



**611TH AIR SUPPORT GROUP
611TH CIVIL ENGINEER
SQUADRON
ELMENDORF AFB, ALASKA**

**KING SALMON AIR STATION
KING SALMON, ALASKA
INSTALLATION RESTORATION PROGRAM**

**RECORD OF DECISION FOR
FINAL REMEDIAL ACTION
NORTH BLUFF (LF005) AND SOUTH
BLUFF (LF014)
GROUNDWATER ZONE 3 (OT029)**

APRIL 2000

**RECORD OF DECISION
FOR
FINAL REMEDIAL ACTION**

**NORTH BLUFF (LF005) AND SOUTH BLUFF (LF014)
(GROUNDWATER ZONE 3 (OT029)
KING SALMON AIR STATION
KING SALMON, ALASKA**

**DECLARATION,
DECISION SUMMARY,
AND
RESPONSIVENESS SUMMARY**

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TECHNICAL DOCUMENT TO SUPPORT INSTALLATION RESTORATION DECISION

DECLARATION

SITE NAME AND LOCATION

Installation Restoration Program (IRP) Site OT029; North Bluff (LF005) and South Bluff (LF014) (known collectively as Groundwater Zone (GWZ) 3), located at King Salmon Air Station, Alaska.

STATEMENT OF BASIS

This decision is based on information contained in the Administrative Record, including but not limited to the results of an IRP Records Search, Site Investigations (1990 and 1991), a Remedial Investigation (1995), a Feasibility Study (1997), Interim Remedial Action (IRA) (1996 and 1998), Interim Remedial Action Record of Decision (1996), and post-closure monitoring (1996 through 1999).

The United States Air Force (USAF) is the lead agency for the North and South Bluffs, working under a three-party agreement with the Alaska Department of Environmental Conservation (ADEC) and the U.S. Environmental Protection Agency (USEPA). ADEC regulations serve as the primary applicable or relevant and appropriate requirements (ARARs) for this program.

This Record of Decision (ROD) presents the selected alternative for GWZ OT029. This document has been developed in accordance with the Defense Environmental Restoration Program, 10 *United States Code* (USC) 2701, consistent with ADEC Oil and Hazardous Substances Pollution Control Regulations [18 Alaska Administrative Code (AAC) 75], the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601 and Executive Order 12580 (52 *Federal Register* 2923), and to the extent practicable with the National Oil and Hazardous Substances Pollution Contingency Plan [40 *Code of Federal Regulations* (CFR) 300].

ASSESSMENT OF SITE

The North Bluff (LF005) and South Bluff (LF014) were historically used to dispose of empty 55-gallon drums and other solid waste at the King Salmon Air Station. The North Bluff (LF005) was used from the 1950s until the 1970s, while the South Bluff (LF014) was used from the early 1940s until the mid-1960s. Residual liquids (mostly petroleum) present in the drums at the time of disposal are potential sources of contamination at the sites. Other potential contaminants include residual paints, paint thinners, solvents, batteries, insecticides, polychlorinated biphenyls (PCBs), and herbicides.

From 1984 to 1992, approximately 28,000 drums were removed from the bluff sites, mostly from the North Bluff (LF005). The drums were emptied, shredded, and stockpiled for shipment offsite. They were eventually recycled. A 1987 geophysical survey defined the approximate area of buried drums and other debris at the bluffs. Surface water and sediment samples collected in 1987 along the base of the North Bluff (LF005) did not contain detectable levels of contaminants. One of three surface-water samples collected from the South Bluff (LF014) contained the pesticide chlordane.

In 1992, a soil gas survey conducted at the southern end of the South Bluff (LF014) and field investigations at both bluff sites indicated the presence of volatile organic carbons

(VOCs) in the subsurface, fuel hydrocarbons in sediments, and several pesticides in A-Aquifer groundwater and surface water.

