ALASKA LEGISLATURE COMMITTEE FILES 1987-1988 8672
5447 SRES OIL & GAS HEARING, 3/7/88 - YUKON FISHERY 1019

"Stipulation No. 5-Work Commitment

The Lessee must commence to drill a well by the end of the fifth year of the primary lease term unless the entire lease interest is committed to an approved unit as described in Paragraph 23. Failure to comply with this stipulation automatically terminates the lease as to all parties."

The end of the fifth year of each primary lease term is October 31, 1985.

Subsection (b) of 11 AAC 83.700 (eff. 11/9/79, Reg. 72) provides, in pertinent part,

"(b) The Commissioner of the Department of Natural Resources will, in his or her discretion, alter or abrogate the terms of the work commitment if the lessee demonstrates to the satisfaction of the Commissioner that the lease will be unproductive or uneconomic under the terms of the work commitment."

As modified by Senate Bill No. 232, AS 38.05.180(h), upon which the foregoing regulation is based, provides in pertinent part:

"...If it is demonstrated that a lease has been proven unproductive by actions of adjacent leaseholders, the Commissioner may set aside a work commitment."

Historical summary of activity. In mid-year, 1983, the Lessee of ADL-318619, located in the southerly portion of the Duck Island Unit two miles to the East of the Chevron block, had proposed a well on that lease and solicited support from Chevron in the form of a contribution of an interest in Chevron's five captioned leases. Chevron offered that Lessee an option to drill on one of Chevron's leases before June, 1985 and after drilling the Duck Island well, to earn a working interest in all five Chevron leases. No response to Chevron's offer was made pending obtaining financing for the Duck Island Unit well. Ultimately, because the Duck Island Unit well was never drilled, Chevron's farmout offer was never accepted and no agreement for drilling on the Chevron block was reached before the 1983-84 drilling season was over.

On December 13, 1984, Chevron filed for permits to re-enter the Arco Sag Delta #11 well which had been previously drilled on Chevron's lease ADL-318601, with plans to redrill this well to a new bottomhole location during the 1984-85 season. In January, 1985 Chevron made contacts with five other major oil companies to solicit their interest in taking a farmout of the Chevron block. None of these companies were able to allocate funds for 1985 drilling. Chevron followed with further similar contacts with two independents, neither of which resulted in an agreement. When it became apparent that the drilling season would be over before the well could be drilled, Chevron withdrew its permit applications.

At this juncture, because of seasonal restrictions, no well could be drilled to comply with the lease work commitments before the critical date, October 31, 1985. The only alternative would have been to unitize the leases.

On June 28, 1985, Clifford C. Burglin et al. applied for the formation of the "Key Unit" which, if approved, would have included the five Chevron leases within its area. Geological data in support of the unit were submitted to the state by Burglin et al. Chevron also presented a technical briefing to the Department of Natural Resources on August 22, 1985 supporting a substantial portion of the proposed unit area. In addition, other data from adjacent lands available to the Department (but not to Chevron) were considered by the Department in evaluating the hydrocarbon potential of the proposed unit area.

By decision and findings of the Commissioner, dated August 29, 1985, the Key Unit application was denied for the reason that (in the Department's view) there had not been demonstrated the existence of an oil or gas reservoir or potential hydrocarbon accumulation underlying the lands proposed for unitization. This was determined as the Department's sole judgment in assessing the submitted data and other data from adjacent lands.

Argument. In its denial of the unit application, the Department has found that no reservoir or potential hydrocarbon accumulation exists on the Chevron leases. Thus, the Department cannot do otherwise than conclude that compliance with the work obligation by drilling into what it has determined to be a non-existent reservoir or a non-existent potential accumulation would be both uneconomical and unproductive.

The Department, in its finding, has considered not only the data provided by the unit applicant and Chevron, but also confidential data from other adjacent wells to which Chevron has no access. It is known, however, without privity to specific technical data, that:

a. Sohio Alaska Petroleum Company's Sag Delta No. 11 well, drilled in 1984-85 on lease ADL-28342, was plugged and abandoned. This lease is abutting on Chevron's lease ADL 318601 and cornering on Chevron's lease ADL 318615.

b. The Arco Delta State #2 well was drilled and abandoned on land now included in Chevron's lease ADL 318601 and presently abutting on Chevron's lease ADL 318615.

c. Arco's Delta State No. 1 well was drilled, plugged and abandoned on the Arco-Exxon lease ADL 28344, which lease abuts Chevron's lease ADL-318615 and corners on Chevron's leases ADL-318601 and ADL-318616.

The above-mentioned wells clearly fall within the scope of "actions by adjacent leaseholders" under the language of AS 38.05.180(h).

Therefore, in view of the Department's own determination of non-existence of a reservoir or potential hydrocarbons on the Chevron leases and the dry holes previously drilled on and adjacent to Chevron's leases, Chevron is entitled to have the work commitment on each of the captioned leases abrogated. In view of the Department's stated lack of confidence in the area, to rule otherwise would frustrate the legislative intent of AS 38.05.180(h). If this law has any meaning, the

Commissioner must set aside the work commitments. We respectfully urge your favorable consideration of this request.

Enclosed with this application is our check for $100 respresenting filing fees of $20 for each of the captioned Chevron leases.

Chevron is paying annual rentals, due November 1, 1985, on each of such leases pending the state's action on this application.

The address to which any notice concerning this application may be mailed is: Mr. Clair Ghylin, Manager, Land Department, Chevron U.S.A. Inc., P. O. Box 5050, San Ramon, CA 94583-0905

Very truly yours,

cc: Esther Wunnicke, Commissioner
Juneau, Alaska

C. Burglin
Land Consultant
P.O. Box 131
Fairbanks, Alaska 99707
(907)452-5149

July 1, 1985

Dear Alaskans:

The purpose of Senate Bill 232 was to extend all leases in Sales 30 and 31. These leases were 10 year leases with a 5 year work commitment. The work commitment provision was inserted at a time when oil was $34.00/barrel and most people mistakenly thought that there was an oil shortage. In fact, in 1979 and 1980, the years of Sales 30 and 31, respectively, there was an oil glut. This fact was recognized by the State of Alaska when future sales did not contain the work commitment stipulation.

Through this same faulty reasoning, the leases from these two sales were the most heavily burdened of any leases sold by the State until that time. However, in Sale 30, there were several bidding procedures used simultaneously.

The leases from which the State derives approximately three billion dollars per year in revenue, pay a 12½% royalty to the State. All State leases pay severance tax in addition to the royalty.

The most productive leases on the North Slope were awarded in January of 1969. The total amount bid for all of these tracts was under $1.5 million dollars ranging from a high bid of $233.00/acre to a low of $1.00/acre, giving an average bid of $33.89 per acre. Nearly all of the leases except the $1.00/acre tracts are producing about $1 million dollars worth of oil per day. These leases are all owned by Arco, Exxon, BP, Sohio and the State of Alaska.

The point is that the greatest ongoing revenue to the State comes from production, not high bonus bids. As a point of interest, both the Prudhoe Bay Field and the Kuparuk River Field were discovered by accident, not by seismic data. These fields are the two largest on the North American continent.

Senate Bill 232 passed the legislature by a substantial margin, and was to correct the faulty reasoning that governed Sales 30 and 31. If these leases are proven capable of commercial production, they will generate the highest percentage of revenue to the State of Alaska of any acreage leased to this date.

Most Sale 31 leases were issued as of November 1, 1980. The permitting process for drilling each well takes approximately 90 days. During the 1980 to 1981 drilling season, there was no time to get permits, arrange for a drilling rig, arrange for financing, etc. to take care of all the details that are required to commence a well on the North Slope. There can even be delays due to snow cover and inefficiencies by both the State bureaucracy and the drilling contractors. There was not one well drilled on Sale 31 acreage until 1984.

The Burglin interests have found that the State will not act on any request that we make in less than 30 days. This footdragging by the State bureaucracy has cost us at least an additional years delay on developing these leases. For example, we requested extension of two leases on the North Slope approximately 6 months ago. As yet we have not had a written answer to the request for these two extensions. We request written answers from the State employees because we have found that what they tell us on the telephone does not necessarily correspond to what the ultimate decision turns out to be.

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Due to delays by the State, and the timing of the issuing of these leases, 2 years out of the 5 year work commitment have been lost for potential development. In the remaining 15 months of drillable time within the 5 year work commitment leases, the Burglin interests have drilled 1 well at a cost of $7 million dollars, built pads on two other leases at a cost of $1.4 million dollars and applied for permits on a 4th lease, which we are ready to drill during the 1985-86 drilling season. The total cost for all these projects will be approximately $40 million dollars. The Burglin interests have also done extensive geologic work, acquired seismic data, acquired satellite data, applied for units, and had expert evaluation done on all of our remaining tracts. The Burglin interests have approximately 109,000 acres that we have diligently worked to develop during the 5 year period. So far, we have only been able to extend 1 lease totalling 1280 acres by drilling and completing a well!

In contrast, Atlantic Richfield, Sohio-BP, Chevron, Mobil, Phillips, and Exxon have saved 110,000 acres by establishing the Hemi Springs Unit. Most of these leases were approximately 18 years old and carried a 12½% royalty. In contrast, Sale 31 leases carry a 20% royalty plus a 30% net profit interest to the State.

One of the reasons for establishing the Hemi Springs Unit was to have continuity for exploration purposes. The Burglin interests supported the major oil companies in this argument. We believe that the State of Alaska should keep as many active leases as they possibly can to enhance its future competitive position. The State can also use the money from ongoing lease rentals.

The Hemi Springs Unit was established to develop a shallow blanket sand called the West Sak. There were other shallower and deeper prospects in the Unit area, but the West Sak Sands were the primary publicized target. All that Arco et al had to do to save 18 year old leases, plus most of their Sale 31 leases, was to promise to drill two wells within 5 years.

Burglin has drilled 1 well, commenced drilling two other wells, has permitted 1 additional well, and the State has only extended 1 lease! According to geologic presentation by Atlantic Richfield, who has drilled over 400 wells, the West Sak Sands encompass an area 50 miles North and South by 80 miles East and West. According to geologic presentations by Atlantic Richfield and Mobil-Phillips, all of the West Sak Sands were not encompassed by the Hemi Springs Unit. This formation has an industry estimated 25 billion barrels of oil in place.

The reason for the passage of SB 232 was to give the Commissioner the legislative authority to extend the Sale 30 and 31 leases for an additional 2 years. Although the Commissioner had extended leases for Amerada Hess and Amoco prior to the passage of the bill, she testified to the legislature that she did not feel that she had the authority to extend the Sale 31 leases. Through SB 232 the Commissioner was specifically given that authority.

In dealing with the Department of Natural Resources, and through correspondence which is available to anyone, the Department has maintained that the reasons for the delays were always that they never have enough people to take care of their work requirements. However, after SB 232 was signed into law, the DNR promulgated within 3 days all the

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P.O. 31
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regulations that are being considered at this public meeting.

At the meetings to formulate these new regulations were Commissioner Esther Wunnicke, Director Kay Brown, Deputy Director James Eason, Petroleum Manager Bill Van Dyke and Catherine Fortney (who is in charge of Unit Agreements). These people compose the heirarchy of the Department of Natural Resources.

These regulations are so onerous, and contrary to the intent of the Bill 232, that they will eliminate all competition by Independents in the State of Alaska. I feel that these regulations were proposed to eliminate the Burglin interests on the North Slope

In reviewing correspondence from the State of Alaska, it is obvious that Commissioner Wunnicke, Director Kay Brown, and the Deputy Director James Eason are very prejudiced in regards to the Burglin leases. Because these persons cannot render fair and impartial decisions in relations to Independents, I strongly feel that they should resign their positions with the State of Alaska. They are certainly not acting in the best interest of the State.

These proposed regulations are a clear attempt to stall and distort the legislative intent of this bill which corrects a bureaucratic injustice to all of the holders of work commitment leases. It is one of the most obvious attempts on the part of bureaucrats to circumvent the intent of the legislature. As a final irony, Commissioner Wunnicke testified in favor of this bill.

If the DNR cancels the Burglin leases and oil prices keep falling, there will be no incentive for the present operators on the North Slope to maximize production in Alaska. In the face of a world wide oil glut, it would make good economic sense to cut production in Alaska and produce oil from their better paying fields in the rest of the world. If Alaskan oil production were cut in half, it would have a devastating effect on every Alaskan. If the Sale 31 leases are denied unitization and extension so that they can be developed, cut backs in Alaskan oil production are a definite possibility. Falling oil prices are a certainty.

Most public hearings are a sham and a charade. The bureaucrats have already made up their minds. These public hearings are no exception.

Because of regulations such as these, small miners are financially and legally out of business. As soon as these regulations take effect, the independent oil industry will join the Alaskan miners.

Thank you,

Cliff Burglin

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF LAW

POUCH K – STATE CAPITOL
JUNEAU, ALASKA 99811
PHONE: (907) 465-3600

OFFICE OF THE ATTORNEY GENERAL

May 28, 1985

Honorable Bill Sheffield
Governor
State of Alaska
Pouch A
Juneau, AK 99811

Re: HCS CSSB 232(Rls) am H --
minimum work commitments
in oil and gas leases
Our file: 388-096-85

Dear Governor Sheffield:

At the request of Ray Gillespie on your behalf, we have reviewed HCS CSSB 232(Rls) am H. Although SB 232 was originally introduced by you for the approval of the Golden Valley Electric Association contract (our file no.: 377-061-85), the GVEA oil contract approval went forward under another vehicle. SB 232 was stripped and the present provisions were inserted at the behest of Senator Bettye Fahrenkamp.

The bill would give the commissioner of natural resources the authority to waive provisions for minimum work commitments that exist in some net profit oil and gas leases. The waiver could be for a period of up to two years if either (1) the commissioner makes a written finding that conditions preventing drilling or exploration are beyond the lessee's reasonable ability to foresee or control, or (2) the commissioner makes a written finding that the lessee has demonstrated through good faith efforts an intent and ability to drill or develop the lease during the term of the waiver.

We would note that the Department of Natural Resources does not oppose this provision. Further, the minimum work commitments provision is no longer being used in present oil and gas leases, and so this legislation speaks to only a limited group of leases issued under past policies. We see no constitutional or other legal objections to this bill.

Sincerely,

Norman C. Gorsuch
Attorney General

NCG:RMM:jf

03 – C32LH

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL AND GAS

POUCH 7-034
ANCHORAGE, ALASKA 99510

March 8, 1985

Mr. Brian Burglin
P.O. Box 131
Fairbanks, AK 99707

Reference: Key and Arsenault Units

Dear Brian:

This letter is in response to your recent question concerning inclusion (verses exclusion) of unleased acreage in proposed unit areas. While the Department has no fixed policy relating to unleased lands, it is our practice to establish the unit boundry based on the extent of the actual or potential hydrocarbon accumulation(s) and include all lands in the unit area that are eligible to participate based on the specific geology and geophysics. Initially, the state unleased lands would not be committed to the unit but would be eligible to be committed if the lands were leased at a later date.

I have also reviewed the draft Key and Arsenault unit outlines. The "A" block in the Key unit proposal was proposed to be included in part in the Prudhoe Bay Unit at one time and this same acreage in part was later proposed to be added to the Duck Island Unit. Neither proposal was ever finalized. To my knowledge the "B" block in the Key unit proposal and the Arsenault unit area have never been reviewed for unitization of any type by the Department. We would like to meet with you and the other effected working interest owners concerning both unit area proposals once everyone has been notified of your proposals and you have assembled a geologic report for each area.

Sincerely,

William Van Dyke
Petroleum Manager

WVD/HB:4141Z

AMERADA HESS CORPORATION

LEON HESS
Chairman of the Board

1185 AVENUE OF THE AMERICAS
NEW YORK, NEW YORK 10036
(212) 997-8400

March 2, 1988

Senator John B. Coghill
Alaska State Legislature
Senate Resources Committee
Box V
Juneau, Alaska 99511

Dear Senator Coghill:

I regret that I must decline your invitation to testify at the Senate Resources Committee hearings next Monday, March 7, regarding legislation to encourage oil and gas development activities in Alaska.

I believe fervently in the need for legislation to encourage development of smaller, offshore Alaskan oil fields. I am convinced there are many, isolated smaller fields in the immediate vicinity of Seal Island and Northstar which will be oil bearing. Historically, similar discoveries have been made in various parts of the world. Prudhoe Bay was the original large discovery, and special legislation should be considered to enable future smaller discoveries to come to the market so that Alaska may continue to benefit from its valuable potential oil reserves. The local jobs that will be created, and the auxiliary effect on the Alaskan economy of the substantial capital investments that will be made, will greatly benefit the people of Alaska, both now and far into the future. The State should act now to encourage development. Because of the hostile operating environment, the lead time for development in Alaska is much longer and the costs are much higher.

Governor Cowper had advised me that he does not at this time believe it is in the best interests of the people of Alaska to support any legislative changes. Under no circumstances will I promote taking any action that the Governor of Alaska would not fully support as being in the best interests of all concerned. Unfortunately, this particular bill has been proposed to your Committee without my knowledge that it presented the same proposal made to Governor Cowper. This was not authorized.

After I received your letter, I telephoned Governor Cowper to ascertain whether he had changed his views. If he had requested me to testify because he supported the bill, I would be very happy to come to Alaska to appear before your Committee.

I do appreciate your invitation and hope you will understand why I cannot attend. I will not be a party to promoting legislation which the Governor does not want to support.

Very truly yours,

Leon Hess

cc: Governor Steve Cowper

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LEON HESS
Chairman of the Board

1185 AVENUE OF THE AMERICAS
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(212) 997-8400

March 2, 1988

The Honorable Steve Cowper
Governor of the State of Alaska
P.O. Box A
Juneau, Alaska 99811-0101

Dear Governor Cowper:

On January 28 you wrote to me advising that you could not support legislation proposed to encourage the discovery and development of smaller Alaskan oil fields. I accept the same. In my two visits to you last year, I stressed my belief that the passage of effective legislation in Alaska required your support and advised that Amerada Hess would not be a party to pushing legislation that was not supported by you.

