.
Site Investigation Report - KAPP Diversion Pond Sediment Sampling and Analysis; Steigers Corporation. 2000.	SC-239B	PTP	5/11/2004	Data from 4/2000. 10 sediment samples (collected in the dry) in 6 soil borings from area proposed for dredging behind KAPP diversion dam. Analyses for VOCs, SVOCs, PCBs, pesticides, metals, DRO, RRO.	Arsenic exceeded AK Soil Cleanup Criteria in 1 sample. Background As concentration twice as high as this one sample. Ni and Cu exceeded lowest toxicological screening benchmarks but below AK Soil Cleanup Criteria. Concluded sediments in KAPP diversion pond not contaminated, and sediment dredging would not introduce contaminants to Ship Creek. Dredging scheduled for late fall 2000. Lab data in appendix.
RCRA Facility Assessment Report, Alaska Railroad Corporation.; EPA, SAIC, 1996.	SC-240B	TTF	5/12/2004	1996 RCRA Facilities Report. Good description of current and past practices. Identifies Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) for the Rail Yard Property. Arsenic reported elevated in Ship Creek sediments.	Summary of file review and visual site inspection of ARRC and tenants. 73 SWMUs and 7 AOCs were identified. Presents detailed descriptions of each SWMU and AOC with conclusions on whether there is a potential for release of contaminants to the environment. Very useful Summary.

Table B-1 Ship Creek Reports: Sediment and Surface Water Quality and Site Investigations

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
<p>RCRA Facility Assessment Report, Alaska Railroad Corporation. Leased Properties; EPA, Booz Allen Hamilton, 2002.</p>	<p>SC-241B</p>	<p>TTF</p>	<p>5/12/2004</p>	<p>This RCRA Facilities Assessment Report serves as a supplement to the 1996 ARRC Railway RFC (SC-240B) and focuses on the leased parcels of the ARRC property. This report provides information on leased properties where documented contamination exists as well as sites where soil and/or groundwater contamination may exist but has not been characterized.</p>	<p>This report should be reviewed to identify SWMUs and AOCs that may be contributing contaminants to Ship Creek. The report states that there is a separate report that recommends further actions at these sites. Probably worthwhile to track this report down and also review.</p>

Table B-2 Ship Creek Reports: Macroinvertebrates and Fisheries

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Assessment of water quality in Chester Creek using bioassays. Gabrielson, E. and A.M Milner. University of Alaska, Anchorage. 1992.	no number	JES	5/13/2004	Study was on Chester Creek, no data collected on Ship Creek.	Studied different stream in Anchorage area. Results showed that the use of Microtox Bioluminescence bioassay test effective to determine water quality and sources of contamination. Could be used in conjunction with bioassessment to conduct ecological risk.
Fisheries bioengineering services for hatchery evaluation and water use/water treatment recommendations. Elmendorf Fish Hatchery. The Conservation Fund Freshwater Institute. 2002	SC-006	JES	5/13/2004	No Ship Creek data. Relevant data on hydrological modifications to Ship Creek. Summary information on all 4 dams on the stream and other anthropogenic modifications. Good aerial photos and maps.	Good and useful reference material on Ship Creek resources and physical parameters. Apparently, impending changes were to occur within the hatchery in 2003-2005 period. Up to date information should be obtained.
1999 Alaska biological monitoring and water quality assessment program report. E. Major, A. Prussian, and D. Rinella. University of AK, Anchorage. 2000	SC-024B	JES	5/12/2004	Ship Creek not included in this study. But provided a good summary of the Alaska Stream Condition Index ASCI protocol for conducting bioassessment in Alaskan Streams	The studies objectives were to refine ASCI protocols and establish reference conditions
Effects of Urbanization on Benthic Macroinvertebrate communities in streams, Anchorage, AK. 2001	SC-025B	JES	5/12/2004	Macroinvertebrates were collected at 2 stations within Ship Creek - Glenn Highway and the Elmendorf Hatchery, both upstream of the AK Railroad in 2000.	ASCI protocols were not used, but data produced of good quality. Difficult to compare to later studies using ASCI. Analysis also looked at all streams studied to compare stream degradation, with anthropogenic indices such as population, road density, storm drain density.
ASCI biological index development for Cook Inlet 1997-2000 Summary. University of AK, Anchorage and Tetra Tech. 2001	SC-028B	JES	5/12/2004	Specific Ship Creek data were not presented, document summarized ASCI protocols and data from 123 stations in 83 streams. Ship Creek had a combined ASCI score of poor/fair.	Another good summary of ASCI. Shows widespread use in Alaska streams.

Table B-2 Ship Creek Reports: Macroinvertebrates and Fisheries

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Preliminary report on water availability in the lower Ship Creek Basin, Anchorage, AK	SC-042B	JES	5/14/2004	dated, pre-Elmendorf Hatchery. No useful data	
Fisheries bioengineering services for hatchery evaluation and water use/water treatment recommendations. Ft. Richardson Fish Hatchery. The Conservation Fund Freshwater Institute. 2002	SC-058	JES	5/13/2004	No Ship Creek data. Relevant data on hydrological modifications to Ship Creek. Summary information on all 4 dams on the stream and other anthropogenic modifications. Good aerial photos and maps.	Good and useful reference material on Ship Creek resources and physical parameters. Apparently, impending changes were to occur within the hatchery in 2003-2005 period. Up to date information should be obtained.
Anchorage Area. ADFG2001 Ship Creek: Effort, Catch, and Harvest Information. ADF&G. Undated	SC-061B/062B	JES	5/14/2004	Recreational fishery regulations, Ship Creek	
Run Timing - Anchorage, Whittier, Seward. ADF&G, undated	SC-063B	JES	5/14/2004	Tabular data on recreational effort, catch, and harvest - 1983-2002 for Chinook, Coho, and rainbow trout.	Data shows a substantially increasing trend in both effort and catch over the time period
Sportfish hatchery program. Elmendorf Hatchery. 2004	SC-064B	JES	5/14/2004	Adult run timing for Ship Creek Chinook and Coho salmon	
Sportfish hatchery program. Fort Richardson Hatchery. 2004	SC-065B	JES	5/14/2004	Adult hatchery return data for all salmonid species in Ship Creek	Stated and evaluated fish production goals
	SC-066B	JES	5/14/2004	Adult hatchery return data for all salmonid species in Ship Creek	Stated and evaluated fish production goals
Chester Creek stream condition evaluation. Davis, J.C. and G.A. Muhlberg. AK Dept of Fish and Game. 2001.	SC-108B	JES	5/13/2004	Collected habitat measurements, not macroinvertebrate samples.	Limited relevance to Ship Creek ecological risk assessment. However, if similar data has been collected for Ship Creek, it could be used in conjunction with macroinvertebrate data to determine water quality impairment due to habitat modifications.

