ALASKA LEGISLATURE COMMITTEE FILES 1987-1988 8672
5091 HSTA HB 469 - HB 480

663

PUBLIC OPINION MESSAGE

DEAR: REPRESENTATIVE ULMER

NAME: CYNTHIA BETHUNE
TITLE:
ADDRESS: 141 NILGRUB
CITY: FAIRBANKS ZIP: 99712
PHONE: 457-6982
BILL NO: HB 469
SUBJECT: EXPANDING PERS PEACE OFFICER DEFINITION
MESSAGE: I SUPPORT PASSAGE OF HB 469 TO INCLUDE WILDLAND FIREFIGHTERS IN THE STATE PEACE OFFICERS RERTIREMENT SYSTEM. YEAR AFTER YEAR THESE FIREMEN RISK THEIR LIVES PROTECTING THE PEOPLE AND RESOURCES OF THE STATE FROM WILDLAND FIRES. THE STATE LEGISLATURE SHOULD RECOGNIZE THEIR CONTRIBUTION TO THE STATE AND ITS' PEOPLE BY PASSING HB 469. THANK YOU.
ECM/MJO/C

POMID: 07095806
DATE: 03/10/88
TIME: 09:58:06
LIONAME: FAIRBANKS LIO

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1

Alaska State Legislature

Please enter into the record my testimony to the House State Affairs Comm. committee name

committee on HB #469 bill/subject, dated 3/11/88.

I am in support of HB #469. However, I would like to see this bill amended to add a section that defines a "wildland firefighter". I am a full time employee whose main job is not fighting wildland fires. But I spend a portion of my time responding to initial attack fires as a fire fighter, as well as a member of overhead teams supporting extended attack fires. Initial attack of a wildland fire is one of the most dangerous times of a fire. The fire is undefined and you can find yourself in a life or death situation real easy. During these periods I find myself in the same health hazards as the actual line fire fighters: I breath the same smoke, I'm in the same danger of a fire burning over the base camp, and other hazards that come with low level flight, etc.

I believe that a "wildland firefighter" should be defined to include anyone that has the responsibility to respond to fires as initial attack as well as part of the overhead teams on extended attack.

Signed: Richard F Baird
Testifier

O Myself
Representing (Optional)

P.O. Box 1062 Delta Jct AK 99737
Address

895-4225 or 895-4504
Phone No.

2.

Alaska State Legislature

Please enter into the record my testimony to the House State Affairs Committee
committee name

committee on HB469, dated 3/11/88.
bill/subject

I support Bill HB469. Wild land fire fighters, Breathe and work in much more smoke and hazardous conditions than a structural fire fighter with much less Protective gear and no breathing appliances. Wild land firefighters deserve at least the same retirement benefits as structural firefighters.

Signed: Don Fabian
Testifier

Representing (Optional)

Po Box 1010 Delta Jct AK.
Address

895-4725
Phone No.

3.

Alaska State Legislature

Please enter into the record my testimony to the House STATE AFFAIRS COMM.
committee name

committee on HB 469 , dated 3/11/88 .
bill/subject

I WOULD LIKE TO SUPPORT THIS BILL FOR ALASKA WILDLAND FIREFIGHTERS. THIS WOULD BENIFIT THE EMPLOYEE RETIREMENT TO A LEVEL THAT WOULD BE MORE JUST.

Signed: Richard L. [illegible]
Testifier

Representing (Optional)

PO Box 1133 DELTA JCT. AK
Address

Phone No.

4.

Alaska State Legislature

Please enter into the record my testimony to the House State Affairs committee name

committee on HB 469 bill/subject, dated March 11, 1988.

Wildland Fire Fighter are exposed to many hazardous chemicals and conditions Theie include ash, polycarbons suspended in the smoke and carbon monoxide, Conditions include: loud noises from chainsaws pumps and Helicopters all of which cause hearing loss. (proven) Exposure to these harmful conditions range from 1 day to 8 weeks at any Given Time. This has totaled up to 90 days of exposure each year. Several of the Delta Forestry Technicians have been fighting fire for 20+ year. Their health deteriorated is showing a decline. I do think that it should not be Limited to just Fire Fighters who are in that position now. I have been fighting fire for 12 years. Now I'm an area Forester. I still am exposed to these hazards each year and have suffered hearing loss or lung damage Thank you for your concern

Signed: _____
Testifier

Representing (Optional)

P.O.Box 1256 Delta Jct. Ak 99737
Address

895-4043
Phone No.

5

Alaska State Legislature

Please enter into the record my testimony to the House State Affairs committee name

committee on HB 469 - PERS bill/subject, dated March 11, 1988.

I am in support of House Bill #469. I am a forestry Tech and spend over half of my time employed fighting wild land fires and pretty over half of that time is actually spent in smoky conditions and dangerous conditions. In my opinion the wildland ~~fire~~ fire fighting breath more smoke and are put in critical situations way more than any structural firemen because of the great amount of time we spend on fires.

Signed: Larry Dorshorst
Testifier

Representing (Optional)

Box 389 Delta Jct. AK. 99737
Address

895 - 4225
Phone No.

6.

Alaska State Legislature

Please enter into the record my testimony to the House State Affairs
committee name

committee on House Bill No. 469 , dated March 11, 1988 .
bill/subject

I support House Bill No. 469, My reasoning is due to the occupational safety hazards that the Division of Forestry wildland firefighter employees face in there normal duty. Often times the employees work in thick smoke and other safety hazards.

The term wildland firefighter needs to be more accurately described so that it includes only those who annually and on a regular basis work on the actual fire line.

Signed: Steven J. Joslin Steven J. Joslin
Testifier

Representing (Optional)

P.O. Box 377 Delta Jct. Ak 99737
Address

895-4565
Phone No.

Alaska State Legislature

Please enter into the record my testimony to the House STATE AFFAIRS committee name

committee on HB-469 bill/subject, dated MARCH 11, 1988.

I FRANK V. COLE support this Bill wholly for the following reasons. I have been A "Wildland Firefighter" for approximately 10 years with the State of Alaska. I breathe, work, sleep in fire scenes. We are exposed to smoke, flames, exploding cylinders, burning structures within the wildlands etc. etc. We carry fire shelters & supervise multiple emergency ~~firefighters~~. 2½ yrs of my time was spent at Fairbanks in "enforcement" of woop cutting areas. I firmly support this Bill and urge its passage to provide equity to other Agency's which are under this retirement system. The Stress level is very intense with no relief in a mile. Thank You

Signed: Frank V. Cole

Testifier

State of Ak. DV of Forestry

Representing (Optional)

Ditt Tot. Ak P.O. Box 1149 9937

Address

895-4225

Phone No.

7.

Alaska State Legislature

Please enter into the record my testimony to the House STATE AFFAIRS Comm.
committee name

committee on H.B. 469, dated 3-11-88.
bill/subject

State employees who work in the field of fire suppression face unique hazards and stressful situati: Under the current retirement system this is not adequate addressed. I think H.B. 469 is an excellent attempt to rectify the situation. The major problem with the bill is that "wildland firefighter" is not defined. Under section 1 (one) a clause should be added:

(29) "wildland firefighter" means all state employees, full time and seasonal, who carry an "Interagency Fire-Job Qualifications Card."

This would solve any problems. Thank you.

Signed: W R Johnson Jr.
Testifier

Self
Representing (Optional)

M. 292.5 Rich. H: SR #10 Delta AK
Address

895-4039 (home) or 895-4225 (work)
Phone No.

Alaska State Legislature

bill/subject

Signed

Testifier

Representing (Optional)

Address

Phone No

2.1

Alaska State Legislature

Testifier

Representing (Optional)

Address

Phone No

3.

Alaska State Troopers

Signed _____
Testifier

_____
Representing (Optional)
P.O. Box 113 Dutch Harbor AK
Address

_____
Phone No

4

Alaska State Legislature

Address

Phone No

5.

Alaska State [illegible]

Signed _____
Tenant

_____
Representing (Optional)

_____
Address

_____
Phone No.

6.

Alaska State Legislature

Signed _____

Testifying _____

Representing (Optional) _____

Address _____

Phone No. 465-4843

Tester

Address

Phone No.

7.

Testifier

Self

Address

Phone No

FYI

February 26, 1988

Representative Fran Ulmer
P.O. Box V
Juneau, AK 99811

Dear Representative Ulmer:

As a registered voter in District 21, I object to Niilo Koponen introducing House Bill 469 and the recent admendment to House Bill 469 (see attached copy).

House Bill 469 is a bill which only caters to a select group of individuals within the Division of Forestry and Interior Fire Chiefs Association. The seasonal firefighter technicians within the Division of Forestry work an average of 4-5 months with 1,000 hours of overtime and make a gross salary of $35,000 to $40,000 per year. These individuals are the creme de la creme of State employees. You should audit their salaries and the amount of overtime these individuals make a year. Many of these seasonal employees hold down jobs on the slope during the winter. When they are offered full time employment with the Division of Forestry the full time jobs are turned down in favor of the more lucrative overtime that can be made fighting fires.

In the Admendment to House Bill #469 it speaks of our aging seasonal firefighters. One reason these individuals are aging so fast is from spending too much time under the sun in Hawaii or getting jet lag flying to Australia, New Zealand or India. After all, these firefighters are not like Alaska State Troopers whose life is on the line for 365 days a year.

Ninety-nine percent of the employees within this division have the qualifications to initial attack fires. Each one of us are red carded. Your Amendment to HB 469 in its wording limits early retirement and overtime hourly conversion to just seasonal forestry technicians. What about the clerk-typist III in Delta Junction that initial attacked fires this past season? What about the forestry technician in the timber program who assists fighting fires all summer? What about the timber technician who is walking a Cat along the fireline or flying in a helicopter

scanning the fireline with an infra red camera. I thought overtime was part of the job and when you took the job it was with the understanding that this was seasonal employment.

You as a representative of this State have an a responsibility to see that the Suppression Fund is used wisely. A bill like this will only create more division within our Division for this select group. If our firefighters are aging on the job then encourage them to take the full time employment with the Division of Forestry when positions become available.

Please do not pass this bill. If this HB bill is passed it would discriminate against the full time employees. This bill should offer the same opportunity to all employees within this division.

Sincerely,

Ruth Earnshaw

cc: Representative Niilo Koponen
Representative Lyman Hoffman
Representative H. A. Boucher
Representative Cliff Davidson
Representative Dave Donley
Representative Terry Martin
Representative Curt Menard

ADMENDMENT TO HB# 469

Sec. 2 In order for the state to maintain a youthful, healthly, agressive cadre of emergency personnel, seasonal peace officers and firemen may use authorized overtime worked within any particular year towards accumulating, but not to exceed, a full year's credited service as if those extra hours had been worked within regular scheduled work weeks during the year. This section is retroactive to January 1, 1979.

(The presently proposed Sec. 2 would be reassigned as Sec. 3 under this admendment)

January 1, 1979 was the first time that seasonal employees became eligible to be in the state retirement system.

Under this admendment there should not be a fiscal note involved as the employees already have retirment taken out and the state's part contributated on all the overtime earn already.

The section is needed to encourage older seasonal firefighters to become vested in the retirement system and muster out of state service before booming very elderly.

The Division of Forestry currently has several wildland firefighters who are 50 years old and numerous others approaching that age. Currently the seasonal firefighters are accuring only about 3.75 years towards retirement each 10 years under the normal 4.5 man-mounts worked each year. A person coming on board with the state at the age of 40 would become vested about the age of 55.

Passage of HB#469 with the above amendment would allow the average wildland firefighter to become vested with only about 10 years of firefighting. They could get the group health insurance and eliminate the chances of becoming a ward of the state as they grow very old without health insurance.

1065 Smallwood Trail
Fairbanks, AK. 99712
3/9/88

Representative Niilo E. Koponen
P.O. Box V
Juneau, AK. 99811

Dear Niilo,

I am writing to ask your support for a bill that is extremely important to myself and other wildland firefighters employed by the Alaska Division of Forestry. HB 469 would permit Forest Technicians and Foresters to be included under the Public Employees Retirement System as "Firemen".

The work that I do as a wildland firefighter is extremely hazardous. In September of 1987 I spent 8 weeks in Northern California on wildfires. Ten firefighters were killed while I was there and hundreds more were injured. I have personally had minor injuries numerous times on fires and been subject to severe dust and smoke conditions for long periods. Wildland firefighters have very little protection from heavy smoke. The men and women who perform my job do not have the luxury of Scott Air Packs with self contained oxygen. A moistened bandana over my face is all I've had for long hours at the head of a spreading fire.

Our work takes us to dangerous places such as canyon bottoms and peat bogs. To work for hours beneath World War II aircraft dropping thousands of pounds of water retardant directly over our heads or untangling cargo nets under hovering helicopters is both physically and mentally stressful.

The amendment to allow overtime to be credited towards retirement (only up to a full year) is an important part of this bill. As it is many firefighters would never be able to reach 20 years of service before retirement age, even though retirement contributions are withheld at the same rate on all overtime payments earned. Our firefighters average 400-500 hours of overtime per season. This is not "easy money". We earn every penny of that overtime!

I will end this letter with an experience I had while fighting a forest fire several years ago. On a steep slope I had one crew above me and another below. As a supervisor I was talking on the radio directing the crew below when a rock about the size of a grapefruit was dislodged a hundred yards above me. Even though the crew above yelled a warning, I couldn't hear due to talking on the radio. The rock whistled by not less than six inches from my head. Six inches meant life or death for me. It

meant death for a firefighter on another crew a few days later. I think of this instance often when I wonder whether to continue as a firefighter and perhaps you can ponder it as you consider whether my profession is dangerous enough to warrant passage of HB 469 and it's amendment.

Your support would be appreciated by many.

Sincerely,

Guy Shuman

1460 Old Richardson Highway
North Pole, Alaska 99705
March 9, 1988

Representative Niilo E. Koponen
P.O. Box V
Juneau, Alaska 99811

Dear Representative Koponen:

I am asking that you support HB 469 which would permit wildland firefighters to be included as peace officers under the Public Employees Retirement System.

I have worked for the Alaska Division of Forestry as a seasonal forestry technician since 1981. Fighting forest fires is hazardous and physically demanding. The job we perform is not only stressful to ourselves, but to our wives and children. We are required to maintain year-around physical fitness in order to run 1 1/2 miles in under 11 minutes 50 seconds. The most obvious hazard we face is that of being burned or physically injured on each fire we respond to. Other lesser known hazards involve long hours of physically demanding work, low level aircraft flight, landing in unimproved landing sites, hooking cargo nets under hovering helicopters, camping in remote areas without sanitation facilities, encounters with bears, exposure to mosquitoes and wasps, operation of emergency vehicles at high speeds, aircraft fueling, transport of hazardous materials heavy lifting, exposure to high concentrations of smoke and dust, high levels of noise from portable pumps, chainsaws, and helicopters, chainsaw operation with associated hazards of falling, limbing and bucking, working in close proximity to bulldozers, operation of backfiring equipment, riverboat operations, working under helicopters dropping water and airplanes dropping aerial fire retardant, working in steep, rough terrain, and use of firearms.

We are required to have considerable specialized training in fire behavior, strategy and tactics, use of pumps and saws, communications equipment, supervisory techniques, aircraft operations, the Incident Command System, first aid, fire investigation, enforcement of statutes and regulations, firearm proficiency, physical fitness, and fire business management. The decisions we make on rapidly spreading forest fires can cost or save the State millions of dollars, as well as the lives and homes of our residents.

Additionally, I ask that you support amendments that would permit seasonal firefighters to use accumulated overtime worked towards credit for retirement. Most of the wildland firefighters are only employed about five months a year. During this time it is not uncommon for us to work over 500 hours of overtime. This is equivalent to 3 1/2 months of work which should be allowed to be credited towards retirement. Many dedicated firefighters have worked for the State Division of Forestry since 1979 and are still not vested for retirement. This amendment would allow firefighters to become vested in about seven more seasons rather than twelve.

There are only about 140 forestry technicians and foresters within the State Division of Forestry that would be affected by this legislation. Please show your support and appreciation for these dedicated persons by passing HB 469 with the amendment to allow overtime worked be credited towards retirement of seasonal firefighters.

Please feel free to contact me should you need any further information.

Sincerely,

Michael G. McGowan

MICHAEL G. McGOWAN
Forest Technician IV

ALASKA FIRE CHIEF'S ASSOCIATION

POST OFFICE BOX 304 • CORDOVA, ALASKA 99574 • TEL. (907) 424-7475

7

RESOLUTION 87-5

TITLE: Wildland Firefighter's Retirement Benefits

WHEREAS fire protection is recognized as a hazardous profession; and

WHEREAS each year several wildland firefighters are seriously injured and/or killed in the performance of their duties; and

WHEREAS the State of Alaska, Division of Forestry, employs personnel in the capacity of wildland firefighters; and

WHEREAS those persons are not covered under the firefighter provisions of the Public Employees Retirement System (PERS):

Therefore, be it resolved that

The Alaska Fire Chief's Association and the Alaska State Firefighter's Association consider it essential that appropriate action be taken to include those persons whose primary duties are wildland firefighting to be included in the firefighter provisions of the Public Employee's Retirement System.

Recommendation: Pass

Adoption: Pass x No Pass _____

Distribution: Governor Cowper
Commissioner of Administration

Dewey Whetsell, Pres., A.F.C.A.

Gaylen Grevik, Pres., A.S.F.A.

141 Milgrub Avenue
Fairbanks, Alaska 99712
February 18, 1988

Representative Niilo E. Koponen
P.O. Box V
Juneau, Alaska 99811

Subject: House Bill 469

Dear Representative Koponen:

I am in support of HB 469 which includes Wildland Firefighters as a part of the firefighter provision of the Public Employee's Retirement System. Nationally, each year several wildland firefighters are seriously injured and/or killed in the performance of their duties. Wildland firefighters are exposed, on a regular basis, to carbon monoxide levels of from 9 ppm (parts per million) to 54 ppm. Measurements of the total suspended particles (TSP) range from 827 to 4000 micrograms per cubic meter of air (U.S. Dept. of Labor). This poses significant health problems when exposure occurs over many years. The National Academy of Science and National Academy of Engineering rate COHb (carbon monoxide hemoglobin) levels greater than 5.0 ppm to cause cardiac and pulmonary functional changes, and 10.0 to 80.0 ppm can cause headaches, fatigue, drowsiness, coma, respiratory failure, and death. Cancer death among firefighters in the United States has doubled in the past 30 years. Lung disease strikes them more frequently than black lung strikes miners, and heart disease disables firefighters 55 percent more often than people they serve (International Association of Fire Chief's report).