Unbeknownst to me, it has been represented by others, to try to ram through a bill, that I would appear to testify on behalf of that legislation. I tried to contact you on Monday to ascertain whether you would want me to testify on behalf of this legislation and could not reach you. I farther understand that someone has written a letter to you stating that I would testify this coming Monday on the bill. This is not the case. Under no circumstances do I want to be a party to legislation unless you were fully supportive of that legislation. I will not push for legislation that you do not think is in the best interests of the people of the State of Alaska.

I apologize to you for other people trying to get me to participate in ramming through the very legislation you did not support. I do not operate in that way.

Sincerely,

Leon

cc: Senator John B. Coghill

801, 316.9

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December 10, 1987

COPY

The Honorable Steve Cowper
Governor of the State of Alaska
P.O. Box A
Juneau, Alaska 99811-0101

VIA FEDERAL EXPRESS

Dear Governor Cowper:

At your request, and on behalf of Amerada Hess, I am pleased to forward draft legislation that would give your administration the power to encourage development of Alaska's smaller, offshore oil fields. Without that relief, development of these fields will be uneconomic, and will not occur.

It is conservative legislation. Many other oil producing jurisdictions have encouraged new oil development by forgiving royalties and severance taxes without regard to project economics and for the life of the field. The enclosed bill takes a more cautious approach, designed to foster development where it would not otherwise occur. Under the bill, if a company purchased its leases prior to January 1, 1986 -- in other words, at a time of radically different oil price expectations -- and the company can demonstrate that it cannot develop its field under current economic conditions, it can receive royalty and production tax relief, but only until recovery of initial development costs. Once those costs are recovered, the relief automatically ends, and the state will have in return: (1) a revenue-producing field that would not otherwise have been developed; (2) a net profit share of production, if the lease is not already a net profit share lease; (3) particularized local hire requirements developed on a constitutionally-defensible case-by-case basis by the Commissioner of Labor; and (4) if it desires, ownership of any affiliated common carrier pipeline.

Relief is available only to those oil fields where the costs of development are so high in relation to foreseeable production revenues as to make development uneconomic. As you have recognized, these are Alaska's smaller offshore fields that face

particular hurdles such as distance from existing pipeline transportation, relatively deep water, sea ice, seasonal drilling restrictions, and high construction and operating costs. However, those constraints make a field uneconomic only if their associated costs exceed likely field production revenues. There is no fixed formula to determine what level of reserves will overcome any particular mix of cost impediments. By defining "uneconomic" fields as ones where development costs exceed production revenues, the bill necessarily takes account of all the engineering and operational difficulties that make development of small offshore fields so uniquely difficult.

The bill has been carefully tailored to limit relief to those instances where it is necessary and appropriate. Three particular aspects of the bill guarantee its limited scope:

(1) After relief is granted, your commissioners of Revenue and Natural Resources will keep a close watch on field revenues. Once the company has realized revenue sufficient to pay for development costs, they will terminate the relief. In this way, the state is assured that the moment a company begins to realize any profit from its investment, the company will have to pay royalty and production tax at the normal rate;

(2) The company must meet four distinct requirements to obtain any relief: One, relief is available only to those who bought their leases before the unanticipated collapse of oil prices in 1986; Two, the company must hav explored its properties and delineated reserves; Three, relief is available only for fields that have never had commercial production; and Four, most fundamentally, the company must meet its burden of showing that unless relief is granted, it cannot recover its development costs in a commercially reasonable time; and

(3) Companies can apply for relief only during the next six years. The bill is thus an emergency measure, intended only to provide an immediate, short-term stimulus to Alaska's moribund economy and not to signal a permanent shift in Alaska's leasing policy. For this reason, the immediate economic benefit of this legislation to the State of Alaska will be substantial. Under the bill, a company must delineate its reserves before application is made. Lessees will thus have a strong incentive to accelerate their exploration plans in order to meet the application deadline.

As you and your staff know, other states, and oil producing countries, have recognized the need to adjust royalties and severance taxes in order to stimulate new investment and employment. In 1983, for example, the United Kingdom acted swiftly in response to a downturn in new oil development. That year, Parliament provided that:

(1) Any new field north of the Southern Gas Basin approved for development after April 1, 1982 would be excused from the government's 12½ percent royalty over the life of the field; and

(2) To encourage small field development, 20,000 barrels per day of production from all fields would be exempt from the petroleum revenue tax, up to a 75 million barrel field limit.

In the same vein, the province of Alberta has provided that any exploratory well drilled between November, 1986 and October, 1987 will be free of royalties for a period of five years, while wells drilled in the subsequent two years will enjoy three and one year royalty holidays, respectively. Alberta has also cut royalty rates across the board for existing production by 2-3 percent in order to improve companies' cash flow. At the same time, the federal government has instituted the Canadian Exploration and Development Incentive Program, which provides cash grants of up to $2.5 million (U.S.) for new exploration and development.

Finally, a number of producing states have provided for severance tax exemptions of varying duration for new wells. In Louisiana, for example, new wildcat wells are exempt from the severance tax until 1990, while all new oil production in Montana is exempt for two years. Other exemption "windows" to encourage new or enhanced production have been enacted by Mississippi, North Dakota, Oklahoma and Wyoming.

I would like to touch on one other component of the legislation. The bill allows the state to acquire the lessee's related pipeline interest as a condition of granting relief. We previously offered this option believing that it would substantially increase our proposal's benefits to the state. Since then, members of your administration have voiced particular concern over this aspect. We continue to believe it would be of substantial benefit to the state to own this pipeline, not only in terms of tariff revenues, but also to encourage development of nearby, prospective fields. However, we do not want this

particular provision to in any way complicate the bill's progress or jeopardize your ability to support it. If you feel the provision would do either, we would concur that it be deleted.

I am confident that Amerada Hess can meet the strict standards of this legislation for the Northstar/Seal Island project. I also believe that your sponsorship and active support of this legislation will signal strong and positive commitment to Alaska's economic future and will receive overwhelming public support. It will help break the current economic logjam in Alaska oil development. It will clearly demonstrate that your administration is committed to taking the forceful steps necessary to turn Alaska's economy around.

Legislation of this kind serves Alaska and the nation, and there should not be any opposition to it. It will advance development by at least a decade at the very time Alaska most needs that development.

Thank you for the interest you have shown on this issue. From this point, as we all have recognized, time is of the essence. Legislation removing the current barriers to Northstar/Seal Island development is critically important this session, and with one month remaining before the session convenes, we must find a sponsor who is anxious to make this bill a legislative priority. Your personal leadership in setting the agenda before Alaska's legislators return to Juneau would set this matter on the proper course.

With your permission, I will call next week, and I will be anxious to hear your reaction to our proposal.

Sincerely,

BIRCH, HORTON, BITTNER
PESTINGER & ANDERSON

Ronald G. Birch

RGB/kf
09RGB2
Enclosure

bcc copies:
John Tillinghast
Barclay Collins
John Katz

Radon Presentation

F91

TELECOPIER COVER LETTER

Please deliver the following pages to:

Name Legislative Affairs

Location Juneau

From Bob Forbes

Location Division of Geological and Geophysical Surveys, Fairbanks

Telecopier phone number 479-4779 to 586-9548

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Date 1-29-88

Comments Please make copies for Representative Mike Davis, Representative Niilo Koponen, Senator Jack Coghill and Senator Bettye Fahrenkamp. Thank You! Paula

IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL US BACK AS SOON AS POSSIBLE.

Telephone number 479-ROCK (Paula)

Radon's Health Risks

The health risks from breathing radon are significantly higher for smokers, according to a recent report on radon by a National Research Council committee. But people can cut the risk of lung cancer from radon even after they have inhaled the radioactive gas by reducing further exposure, the committee concluded.

These are among the new findings of the report, "Health Risks of Radon and Other Internally Deposited Alpha-Transmitters." The report, which was released on 6 January, is based on a 3-year study funded by the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission, and is likely to be used by EPA to drive home the point with that radon is a serious problem.

Radon is a colorless, odorless gas that may be seeping into millions of American homes, EPA estimates. Radon is emitted by the radioactive decay of uranium in rock and soil and enters a building through cracks in the foundation, sump pumps, areas around drainage pipes, and other openings.

Authorities have had difficulty estimating the exact national dimensions of the indoor air pollution from radon. Radon may pose a problem in every state, EPA says based on a few surveys. In August, an EPA study of ten states showed that 21% of the 11,600 homes tested had elevated radon levels. Geology is a good indicator of high-risk areas, EPA says, but levels can vary widely from house to house.

The public health risks posed by radon have been unclear too, but the council report provides fresh findings. Experts have debated, for example, whether smoking greatly increases an individual's chances of developing lung cancer if the person is also exposed to radon. Specifically, they have questioned whether the separate risks of lung cancer from smoking and from radon exposure should be added or multiplied. The council committee found that radon exposure multiplies the lung cancer risk in smokers by at least tenfold.

Researchers also have disagreed whether the risk of lung cancer remains constant after people inhale radon, even when exposure is eliminated. Some researchers have maintained that the risk from radon, as a radioactive substance, remains the same over time, analogous to the cancer risk to atomic bomb survivors, William Ellett, staff director of the council study, explains. But the council study showed that the risk posed by radon is instead similar to the cancer risks posed by cigarette smoking. Reduced exposure to radon will reduce the chances of developing cancer, just as ceasing smoking cuts lung cancer risk. Radon exposure in homes can be reduced by increasing ventilation or sealing openings where the gas may be entering.

Uncertainties about the magnitude of the problem have led to a wide range of estimates about the number of excess lung cancer deaths. EPA has calculated that every year 5,000 to 20,000 lung cancer deaths are linked to radon, making the gas the second leading cause of lung cancer deaths. The risk estimates by the council committee fell into the middle of EPA's range, although it did not cite a specific number. Last year, 136,000 Americans died of lung cancer of which about 85% was caused by smoking, according to American Cancer Society estimates.

The committee developed its risk estimates by reviewing an extensive amount of original data from several key epidemiological studies of uranium miners from United States, Sweden, and Canada. The data were then analyzed with advanced statistical techniques developed in the past few years with the help of better, faster computers, says Jacob Fabrikant, committee chairman and professor at the University of California at Berkeley.

The council committee calculated its risk estimates using a measurement called working level months (WLM). A WLM expresses exposure based on a 170-hour work month to a specific amount of alpha particle energy per liter of air. EPA says that homeowners should reduce radon levels if they are equal to or greater than 4 picocuries per liter. A person who stays home an average of 12 hours per day exposed to 4 picocuries per liter would receive an annual exposure of about 0.5 WLM.

Only a few states, such as Pennsylvania and New Jersey, have extensive radon detection and educational programs about radon. Governments have little authority to control radon in the home, so regulatory action has been limited. EPA has been urging states to survey for radon and support educational programs. EPA itself is currently conducting another survey of another seven states this winter to detect radon on homes. ■ MARJORIE SUN

Taken from "Science" Jan 15, 1988 p. 250

From Bob Forbes

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Lung cancer risks from radon exposure

Living in a home with high concentrations of radon gas can significantly increase an individual's risk of developing lung cancer, but that risk will decrease if the radon exposure is curtailed, according to a report released last week by the National Academy of Sciences. The report, called the most comprehensive to date on the health risks of radon, also found that long-term exposure to this odorless, colorless gas hurts smokers most of all.

"There's a major difference between smokers and nonsmokers. It is truly, to me, the most compelling issue of the whole radon story, especially in males," says Jacob I. Fabrikant of the University of California at Berkeley, who chaired the committee drafting the report.

Radon is produced by the radioactive decay of radium, which is itself an indirect "daughter" of the uranium in rocks. The gas seeps into buildings through foundation cracks and other openings, and can accumulate in poorly ventilated areas. When radon decays, it creates daughters that emit alpha particles. In the lungs these particles can cause the cell damage that eventually leads to tumor growth (SN: 8/15/87, p.105).

As the focus of their three-year epidemiologic study, the academy committee combined data on radon exposure and lung cancer from four separate studies of underground miners in Ontario, Saskatchewan, Sweden and the Colorado Plateau. New statistical techniques enabled the researchers to include such variables as the cancer risk for different age groups and the time lapse after exposure ended. However, because the study was based on data from male miners, there is some uncertainty about extrapolating the risk estimates to the home environment and to women and children.

The researchers found that lung cancer risk increases with the duration of exposure, but once exposure is cut, the risk begins to drop after about 15 years. For smokers, the effect of exposure does not merely add to their already high risk of dying from lung cancer; it *multiplies* the risk, says Fabrikant.

Richard Guimond, head of the Environmental Protection Agency's radon division, says the report confirms the significance of the radon problem: "They are basically saying that radon causes serious risks at levels that we've seen in the environment, levels that we've measured in homes throughout America." The agency has estimated that up to 10 percent of U.S. homes have radon concentrations above the maximum recommended value. — *R. Monastersky*

Science News; p. 39, Jan. 16, 1988
Vol 133, No. 3

Resources
Radon
file

Radiation exposure: Safe, eye on radon

Current annual levels of exposure to radiation from all sources in the United States are, on average, not dangerously high, according to a review of available data released last wee.. by the National Council on Radiation Protection and Measurements, a nonprofit research organization in Bethesda, Md.

The report recommends, however, that a national survey of radon levels in homes be conducted. Radon gas, generated by the natural radioactive decay of radium in the soil, is estimated by the report to account for about 55 percent of the total average yearly exposure to radiation. There is growing concern that large numbers of U.S. homes have high indoor radon levels (SN: 11/22/86, p.325). Uranium miners exposed to elevated radon levels have experienced increased rates of lung cancer, notes the report. Average radon levels can vary greatly from home to home and in different regions of the country, but widespread testing has not been conducted.

Other naturally occurring radiation sources contribute 27 percent of the average yearly exposure, according to the report. These include cosmic radiation from the sun and outer space, radioactive rocks and faint traces of radioactive materials found in living creatures, including humans.

The remaining portion of the yearly radiation exposure, 18 percent of the total according to the report, comes from human-made sources. Medical uses of radiation, such as X-ray procedures and nuclear imaging, account for the bulk of these exposures. Consumer products, including cigarettes, domestic water supplies, building materials, mining and agricultural products and natural gas in heaters and cooking ranges, make up 3 percent of the total annually.

Averaged over the U.S. population, radiation levels on the job and from other environmental sources, including nuclear power plants and fallout from nuclear weapons tests, amount to less than 1 percent of the total yearly exposure.

– B. Bower

From Science News;
Nov 28, 1987
Vol 132, No. 22, p. 347

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POSITION PAPER
HJR 38 RELATING TO RADON
JANUARY 12, 1988

Radon is a colorless, odorless gas resulting from the decay of naturally occurring radioactive elements in the earth. Rising from subsurface sources, radon enters homes where it can become a health hazard.

The U.S. Environmental Protection Agency states that nothing causes more environmental risk to the general population than radon, including toxic waste sites, gasoline combustion and industrial emissions. It is thought to be the second leading cause of lung cancer in this country, cigarette smoking being the first.

The intent of the resolution is to encourage the state and federal government to work cooperatively on Alaska's radon problem. Ten states are currently involved in a program with the EPA in conducting surveys to identify potentially high radon risk areas while 14 other states have recently requested EPA's assistance. Three other states are performing their own surveys.

The radon problem can be solved, but first we need to know where to look. The State Department of Natural Resources, Division of Geologic and Geophysical Survey, and the United States Environmental Protection Agency should participate in a study to locate the areas around the state of highest risk so that efforts to control indoor radon can be directed effectively.

A radon information program designed to meet the needs of the citizens of our state should also be developed and implemented.

Preliminary sampling in several areas of Alaska, including Fairbanks and Denali Park and Healy, have indicated levels high enough to merit concern.

The state has the responsibility to warn citizens about radon and to help people alleviate this problem, and it is essential that the legislature express its support for the necessary measures

Introduced: 1/11/88
Referred: Health, Education & Social Services

5-1448A

IN THE HOUSE BY KOPONEN AND DAVIS

HOUSE JOINT RESOLUTION NO. 38

IN THE LEGISLATURE OF THE STATE OF ALASKA

FIFTEENTH LEGISLATURE - SECOND SESSION

Relating to radon.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

WHEREAS high concentrations of radon, a naturally occurring radioactive gas, have been found in homes around the state; and

WHEREAS radon is found in soils, rocks, and groundwater supplies, and can enter a house through various routes; and

WHEREAS a preliminary survey conducted by the Environmental Protection Agency indicated that as many as 8,000,000 or 12 percent of homes nationwide could contain dangerous levels of this cancer-causing gas, and that between 5,000 and 20,000 people each year die from lung cancer related to radon exposure; and

WHEREAS in Alaska, high concentrations of radon have been found in the areas surrounding Fairbanks, McKinley and Healy; and

WHEREAS there is no completely reliable method for predicting where high levels of indoor radon will be found because radon levels may be affected by the uranium content of nearby rock and soil, soil permeability, house construction, and other factors; and

WHEREAS the only way to determine whether a house contains a high level of radon is to test it with special equipment, because radon cannot be seen or smelled;

BE IT RESOLVED by the Alaska State Legislature that the United States and the State of Alaska should make a coordinated, joint effort to alleviate the growing indoor radon gas problem in Alaska; and be it

FURTHER RESOLVED that a radon information program designed to meet the needs of the citizens of our state should be developed and implemented.

COPIES of this resolution shall be sent to Lee M. Thomas, administrator of the Environmental Protection Agency; to the Honorable Ted Stevens and the Honorable Frank Murkowski, U.S. Senators, and the Honorable Don Young, U.S. Representative, members of the Alaska delegation in Congress; to Governor Steve Cowper; and to Dennis Kelso, Commissioner of Environmental Conservation.

An Invisible Threat

Radon, a natural, odorless gas that can seep into homes and cause cancer, has emerged as the newest national health threat. But whose problem is it? Some officials believe the states are best suited to find a solution.

By Paul Doyle

On a cold day in December of 1984, Stanley Watras went in to work at the Limerick Nuclear Generating Station in Pottstown, Pa. and set off the alarms. The first assessment was that the radioactivity was from his work at the plant, but the culprit was radon, a relatively unknown substance. And it was from his home. The exposure of Watras and his wife and two children to the radioactive gas had been equivalent to smoking 140 cigarettes per day.