Results of a 1995 remedial investigation (RI) were used to develop a Post-Closure Monitoring Plan (PCMP) to guide future monitoring activities at the bluffs. Additional investigations and evaluations, including a baseline human and ecological risk assessment, a feasibility study (FS) to evaluate remedial alternatives, wetland and biota studies, and site monitoring, were performed from 1996 through 1999 at the bluff sites. The implemented Interim Remedial Action (IRA) included a combination of capping, institutional controls, and intrinsic remediation for the bluffs themselves; carbon filtration and intrinsic remediation of groundwater; and implementation of a managed wetlands program.

A 1999 statistical analysis of three years of PCMP results indicated no identifiable contaminant plumes or widespread contamination at the North Bluff (LF005) and South Bluff (LF014) sites. Random detections of several contaminants were identified at both sites; however, follow-up sampling at the same locations has shown that these detections are only sporadic. Relevant findings are presented below. Additionally, no contaminants were detected in any of the area residential wells sampled several times from 1994 through 1997.

Metals and Radioactive Analytes. The concentrations of detected metals and radioactive analytes in all media at both bluff sites appear to be within naturally occurring background levels.

Groundwater. Diesel range organics (DRO) were not detected in any North Bluff (LF005) groundwater samples. The only VOC detected in groundwater at North Bluff (LF005) above regulatory criteria was benzene, which was detected in two upgradient monitoring wells in one event only. The only polynuclear aromatic hydrocarbon (PAH) detected in groundwater at North Bluff (LF005) above regulatory criteria was benzo(a)pyrene, which was detected in one A-Aquifer well sample. No pesticides or PCBs were detected above regulatory criteria in any North Bluff (LF005) groundwater samples.

DRO, VOCs, and PAHs were not detected above regulatory criteria in any South Bluff (LF014) groundwater samples. One pesticide, aldrin, was detected above regulatory criteria in one South Bluff (LF014) groundwater sample.

Surface Water and Sediment. DRO were detected in surface water and sediment samples at North Bluff (LF005). No regulatory or screening criteria exist for DRO in sediments or surface water. VOCs were not detected above regulatory criteria in any of the North Bluff (LF005) surface water samples. The VOCs carbon disulfide and toluene were detected above ecological surface water screening criteria. Three VOCs, toluene, acetone, and 2-butanone were detected above sediment screening criteria. Total PCBs and three pesticides (4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) were detected above sediment screening criteria for several North Bluff (LF005) samples.

DRO were detected in surface water and sediment samples at South Bluff (LF014). No regulatory or screening criteria exist for DRO in sediments or surface water. VOCs and PAHs were not detected above regulatory or ecological screening criteria in any of the South Bluff (LF014) surface water samples. Two VOCs, acetone and toluene, were

detected above sediment screening criteria. Two pesticides (4,4'-DDD and 4,4'-DDT) were detected above sediment screening criteria for several South Bluff (LF014) samples.

DESCRIPTION OF THE SELECTED REMEDY

Based on current site conditions and the successful implementation of interim remedial actions, USAF, ADEC, and USEPA have selected a plan of institutional controls (site-access and land-use restrictions), bluff inspection and maintenance, continued operation of the water-treatment system, and continued monitoring, with no further remedial action planned, as the final action for the North and South Bluff.

The selected remedy is deemed sufficient to protect human health and the environment from risks associated with exposure to contaminated sediment, groundwater, and surface water. Soil is not a media of concern at the Bluff sites because the only known contaminated soil present is associated with solid waste within the landfills, which is contained by the caps. The selected remedy includes the following components:


