

ALASKA LEGISLATURE COMMITTEE FILES 1993-1994 8672

8205 HOUSE TRANSPORTATION

970



*Department of Transportation  
and Public Facilities*

# POSITION PAPER

BILL NO: HB 520

APPROVED: 

TITLE: Courtesy Cars Operated at  
Airports

DATE: March 18, 1994

The Department of Transportation and Public Facilities (DOT&PF) opposes passage of HB 520. This bill expands the courtesy car definition in AS 02.15.095 to include transport to car rental businesses located outside airport terminals. It also prohibits state airports from charging fees for any courtesy car operation.

HB 520 would adversely affect AIA and FIA on-airport car rental revenue, which exceeded \$2 million in FY93. HB 520 encourages on-airport car rental businesses to move off of the airport and avoid paying fees because it prohibits the airports from charging fees to competing businesses who access the same passengers. Under AIA and FIA airline operating agreements, the loss of over \$2 million in existing non-airline revenue will require the airports to make up the shortfall by increasing air carrier landing fees.

Both on- and off-airport car rental businesses access similar passenger markets. AIA currently has a significant amount of off-airport car rental activity that directly competes with the on-airport car rental businesses. Those off-airport businesses pay a small annual permit fee to the airport, as shown on the attached historical revenue information sheet. On-airport car rental businesses will be at a continued competitive disadvantage if airports are prohibited from charging fees to off-airport businesses who regularly use the airports to access customers.

In 1993, AIA and FIA issued a report summarizing research, alternatives, rationale, and recommendations on a proposed new off-airport car rental program and fee. The airports then held public hearings, implemented regulations, and adopted an off-airport fee which takes effect June 1, 1994.

*For Further Information contact J.K. Ginger Johnson at 465-3904.*

BILL NO: HB 520

TITLE: Courtesy Cars Operated at Airports

DATE: March 18, 1994

When current AIA and FIA car rental contracts were offered in 1987, potential bidders for the on-airport business asked the airports to impose off-airport car rental fees to eliminate the competitive disadvantage faced by on-airport firms.

The off-airport car rental fee issue has been addressed at airports throughout the nation over the past ten years. The courts have upheld the right of airports to charge off-airport car rental fees for access to airport passengers. The U.S. Supreme Court has let stand lower court decisions that uphold the right of airports to charge off-airport car rental fees. The courts also recognized that hotel courtesy cars and off-airport car rental vehicles are very different types of service and airports are not required to treat them as the same class of use.

Off-airport car rental interests have repeatedly lobbied the U.S. Congress to prohibit airports from charging off-airport car rental fees. The U.S. Congress, as well as many state legislatures, have rejected these attempts.

**HISTORICAL  
CAR RENTAL REVENUE**

Anchorage and Fairbanks International Airports

On and Off Airport Comparison

	<u>FY 1990</u>	<u>FY 1991</u>	<u>FY 1992</u>	<u>FY 1993</u>
<b>ANCHORAGE INTERNATIONAL</b>				
On-Airport	\$1,551,599	\$1,449,373	\$1,648,600	\$1,776,126
*Off-Airport	75	125	175	175
<b>FAIRBANKS INTERNATIONAL</b>				
On-Airport	\$247,871	\$274,429	\$321,905	413,254
*Off-Airport	0	0	0	0
<b>TOTAL (BOTH AIRPORTS)</b>				
On-Airport	\$1,799,470	\$1,723,802	\$1,970,505	\$2,189,380
*Off-Airport	75	125	175	175

\*Currently, a \$25/year fee is charged to hotels and car rental agencies for a permit which allows them to access the airport with their courtesy vans. This permit is also required of taxicabs, but these figures do not reflect those revenues.

**PUFFIN  
INN**

March 23, 1994

TO: REPRESENTATIVE ELDON MULLER  
FAX# 465-3512  
RE: HOUSE BILL #520

Dear Rep. Muller,

I would like to express my support for House Bill #520 which prohibits certain airports from charging exorbitant fees for the right to pick up guests. While the primary issue of the moment deals with car rental agencies, I believe it would only be a matter of time before the same type of fees were requested of hotels, tour companies, and other businesses.

While a parking permit fee, such as the type which currently exists, is understandable, exacting a percentage of gross income leaves one with a taste of "protection money." This is indeed what the airports are trying to do; essentially they are saying, "you must pay us to do business." This is surely what the constitution meant to protect us from.

Once again, be assured of my support of this bill. Please let me know if there is anything else I can do to ensure its passing. Thank you.

Sincerely,

Sonja .. Jorgensen

**HB**

**544**

# Alaska House of Representatives

*Richard Foster*  
P.O. Box 1630  
Nome, Alaska 99762-1630  
907-443-5036  
Fax 907-443-2162



*During Session*  
State Capitol  
Juneau, Alaska 99801-1182  
907-465-3789  
Fax 907-465-3242

## Sponsor's Statement HB 544

There is a serious need to pass a .007 cent increase in the aviation fuel tax. If the increase is not passed this session, the Department of Transportation Aviation Maintenance Budget will be underfunded by 1.5 million dollars. If that happens, the Department has two apparent options. The first is to reinstitute landing fees on rural airports. The second option is to reduce maintenance by 1.5 million. This second option would be extremely serious since maintenance at many rural airports is already at or near a minimum acceptable level.

### HISTORY

The Department dropped landing fees at rural airports after the industry agreed that a less onerous solution was to institute a .007 cent increase in the aviation fuel tax to supplant the lost landing fee revenue.

One of the reasons that both the industry and Department prefer the fuel tax over landing fees is because landing fees create additional record keeping and monitoring for both the industry and the state. It is important to emphasize that the fuel tax mechanism is already in existence, and requires **no additional record keeping** on the part of the industry and **no additional record keeping and monitoring** on the part of the department.

While I am generally opposed to additional taxes, I am even more concerned about maintaining our basic transportation infrastructure at a level that assures access and safety to the citizens of the state and to other uses.



*Department of Transportation  
and Public Facilities*

# POSITION PAPER

BILL NO: HB 544

APPROVED: 

TITLE: Increase Aviation Fuel Tax

DATE: April 7, 1994

The Department of Transportation and Public Facilities supports the increase in the aviation fuel tax by \$0.007 (0.7 cents) per gallon.

This level of increase will offset the loss in state revenue resulting from not reinstating aircraft landing fees at rural airports operated by the state.

Last session, air carriers were contacted and asked if they would prefer reinstatement of the landing fees or collection of an equivalent amount of revenue through another means. While no firm commitment was made, the general feeling expressed was that an increase in the aviation fuel tax to collect an equivalent amount of revenue would be preferable.

The increased tax will be collected by the Department of Revenue in conjunction with the current tax level.

*For Further Information contact J.K. Ginger Johnson at 465-3904.*

**FISCAL NOTE**

Revision Date:  
Title: Increase Aviation Fuel Tax

Department Affected: DOT&PF  
BRU: Statewide M&O

Sponsor: House Transportation  
Requestor: Foster

Component: Highways & Aviation  
Component Serial Number: #1988

**EXPENDITURES/REVENUES: (Thousands of Dollars)**

OPERATING	FY95	FY96	FY97	FY98	FY99	FY00
PERSONAL SERVICES	0	0	0	0	0	0
TRAVEL	0	0	0	0	0	0
CONTRACTUAL	0	0	0	0	0	0
SUPPLIES	0	0	0	0	0	0
EQUIPMENT	0	0	0	0	0	0
LAND & STRUCTURES	0	0	0	0	0	0
GRANTS, CLAIMS	0	0	0	0	0	0
MISCELLANEOUS	0	0	0	0	0	0
<b>TOTAL OPERATING:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>CAPITAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>REVENUE FUND SOURCE</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**FUNDING: (Thousands of Dollars)**

1002 FEDERAL RECEIPTS	0	0	0	0	0	0
1003 GF MATCH	0	0	0	0	0	0
1004 GF	0	0	0	0	0	0
1005 GF/PROGRAM RECEIPTS	0	0	0	0	0	0
1006 GF/MHTIA	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
<b>TOTAL FUNDING:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**POSITIONS**

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

Estimate of current year (FY94) impact: \$0

**ANALYSIS: (Attach a separate page if necessary)**

See attached.

Prepared by: Ron B. Lind, Director

Phone: 465-8974

Division: Administrative Services Division

Date: April 8, 1994

Approved by Commissioner: *[Signature]*

Phone: 465-3901

Agency: Department of Transportation and Public Facilities

Date: April 8, 1994

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For further distribution information call the Governor's Legislative Office

Bill No.: HB 544  
Bill Title: Increase Aviation Fuel Tax  
Sponsor: House Transportation

Fiscal Note Analysis

Collection of an increased aviation fuel tax will not result in additional state administrative costs since there is already a fuel tax and collection procedure in place. In addition, there is no increased administrative information burden to the airlines related to a change in the fuel tax rate.

When the department has implemented a landing fee at rural airports, an additional accounting position was added (funded by \$58,800 program receipts), to collect, record and distribute these revenues to the maintenance and operations units that were authorized to expend them. Airlines were also required to file monthly certified activity reports which identified activity by airport and by aircraft type. The airlines filed approximately fifty reports per month.

These efforts will not be necessary with an aviation fuel tax increase, which can be collected through the existing structure and deposited to the general fund. The maintenance and operations units have requested a funding switch of \$1,550,000 from program receipts (for non-existent landing fees) to general funds in the FY95 budget. The accounting position and associated landing fee program receipts funding have been deleted from the department's FY95 budget.

# FISCAL NOTE

**STATE OF ALASKA**  
**1994 LEGISLATIVE SESSION**

**BILL NO.** HB 544

Revision Date: _____	Dept. Affected: Revenue
Title: <u>Increase Aviation Fuel Tax</u>	BRU: <u>Revenue Operations/Shared Taxes</u>
Sponsor: (H) TRA	Component: <u>Income and Excise Audit/Aviation Fuel</u>
Requestor: (H) TRA	COMPONENT SERIAL NO. <u>113/104</u>

**Expenditures/Revenues:** (Thousands of Dollars)

OPERATING	FY95	FY96	FY97	FY98	FY99	FY00
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS	20.4	20.4	20.4	20.4	20.4	20.4
MISCELLANEOUS						
<b>TOTAL OPERATING</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>
<b>CAPITAL</b>						

<b>REVENUE FUND SOURCE:</b> General	1,725.7	1,725.7	1,725.7	1,725.7	1,725.7	1,725.7
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**FUNDING:** (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF	20.4	20.4	20.4	20.4	20.4	20.4
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
<b>TOTAL</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>

**POSITIONS:**

FULL-TIME						
PART-TIME						
TEMPORARY						

Estimate of current year (FY94) impact: \$ 0.0

**ANALYSIS:** (Attach a separate page if necessary.)

(See Attached)

Prepared by:	<u>Larry E. Meyers</u> <i>Larry E. Meyers</i>	Phone: 465-2320
Division:	<u>Income and Excise Audit</u>	Date: <u>April 7, 1994</u>
Approved by Commissioner:	<u>Darrel J. Rexwinkel</u> <i>Darrel J. Rexwinkel</i>	Date: <u>April 7, 1994</u>
Agency:	<u>Department of Revenue</u>	

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**Bill Analysis**

This bill increases motor fuel tax rates on aviation fuel by .7¢ per gallon as follows.

	<i>Current Tax Rate</i>	<i>HB 544 Tax Rate</i>	<i>% Increase</i>
Aviation Gasoline	4¢ per gallon	4.7¢ per gallon	17.5%
Aviation (Jet) Fuel	2.5¢ per gallon	3.2¢ per gallon	28.0%

**Operating Costs**

Department of Revenue does not anticipate that this bill will impact its operating budget. Motor fuel tax forms will be revised to reflect the tax rate increases.

**Revenue**

In determining the amount of additional revenue generated from this bill, Department of Revenue used aviation fuel consumption data available from FY 93. Amounts below do not reflect impacts on consumption, if any, due to increased tax rates and other factors.

Under AS 43.40.010(e), 60% of aviation gasoline revenue derived from fuel sales at municipally owned airports are shared with those municipalities. The Department shared \$116,800 of aviation gasoline and fuel tax revenues to municipalities in FY 93. Under this bill, that amount will increase by 17.5% (% increase identified above) or \$20,400.

Additional revenue generated from this bill is estimated to be \$1,705,300 calculated as follows.

	<i>FY93 Consumption</i>	<i>FY 93 Revenue</i>	<i>HB 544 Revenue</i>	<i>Additional Revenue</i>
Aviation Gasoline	18,076,200 gallons	\$ 723,000	\$ 849,600	\$ 126,600
Aviation (Jet) Fuel	228,436,300 gallons	5,710,900	7,310,000	1,599,100
<b>Total</b>	<b>246,512,500 gallons</b>	<b>6,433,900</b>	<b>8,159,600</b>	<b>1,725,700</b>
Amount Shared		(116,800)	(137,200)	(20,400)
<b>Total</b>		<b>\$6,317,100</b>	<b>\$8,022,400</b>	<b>\$1,705,300</b>

# Alaska House of Representatives

*Richard Foster*  
P.O. Box 1630  
Nome, Alaska 99762-1630  
907-443-5036  
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*During Session*  
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*Department of Transportation  
and Public Facilities*

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**APPROVED:** 

**TITLE:** Increase Aviation Fuel Tax

**DATE:** April 7, 1994

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The increased tax will be collected by the Department of Revenue in conjunction with the current tax level.

*For Further Information contact J.K. Ginger Johnson at 465-3904.*

**FISCAL NOTE**

Revision Date:  
Title: Increase Aviation Fuel Tax

Department Affected: DOT&PF  
BRU: Statewide M&O

Sponsor: House Transportation  
Requestor: Foster

Component: Highways & Aviation  
Component Serial Number: #1988

**EXPENDITURES/REVENUES: (Thousands of Dollars)**

OPERATING	FY95	FY96	FY97	FY98	FY99	FY00
PERSONAL SERVICES	0	0	0	0	0	0
TRAVEL	0	0	0	0	0	0
CONTRACTUAL	0	0	0	0	0	0
SUPPLIES	0	0	0	0	0	0
EQUIPMENT	0	0	0	0	0	0
LAND & STRUCTURES	0	0	0	0	0	0
GRANTS, CLAIMS	0	0	0	0	0	0
MISCELLANEOUS	0	0	0	0	0	0
<b>TOTAL OPERATING:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

CAPITAL	0	0	0	0	0	0
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REVENUE FUND SOURCE	0	0	0	0	0	0
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**FUNDING: (Thousands of Dollars)**

1002 FEDERAL RECEIPTS	0	0	0	0	0	0
1003 GF MATCH	0	0	0	0	0	0
1004 GF	0	0	0	0	0	0
1005 GF/PROGRAM RECEIPTS	0	0	0	0	0	0
1006 GF/MHTIA	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
<b>TOTAL FUNDING:</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**POSITIONS**

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

Estimate of current year (FY94) impact: \$0

**ANALYSIS: (Attach a separate page if necessary)**

See attached.

Prepared by: Ron B. Lind, Director

Phone: 465-8974

Division: Administrative Services Division

Date: April 8, 1994

Approved by Commissioner: *[Signature]*

Phone: 465-3901

Agency: Department of Transportation and Public Facilities

Date: April 8, 1994

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Bill No.: HB 544  
Bill Title: Increase Aviation Fuel Tax  
Sponsor: House Transportation

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# FISCAL NOTE

**STATE OF ALASKA**  
**1994 LEGISLATIVE SESSION**

**BILL NO. HB 544**

Revision Date:

Dept. Affected: Revenue

Title: Increase Aviation Fuel Tax

BRU: Revenue Operations/Shared Taxes

Component: Income and Excise Audit/Aviation Fuel

Sponsor: (H) TRA

Requestor: (H) TRA

COMPONENT SERIAL NO. 113/104

**Expenditures/Revenues:**

(Thousands of Dollars)

OPERATING	FY95	FY96	FY97	FY98	FY99	FY00
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS	20.4	20.4	20.4	20.4	20.4	20.4
MISCELLANEOUS						
<b>TOTAL OPERATING</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>	<b>20.4</b>

<b>CAPITAL</b>						
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<b>REVENUE FUND SOURCE: General</b>	<b>1,725.7</b>	<b>1,725.7</b>	<b>1,725.7</b>	<b>1,725.7</b>	<b>1,725.7</b>	<b>1,725.7</b>
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(Thousands of Dollars)

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**POSITIONS:**

FULL-TIME						
PART-TIME						
TEMPORARY						

Estimate of current year (FY94) impact: \$ 0.0

**ANALYSIS:** (Attach a separate page if necessary.)

(See Attached)

Prepared by: Larry E. Meyers  
 Division: Income and Excise Audit  
 Approved by Commissioner: Darrel J. Rexwinkel  
 Agency: Department of Revenue

Phone: 465-2320  
 Date: April 7, 1994  
 Date: April 7, 1994

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**Operating Costs**

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<b>Total</b>		<b>\$6,317,100</b>	<b>\$8,022,400</b>	<b>\$1,705,300</b>

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12

# Alaska State Legislature

715 W. 4TH AVE., SUITE 240-A  
ANCHORAGE, ALASKA 99501-2133  
253-3190 Fax: 253-1261



WHILE IN SESSION:  
STATE CAPITOL  
JUNEAU, ALASKA 99801-1182  
465-2435 Fax: 465-2864

Representative David Finkestein

## SPONSOR STATEMENT HCR 12

A resolution relating to the use of natural gas as a motor vehicle fuel in Alaska.

As the nationwide drive toward alternative fuel use accelerates, Alaska needs to push forward. Our huge natural gas reserves can be put to very beneficial use in fueling motor vehicles, fueling our economy, and reducing pollution.

Currently, natural gas is used in Alaska for electrical generation, heating, and cooking. The resource would be more fully utilized if it were marketed to fuel the approximately 120,000 vehicles operating in southcentral Alaska, where natural gas is widely available.

Alaska's high-quality natural gas is a very viable fuel for motor vehicles. Rich in methane and high in octanes, it creates 90% less health-threatening carbon monoxide than gasoline. The persistent problems in controlling carbon monoxide emissions in Anchorage and Fairbanks could be solved if more motorists there switched to natural gas.

Using natural gas as a motor fuel would help to eliminate the leaking underground storage tank problems inherent to gasoline and diesel fuels, because if natural gas leaks, it simply dissipates into the atmosphere. It produces significantly lower levels of harmful pollutants such as benzene than do gasoline and diesel vehicles.

Motorists--especially truckers--would save money by using natural gas, since it is much less expensive than gasoline or diesel, and necessitates less maintenance. Natural-gas vehicles have been in use in Alaska for many years, and employ proven technology.

Soon, federal laws will mandate alternative-fuel use and impose much stricter emission standards. It makes sense to anticipate such requirements by drawing on and developing our own rich resources.

This resolution encourages federal, state, municipal, and private fleet operators in Alaska to use natural-gas cars, trucks, and buses, and it encourages the rapid development of natural-gas fueling stations.

FISCAL NOTE

STATE OF ALASKA  
1994 LEGISLATIVE SESSION

BILL NO. CS HCR 12 (O&G)

Revision Date: \_\_\_\_\_  
 Title: A Resolution Relating to the Use of  
Natural Gas in Alaska  
 Sponsor: Representative Finkelstein  
 Requestor: House Oil & Gas Committee

Department Affected: Environmental  
Conservation  
 BRU: Environmental Quality  
 Component: Air Quality Management

COMPONENT SERIAL NO. 1428

Expenditures/Revenues:	(Thousands of Dollars)					
	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00
OPERATING EXPENDITURES						
PERSONAL SERVICES	0.01	0.01	0.01	0.01	0.01	0.01
TRAVEL	0.01	0.01	0.01	0.01	0.01	0.01
CONTRACTUAL	0.01	0.01	0.01	0.01	0.01	0.01
SUPPLIES	0.01	0.01	0.01	0.01	0.01	0.01
EQUIPMENT	0.01	0.01	0.01	0.01	0.01	0.01
LAND & STRUCTURES	0.01	0.01	0.01	0.01	0.01	0.01
GRANTS, CLAIMS	0.01	0.01	0.01	0.01	0.01	0.01
MISCELLANEOUS	0.01	0.01	0.01	0.01	0.01	0.01
TOTAL OPERATING	0.01	0.01	0.01	0.01	0.01	0.01
CAPITAL EXPENDITURES	0.01	0.01	0.01	0.01	0.01	0.01
CHANGE IN REVENUES	0.01	0.01	0.01	0.01	0.01	0.01
FUND SOURCE						
1002 Federal Recs	0.01	0.01	0.01	0.01	0.01	0.01
1003 GF Mates	0.01	0.01	0.01	0.01	0.01	0.01
1004 GF	0.01	0.01	0.01	0.01	0.01	0.01
1005 GF/Program Receipt	0.01	0.01	0.01	0.01	0.01	0.01
1006 GF/MHTLA	0.01	0.01	0.01	0.01	0.01	0.01
Other	0.01	0.01	0.01	0.01	0.01	0.01
TOTAL	0.01	0.01	0.01	0.01	0.01	0.01

Estimate of any current year (FY94) cost: \$ \_\_\_\_\_

POSITIONS:

FULL-TIME	0.01	0.01	0.01	0.01	0.01	0.01
PART-TIME	0.01	0.01	0.01	0.01	0.01	0.01
TEMPORARY	0.01	0.01	0.01	0.01	0.01	0.01

ANALYSIS: (Attach a separate page if necessary.)