Until this incident, many citizens would not have believed that an odorless, colorless natural gas that seeps out of the ground and into basements and living rooms would be a major threat to public health. But according to health officials, that is exactly what causes 5,000 to 20,000 lung cancer deaths per year.

Based on the number of potential cancer deaths per year, indoor radon is the greatest environmental problem the Environmental Protection Agency (EPA) is working on—ahead of better known and much more feared dangers such as hazardous waste, toxic chemicals and dangers from air pollution.

Radon is an invisible gas produced by the natural decay of uranium in the earth's crust. It can be found in soils and rocks containing uranium such as granite, shale and phosphate. It makes its way into homes through cracks and holes in foundations, water supplies, and spaces between the soil and the house. The gas decays into radioactive particles that attach to dust and, when inhaled, lodge in the lungs.

The EPA recommends remedial action when four picocuries per liter of radon is found in the home. A picocurie is a standard measurement of radiation. Exposure to this level of radon is equivalent to smoking eight cigarettes per day or having 200 chest X-rays per year.

Richard Guimond, division director of the Office of Radiation Protection at EPA, is certain of the high risks related to radon exposure. "Often you deal with environmental pollutants and people have a tendency to sometimes disregard a lot of the information because it is based on some mice or rat test or they are at levels that are much higher than one will ever observe in the environment," he says. "The reason the radon evidence is so strong is that in addition to animal evidence, you also have human evidence from the health problems uranium miners have contracted from their exposure to radon."

Uranium miners are not allowed to be exposed to more than 20 picocuries per liter. "It is very common to find levels in homes over 20 picocuries, some have exceeded 4,000. This is why we are taking this problem very seriously," says Guimond.

According to EPA, between 4 million and 8 million homes nationally have higher than the recommended four picocuries per liter of radon. Although areas with higher levels of uranium are more likely to have a radon problem, no state is immune. According to Guimond, "Every state has some radon in it; if I were to develop a map where radon is a problem, the map would cover the entire United States."

Guimond's conclusions are supported by a recent 10-state survey conducted by EPA. The 10 states volunteered to have a random sampling of homes tested for radon. Although the study showed that radon levels vary from state to state, high levels were found in every state. For example, Alabama had the lowest number of homes with more than four picocuries per liter of radon (6 percent) but the highest single reading was 180. Colorado (39 percent), Wisconsin (27 percent) and Wyoming (26 percent) were the states with the highest number of homes over the recommended EPA levels.

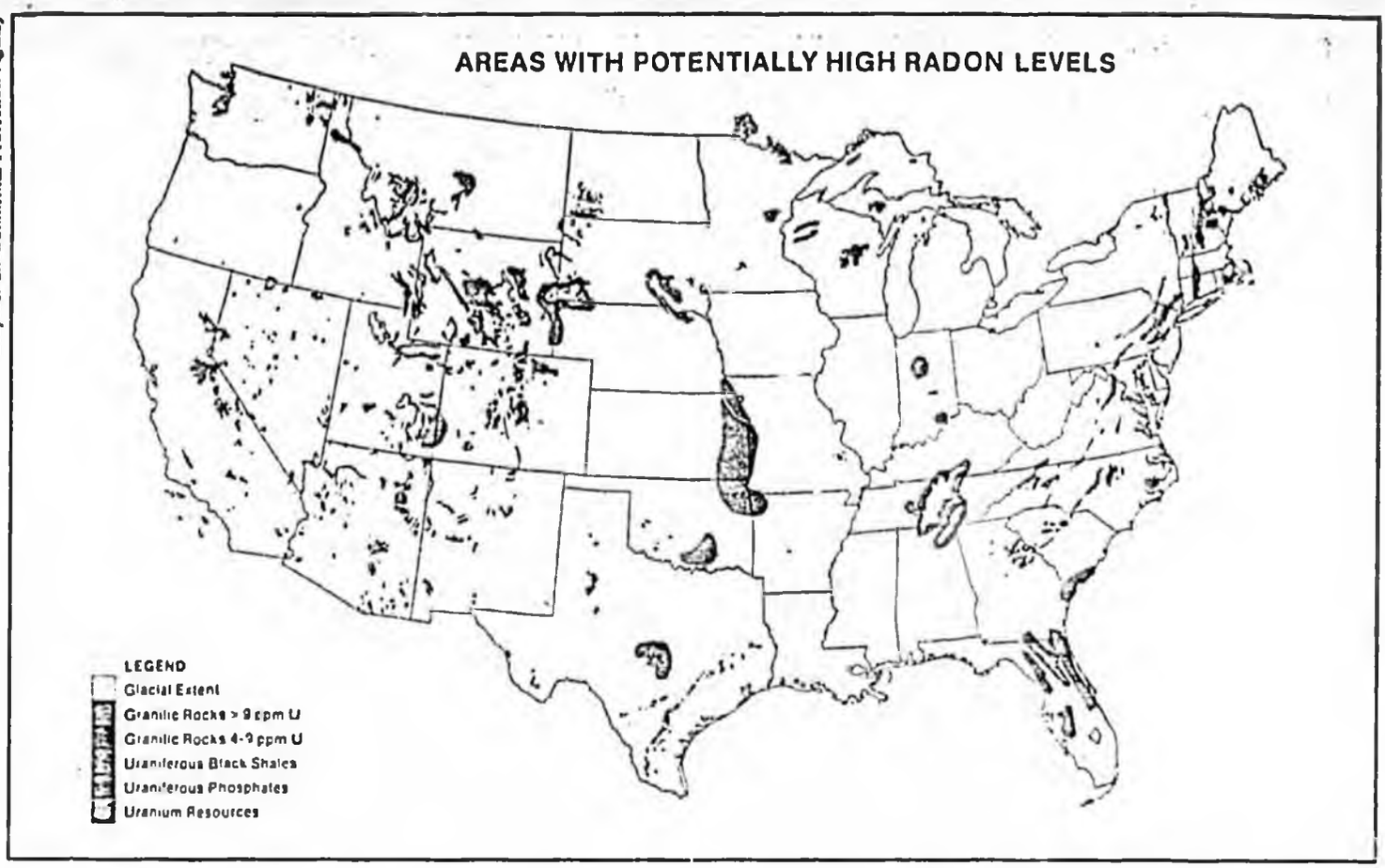
Testing for radon usually is done by placing a small canister containing charcoal in the house for approximately a week. The charcoal absorbs the radon and when analyzed, provides a reading for how much radon there is in a home.

Despite the fact that the gas is invisible, Guimond points out that "homes can be fixed." Even homes discovered to have as much as 3,000 to 4,000 picocuries per liter in parts of Pennsylvania and New Jersey have been sealed and patched so they now test under the EPA minimum standard, he says.

Once radon is found, the most common mitigation techniques include the sealing of openings and cracks to prevent any of the gas from entering the house. The average cost for such remedies is less than $400.

However, unless tested, the radon levels in a particular house cannot be easily detected. Says Pennsylvania state Senator Michael O'Pake, who represents Reading, one of the highest radon areas in the country, "Unfortunately, you can't just look at a house and tell if it has high levels of radon, you do have to measure to be sure. Of two houses sitting side by side, one house may have 1,000 percent higher

Paul Doyle is a principal research analyst in the NCSL Energy, Science and Natural Resources program.



Graphic: Environmental Protection Agency

levels of radon than the one next to it because the house may be sitting on some crack or fault."

Because of this vast difference in the millions of homes affected by radon, Guimond believes the radon crisis is a state and local problem. He thinks the federal government alone cannot effectively deal with radon. "State and local agencies are better able to understand the significance of their local situation and get information and help to the local citizens," he says.

This is a feeling echoed by Donald Deieso, assistant commissioner for New Jersey's Environmental Management and Control. "Radon is the most severe health risk we are facing and we quickly realized in New Jersey that the states are going to have the prime responsibility for its regulation; no one is going to do the job for us," he says.

In most cases, legislation requiring statewide surveys is the first step in a program. Colorado, Florida, Illinois, Indiana, Ohio and Virginia are all currently conducting these diagnostic studies, which pinpoint high radon areas in a state. Many others are expected over the next year.

A few states have gone a step further, by adopting multi-million dollar comprehensive initiatives. In 1986, the New Jersey Legislature appropriated $4.2 million for a radon project. It currently ranks with Pennsylvania and New York as the most expensive in the country. All three efforts have a wide range of radon initiatives. The New Jersey legislation, which is similar to Pennsylvania's, calls for a state radon survey and an epidemiological study to determine if radon causes cancer. New Jersey state officials will be testing the homes of 1,200 lung cancer patients for radon.

Pennsylvania and New Jersey are also providing low interest loans to homeowners to assist in radon-reducing home improvements. Pennsylvania offers loans of up to $7,000 to the victims of radon at a graduated interest rate between 2 percent and 8 percent, depending on income.

States are also pursuing measures to encourage homeowners to test for radon. New York is selling and distributing radon detectors to its citizens. Pennsylvania provides home testing free of charge.

Deieso, however, warns of the dangers of a predominantly state-operated radon program. In New Jersey, "For the state alone to provide what was needed, we were looking at spending $200 million on testing and another $1 billion to $1.5 billion for mitigation measures," he says. "A radon program is not a one- or two-year mass study. Radon, like termites, is going to live forever more."

One of the key elements of a state effort, according to Deieso, is to encourage the private sector to become involved in the radon business. "The private sector is better suited for radon testing and remediation of individual homes than state operated programs, due to its ability to respond quickly and fill the demand in the market place."

With that encouragement the number of private firms offering radon testing in New Jersey has jumped from three in 1985 to 120 in 1987. In 1985 the state had no companies that would take care of a home exposed to radon; today there are 22. With this market-oriented approach, Deieso says that a home radon test can be done in three days and the mitigation work completed within two weeks. "And that is a better performance than any state agency, no matter how well funded."

But in order for such an approach to be effective, the state must oversee and regulate radon testing firms, he says. To maintain quality control over

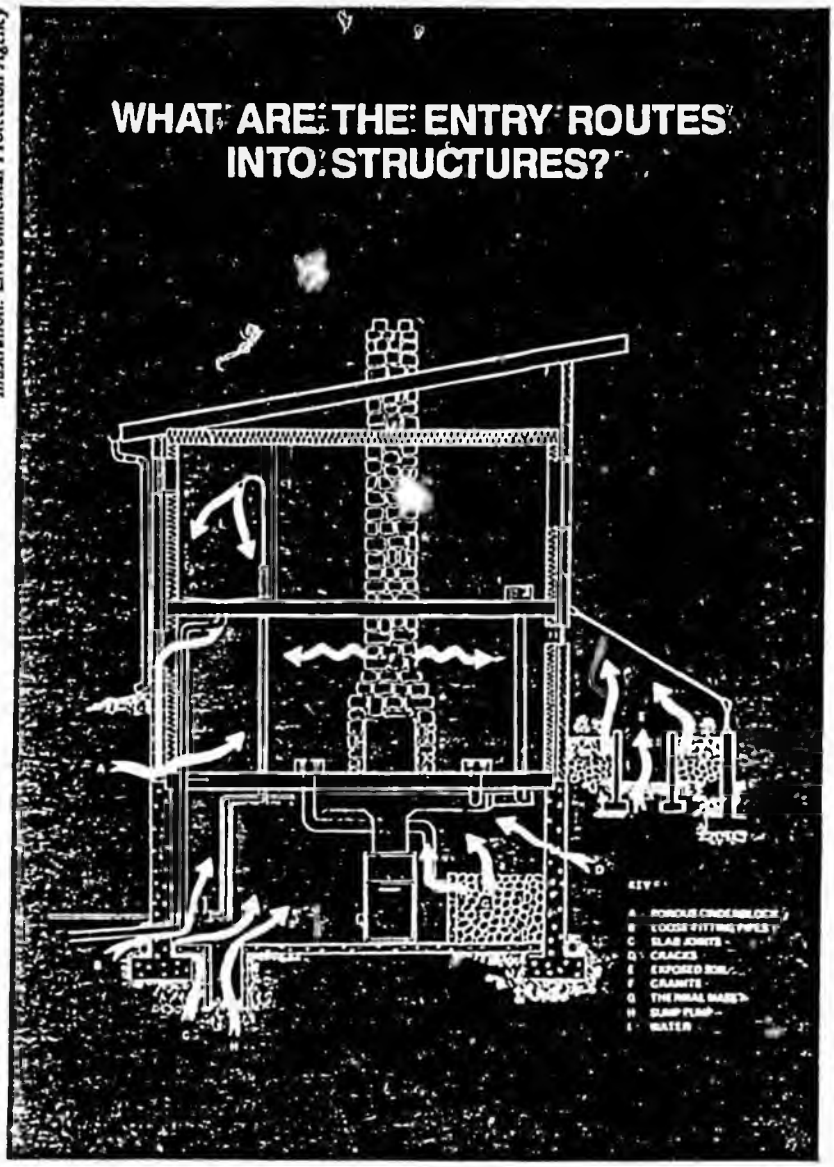


Illustration: Environmental Protection Agency

the radon testing market, New Jersey enforces strict licensing and certification standards. Since the program's inception, more than half the applicants for certification have been rejected. And to keep firms from overcharging for radon-related services, the state provides homeowners with second opinions free of charge.

States are also beefing up their efforts to inform the public of the dangers of radon. New Jersey and Pennsylvania have set up toll-free hot lines staffed by scientists to answer questions about radon. Both states have also published and distributed pamphlets and brochures to the public. New Jersey is sponsoring periodic public opinion surveys to determine the effectiveness of its program.

Despite state efforts, homeowners, for a number of reasons, don't always welcome radon information devices. In Pennsylvania, when the state went door to door offering free testing in the Reading Prong region, one of the highest radon areas in the country, only 30 percent of the homeowners agreed to test. In New Jersey, only eight people have taken advantage of the low-interest loans offered to mitigate the effects of radon.

According to Rich Guimond, part of this phenomenon boils down to perceived risks. "It's easy for someone to see a hazardous waste site down the street and be very fearful, but you don't expect a radiation problem in your 'home sweet home' and, because you can't see it, smell it or feel it, it's easy to say it's not there."

But Senator O'Pake points out that public skepticism and economic uncertainty is also a big factor in explaining people's leeriness about radon. "The public is just not sure that radon can be fixed safely and inexpensively."

Indeed, a recent survey conducted by The Eagleton Institute of Politics at Rutgers University showed that of those polled, 75 percent said that if their homes were found to have radon the real estate values would drop by more than 25 percent; and 25 percent said that even if the radon were removed from their homes the real estate values would still drop, with 50 percent saying the values would stay the same.

This attitude is reflected in parts of New Jersey where real estate transactions have dropped as much as 50 percent. "Real estate, not public health, has become the dominant feature for the radon program," Deieso says. In response, the state is implementing modifications to building codes to include radon mitigation features and incorporating a requirement for radon testing in home sale contracts.

In this age of tight budgets, states are hard pressed to find the money to explore the radon issue. Pending federal legislation is aimed at relieving this pressure. "Many states recognize that they have a radon problem but they lack the resources to investigate and develop needed new programs," says U.S. Senator George Mitchell of Maine, one of the bill's chief sponsors. The legislation directs the EPA to make available to the states $10 million for each of the next three years. In order to be eligible for the money, the states will have to provide 25 percent matching funds for the first year, 40 percent in the second and 50 percent in the third.

Whatever the outcome of the federal legislation, the states will have the primary responsibility for warning their citizens about radon and developing programs to alleviate its potential dangers. Says Deieso, "States will soon learn that radon is not a two-year short-term environmental problem. Like the other environmental threats we face, it is here to stay."

Radiological Health Program
Dept. of Health & Social Services
Juneau, Alaska

UPDATED ALASKA RADON RESULTS

(All data through 12/10/87)

	Location	Number	Concentration of radon, picocuries per liter of air (pCi/l)			
			4 or less	5-8	9-20	20 +
1	Anchorage	69	68		1	
2	Anderson	1	1			
3	Arctic Circle H.S.	1		1		
4	Barrow	1	1			
5	Bethel	1	1			
6	Bettles	1	1			
7	Craig	1	1			
8	Deadhorse	1	1			
9	Delta Junction	3	2	1		
10	Dillingham	1	1			
11	Douglas	3	3			
12	Eagle	1	1			
13	Eagle River	14	14			
14	Fairbanks	67	43	7	7	10
15	Fort Yukon	1	1			
16	Galena	1	1			
17	Glenallen	1	1			
18	Haines	5	5			
19	Healy	3	3			
20	Homer	4	3		1	
21	Hope	1	1			
22	Juneau	26	26			
23	Kasilof	1	1			
24	Kenai	1	1			
25	Ketchikan	4	4			
26	King Salmon	1	1			
27	Klawock	1	1			
28	Kodiak	13	12	1		
29	Kotzebue	2	2			
30	Manley Hot Springs	3	2		1	
31	McGrath	1	1			
32	McKinley Park	46	32	7	6	1
33	Nenana	1	1			
34	Nome	1	1			
35	North Pole	3	3			
36	Northway	3	2		1	
37	Palmer	6	5		1	
38	Pedro Bay	1	1			
39	St. Mary's	1	1			
40	Seward	1		1		
41	Sitka	2	2			
42	Skagway	1	1			
43	Soldotna	4	4			
44	Sterling	1	1			
45	Tanacross	1	1			
46	Tok	3	2		1	
47	Unakleet	1	1			
48	Valdez	2	2			
49	Wales	1	1			
50	Wasilla	5	5			
	TOTALS	318	270	18	19	11

THE ALASKA RADON PROBLEM

by Jeffrey T. Kline and Robert B. Forbes
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Background

Radon (Rn^{222}) gas accumulation has long been known to be a serious health hazard in the uranium and phosphate mining industries, resulting in significantly elevated incidence of lung cancer in miners, but only since 1984 has it emerged as a potentially serious health problem in residences and public buildings throughout the United States.