During the 1987 fire season nearly all Division of Forestry firefighters were dispatched to California to assist with it's devastating fires that threatened many communities. Tragically, 10 firefighters lost their lives and hundreds more were injured during a 30-day period. Many Alaskans were injured, but thankfully, none lost their lives. The dangers faced in California fires are no different than those faced here in Alaska. Wildfires strike thousands of acres annually in remote areas as well as in the urban fringes. Dedicated firefighters then respond night or day under very arduous conditions to save lives and the resources of the State. For these reasons I ask your assistance in passing this much needed and overdue Bill.

Sincerely,

Fredric J. Bethune

FREDRIC J. BETHUNE

ATTACHMENT

NH2 769

DEADLY SMOKE

Smoke-Eaters are Dying from Cancer

Reprinted from The Register, Orange County, California

By Chuck Cook and Marla Cone

"Deadly Smoke" is the result of three months of investigation by reporters Chuck Cook and Marla Cone and photographed by Rick Rickman. It was first published in December 1983 as a three-part report.

For firefighters, smoke eating once was a badge of courage. Now it has become a death sentence.

The cancer death rate among firefighters in the United States has doubled in the past 30 years. The disease strikes their lungs, stomachs, brains and prostate glands, leaving the once-strong crippled or dead.

Lung disease strikes them more frequently than black lung strikes miners.

And heart disease disables them 55 percent more often than the people they serve.

The stark bottom line for firefighters today is that their decision to take a job protecting lives and property means that they will live an average of 10 fewer years than other Americans.

Of the 2,435 full-time firefighters in Orange County, 937 of them can expect to die from cancer — 440 more than would die if firefighters died of cancer at the same rate as the U.S. population, according to recent firefighters mortality studies in the United States and Canada.

Firefighters are accustomed to being smoked, baked and burned. They are used to filling their lungs with so much smoke they spend sleepless nights after fires vomiting black phlegm. They don't worry about burned wrists and charred earlobes where the gloves and helmets don't reach.

But they are not accustomed to watching fellow firefighters die of cancer. In the Orange County Fire Capt. Howard Smith said, "It's only been about a year since we've said, 'Holy smoke, what are we creating?' We have to take responsibility for these chemicals and hazardous materials we are creating."

No one knows the dimensions of the threat to firefighters. About all researchers have determined is that the almost 1.5 million public and private firefighters in the United States are dying from heart and lung diseases and cancer much more frequently than they used to.

We have to take the responsibility for these chemicals and hazardous materials

Thirty years ago, when synthetic chemicals were not widespread, firefighters had a cancer-death rate nationwide on average 2 percent higher than nonfirefighters. But by 1980, firefighter cancer-death rate had increased to almost twice that of the general population.

The threat may be even greater, because the average firefighter is younger and stronger than ever before, part of the "super-healthy" work force.

Fewer firefighters smoke cigarettes now and as a group they are more resistant to disease. They undergo stringent physical examinations when they are hired, and most departments require them to stay in top condition.

Deaths linked to toxic fumes "are only the tip of the iceberg," said Orange

The curse of the firefighter's job is the repeated exposure to toxic and cancer-causing chemicals.

"If it was only a one-time thing, in most cases the body's normal defenses shouldn't be overwhelmed," said Dr. Linda Morse of San Francisco General Hospital, who studies firefighter health hazards.

"Firefighters may be exposed hundreds of thousands of times. The danger is much greater for firefighters who have multiple exposures," Morse said.

Plastics industry officials say they are being unfairly blamed for the soaring firefighter cancer-death rate.

"Our competitors try to tag us as a ticking time bomb, but we are not," said John Lawrence, technical director for the Society of the Plastics Industry in New York.

Plastics contribute to the toxic gases in fires because they are present. There is no body of medical studies on this subject that we consider significantly valid."

Lawrence said studies done to date on firefighter disease and death are preliminary and not conclusive.

"We take the position that let's not get too excited about a health study or two. Let's look at it from the standpoint of maybe we have discovered something here that needs to be looked at."

He said the studies are a "valid reason for firefighters to determine if they are at a higher risk."

He said the plastics industry is sponsoring research into the problem.

Any new research will add tremend-

Firefighters in Los Angeles have received more disability pensions for heart disease than police, although there are twice as many policemen as firefighters.

When a fire alarm is sounded — often while a firefighter is sleeping — pulse rate increases to the equivalent of an hour of aerobics wrapped into one second. While firefighters are in the heat of battle — usually carrying about 70 pounds of equipment — their hearts often work at 95 percent of maximum for extended periods.

The Los Angeles cancer study has prompted similar research across the nation, said Los Angeles Battalion Chief Johnny Sampton, former safety officer for the department.

Most firefighters take for granted that they will suffer lung problems. But they don't realize how serious the damage can be until it's too late.

"Most firemen who are injured don't make it to medical care. They cough a little at the scene and go back to work," said Dr. Guy Randazzo, a lung specialist in Orange. "But now, fire departments are becoming very, very careful."

Firefighters have long been aware they are employed in a very dangerous profession, said Santa Ana's Mahany, but the awareness of the consequences of long-term exposure to smoke and toxics is "something that is very new."

Firefighters also are realizing how poorly protected they are.

Ironically, the suits designed to shield firefighters may themselves be a source of cancer.

Early protective suits were made of asbestos, a known carcinogen. They were

Fatal and Near-Fatal Forest Fires
The Common Denominators

by Carl C. Wilson

Fighting large forest fires often is compared to military operations. Each involves a highly structured organization with a "general" at the head, massive movements of men and equipment, tactical aerial support and long periods of combat and stress until the enemy finally is conquered. Yet, there is one major difference between military and firefighting strategy: in suppressing large fires we do not take the calculated risk of losing fire fighters. In spite of this policy, many people have lost their lives in forest fires in the United States.

The concern is with the differences and the similarities between those fires in which someone dies and those in which someone has a very narrow escape. As this article will show, the line is thinly drawn and depends on many factors, the most vital and most uncertain being that of human behavior.

A review of the U.S. Forest Service's records between 1926 and 1976 shows that 145 men died on 41 fires from fire-induced injuries. There have been no heavy losses in recent years. The largest losses on single fires occurred on the Blackwater fire in Wyoming in 1937 and on the Rattlesnake fire in California in 1953 (Table 1). In each case, 15 people died. A similar analysis made of people lost on fires in areas protected by other Federal agencies and State, county and private agencies reveals 77 fire-induced fatalities on 26 fires. The one fire responsible for the largest number of lost lives was the 1933 Griffith Park Fire in southern California, which accounted for 25 fatalities and 128 injured people (Table 2).

The data in these tables and in the two additional tables listing "near-fatal" fires (Tables 3 and 4) help demystify these related fire types. It is possible to identify some common denominators of fire behavior in both fatal and near-fatal fires. It should be stressed at the very beginning, however, that all fires differ and the change of one small factor can result in an entirely different picture. A glance through the four tables should convince any reader of the immense variability between the circumstances surrounding each fire. The tables also show that fatal and near-fatal fires often involve so-called "erratic fire behavior" and occur under seemingly innocuous conditions. Finally, we need to examine the potential for future tragedy fires and offer some suggestions and guidelines to the man who is going to be out there on the fire line tomorrow.

Common Denominators of Fatal Fires

Based on personal knowledge and information obtained from reports and reviewers, the following generalizations can be made about the fatal fires in Tables 1 and 2:

1. Most of the incidents occurred on relatively small fires or isolated sectors of larger fires.

2. Most of the fires were innocent in appearance prior to the "flare-ups" or "blow-ups". In some cases, the fatalities occurred in the mop-up stage.

3. Flare-ups occurred in deceptively light fuels.

4. Fires ran uphill in chimneys, gullies, or on steep slopes.

5. Suppression tools, such as helicopters or air tankers, can adversely modify fire behavior. (Helicopter and air tanker vortices have been known to cause flare-ups.)

In Tables 3 and 4, near-fatal fires are those close calls which involved a potential threat to life. A review of these tables shows that most of the generalizations made concerning fire behavior apply to near-fatal fires as well as to fatal fires. The hairline difference between the two groups of fires is determined by the individual's reaction to his suddenly critical situation. Escapes may be said to be due either to luck, circumstances, advance planning, a person's ability to stay cool and not panic, or a combination of these factors. Whatever the reasons, individual behavior and circumstances determine between life and death. For the individual fire fighter and crew boss, it becomes increasingly important to be able to identify those conditions under which so many close calls and fatalities occur.

Surprising Factors

Many fire fighters are surprised to learn that fatal and near-fatal incidents occur in fairly light fuels, on small fires or isolated sectors of large fires, and that behavior is relatively quiet just before the incident. The general belief is that the high-intensity crown fire in timber or heavy brush is most likely to trap and kill forest fire fighters. Yet, with rare exceptions, such as the disastrous Sundance fire (north Idaho, 1967), the Blackwater fire (Wyoming, 1937) and King's Canyon fire (western Nevada, 1967), most of the fires in this study were innocent-appearing just before the accidents.

Why, then, do these tragedies and near-fatalities occur under so-called "easy" fire behavior conditions? First, fire spread and intensity can change much more quickly in light fuels than in heavy fuels. Thus, finer fuels tend to be more responsive to changes in atmospheric conditions than heavy fuels. Second, hot, dry weather or Santa Ana (föehn-type) winds dry out the lighter fuels with the result that any change of wind, slope, or other environmental factor may lead to a drastic and unanticipated change in fire behavior. For example, in some areas in the West, downslope winds may occur normally during the afternoon or following thunderstorms. In such cases, an "unexpected wind" or "erratic fire behavior" is blamed for the disaster. In addition, there are few visual clues to warn of fire behavior changes, because dry fuels burn with little or

no smoke. Under such conditions, the obvious signs of a change, such as smoke and crackle of flames, are only noticeable once the situation already has become critical. It is, therefore, important that the fire fighter be alert and sensitive to the fire's behavior, particularly under those environmental circumstances in which a sudden change in fire behavior may occur.

Topography, like wind, has a major influence on fire behavior. A fire spreading uphill resembles a fire spreading before a strong wind. The rate of spread will usually increase as the slope increases. Not only are the flames closer to the steep slope, but also convection is more likely to carry firebrands and start spot fires. For example, other factors remaining constant, a fire burning on level ground (0 to 5%) will spread twice as fast when it reaches a 30 percent slope. The rate of spread will double again as the slope reaches 55 percent.

Topography also has another major effect on fire behavior. Box canyons, narrow canyons and guiches tend to act like the chimney of a stove. Radiation, convection and spotting speed up as if a damper were opened in a chimney.

The external signs and warnings are important, but the internal state of the fire fighter also must be considered in an examination of fatal and near-fatal fires. A glance through the 'remarks' section of the fatal tables shows some very strange behavior by well-trained fire fighters. A person reading about these incidents may think, "I would never do that. . . I know what to do in such a situation. . . ." However, conditions on the line are not the same as in a classroom. There are reasons why so many well-trained fire fighters often are unaware of a dangerous situation until it is too late, and reasons why they often act foolishly and fatally once they do become aware.

Also, there may be physiological reasons for fire fighters' blindness to their potentially dangerous situation. They may be tired and their senses dulled by a long, fatiguing shift on the fire line. Or they may be fresh, but with their "sensing system" not yet tuned to the early warning signals which precede changes in wind direction, velocity, or both. Another physiological factor which is currently gaining attention is the adverse effects of carbon monoxide upon wildland fire personnel. It is a fact that relatively high concentrations (800+ ppm) in the environment can cause death within several hours. Carbon monoxide can occur in and around wildland fires in low-level amounts.[1] Carbon monoxide readings of 50 ppm were taken on a grass fire at a place where a tanker or initial attack crew usually would be operating. On a five-acre prescribed burn at the North Mountain Experimental Area, measured concentrations of 30 ppm were found about 200 feet from the fire front. Research and experience show low-level carbon monoxide poisoning can impair alertness, judgement, vision, and some psychomotor functions. The fire fighter is less likely to be capable of detecting the warning signals associated with drastic changes in fire behavior when he or she is being affected by carbon monoxide.

Carbon monoxide studies made on the Deadline fire (Sawtooth National Forest) and Outlaw fire (St. Joe National Forest) during the 1974 fire season showed that on one fire, most of the fire fighters were exposed to levels of carbon monoxide higher than those permitted by the standard proposed by the National Institute of Occupational Safety and Health (35 ppm during an 8-hour period).[2]

Since the effect of carbon monoxide is cumulative, it becomes a matter of great concern to fire fighters. They should be aware of the kinds of topography which encourage the build-up of carbon monoxide. Since carbon monoxide is heavier than air, this includes areas such as saddles, deep canyons and depressions.

Potential for Loss of Life

The potential for loss of life on forest fires because of burns or other fire-induced causes, is higher now than ever before. There are twice as many people in the United States in 1977 as there were in 1926, and many of these people live or play in the wildlands. As a result, "protection of life and property" has begun to dominate fire suppression action plans. The relative safety of "perimeter fire strategy" often must be sacrificed in favor of people and their possessions. This puts forest fire agencies and fire departments at a disadvantage since most training in the past has concentrated on perimeter strategy. Additional hazards arise as the state, city, and county fire departments confront the extraordinarily flashy grass, brush, and timber fuels in the urban-wildland border.

New fire suppression technology, including air tankers, helitack, chemical fire retardants, and other new tools and techniques have contributed indirectly to the problem by reducing the number of fires which escape initial attack. There are fewer opportunities for training assignments for young people on large fires. As a result, many do not have the chance to use fire behavior training knowledge learned in the classrooms. Moreover, some of the new firefighting tools, such as helicopters and air tankers, create vortices which can adversely affect fire behavior. An analysis of the Timberlodge fire (Sierra National Forest) showed that vortex turbulance created by an aircraft can be projected to the surface.[3] A small fire can then blow up, particularly if the wind is light and the atmosphere unstable.

In summation, there seems to be a strong justification for being pessimistic about the future. There is another side to the story too however, one that includes some hope for the future. Firstly, there are better fire behavior courses now, and more people from all agencies are being trained. Under the auspices of the National Wildfire Coordinating Group, interagency teams are developing new fire behavior courses. Secondly, strengthened fuel management programs and the integration of fire into forest land use planning are reducing the threat to fire fighters and to the people who live and play in the forests.

New developments in the field include major improvements in aerial support for ground forces. New air tanker systems, better fire retardants, larger and faster helicopters, and the potential for "first-night control" using night-navigational systems for helicopters, all can

(Continued on page 15)

[1] Countryman, C.M. 1971. Carbon monoxide: a firefighting problem. U.S. Forest Service, Pacific Southwest Forest and Range Exp. Stn. 6 p., illus.

[2] Tietz, John G. 1975. Firefighters' exposure to carbon monoxide on the Deadline and Outlaw fires. ED&T 2424 (Smoke Inhalation Hazards), Forest Service, USDA Equip. Dev. Center, Missoula, Mont. 3 p., illus.

[3] Davis, James B., and Craig C. Chandler, 1965. Vortex turbulance—its effect on fire behavior. Fire Control Notes 25(1):4-7, illus.

TABLE 1 Common Denominators of Fire Behavior On Fatal Forest Fires

Name of Fire, National Forest And Year	Deaths By Burning	Erratic Fire Behavior	Remarks
Romero Los Padres 1971	4	Strong "Sundowner" Santa Ana evening wind pushed fire downhill	Bulldozer operator and 3 men burned as they burned downhill to find safety
Banning San Bernardino 1971	1	Fire ran upslope in early evening.	Member of tanker crew was doing nose downhill from road at night.
Canyon Angeles & L.A. Co F.D. 1968	3	Santa Ana weakened and unexpected wind pushed fire upslope in late morning.	Men tried to outrun fire uphill after flareup in brush below them
Williams Cleveland 1968	2	High temperatures, local gusty winds-cumulus clouds near fire.	Burned trying to outrun fire.
Daughter Mosche 1967	1	Fire became intense in pre-commercial thinning slash.	Fire boss tried to outrun fire and couldn't hear warning calls from crew on road.
Sundance Kootenai 1967	3	Fire blew up and made major run upward north under strong wind conditions.	Operator and man with tractor were ahead of fire and tried to hide under blade.
Barrett San Bernardino 1967	1	Flareup at night in light fuels on steep slope.	Fire fighter fatally injured when he fell trying to escape flareup.
Loop Angeles 1966	12	Unexpected upslope wind in afternoon after Santa Ana stopped.	Fire fishhooked under crew in a chimney and part of the crew could not reach safety in time.
Coyote Los Padres 1964	1	Downslope wind through Romero Saddle in early afternoon.	Man panicked and ran to lower part of saddle where the temperatures and carbon monoxide concentrations were too high.
Timberlodge Sierra 1962	4	Hot, dry, unstable atmosphere and light fuels. Loaded B-17 air tankers blew low over fire.	Tornado-like action from air tanker vortices produced caused fire to blow up and trapped men.
Silver Creek Nezperce 1961	2	Fire spotted in extremely steep terrain in light fuel under gusty wind conditions near the bottom of the fire.	Crew went to a chute above spot fire, but all except two men left chute when danger was obvious. One man had asthma and had to move slowly
Sierra Angeles 1961	1	Sudden, unexpected wind change.	Man unable to gain safety in time.
Cummings Cr. Umatilla 1960	1	Unexpected wind change in light fuel on ridge.	Man dropped behind and couldn't keep up with crew when fire flared up below them
Six Deduca 1959	2	Unexpected downslope afternoon wind on east-facing slope.	Two men were returning after going downhill to get water. Fire came downhill and trapped them.
Cable San Bernardino 1959	1	Very hot and dry unstable atmosphere.	Tried to outrun fire but apparently had heart attack.
Decker Cleveland 1959	5	Downslope afternoon wind stopped and fire came upslope in early evening.	District Ranger and four men were on state highway when fire came upslope and caught them in the open
Sun Angeles 1959	1	Minor flareup. Fire in front country canyon and wind changed	Man was taking nose uphill was caught by fireline run
Albert Ranch Angeles 1958	1	Minor flareup as wind changed at night	Man was trapped ahead of fire
Stewart Cleveland 1958	1	Minor flareup in chaparral under weakening Santa Ana conditions.	Out-of-region man scouting in brush ahead of fire.
Inaja Cleveland 1956	11	Upslope wind in evening when Santa Ana winds eased. Fire ran uphill	Crew working on indirect line of canyon. Fire fishhooked under them, ran upslope and caught them before they could reach safety
East Highlands San Bernardino 1955	1	Upslope winds in light fuels after Santa Anas tapered off at night.	Tractor operator trapped before he could reach safety.
Sagebrush Cactone Malheur 1955	1	Fire was being mopped up in sage and grass. Down drafts from cumulus cloud caused unexpected wind.	Man was separated from crew and tried to outrun fire.
Johnson Prescott 1955	1	ERC "Extreme," and fire made run in light fuels.	Man tried to outrun fire uphill.
Tunnel No. 6 Tahoe 1954	3	Moist (dry east) winds caused flareup at night.	Men were sleeping in unburned area at edge of fire.
Rattlesnake Mendocino 1953	15	Unexpected evening upslope wind caught entire crew eating lunch on a spotfire.	Part of crew tried to outrun fire downhill
Mann Gulch Helena 1949	13	Rapid spread in light fuels burned upslope. Hot, dry weather.	Smokejumpers jumped into unburned basin, and fire fishhooked below them. Most men failed to use area (burned area) and were caught going uphill
Hells Canyon Payette 1949	1	Fire fanned by high winds.	Man stumbled and fell into fire.
Warm Springs Payette 1949	1	Unexpected strong winds caused flareup.	Man dropped behind crew to eat lunch and was trapped.
Walton Spur Stanislaus 1949	1	Swirling winds in light fuels in Tuolumne River Canyon	Tractor operator trapped above fire.
Barrett Dam Cleveland 1948	1	Winds changed at night from SW to East, and fire flared up.	Man became separated from crew
Bryant Canyon Angeles 1947	2	Spotfire below men burned upslope trapping men in unburned fuel.	Burning rat ran out of main fire into nest. Spotfire spread uphill under men.
Hot Springs Payette 1944	1	Man found in sitting position on trail. Fire burned around him	Suspected heart attack or other health problem.
Hauser Creek Cleveland 1943	11	Sudden wind shift under blackening Santa Ana conditions-maximum wind 8 miles/hr. SW	Crew of Marines caught in small canyon off main Hauser Creek. (12 were saved)
Williams Hill Los Padres 1943	1	Fire made a run in chamise and buckwheat.	Cat operator was bunding line in advance of fire. Cat threw track, and operator tried to escape fire.
Silver Plume Lincoln 1940	1	Sudden wind change and fire flared up.	Man sleeping outside fire line
Rock Creek Humboldt Toiyabe 1939	5	Sagebrush and grass fire made an unexpected run upslope and trapped 5 men.	Five CCC boys from Paradise Camp were burned to death on fire near head of Rock Creek.