Prepared by: Bob Poe, Director  
 Division: Information & Administrative Services

Phone: 455-5010  
 Date: 2/14/94

Approved by Commissioner: [Signature]  
 Agency: Department of Environmental Conservation

Date: 2/14/94

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Department of Transportation  
and Public Facilities

# POSITION PAPER

BILL NO: HCR 12

APPROVED: 

TITLE: Use of Natural Gas in Motor  
Vehicles

DATE: March 3, 1993

DOT&PF supports and encourages the passage of this resolution. In partnership with the Department of Environmental Conservation (DEC), DOT&PF has actively supported and encouraged the use of natural gas as an automotive fuel, including sponsoring a conference on this topic in December, 1992. The two departments are now embarking on the formation of a joint government-industry panel to address what actions are needed to foster an increased supply and demand of natural gas as a motor vehicle fuel for Alaskan fleet vehicles and the general public.

Aside from our enthusiastic support for this resolution, we would like to offer some friendly amendments.

An additional benefit to Alaska in the development of natural gas as an automotive fuel is the presence of the Phillips Petroleum natural gas liquification plant at Nikiski. It provides an opportunity to economically transport natural gas to locations in the state not presently served by natural gas pipelines. Thus the expanded development of fueling infrastructure is not geographically bound by the present pipeline system.

We, therefore, recommend an additional "whereas" clause to the effect:

"Whereas the presence of a natural gas liquification plant at Nikiski would allow for the economic shipment of natural gas to regions of the state not currently served by natural gas pipelines."

*For Further Information contact Katy McHugh at 465-3900.*

THE  
FOLLOWING  
DOCUMENTS  
ARE  
POOR  
ORIGINAL  
COPIES

BILL NO: HCR 12

TITLE: Use of Natural Gas in Motor Vehicles

DATE: March 8, 1993

A further benefit of natural gas is that it is readily suited to heavy duty engines, including highway trucks, which may be facing significant fuel cost increases if the state is not granted an exemption from the low-sulphur diesel fuel requirements of the Clean Air Act. This benefit of natural gas could be addressed with the following clause:

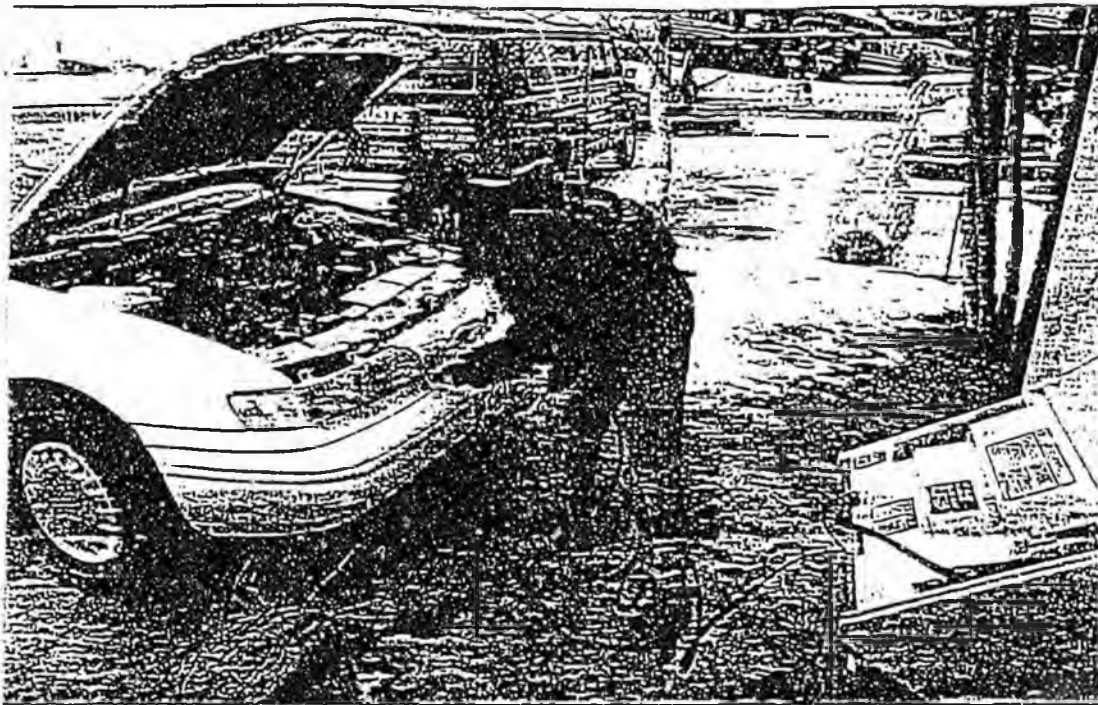
"Whereas natural gas could benefit the commercial motor carrier industry through the availability of reliable, inexpensive fuel which will meet the pending low-sulphur requirements of the Clean Air Act."

A final recommended clause might address the reliability aspects of natural gas in Arctic conditions:

"Whereas natural gas is a proven performer in the Arctic conditions of Alaska having been in use in the North Slope Borough for more than 10 years on a year-round basis."

Finally, in view of the role that might be played by the commercial motor carrier industry, the Phillips Petroleum liquification plant at Nikiski and the Department of Environmental Conservation, I would recommend the addition of the following to the "Copies" paragraph at the end of the resolution:

Mr. Frank Dillon, Executive Director, Alaska Trucking Association  
Mr. Roy Lyons, Kenai Region Manager, Phillips Petroleum  
Honorable John Sandor, Commissioner, Environmental Conservation



Diana Feltis, procurement specialist for the state department of transportation, demonstrates the overnight refueling.

## State tries to set example by driving with natural gas

By HUGH CURRAN  
2/17/94  
Daily News Reporter

Ken Langel knew he had to floor it and make the six min. room.

"Send! Notice any difference?" Langel asked as the government white Dodge and its natural gas-fueled engine roared to life and chugged down Airport Drive on the banks of Lake Hood.

Langel knows that before Alaskans will accept compressed natural gas-powered cars and trucks as another option to consider in the snowmelt floor, they'll have to first be convinced how familiar and routine the cleaner-burning fuel can be.

"You don't need to know one thing different to drive one of these," he said, as manager of the 2,500-vehicle fleet for the state Department of Transportation and Public Facilities. Langel and department commissioner Bruce Campbell see compressed natural gas-fueled vehicles as a way to cut down on the fleet's contribution to Anchorage's carbon monoxide problems, introduce the idea to the public and blaze the trail for widespread, everyday use by residents.

The department took delivery of five vehicles last month to test the practicality and driver reactions to the alternative fuel. A Ford Taurus sedan, Chevy Blazer and Chevy van were converted locally to use either natural gas or regular gas at the flip of a switch. The Dodge Van and Dodge mini-van that the agency plans to buy next month use only compressed natural gas and come that way from the factory.

Langel said it's the recent availability of such factory-made natural-gas vehicles — along with growing air-quality concerns in Anchorage after years of federal clean-air standard violations — that made the time right to try natural gas.

"Compressed natural gas vehicles have been around for 10 or 20 years; it's not like a new rocket science," Langel said.

An Anchorage hotel has been using a natural gas van for the 10 years.

"But previously, there were performance problems with carbureted engines that fuel injection has solved. The tanks and the available pressure weren't as



Ken Langel, fleet manager, with the natural-gas powered van.

Please see Page C-2, CARS

## CARS: State goes natural gas

Continued from Page C-1

good before, either. We also finally have a wide selection of factory-made vehicles and a new environmental awareness that just wasn't there 10 years ago."

A 1990 test by the American Gas Association showed vehicles using compressed natural gas release less than a quarter of the carbon monoxide emitted by gasoline engines.

Based on talks with Lower 48 fleet managers who have used compressed gas for several years, Langel hopes to see miles per gallon equal to or greater than gasoline vehicles and the rough equivalent of 30 to 30 cents per gallon for the fuel.

Langel said another hoped-for advantage is reduced maintenance costs and longer engine life because the fuel is less likely to leave damaging deposits in the engine and on spark plugs.

The agency spent \$2,500 to \$4,000 to convert its three vehicles from gasoline to natural gas, Langel said. The factory models cost \$3,000 to \$5,000 more than gasoline vehicles. He said greater production should translate into lower costs.

The vehicles look, sound and feel no different from their gasoline cousins. The

only telling sign in the Taurus was something that looked like an oxygen tank under the hood and a small metal plug for refueling that sticks out of the grill.

Refueling is currently handled at the Lake Hood office through a compact pump that compresses the natural gas used in the department's building. Langel said the pump refuels an empty vehicle in six to 10 hours. The only commercial compressed natural gas station in Anchorage refills at almost the same speed as regular gasoline.

Langel said the availability of refueling stations will determine whether natural gas vehicles will ever see wide use.

"To really make a dent in air pollution you're going to have to get the public involved, and that can only happen if the refueling infrastructure is there," Langel said. "You'd need at least four stations in Anchorage, one in the Valley and one in Kenai."

Langel said to promote the building of such an infrastructure, local, state and federal agencies — as well as private companies such as Alaska Gas, Enstar, the Alaska Railroad and some tour companies — are putting the final touches on a group tentatively called the Alaska Compressed Natural Gas User's Coalition.

## FACTS TO KNOW

- Natural gas has an octane rating of 130.
- Natural gas burns cooler than propane.
- Natural gas remains a vapor when compressed.
- Natural gas does not contaminate motor oil.
- Natural gas starts more easily in cold weather.
- Natural gas is not imported.
- Natural gas must be odorized.
- We can help support America by operating our fleets on natural gas.

SHOULD  
YOU USE  
NATURAL GAS  
AS YOUR  
MOTOR  
FUEL?



2745 West Walnut Lawn, Springfield, MO 65807, 387-4773, 1-800-543-3855



HERE ARE MANY REASONS  
TO USE NATURAL GAS  
INSTEAD OF GASOLINE TO  
FUEL YOUR VEHICLES.

The following are some of the most frequently asked questions:

**Q** Is natural gas safe as a motor fuel?

**A** Yes! Natural gas is safe. Here are some reasons why:

At 1100°, the ignition temperature of natural gas is approximately 500 F° higher than gasoline.

There are strict flammable limits for commercial natural gas. If the mixture is leaner than 4% or richer than 14%, natural gas will not ignite.

Natural gas is lighter than air. If a leak occurs, the gas rises in the air to the highest containment level and dissipates. When gasoline, propane and other liquid fuels leak, they often form puddles or settle into storm drains. Natural gas is even safe to use in tunnels and other below-grade facilities.

**Q** Are natural gas storage cylinders safe?

**A** Unlike a gasoline fuel tank, natural gas fuel cylinders are *at least* 3/8" thick, depending on the manufacturer's specifications. All natural gas cylinders are constructed to strict D.O.T. regulation.

**Q** What type of vehicle can be converted to natural gas power?

**A** Vehicles with either carbureted or fuel injected gasoline engines can utilize natural gas, including buses, trucks, cars, forklifts and stationary engines.

**Q** What happens to the equipment when a converted vehicle is retired?

**A** The equipment can be reinstalled on a new

vehicle several times with minor modifications. Thousands of conversion kits sold in the 70s are still in operation on new vehicles today.

**Q** How long does it take to fill a vehicle?

**A** A "Quick Fill System" only takes a few minutes. A "Time Fill System" can automatically fill many vehicles overnight while unattended.

**Q** How many vehicles can be filled with a "Time Fill System?"

**A** The refueling station can be sized to fill any size fleet in a given time span.

**Q** Who can install the equipment?

**A** We can install the equipment for you or train your mechanic to install it.

**Q** How much will it cost?

**A** Prices vary for each situation; however, after asking you a few questions about your fleet, fuel consumption and parking arrangements, a firm price can be quoted.

**Q** How long does it take to recoup my investment?

**A** Depending on the fuel consumption of the vehicles converted, the pay back period is approximately 30 to 36 months. A higher mileage vehicle has a faster pay back period.

**Q** Does the refueling station need to be in a building or on a skid?

**A** No! This equipment is designed to be used in any type of weather. An enclosed building requiring thousands of dollars worth of additional equipment is not necessary. A simple shelter over the equipment, enclosed on three sides, is needed for maintenance personnel protection.

**Q** What happens if the vehicle runs out of natural gas?

**A** A fuel selector switch mounted on the dash allows the driver to change from natural gas to gasoline.

**A**s national concern over the environment and energy security increases, more and more vehicles will be running on alternative fuels. Natural gas — the same energy that has safely and comfortably heated homes and cooked meals for more than 100 years — will be used in many of our cars, trucks and buses. Natural gas has multiple advantages over other transportation fuels: it's cleaner, it costs less, it's readily available throughout the country, it's a domestic fuel and it has a proven safety record.

Here are answers to the questions most frequently asked about natural gas vehicles (NGVs):

**Q:** What kind of vehicles can run on natural gas?

**A:** Almost all kinds of vehicles, from passenger cars and pickup trucks to school buses and garbage trucks, can run on natural gas. NGVs can be manufactured from the ground up, or existing gasoline or diesel vehicles can be converted by modifying the fuel system.

**Q:** Is natural gas a safe vehicle fuel?

**A:** Natural gas has an excellent safety record. There are two primary reasons: the structural integrity of the NGV fuel storage system and the physical properties of natural gas. The tanks used to store the natural gas are made of forged steel or fiberglass-reinforced aluminum and are 1 to 3 inches thick. They can withstand coin crashes and heat far better than a standard gasoline tank, which is made of thin sheet metal. In addition, the natural gas tank actually adds to the structural integrity of the vehicle.

NGVs have "closed" fuel systems, which helps eliminate the evaporation characteristic of liquid fuel systems. In the unlikely event that a leak occurs in an NGV, the natural gas dissipates harmlessly into the atmosphere because it is lighter than air.

In addition, natural gas has a high ignition temperature. It ignites at about 1,200 degrees Fahrenheit, compared with about 600 degrees for gasoline. Natural gas also has a very narrow range of flammability, that is, in concentrations in air below about 5 percent and above about 15 percent, natural gas will not burn. The high ignition temperature and limited flammability range make accidental ignition or combustion of natural gas unlikely.

**Q:** Does the United States have enough natural gas to use in vehicles?

**A:** The United States has a huge natural gas resource base. The U.S. Department of Energy estimates that with conventional supplies alone, the nation has at least a 100-year supply of natural gas at today's consumption rates. If so-called nonconventional supplies — some of which are already being produced — are included, the total natural gas resource base can provide more than a 200-year supply. Driving 3 million to 5 million NGVs every year would use about 1 billion cubic feet of gas — less than 1 percent of our current annual natural gas consumption of 19 billion.

**Q:** Is natural gas readily available?

**A:** The natural gas transportation and storage network, a 1.2 million-mile underground pipeline system, is already in place. All 50 states and all major metropolitan areas have access to gas service.

In addition to its extensive distribution system, natural gas has another key advantage — it's primarily a domestic fuel. About 92 percent of the natural gas used in the United States this year will be produced in the United States. Almost all the rest will come from Canada.

**Q:** What are the environmental benefits of NGVs?

**A:** Vehicles fueled with natural gas produce significantly lower levels of harmful pollutants than gasoline or diesel vehicles. For example, NGVs reduce emissions of carbon monoxide by 90 percent and reactive hydrocarbons (which play a major role in the formation of ground-level ozone, the principal ingredient of smog) by 35 percent. Natural gas contains no particulates, such as those associated with diesel fuel, and also reduces emissions of carbon dioxide, the principal "greenhouse" gas.

**Q:** How do the costs of gasoline, natural gas and other alternative fuels compare?

**A:** Natural gas as a vehicle fuel actually costs less today than conventional gasoline and much less than ethanol. The price of natural gas sold for vehicle use ranges from 25 cents to 79 cents for the energy equivalent of a gallon of gasoline. The comparable price of ethanol (M85, priced on the West Coast) is \$1.40 per gallon equivalent versus \$1.23 for gasoline.

In addition, on-road experience with NGVs shows that standard maintenance can be reduced, because natural gas is a very clean-burning fuel.

**Q:** How much does an NGV cost?

**A:** It costs from \$2,500 to \$3,500 to convert a car to run on natural gas. Costs are higher for larger vehicles and vary depending on the number of fuel tanks installed. For most vehicles, installation of a natural gas fuel system takes only one or two days. Modified vehicles may run on either natural gas or gasoline since the liquid fueling system remains intact.

"Dedicated" NGVs run only on natural gas and cost slightly more than gasoline or diesel vehicles because of the cost of the sturdy storage tanks. The U.S. Department of Energy estimates that mass-produced NGVs will have a price tag about \$200 higher than conventional vehicles.

**Q:** Is anyone currently manufacturing original-equipment NGVs?

**A:** All the major U.S. automobile, truck and bus manufacturers are building and reconfiguring prototype vehicles that run on natural gas. For example, the GMC Truck Division of General Motors Corp. is building dedicated natural gas light-duty pickup trucks, and Chrysler Corp. is building natural gas vans. Meanwhile, Ford Motor Co.

s interesting vans, pickups and sedans. United Parcel Service (UPS) is sponsoring development of a natural gas engine for its familiar brown delivery trucks, and a natural gas engine for school buses, made by Tecogen Inc., has been certified by the California Air Resources Board (CARB). The school bus engine is the first alternative-fuel engine to get CARB approval. Medium-duty engines are under development by Cummins Engine Co., Mercedes Engines Inc. and Detroit Diesel Corp. The Flexible Corp. and Bus Industries of America are making natural gas mass-transit buses.

### Q: How does an NGV work?

A: The only major difference between a gasoline vehicle and an NGV is the fuel system. For use in an NGV, natural gas is compressed to approximately 3,000 pounds per square inch and stored in high-pressure steel or aluminum tanks installed in the rear or the undercarriage of a vehicle. When the engine requires fuel, the natural gas leaves the tanks and travels through a high-pressure fuel regulator located in the engine compartment. The natural gas enters the carburetor or is injected at atmospheric pressure through a specially designed natural gas mixer, where it is combined with air.

NGVs can be designed to operate in three different modes. A vehicle that runs solely on natural gas is called a "dedicated" vehicle. Vehicles that operate on either natural gas or gasoline at the flip of a switch are "bi-fuel" vehicles. Those that operate on natural gas and diesel fuel at the same time are "dual-fuel" vehicles. Best performance is achieved when a vehicle is designed to run only on natural gas, because the engine can then be set to take full advantage of the fuel's high octane, which exceeds 120. Bi-fuel vehicles typically are equipped to switch automatically to gasoline when the natural gas tank reaches empty. In addition, a simple electronic device is usually added to adjust the engine's timing when a switch is made from one fuel to the other.

### Q: How are NGVs fueled?

A: The commercial dispenser that fuels NGVs looks a lot like a gasoline pump. A small hose connects easily to the vehicle's fuel system with a coupling device. When the tank is full, the dispenser automatically shuts off.

NGVs are fueled on a "quick-fill" or "time-fill" basis. Quick-fill dispensers fuel a vehicle in about five minutes. Time-fill stations take longer, depending on the number of vehicles being served at one time and the size of the fueling unit. Time-fill stations are popular with operators or vehicle fleets that return to a central location each night, where the vehicle can be hooked up to a natural gas dispenser overnight or for a specified time period and even fueled unattended.

Some dispensers are also available. They are smaller than commercial dispensers, about the size of an air conditioning compressor, and are connected directly to the home's natural gas line. Some fueling operations use the time-fill method, so vehicles usually are fueled overnight.

### Q: How many NGV fueling stations are there in the United States?

A: By early 1992, nearly 500 fueling stations for NGVs were operating in 43 states and the District of Columbia. More than one-half of the stations are open to the public or available through special arrangements with the operator. The rest are used by private fleets. Oil companies involved in public fueling stations include Amoco, Exxon, Mobil, Texaco, Unocal, PINA, Shell, Chevron, Conoco and Phillips 66.