- The USAF will modify the General Plan, 611th Air Support Group (ASG), Remote Alaska (hereafter referred to as the General Plan) and appropriate land records (i.e., deeds) to include approved institutional controls, which restrict future installation of drinking-water wells and soil excavation at both sites. Land-use restrictions and land surveys will be included in the General Plan, which is scheduled for completion by October 2000. Additionally, the wooden barrier fencing constructed at the bluffs to prevent unauthorized site access will be inspected monthly for damage or vandalism, and maintained/repaired as necessary.
- An inspection and maintenance program has been developed and implemented for the bluff caps. This program will continue at both sites following plans outlined in the *Draft Operation, Monitoring, and Maintenance Manual, North and South Barrel Bluffs, King Salmon, Alaska* (Hart Crowser, 1999).
- Operation and maintenance of the water-treatment system at South Bluff (LF014) will continue according to plans outlined in the monitoring and maintenance manual (Hart Crowser, 1999). The objective of the treatment system is to intercept seep water leaching from the banks adjacent to King Salmon Creek and remove petroleum hydrocarbons and other organic chemicals that may be present. Following treatment, the water is discharged into a leach field adjacent to the South Bluff (LF014) wetlands.
- Residential wells near the bluffs have been sampled for potential contaminants several times since 1994. No contaminants have been detected; consequently, residential wells will no longer be sampled. Instead a more comprehensive system of sentry wells has been installed and will be sampled as delineated in the revised monitoring plan (Bristol/OASIS, 1999a).
- Groundwater and surface-water monitoring at the bluffs will continue on an annual basis following procedures outlined in the revised monitoring plan (Bristol/OASIS, 1999a).
- With the IRA in place, contamination remaining at the bluff sites does not pose an unacceptable threat to human health or the environment; however, some

contamination remains in the bluffs disposal area beneath the cap. The remedy summarized above and detailed in this ROD will be reviewed by USAF, ADEC, and USEPA at a frequency of not less than once every five years to evaluate if the remedy continues to be effective and appropriate. The first review will be conducted by 2005. Input from the Naknek/South Naknek Native Village Council, King Salmon Village Council, Federal and State trustees, and the King Salmon Restoration Advisory Board (RAB) will be solicited prior to implementing any changes.

STATUTORY DETERMINATIONS

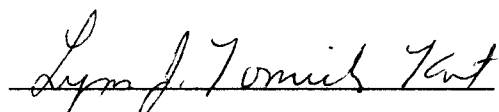
No remedial action, except institutional controls involving land-use and site-access restrictions, a bluff inspection and maintenance program, continued water-treatment system operation at the South Bluff (LF014), and long-term groundwater and surface-water monitoring is necessary to protect human health or the environment at the bluff sites. Interim remedial actions taken at the site have eliminated the need to conduct further remedial action.

This decision may be reviewed and modified in the future if new information becomes available which indicates the presence of previously undiscovered contamination or exposure routes that may cause a risk to human health or the environment.



Michael Wyka, Colonel, USAF
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12 June 00
Date



Lynn J. Tomich Kent
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4/11/00
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ABBREVIATIONS AND ACRONYMS

611 th CES	611th Civil Engineer Squadron
AAC	Alaska Air Command
ADEC	Alaska Department of Environmental Conservation
AFB	Air Force Base
ARARs	Applicable or Relevant and Appropriate Requirements
ASG	Air Support Group
bgs	Below Ground Surface
BRISTOL	Bristol Environmental Services
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
COE	U.S Corps of Engineers
COPCs	Contaminants of Potential Concern
CRP	Community Relations Plan
DRO	Diesel-Range Organics
DWS	Drinking Water Standards
EA	Environmental Assessment
EMCON	EMCON Alaska, Inc.
ES	Engineering Science
FAA	Federal Aviation Administration
Fluor Daniel	Fluor Daniel, Inc.
FS	Feasibility Study
FTN	Flavor Threshold Number
GRO	Gasoline-Range Organics
GWZ	Groundwater Zone
Hart Crowser	Hart Crowser, Inc.
HDPE	High-Density Polyethylene
HI	Hazard Index
HQ	Hazard Quotient
IRA	Interim Remedial Action
IRP	Installation Restoration Program
KSA	King Salmon Air Station
LFI	Limited Field Investigation
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NFRAP	No Further Response Action Planned
NOAA	National Oceanic and Atmospheric Administration
NORAD	Northern American Aerospace Defense Command
OASIS	OASIS Environmental, Inc.
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
PAHs	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PCMP	Post-Closure Monitoring Plan
PP	Proposed Plan
PRG	Preliminary Remediation Goals

ABBREVIATIONS AND ACRONYMS (cont.)