Radon is a colorless, odorless, tasteless, and exceedingly heavy (eight times as heavy as ambient air) radioactive gas with a half-life of 3.8 days[1], which is produced by the natural decay of uranium. It occurs, at least in very small quantities, nearly everywhere at the earth's surface, and at higher concentrations where geologic conditions favor its formation, concentration, and migration in soil and water.

The recent intense interest in residential radon contamination was sparked in 1984 when a nuclear power plant worker in Pennsylvania set off radiation alarms as he entered the plant. His contamination was subsequently traced to an extremely high level of naturally occurring radon which was entering his home through the foundation, and which was emanating from the soil and backfill of the surrounding area. Further checking in the area identified several other residences which had potentially dangerous levels of radon and its radioactive daughters in the ambient air. This area, known as the Reading Prong, became the focus of research to determine the geologic conditions and construction practices which contribute to the accumulation of radon in dwellings, and to develop economically feasible counter measures.

Since that time, numerous areas have been identified throughout the United States where serious levels of radon occur in dwellings. EPA and public health officials postulate that radon exposure may be the leading source of human exposure to naturally occurring background radiation, and the leading cause of non-smoking related lung cancer which may account for from 5,000 to 20,000 cancer-related deaths per year in the United States.

More than 30 states throughout the U.S. have initiated programs to identify areas with high radon hazard potential, and to develop measures to deal with the complex health and legal aspects of the problem. Representatives from

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[1] Half life refers to the length of time in which half of a given number of atoms of a radio isotope undergoes spontaneous radioactive decay to form its daughter element.

most of these states were present at a radon geology workshop held at the U.S. Geological Survey national center in Reston, Virginia, last month.

Geologic Controls

The geology and geochemistry of radon is complex, and recognition of these factors is one of the most important keys in identifying areas which may have a high radon risk potential. One of the first considerations in radon screening surveys is the recognition of the geologic favorability or potential for radon production and release. A variety of geologic conditions may encourage the production and accumulation of radon. These conditions may act singly or in concert to favor the emanation and migration of the gas to the surface and into dwellings. Some of these factors include:

1. Bedrock type (all of the rock types below are common sources of uranium and its daughter products):

   a. black shales and slates
   b. phosphatic carbonate rocks
   c. hydrothermally mineralized metamorphic rocks
   d. feldspathic igneous rocks

2. Bedrock structure:

   Faults and shear zones which provide avenues or conduits for the migration of radium salts and radon bearing fluids.

3. Surficial geology:

   a. Highly permeable and well drained soils such as coarse alluvium, glacial outwash, dune sand, loess, and loamy saprolites allow easy migration of soil gas by diffusion along favorable pressure gradients.
   b. The presence or absence of permafrost may control radon migration

4. Groundwater geochemistry and hydrology:

   eH and pH conditions which may favor the mobilization or concentration of uranium and radium compounds.

State and National Radon Programs

At this time, more than 30 states throughout the U.S. have initiated programs to identify areas with high radon hazard potential and to deal with the complex health and legal aspects of the problem.

DOE and EPA have established offices for the coordination of state assistance programs.

Radon in Alaska

Local areas of high radon emission have been known in the state since the mid 1970s. The first radon anomalies were noted by government and industry

geologists during the course of geologic investigations, including uranium/thorium surveys and exploration programs in Interior Alaska. The most notable of these anomalies was associated with uraniferous granitic rocks in the vicinity of Mt. Prindle and Central, Alaska, located in the Yukon-Tanana Upland northeast of Fairbanks.

Experimental work on the use of radon flux variations to predict earthquakes was conducted by Robert Forbes and Daniel Hawkins several years ago, which yielded some very interesting data on relatively high bedrock and soil radon gas emanation rates at some localities in the Fairbanks District.

High radiation levels which could have resulted from radon daughter isotope decay were noted in the vicinity of Circle Hot Springs during that same time period by exploration geologists in buildings which had been closed for an extended time prior to the field season. In 1980, DGGS commented on the radon problem potential in a proposed State land disposal area in the Central area, but no follow-up seemed to be merited at the time.

Until recently, very few radon measurements had been taken on air within dwellings in the state of Alaska. In 1985, spurred by growing public awareness of the potential hazards of radon in private residences, the Arctic Environmental Information and Data Center (in cooperation with Battelle Northwest Laboratories) conducted a small radon screening study in which nine homes and one office were tested. Elevated radon levels were found in 40% of the structures tested. One of the structures had between five and ten times normal background. The study represented a 'first cut' survey and was designed to simply determine whether or not significant radon concentrations were present at all, and whether or not additional studies were warranted (CONRIM Newsletter, Summer Edition, 1986).

Another small radon survey in the Chena Hot Springs area was initiated by Milton Wiltse of the Alaska Division of Geological and Geophysical Surveys at the request of the Division of Land and Water Management. Nine dwellings were monitored during the spring and summer months of 1986 and from February 12 to May 22, 1987. While the spring and summer radon levels were well below the 4 pCi/l EPA guidelines, winter levels exceeded the guideline in four of the nine buildings in crawl space areas and two of the nine in living space areas (M.W. Wiltse, written communication, July 1987).

In early January 1986, routine water sampling of the Haines public water supply by EPA revealed elevated radon levels. Subsequent resampling of the water by Robert Forbes confirmed that the alpha emitter in the water was dissolved radon. While the levels were not high enough to cause an imminent health danger, they are suggestive that more closely spaced sampling intervals may be warranted for the area than the routine two-year interval of EPA, as radon concentrations are known to vary widely with time. The story was reported January 16, 1986, in the Juneau Empire, and on APRN news broadcasts.

More recently, a screening survey performed by Lee Leonard of DOTPF research indicated that in a sampling of selected public buildings throughout the state, four had three-month average air radon concentration levels which slightly exceeded the 4 pCi/l EPA guideline. These buildings were located in Anchorage, Homer, Seward, and Tok. Radon surveys of public facilities to date is far from complete.

Within the last few weeks, results obtained by Shelby Leonard, Dan Hawkins, and Richard Seifert of the University of Alaska, Fairbanks, from track etch detectors selectively placed in a limited number of homes around Fairbanks showed alarmingly high ambient radon levels, with the highest being 380 pCi/l as an average value for a three month exposure period. The location of this and other monitored dwellings with significantly elevated radon levels suggests that there may be a potential correlation between upland or hillside home sites, and higher radon levels (Lee Leonard, oral communication, July 8. 1987).

A follow-up study of the Ester Dome area carried out in the past two weeks, July 6 through 17, 1987, using activated charcoal detectors, revealed additional high radon values in homes on Ester Dome, with the highest being 989 pCi/l (nearly 15 times the exposure level allowed in underground uranium mines in the U.S. and Canada). We are currently running real-time air monitoring studies at this location with a scintillation counter and lucas cell apparatus, to verify the charcoal detector values. A series of real-time measurements taken at one of the high level homes showed significantly elevated levels (in the range of 195 to 271 pCi/l). These concentrations were less than those determined from 48 hour charcoal accumulators made in previous weeks; however, the weather conditions and the duration of the real-time sampling series could easily account for major fluctuations in the apparent radon values. Such fluctuations are well documented in other studies conducted throughout the U.S.

It is the actual long-term dose rate which must be considered in health risk estimates. In order to assess the annual dose rate, it is necessary to conduct a series of integrated measurements over intervals of three months, four times a year. This kind of long-range integrated counting program should be considered in homes where short duration measurements have produced high radon values.

Another statewide screening survey is currently being conducted by Sid Heidersdorf, radiologist with the Department of Health and Social Services. To date, he has accumulated data points from nearly 200 localities, including some values which exceed 4 pCi/l.

The geologic controls which govern radon emissions from soil and rock are not fully understood, nor is the scope of the problem in the Fairbanks District or Alaska. It is clear that interior Alaska has many, if not most, of the geologic and other environmental characteristics of radon problem areas elsewhere in the U.S. In addition, other factors unique to the arctic and sub-arctic environment such as permafrost and extreme temperature inversions with very long periods of calm, stable air, may tend to obscure some of the geologic correlations used in other parts of the country, and require more extensive research into mechanisms of radon emanation and migration under arctic conditions common to Alaska. No data pertaining to the behavior of radon in permafrost terranes conditions were available at the recently attended Radon Workshop in Reston.

Strategies for Alaska

Radon is an environmental hazard which can be effectively dealt with once its presence is recognized. It can be most easily mitigated during new house

construction when relatively inexpensive engineering and design modifications can essentially render a house 'radon proof.' Existing homes can generally be retrofitted with modified heating and ventilation systems and foundation sealants which usually reduce radon concentrations to acceptable levels.

These techniques have been successfully employed in areas of the eastern seaboard of the U.S. as well as Scandinavia.

The primary problem at present in Alaska and many other states is to determine the magnitude of the problem by performing careful and systematic orientation and screening surveys and correlating their results to geologic parameters. The goal of the latter is to develop a set of geologic criteria incorporating aspects of local surficial and bedrock geology by which predictions of radon potential can be made. By developing geologic models for prediction, workers in other states have been able to identify areas where the need for high density household monitoring is greatest, thereby making the most efficient use of limited funding.

The next step is to educate the public about radon, its long-term health risk, and options for mitigation.

Finally, and perhaps most difficult, is to get a handle on the etiology of long-term low-level radon exposure. It is known from studies of uranium miners that a very significantly increased risk of lung cancer exists after 5,500 hours of exposure to air containing an average radon content of 200 pCi/l. Swedish researchers conclude that a significant health risk is faced after long-term exposure to 100 pCi/l.

Unfortunately, long-range health data at low levels of exposure (the range of 4-50 pCi/l) to radon don't exist. This is primarily because low levels have not been widely monitored prior to the last few years. Most death rate figures quoted by EPA for low-level exposure (i.e. the commonly quoted 5,000-20,000 per year) are based on the extrapolation of data from high-level studies and what is currently known about household radon levels across the country. It is imperative that a better data base be generated on all fronts in order to properly address this problem.

Currently, Alaska is one of the few states for which EPA has little or no information pertaining to radon potential or actual data from radon surveys of homes or public buildings. Limited amounts of such data have been or are currently being gathered on a small scale in local orientation surveys in selected areas of the state. As yet, we do not have a handle on the statewide potential for radon hazards. Based upon presentations and discussions at the workshop, of geologic conditions which favor radon emanation in other regions of the country, and comparing those conditions to what we know about Alaskan geology, it is clear that it would be prudent to develop a multidisciplinary screening program to determine radon hazard potential in regions of this state.

Preliminary Recommendations

1. Initiate a cooperative statewide residential radon reconnaissance program as soon as possible in an attempt to locate potential radon hot spots (other than Fairbanks).

2. Seek and hopefully acquire emergency state and federal funding to meet DGGS obligations to the radon problem until requested funds can be obtained through formal budget channels.

3. Organize and host a conference involving participating state and federal agencies, to establish an ad hoc task force which would design and implement an accelerated statewide radon investigation program.

4. Continue constrained radon investigations on re-directed funds until supplementary financing is obtained.

5. Work with State Radiologist, EPA, and DEC to establish household radon alert network in Alaska.

6. Design short- and mid-range radon investigation program to determine inter-relationship between local and regional geologic factors and radon anomalies.

7. Initiate screening survey of radon in drinking water in cooperation with EPA, State Radiologist, and DEC.

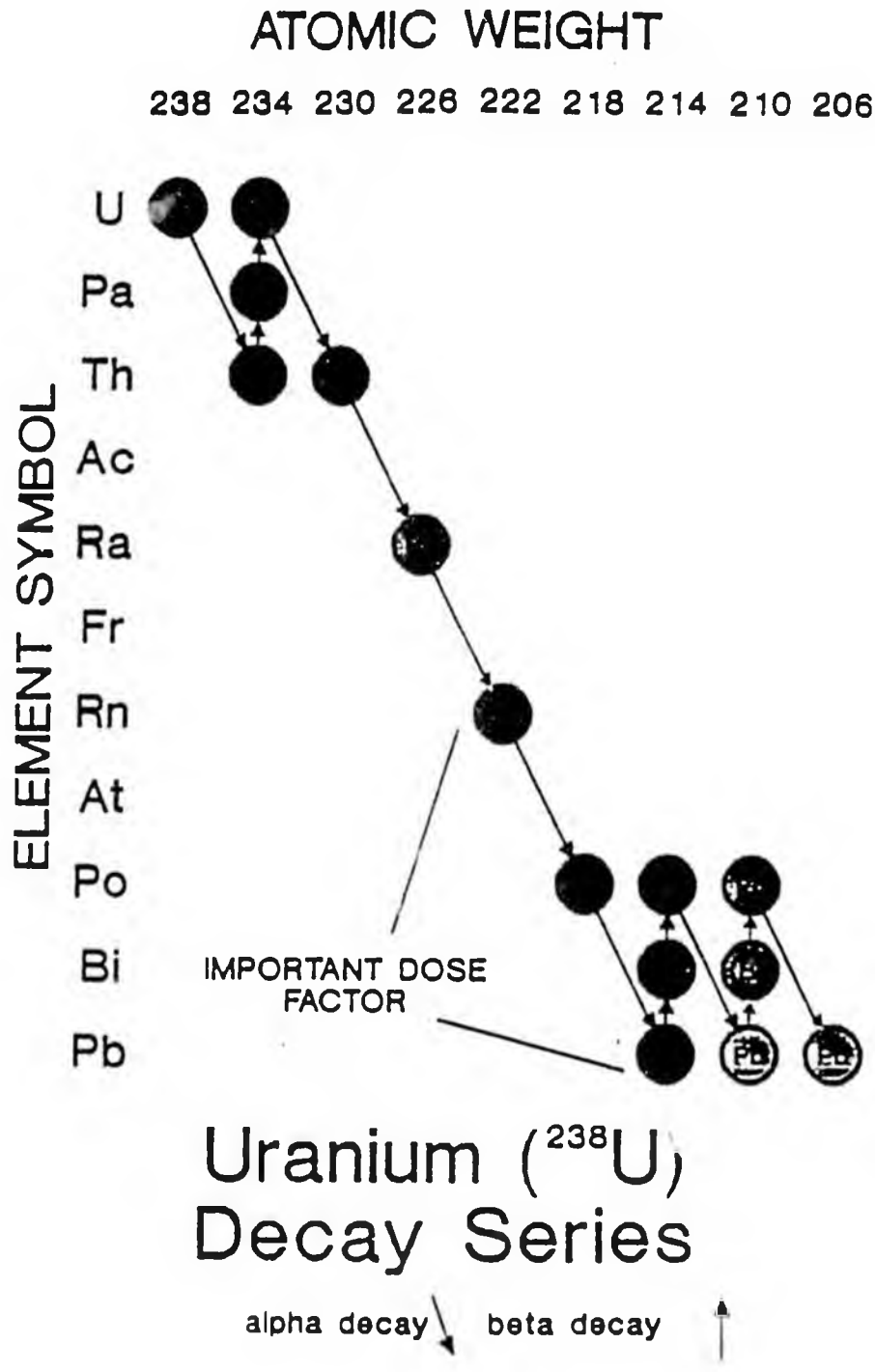
CHARCOAL DETECTOR RADON ANALYSES
FROM RESIDENCES IN THE FAIRBANKS AREA

Code #	Name	pCi/l	Comments
194602		0.3	
194604		10.7	Follow up
194605		5.7	
194606		0.7	
194608		1.0	
194609		1.7	
194610		27.4	Follow up
194611		47.1	Soil tube
194612		3.0	
194614		0.2	
194615		4.6	Follow up
194616		0.0	
194617		112.0	Remedial action
194618		13.0	Follow up
194619		0.6	
194620		1.9	
194621		66.2	Remedial action, follow up
194622		3.9	
194623		8.9	Follow up
194624		989.0	Definite remedial action
194625		0.5	
194626		3.8	
194628		2.8	
194629		1.7	
194630		0.2	
194631		13.2	Follow up
194633		3.1	
194634		6.4	Follow up
194635		4.8	
194637		17.1	Follow up
194638		4.9	Follow up
194639		15.2	Follow up
194640		0.3	
194642		?	

RADON CONCENTRATIONS
Determined by Jeff Kline

Reference #	Date	Name	Pylon Scintillation Count in pCi/l	Area
1	//21/87		271.0	Ester Dome
2	//22/87		8.79	Chena Ridge
3	//22/87		113.7	
4	//23/87		4.13	Goldstream above Okta
5	//23/87		16.4	Hillside above Fox tailings
6	//24/87	Gilmore Creek Tracking Station	4.1	Utilidors under main control room
7	//25/87	Soil gas, Fox tailings	185.7	Near pipeline crossing on Goldstream Road
8	//26/87	Soil gas, Chena Terrace	75.9	Pit near DGGS warehouse
9	//26/87	DGGS warehouse	8.4	Bundtzen/Kline bin
10	8/11/87	(residence)	14.73[A]	Ester Dome
	//25/87	Soil gas on Jones Road (organic silt)	5.2	Thawed organic silt near corner of Jones Road and Weldheim Drive
	//25/87	Soil gas, Jones Road school bus turnaround	27.3	Pit run alluvial gravel

[A] Gene Wescott had a three-month track etch dosimeter reading of 380 pCi/l for three months late last winter.


ATOMIC WEIGHT
238 234 230 226 222 218 214 210 206
ELEMENT SYMBOL
U
Pa
Th
Ac
Ra
Fr
Rn
At
Po
Bi
Pb
IMPORTANT DOSE FACTOR
Uranium (^{238}U) Decay Series
alpha decay
beta decay

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MEMORANDUM

TO: ALL LEGISLATORS

FROM: REPRESENTATIVE NIILO KOPONEN

DATE: JANUARY 14, 1988

RE: RADON

Evidence continues to mount that radon is a serious health hazard. Weekly, national press features at least one report concerning radon and lung cancer. The following report states that 'spending 12 hours a day in a house with excess radon boosts a person's cancer risk by about 50%.'

HJR 38 which I have introduced in the House asks the federal and state government to make a coordinated, joint effort to investigate and alleviate the radon gas problem in Alaska.