### Q: Are NGVs used in other countries?

A: Natural gas as a vehicle fuel has a long-established record in Europe, Canada, New Zealand and Australia. Italy has been using natural gas to power vehicles since

the 1990s, and has about 300,000 NGVs and 340 filling stations.

**Q:** How will NGVs help cities meet the requirements of the Clean Air Act Amendments of 1990?

**A:** The Clean Air Act Amendments of 1990 have much tougher vehicle emissions standards, beginning with model year 1994. NGVs can already meet these standards.

In 22 urban areas, the new law will require oil fleets of 10 or more vehicles that are capable of central fueling to purchase alternative-fuel vehicles, in increasing percentages beginning in model year 1998. Legislation being considered by Congress would move up that date and broaden the concept to include most major urban areas.

In California, the Amendments require that a special pilot program be adopted, involving the mandated production and sale of clean-fuel vehicles — 150,000 vehicles beginning in model year 1990 and growing to 300,000 vehicles in model year 1999 and thereafter.

Finally, an urban bus initiative in the new law is designed to reduce particulate emissions and to encourage the use of clean-fuel buses for mass transit. Natural gas buses are operating successfully in many American cities, are meeting the standards and are emitting virtually no particulates.

**Q:** How can NGVs contribute to America's energy security?

**A:** Although most U.S. economic sectors have diverse energy sources, the transportation sector is currently about 96 percent dependent on oil. The United States is dependent on foreign oil for nearly 50 percent of its energy needs. In 1991, the United States spent \$44 billion dollars to buy imported oil, which is over half the nation's total trade deficit. The best way to increase energy security and reduce the trade deficit — without a

negative environmental or economic impact — is to replace the use of imported oil with domestic natural gas. The most obvious place to begin is in the transportation sector.

**Q:** Who is likely to be driving NGVs today and in the near future?

**A:** Auto, truck and bus fleets are particularly well suited for NGVs, because they can share a central fueling station. Since a national network of public NGV fueling stations is still developing, widespread use of natural gas in privately owned, individual vehicles will come later.

**Q:** Where can I get more information on NGVs?

**A:** For more information on natural gas vehicles, contact:

American Gas Association  
1515 Wilson Boulevard  
Arlington, VA 22209  
(703) 841-8400

## Cherry Creek Schools Compressed Natural Gas (CNG) Program

Cherry Creek School District began converting its buses to CNG ten years ago. This was when clean air, the cost of fuel and environmental issues triggered the District's research on alternative fuels. The district chose CNG because of safety issues and the abundant supply of natural gas.

### Cherry Creeks Experience:

In 1982, when gasoline prices jumped to 95 cents a gallon, unleaded was replacing regular gasoline at the pumps and as concern for the environment was being launched, Cherry Creek began converting 18 of its buses to CNG. As the years passed and CNG technology expanded, 35 more buses were converted.

Today 53 vehicles operate on bi-fuel conversions, 14 performed by Cherry Creek's own mechanical staff. Bi-fuel means the vehicle is equipped with both gasoline and CNG, and can operate on either fuel. The advantage to having both fuel options is flexibility. When the CNG system is down, buses can fuel with gasoline, or on trips they have the capability to run on both gasoline and CNG.

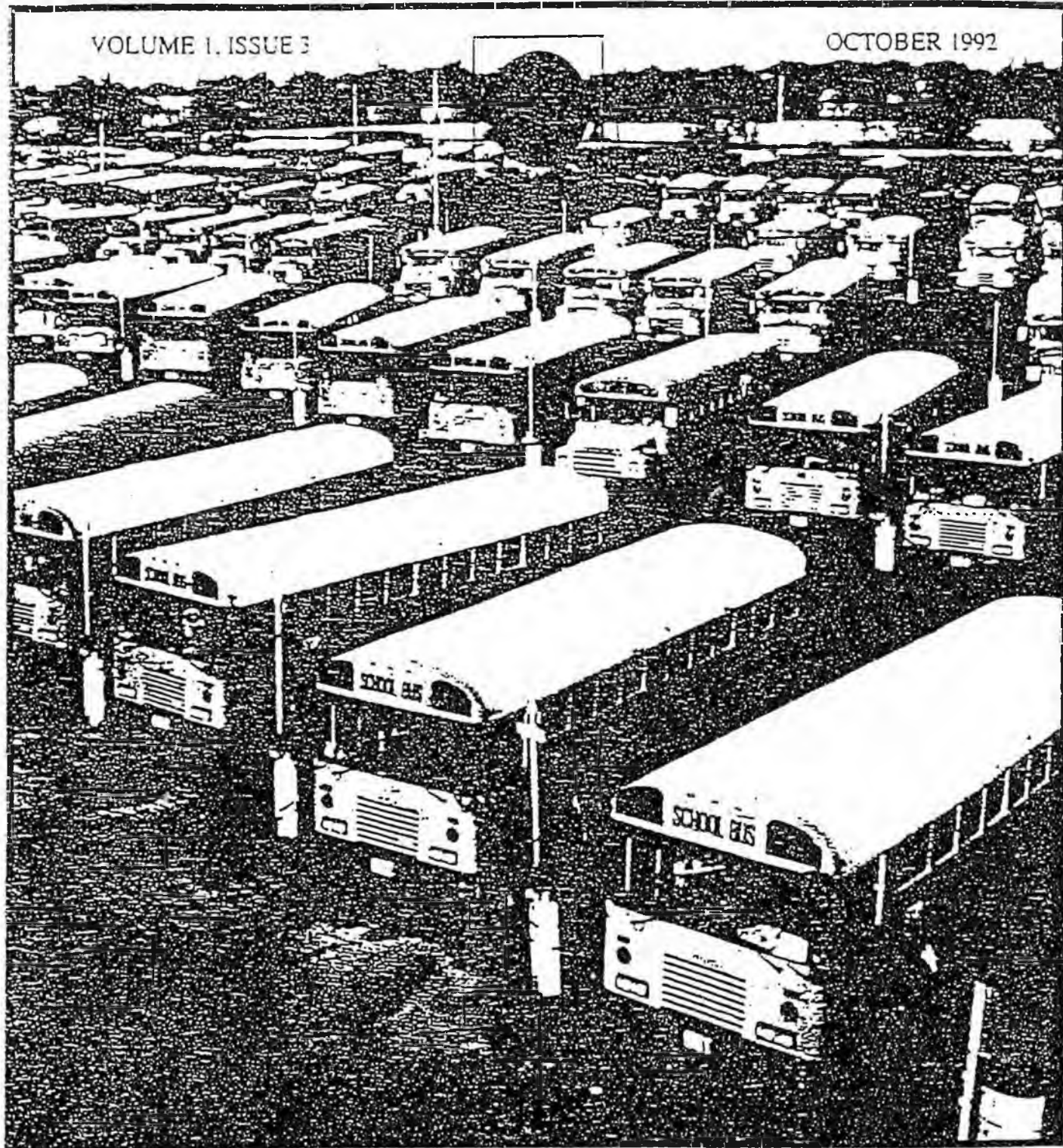
The drivers hardly notice the difference on the newer vehicles, on older vehicles the driver can shift to gasoline when the added power is needed. It should be noted that newer fuel injection systems seem to operate with less problems than carbureted fuel delivery systems.

# NATURAL GAS FUELS

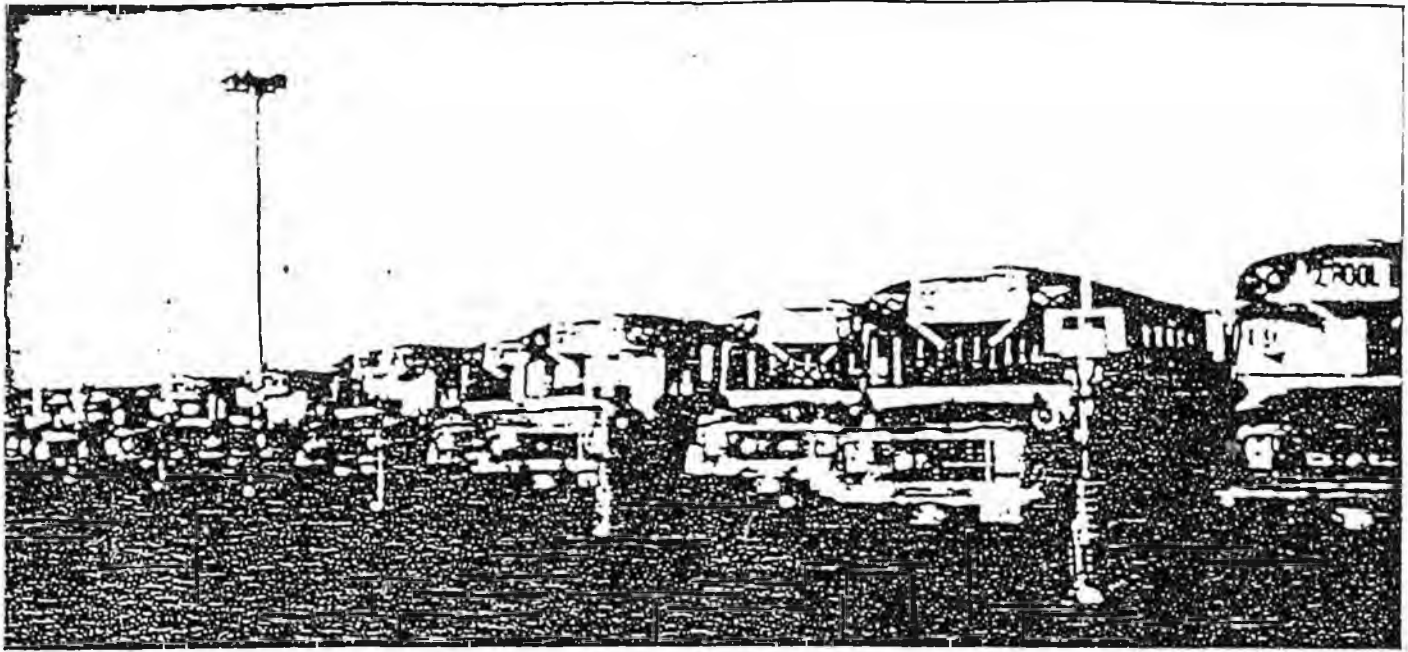
A MAGAZINE DEDICATED TO THE USE OF NATURAL GAS AS A TRANSPORTATION FUEL

VOLUME 1, ISSUE 3

OCTOBER 1992



- Putting Words Into Action: NGVs Go Public
- Alternative Fuels on the Campaign Trail
- Vehicle Fill Pressure Q&A



At the end of their shift, Cherry Creek School buses hook up to fueling units located adjacent to parking stalls.

## AGONY AND ECSTASY

Cherry Creek School District in Aurora, Colo., has been running buses on natural gas since the early 1980s, yet many parents and children remain unaware of the district's alternative fuels program. The now thriving program got its rocky start in 1982, when a schoolboard member suggested experimenting with natural gas buses. At that time, gas prices in excess of one dollar per gallon prompted the district to explore both propane and natural gas. Natural gas was selected largely because of safety factors, i.e., in the event of a leak, gas would dissipate; propane would pool on the ground.

"In the beginning, our natural gas experience could best be described as agony and ecstasy," says Joe Mirabella, director of transportation for Cherry Creek Schools. "Our program had three elements, and in essence they all combined to make things...interesting." The three elements, Mirabella says, were the compressor, the underground lines to the fuel delivery system and the conversion kits. "Unfortunately, the salesmen around at that time made all sorts of promises that the technology just could not deliver, which led to many problems in keeping the buses running. The buses would die, the compressor would not deliver fuel through the slow-fill system, a leak in the pipeline would alter the compression, or the kits would not function. The technicians were unable to deliver on the salesmen's promises, and until about 1985 or 1986 we were literally hanging by our nails trying to keep the program operational."

Although the industry has long touted the lower maintenance of natural gas vehicles, due to their cleaner-burning composition, Mirabella says that only recently has new technology proven out this claim. "On the older buses, maintenance costs were probably equal because the technology was not as advanced. We experienced several minor problems with CNG systems, such as hard starting in cold weather, problems with power loss, and oil in the second state regulators which resulted in diaphragm problems and affected performance. Compressor maintenance problems also trickled down to the buses via the slow-fill line, whereby small leaks in the compressors resulted in lower compression in the buses. However, we eventually overcame all these problems, primarily through changes in our maintenance procedures as we became more experienced with natural gas vehicles. And with the newer vehicles and equipment, we really don't see these types of problems anymore."

While working out the glitches, the program limped along, assisted by two savvy mechanics who were able to somehow keep things rolling. But what really contributed to the program's ultimate success was strong support from the district, which translated into few if any safety concerns or bouts with negative publicity. "Safety concerns have never been an issue, and the drivers do not think twice about filling their vehi-

cles with natural gas," points out Mirabella. Since its floundering beginning, the program has steadily grown from an initial 10 converted buses that used Dual-Fuel and Canadian Fuel kits. A switchover to ANGI kits, and the purchase of two Mako compressors has helped Cherry Creek to build its natural gas fleet to 53 school buses.

All of the natural gas buses are dual-fuel, with the exception of one dedicated Hercules bus. The district recently disposed of the 10 originally converted buses, and is now converting 10 new buses right at its transportation facility. "In the past, we've sent the buses to Natural Fuels Corp. to handle the conversions, but now we believe our level of expertise is to the point where we can handle the conversions on our premises. We are up to speed on the installation and most of the diagnostics, and we still can rely on Natural Fuels if we run into problems," Mirabella says.

The originally purchased Mako compressor is being rebuilt, and the system operates exceedingly well. Buses park in a line at the end of their shift, plug into the slow fill compressor, and are ready for work at the beginning of

## Federal Fleet NGV Purchase Plan by State

	1993	1994	1995	1996	1997
Alabama	10	9	13	12	23
Alaska	2	4	7	11	18
Arizona	37	26	42	37	41
Arkansas	1	1	2	2	3
California	750	563	573	566	316
Colorado	108	67	57	120	99
Connecticut	0	0	0	0	0
Delaware	0	0	0	0	0
District of Columbia	93	60	187	172	206
Florida	6	2	5	8	5
Georgia	29	33	29	4	47
Hawaii	2	2	2	4	4
Idaho	10	11	10	21	27
Illinois	25	30	14	19	22
Indiana	2	2	4	4	6
Iowa	6	1	2	2	6
Kansas	4	12	5	6	9
Kentucky	4	10	11	10	22
Louisiana	29	11	45	22	36
Maine	0	0	0	0	0
Maryland	16	26	28	22	35
Massachusetts	14	5	23	33	63
Michigan	1	1	2	2	4
Minnesota	3	9	9	12	21
Mississippi	0	0	0	0	0
Missouri	2	4	6	9	5
Montana	68	61	64	70	64
Nebraska	0	0	4	0	0
Nevada	34	18	23	26	29
New Hampshire	0	0	0	0	0
New Jersey	4	5	15	7	13
New Mexico	14	20	41	41	29
New York	30	16	40	47	94
North Carolina	5	4	6	6	7
North Dakota	3	9	6	14	11
Ohio	1	4	7	2	11
Oklahoma	45	5	6	6	7
Oregon	18	22	48	57	82
Pennsylvania	24	27	31	22	38
Rhode Island	0	0	0	0	1
South Carolina	135	235	229	189	205
South Dakota	5	5	12	3	7
Tennessee	30	6	41	78	176
Texas	44	49	47	50	32
Utah	8	18	13	13	18
Vermont	0	0	0	0	0
Virginia	21	35	23	45	59
Washington	3	6	3	5	12
West Virginia	4	7	1	4	27
Wisconsin	2	4	6	7	13
Wyoming	15	24	14	15	24
Vehicles to be placed	650	1,053	1,298	1,528	2,186
<b>TOTAL</b>	<b>2,327</b>	<b>2,523</b>	<b>3,154</b>	<b>3,473</b>	<b>4,664</b>

Source: Dept. of Energy draft report on alternative fuel vehicle five-year purchase plan

### Federal Fleet NGV Purchase Plan by Vehicle Type

Vehicle (# passengers)	1993	1994	1995	1996	1997
Bus	0	1	0	1	5
Carry all - 4x4 Compact	1	3	1	3	5
Carry all - 4x4 Full size	0	0	0	7	5
Carry all - Compact	24	13	0	0	0
Carry all - Full size	5	7	5	0	10
Golf cart	33	38	1	0	0
Pickup - 4x4 Compact	10	19	49	49	45
Pickup - 4x4 Full size	66	66	61	77	96
Pickup - Compact	517	647	638	597	1,302
Pickup - Crew Cab	16	11	17	18	19
Pickup - Full size	535	585	503	733	842
Sedan - Compact	256	142	325	271	259
Sedan - Delivery	1	1	2	0	1
Sedan - Full size	11	21	20	36	39
Sedan - Law enf.	13	0	0	0	0
Sedan - Midsize	13	22	51	34	34
Sedan - Subcompact	2	8	0	3	5
Stat. wagon - Compact	17	5	25	28	13
Stat. wagon - Full size	0	0	0	1	3
Truck - Cargo	10	0	0	13	14
Truck - Heavy duty	12	21	21	24	27
Truck - Light duty	18	23	34	38	37
Truck - Med. duty	155	179	254	299	445
Truck - Panel	9	13	27	29	30
Truck - Util. Light 4x4	18	2	0	18	7
Truck - Utility	49	21	44	71	53
Truck - Util. 4x4	1	1	0	0	0
Truck - Util. Light	0	4	0	7	0
Van (8)	282	506	600	625	908
Van (12)	18	6	5	3	0
Van (15)	244	243	283	313	335
Van - Cargo	1	2	11	9	27
Van - Cargo compact	0	2	0	0	0
Van - Delivery	0	2	2	1	1
Van - Mini	190	42	92	113	143
Van - Panel	13	35	47	13	31
Van - Step	22	1	0	0	0
Van - Utility	0	0	1	3	1
Van - Wagon	0	0	6	0	0
Van - Panel 4x4	3	0	0	0	0
Van - Wagon 4x4	0	0	0	9	0

Source: Dept. of Energy draft report on alternative fuel vehicle five-year purchase plan

# Alaska State Legislature

716 W. 4TH AVE., SUITE 240-A  
ANCHORAGE, ALASKA 99501-2133  
253-3190 FAX: 253-1261



WHILE IN SESSION:  
STATE CAPITOL  
UNEAU, ALASKA 99801-1182  
465-2435 FAX: 465-2864

Representative David Finkelstein

## SPONSOR STATEMENT HCR 12

A resolution relating to the use of natural gas as a motor vehicle fuel in Alaska.

As the nationwide drive toward alternative fuel use accelerates, Alaska needs to push forward. Our huge natural gas reserves can be put to very beneficial use in fueling motor vehicles, fueling our economy, and reducing pollution.

Currently, natural gas is used in Alaska for electrical generation, heating, and cooking. The resource would be more fully utilized if it were marketed to fuel the approximately 120,000 vehicles operating in southcentral Alaska, where natural gas is widely available.

Alaska's high-quality natural gas is a very viable fuel for motor vehicles. Rich in methane and high in octanes, it creates 90% less health-threatening carbon monoxide than gasoline. The persistent problems in controlling carbon monoxide emissions in Anchorage and Fairbanks could be solved if more motorists there switched to natural gas.

Using natural gas as a motor fuel would help to eliminate the leaking underground storage tank problems inherent to gasoline and diesel fuels, because if natural gas leaks, it simply dissipates into the atmosphere. It produces significantly lower levels of harmful pollutants such as benzene than do gasoline and diesel vehicles.

Motorists--especially truckers--would save money by using natural gas, since it is much less expensive than gasoline or diesel, and necessitates less maintenance. Natural-gas vehicles have been in use in Alaska for many years, and employ proven technology.

Soon, federal laws will mandate alternative-fuel use and impose much stricter emission standards. It makes sense to anticipate such requirements by drawing on and developing our own rich resources.

This resolution encourages federal, state, municipal, and private fleet operators in Alaska to use natural-gas cars, trucks, and buses, and it encourages the rapid development of natural-gas fueling stations.

FISCAL NOTE

STATE OF ALASKA  
1994 LEGISLATIVE SESSION

BILL NO.