Table B-2 Ship Creek Reports: Macroinvertebrates and Fisheries

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
A summary of the bioassessment of stream water quality within the Municipality of Anchorage. Milner, A.M. and M.W. Oswald. University of AK, Fairbanks. 1995	SC-109B	JES	5/11/2004	Ship Creek sampled for macroinvertebrates at Post Rd., Elmendorf Hatchery, and Glenn Hwy in 1989	Stream specific data for Ship Creek limited, but results from other urban streams indicate relationship between depressed benthic metrics and contamination is present. ID of contaminants can be further established by use of Microtox in conjunction with bioassessment
Fort Richardson Hatchery pipeline. ADF&G FRED. 1992.	SC-111B	JES	5/13/2004	Background information. No useful data	Hatchery production used as mitigation. Proposed project to increase water production to increase hatchery production to replace lost fish resources expected in 1993/1994 as a result of Exxon Valdez spill
Federal aid in sport fish restoration, Ft. Richardson Hatchery ADF&G FRED. 1992	SC-112B	JES	5/13/2004	Background information. No useful data	Hatchery release data from hatcheries. Hatchery is central incubation hatchery for several central Alaska streams.
Federal aid in sport fish restoration, Elmendorf Hatchery. ADF&G FRED. 1992	SC-113B	JES	5/13/2004	Background information. No useful data	Hatchery release data from hatcheries. Hatchery is central incubation hatchery for several central Alaska streams.
Federal aid in sport fish restoration, Elmendorf Hatchery. ADF&G FRED. 1989	SC-114B	JES	5/13/2004	Background information. No useful data	Hatchery release data from hatcheries. Hatchery is central incubation hatchery for several central Alaska streams.
Marking, enumeration, and size estimation for Coho and Chinook salmon smolt releases into Upper Cook Inlet, Alaska, 1998. ADF&G 2000.	SC-130B	JES	5/13/2004	Data on hatchery releases. No information on natural production	Provides tabular data on salmonid hatchery release data since 1990.

Table B-2 Ship Creek Reports: Macroinvertebrates and Fisheries

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Marking, enumeration, and size estimation for Coho and Chinook salmon smolt releases into Upper Cook Inlet, Alaska, 1997. ADF&G 1998.	SC-131B	JES	5/13/2004	Data on hatchery releases. No information on natural production	Provides tabular data on salmonid hatchery release data since 1990.
Marking, enumeration, and size estimation for Coho and Chinook salmon smolt releases into Upper Cook Inlet, Alaska, 1996. ADF&G, 1997	SC-132B	JES	5/13/2004	Data on hatchery releases. No information on natural production	Provides tabular data on salmonid hatchery release data since 1990.
1993 Area management report for the recreational fisheries of the southwest Alaska area. ADF&G. 1994	SC-133B	JES	5/14/2004	No useful data. Out of area	
2002 Alaska biological monitoring and water quality assessment program report. University of AK, Anchorage. 2003.	SC-135B	JES	5/12/2003	No Ship Creek data.	Study assesses expansion of ASCI program to SE AK
Bioassessment of select streams at Anchorage, Alaska: 2000 data report. CH2M Hill. 2000	SC-136B	JES	5/12/2004	Only 1 station was sampled in Ship Creek for macroinvertebrates below Post Rd.	ASCI protocols used; findings found poor rating of Post Rd site, consistent with other studies
Catalog of waters important for spawning, rearing, or migration of anadromous fishes. ADF&G. 1990	SC-148B	JES	5/14/2004	Catalog for companion atlas	
Municipality of Anchorage Aquatic Resources Commission, State of the Streams Report. 1994	SC-149B	JES	5/13/2004	Background information. No useful data	Report states that recreational fishing effort on Ship Creek is second to the Kenai River in Alaska

Table B-2 Ship Creek Reports: Macroinvertebrates and Fisheries

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
Ship Creek bioassessment investigations. C.E. Cushing, R.P. Mueller, and M.T. Murphy. Battelle Pacific NW Laboratory. 1994	SC-202B	JES	5/11/2004	Six Stations between from Post Rd. to the Ft. Richardson Hatchery were sampled for macroinvertebrates in 1994.	Data consistent with other findings, but study was pre ASCI protocols. Data quality good, RBP national protocols were followed but difficult to compare with later Alaska studies which use ASCI.
Alaska Department of Natural Resources Memo. Chinook salmon fisheries. 1996	SC-206B	JES	5/14/2004	Historical information on Ship Creek fisheries.	Small natural runs of Chinook salmon occurred in Ship Creek.
Macroinvertebrates distribution and water quality in Anchorage streams. Milner, A.M. and M.W. Oswood, University of AK, Fairbanks, 1989	SC-228B	JES	5/11/2004	Ship Creek sampled for macroinvertebrates at Post Rd., Elmendorf Hatchery, and Glenn Hwy in 1989	Data consistent with other findings, but study was pre ASCI protocols. Data quality good, but difficult to compare with later studies.
Macroinvertebrate water quality monitoring program in Anchorage streams, 1989 Results. 1990	SC229B	JES	5/13/2004	Macroinvertebrates were collected at 3 stations within Ship Creek - Glenn Highway, Elmendorf Hatchery, and Post Rd in 1989	Data used to determine stream quality. Data consistent with other results in Ship Creek
Macroinvertebrates as an indicator of urbanization in Ship Creek and a comparison of two sampling and analytical methods in southcentral Alaskan creeks. MS Thesis, A. Love, University of AK, Anchorage, 1999.	SC-230B	JES	5/11/2004	RBP and NAWQA bioassessment protocols used on Ship Creek in 1999. Four stations were sampled - Glenn Highway, Elmendorf Hatchery, Port Road, and Chugach Dam	Produced results consistent with other studies. Although a Masters Thesis, sampling protocols and standards appeared to be followed.
1993 evaluation of Campbell Creek using Rapid Bioassessment techniques. University of AK, Anchorage. 1993	SC-232B	JES	5/13/2004	Sediment and water samples, macroinvertebrates, and microtox bioassays, in Campbell Creek drainage. No samples collected in Ship Creek	Sediment chemistry, macroinvertebrate, and microtox data showed that Campbell Creek is unimpaired. Very little contamination was noted, but results of separate tests were consistent.