Today at 12:30 Bob Forbes, the State Geologist and head of the Division of Geological and Geophysical Survey will be showing a slide show on Radon. The presentation will take in the Butrovich Room.

monitoring human
vever, remain skep-
New York-based
Vatch reports that
released 64 dissi-
psychiatric units
-up from 19 in
that 95 remain in
We'll be watching
ther the average
be able to use the
says the group's
Catherine Fitzpatrick.

up nonconformists for extended terms in squalid psychiatric asylums. Are such practices now to cease? That's the question being asked after the Kremlin announcement last week of a new code of legal rights for mental patients.

Advocates of human rights have protested for decades their being railroaded into Soviet asylums, where they have been forced to take powerful drugs and live for years in antiquated conditions. At an early-19th-century structure still in use near Moscow, more than a dozen people have been crammed into wards built for fewer than half that number; patients must use 70-year-old plumbing.

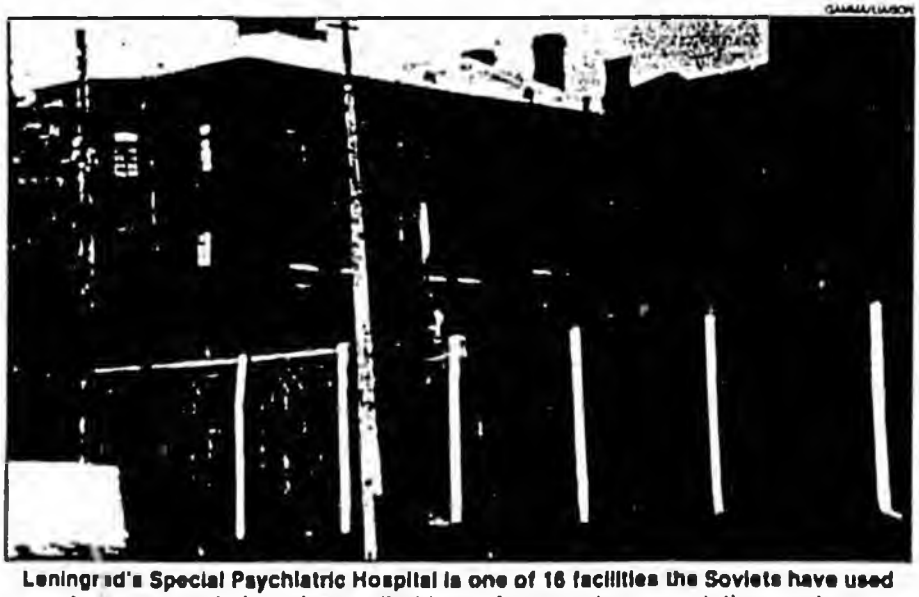
After years of criticism from international psychiatric groups, Mikhail Gorbachev's administration recently signaled change of some sort when the Soviet press began to complain about abuses. One article described the commitment of a 20-year-old Leningrad factory employe who had been branded a schizophrenic after criticizing her boss and her working conditions. Under the new policies, patients and their relatives are entitled to contest commitments in court. The Russian Republic, largest of the 15 Soviet republics, went so far as to make it a crime to force a healthy person into an asylum.

In Moscow's dissident circles, pessimism persists. "We have always had legal protection on paper, but it hasn't done any good," complains a painter who has served long stretches in asylums. "The official attitude still boils down to this: If you're different or disagree with things here, there must be something wrong with you."

HUMAN RIGHTS (CONT'D)

Gorby's curtain

As new psychiatric reforms showcase Mikhail Gorbachev's image-polishing skills, the Kremlin leader is simultaneously pursuing an emigration policy that shows his teeth of steel. After a brief period of presummit leniency, the Soviets last week began enforcing harsh 1987 laws that require a would-be émigré to be invited by a sibling, spouse, parent or child abroad. That disqualifies 90 percent of the 400,000 Jews who want out, according to the Union of Councils for Soviet Jews. Emigration peaked in 1979 at 51,000, then dropped to fewer than 1,000 yearly when détente dissolved over Afghanistan. In 1987, 200 were let go weekly, but last week the number was down again—to 79.



Leningrad's Special Psychiatric Hospital is one of 16 facilities the Soviets have used to house—and often abuse—dissidents. A new code may curb the practice

HEALTH

Lung cancer's gassy ally

Radon gas seeps into 4 to 8 million homes across the U.S., rising through the foundations from underlying soil and rock and mixing with inside air. The radioactive gas is odorless, colorless—and a cause of lung cancer. But how big a cause? Last week, a National Academy of Sciences report made possible the most authoritative answer yet.

The study's chief, Dr. Jacob Fabrikant of the University of California at Berkeley, calculated how exposure to levels of radon considered worrisome by the Environmental Protection Agency affects the odds of contracting lung cancer. His basic finding: Spending 12 hours a day in a house with excess radon boosts a person's cancer risk by about 50 percent.

Of 1,000 male nonsmokers exposed to excess radon, 16 will die of lung cancer, he estimates. That's 5 more than in a nonexposed group. Among 1,000 female nonsmokers, radon exposure ups lung-cancer deaths from 6 to 9. The statistics are much grimmer for smokers: Some 172 out of 1,000 male smokers exposed to excess radon will die of lung cancer—49 more than among nonexposed male smokers. For women smokers, radon pushes the toll from 60 to about 85.

Why radon and smoking are more lethal to men than to women is unknown. Why is radon more lethal to smokers? That, too, is not known. Some experts think smoke-damaged lungs trap the radioactive radon particles.

Homes with serious radon problems can be fixed by sealing cracks to prevent seepage and by improving ventilation. The EPA's Office of Public Affairs offers information booklets and a list of radon-detection companies. Now awaiting action in the House is a bill passed unanimously by the Senate last year that would provide $33 million to the states for radon education and pilot programs.

Yukon Fishery

~Nenana~

Register 82; am 5/11/85, Register 94; am __/__/88, Register ___)

Authority: AS 16.05.251

5 AAC 07.365 is amended to read:

5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. (a) The objectives of the Kuskokwim River Salmon Management Plan are to provide guidelines for the management of the Kuskokwim River commercial salmon fishery that will result in sustained yields of the salmon stocks large enough to provide for subsistence needs and an economically viable commercial fishery.

(b) It is the intent of the Board of Fisheries that the Kuksokwim River king salmon stock be managed in a conservative manner consistent with sustained yield principles and the subsistence priority and, consistent with this intent, that the available surpluses of other salmon stocks be taken. To accomplish these objectives, the department shall manage the Kuskokwim River commercial salmon fishery as follows:

(1) there shall be no directed commercial king salmon fishery;

(2) for the years 1988 and 1989, the fishery shall open no later then June 20;

(3) only those waters of District 1 downstream of ADF&G regulatory markers located at Bethel shall be open during the first fishing period;

(4) there shall be at least three eight hour fishing periods in June;

(5) although no directed fishery on king salmon is allowed, the incidental catch guideline harvest level for king salmon taken during fisheries directed on other species is 15,000 to 35,000 fish;

(6) to the extent possible, the department shall provide at least 24 hours advance opening of District 1 fishing periods;

(7) District 1 fishing periods are from 1:00 p.m. until 7:00 p.m.; when longer fishing periods are allowed, the extra time is to be equally divided before 1:00 p.m. and after 7:00 p.m.(Eff. 6/10/87, Register 102; am __/__/88, Register ___)

Authority: AS 16.05.060
AS 16.05.251

5 AAC 07.367 is added to Article 3 to read:

5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN. (a) The objectives of the District 4 Salmon Management Plan are to maintain a level of sustained yield that will provide for subsistence needs, the long term economic health of the commercial and sport fishing industries, and recreational opportunities in the district and freshwater systems flowing into the district.

(b) The District 4 commercial salmon fishery is to open before June 16.

(c) When the catch of chinook salmon in the commercial fishery is less than 50 percent of the catch of chinook and sockeye salmon combined, the department shall manage, to the extent possible, the commercial salmon fishery based on the strength of the sockeye salmon return.

(d) Commercial salmon fishing periods are established by emergency order. The department shall allow at least one fishing period per week, unless a severe conservation problem develops.

(e) When a closure of the commercial salmon fishery is required, the department shall decide on or before the tenth day of the closure whether to close the sport fishery to the taking of the species of biological concern and whether additional management actions on the sport fishery are needed. (Eff. __/__/88, Register ___)

Authority: AS 16.05.060
AS 16.05.251

JOINT STATEMENT ON THE MANAGEMENT OF THE KUKSKOKWIM RIVER SALMON FISHERY

The Board of Fisheries, the Department of Fish and Game, the Local Fish and Game Advisory Committees, and local subsistence and commercial fishermen agree to work together towards the goal of increasing the sustained yield of Kuskokwim River salmon stocks to provide for subsistence needs and an economically viable commercial fishery. To achieve that goal, the parties agree to the following:

(1) Kuskokwim River salmon users will form a working group;

(2) the local department staff will meet with the Working Group to discuss preseason and inseason management of the fishery and evaluate items such as, but not limited to;

(A) test fishery data;

(B) CPUE data from historic and inseason commercial fisheries; and

(C) inseason subsistence catch data;

(D) it is understood that the purpose of these meetings shall be to arrive at a consensus regarding the openings and closures of the Kuskokwim River fishery; if a consensus can not be reached emergency order authority will continue to be at the area management biologist's discretion;

(3) the department will announce the opening of the first commercial fishing period by June 10;

(4) the fishing periods may be separted by six days to assist king salmon passage;

(5) the department and the Working Group will work towards the development of a comprehensive management plan for all of the Kuskokwim River salmon stocks, and report to the board on their progress;

(6) ~~calls for~~ Working Group\Staff meetings will be CALLED at the discretion of the chair of the Working Group.

FROM KOSKOKWIM ARE - PLAN

Continuing our market report on the farmed salmon industry, this month we look at trends in the USA, Canada, New Zealand and Chile.

FARMED SALMON

New suppliers on stream

Canada: a cautious approach

THIS year 1,000 tonnes of farmed salmon are expected to come out of Atlantic Canada. Next year that figure is expected to increase to 1,600 tonnes, followed by 2,200 tonnes in 1989 and 5,000 tonnes in 1990, reports *Gloria Langlands*.

Most of the Atlantic farmed salmon is marketed by the Atlantic Silver cooperative in St George, NB, and there are plans to improve the effectiveness of this operation along the lines of schemes in Scotland and Norway.

Essentially all product is sold as fresh, with 90 per cent consumed in Eastern Canada. The rest is exported to the USA.

The Atlantic fish farming industry is proceeding cautiously and judiciously in its development, while on the Pacific coast there have been problems encountered through rapid growth.

This year 1,700 tonnes of Pacific farmed salmon are expected, following a massive growth curve over the past four years from just 125 tonnes in 1983. Next year production is expected to more than triple to 5,700 tonnes and then quadruple to 22,600 tonnes in 1989, reaching 30,000 tonnes the following year.

Four species of Pacific salmon are farmed: *Onchorynchus keta* (chum), *O kisutch* (coho), *O tshawytscha* (chinook) and *O gorbuscha* (pink).

Initially, when the industry was still in its infancy, direct communication between the Government and the industry was feasible. However, growth is now such that steps are being taken to organise contact on a more formal basis.

The Pacific industry, in comparison to that on the Atlantic, is obviously set for rapid growth, due partly to growing investment from Europe and North America.

However, in some quarters it is felt that there has been irresponsible growth in the Pacific; two firms have already collapsed. It is also felt that the only money to be made in the short term, is not in the salmon farm itself, but by speculating in the shares of companies on the stock exchange!

The salmon farming industry in Canada is still very young and as each problem arises it presents a challenge for solution and improvement.

New Zealand: aiming for top quality

COMMERCIAL salmon cultivation has made a relatively slow start in New Zealand, but there are now 15 salmon sea-cage farms, 15 fresh water pond farming operations, 12 ocean ranches and one onshore sea water pumping salmon farm, reports *Jim Campbell*. Most companies involved in this developing — and therefore high risk — industry also have other business interests, often combining the enterprise with mussel farming.

It is estimated that these operations have the capacity to produce up to 2,000 tonnes of chinook (*O. tshawaytscha*) per annum. In 1985, 310 tonnes of salmon were produced and 120 tonnes were exported round weight. These figures doubled in 1986 and the 1987 forecast is for 950 tonnes production, 600 tonnes of which will go to export.

Almost all 1986 exports were as gilled and gutted fish. Approximately 25 per cent of exports went to Japan and the remaining 75 per cent to the west coast of the USA. While exports were predominantly as chilled, fresh product, there were some deliveries of frozen, whole fish.

Salmon can be packed to specific customer requirements and can be delivered fresh, chilled to Northern Hemisphere Pacific Coast markets within 48 hours of harvesting.

There has been a considerable development of smoked salmon and Pacific countries took both smoked and filleted salmon last year. The largest producer in New Zealand of smoked salmon is **Angus McNeill Ltd** of Nelson.

From the outset, the New Zealand salmon industry has aimed at achieving the highest possible quality and all farms are

Processing Norwegian product

Filleting Norwegian salmon before smoking.

NORWEGIAN owned **Orkney Seafoods Ltd**, specialising in the supply of live lobster and fresh farm-raised Atlantic salmon, last month commissioned a new smoking plant and processing facility in Kirkwall, the capital of the Orkney Islands.

Present capacity of the new plant is about 5 tonnes of smoked salmon a week. Products will include 200g and 500g retail packs of sliced salmon as well as whole sides.

A company spokesman told *Seafood International* that around 80-90 per cent of the salmon smoked in the new plant will be from Norwegian farms, and will be shipped to Orkney in frozen form for processing.

Though Orkney Seafoods also farms salmon in Orkney, most of this fish is marketed in fresh form, not smoked.

When *Seafood International* visited the new plant, the first batch of 'Superior Orkney Smokehouse' salmon was being smoked in the firm's new Swedish-made **Foodco** computer-controlled kiln.

Orkney Seafoods' processing plant is based in existing premises, which have been completely remodelled and modernised. A new floor has been laid and the factory has the high standard of finish expected of a modern food processing plant.

Situated close to Kirkwall harbour, the plant is divided into three areas. The first, which has direct access from the street, houses the firm's lobster holding tanks and offices. The salmon is filleted, trimmed, salted and smoked in the central area of the factory; then sliced, weighed and packed in the third area.

The self-cleaning Foodco smoking kiln, which has a capacity of 500kg of salmon per load, is fitted with two doors, one at the front and one at the back. This enables the trolley containing the fish to be wheeled into the kiln in one room and taken out after the smoking programme has been completed, in the other. Smoking capacity could be increased as there is plenty of space for another kiln next to the first.

All the plant's stainless steel filleting, trimming and packing tables were supplied by **Sotra Rustfri Industri A/S** of Norway, and the smoked salmon is packaged in printed film by a Swiss-made **Multivac** R5100 packaging machine.

Established in 1973, Orkney Seafoods is an associate of **Konrad Sekkinstad A/S** of Sotra, Norway, which has many years experience of handling seafood, particularly lobster and salmon.

The company markets its products in many parts of the UK and Europe. Italy and Sweden are two significant importers of the firm's smoked salmon.

Orkney Seafoods farms salmon in 15 cages in the Lamb Holm area of Orkney; this year's production is estimated at about 250 tonnes. The company also acts as a marketing agent for certain other farmers on the Islands.

According to Orkney Seafoods, the clean waters of the islands are an ideal environment for the production of firm fleshed salmon.

Enquiries: Orkney Seafoods Ltd, 10 Ayre Road, Kirkwall, Orkney, UK. Tel: (0856) 2173.

New Zealand can offer chinook salmon during the country's spring and summer seasons, when Northern Hemisphere producers have much less fresh product available. Photo: Fletcher Fishing.

Photo: Glory Seafoods.

Photo: Pacific Kitchen, Seattle.

licensed by the Government. Processing, cleaning and packing of fish for export is done under strict regulations.

One advantage which New Zealand enjoys is the ability to offer chinook salmon in top condition during the country's spring and summer period, when Northern Hemisphere producers have much less fresh product available.

Now that more salmon are being released to the sea there is concern among anglers and salmon farmers that the trawlers operating off the east coast of the South Island are taking a higher proportion of salmon than is desirable. Commercial trawler operators have said that the by-catch of salmon comes through the increase in target fishing for such quota species as red cod and barracouta.

The Government is now controlling the disposal of salmon caught by trawlers, which is sold under its supervision. However, there is some speculation that the development of ocean ranching may be retarded by the risk of losses to trawlers.

While chinook is the main commercial species, there are a few surviving sockeye and Atlantic salmon in the landlocked South Islands lakes (first introduced over 100 years ago by British settlers). Attempts are now being made to breed from the species for future farming enterprises.

Alaska: opposition to farming

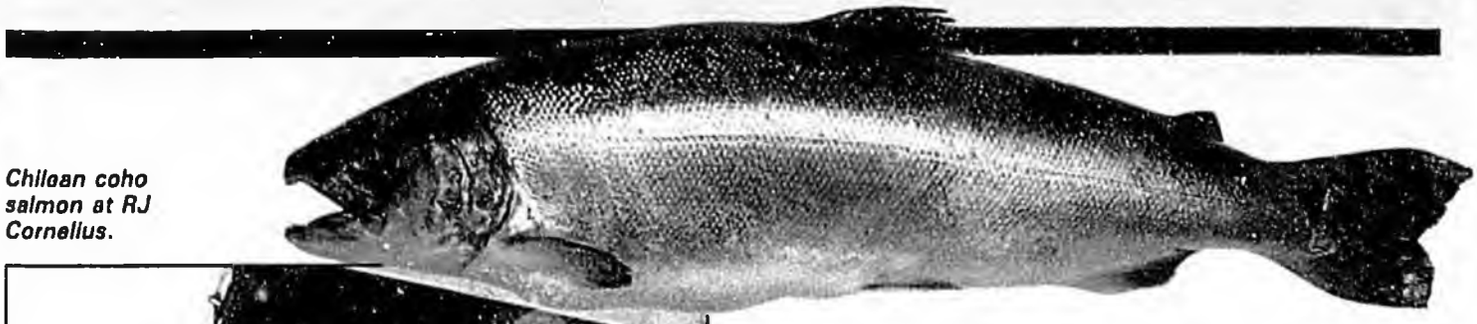
IN Alaska, where commercial fishermen harvest 43 per cent of the world's wild salmon catch and 90 per cent of the US salmon catch, the growing farmed salmon industry has raised a fearsome spectre among the state's high seas fishermen.