CS HCR 12 (O&G)

Revision Date: \_\_\_\_\_  
 Title: A Resolution Relating to the Use of  
Natural Gas in Alaska  
 Sponsor: Representative Finkenstein  
 Requestor: House Oil & Gas Committee

Department Affected: Environmental  
Conservation  
 BRU: Environmental Quality  
 Component: Air Quality Management

COMPONENT SERIAL NO. 1423

Expenditures/Revenues:		COMPARISON OF FISCAL YEARS (Thousands of Dollars)					
	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	
OPERATING EXPENDITURES							
PERSONAL SERVICES	0.01	0.01	0.01	0.01	0.01	0.01	
TRAVEL	0.01	0.01	0.01	0.01	0.01	0.01	
CONTRACTUAL	0.01	0.01	0.01	0.01	0.01	0.01	
SUPPLIES	0.01	0.01	0.01	0.01	0.01	0.01	
EQUIPMENT	0.01	0.01	0.01	0.01	0.01	0.01	
LAND & STRUCTURES	0.01	0.01	0.01	0.01	0.01	0.01	
GRANTS, CLAIMS	0.01	0.01	0.01	0.01	0.01	0.01	
MISCELLANEOUS	0.01	0.01	0.01	0.01	0.01	0.01	
TOTAL OPERATING	0.01	0.01	0.01	0.01	0.01	0.01	
CAPITAL EXPENDITURES	0.01	0.01	0.01	0.01	0.01	0.01	
CHANGE IN REVENUES	0.01	0.01	0.01	0.01	0.01	0.01	
FUND SOURCE							
1002 Federal Recs	0.01	0.01	0.01	0.01	0.01	0.01	
1003 GF Match	0.01	0.01	0.01	0.01	0.01	0.01	
1004 GF	0.01	0.01	0.01	0.01	0.01	0.01	
1005 GF/Program Receipt	0.01	0.01	0.01	0.01	0.01	0.01	
1006 GF/MHTLA	0.01	0.01	0.01	0.01	0.01	0.01	
Other	0.01	0.01	0.01	0.01	0.01	0.01	
TOTAL	0.01	0.01	0.01	0.01	0.01	0.01	

Estimate of any current year (FY94) cost: \$ \_\_\_\_\_

POSITIONS:

FULL-TIME	0.01	0.01	0.01	0.01	0.01	0.01
PART-TIME	0.01	0.01	0.01	0.01	0.01	0.01
TEMPORARY	0.01	0.01	0.01	0.01	0.01	0.01

ANALYSIS: (Attach a separate page if necessary.)

Prepared by: Bob Poe, Director  
 Division: Information & Administrative Services

Phone: 455-5010  
 Date: 2/14/94

Approved by Commissioner: [Signature]  
 Agency: Department of Environmental Conservation

Date: 2/14/94

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Department of Transportation  
and Public Facilities

# POSITION PAPER

BILL NO: HCR 12

APPROVED: 

TITLE: Use of Natural Gas in Motor  
Vehicles

DATE: March 3, 1993

DOT&PF supports and encourages the passage of this resolution. In partnership with the Department of Environmental Conservation (DEC), DOT&PF has actively supported and encouraged the use of natural gas as an automotive fuel, including sponsoring a conference on this topic in December, 1992. The two departments are now embarking on the formation of a joint government-industry panel to address what actions are needed to foster an increased supply and demand of natural gas as a motor vehicle fuel for Alaskan fleet vehicles and the general public.

Aside from our enthusiastic support for this resolution, we would like to offer some friendly amendments.

An additional benefit to Alaska in the development of natural gas as an automotive fuel is the presence of the Phillips Petroleum natural gas liquification plant at Nikiski. It provides an opportunity to economically transport natural gas to locations in the state not presently served by natural gas pipelines. Thus the expanded development of a refueling infrastructure is not geographically bound by the present pipeline system.

We, therefore, recommend an additional "whereas" clause to the effect:

"Whereas the presence of a natural gas liquification plant at Nikiski would allow for the economic shipment of natural gas to regions of the state not currently served by natural gas pipelines."

*For Further Information contact Katy McHugh at 465-3900.*

BILL NO: HCR 12

TITLE: Use of Natural Gas in Motor Vehicles

DATE: March 8, 1993

A further benefit of natural gas is that it is readily suited to heavy duty engines, including highway trucks, which may be facing significant fuel cost increases if the state is not granted an exemption from the low-sulphur diesel fuel requirements of the Clean Air Act. This benefit of natural gas could be addressed with the following clause:

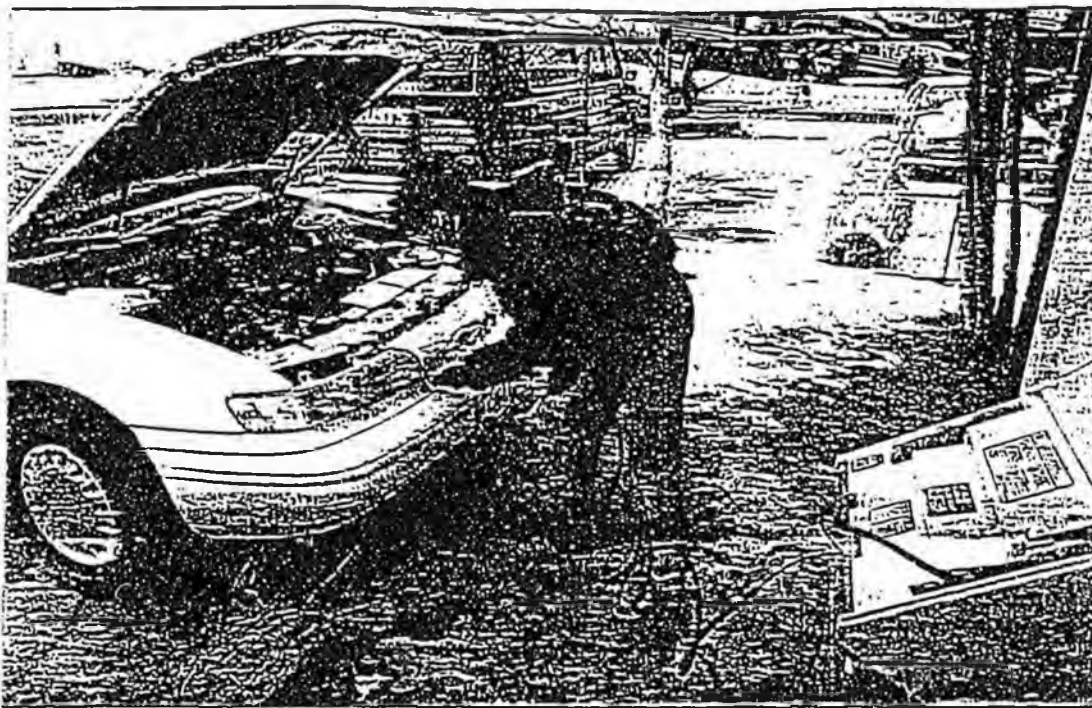
"Whereas natural gas could benefit the commercial motor carrier industry through the availability of reliable, inexpensive fuel which will meet the pending low-sulphur requirements of the Clean Air Act."

A final recommended clause might address the reliability aspects of natural gas in Arctic conditions:

"Whereas natural gas is a proven performer in the Arctic conditions of Alaska having been in use in the North Slope Borough for more than 10 years on a year-round basis."

Finally, in view of the role that might be played by the commercial motor carrier industry, the Phillips Petroleum liquification plant at Nikiski and the Department of Environmental Conservation, I would recommend the addition of the following to the "Copies" paragraph at the end of the resolution:

Mr. Frank Dillon, Executive Director, Alaska Trucking Association  
Mr. Roy Lyons, Kenai Region Manager, Phillips Petroleum  
Honorable John Sander, Commissioner, Environmental Conservation



Diana Fokis, procurement specialist for the state department of transportation, demonstrates the overnight refueling.

## State tries to set example by driving with natural gas

By HUGH CURRAN  
2/10/94  
Daily News Reporter

Ken Langel knew he had to floor it and make the big man boom.

"See! Notice any difference?" Langel asked as the cavernous white Dodge and its natural gas-sipping engine roared to life and raced down Airport Drive on the banks of Lake Hood.

Langel knows that before Alaskans will accept compressed natural gas-powered cars and trucks as another option to consider in the snowbound state, they'll have to first be convinced how familiar and routine the cleaner-burning fuel can be.

"You don't need to know one thing different to drive one of these," he said.

As manager of the 1,500-vehicle fleet for the state Department of Transportation and Public Facilities, Langel and department commissioner Bruce Campbell see compressed natural gas-fueled vehicles as a way to cut down on the fleet's contribution to Anchorage's carbon monoxide problems, introduce the idea to the public and blaze the trail for widespread, everyday use by residents.

The department took delivery of five vehicles last month to test the practicality and driver reactions to the alternative fuel. A Ford Taurus sedan, Chevy Blazer and Chevy van were converted locally to use either natural gas or regular gas at the flip of a switch. The Dodge Van and Dodge mini-van that the agency plans to buy next month use only compressed natural gas and come that way from the factory.

Langel said it's the recent availability of such factory-made natural-gas vehicles — along with growing air-quality concerns in Anchorage after years of federal clean-air standard violations — that made the time right to try natural gas.

"Compressed natural gas vehicles have been around for 20 or 30 years; it's not like a new rocket science," Langel said.

An Anchorage note has been using a natural gas van for the 10 years.

But previously, there were performance problems with carbureted engines that fuel injection has solved. The tanks and the available pressure weren't as



Ken Langel, fleet manager, with the natural-gas powered van.

Please see Page C-2, CARS

## CARS: State goes natural gas

Continued from Page C-1

good before, either. We also finally have a wide selection of factory-made vehicles and a new environmental awareness that just wasn't there 10 years ago."

A 1990 test by the American Gas Association showed vehicles using compressed natural gas release less than a quarter of the carbon monoxide emitted by gasoline engines.

Based on talks with Lower 48 fleet managers who have used compressed gas for several years, Langel hopes to see miles per gallon equal to or greater than gasoline vehicles and the rough equivalent of 80 to 90 cents per gallon for the fuel.

Langel said another hoped-for advantage is reduced maintenance costs and longer engine life because the fuel is less likely to leave damaging deposits in the engine and on spark plugs.

The agency spent \$2,500 to \$4,500 to convert its three vehicles from gasoline to natural gas, Langel said. The factory models cost \$1,500 to \$3,000 more than gasoline vehicles. He said greater production should translate into lower costs.

The vehicles look, sound and feel no different from their gasoline cousins. The

only telling sign in the Taurus was something that looked like an oxygen tank under the hood and a small metal plug for refueling that sticks out of the grill.

Refueling is currently handled at the Lake Hood office through a compact pump that compresses the natural gas used in the department's building, Langel said. The pump refuels an empty vehicle in six to 10 hours. The only commercial compressed natural gas station in Anchorage refills at almost the same speed as regular gasoline.

Langel said the availability of refueling stations will determine whether natural gas vehicles will ever see wide use.

"To really make a dent in air pollution you're going to have to get the public involved, and that can only happen if the refueling infrastructure is there," Langel said. "You'd need at least four stations in Anchorage, one in the Valley and one in Kenai."

Langel said to promote the building of such an infrastructure, local, state and federal agencies — as well as private companies such as Alaska Co., Enstar, the Alaska Railroad and some tour companies — are putting the final touches on a group tentatively called the Alaska Compressed Natural Gas User's Coalition.

## FACTS TO KNOW

- \*Natural gas has an octane rating of 130.
- \*Natural gas burns cooler than propane.
- \*Natural gas remains a vapor when compressed.
- \*Natural gas does not contaminate motor oil.
- \*Natural gas starts more easily in cold weather.
- \*Natural gas is not imported.
- \*Natural gas must be odorized.
- \*We can help support America by operating our fleets on natural gas.

SHOULD  
YOU USE  
NATURAL GAS  
AS YOUR  
MOTOR  
FUEL?



2745 West Walnut Lawn, Springfield, MO 65807, 387-4773, 1-800-543-3855



**HERE ARE MANY REASONS  
TO USE NATURAL GAS  
INSTEAD OF GASOLINE TO  
FUEL YOUR VEHICLES.**

The following are some of the most frequently asked questions:

**Q** Is natural gas safe as a motor fuel?

**A** Yes! Natural gas is safe. Here are some reasons why:

At 1100°, the ignition temperature of natural gas is approximately 500 F° higher than gasoline.

There are strict flammable limits for commercial natural gas. If the mixture is leaner than 4% or richer than 14%, natural gas will not ignite.

Natural gas is lighter than air. If a leak occurs, the gas rises in the air to the highest containment level and dissipates. When gasoline, propane and other liquid fuels leak, they often form puddles or settle into storm drains. Natural gas is even safe to use in tunnels and other below-grade facilities.

**Q** Are natural gas storage cylinders safe?

**A** Unlike a gasoline fuel tank, natural gas fuel cylinders are *at least* 3/8" thick, depending on the manufacturer's specifications. All natural gas cylinders are constructed to strict D.O.T. regulations.

**Q** What type of vehicle can be converted to natural gas power?

**A** Vehicles with either carbureted or fuel injected gasoline engines can utilize natural gas, including buses, trucks, cars, forklifts and stationary engines.

**Q** What happens to the equipment when a converted vehicle is retired?

**A** The equipment can be reinstalled on a new

vehicle several times with minor modifications. Thousands of conversion kits sold in the 70s are still in operation on new vehicles today.

**Q** How long does it take to fill a vehicle?

**A** A "Quick Fill System" only takes a few minutes. A "Time Fill System" can automatically fill many vehicles overnight while unattended.

**Q** How many vehicles can be filled with a "Time Fill System?"

**A** The refueling station can be sized to fill any size fleet in a given time span.

**Q** Who can install the equipment?

**A** We can install the equipment for you or train your mechanic to install it.

**Q** How much will it cost?

**A** Prices vary for each situation; however, after asking you a few questions about your fleet, fuel consumption and parking arrangements, a firm price can be quoted.

**Q** How long does it take to recoup my investment?

**A** Depending on the fuel consumption of the vehicles converted, the pay back period is approximately 30 to 36 months. A higher mileage vehicle has a faster pay back period.

**Q** Does the refueling station need to be in a building or on a skid?

**A** No! This equipment is designed to be used in any type of weather. An enclosed building requiring thousands of dollars worth of additional equipment is not necessary. A simple shelter over the equipment, enclosed on three sides, is needed for maintenance personnel protection.

**Q** What happens if the vehicle runs out of natural gas?

**A** A fuel selector switch mounted on the dash allows the driver to change from natural gas to gasoline.

**A**s national concern over the environment and energy security increases, more and more vehicles will be running on alternative fuels. Natural gas — the same energy that has safely and comfortably heated homes and cooked meals for more than 100 years — will be used in many of our cars, trucks and buses. Natural gas has multiple advantages over other transportation fuels: it's cleaner, it costs less, it's readily available throughout the country, it's a domestic fuel and it has a proven safety record.

Here are answers to the questions most frequently asked about natural gas vehicles (NGVs):

**Q:** What kind of vehicles can run on natural gas?

**A:** Almost all kinds of vehicles, from passenger cars and pickup trucks to school buses and garbage trucks, can run on natural gas. NGVs can be manufactured from the ground up, or existing gasoline or diesel vehicles can be converted by modifying the fuel system.

**Q:** Is natural gas a safe vehicle fuel?

**A:** Natural gas has an excellent safety record. There are two primary reasons: the structural integrity of the NGV fuel storage system and the physical properties of natural gas. The tanks used to store the natural gas are made of forged steel or fiberglass-reinforced aluminum and are 1 to three-quarter inches thick. They can withstand both crashes and heat far better than a standard gasoline tank, which is made of thin sheet metal. In addition, the natural gas tank actually adds to the structural integrity of the vehicle.

NGVs have "closed" fuel systems, which helps eliminate the evaporation characteristic of liquid fuel systems. In the unlikely event that a leak occurs in an NGV, the natural gas dissipates harmlessly into the atmosphere because it is lighter than air.

In addition, natural gas has a high ignition temperature. It ignites at about 1,200 degrees Fahrenheit, compared with about 600 degrees for gasoline. Natural gas also has a very narrow range of flammability that is in concentrations in air below about 5 percent and above about 15 percent; natural gas will not burn. The high ignition temperature and limited flammability range make accidental ignition or combustion of natural gas unlikely.

**Q:** Does the United States have enough natural gas to use in vehicles?

**A:** The United States has a huge natural gas resource base. The U.S. Department of Energy estimates that with conventional supplies alone, the nation has at least a 100-year supply of natural gas at today's consumption rates. If so-called nonconventional supplies — some of which are already being produced — are included, the total natural gas resource base can provide more than a 200-year supply. Driving 5 million to 10 million NGVs every year would use about 1 million cubic feet per car of gas — less than 2 percent of our current annual natural gas consumption of 19.4 Tcf.

**Q:** Is natural gas readily available?

**A:** The natural gas transportation and storage network, a 2 million-mile underground pipeline system, is already in place. All 50 states and all major metropolitan areas have access to gas service.

In addition to its extensive distribution system, natural gas has another key advantage — it's primarily a domestic fuel. About 92 percent of the natural gas used in the United States this year will be produced in the United States. Almost all the rest will come from Canada.

**Q:** What are the environmental benefits of NGVs?

**A:** Vehicles fueled with natural gas produce significantly lower levels of harmful pollutants than gasoline or diesel vehicles. For example, NGVs reduce emissions of carbon monoxide by 90 percent and reactive hydrocarbons (which play a major role in the formation of ground-level ozone, the principal ingredient of smog) by 35 percent. Natural gas contains no particulates, such as those associated with diesel fuel, and also reduces emissions of carbon dioxide, the principal "greenhouse" gas.

**Q:** How do the costs of gasoline, natural gas and other alternative fuels compare?

**A:** Natural gas as a vehicle fuel actually costs less today than conventional gasoline, and much less than ethanol. The price of natural gas sold for vehicle use ranges from 25 cents to 70 cents for the energy equivalent of a gallon of gasoline. The comparable price of ethanol M85, priced on the West Coast, is \$1.40 per gallon equivalent versus \$1.20 for gasoline.

In addition, on-road experience with NGVs shows that standard maintenance can be reduced, because natural gas is a very clean-burning fuel.

**Q:** How much does an NGV cost?

**A:** It costs from \$2,500 to \$3,500 to convert a car to run on natural gas. Costs are higher for larger vehicles and vary depending on the number of fuel tanks installed. For most vehicles, installation of a natural gas fuel system takes only one or two days. Modified vehicles may run on either natural gas or gasoline since the liquid fueling system remains intact.

"Dedicated" NGVs run only on natural gas and cost slightly more than gasoline or diesel vehicles because of the cost of the sturdy storage tanks. The U.S. Department of Energy estimates that mass-produced NGVs will have a price tag about \$200 higher than conventional vehicles.

**Q:** Is anyone currently manufacturing original-equipment NGVs?

**A:** All the major U.S. automobile, truck and bus manufacturers are building and retooling prototype vehicles that run on natural gas. For example, the GMC Truck Division of General Motors Corp. is building dedicated natural gas light-duty pickup trucks, and Chrysler Corp. is building natural gas vans. Meanwhile, Ford Motor Co.

is purchasing vans, pickups and sedans. United Parcel Service (UPS) is sponsoring development of a natural gas engine for its familiar brown delivery trucks, and a natural gas engine for school buses made by Tedagen Inc. has been certified by the California Air Resources Board (CARB). The school bus engine is the first alternative-fuel engine to get CARB approval. Medium-duty engines are under development by Cummins Engine Co., Mercedes Engines Inc. and Detroit Diesel Corp. The Fixdite Corp. and Bus Industries of America are making natural gas mass-transit buses.

### Q: How does an NGV work?

**A:** The only major difference between a gasoline vehicle and an NGV is the fuel system. For use in an NGV, natural gas is compressed to approximately 3,000 pounds per square inch and stored in high-pressure steel or aluminum tanks installed in the rear or the undercarriage of a vehicle. When the engine requires fuel, the natural gas leaves the tanks and travels through a high-pressure fuel regulator located in the engine compartment. The natural gas enters the carburetor or is injected at atmospheric pressure through a specially designed natural gas mixer, where it is combined with air.

NGVs can be designed to operate in three different modes. A vehicle that runs solely on natural gas is called a "dedicated" vehicle. Vehicles that operate on either natural gas or gasoline at the flip of a switch are "bifuel" vehicles. Those that operate on natural gas and diesel fuel at the same time are "dual-fuel" vehicles. Best performance is achieved when a vehicle is designed to run only on natural gas, because the engine can then be set to take full advantage of the fuel's high octane, which exceeds 100. Bifuel vehicles typically are equipped to switch automatically to gasoline when the natural gas tank becomes empty. In addition, a simple electronic device is usually added to adjust the engine's timing when a switch is made from one fuel to the other.