RA	Risk Assessment
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPM	Remedial Program Manager
SAIC	Science Applications International Corporation
SMCLs	Secondary Maximum Contaminant Levels
SVOCs	Semivolatile Organic Compounds
TAH	Total Aromatic Hydrocarbons
TAqH	Total Aqueous Hydrocarbons
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Level
USAF	United States Air Force
USC	United States Code
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compounds

UNITS OF MEASURE

mg/Kg	Milligrams Analyte per Kilogram of Sample
mg/L	Milligrams Analyte per Liter of Sample
µg/Kg	Micrograms Analyte per Kilogram of Sample
µg/L	Micrograms Analyte per Liter of Sample

1 INTRODUCTION

This Record of Decision (ROD) summary provides an overview of the determination for Installation Restoration Program (IRP) Site OT029; North Bluff (LF005) and South Bluff (LF014) (collectively known as Groundwater Zone (GWZ) 3), located at King Salmon Air Station, Alaska. This ROD document presents the physical features of the site, the contaminants present, and the associated risks to human health and the environment. It also describes the rationale for no further invasive removal with the implementation of institutional controls, bluff inspection and maintenance, continued operation and maintenance of the treatment system, and long-term monitoring. This document also states how the determination satisfies requirements of the Defense Environmental Restoration Program, 10 *United States Code* (USC) 2701, consistent with ADEC Oil and Hazardous Substances Pollution Control Regulations [18 Alaska Administrative Code (AAC) 75], CERCLA, and to the extent practicable with the National Oil and Hazardous Substances Pollution Contingency Plan [40 *Code of Federal Regulations* (CFR) 300].

The United States Air Force (USAF) is the lead agency for the North and South Bluffs, working under a three-party agreement with the Alaska Department of Environmental Conservation (ADEC) and the U.S. Environmental Protection Agency (USEPA). ADEC regulations serve as the primary applicable or relevant and appropriate requirements (ARARs) for this program.

The USAF has completed a Remedial Investigation (RI), Feasibility Study (FS), Human Health and Ecological Risk Assessments (RAs), and additional sampling at the North and South Bluffs. The results of the various investigation activities and the risk assessments were used to determine the need for remedial action at the bluffs.

A proposed plan for Interim Remedial Action (IRA) was distributed in October 1994. After consideration of public comments, the preferred remedial alternative was selected and documented in an Interim Action ROD, which was issued in March 1996. IRA activities involved limited drum/debris removal and landfill capping, and were implemented beginning in 1996.

A fact sheet presenting the proposed final action at the North and South Bluffs was distributed for comment in July 1999. Public comments were received and are addressed in the Responsiveness Summary (Section 8). The fact sheet is provided as Appendix B.

The IRA fieldwork conducted at the site has reduced the risk to human health and the environment. The need to conduct further invasive removal has been eliminated at this point in time. The resulting decision includes the following elements:

- Institutional controls limiting land use and site access;
- An inspection and maintenance program for the bluffs;
- Continued operation of the water treatment system at the South Bluff (LF014);
- Annual groundwater and surface-water monitoring; and
- Five-year reviews to ensure that no unacceptable risk or threat to public health or the environment remains at the site.

2 SITE DESCRIPTION

2.1 SITE LOCATION AND DESCRIPTION

King Salmon is situated on the Alaska Peninsula adjacent to Bristol Bay and Katmai National Park and Preserve, approximately 280 miles southwest of Anchorage and 15 miles east of Kvichak Bay (Figure 1). King Salmon lies in the Nushagak-Bristol Bay Lowland, a broad piedmont characterized by morainal topography and abundant fresh-water lakes. The area is accessible only by air or water.

The name "King Salmon" is used in this ROD to indicate the general area of the property and installation, including the commercial airport, current and former USAF property, and the community of King Salmon. King Salmon Air Station (KSA) refers specifically to current and former USAF property.