Table B-2 Ship Creek Reports: Macroinvertebrates and Fisheries

Report Title	I.D. Number	Reviewer	Date	Relevant Data?	Comments
<p>A protocol for assessing the impacts of urbanization on Coho salmon with application to Chester Creek, Anchorage, Alaska. MS Thesis, M.S. Whitman. University of AK, Fairbanks, 2002.</p>	<p>SC-233B</p>	<p>JES</p>	<p>5/13/2004</p>	<p>Developed protocol for using habitat measurements: hydrology, riparian zone, channel morphology, sediment dynamics, water quality, competition/predation. No specific Ship Creek data collected</p>	<p>Reference material. Summarizes substantial amount of literature on habitat indices for salmonids, but little direct relevance to Ship Creek ecological risk assessment</p>
<p>RCRA facilities assessment report, AK Railroad Corporation, Anchorage AK. EPA 2002</p>	<p>SC-241B</p>	<p>JES</p>	<p>5/14/2004</p>	<p>Summary of location of potential sources of contamination in relation to Ship Creek. Potential receptors and pathways for contamination</p>	



APPENDIX C
SHIP CREEK DOCUMENT INDEX

Document Data

Index No.	Document Title	Authoring Organization	Named Author	Responsible Organization	Document Date	Document Location
SC-001	Monitoring Wells and Oil Collection Gallery, Ship Creek Railroad Yard, Anchorage, Alaska	Shannon & Wilson, Inc.		ADEC	August 1989	EPA Website
SC-002	Site Inspection Report Alaska Railroad - Anchorage, Alaska	Ecology & Environment, Inc.	Jeff Whidden	EPA Region X	January 1986	EPA Website
SC-003	Environmental Assessment of the Knik Arm Power Plant and Associated Properties	Environmental Services, LTD.		Hobbs Industries, Inc.	December 28, 1990	EPA Website
SC-004	Arctic Cooperage Phase II Site Assessment	ENSR		ARRC	September 1996	EPA Website
SC-005	Ship Creek Targeted Brownsfields Assessment Report Ship Creek Brownsfields Site Anchorage, Alaska TDD:97-08-0006	Ecology & Environment, Inc.		EPA Region X	November 1999	EPA Website
SC-006	Fisheries Bioengineering Services for Hatchery Evaluation and Water Use/Water Treatment Recommendations Elmendorf State Fish Hatchery Alaska Department of Fish and Game Sport Fish Division	The Conservation Fund Freshwater Institute		Elmendorf State Fish Hatchery ADF&G Sport Fish Division	March 2002	EPA Website
SC-007	EPA Superfund Record of Decision Elmendorf AFB (Government Hill over Creek) EPA ID: AK8570028649 OU-02 Anchorage, Alaska	EPA		EPA Region X	September 1, 1992	EPA Website
SC-008	EPA Superfund Record of Decision (Part of the Lower Ship Creek Drainage) Elmendorf AFB EPA ID: AK8570028649 OU 01 Anchorage, Alaska	EPA		EPA Region X	September 9, 1994	EPA Website
SC-009	EPA Superfund Record of Decision (Near Elmendorf Hatchery on Ship Creek) Elmendorf AFB EPA ID: AK8570028649 OU 05 Anchorage, Alaska	EPA		EPA Region X	December 28, 1994	EPA Website
SC-010	EPA Superfund Record of Decision (On Ship Creek) Elmendorf AFB EPA ID: AK8570028649 OU 02 Anchorage, Alaska	EPA		EPA Region X	March 31, 1995	EPA Website
SC-011	EPA Superfund Record of Decision Elmendorf AFB EPA ID: AK8570028649 OU 04 Anchorage, Alaska	EPA		EPA Region X	September 26, 1995	EPA Website
SC-012	EPA Superfund Record of Decision Elmendorf AFB EPA ID: AK8570028649 OU 06 Anchorage, Alaska	EPA		EPA Region X	December 04, 1996	EPA Website

Document Data

SC-013	EPA Superfund Record of Decision Elmendorf AFB EPA ID: AK8570028649 OU 03 Anchorage, Alaska	EPA		EPA Region X	December 05, 1996	EPA Website
SC-014	EPA Superfund Explanation of Significant Difference Standard Steel & Metal Salvage Yard (USDOT) EPA ID: AK8570028649 OU 01 Anchorage, Alaska	EPA		EPA Region X	November 18, 1998	EPA Website
SC-015	Memo: Standard Steel Five Year Review Report	EPA		EPA Region X	April 21, 2003	EPA Website
SC-016	EPA Superfund Record of Decision Standard Steel & Metal Salvage Yard (USDOT) EPA ID: AKD980978787 OU 01 Anchorage, Alaska	EPA		EPA Region X	July 16, 1996	EPA Website
SC-017	EPA Superfund Record of Decision Fort Richardson (US Army) EPA ID: AK6214522157 OU 04 Anchorage, Alaska	EPA		EPA Region X	September 27, 2000	EPA Website
SC-018	EPA Superfund Record of Decision Fort Richardson (US Army) EPA ID: AK6214522157 OU 02 Anchorage, Alaska	EPA		EPA Region X	September 15, 1997	EPA Website
SC-019	Tank Farm Study Summary of the Panel Discussion on Water Rights in the Ship Creek Watershed at the Annual Meeting of the Anchorage Waterways Council on January 24, 2000, and the Resulting Proposed Action	Goldier Associated Anchorage Waterways Council	Allyz Kramer, Dr. Julius Rockwell, and Robert Shipley	MOA Anchorage Waterways Council	August 2002 June 7, 2000	MOA/Internet EPA Website
SC-021	Environmental Site Assessment and Clean-Up Report Chugach Electric Association, Inc., Marine Division 1200 Ocean Dock Road Anchorage, Alaska (produced as two comb binders)	Chugach Electric Association, Inc., and Environmental Management, Inc.		ARRC	March 1996	ARRC
SC-022	ADF&G and ADNRR Permits 1991 - Present	ADF&G, ADNRR		Fish & Game and ADNRR Habitat Division	1991 - Present	ADF&G
SC-023	Phase I Storm Sewer System Evaluation Anchorage Railroad Yard	CRW Engineering Group		ARRC	March 17, 1994	ARRC
SC-024	1999 Alaska Biological Monitoring and Water Quality Assessment Program Report	Environmental and Natural Resources Institute (ENRI)	Elaine Major, Aaron Prussian, and Daniel Rinella	ARRC	August 2000	ARRC
SC-025	Characteristics of Urbanization in Five Watersheds of Anchorage, Alaska : GIS Data (National Water-Quality Assessment Program Report 02-334)	USGS	Edward H. Moran	USDOI		USGS Website
SC-026	Effects of Urbanization of Benthic Macroinvertebrate Communities in Streams, Anchorage, Alaska (Water-Resource Investigations Report 01-4278)	USGS	Robert T. Ourso	USDOI	2001	USGS Website
SC-027	Publication: Method for Attenuation of White Phosphorus Contamination in Wetlands	Journal of Environmental Engineering, Vol. No.126, No.11	Michael R. Walsh P.E., Marianne E. Walsh, and Charles M. Collins	USACE-AK	November 2000	ARLIS