Fishermen fear the growth of salmon farming for three reasons: first it will decimate markets for wild salmon; second that high startup and operating costs will mean only large corporations (probably Norwegian) could afford to build them, with profits moving out of the area and high marketing competition; and third that pen-reared salmon might introduce non-indigenous diseases into the wild Pacific salmon stocks.

Although opposition is strident, pro-development supporters are countering with their own theories. Technology is developing to decrease the likelihood of disease in fish farms and some say it's easy to prevent intermingling between wild and farmed salmon by building the salmon farm inland and pumping in seawater.

A few reports have indicated that farmed salmon may not harm wild salmon markets but might actually enhance those markets by moving salmon from a delicacy item to a year-round entree item on menus, at fish counters, and in the minds of consumers.

Particularly relevant to the Alaskan situation is the fact that, whether or not Alaskans enter the pen-reared salmon industry, British Columbia and Norway are already in it, and the output from those countries must be considered an important factor in making a decision in Alaska.



Chilean coho salmon at RJ Cornelius.

'Alaska fishermen will face competition from farmed salmon regardless of whether or not they come from Alaska farms,' reads a mariculture report published by the Alaska legislature.

Supporters also insist that investment in Alaska from large US or foreign companies is good, not bad, as long as Alaskans are employed and some profits stay in Alaska.

Norwegians reportedly have invested $50m in British Columbia fish farms, and they are now looking to Alaska. This summer Norway hosted a contingent of Alaskan legislators who wanted to see first-hand how Europeans were dealing with the industry.

Meanwhile, Alaskan corporations, unable to develop an industry at home, are now investing in fish farms elsewhere in the USA. Sealaska Corp has purchased 49 per cent of Swecker Salmon Farms of Olympia, Washington, a company that raises its own salmon and processes salmon grown in Idaho, Oregon, Washington and British Columbia.

Will Alaska be able to compete in the salmon industry? No, not unless it starts immmediately, supporters say. If it does, potential annual revenues from even a 'modest Alaskan industry' are estimated to reach $100m and provide 'thousands of jobs', according to one consultant.

Will the wild salmon fishery and its attendant 11,000 fishermen survive? Not unless the industry is developed slowly and regulated carefully, say salmon farming opponents. Whatever happens next will be watched carefully by those on both sides of the issue in Alaska and abroad.

Chile: major jump in production

THE Chilean salmon industry will have delivered some 4,000 tonnes of fresh salmon to the international market last harvesting season (1986/87). This represents a big jump from the 1,600 tonnes harvested the previous year (1985/86), but half of what the production forecast is for the 1988/89 season.

What has brought such an extraordinary growth rate to what was virtually a non-existant industry just four years ago? Some of the reasons are: the excellent geographical conditions in the south of Chile; the low cost of labour and feed, compared with Northern Hemisphere countries; high growth and food conversion rates and low mortality; plus the fact that Chilean producers can supply the international market at a time when there is no fresh farmed salmon available from Northern Hemisphere producers.

Since 1981, coho salmon culture in Chile has seen a dramatic growth (table 1).

The real 'boom' started in 1982, when trout and salmon farming projects experienced a quantam leap. By March 1986 there were 58 companies authorised to install salmon farming facilities; 49 of these are now in operation.

In the last year another 11 new salmon farm operators have come onto the scene. Official figures (Undersecretariat of Fisheries) estimate that 70 per cent of these will be operative for the next season. There are now 91 farms operating in Chile, 24 of which have hatching facilities. Official data report that 70 per cent of these salmon farms are located in the Tenth Region (40 deg South) with most concentrated in the island of Chiloe.

It is estimated that the existing hatching facilities could produce some 50 million salmon ova annually. Taking 2.5kg adult fish as an average, and assuming a 50 per cent death rate, these ova could produce over 40,000 tonnes of salmon per year.

The farming of Atlantic salmon is now beginning in Chile, and may experience rapid growth in the near future, following the importation of Atlantic salmon ova by six companies last summer. Norwegian and Scottish companies are also investing in this area, bringing into the country their own technology.

Analysts forecast that in 1989 20 per cent of the Chilean salmon production will be of the Atlantic species (*Salmo salar*) (table 2).

One interesting feature of the Chilean salmon farming industry is the relatively important size of the farms (or companies). In fact, over 50 per cent of the companies can produce between 100 and 500 tonnes (12 companies), another 20 per cent can produce over 500 tonnes (four companies).

Only one company **Salmones Antartica Ltd** is successfully operating a salmon ranching programme in Chile, although it still has limited commercial output. However, another three companies are active in this area, although results are as yet unknown.

In 1986 a Chilean salmon farmers marketing association was set up — **Asociacion de Productores de Salmon y Truchas AG** — to develop exports and establish quality standards.

These standards were defined with the help of Fundacion Chile and are now compulsory for all member companies. The standard code adopted by the Association regulates the grades, and specifications that producers must meet to obtain a quality seal, as well as other aspects related to feed, medical treatments, harvesting procedures, degutting, packing specifications, etc.

Starting this month, the Association will begin — with the help of a US based seafood promotions agency — an advertising campaign and taste sampling in the East Coast of the USA that will culminate at the Boston Seafood Show in March.

The budget for this venture, although modest, indicates that Chilean salmon producers are taking things seriously and seek to consolidate their market participation.

The strongest market for Chilean farmed fresh salmon is — and probably will continue to be — the USA, specifically during the off-season for the fresh capture Pacific salmon fishery.

The distance to that market is 6,000km so fresh fish has to be airfreighted at $1.50 per kg. Some experts believe that this is the only major disadvantage for Chilean salmon farmers in the world market.

However, because production costs are said to be lower in Chile, its salmon is likely to remain competitive compared with salmon from New Zealand, and even from Europe. ■

Table 1: Production figures 1981-87

(coho salmon)

Year	Production (tonnes)
1981	70
1982	80
1983	94
1984	104
1985/6	1,300
1988/87	1,600

Table 2: Estimated production per season all salmon (tonnes)

Species	1986-87	1987-88	1988-89
Coho	1,600	7,125	12,500
Atlantic	–	277	2,790
Chinook	120	120	120
Grand Total	1,720	7,522	15,410

Source: Undersecretariat of Fisheries

Mieras produces a large range of high-quality mussel- and cocklepreserves. An unique combination of a long experience in processing mussels as well as cockles with modern production facilities and an intensive quality control gives you the quarantee that Mieras products are always of the finest quality.
Mieras produces: Marinated mussels, mussels in different sauces, various frozen musselspecialities, i.q. frozen mussels, marinated cockles, tinned cockles, i.q. frozen cockles, various soups.

Mieras, you can see, and taste the difference.

MIERAS

L. Mieras & Co B.V., Keetweg 11, P.O. Box 3, 4340 AA ARNEMUIDEN-Holland. Tel. (0)1182 - 1920, Telex 37829, Fax (0)1182 - 3284.

List of Agency Personnel to Testify

Department of Fish and Game

Division of Commercial Fisheries

Ken Parker, Director
Craig Whitmore, Herring Research Biologist
Fred Andersen, Yukon Area Management Biologist

Division of F.R.E.D.

Brian Allee, Director

Division of Subsistence

Terry Haynes, Interior and Arctic Regional Supervisor

Elizabeth Andrews, Western Regional Supervisor

Department of Public Safety

Craig Smithson, Sergeant

Possibles: Lt. Rudell and/or
Colonel Jack Jordon, Director,
Division of Fish and Wildlife Protection

The Governors Office may also be in attendance.

List of Requested Witnesses

(1) Yukon Canada Negotiating Group
Dave Cooper - Marshal
Harry Wild - Mt. Village
Jimmy Walker - Holy Cross
Terry johnson - Fairbanks

Manley Hot Springs
(Sharon Said Someone was driving over, did not give me names)

(2) Interior Fish and Wildlife
Wayne Taylor
~~Terry Clark~~
~~Doug Boren~~
Mike Holts

Tanana Chiefs Conference
Mitch Demientieff
Ron Silas

Tanana Fish and Game Association
Bill Fliris
and others

Independents
Mike Coombs
JEFF OATES

(3) Sam Demientieff - Doyon & FBKs Native Ass'n

Location: Nenana Civic Center

Issues: Sale of Roe from Subsistence Catches
Fish Counts
Enforcement Procedures
Enhancement Alternatives

Schedule:

Friday, March 18: Depart Juneau after Session
Staff will meet you upon arrive in Fairbanks with transportation.

Hearing Times:

Saturday, March 19: Transportation has been arranged to Nenana via Bus

7:15am - Depart Fairbanks WestMark

8:30am to 10:15am - Agency Testimony
10:30am to 12:00pm - Requested Witnesses

12:00pm to 1:30pm - Lunch

1:30pm to 3:15pm - Agency Testimony
3:30pm to 5:30pm - General Public Participation

5:30pm - Reception Following Hearing

7:00pm - Dinner

The focus of Saturdays hearing is identifying the problems and investigating possible short term solutions, primarily.

Sunday, March 20: 8:00am to 8:45am - Continental Breakfast or the local cafe

9:00am to 11:00am - General Public Participation Agency start

11:00am to 1:00pm - Local Tour and Lunch Hatchery Tour

1:00pm to 3:30pm - Conclude Hearings

The focus of Sundays hearing is to look for possible long term solutions to the problem and complete the public testimony record.

4:00pm - Depart Nenana via Bus for Fairbanks

5:00pm - Approximate Arrival in Fairbanks
9:10pm - Arrive Juneau on Alaska

List of Agency Personnel to Test_fy

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Craig Smithson, Sergeant

Possibles: Lt. Rudell and/or
Colonel Jack Jordon, Director,
Division of Fish and Wildlife Protection

The Governors Office may also be in attendance.

CLEAR STATE FISH HATCHERY

Clear Hatchery was completed at Clear Air Force Station near Nenana in January 1980. The site was selected because of the availability of heated waste water which allows a flexible rearing program.

The hatchery consists of a main building 130'x40' which contains an office, laboratory, shop, incubation and startup area, four concrete raceways, and a water treatment tower. The incubation and rearing areas contain six incubation stacks, eight startup troughs, seven 3'x8' circular tanks and 6'x60' concrete raceways.

The primary goal of this facility is to culture and release six species of sport fish into over 100 lakes and streams in the interior. These fish will enhance and provide more diversified angling opportunities for interior sport fisherman.

The secondary goal is to develop culture techniques for Arctic grayling, Arctic char, sheefish, and Lake trout.

FY-88 Facility Budget: $383,500

Facility Staffing: Three fulltime personnel and two permanent seasonals @ 5.5 months each.

FY-88 PRODUCTION GOALS

SPECIES	# FISH RELEASED	SIZE
Coho Salmon	160,000	2.1 grams
" "	380,000	4.0 grams
Sheefish	100,000	12.0 grams
" "	125,000	3.0 grams
Rainbow Trout	1,000,000	2.0 grams
" "	110,000	25.0 grams
Arctic char	125,000	4.0 grams
Arctic grayling	1,000,000	Unfed fry
" "	210,000	4.0 grams
Lake Trout	50,000	4.0 grams
	4,260,000	

PROBLEM AREAS IDENTIFIED BY THE FISH TASK FORCE OF THE FAIRBANKS NORTH STAR BOROUGH

1. The fish counting techniques currently being utilized by the Alaska Department of Fish and Game on the Yukon River have proven to be inadequate to accurately predict the run strength. The ADFG has submitted a request for funds to purchase a dual beam sonar ($188,000), and accessory equipment, such as boats, tents and nets, ($44,000). Additional funds of $25,000/month have been requested to operate the equipment for a 4 month period. We urge our Interior Delegation to support this $332,000 funding request.

2. The Task Force would like to see an interior commercial fisherman (one who lives and fishes here) appointed to one of the 2 current vacancies on the Fish Board. We recognize that the sports fisherman also want representation on the Board. We urge that this requirement be met by filling a position other than the traditional Interior position, with a sports fisherman.

3. The Task Force would like to see state funding restored to the Clear Hatchery.

4. The Task Force would like for the Alaska Seafood Marketing Institute to assist interior fishermen in obtaining markets for the river run fish.

5. The Task Force would like to see additional funding for fish enforcement personnel.

6. The Task Force endorses the False Pass tagging effort done in 1987.

WAYNE E. TAYLOR
Nenana, Alaska

Fishing has occurred on the Y & T Rivers for hundreds, possibly thousands, of years.

The first documented fishing on the Tanana was 1899 by Alfred Brooks of the U.S. Geological Survey. He reported Indians were catching and curing salmon of an undetermined species.

Local Natives remember being in fish camps above and below Nenana, at the Wood River, Toklat, Nenana River, Kantishna, Tolavana, and the Tanana River around Manley. They first fished with fish traps and dip nets. It is believed Abraham Albert built the first fish wheel in 1918 and it fished at Rock Crossing by the mouth of the Kantishna.

This was a yearly occurence, as they depended upon the fish for food, barter and dog feed. (Dogs were their only means of winter transportation.)

Commercial fishing for cash or barter or subsistence fishing or both and commercial fishing for cash has been occuring for many, many years. They are still catching the same fish - no matter what terms you want to call the fishing.

Bob Coghill remembers stacking bales of dried salmon in their fish house during the 1930's and 40's. They would buy or barter them from whoever needed money, goods or cash. He recalls his dad buying fish from Dominic Donetti in Holy Cross and the fish arriving here. He and Jack would have to stack them in the fish house after school. They would stack the bales on top of each other and then stand on one tier to stack another layer until they reached the ceiling. He said "Boy, they stunk!!"

Then his dad would sell them to dog mushers in Fairbanks and Anchorage or whoever and usually ship them by the ton on the train. He believes they handled anywhere from 9 tons to 20 tons per year.

The rule of thumb was one dried fish to the pound. This equates to handling 18,000 fish to 40,000 fish.

Norm Suckling who managed the Northern Commercial Store in Manley from 1945-1956 remembers doing the same thing. He indicated they handled about 20 tons per year, which again is about 40,000 fish.

These runs were not regulated in any way. If there was fish, people fished; if there were not any fish, they did not fish. Everyone knew there had to be spawners and they left the ones at the spawning grounds alone.

The run survived without formal management or regulations. How or why, by modern technology, who knows - but, every

year there is living proof that it has worked. What has happened in Alaska's management of fisheries? It has been a long, slow process; but, statewide it has been very positive. There have been a number of different major players in developing fisheries management in Alaska. It has been a cooperative effort between industry, science and government.

Role of Industry

Commercial processing began in Alaska in the 1880's with curing and salting of salmon. Soon thereafter, canning of salmon was started. Peak harvest years occurred in 1918, 1936, 1941, with the processing of over 500 million pounds. The Federal government passed the White Act in 1924, which required that 50% of the run had to escape. So people fished until 50% of the run went by and then had to stop. This led to overfishing and there was not any protection or enforcement by the Feds. The fishing stocks in the late 40's declined dramatically. This caused the processors to look to science and they hired Dr. Thompson from the University of Washington to establish a system of research information and tying it to fisheries management decisions. The industry wanted and needed a healthy continuous fishing industry.

Role of Science

The role of research in commercial fisheries in Alaska began in the 1940's. They started by doing basic fish population studies, then tying it to sustainable yield catches and escapement.

The Statehood act in 1959 really accelerated fishries research, which has made substantial contributions to the scientific basis for fisheries management.

Role of Government

Aboriginal Alaskans considered they owned the natural resources, including the fish. Salmon were a basic necessity to living and to life. Europeans brought the concept of Roman law, that fish of the commons (rivers, lakes, salt water) were not owned until captured and that everyone has a right to fish in the commons. The salmon industry started out small and grew into a very powerful force, both financially and politically. Competition by processors encouraged over-fishing and elimination of competition. Territorial control of fishing did not start until 1949. There was never local control nor was there much attempt at control or management by the Federal government. This one fact probably contributed a lot to the Statehood Act. Many people were fed up with Federal control or lack of it with fisheries. Salmon production in 1959 was the lowest it had been for 60 years. One of the State's top

priorities after Statehood was to revive fisheries. The Legislature decided to eliminate the White Act to help fisheries management and try to eliminate the Federal ineptness of fisheries management which had led to widespread violations of existing regulations.

The new management system grew dramatically with the advent of the Alaska Dept. of Fish and Game - Commercial Fishery Division. There were four regional divisions with 22 management districts. They were staffed with management personnel who were to live in their districts, know the resources, the people and during the season have a daily knowledge of fishing activities and catches. They emphasized that fisheries management was like a company that depended on input from everyone concerned.

Limited entry passed the legislature in 1973. It was suposed to help fisheries management separate much of the politics of conservation from the politics of economics or equity. It has helped but has not always been the case. Fisheries management conservation based upon scientific findings is willingly accepted but those decisions based upon politics, economics, or a whim, are definitely not accepted.

Salmon management is an extremely complicated process because of the large volume of information the forecaster must work with, all of which is marginally reliable. Each spawning unit of a tributary of a stream or lake, bays of lakes is a separate genetic unit. There are thousands of genetic units in Alaska. There are hundreds of genetic units on the Yukon and Tanana Rivers. Each unit needs to be managed as a separate entity, but due to the numbers, it is impossible. It is possible to manage in a number of groups that return on similar schedules through defined fishing areas. Each area and period must be regulated to allow genetic groups to pass while allowing others to be caught - allowing fish to spawn and fish to be caught. Decisions on fishing periods must be based on forecasts of size and timing of each run. Fisheries managers who are successful based their decisions upon the best scientific information available and maintained good communications with all the people concerned.

Twenty-eight years ago the State took over the management of fisheries and, by good management practices, have built healthy runs that maximize natural resources for all users.