(Table 1 continued on next page)

Name of Fire; National Forest And Year	Deaths By Burning	Erratic Fire Behavior	Remarks
Blackwater Shoshone 1937	15	"Sudden wind" caused fire to blow up in heavy Douglas-fir re-burn. Spotfire made a run uphill toward men.	Men went in from top toward spotfire - then it flared up. Part of crew found safety on rocky point.
Welcome Lake Huron 1937	1	Early spring fire, strong, dry winds from West. Fire crowned in jack pine and red pine plantation.	CCC foreman was pulling his crew out when it started to crown. He was looking for 2 of his men and was trapped and died 100 feet from safety.
Kamus Burn Okanogan 1933	2	Fire in light fuels, and wind changed direction.	Men tried to outrun fire but failed.
Doctor Mt. Cowlitz 1929	1	Sudden wind change in predtwery light fuels.	Man tried to outrun fire uphill.
King's Canyon Tonopah 1926	5	Unexpected downslope wind on lee side of Sierra pushed fire into second-growth forest with understory of brush.	Men had gone downhill for water and were trapped on road when wind changed.

TABLE 2

Common Denominators of Fire Behavior On Fatal Forest Fires (State, County and Local Agencies)

Name of Fire, State And Year	Deaths By Burning	Erratic Fire Behavior	Remarks
Battlement Nat Forest 1976	3	Rapid upslope fire on a steep draw with Southwest exposure on mixed mountain shrub type.	Four men were trapped on narrow fireline on ridge and three died.
Morgan Co. Tennessee 1972	1	Small 24-acre fire. Wind gusts 20-25 mph. Fire crossed plowed line.	Plow operator trapped and suffocated on bench on upper side of fire.
Horns Ridge Idaho 1972	2	Steep, rocky terrain. Dry grass and brush and scattered trees. Thunderstorms caused "squirrely winds."	Two men on fire line. A rolling log hit the men, and they rolled into the fire and died of suffocation.
Banks Arkansas 1972	1	Medium fuels, moderate winds, very high FDR.	Man was knocked unconscious by falling tree. He was fatally burned.
Eagle Rock Virginia 1971	1	Return in reoccurrence, steep slope.	Three men were felling snags.
None N. Carolina 1968	1	Unknown	Man, age 64, tried to beat fire with pine boos; clothes caught fire; was dead when found.
None Florida 1968	1	Heavy palmetto and wiregrass. Unexpected wind.	One-man suppression crew - tractor lodged on stump, and man couldn't escape.
None N. Carolina 1968	1	Unknown	A county ranger was suppressing fire. Died of 3rd degree burns.
None Mississippi 1967	1	Small fire, flashy fuels, gusty winds.	Man backfiring out last backfire. Died after 3 days in hospital.
Windsor S. Carolina 1967	1	Weather dry and windy. Fire (4,000 acres) was fast-moving and erratic in pine.	Man was trapped by fast-moving head fire in dense smoke. Couldn't escape.
[illegible] N. Carolina 1965	1	Wind speed increased. Fire in broom sedge.	Was helping on control burn. Was caught in wire fence and burned to death.

Name of Fire, State And Year	Deaths By Burning	Erratic Fire Behavior	Remarks
Fairview Hollow Kentucky 1965	3	Small fire (26.6 acres) near town, light wind. Fire burned in a small hollow with 40-65 degree slope. Fuels were light carpet of leaves of beech, oak, maple, basswood, and poplar.	Men ran up the hill ahead of fire but were trapped on steep slope.
Joshua Falls Virginia 1964	1	Fire burned up draw toward men.	One man apparently refused to follow leader and was killed by heat.
None Georgia 1963	1	Control burn escaped.	Man overcome by smoke and/or coronary.
Unnamed Georgia 1960	3	Ordinary control burn escaped.	All 3 men were shown as dying of heart attacks. (Only 3 were 30+)
None Florida 1960	1	Light fuels and unexpected wind change.	Two men on head. One ran to safety.
Siler City N. Carolina 1960	1	Fire in grass.	Man burned to death while attempting to put out grass fire.
Pennington Texas 1959	1	High winds in grassy fuels.	Man on road grader got in front of head of fire and was killed.
Hacienda California 1955	5	Light fuels, high temperatures, low humidity and unstable atmosphere. Fire threatening homes.	Foreman and crew were in burned-out area when flashover occurred.
Gap Creek Tennessee 1954	3	Strong winds pushed fire upslope and it crowned.	Men were trapped on slope above fire.
None N. Carolina 1953	2	Woods fire.	Foreman (age 62) and 15-year (age 11) were burned in woods fire trying to put it out.
Bonnie Blue Virginia 1953	1	Fire burned rapidly up steep slope.	Man became separated from main crew and was burned.
Glenville Cost Arkansas 1952	1	Sagebrush & grass, high winds, high FDR and fire threatening homes.	Individual igniting fire lost in each of fire from ex-Assistant and died.
Kawaihae Hawaii 1941	2	Flashy fuels and the wind changed unexpectedly.	Two men were unable to gain safety in thick sugarcane field.
Pepper Run Pennsylvania 1938	8	Fire burning in mixed-hardwood leaves on fairly steep slope. Wind shifted and crossed fireline behind men. Final size 134 acres.	Squad foreman told men to run for safety. All ran up the hill and were caught by the fire.
Griffith Park California 1933	25 killed plus 129 injured	Fire burned in light chaparral near Griffith Park. Wind changed.	Men tried to run for safety, but 25 failed.

TABLE 3

Common Denominators of Fire Behavior On Near-Fatal Forest Fires

Name of Fire, National Forest And Year	Number Involved	Erratic Fire Behavior	Remarks
Meyers Fire San Bernardino 1970	Sector Boss and crews	Fire burning in steep country and dense chaparral at night and spotted across line.	Crews and cats were building fire downhill when fire blew up - they found safety in cat line.

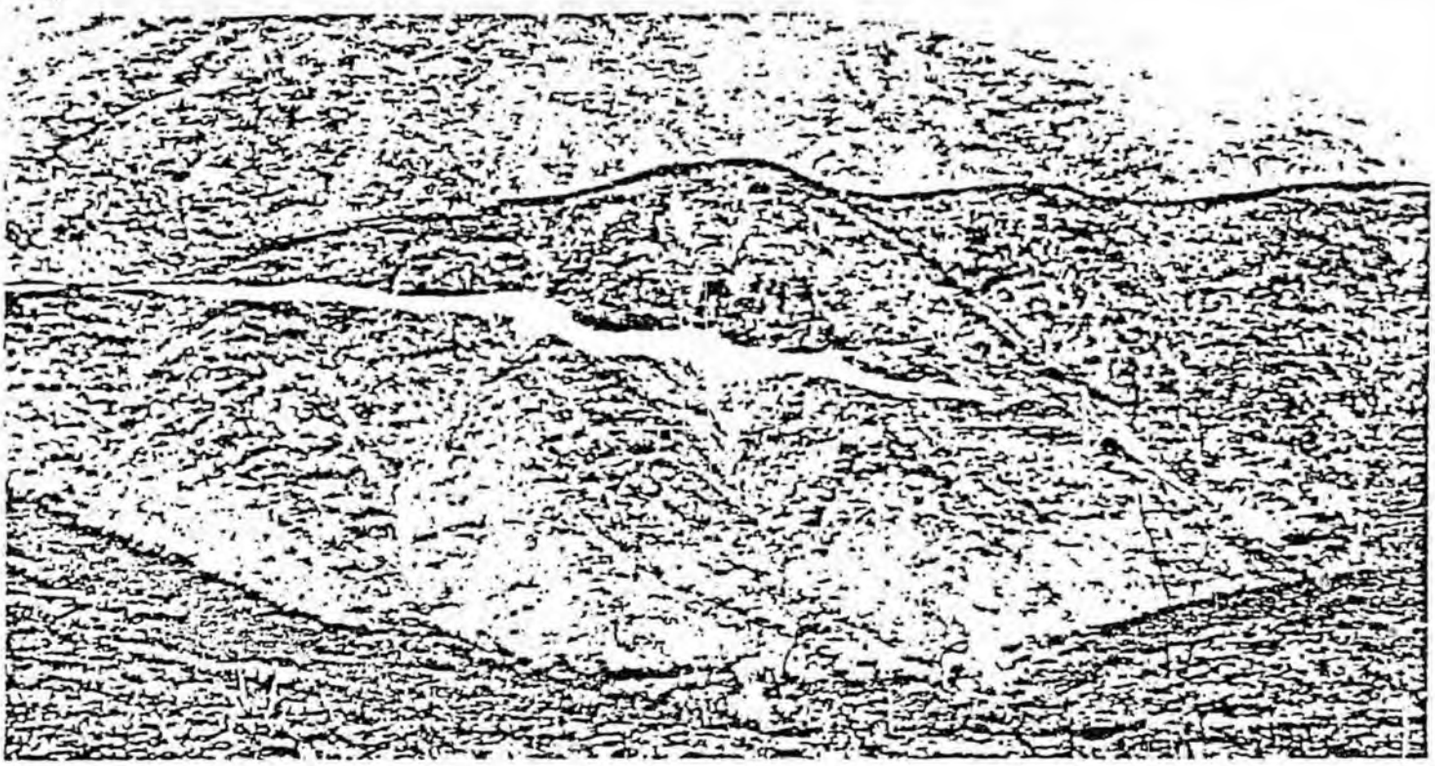
(Table 3 continued on next page)

Name of Fire, National Forest And Year	Number Involved	Erratic Fire Behavior	Remarks
Mitchell Creek Fire Wenatchee 1970	Line boss and crews	Unexpected strong, upslope winds at midnight caused fire to jump line.	Crews were pulled out time.
South Tommy Fire Wenatchee 1970	Crew	Fire spotted below crew and came "roaring up mountain." Weather hot, dry and windy.	Crew in unfamiliar country found refuge in burned-over rock slide for two nights.
Fourth of July Mt Fire Wenatchee 1967	Foreman and crew	Fire in light fuels was quiet in early morning (2:00-3:00 a.m.), then humidity unexpectedly drooped and entire canyon burned out.	All men were pulled into safety zone.
Powette Forest Fire Powette 1967	5-man crew	Lodgepole pine blowdown. Gusty winds caused blow-up from cat piles.	Three men found safety in clearing, and 2 went into burn. No one hurt.
Boot Strap Fire BLM Elko District 1964	Foreman and inmate crew	Fast-moving fire in sagebrush and grass moving on wide front.	Foreman was driving across front of fire with crew when they encountered edge of fire and drove through safely.
Maggie Fire Malheur-Whitman (near Izee) Canyon 1963	Fire Boss and 20 men	Fire was in mop-up stage when there was a sudden increase in wind - blowing upslope. Fire burned in dense stand of grass.	Crew working downhill on steep slope in heavy, dry grass. Found safety in 30 ft. burned out strip on the ridge top.
River Bend Fire Deschutes 1962	Division Boss and Tractor Operator	Fire burning in open ponderosa pine and manzanita brush. Fire crowned in ponderosa pine.	Man ran uphill along dozer line and buried face in soil. Wind let up, and he escaped.
Fresno Co. Fire-Calif. Div. of Forestry 1962	4 men (3 received burns)	Strong winds in light fuels (grain field), 90° F temp. Wind shifted unexpectedly.	Fire outflanked 4-man pumper crew. 3 men found safety in truck cab. One man went to burnt out area.
Salmon River Fire Powette 1961	Crew Boss and Pumper Crew	Fire burning in cheatgrass then crowned in brush and timber on steep slopes of Salmon River.	Fire jumped road, but crew moved back and forth on road to avoid being burned.
Tenus Gorge Fire Wenatchee 1961	Crew	Fire in heavy cheatgrass and scattered brush in breaks of Columbia River. Spotfire started below crew.	Crew burned out a safety area on a knoll. In a few minutes main fire passed, but no one was injured.
Oregon Protection Agency Fire Ore. Prot. Agency 1960's	Crew Boss and 37 men	Daytime temperature was 105° and fire was burning in scrub oak and light brush at night. Unburned fuels inside perimeter caused spots across cutline.	Crew moved to safety in time - while 200 acres more burned.
Fire in Region 4 1960's	Two men	Fire had burned downhill on ground then crowned uphill toward men.	Men abandoned fireline in time to reach safety.
Cottonwood Pass Fire Medicine Bow 1960's	Crew Boss and 13 men	Fire was in mop-up stage. Temperatures rose, and unexpected winds blew fire across firelines - because of unburned fuels inside.	Crew scrambled to safety as fire burned 1,200 acres more.
Brush Patch Fire Salmon 1960's	Sector Team and 40 men	Fire burning in logging slash in steep canyon at night with up-canyon winds.	Sector boss and 5 men found safety at helispot as fire ran uphill - rest stayed on fireline.
Sutters Meadow Fire Powette 1957	Foreman and brush crew	Fire burning in spruce logging slash at 7,000 ft. elevation. Winds picked up and blew fire across line.	Foreman and crew had pre-determined line of retreat to small meadow and ex willow.
Sagebrush Maine Forest 1955	One crew	Downdrafts from thunderstorm created strong winds on a sagebrush fire.	Experienced logger got separated from crew and he tried to outrun fire uphill. Rest of crew went into burned area.
Milepost 324 Plumas 1949	One	Fire made run in sagebrush and grass.	Wind shifted briefly and fireboss ran back through burn to safety.

TABLE 4

Common Denominators of Fire Behavior On Near-Fatal Forest Fires

Name of Fire, National Forest And Year	Number Involved	Erratic Fire Behavior	Remarks
Freezeout Oregon 1973	50-70	Fire came up slope at night into grass-covered area.	Crew pulled away from edge of canyon into safety area. Crew isolated from camp for 3 hours.
Laguna Cleveland 1970	15 men 2 tractors and 4 tankers	Fuels were grass and brush. Wind from S-NE 40 mph. Spotfire outside of line. Blew up. About 40 acres enclosed.	All men ran for cat line and semi-burned area. Nobody hurt, but all had singed hair and eyebrows.
Canyon Angeles 1958	3 tanker crews	Backfire operation triggered flareup of main fire in canyon below men at night. Tankers surrounded by unburned fuels.	Tanker crews retreated to burned out area near powerline and waited out the flareup.
Alaska Interior Bureau of Land Mgmt Territory 1958	25 men	Temperatures continued high at night because sun didn't set. Flareup in peat bogs surrounded crew.	Line was abandoned and men moved into a swamp, waist-deep in water. Fire burned in grasses covering swamp, but no one was burned.
Stash Colville 1967	Scout	Reburn below saddle in 250-acre cut-block blew through saddle.	Ran downhill through fire in saddle and got second & third degree burns on face, neck and hands.
Indigo Siskiyou 1967	1	Fire in Douglas-fir reproduction and in clear-cut block. Fire crowned in reproduction and blocked line of retreat.	Scout ran down cat line between fire in cut-block and flare-up in Douglas-fir reproduction. But was not injured.
Evergreen Mountain Rogue River 1967	Crew Foreman and Crew	[illegible] area rolled downhill below crew. Fire "chimneyed" up slope during mid-day.	Crew foreman and crew ran to the clear-cut burned area for safety and had to stay 24 hours.
Winter Rim Fremont 1966	Sector Boss & 50 men	Light gusty winds at night caused fire to jump line in reproduction patches.	Crew pulled out, and went to fire perimeter because of erratic behavior.
Maggie Ridge Oregon 1960's	4 men	Main fire was contained, but it blew up and headed uphill toward crew on small spot fire on slope.	Crew ran toward ridge top but one man fell and had to be carried - made safe area with 5 minutes to spare.
Woodwardia Angeles 1959	13	Fire was smouldering in canyon below helispot in light fuels.	Eighteen men dug in on lee side of helispot and fire spotted overhead. Steep downhill situation without burned escape route.
Lakeview Fremont 1958	Sector Boss & 25 men	Fresh logging slash and pine reproduction. Wind stepped and direction changed unexpectedly.	Sector boss and crew rushed back into burned area and suffered minor burns.
Alder Creek Oregon 1955	One crew	Fireline being built in bottom of semi-timbered canyon. Fire crossed canyon and surrounded crew.	Crew ran down canyon to edge of fire. One tractor burned up.
Horsethief Basin Santiam 1953	Crew Boss & 10 men	Unburned islands of sub-alpine fuels & small meadows. Unburned islands burned out when cumulus clouds developed over fire.	Fire was spotting all around men so they sat in pothole with water up to their necks and fire blew over.