Document Data

SC-028	Alaska Stream Condition Index: Biological Index Development for Cook Inlet 1997 - 2000 Summary	Environmental and Natural Resources Institute (ENRI) and Tetra Tech, Inc.	Elaime Major, Aaron Prussian, Daniel Rinella and Benjamin K. Jessup	ADEC	August 2001	ARLIS
SC-029	Lateral Movement of Contaminated Ground Water from Merrill Field Landfill, Anchorage, Alaska U.S. Geological Survey Open-File Report 89-624	MOA	Jliann O. Brunett	USDOI	1990	ARLIS
SC-030	Letter Report: Transmittal of Site Investigation Sampling and Analysis Plan KAPP Repowering Project Marlow Power & Steam, Inc.	Steigers Corporation	Paul McGuire	ADEC	March 21, 2000	ADEC
SC-031	Draft Report : Ship Creek Water Quality Assessment					ADEC
SC-032	Ship Creek Brownfields Site Assessment Final Sampling and Quality Assurance Plan TDD: 97-08-0006	Ecology & Environment, Inc.		EPA Region X	September 1998	ADEC
SC-033	Watershed Activity Checklist & Report Ship Creek, Anchorage Period: March to September 1997	ADEC	Kent Patrick-Riley	ADEC	September 30, 1997	ADEC
SC-034	MEMO : Summary of Information on the Natural Occurrence (Background) of Mercury in Soil and Stream Sediments in Alaska and the Seward Quadrangle	CH2M Hill	Rob Crotty	Susan Schrader/ARRC	September 5, 1996	ADEC
SC-035	Water Quality-Limited Designation Alaska's 1998 Final Section 303 (d) List (June 71999) Listed Water Quality-Limited Waterbodies			ADEC		ADEC / Internet
SC-036	ACWA Water List					AWRA/Internet
SC-037	Corrective Action Priorities for Polluted Waters Watershed Assessment Tracking & Environmental Results System	EPA		EPA		EPA Website
SC-038	Progress Report: Urban Contaminants Project: Data for Sediment, Fish and Eggs Collected from Chester Creek, Anchorage, Alaska 1991	USF&WS			April 6, 1994	USF&WS/Internet
SC-039	Evaluation of Contaminant Exposure and the Potential Impacts on Aquatic Habitat Quality in the Anchorage Area of the Cook Inlet Basin	USGS	J.N. Huckins, J.D.Petty, W.L.Cranor and R.C.Clark	Steve Frenzel/USGS-WRD	February 28, 2001	USGS Website
SC-040	Priority-Pollutant Trace Elements in Streambed Sediments of the Cook Inlet Basin, Alaska 1998-2000 Water-Resource Investigation Report 02-4163	USGS		USGS	2002	USGS Website
SC-041	Water Temperature of Streams in the Cook Inlet Basin, Alaska and Implications of Climate Change Water-Resource Investigations Report 01-4109	USGS		USGS	2001	USGS Website
SC-042	Publication: Preliminary Report on Water Availability in the Lower Ship Creek Basin, Anchorage, Alaska - with special reference to the fish hatchery on Ft. Richardson and a proposed fish-hatchery site near the Elmendorf AFB Power Plant.	USGS	ADF&G	USGS	January 1976	USGS
SC-043	Letter Report: Transmittal of Site Investigation Report KAPP Repowering Project Marlow Power & Steam, Inc.	Steigers Corp	Paul McGuire	ADEC	May 18, 2000	ADEC
SC-044	11x17 Figure: Figure 3 Sediment Sample Summary Knik Arm Power Plant	Steigers Corp		ADEC		ADEC
SC-045	Publication: The Relationship Between Surface Water and Ground Water in Ship Creek Near Anchorage, Alaska		John B Weeks	USGS Professional Paper 700-B, Pages B224-B226	1970	ADEC