The North and South Bluffs are located along the eastern bank of King Salmon Creek approximately 3,000 feet north and 2,000 feet northwest of KSA, respectively (see Figure 1). Both bluffs are adjacent to wetland areas that drain into the creek. The western boundary of the South Bluff (LF014) slopes steeply to King Salmon Creek, which flows southward and discharges into the Naknek River. Ground surface elevations range from approximately 10 to 60 feet above sea level at the bluff sites. The bluffs were primarily used to dispose of empty 55-gallon drums and other solid waste such as metal and wood debris. The North Bluff (LF005) was used from the 1950s until the 1970s, while the South Bluff (LF014) was used from the early 1940s until the mid-1960s. Residual liquids (mostly petroleum) present in the drums at the time of disposal are potential sources of contamination at the sites. Other potential contaminants include residual paints, paint thinners, solvents, batteries, insecticides, PCBs, and herbicides.

2.2 SITE CHARACTERISTICS

Site characteristic information for the North and South Bluffs was summarized from the following sources: *1999 Draft Monitoring Report, North and South Bluffs, King Salmon Airport, Alaska* (Bristol/OASIS, 2000); *Statistical Analysis of Sampling Events, Revision of Post-Closure Monitoring Plan North and South Bluffs King Salmon Airport Final Report* (Bristol/OASIS, 1999a); and *Overview of Environmental and Hydrogeologic Conditions at King Salmon, Alaska* (Waythomas, 1994).

2.2.1 Climate

The King Salmon area has a climate transitioning between maritime (cool, wet summers) and continental (moderately cold winters). The local weather is highly influenced by cyclonic storms originating in the Aleutian Chain. The mean annual temperature at KSA is 33 °F, mean annual precipitation is approximately 20 inches, and annual snowfall is about 44 inches.

2.2.2 Geology

There are several hundred feet of unconsolidated surficial deposits overlying bedrock at KSA. Most of the sediments were deposited during Quaternary glaciation of the Alaska Peninsula. Alluvial deposits are found along Eskimo Creek, King Salmon Creek, and the Naknek River. The exact depth to bedrock in the King Salmon area is unknown. Wells

as deep as 180 feet did not encounter bedrock, and bedrock is not exposed in the bluffs along the Naknek River near King Salmon.

2.2.3 Groundwater Hydrology

Based on field observations and soil boring data, at least three aquifer units are known to exist in the King Salmon area. The aquifers consist of unconsolidated, well-sorted to poorly sorted silty and gravely sands separated by aquitard units consisting of silty sands, silts, and clays.

The shallowest aquifer, the A-Aquifer, is unconfined and is exposed in many areas within KSA. The total depth to the A-Aquifer ranges from the surface at the Naknek River to 45 feet below ground surface (bgs) along the northern margin of KSA. The saturated thickness of the A-Aquifer ranges from zero to 15 feet. Groundwater movement in the A-Aquifer generally is toward local topographic lows and surface drainages such as wetlands, rivers, creeks, and ditches. The A-Aquifer likely is recharged by precipitation and influent stream flow.

The A-Aquitard is between 7 and 22 feet thick and underlies the A-Aquifer. The surface of the aquitard is not horizontal, and the relief may affect local groundwater flow direction and contaminant distribution. Eskimo Creek, King Salmon Creek, and the Naknek River have eroded through the A-Aquifer.

Underlying the A-Aquitard, the top of the B-Aquifer has been encountered at depths ranging from 50 to 80 feet bgs. The known thickness of the aquifer ranges from 15 to 40 feet. Groundwater in the B-Aquifer probably is in equilibrium with the A-Aquifer; a similar piezometric surface has been measured in adjacent A-Aquifer and B-Aquifer monitoring wells. Numerous residential drinking-water supply wells are screened in the B-Aquifer. Residential areas near the north bank of the Naknek River are downgradient of potential KSA contamination sources. The B-Aquitard underlies the B-Aquifer. The thickness of this aquitard may vary from 10 to 120 feet; only two KSA supply wells are known to have penetrated the B-Aquitard.

A third aquifer, the C-Aquifer, underlies the B-Aquitard at a depth of approximately 200 feet bgs. KSA's water-supply wells are reported to terminate in the C-Aquifer, which probably is confined. Aquifer thickness and direction of groundwater movement are unknown.