View of disaster scene in Rattlesnake Canyon, Mendocino National Forest, California where 15 men lost their lives in 1953. Circle in left center of photograph marks the spot where crew was working before fire overran them. Photo courtesy of U.S. Forest Service

(Continued from page 10)

speed up suppression and reduce threats to the fire fighters on the ground. Finally, more effective use of the National Fire Danger Rating components under pre-suppression and suppression conditions is helping to alert all concerned to potentially explosive conditions. For example, a high ignition component will indicate the high probability of spot fires. Similarly, a high burning index will tell the fire fighter that rapid fire spread can be expected in the light fuels where possibility of getting trapped is the greatest.

The final picture, therefore, includes some positive and some negative aspects. The individual fire fighter must realize that this year's fire season is bound to be the worst one ever. Modern technology, however, will help make the job of firefighting as safe as possible. But, the final responsibility rests with him and his fellow fire fighters. Once they are conscious of which situations are potentially dangerous, and once they know what to do in a blow-up or flare-up, their chances for avoiding a fatal fire increase.

Conclusions

There are four major common denominators of fire behavior on fatal and near-fatal fires. Such fires often occur:

1. On relatively small fires or deceptively quiet sectors of large fires.
2. In relatively light fuels, such as grass, herbs, and light brush.
3. When there is an unexpected shift in wind direction or in wind speed.
4. When fire responds to topographic conditions and runs uphill.

Yet, these factors should not be considered all inclusive. A sudden change of wind, and the fire may change direction, regardless of the topography.

Each set of circumstances has the potential for creating a fatal or near-fatal fire. Often, human behavior is the determining factor. The fire fighter, who "keeps his or her cool" when the wind direction changes, moves back into a burned area, will survive. The fire fighter who panics and tries to outrun a fire under similar conditions may die. The difference between a fatal and a near-fatal fire may be luck, skill, or advanced planning. But in all cases, it pays to be alert and aware of certain conditions which may signal a sudden change in fire behavior. In a few words—

Be alert. Watch out for:

Light fuels
Wind shifts
Steep slopes and chimneys

The person who is not caught unaware has the best chance for survival.

Portions of this paper were originally prepared for the National Advanced Fire Behavior Course, Sunriver, Oregon, April 1974, and for the National Fire Behavior Officer's Training Course, Marana, Arizona, March 1976.

Carl C. Wilson joined the U.S. Forest Service in 1946. In 1950 he transferred to the Pacific Southwest Forest and Range Experiment Station of the U.S. Forest Service and, in the following year, became Chief of the Division of Forest Fire Research. He was named Assistant Director of the Experiment Station in 1962, and eleven years later transferred to the Cooperative Fire Protection Staff of State and Private Forestry where he serves as National Fire Specialist. He has done work abroad in the development of fire management programs for the Food and Agriculture Organization of the United Nations.

Mr. Wilson is the author of more than 30 professional and technical publications of forestry and forest fire matters. In 1975 he received an Outstanding Fire Management Award from the Chief, U.S. Forest Service and President, National Association of State Foresters.

FROM: COMMON DENOMINATORS OF FIRE BEHAVIOR ON TRAGEDY AND NEAR MISS FOREST FIRES. by Carl C. Wilson

Based on analysis of 40 tragedy fires from 1926-1974 (136 deaths) average 3-1/2 men per year.

1. Most of the incidents occurred on relatively small fires or isolated sectors of larger fires.

2. "Unexpected" or "unpredicted winds" were often given as the major cause of "erratic behavior".

3. Most of the fires were innocent in appearance -- in some cases the mop-up stage -- prior to the "flare-ups" or "blow-ups."

4. Flare-ups occurred in deceptively light fuels.

5. Fires ran uphill in "chimneys, gullies, or on steep slopes."

6. Suppression tools, such as helicopters or air tankers, can adversely modify fire behavior. (Helicopters and air tanker vortices have been known to cause flare-ups.)

7. There are no erratic fire behavior situations. Our inability to predict fire behavior causes us to fall back on the term "erratic."

HB 469

California: The Siege of '87 at a Glance*

The Final Total

"What we're focusing on here is a natural disaster of the first magnitude."—George Dunlop, assistant secretary of agriculture

- 775,000 acres burned, 700,000 in national forests.
- 19,000 fire fighters involved.
- $160,000,000 in suppression costs.

The Human Cost

"This is like being in a war and not knowing if on any given day you're going to die."—Dr. Thomas Curtis, psychiatrist and specialist in hazardous work conditions

- 10 fire fighters' lives lost.
- 28 homes and 36 other structures destroyed.
- More than 6,000 people evacuated.

The Resource Loss

"Probably in my lifetime, I will not see Tuolumne County as it was when I came here 20 years ago."—Clifton White, Tuolumne County resident

- 100 recreational facilities burned.
- 274 miles of trails damaged.
- 63 archeological sites damaged.
- 155 miles of riparian habitat lost with as yet unknown but inevitable effects on anadromous and resident fisheries.
- $1,000,000 of range improvements incinerated.
- 1.9 billion board feet of timber blackened.

The Task Ahead

"Just as people are seeing nature recover at Mount St. Helens, they will be able to see the miraculous operation of nature's forces, with assistance from man."—Richard Benjamin, assistant regional forester, Region 5, USDA Forest Service

Emergency Burn Rehabilitation (immediate work designed to help stabilize soils and control water, sediment, and debris movement)

- Aerial seeding of 80,000 acres.
- Construction of more than 500 erosion-control structures.
- Construction of 1,500 miles of drainage facilities.

Long-Term Recovery

- Reforestation of 200,000 acres requiring 100 million seedlings.
- Renovation and stabilization of 274 miles of trails.
- Salvage of 1.6 billion board feet of timber.
- The list is longer and estimates are still being made.

Estimated long-term recovery costs run more than $150 million. The time frame for full recovery extends beyond our generation. Faced with such an enormous task, it is easy to forget that 96 percent of California's national forests are still green and still offer all we have come to expect from national forests. The challenge is to care for that land while healing the wounds from the siege of '87.—*Robert Tribble, Office of Information, USDA Forest Service, Region 5, San Francisco, CA.*

*Initial assessments have not been completed for all forests. Figures presented here are estimates and are subject to change.

how the fire fighters did it," one resident said. "It was like a war."

Some 160 miles to the south, residents of nine communities—about 14 percent of Tuolumne County's 42,000 people—were asked to leave their homes. Most of the evacuations were precautionary as fires burned within striking range of homes and towns. But for Carl Grindstaff of Buck Meadows, it was a nearer thing: "Just before dark the fire came over the ridge at us like gangbusters, with 70-foot flames .... You could feel the heat. Like staring the devil in the face. It scared us to death."

By the end of the first week, the Stanislaus fires had merged into one massive 100,000-acre blaze. But the threat to structures eased, and the fire-fighting strategy changed. "Once we got out of the structures, we were able to go on the offensive," explained Robert Monsen of the California Department of Forestry. Statewide priorities changed too.

Stanislaus National Forest. One of almost 2,000 fire fighters on the line. Containing the Stanislaus fires alone took 15 days, 5,000 people, 378 engines, 111 bulldozers, 100 water tenders, 12 airtankers, and 11 helicopters.

Health Hazards of Smoke

Inhalation of smoke, whatever the source, can result in damage to health, both acute and chronic. The acute, or immediate, symptoms are caused by exposure to high concentrations of smoke over short periods. Manifestations range from irritation of the eye and respiratory tract to impaired judgment, semiconsciousness, unconsciousness, and even death.

More insidious are repeated exposures to relatively low concentrations. These may result in respiratory allergies, bronchitis, emphysema, and cancer. Chronic health hazards are by far the most significant, because these problems usually take 15 or more years before the victim is diagnosed.

The hazards vary with the kinds of smoke inhaled. Smoke is a complex mixture whose components depend in part on the type of fuel, its moisture content, additives to the fuel (for example, pesticides sprayed on trees or foliage), and, of course, the temperature of combustion. Burning forest fuels discharge hundreds if not thousands of chemical compounds into the atmosphere— including carbon monoxide, total suspended particulates, hydrocarbons, nitrogen oxides, and water vapor.

Also given off are polycyclic organic materials such as methyl anthracene, pyrene, chrysene, benzotalanthracene, fluoranthene, methylchrysene, and benzo[a]pyrene. Other constituents include volatile oxygenated organic compounds, acids, ketones, alcohols, aldehydes (including formaldehyde), and furans. Many of these are absorbed in, or adsorbed on, condensing smoke particles. Penetration of these particles into the lungs increases the chemicals' toxicity. Researchers consider particles with diameters of less than 10 microns to be respirable. Ninety-two percent of particulate emissions from logging slash are 3 microns or less in diameter.

The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight produces ozone and organic oxidants, which are potent irritants.

The effects of the important dangerous chemicals can be placed in the categories below.

The next step is to determine if the chemicals have a threshold limit value (TLV). The TLV represents conditions under which it is believed that nearly all workers may be repeatedly exposed to airborne concentrations day after day without adverse effects. The value is not absolutely safe. Because of wide variations in individual susceptibility, a small percentage of workers may experience discomfort within the threshold; a smaller percentage may be affected more seriously by aggravation of a preexisting condition or by development of an industrial disease at concentrations at or below the TLV.

The TLV is usually given as a time-weighted average that depends on length of the period during which a person is exposed or as a ceiling value not to be exceeded. The TLV for carbon dioxide, for example, is 5,000 parts per million. For ozone it is 0.1 p.p.m.

Depending on the extent of exposure, protective measures can safeguard workers' health by shielding respiration, eyes and face, and skin. In addition, all exposed persons should be adequately informed of the potential hazards, the importance of wearing the protective equipment, and, of course, the steps to be taken in an emergency. Stand-by equipment, along with well-trained crews, should be immediately available for emergencies during fires. Finally, all persons routinely exposed to smoke should have an annual physical examination.

Although periodic exposure to forest-fire smoke over a long time can be dangerous, recognition and evaluation of the hazards, adequate controls, employee training, and an annual physical examination will go a long way toward minimizing the deleterious effects.

Peter A. Breese
Department of Environmental Health
University of Washington
Seattle

Irritants
- upper respiratory: ammonia, sulfur dioxide
- lung: nitrogen dioxide, ozone

Asphyxiants
- simple inert gases that replace oxygen in the atmosphere: methane
- chemical: prevent body from using available oxygen: carbon monoxide, hydrogen cyanide, hydrogen sulfide

Anesthetics and narcotics
- intoxicants (simple anesthetics without serious systemic effects): acetylene hydrocarbons

Systemic poisons
- damage to liver and kidneys: carbon tetrachloride
- damage to blood system: phenol
- damage to nervous system: methyl alcohol, carbon disulfide
- toxic metals: lead, mercury
- toxic nonmetals: compounds of arsenic

Particulates and liquid droplets (other than systemic poisons)
- fibrous dusts: silica
- inert dusts: carbon
- allergic dusts and liquid droplets: pollen, certain dusts
- skin irritants: acids and caustics
- microorganisms: fungi, molds

Carcinogens
- known: asbestos, vinyl chloride
- suspected: formaldehyde, chrysene, benzo[a]pyrene

Teratogens
- nitrous oxide

From ... the USFS Pacific Northwest Region, Jan. 1976

HB 469

FACTORS AFFECTING FIREFIGHTER PERFORMANCE

Firefighter Fatigue

Industrial hygienists and safety specialists have long recognized the direct relationship of fatigue to accidents. There is a point at which everyone eventually wears down and is forced to stop and rest. Medical research has shown that although the fatigue point differs from person to person, it is lower in the young and old. The person who has not yet reached physical maturity and the person who neglects to keep his body in condition are our greatest concern. Physical maturity is achieved in the average American male at ages 24 to 26, and in the average American female at ages 21 to 23. With the majoriyt of our pickup summer crews being under 26, we must consider fatigue as a major area of concern in accident prevention.

The factors that combine to cause fatigue, and finally exhaustion, begin as the muscles burn the sugars stored in the muscles. This produces heat, lactic acid and carbon dioxide (CO_2). The CO_2 is dispersed through the body by the lungs and the other detrimental products saturate the body. These by-products can be flushed out of the tissue only so fast.

When strenuous muscle activity produces these by-products faster than the body can eliminate them, the body can become oversaturated causing muscle failure or exhaustion. Exhaustion reamins until the body is given sufficient time to automatically flush out the lactic acid buildup and CO_2. Only sleep does a thorough job.

A. Factors Contributing to Fatigue

1. Arduous work.
2. Long hours.
3. Monotony.
4. Constant strain.
5. Faulty posture.
6. Pressing or holding objects against the body.
7. Irregular hours of sleep.
8. Working at a fast pace.
9. Excessive heat.
10. Noxious dusts, fumes, and gases.
11. Unhealthy living conditions.
12. Emotional disturbances.
13. Loss of body heat.
14. Excessive loss of body water.
15. Food and salt intake.

B. There are no definite symptoms of fatigue. However, the following are indirect indicators of fatigue.

1. Decrease in amount of work.
2. Increase in frequency of small accidents or near misses.
3. Inability to feel refreshed after several hours of sleep.
4. Loss of interest in the work.
5. Constant struggle to keep up with the rest of the crew.

6. Poor reflex action, recurring stumbling, poor control of arms and legs.
7. Need for frequent and prolonged rest stops.
8. Dazed and careless attitude, decreasing attention span and frustrati
9. Failure of the pulse rate to recover to 110 before work is resumed a a short rest.

Hazardous work requires alertness. The person who continues to work while unduly fatigued is not fully alert to the existence of danger and the precautions he must take to avoid injury, nor is he meticulous in his observance of safe practice rules. Fatigue must be avoided not only to maintai quantity and quality of production, but because of the injurious physical effects on workers. The workman with a fatigued mental, nervous, or muscular system is a bad risk for himself and his co-workers. This is evident by the increase of more serious injuries and near misses after the fourth day of a large fire.

Firefighting and the fire camp introduces a new culture and environment t the worker. The Occupational Safety and Health Act (OSHA), makes manage responsible for controlling the unsafe acts of employees. Therefore, it is necessary to remove, or at least minimize, the sources of fatigue and in turn reduce illness and accidents.

C. Methods to reduce fatigue (and in turn reduce exposure to accidents).

1. Physical Examinations - Employees exposed to the demands of firefighting should be given periodic physical examinations. It is especially important that all fire-going personnel over 45 be given a complete physical every two years while those over 55 be on an annual schedule

2. Physical Fitness - At the beginning of every fire season, assess the physical fitness of each person and enter into a comprehensive progra of physiological fitness, exercise, and weight control. Dr. Brian J. Sharkey's guide to the prescription of exercise, "Physiological Fitness and Weight Control", should be used as a basic approach.

3. Strength and Agility - Use of strength and agility tests to determine that an individual is capable of functioning under long periods of excessive demands on their system. Persons incapable of getting into condition to pass these tests will constantly be working at an output greater than they are capable of and deeper into a fatigued condition.

4. Crew Boss Training - Include a greater emphasis on crew welfare, hygiene, fatigue, and smoke symptoms. Crew Bosses should tell their crew people how to condition themselves, conserve energy, relax, and live comfortably in a fire situation. Refresher courses should be required every three years.

5. Work Assignments - Assign workers only to tasks for which they are conditioned and trained. All fire personnel should be physically and mentally capable of coping with their fire assignments. Within crew activities, crewmembers acting as lookouts must be familiar with able to recognize all emergencies.

6. Work Hours - Adopt a regular schedule of working hours as soon as possible. The schedule should allow for a reasonable amount of time for rest and relaxation away from the job.

7. Rest Periods - As soon as the fire allows, provide for 15 or 20 minute rest breaks in the morning and afternoon, and deliver coffee, pop or juice to the people on the line. Encourage them to relax completely during the break.

8. Rest and Recuperation - On a rotational basis, and right in camp if done properly, begin giving individuals or crews a day off every 48 to 60 hours. A specialist should be assigned to each project fire to set up the rest and recuperation (R&R) and provide follow through.

9. Meal Time - Shorten the waiting time in meal lines by providing more service areas. Provide more servers to keep the lines moving. Construct tables with benches so crew can sit and relax while they eat.

10. Showers - Provide showers and laundry facilities close enough so time is not lost moving people back and forth or waiting in lines. Encourage workers to cleanup, shower, and shave daily.

11. Sleeping Facilities - Provide ground cloths, shelters, comfortable sleeping bags, and air mattresses. Furnish a cool shaded sleeping location for day sleepers and a warm dry spot for night sleepers.

12. Vitamin C - Encourage fire going personnel to use vitamin C to reduce their susceptibility to summer colds that tend to unduly wear a person down.

13. Canteen - Most men involved in slash burning or other arduous District work will relax with a cold beer or some other refreshment as soon as they come home. The same opportunity ir fire camp could have therapeutic effects. We should contract with someone to provide canteen facilities for after work hours. Ice cream bars, sodas, malts, and snacks, to break up the camp routine, would give men a chance to relax. Top feature movies at twilight are also possiblities, especially during R&R.

A person in good physical condition is less likely to become fatigued than one in poor physical condition. The ultimate responsiblity for keeping fit is the individual's. We must do everything we can to provide the facilities to help him discharge that responsibility.

he Smoke Inhalation Problem

ittle is known about the dangers to firefigners from prolonged exposure to smoke nile fighting wild or controlled fires. Studies that have been used as refernce include a literature search conducted by Missoula Equipment Development Cener, controlled burning studies by the Pacific Southwest Forest and Range Experment Station, and numerous reports and articles from scientific research conucted by and for the International Association of Firefighters.

An insight into the health hazard of smoke inhalation may assist supervisors in preventing problems. It is reasonable to assume that firefighters will not be exposed to lethal concentrations of carbon monoxide or other harmful gases. However, scientists agree that the effects of low concentrations of carbon monoxide can be a pressing concern. The effects of carbon monoxide and smoke particles are summarized separately.

A. Carbon Monoxide

The gaseous portion of smoke is far more hazardous than the particulate portion. Carbon monoxide (CO) is present in varying concentrations in all smoke from burning hydrocarbons (such as wood, leaves, and gress). CO is a good example of a gas that enters the body through the lungs but exerts toxic effects on other parts of the body. This gas rapidly combines with hemoglobin (Hb) -- the oxygen-carrying part of the blood. CO reacts with hemoglobin to form carboxynemoglobin (COHb). This COHb interferes with the transfer of oxygen to living tissues.