Document Data

	Ship Creek				(Hydrogeology Info File)				ADEC
SC-046	Ship Creek								ADEC
SC-047	Letter: Ship Creek Culvert Removal Project - Draft EA	NOAA	James W. Balsiger		Anne Leggett/ HDR Alaska	August 1, 2002			ADEC
SC-048	Letter: Multi-Use Trail Construction and Bridge Replacement - Ship Creek Stream Number 247-50-10060 Section 8.9, 12, and 18, T. 13 N., 3 W., S.M.	ADF&G	Cindy Anderson		Lori Schanche / MOA	November 27, 2002			ADEC
SC-049	Letter: Thank you letter with attachments for Evaluation of Ship Creek Fish and Sediments Study	Environmental Services, LTD.	Lee Browning		Dave Sturdevant/ADEC	February 21, 1989			ADEC
SC-050	Publication: Watershed Activity Checklist & Report Ship Creek Anchorage	ADEC			ADEC	Historical to March 1, 1997			ADEC
SC-051	Period: Historical to March 1, 1997								
SC-052	A Petition to Reclassify Portions of Ship, Chester, Campbell and Fish Creeks Incident Action Plan Arctic Cooperage/Alaska Railroad Reserve Site	ADEC			MOA	January 30, 1980			ADEC
SC-053	Letter: Temporary Water Use Permit TWP 96-16 Ship Creek	ADNR	Buzz Kuby		Bob Camilli/ Emulsion Products of Alaska, Inc.	April 25, 1996			ADEC
SC-054	Letter: Proposed Ship Creek Dam	Anchorage Waterways Council	Julius Rockwell, Jr.		ADEC	June 6, 1996			ADEC
SC-055	Letter: Response letter to June 6th letter requesting information about Ship Creek	ADEC	Leonard D. Verrelli		Barbara Mahoney, President. Julius Rockwell, VP Anchorage Waterways Council	July 2, 1996			ADEC
SC-056	Work Plan Ship Creek Total Daily Maximum Load (TDML) Project	ADEC			ADEC	May 9, 1996			ADEC
SC-057	Work Plan Ship Creek Total Daily Maximum Load (TDML) Project	ADEC			ADEC	May 13, 1996			ADEC
SC-058	Fisheries Bioengineering Services for Hatchery Evaluation and Water Use/Water Treatment Recommendations Fort Richardson State Fish Hatchery	The Conservation Fund Freshwater Institute			ADF&G	February 2002			ADEC
SC-059	Selected Organic Compounds and Trace Elements in Streambed Sediments and Fish Tissues, Cook Inlet Basin, Alaska Water-Resources Investigation Report 00-4004	USGS			USGS	2000			USGS/Website
SC-060	Chester Creek Stream Condition Evaluation Technical Report No. 01-7		Jeffrey C. Davis and Gay A. Muhlberg		ADF&G	July 2001			ADF&G Website
SC-061	Publication: Anchorage Area	Northern Cook Inlet Sport Fishing Opportunity			ADF&G	2001			ADF&G Website
SC-062	Publication: Anchorage Area	Southcentral Region Northern Cook Inlet			ADF&G				ADF&G Website
SC-063	Spreadsheet: Ship Creek : Effort, Catch, and Harvest Information	ADF&G	Dan Bosch		ADF&G				ADF&G
SC-064	Run Timing - Anchorage, Whittier, Seward	Southcentral Region Anchorage Area			ADF&G				ADF&G Website
SC-065	Sport Fish Hatchery Program Overview	ADF&G			ADF&G				ADF&G Website
SC-066	Sport Fish Hatchery Program Fort Richardson State Fish Hatchery	ADF&G			ADF&G				ADF&G Website
SC-067	Data: Ship Creek Fish Tissue and Sediment				ADEC				ADEC
SC-068	Study: National Bioaccumulation Study				ADEC				ADEC

Document Data

SC-069	Publication: Watershed Activity Checklist & Report Ship Creek Anchorage Period: March to September 1997	ADEC			ADEC				
SC-070	Request For Quotation	Southcentral ADEC			ADEC			September 14, 1993	ADEC
SC-071	Hydrologic Susceptibility and Vulnerability Assessment for Municipality of Anchorage (MOA) - Ship Creek Public Drinking Water Source, Anchorage, Alaska	ADEC		Trena K. Hallback	ADEC			2001	ADEC
SC-072	Paper: Ship Creek Water Quality Assessment Phase II	Colorado Sate University		Kevin Boden				December 1997	ADEC
SC-073	Ship Creek Enhancement Project Bibliography							November 1, 1996	ADEC
SC-074	(Surface Water and Biological Water-Quality Studies) Letter: Receipt of Ship Creek Brownsfields Assessment			Gary Prokocsh			Kent Patrick-Riley - ADEC		ADEC
SC-075	Final Sampling and Quality Assurance Plan TDD: 97-08-0006	EPA		Joanne LaBaw			Kent Patrick-Riley - ADEC	September 29, 1998	ADEC
SC-076	OU 01 Remedial Investigation/Feasibility Study Report Final	Jacobs Engineering					Elmendorf AFB	January 1994	ADEC
SC-077	Excerpt: Municipal Solid Waste Landfill Site Evaluation (OU 01)	Radian Corp					Elmendorf AFB	December 1995	ADEC
SC-078	Excerpt: Municipal Solid Waste Landfill Closure Plan (OU 01) Draft	Radian Corp					Elmendorf AFB	December 1995	ADEC
SC-079	Excerpt: Cumulative Risk Evaluation for Operable Units 1 - 6 Work Plan Draft						Elmendorf AFB	January 1995	ADEC
SC-080	Excerpt: Operable Unit 1 Management Plan Excerpt: DRAFT Installation Restoration Program (IRP) Stage 4	Jacobs Engineering					Elmendorf AFB	May 1992	ADEC
SC-081	Health and Safety Plan Operable Unit 1	Jacobs Engineering					Elmendorf AFB	November 1991	ADEC
SC-082	Letter: OU 06 Remedial Action Plan	Anchorage Waterways Council		Julius Rockwell, Jr.			Mark Davidson Elmendorf AFB	April 29, 1996	ADEC
SC-083	Excerpt: Final: Operable Unit 5 Remedial Investigation/Feasibility Study Volume 1 - Text	Radian Corp					Elmendorf AFB	March 1994	ADEC
SC-084	Excerpt: Final: Elmendorf Air Force, Alaska Management Plan Operable Unit 5	Battelle					Elmendorf AFB	July 1992	ADEC
SC-085	Sampling and Analysis of Ship Creek Elmendorf AFB, Alaska Seventh Quarterly Report of Results	Radian Corp					Elmendorf AFB	August 1996	ADEC
SC-086	Excerpt: Elmendorf AFB Report Appendix B: CERCLA Program Sources							December 5, 1994	ADEC
SC-087	Reconnaissance and Biological Sketch of Lower Ship Creek			William A. Quirk, III					ADEC
SC-088	Memo: Request for Authorization for Bank Stabilization Activities in Ship Creek (D-970449)	USACE-AK		Angela London			Kate Wedemayer Elmendorf AFB	June 18, 1997	ADEC
SC-089	Excerpt: Management Plan Operable Unit D F.T. Richardson Alaska Draft	USACE-AK						February 1996	ADEC
SC-090	Excerpt: Geotechnical Report for Groundwater Monitoring Network Fort Richardson, Alaska						USACE-AK	February 1996	ADEC