### Q: How are NGVs fueled?

**A:** The commercial dispenser that fuels NGVs looks a lot like a gasoline pump. A small hose connects easily to the vehicle's fuel system with a coupling device. When the tank is full, the dispenser automatically shuts off.

NGVs are fueled on a "quick-fill" or "time-fill" basis. Quick-fill dispensers fuel a vehicle in about five minutes. Time-fill stations take longer, depending on the number of vehicles being served at one time and the size of the fueling unit. Time-fill stations are popular with operators of vehicle fleets that return to a central location each night, where the vehicle can be hooked up to a natural gas dispenser overnight or for a specified time period and even fueled unattended.

Some dispensers are also available. They are smaller than commercial dispensers, about the size of an air conditioning compressor, and are connected directly to the home's natural gas line. Some fueling businesses use the time-fill method, so vehicles usually are fueled overnight.

### Q: How many NGV fueling stations are there in the United States?

**A:** By early 1992, nearly 500 fueling stations for NGVs were operating in 43 states and the District of Columbia. More than one-half of the stations are open to the public or available through special arrangements with the operator. The rest are used by private fleets. Oil companies involved in public fueling stations include Amoco, Exxon, Mobil, Texaco, Unocal, FINA, Shell, Chevron, Conoco and Phillips 66.

### Q: Are NGVs used in other countries?

**A:** Natural gas as a vehicle fuel has a long-established record in Europe, Canada, New Zealand and Australia. Italy has been using natural gas to power vehicles since

the 1940s, and has about 300,000 NGVs and 240 filling stations.

**Q:** How will NGVs help cities meet the requirements of the Clean Air Act Amendments of 1990?

**A:** The Clean Air Act Amendments of 1990 have much tougher vehicle emissions standards, beginning with model year 1994. NGVs can already meet these standards.

In 22 urban areas, the new law will require all fleets of 10 or more vehicles that are capable of central fueling to purchase alternative-fuel vehicles, in increasing percentages beginning in model year 1998. Legislation being considered by Congress would move up that date and broaden the concept to include most major urban areas.

In California, the Amendments require that a special pilot program be adopted, involving the mandated production and sale of clean-fuel vehicles — 150,000 vehicles beginning in model year 1996 and growing to 300,000 vehicles in model year 1999 and thereafter.

Finally, an urban bus initiative in the new law is designed to reduce particulate emissions and to encourage the use of clean-fuel buses for mass transit. Natural gas buses are operating successfully in many American cities, are meeting the standards and are emitting virtually no particulates.

**Q:** How can NGVs contribute to America's energy security?

**A:** Although most U.S. economic sectors have diverse energy sources, the transportation sector is currently about 96 percent dependent on oil. The United States is dependent on foreign oil for nearly 50 percent of its energy needs. In 1991, the United States spent \$44 billion dollars to buy imported oil, which is over half the nation's total trade deficit. The best way to increase energy security and reduce the trade deficit — without a

negative environmental or economic impact — is to replace the use of imported oil with domestic natural gas. The most obvious place to begin is in the transportation sector.

**Q:** Who is likely to be driving NGVs today and in the near future?

**A:** Auto, truck and bus fleets are particularly well suited for NGVs, because they can share a central fueling station. Since a national network of public NGV fueling stations is still developing, widespread use of natural gas in privately owned, individual vehicles will come later.

**Q:** Where can I get more information on NGVs?

**A:** For more information on natural gas vehicles, contact:

American Gas Association  
1515 Wilson Boulevard  
Arlington, VA 22209  
(703) 841-8400

## Cherry Creek Schools Compressed Natural Gas (CNG) Program

Cherry Creek School District began converting its buses to CNG ten years ago. This was when clean air, the cost of fuel and environmental issues triggered the Districts research on alternative fuels. The district chose CNG because of safety issues and the abundant supply of natural gas.

### Cherry Creeks Experience:

In 1982, when gasoline prices jumped to 95 cents a gallon, unleaded was replacing regular gasoline at the pumps and as concern for the environment was being launched, Cherry Creek began converting 18 of its buses to CNG. As the years passed and CNG technology expanded, 35 more buses were converted.

Today 53 vehicles operate on bi-fuel conversions, 14 performed by Cherry Creek's own mechanical staff. Bi-fuel means the vehicle is equipped with both gasoline and CNG, and can operate on either fuel. The advantage to having both fuel options is flexibility. When the CNG system is down, buses can fuel with gasoline, or on trips they have the capability to run on both gasoline and CNG.

The drivers hardly notice the difference on the newer vehicles, on older vehicles the driver can shift to gasoline when the added power is needed. It should be noted that newer fuel injection systems seem to operate with less problems than carbureted fuel delivery systems.

# NATURAL GAS FUELS

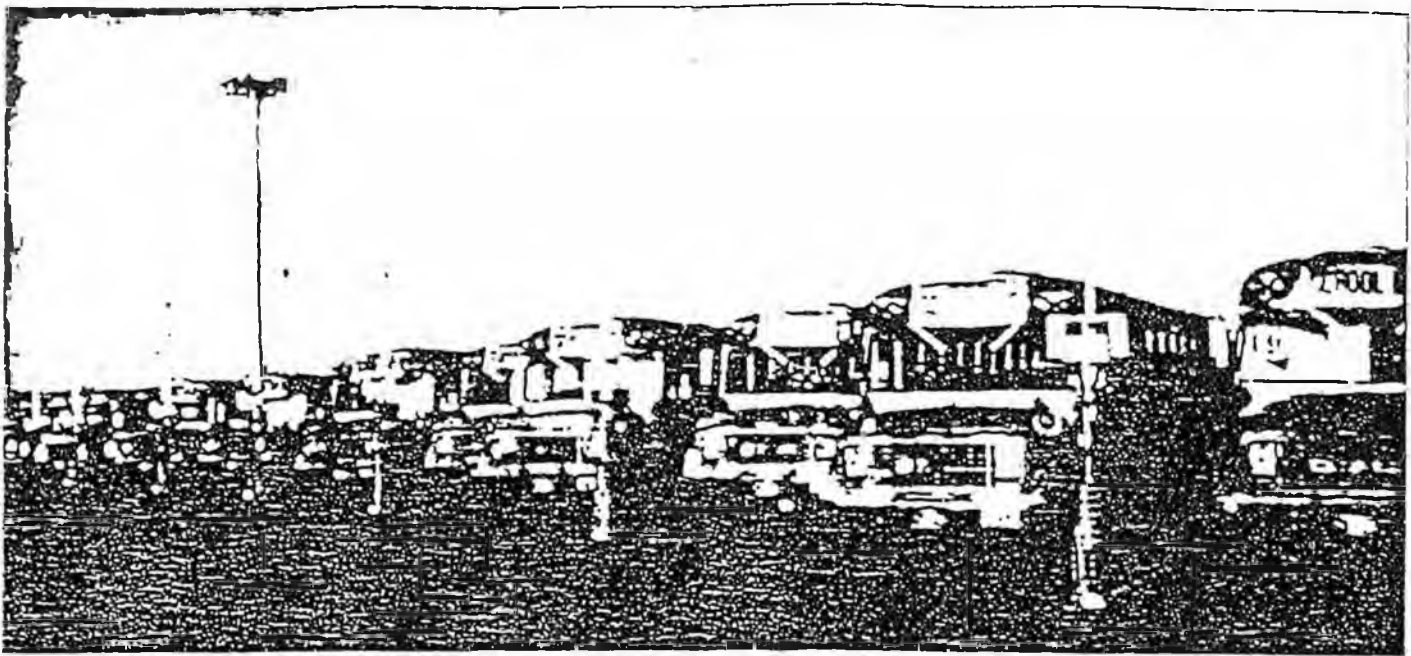
A MAGAZINE DEDICATED TO THE USE OF NATURAL GAS AS A TRANSPORTATION FUEL

VOLUME 1, ISSUE 3

OCTOBER 1992



- Putting Words Into Action: NGVs Go Public
- Alternative Fuels on the Campaign Trail
- Vehicle Fill Pressure Q&A



At the end of their shift, Cherry Creek School buses hook up to fueling units located adjacent to parking stalls.

## AGONY AND ECSTASY

Cherry Creek School District in Aurora, Colo., has been running buses on natural gas since the early 1980s, yet many parents and children remain unaware of the district's alternative fuels program. The now thriving program got its rocky start in 1982, when a schoolboard member suggested experimenting with natural gas buses. At that time, gas prices in excess of one dollar per gallon prompted the district to explore both propane and natural gas. Natural gas was selected largely because of safety factors, i.e., in the event of a leak, gas would dissipate; propane would pool on the ground.

"In the beginning, our natural gas experience could best be described as agony and ecstasy," says Joe Mirabella, director of transportation for Cherry Creek Schools. "Our program had three elements, and in essence they all combined to make things...interesting." The three elements, Mirabella says, were the compressor, the underground lines to the fuel delivery system and the conversion kits. "Unfortunately, the salesmen around at that time made all sorts of promises that the technology just could not deliver, which led to many problems in keeping the buses running. The buses would die, the compressor would not deliver fuel through the slow-fill system, a leak in the pipeline would alter the compression, or the kits would not function. The technicians were unable to deliver on the salesmen's promises, and until about 1985 or 1986 we were literally hanging by our nails trying to keep the program operational."

Although the industry has long touted the lower maintenance of natural gas vehicles, due to their cleaner-burning composition, Mirabella says that only recently has new technology proven out this claim. "On the older buses, maintenance costs were probably equal because the technology was not as advanced. We experienced several minor problems with CNG systems, such as hard starting in cold weather, problems with power loss, and oil in the second state regulators which resulted in diaphragm problems and affected performance. Compressor maintenance problems also trickled down to the buses via the slow-fill line, whereby small leaks in the compressors resulted in lower compression in the buses. However, we eventually overcame all these problems, primarily through changes in our maintenance procedures as we became more experienced with natural gas vehicles. And with the newer vehicles and equipment, we really don't see these types of problems anymore."

While working out the glitches, the program limped along, assisted by two savvy mechanics who were able to somehow keep things rolling. But what really contributed to the program's ultimate success was strong support from the district, which translated into few if any safety concerns or bouts with negative publicity. "Safety concerns have never been an issue, and the drivers do not think twice about filling their vehi-

cles with natural gas," points out Mirabella. Since its floundering beginning, the program has steadily grown from an initial 10 converted buses that used Dual-Fuel and Canadian Fuel kits. A switchover to ANGI kits, and the purchase of two Mako compressors has helped Cherry Creek to build its natural gas fleet to 53 school buses.

All of the natural gas buses are dual-fuel, with the exception of one dedicated Hercules bus. The district recently disposed of the 10 originally converted buses, and is now converting 10 new buses right at its transportation facility. "In the past, we've sent the buses to Natural Fuels Corp. to handle the conversions, but now we believe our level of expertise is to the point where we can handle the conversions on our premises. We are up to speed on the installation and most of the diagnostics, and we still can rely on Natural Fuels if we run into problems," Mirabella says.

The originally purchased Mako compressor is being rebuilt, and the system operates exceedingly well. Buses park in a line at the end of their shift, plug into the slow fill compressor, and are ready for work at the beginning of

## Federal Fleet NGV Purchase Plan by State

	1993	1994	1995	1996	1997
Alabama	10	9	13	12	23
Alaska	2	4	7	11	18
Arizona	37	25	42	37	41
Arkansas	1	1	2	2	3
California	760	563	573	566	316
Colorado	108	57	57	120	99
Connecticut	0	0	0	0	0
Delaware	0	0	0	0	0
District of Columbia	93	60	187	172	206
Florida	6	2	5	3	5
Georgia	29	33	28	44	47
Hawaii	2	2	2	4	4
Idaho	10	11	10	21	27
Illinois	25	30	14	19	22
Indiana	2	2	4	4	6
Iowa	3	1	2	2	6
Kansas	4	12	6	3	9
Kentucky	4	10	11	10	22
Louisiana	29	11	45	22	36
Maine	0	0	0	0	0
Maryland	16	25	28	22	35
Massachusetts	14	6	23	33	63
Michigan	1	1	2	2	4
Minnesota	3	9	9	12	21
Mississippi	0	0	0	0	0
Missouri	2	4	6	9	6
Montana	68	61	64	70	64
Nebraska	0	0	4	0	0
Nevada	34	18	23	26	29
New Hampshire	0	0	0	0	0
New Jersey	4	5	15	7	13
New Mexico	14	20	41	41	29
New York	30	16	40	47	94
North Carolina	5	4	6	6	7
North Dakota	3	9	6	14	11
Ohio	1	4	7	2	11
Oklahoma	45	5	6	6	7
Oregon	18	22	48	57	82
Pennsylvania	24	27	31	22	38
Rhode Island	0	0	0	0	1
South Carolina	135	235	229	189	205
South Dakota	5	5	12	3	7
Tennessee	30	6	41	78	176
Texas	44	49	47	50	32
Utah	8	18	13	13	18
Vermont	0	0	0	0	0
Virginia	21	35	23	45	59
Washington	3	6	3	5	12
West Virginia	4	7	1	4	27
Wisconsin	2	4	6	7	13
Wyoming	15	24	14	15	24
Vehicles to be placed	650	1,053	1,298	1,528	2,186
<b>TOTAL</b>	<b>2,327</b>	<b>2,523</b>	<b>3,154</b>	<b>3,473</b>	<b>4,664</b>

Source: Dept. of Energy draft report on alternative fuel vehicle five-year purchase plan

### Federal Fleet NGV Purchase Plan by Vehicle Type

Vehicle (# passengers)	1993	1994	1995	1996	1997
Bus	0	1	0	1	5
Carry all - 4x4 Compact	1	3	1	3	5
Carry all - 4x4 Full size	0	0	0	7	5
Carry all - Compact	24	13	0	0	0
Carry all - Full size	5	7	5	0	10
Golf cart	33	38	1	0	0
Pickup - 4x4 Compact	16	19	49	49	45
Pickup - 4x4 Full size	66	66	61	77	96
Pickup - Compact	517	547	638	697	1,302
Pickup - Crew Cab	16	11	17	18	19
Pickup - Full size	535	525	503	733	842
Sedan - Compact	256	142	326	271	269
Sedan - Delivery	1	1	2	0	1
Sedan - Full size	11	21	20	36	39
Sedan - Law enf.	13	0	0	0	0
Sedan - Midsize	13	22	51	34	34
Sedan - Subcompact	2	3	0	3	5
Stat. wagon - Compact	17	6	25	28	13
Stat. wagon - Full size	0	0	0	1	3
Truck - Cargo	10	0	0	13	14
Truck - Heavy duty	12	21	21	24	27
Truck - Light duty	18	23	34	38	37
Truck - Med. duty	155	179	254	299	445
Truck - Panel	9	13	27	29	30
Truck - Util. Light 4x4	18	2	0	18	7
Truck - Utility	49	21	44	71	63
Truck - Util. 4x4	1	1	0	0	0
Truck - Util. Light	0	4	0	7	0
Van (8)	282	506	600	626	908
Van (12)	18	6	5	3	0
Van (15)	244	242	283	313	335
Van - Cargo	1	2	11	9	27
Van - Cargo compact	0	2	0	0	0
Van - Delivery	0	2	2	1	1
Van - Mini	190	42	92	113	143
Van - Panel	13	35	47	13	31
Van - Step	22	1	0	0	0
Van - Utility	0	0	1	3	1
Van - Wagon	0	0	6	0	0
Van - Panel 4x4	3	0	0	0	0
Van - Wagon 4x4	0	0	0	9	0

Source: Dept. of Energy draft report on alternative fuel vehicle five-year purchase plan

**HCR**

**26**

FISCAL NOTE

REQUEST:

Revision Date: 2/8/94 Dept. Affected All Departments  
Title: Declaring 1994 The Year of Vancouver

Sponsor: House Labor & Commerce Cmte BRU: Office of the Commissioner  
Requestor: House Trans Cmte Components: \_\_\_\_\_

EXPLNDITURES/REVENUES: (THOUSANDS OF DOLLARS)

OPERATING	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00
Personal Services	0.0	0.0	0.0	0.0	0.0	0.0
Travel	0.0	0.0	0.0	0.0	0.0	0.0
Contractual	0.0	0.0	0.0	0.0	0.0	0.0
Supplies	0.0	0.0	0.0	0.0	0.0	0.0
Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Land & Structures	0.0	0.0	0.0	0.0	0.0	0.0
Grants, Claims	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0

CAPITAL EXPENDITURES						
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CHANGE IN REVENUES						
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FUNDING: (THOUSANDS OF DOLLARS)

1002 Federal Receipts	0.0	0.0	0.0	0.0	0.0	0.0
1003 GF Match	0.0	0.0	0.0	0.0	0.0	0.0
1004 GF	0.0	0.0	0.0	0.0	0.0	0.0
1005 GF/Program Receipts	0.0	0.0	0.0	0.0	0.0	0.0
1006 GF/MHTIA	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

ESTIMATE OF ANY CURRENT YEAR (FY 94) COST \$ \_\_\_\_\_

POSITIONS:

Full-Time	0	0	0	0	0	0
Part-Time	0	0	0	0	0	0
Temporary	0	0	0	0	0	0

ANALYSIS: (Attach a separate page if necessary)

Prepared By: House Transportation Committee Elizabeth M. Bell Phone: 465-4858  
Division: \_\_\_\_\_ Date: 2/8/94  
Approved By: \_\_\_\_\_ Date: \_\_\_\_\_  
Agency: \_\_\_\_\_

# HOUSE LABOR AND COMMERCE COMMITTEE

ALASKA STATE LEGISLATURE

STATE CAPITOL, JUNEAU, AK 99801-1182  
(907) 465-4954



## SPONSOR STATEMENT

### HCR 26 DECLARING 1994 THE YEAR OF VANCOUVER

This year marks the 200th anniversary of Captain George Vancouver's voyage to Cook's River and Prince William Sound, then to northern Southeast Alaska. In two small vessels, the *Discovery* (100 feet) and the *Chatham* (65 feet), the expedition had, by the end of 1793, finished exploring the Columbia River, British Columbia coast, and southern Southeast Alaska. HCR 26 declares 1994 to be the year of Vancouver to commemorate George Vancouver's important contribution to Alaska's history.

To celebrate the 200th anniversary of Vancouver's expedition, the newly formed Alaska Maritime Heritage Foundation Vancouver Bicentennial Committee is planning educational events. In Anchorage there are plans for a lecture series and a conference to commemorate Vancouver. Here in Juneau we plan to have a special exhibit at the Alaska State Museum and a series of speakers over the summer months. The exhibit, a major event called "Vancouver Meets the Tlingits," will consist of Native and European artifacts and trade goods that have had an influence on Native culture and change.

The National Geographic Society and the Alaska Geography and Education Program are very supportive of the concept and are working to prepare a curriculum for use in Alaska's schools. I believe this is an excellent opportunity to provide public education on many of Alaska's place names and the rich history of our state.