Since CO combines with red cells 200 times more easily than oxygen, the inhalation of very low concentrations of CO can quickly dispel all oxygen from the cells causing hypoxia, the lack of oxygen. This affects all organs and systems of the body but primarily the brain. The main effect of low concentrations of CO is on the central nervous system. Alertness, vision, and time perception are affected. Judgement and the ability to do psychomotor tasks -- tasks requiring thinking and doing -- are impaired. Apparently, these effects are more pronounced when the victim is subjected to distractions or must attend to more than one task, the kind of situation that often faces supervisory personnel, aircraft pilots, and operators of motor vehicles and equipment.

There is evidence that people subjected to low concentrations of CO are more likely to have vehicle accidents than others. People may be temporarily knocked out or made sick from its influence. Once CO occupies the red blood cells, many hours are required for removal. Repeated small exposures to the gas tend to have a cumulative effect.

Symptoms to watch for are red skin coloring (although a person in an advanced stage of CO may be blue due to a lack of oxygen), headache, dizziness and nausea with possible collapse. Pump operators standing near the exhaust of an operating pump for prolonged periods, may also experience high saturations of CO. Scientists have determined that CO does clear from the blood, but slowly. The time required depends on the amount of CO absorbed and the times between exposure. A better understanding of these relationships is needed, together with a means of speeding up clearance of CO from the blood stream. Exposure to fresh air and sunshine helps speed the clearance of CO from the blood.

EFFECTS FROM VARIOUS LEVELS OF CARBOXYHEMOGLOBIN:

As COHb levels or duration of exposure increase, health effects become more serious.

COHb Level, Percent	Demonstrated Effects
Less than 1.0	No apparent effect.
1.0 to 2.0	Some evidence of effect on behavioral performance.
2.0 to 5.0	Central nervous system effects. Impairment of time interval discrimination, visual acuity, brightness discrimination, and certain other psychomotor functions.
Greater than 5.0	Cardiac and pulmonary functional changes.
10.0 to 80.0	Headaches, fatigue, drowsiness, coma, respiratory failure, death.

Source: National Academy of Science and National Academy of Engineering

3. Ways to Minimize Effects of Carbon Monoxide

The possibility of CO poisoning is a fire control occupational hazard that cannot be eliminated, only minimized. Because low-level CO poisoning impairs alertness, judgement, vision, and some psychomotor functions, it affects fire control operations and fireline safety. To reduce the hazard of CO, these steps can be taken:

1. Inform key personnel of the hazards of carbon monoxide - Low-level CO poisoning is most likely to have serious consequences if fireline supervisors, aircraft pilots, equipment operators, and vehicle drivers are affected. If they recognize that CO can reduce their capability, they can consciously try to compensate for this.

2. Shorten tours of duty in hot-line situations - In most wildfires the highest CO concentrations are likely to be found where the smoke is the heaviest, such as at the head of the fire. Crews working in these areas should be relieved, or rotated to less dense smoke areas at frequent intervals, to permit at least partial recovery from CO effects. Short or intermittent tours of duty in hot-line situations are particularly important for supervisory personnel since mistakes and errors in judgement by these people can have far-reaching results. Short tours of duty for equipment operators working in dense smoke should also be given special consideration.

   During breaks away from hot line situations crew members should be encouraged not to smoke. Smoking adds to the CO content of the body and diminishes the advantage of the break.

3. Provide for close monitoring of supervisory personnel in critical fireline situations - If line overhead must be exposed to possible high CO concentrations, or to lower concentrations for long periods of time, their actions and decisions should be monitored closely by their supervisors. This will allow correction of errors in judgement that might otherwise result in injuries or death.

4. Limit operation of vehicles by persons likely to be exposed to carbon monoxide - Carbon monoxide is very likely to affect driving ability. Operation of motor vehicles by fireline personnel should be kept to a minimum and eliminated entirely if possible. When motor vehicle drivers are exposed to smoky conditions their tour of duty should be shortened, particularly at night, since CO can affect vision.

5. Locate fire camps in smoke-free areas - Carbon monoxide poisoning is a reversible process, but the reduction of the COHb level of the blood requires considerable time. Also, the reduction of COHb will proceed only to a point where it is in balance with the existing CO concentration. A fire crew starting its shift with above-normal COHb level will be affected more quickly than usual.

   Fire camps partially or wholly surrounded by smoldering fires are most likely to have significant levels of CO, since smoldering fires produce more CO for the amount of fuel burning than do more active fires. If it is not feasible to provide smoke-free fire camps for all fire personnel, then such areas should be provided for at least supervisory personnel, aircraft pilots, equipment operators, and motor vehicle drivers.

C. Smoke

Smoke is the suspension of small particles in heated gases. While the heat and toxic qualities of fire gases can be injurious, the solid and liquid particles in suspension in the gases can also have harmful effects. The particles may vary and be of such color, size, and quantity that they can obscure the passage of light, thus blocking escape paths or paths to safety. Because they are coated with irritating substances, the trapped particles produce temporary inflammation of the eyes, nose, and throat.

On the other hand, the visible density of smoke is not an index of toxicity. Smoke particles can be irritating when inhaled, and long exposure to them may cause damage to the respiratory tract. Particles lodged in the eyes cause tears and irritation, which may impair vision and when lodged in the nostrils and throat, may cause sneezing and coughing. Smoke particles in the air stream may cool to the point where water vapor, acids, and aldehydes will condense on them. Particles trapped in the mouth and throat can be swallowed and irritate the stomach often to the extent that nausea, vomiting and diarrhea may result. While these symptoms are not particularly damaging they may incapacitate the firefither for at least a short time. These unpleasant symptoms can usually be relieved promptly by any common antacid that is available in fire emergency medical kits.

Thus, smoke inhalation may present a number of problems, ranging from irritation of the eyes, nose and gastrointestinal tract, asphyxia, and hypoxia to pulmonary damage. The diagnoses and treatment of exposed patients is further complicated because many times there are many symptoms present. Also, the whole picture may be obscured by contributions from hyperventilation, heat exhaustion and heart attack. These three may produce the same symptoms such as difficult breathing, collapse, unconsciousness, and cyanosis.

II. Water Requirements

Water requirements of the human body vary with the environmental condition and the amount of exercise. At high temperatures a person who is resting may lose as much as a pint of water per hour by sweating. If he is working, his water loss and water requirement will increase in proportion to the amount of work being done. The supply of water must, therefore, be sufficient to provide for the heaviest type of work which the crew may be doing. Workers engaged in heavy work in extreme heat may require 4-1/2 gallons or more of drinking water per person during a 24-hour period. A water requirement guide to be used for planning purposes only is shown below.

Water requirements should be increased above the levels shown in this guide when workers are performing heavy labor in temperatures of 100°F., or greater, with low humidity. The hotter the environment, the greater the fluid loss by sweating and the greater the chance of denydration. Crew Bosses must provide optimum amounts of water at all times for drinking purposes. Workers should be encouraged to drink more water and to drink it more frequently than is necessary to quench their thirst, especially during periods of acclimatization. Thirst is not an adequate drive to stimulate one to drink that much more water. An ample supply of cool water must be readily available to the workers and they should be encouraged to take a drink of water each 15 to 20 minutes. Each crew member must have his own canteen and be responsible for filling it and keeping it in his possession. This is the only method for knowing how much water each person has consumed.

GUIDE FOR DETERMINING AVERAGE DRINKING WATER REQUIREMENTS

	Activities	Quarts of Water Per Man Per Day	
es	Examples	Moderate*	Severe**
nt	Desk work; camp security	6	10
erate	Working on level ground, around camp; tanker operation	7	11
y	Firefighting and all arduous work	9	13

Desert: Air temperature below 105°F.
Tropical: Air temperature below 85°F.
Desert: Air temperature above 105°F.
Tropical: Air temperature above 85°F.

Intake of water below the amount needed for proper cooling will result in rapid loss of efficiency, reduction in the ability to work, and deterioration of morale.

Other important problems are disorders of water and electrolyte balance. The principle disorders in this category are water-depletion heat exhaustion, and salp-depletion heat exhaustion. Both disorders can occur following continued heavy sweating. It is not uncommon for workers to lose 20 to 25 pints of sweat each day and if that much water is not replaced, water depletion occurs. Irrespective of whether water depletion occurs rapidly (e.g., in a day) or progressively (over many days), the end result is the same. In extreme examples, as for people lost in a desert with no water to drink to replace sweat losses, death can occur in 12 hours and is usually inevitable within 48 hours. Even for individuals in a temperatue climate, such as castaways at sea, water deprivation will usually result in death in seven to ten days. Death from water depletion will occur if 18 to 20 pints is lost from the body, and loss of eight pints without replacement leads to intense thirst, a rapid heart rate, and a high body temperature.

Water intake must equal the water lost by sweat if this disorder is to be avoided. workers exposed to hot climates must be encouraged to drink an ample supply of water, flavored drinks, or tomato juice, which must be readily available to them. There is no advantage in the use of thirst quenchers such as chewing gum or fruit drops. For any given amount of work under high temperature conditions, water depletion is substantially the same whether water is taken only at mealtimes or whenever one is thirsty. Those who delay drinking until mealtime may experience considerable discomfort without any apparent advantage in water economy. The greatest benefit will be obtained and the maximum efficiency will result if water is taken at short rather than at long intervals. Drinking in small amounts when thirsty is the best practice, thus preventing discomfort which may result from drinking large quantities of water at one time.

When the water supply is limited, Crew Bosses should conserve it by having the men do the required heavy and strenuous work during the coolest periods of the day or at night, if possible, when heat stress and water requirements will be less. Up to 40 percent of the daily fluid requirement may be saved by this method. The human body cannot be trained to function with less than the minimum amount of water it requires for cooling, waste elimination, and metabolism; any attempt to train the body to do so can be harmful.

IV. Salt Requirements

When water is lost through perspiration vital body salt is also lost in the sweat. The concentration of salt in the sweat is higher in unacclimatized people than in acclimatized people, but the concentration also depends on the dietary salt intake, which is usually in excess of the body's needs. An ordinary diet contains enough salt to make up for this loss when a person's water intake is less than one gallon a day. If the daily water intake is increased to 1-1/2 gallons, it is still possible to take in an adequate amount of salt which a person can spread over his food in three meals without spoiling the taste is approximately one-half teaspoon.

Even though a full diet is eaten, the salt stores in the body will have to be replenished. If salt lost in the sweat exceeds the dietary intake, a salt depletion occurs. If this is not corrected, a vicious cycle can occur, since salt depletion can lead to loss of appetite and nausea, leading in turn to a further salt depletion; moderately severe salt depletion results in vomiting and diarrhea, with further loss of salt. If this cycle is not interrupted, death inevitably follows. Those who suffer salt depletion complain of weariness and

weakness and may suffer muscle cramps, headaches, giddiness, and other symptoms. While those who are not acclimatized face a greater risk, the disorder can occur in any individual who sweats a lot and whose dietary salt intake is low.

Supplementary salt of 5 to 15 grains daily may be required by unacclimatized men to avoid salt depletion, though this may be reduced by half (or more) after 10 days of work in the heat. If there is a shortage of drinking water, extra salt should not be taken.

Healthy people, well acclimatized to working in high temperatures, on adequate fluids and a general diet, rarely need to take salt tablets. The acclimatized individual loses much less salt in his sweat. Salt can be replaced by liberally salting one's food or by useing a 0.1% salt solution drinking water. It is particularly important that salt depletion is prevented by supplemental salt intake during the first few days of heat exposure when the worker is not yet acclimatized.

Enteric coated salt tablets which are made to dissolve slowly in the intestines are available. These tablets will prevent the nausea and sick feeling sometimes felt after taking the plain salt tablets. They must be taken while drinking water or eating and should be swallowed whole. SALT TABLETS SHOULD BE MADE AVAILABLE WITH THE WARNING THAT THEY SHOULD ONLY BE USED WITH EXTREME SWEATING, SHOULD ONLY BE TAKEN WITH PLENTY OF WATER, AND THEN NO MORE THAN ONE TABLET WITH MEALS. To insure their proper use, they should only be dispensed by medical technicians with full instructions that no more than 3 a day should be taken and with adequate water to balance the supplementary salt.

Some people prefer to take their extra salt in the form of lightly salted water. This is an excellent method. The amount of table salt used to make a 0.1% salt solution for different water containers is as follows:

(1) One pound of salt to a tank (100 gallons) of water.

(2) Three-tenths pound of salt to a purification bag (36 gallons) of water.

(3) One level tablespoon of salt to 15 quarts of water.

(4) One-fourth teaspoon of salt to a canteen (quart) of water.

(5) Two 10-grain plain salt tablets dissolved in a canteen (quart) of water.

Whenever possible, each employee exposed to heat should weigh himself at the beginning and end of the workday to insure that fluid intake has been sufficient to prevent serious denydration. Weight loss at the end of the workday should not exceed 1.5% of the worker's body weight.

Water and Salt Balance

A. Excessive consumption of salt must be avoided in attempting to maintain water and salt balance. Excessive salt can have serious consequences just as inadequate salt can. The goal is balance, neither too much nor too little.

B. Some persons assume that consumption of salt tablets would somehow let the body tolerate a smaller water intake. The contrary is the case. For salt and water balance, more salt requires more water and more water requires more salt. Furthermore, there are upper and lower limits to the amount of even balanced salt and water which the body can accept without impairment of performance.

C. It is necessary to make people aware that massive salt intake is not the answer to heat problems. Very recent studies indicate that when a normal diet is consumed, the ingestion of up to 2 grams of additional sodium chloride (rougnly 3 salt tablets) per day does NOT reduce the incidence of heat cramps or heat stroke and only slightly reduces the incidence of heat exhaustion. When more than 2 grams of additional salt were taken daily, the incidence of all 3 types of heat illness increased.

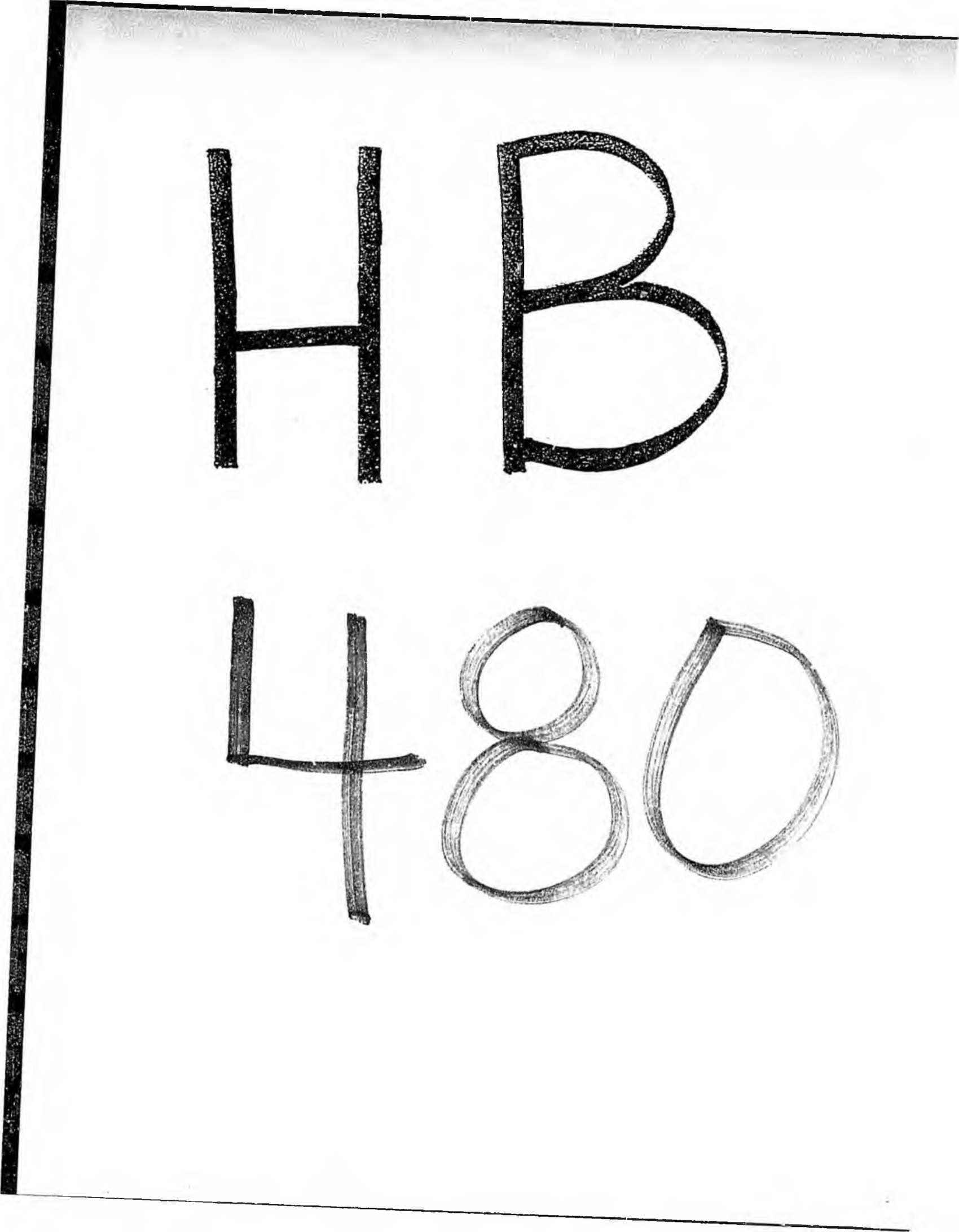
VI. Salt, Water, and Rations

A. Persons working in a hot environment must not miss meals if they are to avoid heat illness. During the first 4 or 5 days of acclimatization to hot environment, a person may require up to 2 grams of salt in addition to that provided by normal food. This is best provided by use of the salt shaker.

B. It is important to be aware that field rations such as "C" rations and Long Range Patrol Rations are not "normal Food". They are heavily loaded with salt, which has been added primarily as a preservative. They average 25 grams of sodium chloride per day plus 5 grams of additional salt in packets. Persons eating such rations are on a high salt intake, and should be observed for symptoms of salt excess as described below. They should not take salt tablets.