The Yukon/Tanana River fiheries problems amongst users, processors and ADF&G are by no means an isolated case. The Kuskokwin, Copper, Russian, Kenai, Naknek, Nushagak/Wood River systems have all experienced competition, lawsuits and unhappiness among user groups. There are not any easy answers. The general tendency is to feel isolated and picked upon by either Commercial fish, Sport fish or

Protection. Most people have found the only way they can be heard by ADF&G, Board of Fisheries or the legislature is to form into groups and see who can get the most people and/or money together and fight or control the system.

There is another way and the only way that will actually work in order to provide maximized utilization of resources. That is to form management councils for the different river systems that include all user groups and management. This means a sharing of information, knowledge, and planning. It means user groups will have to break out of that syndrom of "they are my fish and not yours and if I do not get to fish, I will get my fair share anyway." It also means a system of self-policing.

It also means that management needs to share run and catch projections, escapement plans, long-term management plans, etc. It is a give and take situation on both sides and a sharing of information on both sides.

Based upon what has happened this year and in some years past, management and users appear to be wrong. For instance, to keep a fishing season closed affecting all fishermen to maybe run a sting operation for one or two is wrong. While processing fish or products that cannot be sold is also wrong.

The decision of whether or not to open the fishery should not be based upon politics, money or anything else other than the conservation of the sustained yield of the fishery.

To process fish or fish products that may have been caught legally, b ut which cannot be sold legally, is also not the correct approach. If it is against the law, then the law should be evaluated.

The selling of roe from subsistence and personal use salmon fishermen is another problem that needs to be addressed. At the current time, it is against the law. At one point in time, it was not against the law. A study was done by ADF&G about the selling of subsistence salmon roe from 1974 to 1978 and it recommended against the selling of salmon roe by subsistence fishermen due to the "waste" of carcasuses. Perhaps the throwing away of eggs is also almost as big a waste. This provision should be evaluated again because the first study did not take into account limited entry, buyers moving in and out of areas (now they are more stable) and the change-over from a subsistence economy to a cash economy.

The whole situation needs to be evaluated based upon conservation of the fishing runs, utilization by fishing groups and of fishing resources.

There appeared to be a lot of fish in the are by catch records. This whole situation needs to be evaluated and maybe readjusted based upon all facets and avenues of information.

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
OFFICE OF THE COMMISSIONER

P.O. BOX 3-2000
JUNEAU, ALASKA 99802-2000
PHONE: (907) 465-4100

February 16, 1988

The Honorable Jack Coghill
Alaska State Legislature
P. O. Box V
Juneau, AK 99811

Dear Senator Coghill:

Your aide, Mr. Mike Coombs, requested that the Alaska Department of Fish and Game (ADF&G) provide you with a cost estimate for a 20 million-fry chum salmon hatchery at Clear. Our review indicates that it would cost approximately $4.86 million to build this facility. I expect that such a facility will yield an annual chum salmon return of approximately 220,000 adult fish. This adult return projection is based upon survivals (1.1 percent marine survival) achieved with experimental chum salmon releases from the Clear Hatchery.

Both the Fisheries Rehabilitation, Enhancement and Development (FRED) and Commercial Fisheries Divisions have examined this proposal. They envision that this facility should focus on fall chum salmon and that the focus of the hatchery program should be to rebuild and supplement the natural chum salmon stocks that return to the Toklat, Delta, and mainstem Tanana Rivers. Eggs would be collected from these natural stocks and fry returned to their parental stream for imprinting and release. You will note that the bioengineering criteria are based upon a release near the hatchery; however, the implementation of this wild-stock rehabilitation strategy will not affect the facility construction costs. Given the natural chum salmon stock rehabilitation strategy for the Toklat, Delta, and mainstem Tanana Rivers, the annual operational costs for the hatchery are estimated at $300,000 to $350,000.

Please be aware that a chum salmon hatchery program will not yield adult returns until four years after the facility is constructed and would probably not reach full production for eight years. Please also note that chum salmon returning from hatchery releases will be harvested in commercial and subsistence fisheries along the length of the Tanana River drainage. Some unknown portion of the harvest of fish produced by this rehabilitation project will occur in the lower portion of the river. There is the possibility of a terminal harvest of fish in the

11-K2LH

Tanana River in the vicinity of the fry release sites. A tag and recovery program would be implemented as part of the hatchery releases allowing ADF&G to monitor the timing and migration patterns of hatchery returns to assist in the development of management that will optimize production of both hatchery and wild stocks. A four-year program for tag recovery of hatchery returns would have an estimated annual cost of $50,000.

The overall plan should include development of a sonar enumeration program in Tanana River to permit in-season run assessment. The plan should also include some evaluation of potential for hatchery coho salmon production in the likelihood that commercial harvest of chum salmon would impact wild coho salmon stocks.

If I can provide further assistance, please let me know.

Sincerely,

Don W. Collinsworth FOR
Commissioner

Enclosure

cc: Brian Allee
Ken Parker

CLEAR CHUM SALMON PROPOSAL

DRAFT THREE OF February 3, 1988

CLEAR STATE FISH HATCHERY

GOAL: Supplemental production of 220,000 adult chum salmon per year returning to the Yukon River.

STRATEGY: Release twenty million chum salmon fingerlings per year near Clear. These smolt would be produced at Clear State Fish Hatchery from eggs taken at Clear. Fingerlings would be transported the 7 miles to the release site. Ample opportunity to grow and smolt would be provided by the almost 800 mile down river journey. To insure return to Clear eggs source would be local Clear stocks and release would also be at Clear. Intent is to supply river with chum to offset downstream harvest.

ASSUMPTIONS:			
RELEASE SIZE IN GRAMS	1.00		ADULTS
SURVIVAL TO RELEASE	83.00%	HARVEST	165,000
SURVIVAL TO ADULT	1.10%	SPAWNERS	17,524
HARVEST IN RIVER	75.00%	ESCAPEMENT	37,476
FECUNDITY	2,750		
TOTAL ADULTS DESIRED	220,000	EGGS REQUIRED	24,096,000
ADULT WEIGHT EACH	8.50	RELEASES REQUIRED	20,000,000
VALUE PER POUND	$0.50		
PRODUCTION COST FISH	$0.0120	VALUE HARVEST	$701,250
CAPITAL COST TOTAL	$4,868,000	PRODUCTION COST	$239,870
		YEARLY CAPITAL COST	$243,400
		VALUE-COST	$217,980

SIMPLISTIC RATIO OF BENEFITS/ COSTS 1.5

This simplistic approach suggests that this concept shcuild receive further work since the ratio of benefits to cost is over 1. More detailed work will most likely result in a higher cost and thus a lower ratio.

See attached sheets for detailed costs.

ESTIMATED CAPITAL COSTS

CLEAR CHUM SALMON PROPOSAL

CLEAR STATE FISH HATCHERY

RACEWAYS REQUIRED	12	CUBIC METERS EACH	60.00
COST PER M^3	$600	COST FOR RACEWAYS	**$432,000**
FLOW REQUIRED	5,871	COST GPM	$135
		COST FOR WATER	**$793,000**
BUILDING	11,000	SQUARE FEET AT	$242
		COST FOR BUILDING	**$2,662,000**
		SUBTOTAL	**$3,887,000**
EGG TAKE SITE DEVELOPMENT			**$170,000**
		SUBTOTAL	**$170,000**
COST OF CONTRACT AND EQUIPEMENT			$4,057,000
CONTIGENCY (included in totals above)			$0
		SUBTOTAL	**$4,057,000**
DOTPF DESIGN & ADMINISTRATION 20%			$811,000
		GRAND TOTAL	**$4,868,000**

ESTIMATED ADDITIONAL OPERATIONAL COSTS

CLEAR CHUM SALMON PROPOSAL
CLEAR STATE FISH HATCHERY

OPERATIONS

MAINTENANCE MAN			$70,000	$70,000
ELECTICAL	426,210	KW	0.08	$34,097
			TOTAL OPERATIONS	**$104,097**

EGG TAKE

24,096,000	EGGS		EGGS PER DAY	1,800,000
CREW SIZE	10		REQUIRED DAYS	134
COST PER DAY/PERSON	$165			
			TOTAL LABOUR	**$22,110**
PERDIAM, DAYS	134		$40	$5,360
VEHICLE EXPENSE	3000	MI	$0.26	$780
AIR CHARTER, EGGS	20.00	hrs	$185	$3,700
			TOTAL EGG TAKE	**$31,950**

INCUBATION

WATER PUMPING				
24,096,000	EGGS		FOR DAYS	161
623	GPM		COST FOR PERIOD	$2,000
EGG SORTING				
HOURS	301		COST PER HOUR	$12
			COST FOR SORTER	$3,614
			SUBTOTAL	$5,614
SUPPLIES				
10 PER CENT OF SUBTOTAL			COST OF SUPPLIES	$561
			TOTAL INCUBATION $	**$6,176**

REARING

WATER PUMPING

2,936	GPM MEAN	DAYS OF REARING	81
		COST OF PUMPING	$4,756

FISH FEED

40,656	POUNDS AT	$0.52	PER POUND
		TOTAL FEED COST	$21,141

FREIGHT ON FISH FOOD

40,656	POUNDS AT	$0.30	PER POUND
		TOTAL FREIGHT COST	$12,197

SUBTOTAL	$33,419

REARING SUPPLIES

25.00%	SUBTOTAL	$8,355

TOTAL FOR REARING	$41,774

MARK & TAG

% OF RELEASE TO TAG	2.00%	OR	400,000	FISH
COST PER TAG	$0.12	TOTAL TAG		$48,000

RELEASE

FISH PER TRIP	254,000		TRIPS	79
COST PER TRIP	$100	TOTAL CO		$7,900

GRAND TOTAL OPERATIONAL COST	$239,870

TWO WAY WHAT-IF TABLE

SHOWS B/C FOR DIFFERENT RELEASE SIZES AT VARIOUS OCEAN SURVIVALS

RELEASE SIZE in GRAMS EACH

OCEAN SURVIVALS

1

	0.70	1.00	1.50	2.00
0.90%	1.4	1.3	1.2	1.1
1.10%	1.5	1.5	1.3	1.2
1.30%	1.6	1.5	1.4	1.3
1.50%	1.7	1.6	1.5	1.4
1.70%	1.7	1.7	1.6	1.5

HATCHERY:	CLEAR
PROGRAM:	Fingerling
SPECIES:	CHUM
RELEASE NUMBER:	20,000,000
RELEASE SIZE:	1.00 GRAMS EACH
RELEASE DATE:	31-May-90
EGG TAKE DATE:	1-Oct-89
EGGS/FEMALE:	2,750 EGGS
FEMALES PER MALE:	1.00
TU TO ALL FEED:	850.00 TEMP.UNIT
START WT EACH:	0.34 GRAMS EACH
K FACTOR:	8.00E-06 K
CONVERSION:	1.40
DIET COST/KG:	$1.76
WATER COST /LPM:	$0.0200
% SAT. DO IN:	95%
MIN DO OUT:	7.00 MG/LITER
TOTAL FISH MORTALITY:	5.00% EGG MORT: 15%
GROWTH MM/TU:	MM/TU
MAX DENSITY:	GRAM 1/M^3
EGGS PER LITER:	
FLOW PER LITER EGGS	LPM
MINIMUM EXCHANGE R	PER HOUR
M^3 PER RACEWAY:	60.00 METER^3

HOW MANY TEMPERATURE UNITS REQUIRED ?

1228 TU	2210 FTU

MEAN DAILY TEMPERATURE REQUIRED?

5.07 C	41.13 F

DAYS IN PERIOD	INCUBATION	REARING
	242	161	81

START LENGTH =

34.90 MM	1.37 INCH

END LENGTH =

50.00 MM	1.97 INCH

END SPACE REQUIRED AT MAXIMUM DENSITY ?

667 CUBIC METERS	23,540 FT^3

END FLOW REQUIRED AT MEAN TEMP ?

22,222 LPM	5,871 GPM

APPROXIMATE EGGS REQUIRED	LITERS OF EGGS
24,000,000	4800

NUMBER OF FEMALES	INCUBATOR FLOW =
8,727	2,400 LPM
NUMBER OF MALES	623 GPM
8,727	

RACEWAYS REQUIRED AT END	R
11	2.0

MORTALITY RATE PER DAY

EGGS = 0.08% FISH = 0.06%

SALE OF ROE FROM SUBSISTENCE CAUGHT SALMON IN THE ARCTIC-YUKON-KUSKOKWIM REGION, 1974-1977

REPORT TO THE ALASKA BOARD OF FISHERIES

DECEMBER 1977

ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

ANCHORAGE, ALASKA

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Preface

The sale of roe from subsistence caught salmon has been allowed in the Arctic-Yukon-Kuskokwim region since 1974. Section 16.05.827 of the Alaska Statutes, providing for legalization of these sales, has expired. The Legislature has directed the Department to recommend if the sale of subsistence salmon roe should be continued beyond the 1977 season.

This report comprises an updating of the 1976 report presented to Legislature and, with the benefit of additional information from the 1977 fishing season, presents a more comprehensive review of this issue. Slight revisions have been made to some of the data previously presented in the 1976 report.

SALE OF ROE FROM SUBSISTENCE-CAUGHT SALMON
IN THE ARCTIC-YUKON-KUSKOKWIM REGION

Introduction and Background

In years past when native people were experiencing a traditional or "pure" subsistence type of livelihood, all or nearly all portions of fish captured were probably utilized. Salmon roe, a fish by-product, was consumed by people with probably greater quantities fed to their sled dogs. Due to recent changes in employment and welfare opportunities, there has been a gradual decline in the dependence upon subsistence fishing in many areas. Replacement of sled dogs with snowmachines has also been a very important influence on the decline in utilization of salmon and salmon roe. Reports received from various village residents, indicated that much of the roe from subsistence caught salmon was discarded in the recent years prior to 1974. Actual amounts of salmon roe either discarded or utilized during these earlier years were never documented.

Initial interest in permitting sales of subsistence caught salmon roe came from commercial salmon buyers. Beginning with the 1973 season, most Kuskokwim area buyers and a few buyers in the upper Yukon illegally augmented their roe production to some extent from subsistence fishing channels. It was estimated that illegal purchases of subsistence salmon roe represented 10-15 percent of the reported commercial roe production for the Kuskokwim area in 1973.

Three different bills were introduced in the 1974 Legislature that involved legalization of the sale of subsistence caught salmon roe. None of these bills passed as they remained in committee through adjournment.

It was apparent that in the spring of 1974 several commercial salmon buyers were gearing up to illegally purchase even larger amounts

of subsistence roe. Both the Deparment's of Fish and Game and Public Safety assigned additional personnel for fishery patrol in an attempt to minimize the illegal purchases of subsistence roe. The major thrust of the enforcement program consisted of increased surveillance of buying and processing stations. News releases and public notices were issued to clarify existing regulations.

An emergency regulation with an effective date of June 15, 1974 was issued by Commissioner James Brooks which allowed the unrestricted sale of salmon roe obtained as an unavoidable product of legal subsistence fishing throughout the entire A-Y-K region. Issuance of the emergency regulation, in effect for 120 days, was coincidental with the beginning of the salmon runs.

The Legislature finally adopted an Act in 1975 (Appendix I) with an effective date of May 29 that legalized subsistence salmon roe sales only in the A-Y-K region. These statutes contained the following important provisions:

1. Expiration date was January 1, 1977 which was subsequently extended to encompass the 1977 fishing season. Sales after this time will presumably depend on further review and action by the Legislature and the Board of Fisheries.
2. No person may purchase or trade for subsistence salmon roe unless he possesses an annual permit issued by the Commissioner.
3. The Commissioner may close any or all areas to the sale of subsistence salmon roe if the waste of carcasses, damage to stocks or circumvention of management programs is occurring. A separate section defining the "waste of salmon" and penalties for violators was included.

4. If the subsistence catch in an area exceeds or is likely to exceed by 10 percent the 1974 subsistence catch for that area, the Commissioner shall close that area to the sale of subsistence salmon roe.

5. The Board of Fisheries may adopt regulations necessary to allow the sale of roe based on traditional subsistence needs coupled with the maintenance of salmon stocks on a sustained yield basis.

To administer the legislation, Commissioner Brooks issued an emergency regulation in June of 1975. This emergency regulation contained provisions pertaining to permitting and reporting requirements in addition to prohibiting subsistence roe sales in areas where the salmon runs were especially vulnerable or where recent subsistence salmon catches were negligible.

The Board of Fisheries in December of 1975 adopted regulations for the 1976 season that were similar to the provisions contained in the aforementioned emergency regulation. The Board regulations contain an additional important provision which provides that sale of subsistence roe may be prohibited when the subsistence catch exceeds or is likely to exceed the 1970-74 average annual harvest in any district, subdistrict or portions thereof. These regulations, including several adopted at the December 1976 meeting, will remain in effect until changed by future Board action or superceded by legislation (Appendix II).