# With Vancouver in Alaska, 1793-1794

A day by day summary of his survey, activities  
and telling how places were named.

by  
Wallace M. Olson

Heritage Research  
Box 210961  
Auke Bay, Alaska  
99821  
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# **CORRECTION**

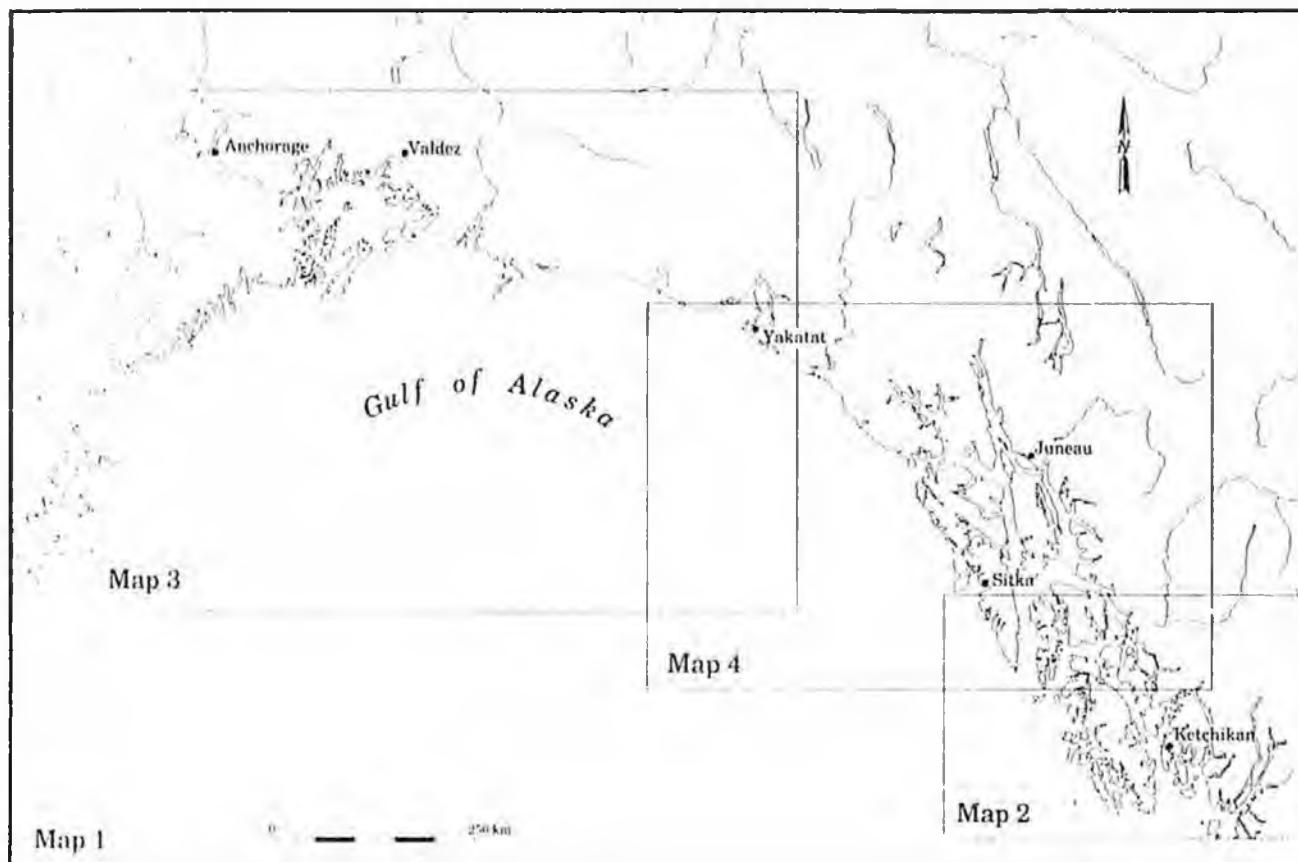
**THIS DOCUMENT  
HAS BEEN REPHOTOGRAPHED  
TO ASSURE LEGIBILITY**

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## MAPS

The illustrations on the front and back covers are reproductions based on Vancouver's charts published in the 1798 edition of his journal. The front cover shows his chart of the Cross Sound area, while the back cover is a portion of his chart from west to east showing the coast to the mainland, and in a north-south direction from Cross Sound to Frederick Sound.

The other maps in this booklet, showing the surveys, have been provided through the courtesy of the University of Alaska Press and first appeared in the *Alaska Travel Journals of Archibald Menzies, 1793-1794*.

## INTRODUCTION

On April 1, 1791, Captain George Vancouver set sail from England on what Navy officials thought would be a two or three year exploration and survey of the Northwest Coast of North America. The expedition returned to England in the fall of 1795.

Over the next three years, Vancouver prepared a record of his discoveries and adventures. His brother, John, who had been assisting him, completed the text just before Vancouver's death on May 12, 1798. The first edition consisted of three volumes with charts, and was published in 1798. A second edition, with corrections, was published in six volumes in 1801. Within a few years, the journal was translated into French, German, Danish, Swedish and Russian. Other, abridged editions were published in several languages.

In preparing his report, Vancouver relied upon his own daily logs and journal along with the journals of several officers and crew members. These other journals contain a few details not found in the final version of Vancouver's report.

In 1984, the Hakluyt Society, published a new, four volume edition of his journal entitled *The Voyage of George Vancouver, 1791-1795*. This edition was edited and annotated by W. Kaye Lamb of Vancouver, British Columbia. Lamb's work is a masterpiece of research and analysis. He studied not only the original editions, but also looked at every other journal, reports and letters related to the Vancouver expedition. His 290 page introduction and 120 pages of notes at the end, provide the reader with a complete background to the survey and detailed lists of crew members, correspondence and other important information. In addition, Lamb has extensive footnotes in which he gives present-day names of places, the correct longitude and latitudes, explanations of place names given by Vancouver, and, where the other journals have additional information, they are quoted and referenced.

Another major journal of the expedition was kept by the expedition's surgeon and naturalist, Archibald Menzies. Menzies had been sponsored by Sir Joseph Banks, an influential individual in England at that time. Menzies and Vancouver had a dispute near the end of the voyage, and Menzies refused to turn over his journal to Captain Vancouver. Banks hoped that Menzies would complete his journal and publish it before Vancouver's work came out. However, by the time Vancouver's journal was published, Menzies had returned to service in the Navy and still had not finished his account of the final year of the survey.

In 1993, the University of Alaska Press published *The Alaska Travel Journals of Archibald Menzies, 1793-1794* with an introduction and annotation by Wallace M. Olson and a list of the botanical collections by John F. Thilenius. Menzies had been on several of the boat surveys and gives a first hand description of what he observed. There is some overlap between Vancouver's and Menzies' journals because whenever Menzies stayed aboard the *Discovery*, he used the same reports from other crew members which Vancouver later used for his summary.

The following pages are only intended to be a daily guide and brief description of Vancouver's survey. In both Vancouver's and Menzies' accounts, there are long, descriptive narratives with detailed information regarding certain events. Vancouver also has extensive descriptions of the weather, sailing conditions and specific information on the longitude and latitude and chronometers used to determine longitude. To find the details and specific information regarding certain events, the reader will have to search out the passages in Vancouver's or Menzies' journals.

In his journal, Vancouver usually gives a day by day account of his activities and the boat surveys in which he participated. But on those occasions when he remained aboard the *Discovery* and others carried out the survey, he describes their research only after they have returned and reported to him. And so, a person needs to examine the text to find specific dates and events. The following is a compilation and brief summary on a daily basis, based upon both Vancouver's and Menzies' journals so that the reader can begin to retrace the events as they took place.

Wallace M. Olson

# I VANCOUVER AND HIS TIMES

George Vancouver was born at King's Lynn, Norfolk, England on June 22, 1757 and was the youngest of six children born to John Jasper Vancouver and his wife, Bridget Berner. John Vancouver was a descendant of the van Coeverden's from the province of Drenthe in the Netherlands. John's branch of the family had lived in England for several generations, and he had served as the Deputy Collector of Customs at King's Lynn. The Berners were an old English family, and Bridget came from St. Mary's Wighenhall, near King's Lynn.

At age 14, George Vancouver was chosen to serve under Captain James Cook aboard the *Resolution* on the second of his three great voyages. It was on this voyage that the young seaman developed his nautical skills and was trained in navigation. On this trip, Cook explored the coast of Antarctica and visited several south sea islands and New Zealand, to which Vancouver would return on his voyage nearly twenty years later. In 1776, Vancouver again joined Cook for his third voyage, but this time he served aboard the *Discovery* under Captain Charles Clerke. They sailed to New Zealand, Tahiti, Hawaii and continued on to the Northwest Coast of North America, going as far north as Bering Strait. Cook sailed offshore the coast of present day Southeastern Alaska and did not explore the inside waters at all. Cook realized that someday, someone would have to make a detailed study of those intricate waterways, but that would not be done until Vancouver's survey of 1793-1794. Vancouver was with the Cook when the latter was killed on February 14, 1788. After returning to England in 1780, Vancouver served in the Caribbean and by 1783, he was back home. In 1784, he returned to the West Indies and in 1788 was made a first lieutenant, or second in command of the *Europa* and the following year returned to his homeland.

In the meantime, there had been trouble on the Northwest Coast of North America. The Spanish had explored parts of what is today Alaska, and had a small settlement on the west coast of Vancouver Island at Friendly Cove in Nootka Sound, which Cook had previously discovered. By this time, several British ships were engaged in the sea otter trade along the Northwest Coast.

In 1788, Captain James Colnett with his ship the *Prince of Wales* sailed to the Northwest Coast to trade for sea otter skins. With him were Archibald Menzies and James Johnstone. They visited Prince William Sound, Yakutat and stopped near the present city of Sitka. In 1789, Colnett returned to Nootka aboard the *Argonaut*, and he and his ships were seized by the Spanish commander, Estéban José Martínez. This precipitated a major dispute between England and Spain which was resolved with the Nootka Sound Convention in October 1790. As a consequence of this agreement, those captured were freed, and the port of Nootka was to be turned over to the British. In addition, British trading ships were to have unrestricted access to the area.

The British government now decided that an expedition was needed to be sent to the Northwest Coast to receive the port of Nootka for the Crown and secondly, to learn about this area to which they now had free access. Finally, for years there had been reports that there was a Northwest Passage; a waterway across North American linking the Atlantic and Pacific Oceans. It was said to begin at about 60° North. Captain Cook had looked for it, but failed to find it.

On December 13, 1790 Vancouver received his commission as captain of the *Discovery*, while it was still being outfitted for the voyage. In the meantime, the Treasury had engaged Menzies to be the naturalist for the voyager. Sir Joseph Banks had been with Cook on his first voyage and now supported Menzies as his protegee. Menzies, although a naval surgeon in his own right, was signed on as a naturalist. It was only later in the voyage, when the regular surgeon, Cranstoun, became ill and had to return to England, that Vancouver appoint Menzies as ship's surgeon. Among the others to sail with Vancouver were his old acquaintances, Peter Puget, Joseph Baker, Zachary Mudge.

Accompanying the *Discovery* was the smaller vessel, the *Chatham* under the command of William R. Broughton. The Master of the *Chatham* was James Johnstone who had been in the navy

since 1778 and had also served in the Caribbean. He and Menzies remained good friends since their voyage to the Northwest Coast with Colnett in 1788.

The expedition had three objectives. Vancouver was to receive Nootka for the British. He was to then examine every inlet leading north or east in search of the Northwest Passage. In the process of doing this, he was to carefully explore and chart the coast in detail. Menzies, on the other hand, as the naturalist, was to examine the plants, animals, lands, and natural phenomena with a particular view as to possible use in the future by British settlers. Also, he was ordered to describe all of the native people in the region and obtain as much information as he could on their languages, customs, population, settlements, culture and technology.

## II THE SURVEY BEGINS

The main ship, the *Discovery* was 96 feet long, with a beam of 28 feet and a draft of 14 feet. The second vessel, the *Chatham* was 65 feet in length, with beam of 22 feet and drew 12 feet of water. On board the *Discovery* was a complement of 100 men including officers, midshipmen, seamen and marines. The *Chatham* had a crew of 45. Most of the men ranged in age from 17 to 30. A few, such as Vancouver, Whidbey and Menzies, were in their mid-thirties. In the letters and journals of several of the crewmen, Vancouver is described as irascible and given to emotional outbursts. However, as commander of two vessels and 145 men, at sea for four years, he needed to maintain strict discipline and from his reports seems to have been greatly concerned for the health and safety of his men. It is quite understandable that his patience must have been sorely tried on a 96 foot vessel, with 100 men and all their supplies, sails and other equipment, with crowded and uncomfortable conditions. Also, Vancouver had spent most of his adult life at sea and expected others to follow his orders precisely. Dr. John Naish, a retired British Naval Surgeon, after looking at all of the reports regarding the captain, says that Vancouver appears to have been suffering from chronic kidney failure even before he left on the voyage. Because of his health, Vancouver himself seldom went on any boat surveys in the last year of the trip.

After leaving England in the spring of 1791, the two ships sailed for the Cape of Good Hope which they reached in July. By fall they had visited Australia and New Zealand and in December were in Tahiti. In late January they sailed on to the Hawaiian Islands where Vancouver had been with Cook thirteen years earlier. They left Hawaii on March 16, 1792 and sighted land about 110 miles north of San Francisco Bay on April 18th. They worked their way northward up the coast and by May 1st were in the Strait of Juan de Fuca and began their survey of Puget Sound.

It was soon apparent to Vancouver that the large ships would not be able to survey all of the labyrinthine waterways of the inside passage. A routine was established in which the larger ships anchored and survey parties were dispatched in the smaller boats - the cutters, launches and yawl. Each boat carried about 12 to 15 men with their equipment and supplies. Since they were equipped with sails, they sailed whenever the weather permitted, but on some of the surveys, the crew had to row the entire distance. Each bay, inlet or channel leading north or east was examined. It was a slow, tedious and laborious process. Along the way observations were taken to determine the exact longitude and latitude of key points. Joseph Whidbey was in charge of many of the surveys. There were several British and American traders on the coast at this time, and no doubt Vancouver gleaned from them some details concerning the area he was to survey.

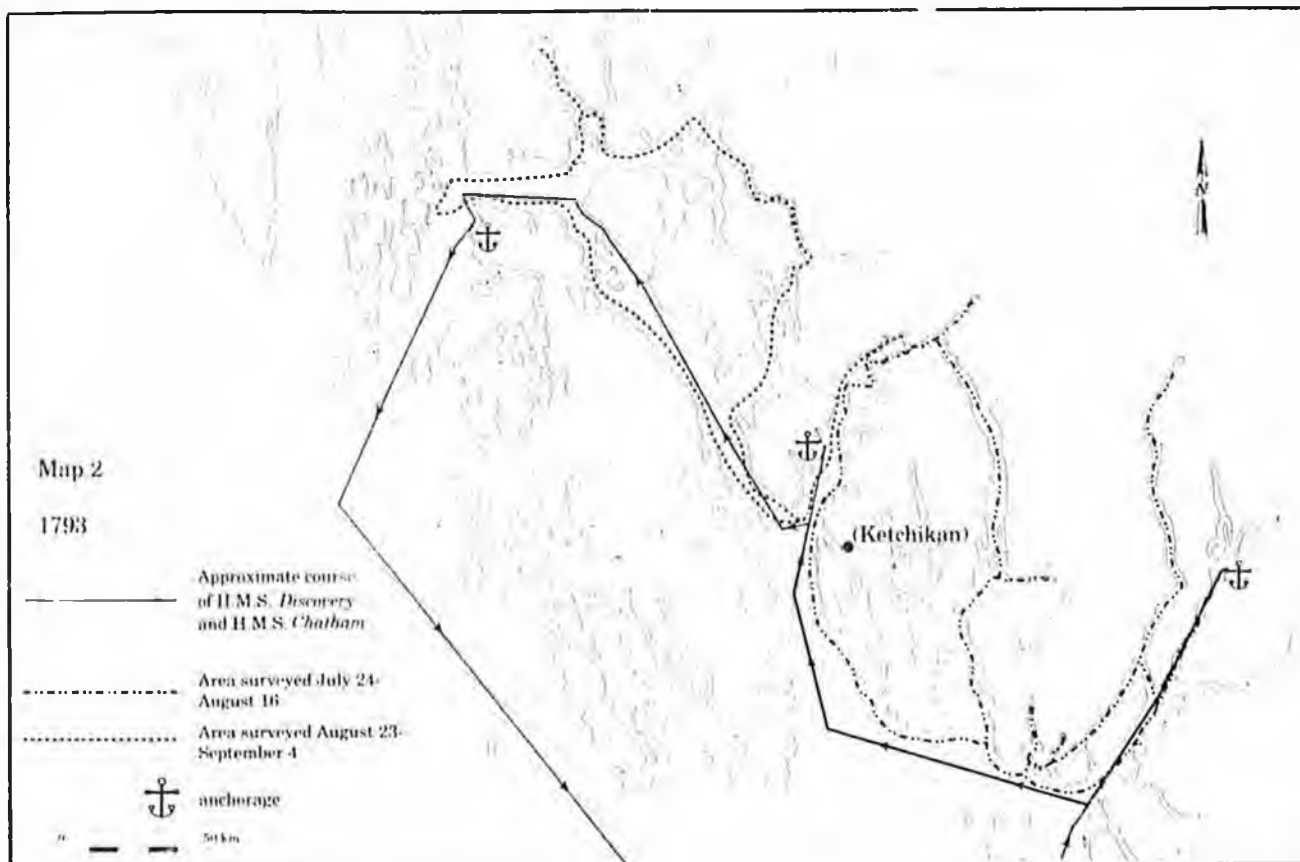
Some of the places had been named earlier by various explorers or traders, but many features remained unnamed. In his survey, Vancouver named 388 geographic features. Some places were named for his officers and crewmen while quite a few of the names were given to honor members of the Admiralty, the Royal Family, friends and acquaintances. A few names commemorated places in England and especially Vancouver's home area of Norfolk. Today, the

names he gave, like Puget, Baker, Orchard, Whidbey, Chatham are still in use on the Northwest Coast.

By August, Vancouver ended his survey for 1792 and went to Nootka where he met with Señor Juan Francisco de la Bodega y Quadra. (Although, according to Spanish tradition, his family name was Bodega, he is often referred to a "Quadra.") There was some confusion and disagreement over the northern boundary of Spanish control and the actual transfer of Nootka to the British. Even though Vancouver and Bodega y Quadra got along quite well personally, they were unable to come to closure regarding Nootka. After six weeks at Nootka, the *Discovery* sailed for California and Hawaii in mid-October. For the next few weeks, they visited Spanish settlements in California and by February they were in Hawaii where Vancouver met the new king, Kamehameha at Kealakekua Bay. Vancouver was hoping to make the Sandwich Islands, as Hawaii was known at that time, a British colony.

At the end of March, 1793, the *Discovery* and *Chatham* set out again for the Northwest Coast to continue their survey. The ships separated at sea, but had arranged to meet at the point where they had terminated their survey the previous season. After stopping in Nootka, Vancouver went to Restoration Cove in Burke Canal, British Columbia. Here they continued their survey with numerous boat expeditions under the command of Joseph Whidbey from the *Discovery* and James Johnstone from the *Chatham*. At times, the boats were gone two or three weeks while the ships remained at anchor. By July, they had explored every inlet and passage and were now near the present border between Canada and Alaska. The ships were anchored in Observatory Inlet, just east of the mouth of the Nass River in British Columbia.

From their anchorage, Johnstone and his crew were sent to examine the coast back to the end of their previous survey, while Vancouver led the other survey north in hopes of finding the Northwest Passage.



### III THE SURVEY OF 1793

- July, 1793  
Tue. 23rd      Johnstone set out with a survey party to examine the shoreline from Point Maskelyne back to where the ships were anchored at Salmon Cove, Observatory Inlet.
- Wed. 24th      Johnstone was at the mouth of the Nass River, but found it too shallow for navigation by ships.
- Thu. 25th      Johnstone's party reached Point Maskelyne on the north tip of the Tsimpsian Peninsula and the entrance to Portland Canal.
- Fri. 26th      Johnstone surveyed Work Channel east of Prince Rupert, British Columbia.
- Sat. 27th      Vancouver and his party left the *Discovery* and began a survey up a passageway which he later named Portland Canal in honor of the Bentinck family, the Dukes of Portland. Here they met Indians and Vancouver described the people, their dress, decoration and behavior. The Indians had sea otter skins to trade, and wanted firearms in return, but Vancouver refused to trade guns or ammunition.
- Sun. 28th      At the upper end of Portland Canal, near the present town of Hyder, Vancouver was "mortified" to realize that they had wasted so much time tracing this passageway. He noted that the waters were filled with leaping salmon, sea otters and seals.
- Mon. 29th      They continued back down Portland Canal.
- Tue. 30th      Vancouver was back at the northern end of Pearse Island near the place they had met the Indians on Saturday. Johnstone's party returned to the *Chatham*.
- Wed. 31st      In the fog, Vancouver's survey party moved down Pearse Canal past Hidden Inlet and later met more Indians.
- August  
Thu. 1st      As they continued on, they encountered another group of Indians under the direction of an old woman who steered the canoe. After examining Filmore Inlet, the boats were nearly swept in to Willard Inlet by the incoming tide.
- Fri. 2nd      They passed Tongass Island and then entered Nakat Bay and Inlet. Vancouver was discouraged because in a week they had progressed only a few miles northward along the coast.
- Sat. 3rd      In haze and heavy rain, they passed a cape which Vancouver named to honor the Right Honorable Charles James Fox.
- Sun. 4th      In heavy fog, the survey party passed "Foggy Point".
- Mon. 5th      They passed Very Inlet and turning east at Kah Shakes Point, entered Boca de Quadra and looked at Vixen Bay.