VII. Excess Salt Symptoms

Symptoms of excess salt include gastrointestinal distress, muscular soreness intensified after physical work, fatigue and decreased work capacity. Metabolic efficiency is impaired and there is decreased cardiovascular function characterized by depressed heart rate when it should be elevated, decreased diastolic and mean arterial pressure. Total vascular resistance and cardiovascular reserve may be reduced to near shock levels during physical work. Progressive loss of potassium is reflected by serum electrolytes and electrocardiogram changes suggestive of hypokalemia and left ventricular dilation. There is increasing stress on the kidneys with progressive urinary loss of potassium, calcium, sodium, and chloride. Hematuria may appear after exhausting work. Heat acclimatization and temperature regulation are impaired. Mental function may deteriorate and disorientation may occur.


HB
480

Alaska State Legislature
House

Official Business

Pouch V
State Capitol
Juneau, Alaska 99811

COMMITTEE ON STATE AFFAIRS

April 21, 1988

Judy Brady, Commissioner
Department of Natural Resources
400 Willoughby Avenue
Juneau, AK 99801

Dear Commissioner Brady:

Yesterday the House State Affairs Committee held a hearing on House Bill 480, An Act relating to appropriations of water. At the end of the discussion, I asked for the following information from your department.

1) How is beneficial use defined and interpreted by the department? Is there definition in statute, regulation, or case law?

2) To what extent does the department make that information available to applicants so that they know exactly what standards they are being judged against?

3) How many beneficial use studies has the department done? Do you have the resources to do them?

4) When somebody comes in with an application, is a beneficial use study initiated at that time or does it only get initiated when another state agency has an interest in it?

The discussion on this bill raised some interesting policy questions which may not easily be resolved but I believe it is important to clarify the issue so that the public can at least have a better understanding of the process.

Sincerely,

Fran Ulmer, Chair
Committee on State Affairs

STATE OF ALASKA

STEVE COWPER, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE COMMISSIONER

400 WILLOUGHBY AVE.
JUNEAU, ALASKA 99801-1796
PHONE: (907) 465-2400

May 2, 1988

The Honorable Fran Ulmer
Chair, House State Affairs Committee
P.O. Box V
Juneau, Alaska 99811

Dear Representative Ulmer:

I have received your letter regarding HB 480, a bill which proposes to amend AS 46.15.090. You asked several policy questions which I will address by number.

1 & 2) How is the term "beneficial use" defined and interpreted by the department, and to what extent is it made available to the applicant?

The term is defined in AS 46.15.256 (3):

> "beneficial use" means a use of water for the benefit of the appropriator, other persons or the public, that is reasonable and consistent with the public interest, including, but not limited to, domestic, agricultural, irrigation, industrial, manufacturing, fish and shellfish processing, navigation and transportation, mining, power, public, sanitary, fish and wildlife, recreational uses, and maintenance of water quality;

The department interprets this in a straight forward manner to mean a use of water which benefits the appropriator, other persons, or the public and which is also reasonable and consistent with the public interest. Under AS 46.15.080 (3) the Commissioner in deciding to issue a permit must determine if the proposed use of water is beneficial. AS 46.15.080 (4) provides guidance as to those aspects the Commissioner shall consider in determining the public interest. In an effort to inform and assist the public in understanding the state's water right system the department publishes fact sheets and a water users handbook which includes the statute (copy enclosed). All of these publications are readily available and usually included with requests for applications.

10-J9LH

3) How many beneficial use studies has the department completed, and do we have the resources to do them?

Statewide the department makes approximately 2500 decisions a year pertaining to applications to appropriate water. Ninety-nine percent of these are granted. The department does not use the term "beneficial use studies". AS 46.15.080 sets forth criteria for issuing permits, and the Commissioner makes a decision on whether the proposed appropriation meets all the criteria. One of these criteria [AS 46.15.080 (3)] is that the proposed use of water is beneficial. In that regard the department is continually making decisions as to beneficial use. Given the broad definition, beneficial use is rarely ever an issue.

The majority of these decisions (roughly 70 percent) are non-controversial in nature and represent appropriations of relatively small quantities of water. Roughly 20 percent represent cases which could potentially involve negotiation and resolution of relatively simple issues, concerns, or objections. Approximately 10 percent represent cases which by their very nature involve sensitive issues and public concerns. These usually involve issues ranging from the use of large quantities of water, impacts to important coastal resources and values, and a limited supply of water to meet the demands of users, to whether or not the proposed appropriation is in the public interest. The resolution of these types of cases are given a high priority. Although the department has sustained extensive cuts to this project in recent years, we remain capable of carrying out our statutory responsibilities even though response time has been affected.

4) When somebody comes in with an application, is a beneficial use study initiated at that time or does it only get initiated when another state agency has an interest in it?

No, these issues are not addressed solely when another state agency has an interest. Each individual application requires a decision which includes a finding that the use is beneficial under AS 46.15.080 (3). Most applications are required by statute to go through a public notice process whereby the Commissioner receives input from the public and other state agencies to help determine the public interest aspect of the specific case.

I hope I have adequately addressed your questions. My staff and I are available to respond should you require further information.

Sincerely,

Judith M. Brady
Commissioner

Enclosure

cc: Committee Members
Rod Swope
Bob Evans
Dick LeFebvre

STATE OF ALASKA
WATER USER'S HANDBOOK

Division of
LAND AND WATER
MANAGEMENT

Alaska Department of
NATURAL
RESOURCES

STATE OF ALASKA

WATER USER'S HANDBOOK

WATER MANAGEMENT SECTION
DIVISION OF LAND AND WATER MANAGEMENT
ALASKA DEPARTMENT OF NATURAL RESOURCES
BOX 7-005
ANCHORAGE, ALASKA 99510

May 1981
Revised
June 1984
Jan 1986

FOREWORD

The first issue of the Alaska Water Users Handbook was funded by the 1980 Alaska Legislature to assist Alaskans in improving their knowledge and understanding of water rights within the state. This booklet has been designed to give citizens a broad base of historical background on water rights, information about the procedures which are necessary to obtain a Certificate of Appropriation, pointers on special types of water uses and on-going management programs within the Department of Natural Resources.

The Department of Natural Resources, Division of Land and Water Management, Water Management Section, is responsible for planning and administering the appropriation of water in Alaska. Future conservation and development of water resources is dependent upon these important functions.

The division also publishes "fact sheets" to provide further information on items of importance to Alaskan citizens.

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I. GENERAL INFORMATION ABOUT WATER RIGHTS

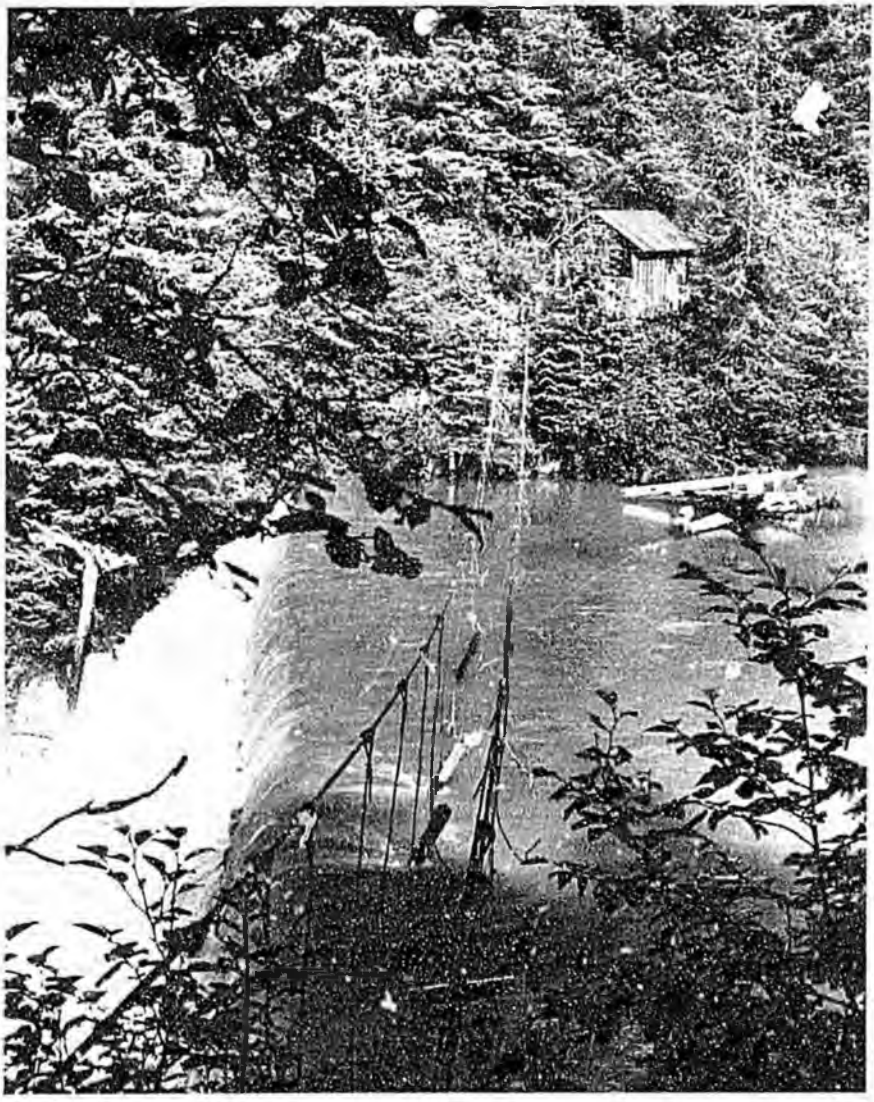


Photo © 1983 Kurt Savikko

The Alaska Water Use Act provides the public with a legal method to obtain water rights for the use of surface and subsurface waters. A water right is a property right and is issued only to individuals who apply for it. The user has the right to divert, impound and/or withdraw specified amounts of water from particular water sources for certain uses.

When the water right is granted, it becomes attached to (appurtenant to) the land where the water is being used, for as long as the water is utilized. If the land is sold, the water right goes with the land to the new owner, unless the water right has been separated from the land through prior approval of the Commissioner of the Department of Natural Resources.

To obtain a water right, individuals must complete the Application for Water Rights (Form 10-102) obtained from and submitted to the local regional or area office of the Department of Natural Resources Division of Land and Water Management. A permit is then issued to develop the water source and the means to use it. Only after the water is being beneficially used is a Certificate of Appropriation issued. This is the legal document which conveys water rights once the water is in use.

In Alaska there are no rights to ground water based on ownership of the overlying land nor are there any rights to surface waters based on ownership of the adjoining or surrounding land.

With an established water right, individuals have a legal standing to assert that right against conflicting uses of water with people who do not have water rights or who are junior in priority. The use of water without a permit or certificate does not give the user defensible legal rights to the water, no matter how long the water has been in use or continues to be in use. Holders of water rights also have a priority to the use of water over persons who later file for water rights from the same water source.

Water rights records provide valuable resource information to the Department of Natural Resources about water use and consumption in Alaska. This information is essential in estimating the present uses of water, predicting future withdrawals, protecting the rights of prior appropriators and providing for proper management of this valuable resource.

If a significant amount of water is needed for a short-term project, such as a construction project, temporary authorization can be obtained. Applications should be made in the form of a letter request to the Department of Natural Resources stating the amount of water needed and the time period for which it will be used. An associated map showing the location of the point from which the water will be taken and if it differs from the source, the place at which the water will be used, should be attached to the letter of request. The temporary authorization does not establish a water right. It is only intended to help avoid problems between those who have a short-term water need and those who have existing water rights.

Photo © 1970 Ken Roberson

II. HISTORY OF WATER RIGHTS IN ALASKA

A. The Alaska Constitution

Water. The issue of water rights was a disputed issue in the State of Alaska for many years. Miners, homesteaders and recreational users argued among themselves for many years about who really had the right to use the water.

In 1959 when Alaska was admitted to the Union and the Constitution of the State of Alaska was ratified, water use was addressed in Sections 3, 13, and 16. These sections outlined the doctrine of "prior appropriation" allowing the first appropriator of water a priority of right over subsequent appropriators on a "first-in-time, first-in-right" basis.
The following sections are quoted from the Alaska Constitution:

SECTION 3, COMMON USE — Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use.

SECTION 13, WATER RIGHTS — All surface and subsurface waters reserved to the people for common use, except mineral and medicinal waters, are subject to appropriation. Priority of appropriation shall give prior right. Except for public water supply, an appropriation of water shall be limited to stated purposes and subject to preferences among beneficial uses, concurrent or otherwise, as prescribed by law, and to the general reservation of fish and wildlife.

SECTION 16, PROTECTION OF RIGHTS — No person shall be involuntarily divested of his right to the use of waters, his interest in land, or improvements affecting either, except for superior beneficial use or public purpose and then only with just compensation and by operation of law.

With the need for a clear definition of the boundaries of the doctrine of prior appropriation, the Alaska Water Use Act was introduced.

B. The Alaska Water Use Act

In 1961, Governor William A. Egan called for a comprehensive water code which would address all aspects of Alaska's future water uses. Frank J. Trelease, Dean and Professor of Law, University of Wyoming College of Law was hired by the Commissioners of the Alaska Departments of Natural Resources, Health and Welfare, Fish and Game, and Public Works as a consultant to draft a comprehensive water code tailored to the future needs of the state.

Trelease's final report, "A Water Code for Alaska, A Report to the State of Alaska," was submitted in January 1962. This code was rewritten as a bill and introduced to the legislature where it failed to pass. A revised version, "The Alaska Water Use Act, Alaska Statutes 46.15.010-270," was enacted in 1966 covering appropriation and use of water. This Act gave a statutory definition to the doctrine of prior appropriation as authorized by the state constitution.

The Alaska Water Use Act established a procedure for maintaining existing rights and obtaining new rights to all ground and surface waters of the state. The Alaska Department of Natural Resources (DNR) was delegated the authority to determine and adjudicate rights to the use of the waters of the state and to administer the Act. Regulations were adopted by the Commissioner of Natural Resources and became effective in February 1967.

These regulations defined existing rights, or "grandfather rights", as those rights which where established as of July 1, 1966. They included the beneficial use of water on mining claims that included within the claim boundaries both banks of the stream from which the water was taken, the use of water after posting a notice of appropriation at the point of diversion, construction of a means of diversion and the recording of a notice of appropriation, the beneficial use of water during the periods of July 1, 1961 to July 1, 1966, and the construction of a means for diverting water to a beneficial use if the construction was in progress on July 1, 1966.

The procedure used in formalizing existing rights was to file a declaration of appropriation with the Commissioner of the Department of Natural Resources during specified filing periods, the last of which closed in April, 1968. A preliminary determination of validity was made and notice was sent to each person who filed within the area. After a 20-day comment period or hearing, the Commissioner then issued or denied the Certificate of Appropriation. Any declarations received since April, 1968 are treated as applications for water rights.

The statutory procedure for obtaining new water rights requires filing an Application for Water Rights with the Commissioner of the Department of Natural Resources. After a permit is issued and beneficial use of water has begun, a Certificate of Appropriation is issued. All persons planning to withdraw, impound or divert surface or ground water must file an Application for Water Rights. (Section III discusses the process of obtaining water rights.)

The original regulations implementing the Water Use Act were extensively amended on December 29, 1979 and incorporated as 11 AAC 93, Water Management. Those of particular interest relate to the appropriation of water, water-well standards, dam safety and construction, and temporary water use. These regulations have significantly reduced the average time for issuance of a domestic water use permit (for 1,000 gallons of water per day or less) from up to six months to a matter of days.

Any questions regarding these regulations or requests for copies may be addressed to any of the local public offices of the Department of Natural Resources, Division of Land and Water Management as listed in the appendix.

The latest amendments to the Alaska Water Use Act include legislation relating to instream uses of water and geothermal development

C. Instream Flow and Geothermal Legislation

The instream flow amendments to the Alaska Water Use Act were passed by the 1980 Alaska Legislature and signed into law by Governor Jay Hammond in June, 1980. The regulations for instream flow became effective in September 1983 and are incorporated in 11 AAC 93.

This legislation allows private parties and public agencies to apply to the Department of Natural Resources for reservations of water for instream uses including fisheries, navigation, recreation, and water quality purposes. It provides for quantification of instream water uses, the establishment of a priority date and issuance of a Certificate of Reservation within the existing state water rights system.

Legislation regarding development of geothermal resources was also passed by the 1980 Legislature. This legislation replaced the lengthy and outdated Geothermal Resources Act and also contained amendments to the Water Use Act.

The bill bases the definition of "geothermal resources" on a temperature threshold exceeding 120°C (248°F). When obtaining rights to the use of hot water resources below 120°C, only a water right is required from the Department of Natural Resources, Division of Land and Water Management. This provides an incentive for local and small-scale developers of thermal energy. Rights to develop geothermal resources above the 120°C threshold may be obtained from the Department of Natural Resources, Division of Oil & Gas. The use of geothermal resources may thus decrease dependency on the more expensive, non-renewable energy resources.

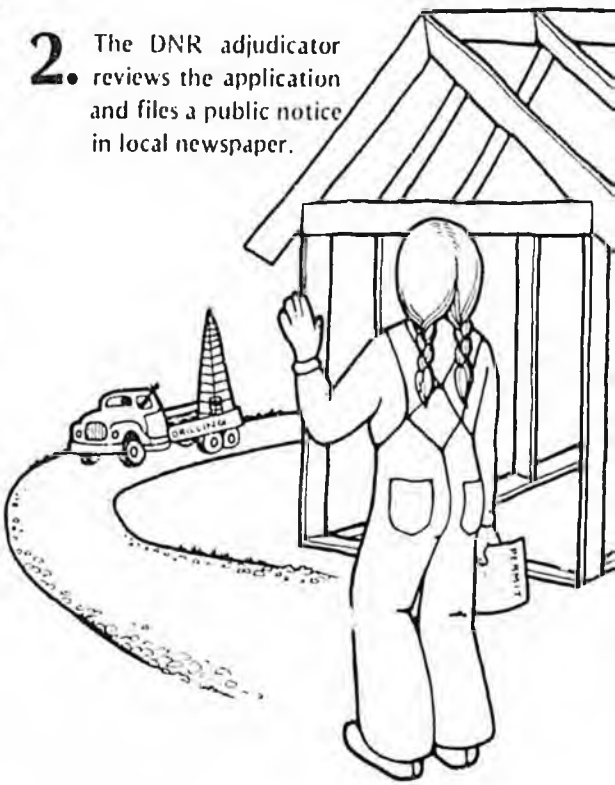
The amendments of the Geothermal Act to Alaska Water Use Act also clarify the ability of the state to place conditions on Certificates of Appropriation. The Act also clarifies the basis for terminating Permits to Appropriate Water. Thus the State has the ability to enforce safety and resource conservation aspects of drilling hot water resources below 120°C.