General Description and Management of the Roe "Fishery"

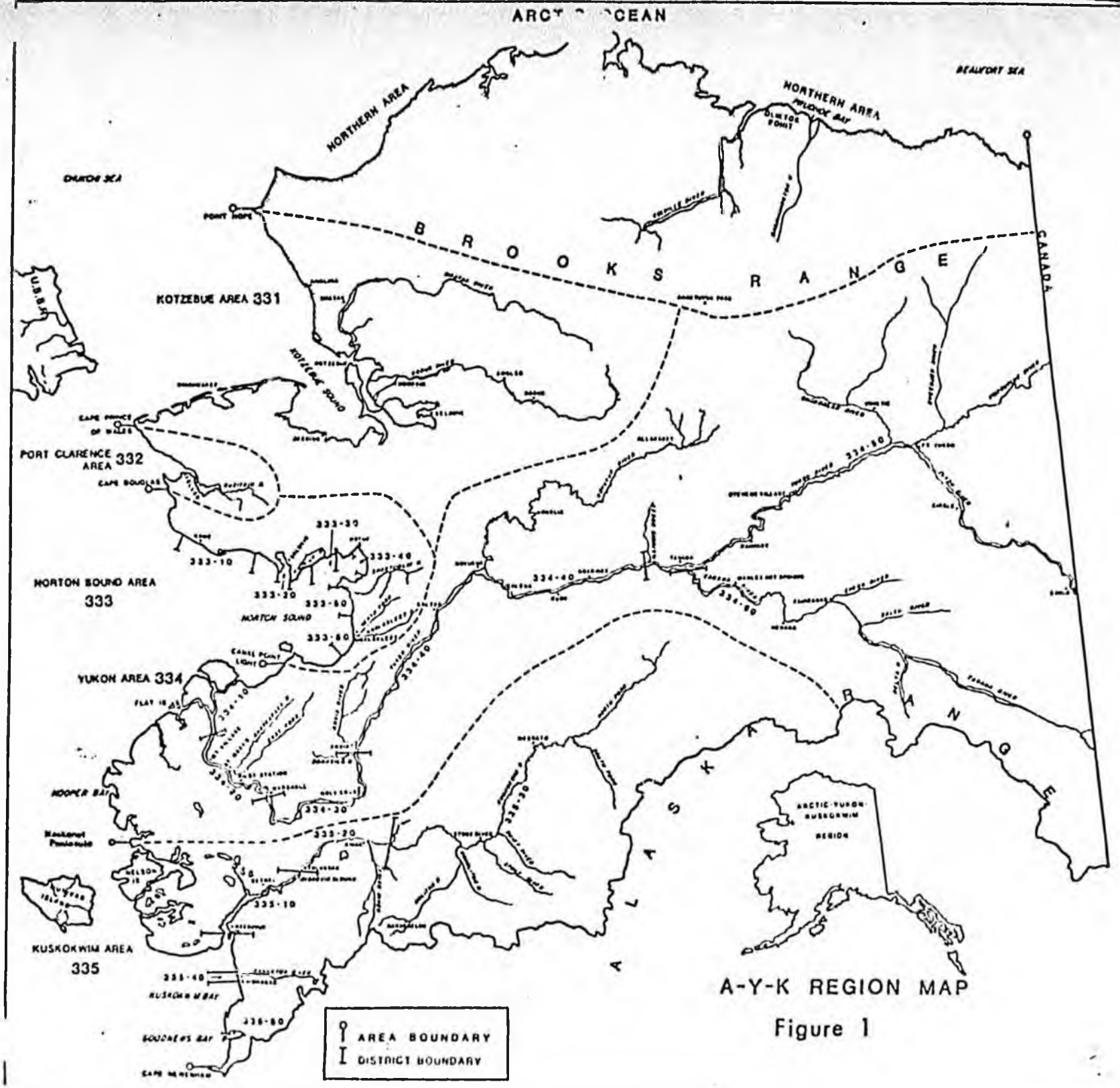
Current Board of Fisheries' regulations allow the sale of subsistence salmon roe only in the main Yukon River, main Tanana River downstream of the Chena River, main Kuskokwim River downstream of the Kolmakof River, Goodnews Bay and at Quinhagak. Although permitted over a greater

portion of the region in 1974 and 1975, the vast majority of sales occurred in the aforementioned areas (Figure 1).

Since subsistence fishing occurs in many widely scattered villages and fish camps, the roe buyers have developed an extensive collection system. Buyer representatives are placed in most villages and the larger fish camps where subsistence roe sales are permitted. Fishermen are given plastic buckets in which to place roe and these are transported almost daily by boat or aircraft to processing plants, most of which are located in Bethel, Galena, Manley Hot Springs, Nenana and Fairbanks. For the most part, processing is done by Japanese technicians who salt and pack the roe using conventional methods required for marketing in Japan.

Due to the extensive nature of the subsistence fishery, the critical task of monitoring roe sales is time consuming and expensive. Accurate and timely information regarding the amounts of roe sold is essential since sales are prohibited when subsistence harvests exceed levels specified in the regulations. For example, with subsistence fishing occurring from 5 to 7 days a week, as much as 45,000 pounds of roe representing a subsistence catch of nearly 100,000 fish can be made in the Kuskokwim River during a single week. Pounds of roe by species sold daily and weekly are obtained from written reports and special roe tickets provided by buyers.

Annual subsistence harvests since statehood have been obtained by comprehensive surveys consisting of personal interviews of fishermen made at the end of the fishing season. Present regulations require that estimates of in-season catches also be obtained. This is accomplished by translating pounds of subsistence roe sold to numbers of fish using sex ratio and average roe weight information which are obtained each week from catch samples.



A-Y-K REGION MAP

Figure 1

Several emergency orders were issued during 1975-1977 prohibiting subsistence roe sales in various subdistricts and sections when subsistence catch levels or "quotas" specified in the regulations were attained. These "quotas", which have been utilized for management purposes since 1975, represent traditional recent harvests made prior to the legalization of subsistence roe sales. Subsistence fishing was legal after roe sales were prohibited, but it was observed that effort in many areas declined sharply following the sales closures.

King and chum salmon "quotas" are based on the 1974 (+10%) harvest and the 1970-1974 average annual harvest respectively. The Department has exercised the option provided in current statutes and regulations of selecting the base period for establishing "quotas" of moderate magnitudes.

The Legislature in FY 1977 appropriated a total of $19,000 to the Department for the purpose of monitoring roe sales. Several temporary fishery technicians have been hired to monitor subsistence fisheries and roe sales in key villages and to assist management biologists in tabulating and analyzing roe sales data. In addition to expenditures associated with monitoring roe sales, the Department spends approximately $16,000 annually for monitoring subsistence salmon catches in all Yukon and Kuskokwim villages.

Production, Value and Participation

Table 1 presents information on the poundages of subsistence roe sold, number of persons making sales and economic values for each management area and year. Chum salmon roe comprised approximately 75 percent (by weight) of all sales with the remainder being king salmon roe. Small amounts of roe from the other salmon species were sold and these are included in the chum salmon totals.

Table 1. Subsistence salmon roe sale information by management area and year, Arctic-Yukon-Kuskokwim Region, 1974-77.

	Pounds of raw product			Value of sales	Number of persons reporting sales	Average sales value per person	Number of processors	First wholesale value 4/
	King	Chum	Total					
1974								
Kuskokwim	34581	98602	133,183 2/	$180,000	1438	$ 125	4	$360,000
Yukon 1/	2452 2/	79565 2/	82,017 2/	61,513 3/	237 3/	260 3/	11	123,026
Total	37033 2/	178167 2/	215,200 2/	241,513 3/	1675 3/	144 3/	15	483,026
1975								
Kuskokwim	24399	57711	82,110	$124,000	1200	103	4	$248,000
Yukon 1/	2467	70540	73,007	84,908	263	323	14	169,816
Total	26866	128251	155,117	208,908	1463	143	18	417,816
1976								
Kuskokwim 1/	62210	95541	157,751	336,000	1321	254	6	672,000
Yukon 1/	5830	68657	74,487	99,430	331	300	14	198,860
Total	68040	164198	232,238	435,430	1652	262	20	870,860
1977								
Kuskokwim	51174	116000	167,174	635,876	1304	488	7	1,271,860
Yukon	15407	63430	76,837	209,539	632	332	15	419,078
Total	66581	179430	246,011	845,415	1936	437	20 5/	1,690,938
Totals (all years)								
Kuskokwim	172364	367854	540,218	1,275,876	-	-	7	2,551,860
Yukon	26156	282192	308,348	455,390	-	-	15	910,780
Total	198520	650046	848,566	1,731,266	-	-	20 5/	3,462,640

1/ Slight revisions made in previously reported data.
2/ Includes small amount of roe taken in Norton Sound.
3/ Does not include small undetermined number of Norton Sound fishermen.
4/ Based on 2x that of fishermen value.
5/ Two buyers purchased roe from both areas.

A total of 849,000 pounds of roe was sold in the Yukon and Kuskokwim areas during 1974-77 worth $1.7 million to the fishermen. During the same period the commercial salmon catch in these areas totaled 45 million pounds, worth $17.2 million to the fisherman (Appendix V). Subsistence salmon catches totaled 2.2 million fish during this period (Appendix VI).

Record roe sales were made in 1977 totaling 246,000 pounds from all species. Totals of 215,200, 156,000 and 232,000 pounds were sold in 1974, 1975 and 1976 respectively. Record sales were also made in 1977 from the standpoint of fishermen earnings ($845,000), average earnings ($437) and first wholesale value ($1,691,000).

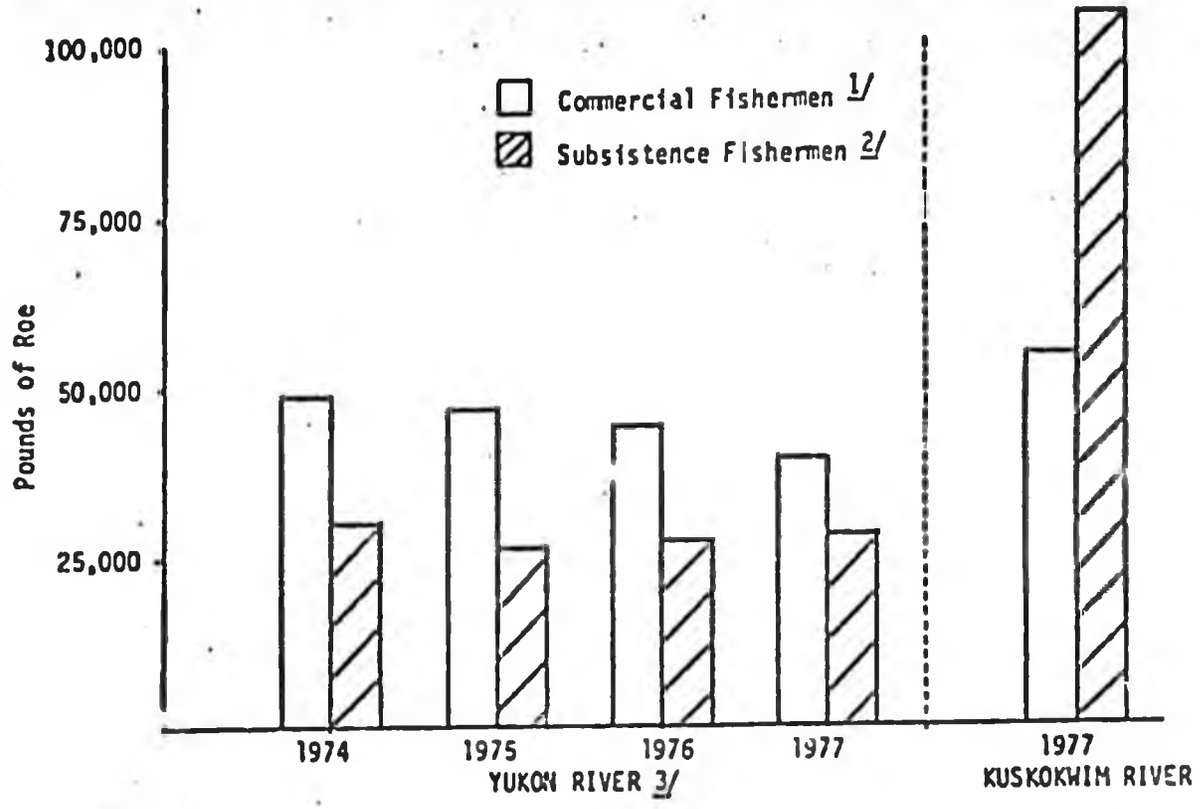
The numbers of persons making roe sales each year ranged from 1463 to 1936. In 1977 it was determined that of the 1936 persons selling roe, approximately 34% (663) held an entry permit and probably fished commercially. Forty two percent had fished commercially in 1976. All persons that made sales were probably not fishermen since it was common practice for the parents to give roe to their children to sell, especially in Kuskokwim River villages.

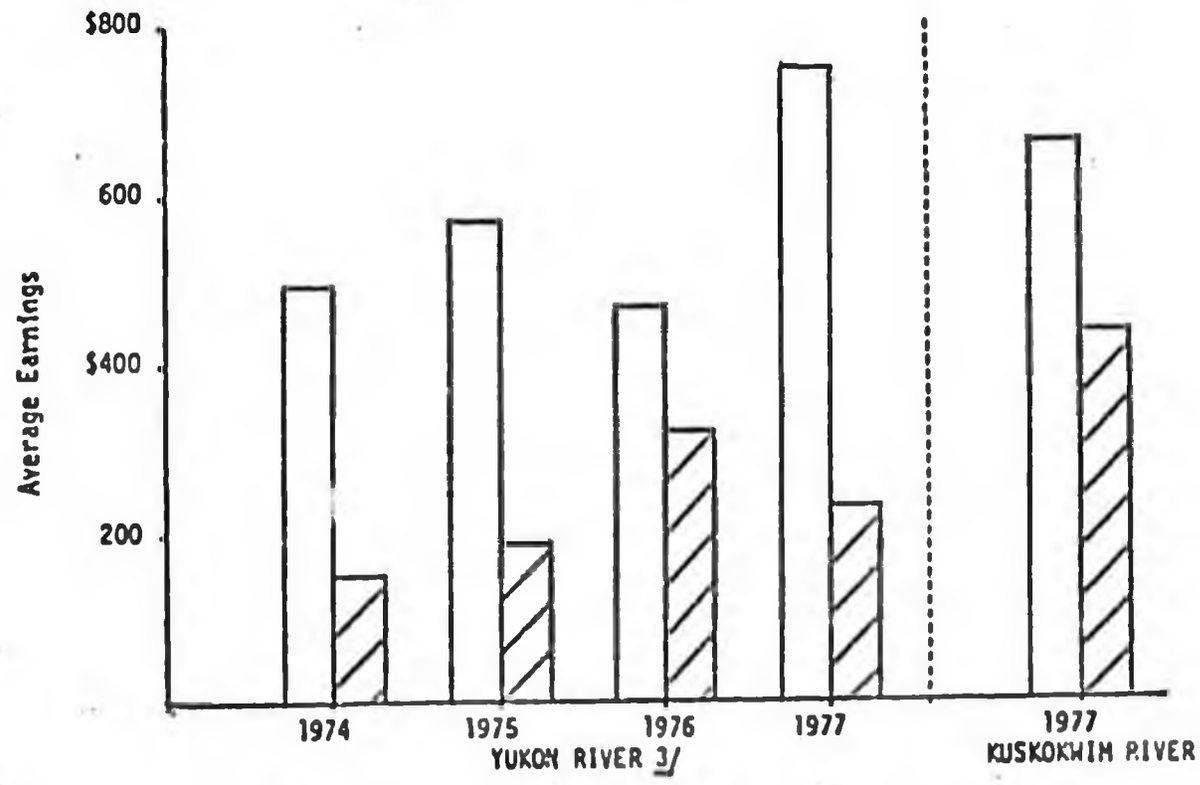
Twenty subsistence roe buyers operated in the region during 1977 with the five major buyers processing 80 percent (by weight) of all roe purchased. Thirteen buyers operated in the Yukon area, 5 in the Kuskokwim area and 2 in both areas. Two Bethel based buyers processed 50 percent of the roe. Only one Yukon based buyer was among the top five with only 7 percent of the production. Prices paid to Kuskokwim River fishermen averaged $3.80/pound an increase of $1.68/pound over 1976 prices. Yukon fishermen received an average of $2.65/pound, an increase of $1.27/pound. It was difficult to obtain accurate first wholesale values which was finally estimated at twice the value received by fishermen.

Commercial fishermen comprised about 35 percent of all persons making roe sales in each river. Yukon River commercial fishermen sold 60 percent by weight of the subsistence caught roe during the last four years. Kuskokwim River commercial fishermen in 1977 sold only 34 percent of the subsistence caught roe (Figure 2). The average earnings from subsistence roe sales were substantially greater for commercial fishermen. Yukon River commercial fishermen earnings in 1977 averaged $748 compared to $230 for subsistence fishermen. Kuskokwim River commercial fishermen for the same year earned $658 compared to $437 for subsistence fishermen (Figure 2).

Annual production and value information is presented by sub-area for the Kuskokwim and Yukon areas in Appendices III and IV respectively. The largest quantities of roe were sold in the following sub-areas during 1974-77: lower Kuskokwim River downstream from Tuluksak (49% by weight), mid-Yukon from Anvik to Ruby (15%), mid-Kuskokwim River from Tuluksak to Chuathbaluk (13%) and Tanana River (11%). Small amounts were sold in the lower and upper Yukon River areas and in some coastal villages. Although it was legal to do so, no roe was sold in the Yukon River drainage upstream of Beaver or in several villages near the mouth. The small subsistence fisheries or remote locations of these latter areas has made it uneconomical to date to transport the roe long distances to central processing plants.

Figure 2. Comparison of subsistence roe sales and average earnings between commercial and subsistence fishermen, Yukon River, 1974-77; Kuskokwim River, 1977.





1/ persons that sold roe from subsistence-caught fish and also fished commercially based on possession of a commercial fishing entry permit

2/ persons that sold roe from subsistence-caught fish and did not fish commercially; includes family members of commercial fishermen

3/ upstream of Holy Cross

Special Management Considerations and Problems

Traditionally, the subsistence salmon fishery was naturally limited by personal food requirements and the numbers of salmon that could be handled in a day and hung to dry or smoke during the season. These restraints do not apply to any fishery where the profit motive becomes of major importance. For example, a Kuskokwim River subsistence fisherman currently is paid an average of $10.00 and $3.00 for the roe sold from a single king and chum salmon respectively. These prices, especially for chum salmon roe, are only slightly less than what the carcasses of these species are worth to a commercial fisherman in the same area. The high value of subsistence salmon roe is an incentive for some individuals - buyers and fishermen - to risk violating either the intent or legal wording contained in existing statutes and regulations. Wastage, misuse and overfishing of the salmon resource were documented for specific times and locations during the past four seasons.

A possible consequence resulting from the continuation of subsistence roe sales is that the concept and management of subsistence fishing may be permanently altered. Subsistence fishing regulations in the A-Y-K region are quite liberal which has been in recognition of the supplemental protein needs of a large rural population. If the problems cited in this section continue, then the state policy which assigns the highest priority among beneficial uses to subsistence fishing must be re-examined. Most salmon populations are being harvested at maximum levels, and an increase in subsistence fishing effort and utilization must be countered with additional restrictions on subsistence fishing, commercial fishing or on both fisheries.

The remainder of this section is a discussion of special problems associated with subsistence salmon roe sales.