2.2.4 Surface-Water Hydrology

Surface water is abundant in the King Salmon area and includes numerous fresh-water lakes, streams, and bogs. King Salmon Creek is the principal surface-water body within the project area. A tributary of the Naknek River, it flows in a general southerly direction. The Naknek River itself is a major tributary of Kvichak Bay. Wetlands are present between the base of the Bluffs and King Salmon Creek.

2.2.5 Background Metals Concentrations

Metals occur naturally in sediments, surface water, and groundwater. Naturally occurring background metals concentrations are determined by site geology and hydrogeology. Two separate background metals evaluations were performed for some media at KSA. During the 1994 RI verification sampling, seven background sediment

samples were collected from wetland areas throughout KSA. The 1994 sampling data are not specific to the North and South Bluffs. In 1995, seven sediment and surface water samples were collected from wetlands in the Bluffs area to evaluate background chemistry. The 1995 data were not accepted by the USAF because the laboratory that analyzed the samples was subsequently discredited by the USAF. Therefore, the background metals concentrations for surface water, sediments, and groundwater in the Bluffs area have not been defined.

A variety of metals are detected in most of the groundwater and sediment samples. Some of the metals detections exceed ADEC screening criteria. However, it is not possible to distinguish between naturally occurring metals concentrations and detections due to contamination because background metals concentrations for the Bluffs area have not been defined.

2.2.6 Air

Air quality at KSA is qualitatively good (Waythomas, 1994). Although air-quality modeling or analyses have not been performed, pollution levels are likely to be low given the remote location and low level of development in the King Salmon area. Potential natural pollutants include forest fire smoke and windblown silt. Anthropogenic sources include petroleum hydrocarbon vapors and combustion emissions from storage tanks, refueling operations, and engine operations.

2.2.7 Wildlife and Vegetation

As a result of the relatively mild climate and varied topography, the King Salmon area supports a diverse and productive range of fish, birds, mammals, and plants. Plentiful surface water sustains an abundant community of commercially valuable fish species including rainbow trout, arctic char, arctic grayling, lake trout, whitefish, burbot, northern pike, and all five species of Pacific salmon.

Large populations of waterfowl (ducks, geese, and swans) nest and migrate through the area. Shore and wading birds include arctic and red-throated loons, cranes, parasitic jaegers, mew gulls, and Arctic terns. Land-dwelling bird species that have been observed in the King Salmon area include the spruce grouse, Lapland longspur, snow bunting, swallows, American dipper, Savanna sparrow, and raptors (osprey, short-eared owl, and bald eagle). No raptor nesting sites have been reported within KSA boundaries.

The largest land mammals using the area are brown bear, moose, and caribou. Other land mammals include wolf, wolverine, lynx, arctic and tundra hare, porcupine, and beaver. Beluga whales and river otters have been observed in the Naknek River.

A variety of vegetation, from subarctic forest to moist tundra, can be found throughout the region. Commonly observed vegetation includes lichen, sphagnum heath, crowberry, low birch, and marsh blueberry. Shoreline areas typically are foliated with sedges, cotton grass, willows, grasses, balsam poplar, and alder.

No threatened or endangered species have been observed at the North and South Bluff sites. While peregrine falcons and a variety of marine mammals live near the area, these species are unlikely to use the sites for feeding, nesting, or propagating.

2.2.8 Socioeconomics

King Salmon shares close socioeconomic ties with the nearby communities of Naknek and South Naknek. Naknek and King Salmon lie on the north bank of the Naknek River and are connected by a 13-mile long road. South Naknek is located on the southern bank of the Naknek River, opposite Naknek. The three communities share public utility services. Based on information compiled by the Alaska Department of Labor in 1996, the total permanent population of the three communities is approximately 1,250 residents, of which approximately 470 are in King Salmon.

The economic base of the area principally is composed of commercial fishing, fish processing, and transportation services. Fish processing attracts many workers from other areas during the fishing season. Transportation services include air taxi companies and commercial jet aviation (passenger and air cargo). Of the resident population, approximately 24 percent are employed in educational services, 22 percent in public administration, 13 percent in retail trade, 12 percent in transportation, 7 percent in construction, and the remainder in professional services, public utilities, manufacturing, and fisheries (1990 census figures).