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SC-091	Excerpt: Preliminary Source Evaluation 2 Operable Unit D REDLINE FINAL	ENSR		USACE-AK	August 1995	ADEC
SC-092	Excerpt: Site Assessment/Release Investigation and Corrective Action Plan Site 4, Bldg.35752 High-Frequency Transmitter Site Fort Richardson, Alaska	HLA		USACE-AK	April 13, 1994	ADEC
SC-093	Superfund Final Site Close Out Report Standard Steel and Metals Salvage Yard Anchorage, Alaska	Michael F. Gearheard	Michael F. Gearheard	ADEC	June 26, 2002	ADEC
SC-094	Water Quality Monitoring Program 1989/90 Annual Report	JMM Consulting Engineers, HDR/OTT Engineering, Inc.		MOA Department of Health & Human Services	July 1990	ADEC
SC-097	Evaluation of Ship Creek Fish and Sediment Studies			Dept. of Health and Human Services Environmental Services Division		ADEC
SC-098	Memo: ERT Response at Standard Steel, Anchorage, Alaska	Environmental Response Team, Edison, New Jersey	George R Prince and Alan M. Humphrey	Bill Longston, EPA	June 23, 1987	ADEC
SC-099	Letter and Labs: Nitrate Testing for Ship Creek	Directorate of Public Works Ft. Richardson	Rober J. Wrentmore	Mr. Kevin Klaweno ADEC	February 16, 1994	ADEC
SC-100	Memo: Base Response to Nitrate Levels in Ship Creek - ACTION MEMORANDUM	USAF	Thomas Case 3 WG/CC Elmendorf AFB	Elmendorf AFB	April 25, 1994	ADEC
SC-101	Memo: Use of Urea as a Deicing Chemical	USAF	Samuel C. Johnson III 3 WG/CC Elmendorf AFB	Elmendorf AFB	February 23, 1994	ADEC
SC-102	Excerpt Letter: Ship Creek Nitrate Sampling Plan	USAF	Donald Hickman	Elmendorf AFB	February 24, 1994	ADEC
SC-103	Statement of Work Remedial Investigation/Feasibility Study for Ship Creek at Elmendorf AFB, Alaska.			Elmendorf AFB	February 11, 1994	ADEC
SC-104	Letter: Response Letter for requested Report of Fish Tissue and Sediments Data	Dept Interior	Ann G. Rappoport	Kent Patrick-Riley - ADEC	March 28, 1997	ADEC
SC-105	Excerpt : Report by Woodward Clyde Consultants, 1994 Remedial Action Objectives for Standard Steel and Metals Salvage Yard Superfund Site, Anchorage, AK Draft Technical Memorandum, July 1994	Woodward-Clyde Consultants			July 15, 1994	ADEC
SC-106	A Study of Oil Pollution in an Alaskan Salmon Hatchery's Water Supply Vol. 1	ADF&G	Robert O. Baker	Bob Roys, FRED Division, Juneau	1978	ARLIS
SC-107	State of the Creeks Anchorage Waterways Council Annual Report 2000-2001	Anchorage Waterways Council		MOA		ARLIS
SC-108	Technical Report No. 01-7 Chester Creek Stream Condition Evaluation	ADF&G	Jeffrey C. Davis and Gay A. Muhlborg	MOA	July 2001	ARLIS
SC-109	A Summary of the Bioassessment of Stream Water Quality within the Municipality of Anchorage	UAF	Alexander M. Milner and Mark W. Oswood	UAF	December 1995	ARLIS
SC-110	Assessment of Water Quality in Chester Creek Using Bioassays	ENRI	Elaire B. Gabrielson and Alexander M. Milner	ADF&G	April 1992	ARLIS
SC-111	Fort Richardson Hatchery Water Pipeline	FR Bell and Associates		ML&P	April 1991	ARLIS

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SC-112	FRED D-J Report Federal Aid in Sport Fish Restoration Vol. 5, No. 4 Fort Richardson Hatchery	Gary Wall		ADF&G	November 1990	ARLIS
SC-113	FRED D-J/W-B Report Federal Aid in Sport Fish Restoration Vol. 7, No. 2 Elmendorf Hatchery	Darrell Keifer		ADF&G	September 1992	ARLIS
SC-114	FRED D-J Report Federal Aid in Sport Fish Restoration Vol. 4, No. 3 Elmendorf Hatchery	Darrell Keifer		ADF&G	November 1989	ARLIS
SC-115	1991 Underground Storage Tank Removals and Site Characterizations Tunnel Section Moose Pass Anchorage	ENSR		ARRC	January 1992	ARLIS
SC-116	An Investigation of Surface Water Quality of Four Selected Streams within the Anchorage Urban Area Anchorage, Alaska. (a working paper)	ADEC		ADEC	July 1981 (published in 1984)	ARLIS
SC-117	Reconnaissance Report and Feasibility Phase Project Study Plan Ship Creek Watershed Anchorage, Alaska	Tryck Nyman Hayes, Inc Tetra Tech/Simons Li & Associates, Inc.		USACE-AK	September 1999	
SC-118	NEPA Review Comments Moose Run Golf Course First Tier Environmental Assessment (State ID No. AK9605-15AA)			Guy McConnell, USACE-AK	July 3, 1996	ADEC
SC-119	Excerpts : Environmental Restoration Program Operable Unit 5 Remedial Investigation/Feasibility Study Vol. 1 - Text FINAL	Radian Corp		Elmendorf AFB	March 1994	ADEC
SC-120	A Chronology of Water Use and Water Rights on Ship Creek US Army Alaska				March 1997	ADEC
SC-121	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Eighth Quarterly Report of Results and Overall Water Quality Assessment			Elmendorf AFB	November 1996	ADEC
SC-122	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Sixth Quarterly Report of Results			Elmendorf AFB	May 1996	ADEC
SC-123	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Fifth Quarterly Report of Results			Elmendorf AFB	February 1996	ADEC

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SC-124	Excerpts: Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Fifth Quarterly Report of Results		Elmendorf AFB	February 1996	
SC-125	Excerpts: Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Fourth Quarterly Report of Results		Elmendorf AFB	November 1995	
SC-126	Excerpts: Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Third Quarterly Report of Results		Elmendorf AFB	August 1995	
SC-127	Excerpts: Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Second Quarterly Report of Results DRAFT		Elmendorf AFB	May 1995	
SC-128	Excerpts: Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska First Quarterly Report of Results DRAFT		Elmendorf AFB	April 1995	
SC-129	Excerpts: Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Sixth Quarterly Report of Results		Elmendorf AFB	May 1996	
SC-130	Fisheries Data Series No. 00-7 Marking, Enumeration, and Size Estimation for Coho and Chinook Salmon Smolt Releases into Upper Cook Inlet, Alaska in 1998	Diane Loopstra, Carmen Olito, and Patricia Hansen	ADF&G	July 2000	ARLIS
SC-131	Fisheries Data Series No. 99-1 Marking, Enumeration, and Size Estimation for Coho and Chinook Salmon Smolt Releases into Upper Cook Inlet and Resurrection Bay, Alaska in 1997	Diane Starkey, Carmen Olito, and Patricia Hansen	ADF&G	April 1999	ARLIS
SC-132	Fisheries Data Series No. 97-13 Marking, Enumeration, and Size Estimation for Coho and Chinook Salmon Smolt Releases into Upper Cook Inlet, Alaska in 1996	Diane Starkey, Carmen Olito, and Patricia Hansen	ADF&G	July 1997	ARLIS
SC-133	Fishery Management Report No. 94-4 1993 Area Management Report for the Recreational Fisheries of the Southwest Alaska Area	R. Eric Minard and Dan O. Dunaway	ADF&G	July 1994	ARLIS
SC-134	Restoration and Enhancement of Aquatic Habitats in Alaska: Case Study Reports, Policy Guidance, and Recommendations	Betsy I. Parry and Glenn A. Seaman	ADF&G	July 1994	ARLIS
SC-135	2002 Alaska Biological Monitoring and Water Quality Assessment Program Report	ENSR	ADF&G	September 2003	ARLIS