- Tue. 6th After reaching the end of Boca de Quadra, Vancouver returned to the main waterway which the Spanish had named Canal de Revilla Gigedo in honor of the Viceroy of New Spain (Mexico).
- Wed. 7th As they moved northward, they turned to the east up a passage which Vancouver later named Behm Canal in honor of Magnus von Behm, Governor of Kamchatka when Vancouver had been there in 1779. He named point Alava to compliment the Spanish governor at Nootka and other points after Lord Nelson and John Sykes, Master's Mate of the *Discovery*.
- Thu. 8th They spent the day examining Smeaton Bay. They also saw a mortuary box with human bones inside.
- Fri. 9th Vancouver passed "a remarkable rock" which he named New Eddystone because it resembled the light house off Plymouth, England. They met Tlingit Indians who said that they called the rock shaa gil.
- Sat. 10th Vancouver was now worried because they were out of provisions. They looked into Rudyerd Bay and passed by Walker Cove.
- Sun. 11th After passing a point which he named in honor of John Fitzgibbon, Earl of Clare, they stopped in Burroughs Bay to take several spawning "hunch-backed" salmon. Later, they passed a deserted village which Menzies describes as a fortress.
- Mon. 12th They went through Behm Narrows and passed Bell Island and later met several large, well manned, Tlingit canoes. After going ashore to take observations, the Indians in their canoes surrounded the yawl and began to steal firearms, Vancouver tried to get them to leave, but an old woman urged them on and they began to attack with spears. Fortunately for Vancouver, the launch came from behind and fired on the Indians. Puget estimates that several Indians were killed or wounded. Two of Vancouver's men, Robert Betton and George Bridgemen had been seriously wounded by spears. Vancouver named the site Traitor's Cove and Escape Point, and later named an island in honor of Betton. Vancouver was very upset with the treacherous attack by the Tlingit.
- Tue. 13th As Vancouver left Behm Canal, he named two points of land for Don Ambrosio O'Higgins de Vallenar, Governor of Chili, and the island they had circumnavigated in honor of Conde de Revilla Gigedo.
- Wed. 14th In a hurry to get back to the ship, Vancouver sailed around Gravina Island, naming Point Davidson for the captain of his supply ship, and a point and a cape in honor of the Percy family, the Dukes of Northumberland.
- Thu. 15th Vancouver returned to the *Discovery*.
- Fri. 16th Equipment that had been taken ashore was loaded on the ships and preparations were made to sail.
- Sat. 17th The *Discovery* and *Chatham* started back down Portland Canal.
- Sun. 18th They anchored near the mouth of the Nass River.

- Mon. 19th      The ships slowly moved towards Main Passage and the ocean.
- Tue. 20th      The expedition sailed into Main Passage on the northern end of Chatham Sound and then sailed north past Dundas Island and Cape Fox entering what are today Alaskan waters. Vancouver named a sound after the Earl of Moira.
- Wed. 21st      Continuing north, Vancouver named an inlet on the western shore in honor of the Earl of Cholmondeley. Later, Vancouver named this strait in which they were sailing in honor of His Royal Highness Prince William Henry, the Duke of Clarence. They met a group of Indians who indicated that their great chief was coming from the "Stikin". The ships were anchored in a small port which Vancouver later named Port Stewart to honor a midshipman, John Stewart, who surveyed the harbor.
- Thu. 22nd      The small boats were prepared for another survey.
- Fri. 23rd      Whidbey was sent back to examine Behm Canal to the north and east, while Johnstone's group was sent north up Ernest Sound. The Indians they had met earlier returned and again said that a great chief by the name of "Ononistoy" was coming.
- Sat. 24th      Whidbey's party went around an island which was named for midshipman, Edward Bell, clerk of the *Chatham*.
- Sun. 25th      Near midnight, a party of Natives entered Port Stewart and continued singing until daybreak. They remained by the ships for several days, trading and Vancouver observed that they were very honest and well mannered. Whidbey's group examined a cove which was named for William Walker, surgeon of the *Chatham*. Meanwhile Johnstone started up Ernest Sound which Vancouver named for Prince Ernest. Another point was named for William Le Mesurier, master's mate of the *Chatham*.
- Mon. 26th      On their return trip, Whidbey met Indians who followed the boats and then carried out a peace ritual, some of these Indians were recognized as having been involved in the earlier attack on Vancouver and his men at Traitor's Cove. Johnstone inspected Bradfield Canal.
- Tue. 27th      Whidbey again met Indians who blew bird down into the air as a sign of peace and later gave the boat crew some fish. Whidbey examined Yes Bay and went past Spacious Bay. Johnstone went up Blake Channel and passed a point which Vancouver later named for Bishop Spencer Madan.
- Wed. 28th      Whidbey returned from his survey. After passing Point Highfield, Johnstone and his men turned towards the mouth of the Stikine River and then west into Sumner Strait.
- Thu. 29th      Johnstone's group continued on past a point named for Admiral Lord Howe and started up the Wrangell Narrows. Vancouver later named many of the features in this area, but the source of these names is unknown.
- Fri. 30th      Another group of 25 Indians visited Vancouver in Port Stewart. In his journal, Edward Bell mentions that they measured one of the chiefs who came on board and

he was 6 feet 5 inches tall. Johnstone explored a canal later named for Admiral Charles Duncan.

- Sat. 31st At Port Stewart, the Indian visitors spent the day aboard the *Discovery*. In the afternoon, a large canoe approached and the Indians near the *Discovery* went to meet them. Among this group was the great leader Ononistoy and his group spent the night aboard the ship. After leaving Duncan Canal, Johnstone continued west past a point named for Captain William Mitchell.
- September
- Sun. 1st Ononistoy and his friends joined the Indians on shore and performed an elaborate welcoming ceremony for Vancouver's men. Both Vancouver and Menzies describe in detail the activities that took place over these few days. Johnstone turned south to begin his return to the ships past points which Vancouver later named for Captain Macnamara and Admiral Colpys.
- Mon. 2nd The Indians left Port Stewart. Johnstone continued southward into Clarence Strait past points which Vancouver named Nesbitt, Harrington and Stanhope.
- Wed. 4th After meeting a group of 250 Indians, Johnstone and his survey party returned to the ships.
- Thu. 5th The ships left Port Stewart.
- Fri. 6th In a gale, the ships started north up Clarence Strait.
- Sat. 7th The weather cleared and they sailed into Sumner Strait.
- Sun. 8th While at anchor, they were visited by a large group of Indians. Vancouver and Menzies both describe the Natives and their ornamentation. A storm developed and the ships turned to the south after passing a point named for Lieutenant Joseph Baker. They were fortunate to find a secure harbor which Vancouver named Port Protection.
- Mon. 9th Vancouver, Whidbey and Johnstone surveyed and charted the harbor.
- Tue. 10th Whidbey, was sent to survey the western shore while Johnstone and Mr. Barrie were to examine the northern shore.
- Wed. 11th Johnstone returned, having found no passage to the north. Conclusion Island was named to note the end of this year's survey. Meanwhile, Whidbey surveyed Port Beauclerc to a point which Vancouver named for Amelius Beauclerc, whom Vancouver met in the West Indies. Whidbey continued on to an island which Vancouver named for Captain John Borlase Warren.
- Sun. 15th In spite of stormy weather and a damaged launch, Whidbey and his men examined a channel later named for Admiral Affleck.
- Tue. 17th The storm continued and the ships remained in Port Protection.

- Wed. 18th      After waiting for a heavy fog to clear, Whidbey reached a promontory which Vancouver later named Cape Decision having decided that the stories of De Fuca and De Fonte regarding a Northwest Passage were not true.
- Fri. 20th      Whidbey's party returned to the ships.
- Sat. 21st      The ships left Port Protection passing a mountain which Vancouver named for Admiral Robert Calder.
- Sun. 22nd      Since this was the anniversary of the coronation of King George III, Vancouver named an island off the southern end of Kuiu Island, Coronation Island. They now left Alaskan waters and headed for the Queen Charlotte Islands.

#### IV CALIFORNIA - HAWAII INTERLUDE

Vancouver stopped at Nootka hoping to meet with his supply ship the *Daedalus* and to receive instructions for the transfer of the port from the Spanish. When he arrived, the *Daedalus* had not arrived nor were there any messages. So after three days, he sailed for California, intending to meet with Bodega y Quadra to settle the Nootka affair. In contrast to his warm welcome the previous year, his receptions at San Francisco and Monterey were cool and formal. It seems that the Spanish feared that Vancouver was spying on them to determine their military strength in the area. None of his men were allowed to go ashore while he was ordered to resupply his ships and leave as soon as possible. He was not to stop at any other port in New Spain. He did, in fact, stop at the missions of Santa Barbara and San Diego and was given a cordial reception by the missionaries. He looked for, but failed to find, the small pueblo of the mission Los Angeles.

They joined with the *Daedalus*, and resupplied, but there were no further instructions from his government regarding the transfer of Nootka. And so, they left California for Hawaii on December 15, 1793 and sighted the land on January 8th. Although Kamehameha wanted them to stay at Hilo, Vancouver preferred to anchor in Kealahou Bay where he had moored before. While the ships were being restocked and repaired, Vancouver was busy trying to settle a civil war among the Hawaiians and to have Kamehameha cede the island to Great Britain. Upon learning that James Boyd, an Englishman employed by Kamehameha, was attempting to build a schooner, Vancouver sent the ships' carpenters to help them. When he departed, Vancouver left the necessary ironwork, sails, lines and equipment to outfit the 36 foot schooner, *Britannia*.

A small party of men including Archibald Menzies, Joseph Baker and midshipman George McKenzie, became the first Europeans to climb to the top of Mount Mauna Loa. On February 16, Menzies, using a barometer, measured the height to be 13,634 feet which is very close to the actual height of 13,680 feet.

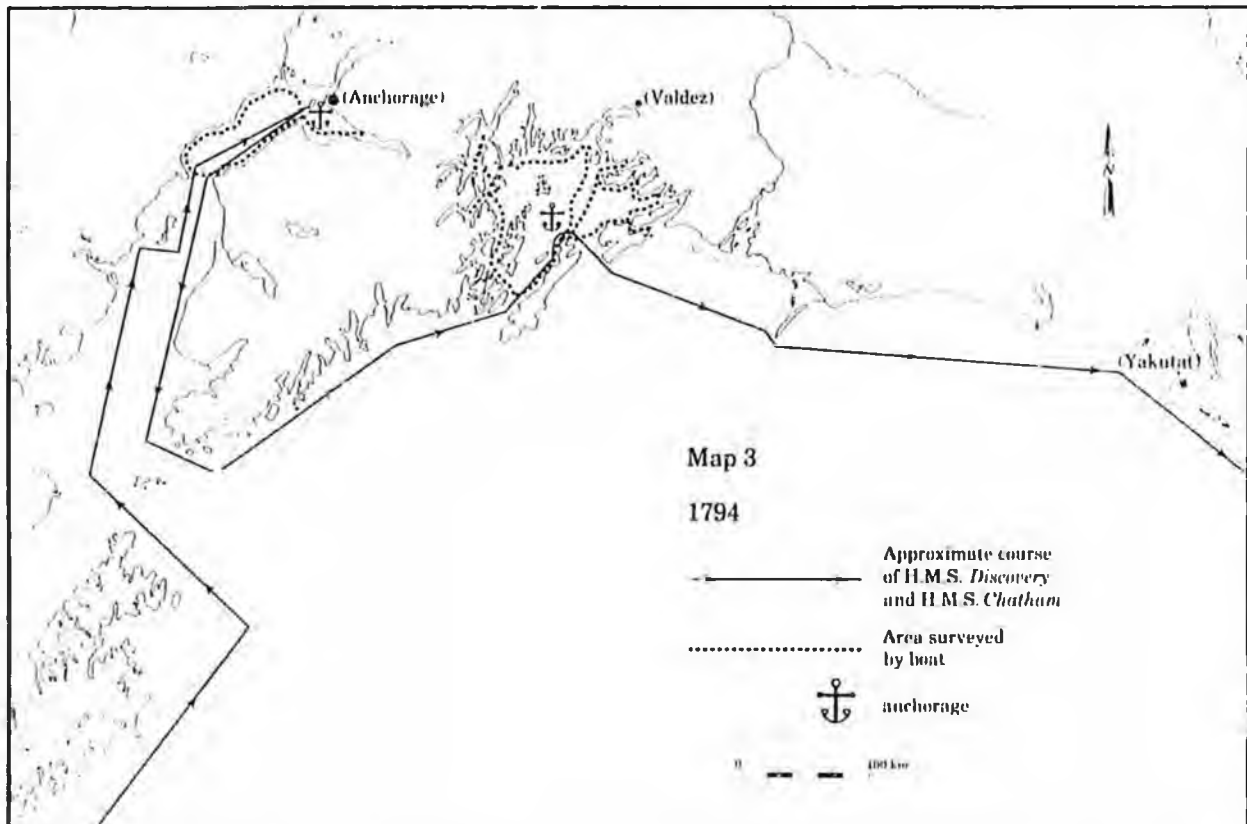
Kamehameha arranged a meeting of Hawaiian chiefs and while all were gathered aboard the *Discovery* on February 25, 1794, the island of Hawaii was ceded to the protection of the King of Great Britain. The Hawaiians were hoping that the British would now send forces to protect them from exploitation by other European or American powers.

Before leaving the islands, Vancouver made a short survey of Maui, Oahu, Kuai and then stopped briefly at Niihau. On March 15, 1794, they left the Hawaiian Islands and set out for the Northwest Coast to continue their survey.

## THE SURVEY OF 1794

March  
Sat. 15th

After departing the Hawaiian Islands, the *Discovery* and *Chatham* became separated at sea. Peter Puget was appointed the commander of the *Chatham* because Captain Broughton had been dispatched back to England with reports. The ships were to rendezvous at Cook's River, now Cook Inlet.



April  
Thu. 3rd

The crew of the *Discovery* sighted Chirikof Island, 100 miles southwest of Kodiak Island. Vancouver named the island to honor the Russian mariner.

Fri. 4th

They passed to the east of the Trinity Islands. Since Vancouver had been in this area with Captain Cook in 1778, he recognized some of the landfalls.

Sat. 5th

They were off Trinity Islands where they were visited by two Natives in a kayak. From having them count their numbers, it was determined that they spoke the language of Unalaska or Prince William Sound.

Sun. 6th

A gale blew, and the ship made little progress northward.

Mon. 7th

They continued to move slowly to the north off Kodiak Island.

Tue. 8th

They were just east of Sitkalidak Island.

- Wed. 9th      The weather was calm and the *Discovery* made little progress.
- Thu. 10th     The *Discovery* was off Ugak Island.
- Fri. 11th     The breeze picked up and they passed Marmot Island and sighted Cape Douglas, Mount Douglas and Fourpeaked Mountain.
- Sat. 12th     They entered Cook Inlet. Cook had left no name for this place on his charts, and it was later named Cook's River. Vancouver changed the name to reflect the fact that it was an inlet, not a river. They started up the western shore of the inlet.
- Sun. 13th     The weather turned cold with frost and heavy snow, so they anchored.
- Mon. 14th     The weather cleared and they saw Mount St. Augustine which Cook had named on the feast day of St. Augustine of Canterbury, May 26, 1778. The *Discovery* continued along the western shore of Cook Inlet.
- Tue. 15th     The heavy snow continued and they advanced only a short distance. The temperature fell to 23°F.
- Wed. 16th     As they moved north, three Natives came aboard. Vancouver does not provide any specific information which might identify the visitors as Eskimo, Aleut or Indian. Since the Natives were traveling north as well, their skin boats were brought aboard.
- Thu. 17th     Vancouver visited Kalgin Island. After weighing anchor, the ship struck bottom several times.
- Fri. 18th     Early in the morning they circled south of Kalgin Island over to the eastern shore. Vancouver named the West, East and North Forelands and they were joined by two more Natives.
- Sat. 19th     The Natives visitors left saying that their village was on the western shore near the West Forelands. Vancouver praised the Natives for the excellent conduct on the trip.
- Sun. 20th     In very cold weather, Whidbey was sent ahead to locate a safe channel into Knik Arm. They could see the south shore of Turnagain Arm which Cook had named Point Possession.
- Mon. 21st     The weather cleared and they anchored near Fire Island.
- Tue. 22nd     The tide carried them into Knik Arm where they anchored.
- Wed. 23rd     They moved farther up the arm and anchored again.
- Thu. 24th     In the vicinity of Eagle River, Vancouver went ashore in a boat to find fresh water and discovered a deserted village which he describes as probably being a former Russian settlement.
- Fri. 25th     Men were sent ashore for wood and water.

- Sat. 26th They were visited by twenty three Natives in a skin boat under the direction of "a young chief named *Chatidooltz*." On shore, some of the men met a family of 18 Natives "evidently of a different tribe or society from those with *Chatidooltz*."
- Sun. 27th The visitor, whom Vancouver describes as being very well-behaved, left the *Discovery*.
- Mon. 28th Whidbey was sent out with two boats to explore Turnagain Arm.
- Tue. 29th Vancouver continued to be worried about the extreme tides pushing massive pieces of drift ice by the ship. One anchor cable broke. In Turnagain Arm, Whidbey was forced to end his survey because of the extreme tides and returned to Point Possession.
- Wed. 30th They hooked the broken anchor line and fixed a buoy to it. Ten Russians and twenty Indians visited the ship. The Russians indicated that Turnagain Arm terminated not too far away and that they portaged from its termination over to Prince William Sound. This group had a post south of the East Foreland and another at Port Etches in Prince William Sound. South of Point Possession, Whidbey was visited by Indians who gave him dried fish.
- May
- Thu. 1st They moved the ship and reanchored. Whidbey crossed over the West Foreland.
- Sat. 3rd The weather changed to rain. Vancouver named the eastern point of land for Woronzof, Russian Ambassador to Great Britain, and the point on the wester shore for James Stuart Mackenzie and Point Campbell probably to honor Archibald Campbell, Governor of Jamaica when Vancouver was there. At the North Foreland, Whidbey stopped near a post of the Lebedev-Lastockin Company where 19 men lived in one large house.
- Sun. 4th Whidbey returned to the *Discovery*.
- Mon. 5th Crews went ashore to get wood and water.
- Tue. 6th After conducting a boat survey, Vancouver determined that this was an inlet, not a river.
- Wed. 7th The *Chatham* arrived from the south. They had anchored in Port Chatham, where they were met by Natives, several of whom spoke Russian. A small group of Russian fur traders had also visited them. Both vessels weighed anchor and started down Cook Inlet. A small party of Russians rowed out to meet them at Fire Island.
- Thu. 8th They continued on south down Cook Inlet.
- Fri. 9th The ships moved slowly down the inlet.
- Sat. 10th The ships anchored off the mouth of the Kenai River.