III. OBTAINING WATER RIGHTS IN ALASKA

A. Water Rights Application to Certificate Process

1. Claimant submits application to the Regional office of DNR.

2. The DNR adjudicator reviews the application and files a public notice in local newspaper.



3. Claimant is issued a permit to begin diversion of water.

4. Water source is developed and beneficial use has begun

5. A site inspector verifies use, methods of diversion, and measures flow of the water source.

6. DNR issues water rights certificate and records document.

B. Filling out an Application for Water Rights

- This completed application should be submitted to the appropriate Department of Natural Resources regional or area office in which the property is located. The application shall be accompanied by the appropriate filing fee as set forth in the fee schedule of the Department of Natural Resources. Please see the appendix for the listing of the local public offices in the Department of Natural Resources.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF LAND AND WATER MANAGEMENT

OFFICE USE ONLY

ADL

APPLICATION FOR WATER RIGHT

Instructions: You will need (1) a map showing the location of your source of water and the area of use, (2) a copy of your property ownership document, i.e. deed, patent, lease agreement or an easement agreement if you do not own the property involved, (3) a copy of your driller's well log, if application is for an existing well, (4) Statement of Beneficial Use Of Water (Form 10-1003A) if this is an existing water use, and (5) Application for Permit to Construct or Modify Dam (Form 10-1015) if you will be constructing a dam over 10 feet high or over 50 acre feet of storage. Please type or print in ink.

- Do not write in the Office Use Only space. The date and time at which the application is submitted are placed here when the application is filed. This date/time stamp is known as the "priority date."

- An Alaska Division of Lands case file number is assigned by the local intake office when the application is properly completed and filed. This number is placed on the receipt, all correspondence, and the permit and certificate when they are issued. Remember, the date/time stamp establishes the priority date, not the case file number. Water rights are issued on the first come, first served principle.

1. Full legal name of Applicant(s) _____

_____

Item 1 - Full legal name:

- The full, legal name of the applicant should be entered here and should correspond with the signature at the end of the form.

- If a husband and a wife are filing the application, the names should be shown as John T. and Mary L. Sample, rather than Mr. and Mrs. John T. Sample.

2. Mailing Address _____

_____

Home Phone_____ Business Phone_____

Item 2 - Mailing Address and Telephones:

- Self-explanatory.

3. Source of Water Supply:

Item 3 - Source of Water Supply:

- Determine whether the water source is a well or surface water. If the water is taken from two separate sources, (such as a well and a stream) two separate applications should be filed.

(a) ☐ Well

☐ Drilled ☐ Hand Driven ☐ Dug ☐ Other _____

If existing well, attach copy of driller's well log.

If existing well, and no log, supply all known information

Total depth_____ _____ Drawdown_____

Intake Depth _____ _____ Screened Yes_____ No_____ Unknown_____

Static level _____

(a) Check the appropriate box for well type and supply a well log or all known information.

- The driller's well log is a record of the various rock layers drilled through, the thickness of those layers and the depth to the water in the well. The driller usually gives the land owner a copy of the well log.

- If the well is in existence and no log is available, please supply information on total depth. This is the distance from the land surface to the deepest point in the well as reached by the drill, the depth of the open hole. If the depth of the well is not known, please state "depth unknown".

- The intake depth is the distance from the ground surface to the device in the well which allows water to enter the well casing going up to the pump.

- The level at which water stands in a well when no water is being taken from the well is the static water level. This is the distance from the ground surface to the water level in the well.

- The drawdown in a well is how much the water level lowers when pumping is in progress or when water is discharging from a flowing well. Drawdown is the difference, measured in feet, between the static water level and the pumping level. The water table in the vicinity of the well is lowered when drawdown occurs.

- Most wells are either screened or have slotted casings. These are installed in wells to permit sand-free water to flow into the well and also to provide support for unstable formations to prevent caving.

(b) ☐ Surface Water

☐ Stream ☐ River ☐ Lake ☐ Spring

Give geographic name (if unnamed, state so) _____

Water will be taken from surface water source by:

☐ Pumping

☐ Gravity Flow System

☐ Diversion (Altering a watercourse) - Attach sketch and plans giving dimensions and specifications.

☐ Damming - Attach sketch and plans giving dimensions and specifications. If dam is over 10 feet high or over 50 acre feet storage, MUST file Application for Permit to Construct or Modify Dam (Form 10-1015).

☐ Other _____

(b) Indicate the type of surface water and its geographic name. If it is unnamed, state "unnamed stream", "unnamed lake", etc.

- Sketches must be attached for diversions, along with plans to divert or alter the water course.

- When a dam is to be built or altered in conjunction with an appropriation, an Application to Construct or Modify a Dam must be filed if the dam is over 10 feet high and/or has over 50 acre-feet of water storage. Sketches and plans giving dimensions and specifications must be attached both for existing dams and dams under construction.

4. Location of point of **WITHDRAWAL, DIVERSION** or **IMPOUNDMENT:**

MUST attach copy of map or subdivision plat and indicate location

(a) Fraction part_____ Section_____
Township_____, Range_____, _____ Meridian.

(b) If applicable, Lot, Block, Subdivision; U.S. Survey No. _____

_____

(c) Does applicant own or lease the property at point of water withdrawal and over which water is transported? Yes ☐ No ☐

If "Yes," MUST attach copy of ownership document (i.e. deed, patent)

If "No," MUST obtain an easement or right-of-way and supply copy. Give name, mailing address and phone number(s) of legal owner.

Name _____

Mailing Address _____

_____ Zip _____

Home Phone _____ Business Phone _____

Item 4 - Location of Point of Withdrawal, Diversion, or Impoundment

- Write the legal description of the parcel of property containing the point of water withdrawal (well, spring, water collection point in stream), diversion or impoundment. Legal descriptions should be precise to at least the quarter-quarter section. If the parcel of property is irregularly shaped, a metes and bounds (boundary line) description is necessary.
- Copies of documents showing proof of interest in this property (deed, patent, lease) should be attached.
- If the property at the point of water withdrawal or over which water is transported is not owned by the applicant, copies of easement or right-of-way applications, permits or agreements, should be attached, if these have been applied for, obtained or executed. The land owner's name, address and telephone numbers must be stated.

5. Location of point of USE: If same as question 4, check and go to question 6. ☐

MUST attach copy of map or subdivision plat and indicate location.

(a) Fractional Part _____ Section _____
Township _____, Range _____, _____ Meridian.

(b) If applicable, Lot, Block, Subdivision; U.S. Survey No. _____

_____

(c) Does applicant own or lease the property at point of water use? Yes ☐ No ☐

If "Yes," MUST attach copy of ownership document (i.e. deed, patent)

If "No," MUST obtain an easement or right-of-way and supply copy. Give name, mailing address and phone number(s) of legal owner.

Name _____

Mailing Addrss _____

_____ Zip _____

Home Phone _____ Business Phone _____

Item 5 - Location of Point of Use.

- Write the legal description of the parcel of property on which the water is to be used. This may or may not be the same as the parcel of property from which the water is withdrawn, diverted or impounded. If the property is the same, check the box on question five and go to question six. A subdivision plat or other type of map showing the location of the point of use must be attached.
- Copies of the ownership document (deed, patent, lease) must be attached for the property at the point of use.

- If the applicant does not own or lease the property, copies of ease ment or right-of-way applications, permits or agreements must be tached. The legal land owner's name, address and telephone numb must be stated. Documents showing proof of the applicant's inter the property must be attached.

6. Type of water use and Quantity of water needed: Please fill in the attached Water Use Chart indica quantity of water and months of use for each type of water use. Standard quantities and definit provided for your convenience. If water use is for a Commercial/Industrial purpose or other Use nc Water Use Chart, refer to question 7.

WATER USE CHART

Office Use SIC	Type(s) of Use	Standard Quantities	Quantity Requested	Months of Us From	To (Inclusive)
8800	(1) Single Family	Per Household	GPD		
	(a) Fully plumbed	500 GPD	GPD		
	(b) Partially plumbed	250 GPD	GPD		
	(c) Unplumbed	75 GPD	GPD		
6514	(2) Duplex	Per Duplex 1000 GPD	GPD		
	(3) Multi-Family	Per Unit 250 GPD	GPD		
7011	(4) Motel, Resort	Per Room 100 GPD	GPD		
	(5) Livestock	Per Head			
0241	Dairy Cows	30 GPD	GPD		
	Hosing dairy barn	35 GPD	GPD		
0212	Range Cattle	15 GPD	GPD		
0272	Horses	15 GPD	GPD		
0214	Sheep	2 GPD	GPD		
	Goats and Hogs	3 GPD	GPD		
	Poultry, Rabbits, etc.	1 GPD	GPD		
		Livestock Total	GPD		
	(6) Irrigation (Type of Crop: _____)	Per Acre 0.5 AFY	AFY		
	(7) Commercial Industrial				
	(8) Other _____				

DEFINITIONS:

GPD—gallons per day AFY—acre feet per year CFS—cubic feet per

(1) SINGLE FAMILY—Water use necessary for a single household and the irrigation of up to 10, ft. of yard and garden.

(a) Fully plumbed—Water piped into the residence for domestic uses. Hot water heater an flush toilet included.

(b) Partially plumbed—Water piped into residence for limited domestic uses. Generally no ho heater and no water flush toilet included.

(c) Unplumbed—No water piped into the residence. Water is hand carried for limited dome

(2) DUPLEX—Water use necessary for two single households and the irrigation of up to 20,000 s yard and garden.

(3) MULTI-FAMILY—Water use necessary; for three or more households. Apartment units incl

Item 6 - Type of Water Use and Quantity

- Specify type of water use, quantity, and periods of use on the attached Water Use Chart. Any exceptions to the standarized quantities must be fully explained in writing and attached.

7. Commercial/Industrial and Other Uses:

   Explain in detail the basis for quantity of water requested. Use additional sheet of paper if needed. Indicate type of operation including structures and methods used. Include a sketch or engineering drawings. Enter quantity requested and months of use on attached Water Use Chart.

Item 7 - Commercial Industrial and Other Uses

- Quantity requested, periods of use and type of use must be stated on the attached Water Use Chart along with any calculations used to determine the quantity requested.

8. Date when water use began or is expected to begin _____. If water use is existing, fill out Statement of Beneficial Use of Water (Form 10-1003A).

Item 8 - Date of Use

- If water use is in existence, show the date use began and also include a notarized Statement of Beneficial Use of Water.

- If the property is being developed, show the approximate month and year when construction is expected to be completed and water use will begin.

HAVE YOU ATTACHED?

- ☐ Deed, patent, lease, etc.
- ☐ Driller's log (if existing well)
- ☐ USGS or Subdivision map
- ☐ Diversion sketch and plans
- ☐ Water Use Chart
- ☐ Dam Sketch and plans
- ☐ Statement of Beneficial Use of Water (Form 10-1003A) (if existing water use)

Attachments

- Check to be sure you have attached all the necessary information. Without these attachments, the application is incomplete and will be returned to you. This will delay the processing of your water right.

Statements appearing herein are to the best of my knowledge true and correct.

► SIGNED _____ DATE
(Applicant)

OFFICE USE ONLY	*x,y*	RMI	Location check	Other

10-102 Rev. 6/79

Signature

- Check to make sure the application is SIGNED with your full legal name and correctly DATED. The application cannot be processed without the proper signature.

Incomplete Applications

An incomplete application will be returned to the applicant with a date time stamp but without an Alaska Division of Lands number, along with the check and attachments, and a letter requesting additional information.

Complete Applications

When it is determined the application is complete, the ADL number is assigned. Your application form will then be processed.

C. Water Quantity Conversion Table

- 1 cubic foot per second (cfs) expresses a rate of flow of water equivalent to the following:

7.48	U.S. gallons per second
448.8	U.S. gallons per minute
646,272	U.S. gallons per day
1.98	acre-feet per day

- 1 acre-foot is equivalent to a volume of water which will cover one acre to a depth of one foot or:

43,560	cubic feet
325,851	U.S. gallons

D. Legal Advertisement and Public Notice

Once the completed application is received and processed, staff of the Commissioner of the Department of Natural Resources may investigate the site. This may include the proposed construction work, source of water or other uses or demands for water within the area. This inspection is to determine if other water rights or the public interest will be affected by the proposed appropriation.

The applicant will then be provided with a prepared request for publication which must appear in a newspaper of general distribution in the vicinity of the water appropriation. The applicant must submit this to the newspaper and pay for the legal ad. This legal advertisement will summarize the proposed appropriation and allow the public to submit comments or objections regarding the appropriation to the Department. If there is no newspaper in the vicinity, the notice must be posted for 15 days in a public place near the proposed appropriation site.

During this period, the Commissioner will also serve individual notice to prior appropriators who may be affected by the new appropriation, and to the Alaska Departments of Fish and Game and Environmental Conservation. Objections must be submitted in writing within 15 days containing all pertinent facts and reasons why the appropriation should be modified or withheld. All objections will be answered in writing by the Department of Natural Resources.

If there are no written objections within the 15 days following publication, posting or serving of notice, the Department will then proceed with adjudication of the application. Any objections received after the closing date for comments will be considered by the Commissioner at his discretion.

Applications to appropriate 1,000 gallons of water per day or less for single-family domestic use are exempt from this public notice except in areas where the total amount of available water appears to the Department to be limited with respect to the number of potential users of the same source. A municipality may also request notice.

Once the posting notice or legal advertisement and public notice period is over and the adjudication is completed, a permit may be issued.

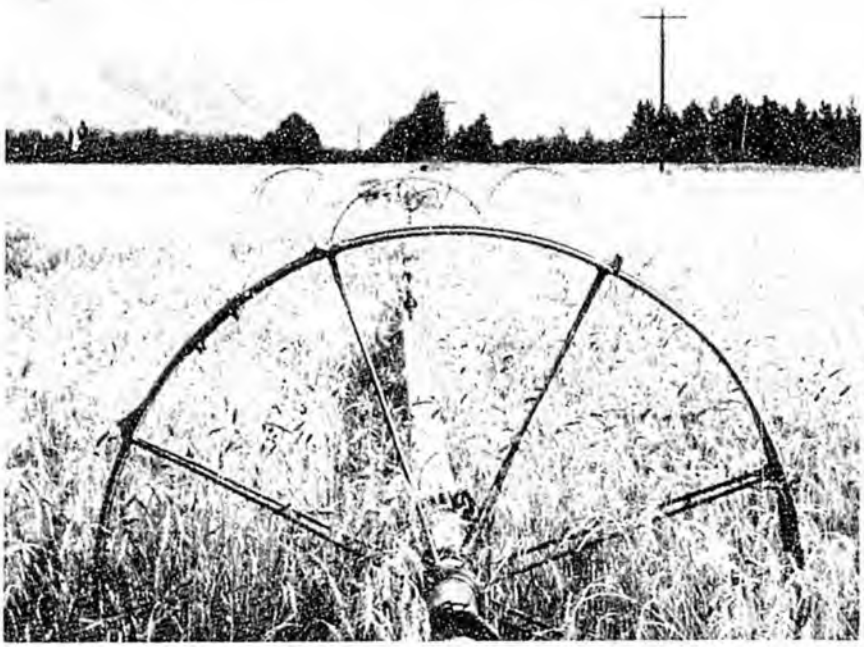
E. Permit to Appropriate Water

The Permit to Appropriate Water is the authorization necessary from the Alaska Division of Land and Water Management to begin construction of a means to take water and begin beneficial use of that water.

The permit allows the permittee to look for water on the specified property, from a specified water source, for a specified use and in a maximum quantity. The permittee may then construct a means to use the water, begin beneficial use of the water and determine the specific quantity of water needed for the development.

The Commissioner will issue the Permit to Appropriate Water if it meets the requirements of Alaska Statute 46.15.080. The permit will be issued for a period of time adequate to complete construction and development of the project and begin using water. Conditions may be placed on the permit, such as the requirement for obtaining an easement or right-of-way or the requirement for metering and/or submission of water use reports.

Once the appropriation is completed, beneficial water use has begun, and the permittee has shown that all permit conditions have been met, the Statement of Beneficial Use of Water (Form 10-1003A) may be submitted requesting that a Certificate of Appropriation be issued.



F. Filling out a Statement of Beneficial Use/Request for Permit Extension/Notice of Relinquishment

Part A - STATEMENT OF BENEFICIAL USE OF WATER

- A notarized Statement of Beneficial Use of Water (Form 10-1003 A) must be submitted to the appropriate Department of Natural Resources regional or area office by the permittee after a water appropriation has been perfected and beneficial use begun, or if a water use is already in existence.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF LAND AND WATER MANAGEMENT

Please complete A, B, or C, as required, and return to your District Office.

-A-

STATEMENT OF BENEFICIAL USE OF WATER

Permit No. _____ ADL _____

Construction of structures authorized under the above numbered Permit to Appropriate Water, of which I am the lawful holder, have been completed and beneficial use of water is being made. I hereby request that a Certificate of Appropriation be issued to me. I certify that I have complied with all conditions on the permit.

Amount of water being used for each type of water use: _____

_____

Item 1 - Amount and Type of Water Use:

- This should state the type and quantity of water use which has been perfected and is being beneficially used. The quantities may not exceed those on the permit.

Location of point of withdrawal, include sketch: _____

_____

Item 2 - Location of Point of Withdrawal:

- The location of the point of water withdrawal, impoundment or diversion must be stated. A sketch of this location may also be submitted

Location of point of use, include sketch: _____

_____

Item 3 - Location of Point of Use:

- The location of the parcel of property on which water is used must be stated. A sketch of this location may also be submitted.

Briefly describe the structures for withdrawing and conveying water to the point of use (if a well, please attach copy of well log): _____

_____

Item 4 - Structures Used

- Structures such as a well, catchment basin, pipe or dam, used to withdraw and transport water to the point of use must be stated. If a well is used to obtain water, a well log should be attached. If a well log cannot be obtained, all known data such as type, depth, and static water level should be submitted.

I certify under penalty of perjury that the foregoing is a true and accurate statement of the extent to which the above water use has been developed.

SUBSCRIBED AND SWORN TO before me this _____ day of _____, 19____

_____
Notary Public or Postmaster

State of _____
Commission expires _____

SIGNED _____
(Permit Holder)

DATE _____

PLACE _____

10-1003A

Item 5 - Signature:

a) The form MUST be signed by at least one of the permittees.

b) The form must be dated.

c) The form must be notarized or witnessed by a postmaster to certify the signature of the permittee.