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SC-136	Bioassessment of Select Streams at Anchorage, Alaska: 2000 Data Report Doc No. WMP APR00005	Watershed Management		MOA	December 2000	ARLIS
SC-137	Municipality of Anchorage Comments for ADEC Revised 1994 Clean Water Act Section 303(d)(1)(A) and (B) List				September 23, 1994	ARLIS
SC-138	Excerpt from News from the Alaska Public Health Association Opinion: Are the fish in Ship Creek Safe to Eat?	Alaska Medicine			March/April 1989	Loussac
SC-139	Data: Fish Data Sheet				January 23, 2001	ADF&G
SC-140	Environmental Restoration Program Cumulative Risk Evaluation for Operable Units 1-6 Work Plan Final			Elmendorf AFB	March 1995	ADEC
SC-141	Environmental Restoration Program Basewide Environmental Monitoring Program, Groundwater Analytical Results for Operable Unit 1, Round 1			Elmendorf AFB	September 2000	ADEC
SC-142	Environmental Restoration Program Basewide Environmental Monitoring Program Groundwater and Surface Water Analytical Results for OU 5, Round 2, 2000			Elmendorf AFB	October 2000	ADEC
SC-143	Environmental Restoration Program Basewide Environmental Monitoring and Well Maintenance Program, Groundwater and Surface Water Analytical Results for OU 5, Round 1			Elmendorf AFB	August 1999	ADEC
SC-144	Environmental Restoration Program Basewide Environmental Monitoring Program Groundwater and Surface Water Analytical Results for OU 5, Round 2, 2001			Elmendorf AFB	October 2001	ADEC
SC-145	OU 5 Surface Water Sampling Ship Creek, Elmendorf AFB			Elmendorf AFB	May 2001	ADEC
SC-146	Environmental Restoration Five Year Review Elmendorf AFB, Alaska					Elmendorf AFB/Website
SC-147	Port of Anchorage Drainage Study, Final Report DPW #95-17	CH2M Hill	HDR	MOA	March 1997	MOA
SC-148	Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes (as revised July 11, 1990 effective September 29, 1990)	ADF&G		Southcentral Region II	1990	MOA
SC-149	Draft Municipality of Anchorage Aquatic Resources Commission State of the Streams Report			MOA	February 9, 1994	MOA
SC-150	Port of Anchorage Drainage Study, Final Report - Technical Appendices DPW #95-17	CH2M Hill	HDR	MOA	March 1997	MOA

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SC-151	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska First Quarterly Report of Results DRAFT	Radian Corp		Elmendorf AFB	April 1995	ADEC
SC-152	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Second Quarterly Report of Results DRAFT	Radian Corp		Elmendorf AFB	May 1995	ADEC
SC-153	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Third Quarterly Report of Results	Radian Corp		Elmendorf AFB	August 1995	ADEC
SC-154	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Fourth Quarterly Report of Results	Radian Corp		Elmendorf AFB	November 1995	ADEC
SC-155	Environmental Restoration Program Sampling and Analysis of Ship Creek Elmendorf Air Force Base, Alaska Eighth Quarterly Report of Results and Overall Water Quality Assessment	Radian Corp		Elmendorf AFB	November 1996	ADEC
SC-200	Ship Creek Water Quality Information	ADNR (Mining and Water Management)		MOA, Heritage Land Bank, Ship Creek Enhancement Project	June 30, 1997	ADEC
SC-201	Macroinvertebrate Distribution and Water Quality in Anchorage Streams	Alexander M. Milner & Mark W. Oswood (UAF)		UAF	June 1, 1989	ADEC
SC-202	Ship Creek Bioassessment Investigations	Pacific Northwest Labs		USAF	December 1, 1994	ADEC
SC-203	Checklist: Alaska's Watershed Framework Watershed Activity Checklist & Report, Ship Creek, Anchorage Period: Historical to March 1, 1997	ADEC		ADEC	March 1, 1997	ADEC
SC-204	Contaminated Sites List					ADEC
SC-205	Excerpts: Concentrations of Selected Hydrocarbons in Arctic Diesel Oil and Potentially Petroleum Impacted Hatchery Trout (Water Quality and Hatchery)	Battelle Pacific Northwest Labs	Robert G. Riley and Benta L. Thomas	ADF&G	November 1982	ADEC
SC-206	Memo: ADF&G Fish Information: Ship Creek Chinook Salmon Fisheries	Division Of Mining and Water Management	Mary Maurer (ADNR/DMWM)	Kent Patrick-Riley	June 17, 1996	ADEC
SC-207	Ship Creek Water Balance/Water Use Report	ADNR/DMWM		MOA, Heritage Land Bank, Ship Creek Enhancement Project	June 30, 1997	ADEC