- Sun. 11th Vancouver and Menzies visited the Russian posted on shore. The post is described as being full of filth and had a "most intolerable smell." Vancouver described the fort, the living quarters and other conditions at the post.
- Mon. 12th The ships anchored off Point Bede which had been named by Captain Cook.
- Tue. 13th As they started south, the Russian commander who told them that Alexander Baranov was on his way to meet them.
- Wed. 14th The Russians brought Vancouver some halibut, but Baranov did not arrive. They sailed south to the Barren Islands and then returned back to the vicinity of Point Bede and anchored.
- Thu. 15th The ships left Cook Inlet and passed Elizabeth Island.
- Fri. 16th Near East Chugach Island they encountered a group of 400 Native hunters and traded with them.
- Sat. 17th In rain, strong winds and high seas, the ships sailed northeast along the coast.
- Sun. 18th They were off shore of the Chiswell Islands.
- Mon. 19th Hampered by north east winds, the ships made slow progress along the coast.
- Tue. 20th The ships now approached Montague Island which Cook had named for John Montagu, 4th Earl of Sandwich and First Lord of the Admiralty, whose mansion was at Hinchinbrooke.
- Wed. 21st Montague Island was sighted and they anchored near the southwest tip of the island.
- Thu. 22nd The ships made slow progress northeast through Montague Strait. A brief, violent storm damaged the masts and sails of the *Discovery*.
- Fri. 23rd With temporary repairs completed, they continued north towards Port Chalmers on the northwest end of Montague Island where they hoped to make permanent repairs.
- Sat. 24th With little wind, the ships were forced to anchor on the west shore of the island.
- Sun. 25th They reached Port Chalmers.
- Mon. 26th As the carpenters began the repairs, others gathered firewood and filled the water casks.
- Tue. 27th Two survey parties were sent out. Whidbey was to start his survey at the west end of Prince William Sound and proceed north and east. Johnstone's party was to start at Snug Corner Cove on the eastern end, where Captain Cook had visited in 1778. He was then to proceed south along the coast to Cape Suckling.
- Wed. 28th Work continued on repairing the *Discovery*. Johnstone surveyed Port Fidalgo, starting at Bligh Island. After crossing Montague Strait, Whidbey began his

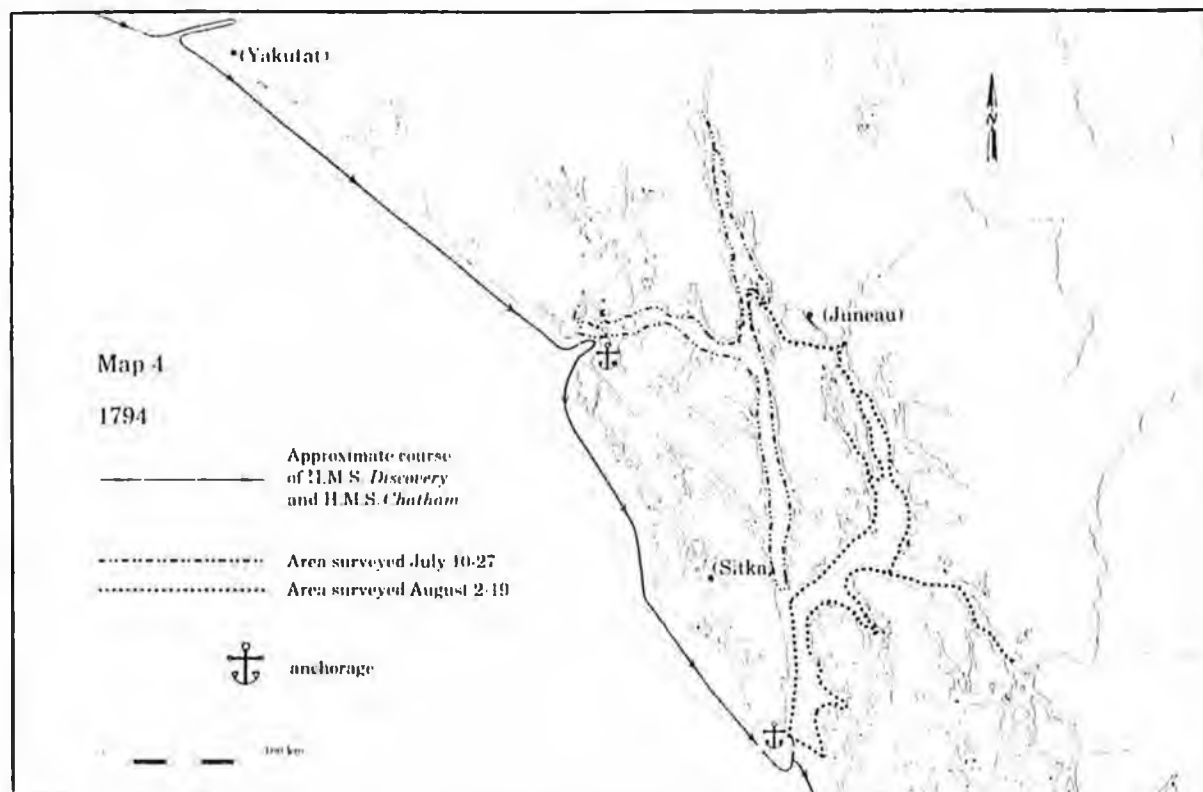
examination of the west side of Prince William Sound and proceeded down a bay which Vancouver later named Port Bainbridge for the astronomer Joseph Bainbridge.

- Thu. 29th A gale put a stop to the repair work. In Port Fidalgo, Johnstone saw a marker left by Señor Salvador Fidalgo in 1790. Whidbey and his men had to interrupt their survey and wait out the storm for two days.
- Fri. 30th Torrential rains continued to prevent the carpenters from working. Johnstone camped on a small island and was joined by a party of friendly Natives.
- Sat. 31st At Port Chalmers, the wind increased and an anchor cable was broken. Johnstone was near the entrance of Port Gravina.
- June
- Sun. 1st The storm continued.
- Mon. 2nd Whidbey's party returned because one man had been seriously wounded in a quarrel with a shipmate. Johnstone examined Port Gravina.
- Tue. 3rd Work continued on the repairs to the *Discovery*. Johnstone passed Simpson and Sheep Bays at the east end of Orca Bay. Whidbey returned to his survey down Bainbridge Passage on the west side of Prince William Sound and passed a point of lat. 1 which was named to honor Captain Countess.
- Wed. 4th At Port Chalmers, in recognition of the King's birthday, work was suspended and the men were given a double allowance of grog. In Orca Inlet, Johnstone's party stopped at Mummy Island and met a group of Russians near a large Native settlement. Whidbey explored Whale, Icy and Jackpot Bays.
- Thu. 5th At Port Chalmers, eight Natives and their Russian leader visited the ships. Johnstone and his men crossed over from Orca Inlet to the north end of Hinchinbrook Island and then started back to the ships via Hawkins Island Cutoff. Whidbey went by Ewan and Paddy Bays off Dangerous Passage and entered Port Nellie Juan.
- Fri. 6th The Natives returned to the *Discovery*, bringing with them several birds they had killed. In a cove on the north end of Hinchinbrook Island, Johnstone found another marker from the Fidalgo expedition. Whidbey explored around Port Nellie Juan and camped near a point which was later named for a naval officer, Sir Alexander Forrester Cochrane.
- Sat. 7th At Port Chalmers, more Russians arrived including Amos Balushin from the Lebedev-Lastochkin Company's post at Nuchek on Hinchinbrook Island. Johnstone stopped at Port Etches and visited the Russian post. Whidbey went up Passage Canal to a point near the present site of Whittier where he realized he was at the eastern end of the portage which the Russians used to cross from Cook Inlet to Prince William Sound.
- Sun. 8th Johnstone and his men returned to Port Chalmers. The Russians from Port Etches visited the *Discovery* and *Chatham*. After camping in Pigot Bay, named for

midshipman Robert Pigot, Whidbey looked at a Native burial site which Vancouver describes. They then went up Port Wells and College Fjord where a point of land was named for Admiral Sir Edward Pellew.

- Mon. 9th The carpenters continued to work on repairs to the *Discovery*. Whidbey went into Unakwick Inlet and met Chugach Eskimos from Kiniklik.
- Tue. 10th Vancouver examined charts which the Russians had brought. "At four o'clock [a.m.], the usual time of moving," Whidbey's party went by Columbia Bay and Glacier and entered Valdez Arm where today the town of Valdez and the oil pipeline terminal are located.
- Wed. 11th The *Chatham* was sent to examine the coast between Prince William Sound and Port Mulgrave in Yakutat Bay. Whidbey went past Bligh Island which Cook had named in 1788 for William Bligh, Commander of the *Resolution*, famous for the mutiny on the *Bounty*.
- Thu. 12th While repairs continued, Vancouver waited for Whidbey's men to return. Meanwhile, Whidbey concluded his survey by examining the entrance to Port Fidalgo. Puget aboard the *Chatham*, sailed along the sandy shoals south of the present town of Cordova and the mouth of the Copper River.
- Fri. 13th Vancouver and Lieutenant Baker surveyed and charted the area around Port Chalmers. Whidbey started back to the ship. West of Cape Suckling, Puget passed a point which he named for Sir Henry Martin and also named Wingham Island.
- Sat. 14th Repairs completed, the *Discovery* was prepared for sailing. Meanwhile, Puget set midshipman William LeMesurier in a cutter to examine the eastern entrance to Controller Bay, which Cook had named Comptroller's Bay to honor Maurice Suckling, Comptroller of the Navy.
- Sun. 15th Whidbey's survey party returned to the ship. Near Wingham Island, the *Chatham* grounded, but was soon refloated.
- Mon. 16th Vancouver tried to warp his way out of Port Chalmers, but the tow line broke. Puget anchored off the northwest end of Kayak Island. Some of the *Chatham's* crew went ashore on Wingham island and gathered sixty dozen sea bird eggs.
- Tue. 17th After being towed out, the *Discovery* started to sail between Montague and Green Island but struck a rock. Puget sailed around Kayak Island and continued on towards Yakutat Bay.
- Wed. 18th The *Discovery* passed the north east end of Montague Island but in trying to start out to sea, the winds failed.
- Thu. 19th Fortunately the *Discovery* drifted into Port Etches where the Russians had a post in Constantine Harbor. In the evening, Vancouver visited the Russian post.
- Fri. 20th Vancouver sailed out of Port Etches and eastward past Cape Hinchinbrook. At this point in his journal, Vancouver gives an extensive report of his observations on the waterways, lands, Russians and Natives of Prince William Sound.

- Sat. 21st      With poor winds, the *Discovery* sailed slowly towards Kayak Island which Cook had previously named Kaye's Island.
- Sun. 22nd      For this and the next three days, Vancouver plied back and forth, trying to sail against a easterly head wind.
- Thu. 26th      Vancouver passed the southern end of Kayak Island and started towards Cape Suckling. On passing Point Manby, Puget noticed large amounts of glacial water on the surface of the ocean. Several Kodiak Eskimos, hunting for the Russians, brought Puget a letter from James Shields, a British shipwright who was building a ship for the Russians at Resurrection Bay.
- Fri. 27th      The *Discovery* sailed slowly eastward along the coast. After looking into Disenchantment Bay at the north east end of Yakutat Bay, Puget was met by a large party of Eskimo hunters with their Russian supervisors, George Purtov. They had reportedly brought 700 kayaks and 1400 Eskimos to the area to hunt for sea otters.
- Sat. 28th      Vancouver was off the mouth of Icy Bay. Puget anchored near an island which he named for Sir John Knight of the Royal Navy. With great difficulty, Puget moved the *Chatham* through the shallow waters between the islands and southern shore of Yakutat Bay, into Port Mulgrave.
- Sun. 29th      Vancouver named the east point of the entrance to Icy Bay in honor of Edward Riou, who had been a midshipman with him on Cook's third voyage. They saw Mount St. Elias.
- Mon. 30th      Easterly winds drove the *Discovery* back to the west.
- July
- Tue. 1st      The wind changed to the west as they approached Yakutat where Vancouver named the western point of the entrance for Thomas Manby, Master of the *Chatham*. At Port Mulgrave, the Russians and Eskimos moved their camp next to the *Chatham* for protection from the Tlingit Indians.
- Wed. 2nd      Adverse winds prevented Vancouver from entering Yakutat Bay.
- Thu. 3rd      The *Discovery* met the *Jackal*, commanded by Mr. Brown, a fur trader they had met the previous year.
- Fri. 4th      For this and the next day, southeast winds force Vancouver to tack back and forth off the coast south of Yakutat. At Port Mulgrave, a group of Tlingit men arrived and complained that the Russians and Eskimos were taking their sea otters without paying for them. The Russians were afraid that if the *Chatham* left, the Tlingit might attack.
- Sat. 5th      The *Jackal* separated from the *Discovery* and the next day sailed into Port Mulgrave.
- Sun. 6th      The wind improved and the *Discovery* sailed southeast along the coast, passing Cape Fairweather and Lituya Bay. The *Chatham* left Port Mulgrave.



- Mon. 7th      The *Discovery* sailed into Cross Sound, where Vancouver named the northern point of land Cape Spencer to honor Lord Earl John Spencer, First Lord of the Admiralty. Offshore, they met Indians who wanted to trade, but who also demanded an exchange of hostages for security beforehand.
- Tue. 8th      As the *Discovery* approached the eastern shore of Cross Sound, they were joined by the *Chatham*. The ships anchored at Granite Cove on George Island in Port Althorp, which Vancouver named for the heir to Earl Spencer, Viscount Althorp.
- Wed. 9th      Rather than two expeditions, Vancouver decided to send one group under the command of Whidbey to survey the inside waterways, beginning at Cape Spencer.
- Thu. 10th     Whidbey's party left the *Discovery* and Vancouver remained behind due to poor health. Whidbey went up Taylor Bay to the face of Brady Glacier.
- Fri. 11th     Whidbey went past Point Wimbledon which Vancouver named to honor the birthplace of the 2nd Earl Spencer. On the southern shore, a point was named in honor of the Earl's wife, Lady Lavinia Spencer. Menzies notes that in passing north of the Inian Islands, huge icebergs rushed by, carried by the outgoing tide.
- Sat. 12th     Whidbey and his men anchored near a point which Vancouver named for Henry Dundas, Treasurer of the Navy. Icy Strait was filled with ice and the face of the glacier was right at the mouth of what is today Glacier Bay and passed a "pleasant" island. Another island was named for William Le Mesurier, Master's Mate of the *Chatham*.

- Sun. 13th Whidbey arrived at the junction of Icy and Chatham Straits, where the northern point was named Couverden in honor of Vancouver's ancestral home in the Netherlands. The northern end of Chatham Strait was named Lynn Canal for Vancouver's home town of King's Lynn.
- Mon. 14th With strong head winds, Whidbey's men progressed slowly up Lynn Canal.
- Tue. 15th The brig, *Arthur*, under the command of Henry Barber, arrived in Cross Sound and anchored south of the *Discovery*. Whidbey passed by Sullivan Island.
- Wed. 16th After looking up Chilkat Inlet, Whidbey went around a point of land and a short distance up Chilkoot Inlet. Vancouver later named Point Seduction "in consequence of the artful character of the Indians who are said to reside in its neighbourhood." They were then met by a group of Tlingit whose leader appeared to be a very important individual. Both Vancouver and Menzies describe this man and his activities in some detail.
- Thu. 17th After stopping overnight, Whidbey noticed that the Indians they had met the previous day, had been joined by many more who were well equipped with muskets, blunderbusses and had a speaking trumpet and telescope. After passing Berner's Bay, which Vancouver named for his mother's family, they camped on a small island.
- Fri. 18th Three Indians were caught stealing iron from the *Discovery* and *Chatham*. Whidbey continued south along the east shore of Lynn Canal to the southern end of Shelter Island opposite Auke Bay. Here they were joined by Tlingit in two canoes. Whidbey tried to drive the Indians away by firing muskets over their heads, but this only made them more aggressive. Whidbey started towards the shore to rest, but the Indians got to the beach before him and drew up in battle array. "There was now no alternative but either to force a landing by firing upon them, or to remain at the oars all night. The latter Mr. Whidbey considered to be not only the most humane, but the most prudent measure to adopt..."
- Sat. 19th Whidbey's men stopped to rest at a place which Vancouver later named Point Retreat in light of the events of the previous evening. During the day, Whidbey's party rowed along the eastern shore of Chatham Strait past a point Vancouver named in honor of a Mr. Marsden.
- Sun. 20th Whidbey and his men passed a point which Vancouver named Point Parker.
- Mon. 21st As Whidbey's party went by Kootznahoo Inlet and the present site of the village of Angoon, Menzies noted that the Tlingit there had small gardens where they cultivated tobacco. Five hundred Tlingit came out in canoes and welcomed the Whidbey and his men and wanted to trade with them. Many of the Indians were dressed in European or American clothing. Continuing south, they passed a bay and point which Vancouver later named for Vice Admiral and Baron, Samuel Hood.
- Tue. 22nd Early in the day, Whidbey reached the southern tip of Admiralty Island, which Vancouver named for Sir Alan Gardner. They started east up Frederick Sound, but after reaching Point Brightman, Whidbey decided to return to the *Discovery*.

- Wed. 23rd      The *Arthur* sailed out of Cross Sound and three days later the *Jackal* anchored next to the *Discovery*. With a strong southeast wind, Whidbey and his men sailed nearly sixty three nautical miles north along the west side of Admiralty Island.
- Thu. 24th      Whidbey's boats crossed Chatham Strait to a point on the southern shore of Icy Strait. Here, Vancouver began to name places for the family of King George III, including Points Augusta and Sophia for his daughters, and Port Frederick and Point Adolphus for his sons. Whidbey and his men camped near a Tlingit sepulchre.
- Fri. 25th      Whidbey went past Idaho Inlet and continued along the southern shore of Icy Strait.
- Sat. 26th      Whidbey and his men returned to the *Discovery*. Vancouver then named the point on the southern end of Cross Sound for Margaret Bingham, Countess of Lucan and the mother of Lady Lavina Spencer and the south point in port Althorp was named Point Lucan.
- Sun. 27th      Equipment was brought aboard the ships and they were made ready for sailing.
- Mon. 28th      Final preparations were made to leave Port Althorp.
- Tue. 29th      The *Discovery* and *Chatham* started around the west side of Baranof Island, past Cape Edward which Vancouver named for Edward the son of George III and later the father of Queen Victoria.
- Wed. 30th      The ships were directly west of Cape Edgecumbe and then passed two points which Vancouver named for Princesses Amelia and Mary, daughters of George III.
- Thu. 31st      The ships went around Cape Ommaney to the entrance of Chatham Strait which had been called Christian's sound for Rear Admiral Hugh Christian. Others called it Menzies' Strait in honor of Archibald Menzies.
- August
- Fri. 1st      The ships moored in Ship Cove of a bay which, at the end of the expedition, Vancouver named Port Conclusion. Two boat surveys were prepared. Whidbey and Spelman Swaine, were to take a crew and return to Point Gardner at the tip of Admiralty Island, and survey north and east. Johnstone and midshipman Robert Barrie were to lead a party to Cape Decision on the southern end of Kuiu Island and then proceed along the west shore of Chatham Strait as far east as possible.
- Sat. 2nd      The survey parties left the ships.
- Sun. 3rd      At noon, Whidbey reached Point Gardner and started north east up Frederick Sound in windy, rainy weather. At the same time, Johnstone and his men were at a bay and point, on the west side of Kuiu Island which Vancouver named for Sir James Harris, 1st Earl of Malmesbury. They continued north and examined Tebenkof Bay.
- Mon. 4th      Whidbey passed several bays on the south end of Admiralty Island and a point which Vancouver named Point Pybus. Later they passed two points which were named for Vice Admiral James Gambier and Vice Admiral Lord Hugh Seymour.

- Tue. 5th Whidbey examined Seymour Canal, while Johnstone's men continued to survey Tebenkof Bay.
- Wed. 6th Whidbey's party returned out of Seymour Canal and in darkness, with rain and heavy seas, started up Stephens Passage which Vancouver named for Sir Philip Stephens, Secretary of the Admiralty. Having completed his study of Tebenkof Bay, Johnstone moved into the Bay of Pillars. In all of these places, Johnstone found only a few Tlingit houses.
- Thu. 7th Whidbey passed Grand Island. Continuing north, Johnstone's men passed two points which Vancouver named for William Francis Sullivan of the Royal Navy, and Vice Admiral Robert Baker Kingsmill.
- Fri. 8th Vancouver surveyed Port Conclusion. In his journal, Vancouver expresses his concerns about his men and the dangers involved in meeting the Tlingit. Meanwhile, in Stephens Passage, Whidbey's men passed a point which was later named for Richard Pepper Arden and from which they could see three passages. To the northeast was Taku Inlet which was terminated by a glacier. The central passage, Gastineau Channel, leading to the present city of Juneau, was entirely blocked by ice. Whidbey went up the western channel past a point which was named for Admiral Sir George Young and in front of Young Bay where an Indian village was seen. They were followed by several canoes filled with Indians. Whidbey ordered his men to fire muskets towards the canoes, but this only incited the Indians to increase their speed, and so shots were fired directly at the canoes and apparently some Indians were wounded or killed. The canoes withdrew. Whidbey continued on to Point Retreat and examined the narrow inlet he called Barlow's Cove.
- Sat. 9th Returning south, Whidbey went along the west side of Douglas Island which Vancouver named for the Rev. John Douglas, Bishop of Salisbury, and editor of Cook's journal for his third voyage. Johnstone examined Security and Saginaw Bays and Keku Strait, just south of the present village of Kake. The southern point of the entrance was named for Charles, 1st Marquis Cornwallis, a British Commander in the Revolutionary War. Camden Bay on the south side of the strait was named for Charles Pratt, Earl of Camden.
- Sun. 10th Whidbey now knew that they had circumnavigated an island which Vancouver later named Admiralty Island and that there was no northwest passage in this area. They passed two Indian villages and examined Taku Inlet which Vancouver describes as "dreary and inhospitable an aspect as the imagination can possibly suggest."
- Mon. 11th Whidbey started south down the eastern shore of Stephens Passage. At this point, Vancouver assigned names to commemorate people and places of his homeland in Norfolk, England. A point and a port were named for Henry Styleman and for his home town of Snettisham, Norfolk. Meanwhile, after examining Port Camden, Johnstone and his men went south down a very narrow, rocky pass to a point where they could look across and see Port Conclusion where they had been the previous year.
- Tue. 12th Whidbey passed places which were later named for Thomas Coke, Earl of Leicester, who built Holkam Hall as his mansion at Holkam and for Anmer, a town near Vancouver's home of King's Lynn. Johnstone, returning north out of Rocky Pass, examined the east end of Keku Strait where he found "no less than eight deserted