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SC-208	Public Hearing Draft: Ship Creek-Port Area Meriting Special Attention Plan	MOA	Michael J. Meehan, AICP, Director, Department of Economic Development and Planning	MOA	ADEC
SC-209	Ship Creek Bridge and North "C" Street Realignment. Final Environmental Assessment.	Peratrovich, Nottingham & Drage, Inc.		MOA-DPW	August 1991 ADEC
SC-210	Ship Creek Waterfront Request for Proposal (Summary)			Anchorage Economic Development Corporation	October 1990 ADEC
SC-211	Monthly Activity Report: Ship Creek Water Treatment Facility Field Operations and Eklutna Water Treatment Facility			MOA - Anchorage Water & Wastewater Utility	September 1991 ADEC
SC-212	Memo: Review of Ship Creek - Port of Anchorage AMSA	ADF&G	Betsy Parry, Habitat Biologist, Region II	ADF&G	June 11, 1991 ADEC
SC-213	Memo: Ship Creek/Waterfront Land Use Plan	MOA	Tom Neilson, Land Use Planning Supervisor.	Planning and Zoning Commission	June 21, 1991 ADEC
SC-214	Newspaper Clippings (circa 1989): *City Officials Defend Removal of Signs at Creek*	Anchorage Daily News			ADEC
SC-215	TAT Activity Reports: Preliminary Site Assessment Standard Steel and Metals Salvage Yard, Anchorage, Alaska 28 October - 8 November 1985	EPA Region X	Technical Assistance Team TDD#10-8510-07	EPA Region X	March 1986 ADEC
SC-216	(Incomplete) Interim: Federal on Scene Coordinator's Report Hazardous Waste Site Cleanup Standard Steel and Metals Salvage Yard Anchorage, Alaska 2 June - 31 July 1986	EPA Region X	Technical Assistance Team TDD#10-8701-05	EPA Region X	January 1987 ADEC
SC-217	National Bioaccumulation Study: Contaminant Concentrations of Xenobiotics other than Dioxin/Furans				ADEC
SC-218	1988 Statewide Water Quality Assessment	ADEC			ADEC
SC-219	1989 Nonpoint Source Water Quality Assessment	ADEC			ADEC
SC-220	Except: TAT Activity Reports: Hazardous Waste Site Cleanup Standard Steel and Metals Salvage Yard Anchorage, Alaska 2 June - 31 July 1986	EPA Region X	Technical Assistance Team TDD#10-8610-01	EPA Region X	October 1986 ADEC
SC-221	(Excerpts) Draft Technical Memo: Remedial Action Objectives	Woodward-Clyde Consultants		Standard Steel and Metals Salvage Yard Superfund Site Anchorage, Alaska	July 1994 ADEC
SC-222	Except: Management Plan Remedial Investigation/Feasibility Study Standard Steel and Metals Salvage Yard Superfund Site Anchorage, Alaska Final	Woodward-Clyde		EPA Region X	March 1993 ADEC

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SC-223	Excerpt: On-Scene Coordinator's Report for: Standard Steel and Metals Salvage Yard Superfund Site Anchorage, Alaska	Ecology & Environment, Inc.	J.L. Roland	EPA Region X	December 1988	ADEC
SC-224	Letter: EPA Comments on the Remedial Design/Remedial Action Work Plan Air Monitoring Plan, Appendix E.	EPA Region X	Christopher Cora	EPA Region X	February 23, 1998	ADEC
SC-225	Letter: Erosion Control Wall Repair Standard Steel and Metals Salvage Yard	EPA Region X	Christopher Cora	EPA Region X	September 26, 1996	ADEC
SC-226	Fact Sheet: Superfund Fact Sheet Standard Steel and Metals Salvage Yard	EPA Region X		EPA Region X	October 1998	ADEC
SC-227	Report: Conceptual Design Plan Remedial Design/Remedial Action Standard Steel and Metals Salvage Yard Superfund Site	Alta Geosciences, Inc.		Standard Steel RD/RA PRP Group	July 1997	ADEC
SC-228	Macroinvertebrate Distribution and Water Quality in Anchorage Streams	Woodward-Clyde Consultants	Alexander M. Milner & Mark W. Oswood (UAF)	MOA	June 1, 1989	ARLIS
SC-229	Macroinvertebrate Water Quality Monitoring Program in Anchorage Streams 1989 Results	Woodward-Clyde Consultants	Alexander M. Milner & Mark W. Oswood (UAF)	MOA	August 1990	ARLIS
SC-130	Thesis: Macroinvertebrate as an Indicator of Urbanization in Ship Creek and a Comparison of Two Sampling and Analytical Methods in Southcentral Alaskan Creeks	Audra Love (APU)		APU	December 1999	ARLIS
SC-231	Draft Report: An Investigation of Sedimentation Processes in the Vicinity of the Ship Creek Waterfront Development	Woodward-Clyde Consultants and Coastline Engineering	Joseph M. Colonel and Douglas F. Jones		October 31, 1990	ARLIS
SC-232	1993 Evaluation of Campbell Creek Using Rapid Bioassessment Techniques	ENRI	Elaine Gabrielson and Alexander Milner (UAA)	ADEC	December 1993	ARLIS
SC-233	Thesis: A Protocol for Assessing the Impacts of Urbanization on Coho Salmon with Application to Chester Creek, Anchorage, Alaska	Matthew S. Whitman (UAF)		UAF	August 2002	USCG
SC-234	Publication: Streamflow and Sediment Transport Characteristics of the Lower Campbell Creek Basin, Anchorage, Alaska 1986-88	ADOT&PF	Stephen W. Lipscomb	USGS	1991	USGS
SC-235	Publication: Effects of Artificial-Recharge Experiments at Ship Creek Alluvial Fan on Water Levels at Spring Acres Subdivision, Anchorage, Alaska	USGS	William Meyer and Leslie Patrick	USGS	1980	USGS
SC-236	Publication: Surface-Water Quality in the Campbell Creek Basin, Anchorage, Alaska	MOA	Timothy P. Brabets and Lorin A. Wittenberg	USGS	1983	USGS
SC-237	Publication: Quantity and Quality of Urban Runoff from the Chester Creek Basin, Anchorage, Alaska	MOA	Timothy P. Brabets	USGS	1987	USGS
SC-238	Publication: Artificial Recharge Experiments on the Ship Creek Alluvial Fan, Anchorage, Alaska	MOA	Gary S. Anderson	USGS	1977	USGS
SC-239	Site Investigation Report KAPP Diversion Pond Sediment Sampling and Analysis.	Steigers Corp and T&R Environmental Consulting, Inc.		Knik Arm Power Plant Matlow Power & Steam, Inc.	May 2004	ADNR
SC-240	RCPA Facility Assessment Report Alaska Railroad Corporation Anchorage, Alaska EPA I.D. No. AKD 98176 7403	SAIC		EPA Region X	March 1996	ARRC

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SC-241	RCRA Facility Assessment Report Alaska Railroad Corporation Lease Properties Anchorage, Alaska			EPA Region X		ARRC
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