Part B - REQUEST FOR PERMIT EXTENSION

- If the Permit to Appropriate Water has or will soon expire and the permittee has not completed the structures to appropriate water and/or begun beneficial use of that water, a Request for Permit Extension (Form 10-1003 B) may be filed.

-B-

REQUEST FOR PERMIT EXTENSION

Permit No. _____ ADL _____

Construction of the structures authorized under the above numbered Permit to Appropriate Water, of which I am the lawful holder, have not yet been completed.

The structures already completed. _____

_____

Item 1 - Completed Structures

- List the structures such as a well, catchment basin, pipe or dam that have been constructed and completed to appropriate water

The structures to be installed: _____

_____

Item 2 - Structures to be Installed

- List the structures not yet constructed or completed that are necessary to withdraw, impound or divert water and begin beneficial use of water

The reason work has not been completed: _____

_____

Item 3 - Work Not Completed

- Explain the reasons why the appropriation has not been perfected during the permit period

Estimated date of completion: _____ _____

Item 4 - Completion Date

- State the estimated time to complete the structures to take water and begin beneficial use of water

I hereby apply for an extension of time in which to complete construction of the structures and begin beneficial use of water.

SIGNED _____
(Permit Holder) DATE

Item 5 - Signature

- This form must be signed and dated by at least one of the permittees. The extension request must be accompanied by the appropriate fee as set forth in the fee schedule of the Department of Natural Resources. The permit may be extended for good cause shown. Extensions are granted by amending the Permit to Appropriate Water.

Part C - NOTICE OF RELINQUISHMENT

- If the permittee intends to abandon the works to impound, withdraw or divert water and/or beneficially use all or part of the water, a Notice of Relinquishment (Form 10-1003 C) must be submitted to the local Department of Natural Resources regional office.

-C-

NOTICE OF RELINQUISHMENT

Permit No._____ Certificate No._____ ADL_____

To Whom It May Concern:

The project/beneficial water use has been abandoned and I hereby relinquish to the State of Alaska all my right, title and interest in and to the above numbered Permit to Appropriate Water/Certificate of Appropriation. I understand that the appropriation reverts to the State and the water becomes unappropriated water.

SUBSCRIBED AND SWORN TO before me

this _____ day of _____, 19____

_____
Notary Public or Postmaster

State of _____

Commission Expires _____

SIGNED _____
(Permit or Certificate Holder)

DATE _____

PLACE _____

10-1003B

Item I - Signature

a) The form must have the legal signature of at least one of the permittees.

b) The form must be dated.

c) The form must be notarized or witnessed by a postmaster to certify the permittee's signature.

G. Site Inspection of Perfected Water Rights

Personnel from the nearest regional or area office of the Department of Natural Resources may conduct a field inspection of the completed appropriation. The purpose of this visit will be to determine if actual water use has begun, or to determine what stage of construction has been reached. The water officer may want to see your operation to check the size and type of equipment used, or the area or size of the house to verify the amount of water which you have requested. Water measurements may be taken at this time, if deemed necessary.

The Alaska Water Use Act provides that a water right may only be issued for a quantity of water that is beneficially used. In some instances, applicants inadvertently ask for more water than can be beneficially used or the applicant does not ask for enough water to cover the needs. After the field inspection, the water officer can usually determine the appropriate quantity

Photo © 1980 Gary Prokosch

H. Certificate of Appropriation

Once the water rights application is completed, the permit issued, beneficial use established and any necessary site inspection completed, a Certificate of Appropriation will be issued. When this certificate is issued, it is the applicant's responsibility to have it recorded in the recorder's office in the area in which the appropriation is located.

In the event of a change of address, change of applicant's name or change in ownership of the property, the Department of Natural Resources and recorder's office should be notified in order to keep their files current.

The Certificate of Appropriation conveys a property right and should be kept in a safe place with other documents relating to property ownership.

I. Appeal Procedures

By statute, there are 15 days to respond to a notice of proposed appropriation of water and to file any written objection regarding that application.

The Commissioner of the Department of Natural Resources is obligated by statute to grant or deny any application, in whole or in part, within 30 days of receipt of the last objection. If the Commissioner elects to hold a hearing, the application must be granted or denied within 180 days of receipt of the last objection. If the Commissioner fails to grant, deny or condition the application in accordance with these time periods, the unsatisfied party may appeal directly to Superior Court.

If any person is unsatisfied by a delegated decision or order of the Commissioner he may, within 30 days after the date that the decision or order was mailed or personally served, appeal to the Commissioner for modification or reversal of the decision or order. Before making a decision the Commissioner may require additional information or hold a hearing. The appellant may also request permission to present further information to the Commissioner. If a party is still unsatisfied by the decision of the Commissioner, there are 30 days to appeal to Superior Court in accordance with the Administrative Procedures Act.

IV. GUIDELINES FOR SPECIAL WATER USES

A. Drilling a Water Well

When drilling a water well it is important to determine what the water will be used for and how much water will be needed. For most single family residences in this state, 500 gallons of water per day is more than adequate for a fully plumbed dwelling unit. If the well will serve other needs such as livestock watering, agricultural irrigation, or commercial use, the water well driller must determine the water required in order to design the well. Sources of information for determining these needs are the Department of Natural Resource's Division of Land and Water Management, the Extension Service of the U.S. Department of Agriculture, the Department of Environmental Conservation, and the water-well drilling contractor.

When drilling a water well, the selection of a reliable drilling contractor is a significant factor. Locate the names of local water well drilling contractors from the classified telephone directory, or from local banks, pump dealers, or neighbors who have recently had a well completed. In selecting a contractor, check reliability, reputation, record of satisfied customers and how long they have been established. Do not be afraid to ask the contractor for references; nor hesitate to check those references.

Feel free to ask a prospective contractor the following questions:

1) Will you make a written contract for our mutual protection?

2) Do you carry adequate insurance to protect both of us?

3) Will you explain how you will construct the well?

4) Are you licensed as a specialty contractor with the State of Alaska?

5) Do you furnish a certified log of the well?

Also ask the prospective drilling contractor to itemize the cost estimate as follows:

- cost of drilling per foot
- casing per foot
- cost of other materials, drive shoe, screen, pitless adaptor, etc
- cementing
- developing and test pumping
- water treatment equipment
- pump

Keep in mind that a contractor cannot always determine the depth at which an adequate supply of water may be found. Neighboring wells may give some indication of adequate water depth, but depths may vary significantly within a matter of a few hundred feet on the surface.

If applying for water rights for an existing drilled well, submit a copy of the well log for the well. If there is no copy of the well log, try to contact the original owners to see if they still have one, or if they can identify the water well contractor. If the contractor is located, he may still have a copy of the water well log which should be included with the Application for Water Rights or Statement of Beneficial Use of Water.

In some instances, a water well log may already be on file with the Department of Natural Resources. Since 1977 it has been a state law that water well logs be filed with the Department of Natural Resources. Some drillers have filed their logs while others have not. If a water well driller fails to file a well log, then later goes out of business, it may be impossible to locate a log of the water well.

Driven or hand-dug wells do not require a well log because it is generally impossible to obtain one from a driven well and dug wells are usually very shallow. In either case, however, provide information on the total depth of the well and total yield of the well if it is known.

B. Dam Construction and Safety

When developing water rights, individuals may also need to construct a dam and reservoir at the site. An Application to Construct or Modify a Dam is required by the Department of Natural Resources for dams which are 10 feet or more in height or storing 50 acre-feet or more of water.

In general, any dam 10 feet or more in height must have plans submitted ... well as specifications, topographic maps of the dam site, profiles and cross sections of the dam. And in some cases, detailed hydrologic data, a seepage and permeability analysis of the structure, and a stability analysis must be submitted if the structure is in an earthquake zone.

For dams less than 10 feet in height, or less than 50-acre feet in storage, no special additional approval is needed other than the granting of a water rights permit to develop the water source. However, plans and specifications will generally still be required.

The purpose of the dam construction and safety regulations is twofold. The primary purpose is to maintain an accurate central file system of existing structures. The system may be utilized by civil defense and emergency personnel in the event of an earthquake which may cause cracking or failure of reservoir structures and necessitate evacuation of the area below the dam. The secondary purpose of the dam construction and safety regulations is to ensure a consistent review of dam construction and the application of sound engineering standards in the construction of dams.

C. Water Rights for Placer Mining

Water rights play an important part in mining operations. Mining operations which affect water flow, quantity or quality and anadromous fish habitats need several land and water permits. A single tri-agency application form, the Annual Placer Mining Application for Land Use and Water Use Permits and Mining License (Form 00-001, Revised 12/83), simplifies the permit process. This form may be obtained from and submitted to the nearest local intake office of the Department of Natural Resources, Division of Land and Water Management (see the appendix for these listings).

Completion of this single, joint-application form allows individuals to satisfy the application requirements for the following permits:

1) Permit to Appropriate Water - Issued by the Department of Natural Resources, Division of Land and Water Management.

2) Miscellaneous Land Use Permit - Issued by the Department of Natural Resources, Division of Mining.

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3) Anadromous Fish Permit - Issued by the Department of Fish and Game

4) Wastewater Discharge Permit - Issued by the Department of Environmental Conservation

5) Alaska Mining License - Issued by the Department of Revenue

All applications should be submitted by February 15 of each year to allow time for the issuance of permits before operations in the field begin. A copy of a U.S. Geological Survey 1:63,360 map showing the vicinity of your mining operation should accompany this application.

The 1980 revision of the booklet "Regulations and Statutes Pertaining to Mining Rights on Alaska Lands as Contained in the Alaska Statutes and the Alaska Administrative Code," contains pertinent information of interest to miners and may be obtained at the local offices of the Department of Natural Resources.

V. DEPARTMENT OF NATURAL RESOURCES WATER MANAGEMENT PROGRAMS

A. Alaska Water-Use Data System

Water use in Alaska is increasing significantly. However, all major population and industrial centers indicate concern over the adequacy of present supplies, and possible future sources. In cooperation with the U.S. Geological Survey (USGS), the Department of Natural Resources (DNR) is continuing a program where significant water use in Alaska is recorded, computer stored for evaluation, and then dissemintated to those in need of such data. Information gathered by the State is shared with the USGS, where it is compiled with other co-operating states, then published every five years as a national "estimate." The national publication indicates trends in water use per state based on five categories. Statistical increases or decreases are shown for nation-wide water use per type of use, i.e., hydroelectric, public supply, rural, self-supplied industrial and irrigation.

The development of a computerized water-use program was completed in 1983. With an operational data base, efforts to comp existing water-use data have begun. A five-year Project Managem Plan detailing collection schedules and strategies is being designed enable present and future water users to examine specific areas, to assess their ability to obtain adequate water for either commercial, industrial or private needs, and plan accordingly. (Confidentiality between DNR and providers of commercial or industrial water-use data is maintained. Only a "summary" of total water used per type use is ever published.)

In Alaska, the availability of water-use data for each different type use will provide a powerful and essential tool in regional planning land-use management, water rights adjudications, and for maintain in-stream flows. Mining, recreation, fisheries, irrigation, as well as seafood processing, and hydroelectric power generation are amon the categories established for data compilation. More information the Alaska Water-Use Data System is available through the Department of Natural Resources, Division of Land and Water Management.

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B. Water Resources Inventory Programs

Water resources data gathering programs are conducted by the Water Resources Section of the Department of Natural Resource's Division of Geological and Geophysical Surveys. The Division of Geological and Geophysical Surveys is responsible for all data collection (water as well as geological, soils, etc.) within the Department of Natural Resources. The Water Resources Section conducts data collection programs for surface water, ground water and water quality throughout Alaska. The section also coordinates hydrological investigation and data collection with the U.S. Geological Survey, Water Resources Division.

The U.S. Geological Survey, Water Resources Division is currently, the principal water resources data collector in Alaska. Under its supervision and with cooperation from several other agencies, stream data are collected at 188 stations throughout Alaska. Of these stations, 104 are continuous record stations and 83 are partial record stations. The stations are primarily located near population or activity centers; thus much of Alaska is not adequately covered by the stream station network. Only three lake stage stations exist in spite of the large number of lakes in Alaska.

Wells provided the primary and most important ground water information. Observation wells have been established in order to document water level fluctuations. Of the 141 observation wells, 32 are continuously recording, 64 are long term, and 45 are short term stations. These wells are located near centers of population, but future observation wells are planned for less populated Alaskan communities and locations.

Water quality data are collected from about 56 surface water stations throughout Alaska. Surface waters are variously analyzed for temperature, specific conductance, pH, sediment, inorganic constituents, pesticides, minor elements, radiochemical components and biological data.

Data storage and retrieval is an important part of the Department of Natural Resources data program. Alaskan data for surface water, ground water and water quality are stored in the U.S. Geological Survey WATSTORE computer program. These data can be called for by computer technicians to produce printouts for small or large areas. Also the data are published each year by the U.S. Geological Survey in cooperation with the State of Alaska in a publication called "Water Resources Data for Alaska—Water Year 19_____."

VI. ALASKA WATER RESOURCES BOARD

The Alaska Water Resources Board serves as an advisory group to the governor on all water related matters in the State of Alaska. This Board was created by Article 3 of Alaska Statutes 46.15, the Alaska Water Use Act.

The Board is required to hold at least two meetings each year with one of those meetings held in the state capital. The Board functioned as an active group from the Water Use Act's passage in 1966 until 1975. The Board did not meet in 1976 and 1977.

In late 1977, a concerted effort was made to reestablish the Board as a citizen's advisory group to provide input on an increasingly complex array of water resource issues facing the state. Governor Jay Hammond made appointments to fill existing vacancies and the Board began meeting regularly again in May 1978.

The Water Resources Board covers a wide range of topics at its meetings. Generally, a presentation of a topic is given by an agency representative followed by a discussion of the topic by the Board members. Action taken by the Board is usually in the form of a resolution to the governor or letters to state department commissioners requesting some form of action.

Recently, the Board has addressed itself to matters relating to administrative efficiency on the part of the agencies dealing with the public as well as policy matters that may cut across agency lines.

VII. APPENDICES

A. Regional Location Map

REGIONAL LOCATION MAP

B. Department of Natural Resources Regional and Area Office Locations for Obtaining Forms and Assistance

DIVISION OF LAND AND WATER MANAGEMENT

NORTHERN REGION OFFICE
4420 Airport Way
Fairbanks, Alaska 99709
479-2243

SOUTHEASTERN REGION OFFICE
400 Willoughby Avenue
Suite 400
Juneau, Alaska 99801
465-3400

SOUTHCENTRAL REGION OFFICE
3601 C Street, 10th Floor
Post Office Box 7-005
Anchorage, Alaska 99510
762-2277

MAT-SU AREA OFFICE
Century Plaza, Suite 202
P.O. Box 874008
Wasilla, Alaska 99687
376-4595

DIVISION OF FORESTRY

Haines/Skagway Area Office
Room 6, Gateway Bldg.
Post Office Box 263
Haines, Alaska 99827
766-2120

Petersburg Area Office
Petersburg State Office Building
215 Sing Lee Alley
Box 1580
Petersburg, Alaska 99833
772-3236

Ketchikan Area Office
318 NBA Building
Post Office Box 5220
Ketchikan, Alaska 99901
225-3070

Kenai Peninsula Area Office
Mile 92.5 Sterling Highway
S.R.2, Box 107
Soldotna, Alaska 99669
262-7559

Copper River Area Office
Mile 110 Richardson Highway
Post Office Box 185
Glennallen, Alaska 99588
822-5534

Tok Area Office
Mile 124.1 Glenn Highway
Post Office Box 305
Tok, Alaska 99780
883-5134

Delta Area Office
Mile 267.5 Richardson Highway
Post Office Box 1149
Delta Junction, Alaska 99737
895-4225

McGrath Area Office
McGrath Airport
Post Office Box 130
McGrath, Alaska 99627
524-3010

Alaska Statutes

Title 46. Water, Air, Energy, and Environmental Conservation.

Chapter 15. Water Use Act.

Article
1. Administration (§§ 46.15.010—46.15.020)
2. Appropriation and Use of Water (§§ 46.15.030—46.15.185)
3. Water Resources Board (§§ 46.15.190—46.15.240)
4. General Provisions (§§ 46.15.250—46.15.270)

Article 1. Administration.

Section
10. Determination of water rights
20. Authority and duties of the commissioner

Sec.46.15.010. Determination of water rights. The Department of Natural Resources shall determine and adjudicate rights in the waters of the state, and in its appropriation and distribution. (§ 1 ch 50 SLA 1966)

Sec. 46.15.020. Authority and duties of the commissioner. (a) The commissioner shall exercise all those powers and do all those acts necessary to carry out the provisions and objectives of this chapter. The commissioner may

(1) enter into contractual agreements necessary to carry out the provisions of this chapter including agreements with federal, state and local agencies;

(2) apply for, accept, administer and expand grants, gifts, and loans from the federal government and any other public or private sources for the purpose of this chapter, and adopt procedures and do acts not otherwise restricted by law which are necessary to qualify the state to receive grants, gifts and loans;

(3) establish a division of water in the Department of Natural Resources and assign to that division the responsibility for carrying out the provisions of this chapter.

(b) The Commissioner shall

(1) adopt procedural and substantive regulations to carry out the provisions of this chapter, taking into consideration the responsibilities of the Department of Environmental Conservation under AS 46.03 and the Department of Fish and Game under AS 16;

(2) Keep a public record of all applications for permits and certificates and other documents filed in his office; and shall record all permits and certificates and amendments and orders affecting them and shall index them in accordance with the source of the water and the name of the applicant or appropriator;

(3) cooperate with, assist, advise and coordinate plans with the federal, state and local agencies in matters relating to the appropriation, use, conservation, quality, disposal or control of waters and activities related thereto;

(4) prescribe fees or service charges for any public service rendered. (§ 1 ch 50 SLA 1966; am § 6 ch 104 SLA 1971; am § 50 ch 71 SLA 1972)

Legislative committee report.—For report on ch. 71, SLA 1972 (HCSSB 383 am H), see 1972 House Journal, p. 898.

Article 2. Appropriation and Use of Water.

Sec. 46.15.030. Waters reserved to the people. Wherever occurring in a natural state, the waters are reserved to the people for common use and are subject to appropriation and beneficial use and to reservation of in-stream flows and levels of water, as provided in this chapter. (§ 1 ch 50 SLA 1966; am § 4 ch 84 SLA 1980)

Effect of amendment. — The 1980 amendment, effective June 19, 1980, inserted "and to reservation of instream flows and levels of water" near the end of the section.

Pursuant to the Alaska Statehood Act, the Submerged Lands Act of 1953 applies to Alaska. Alaska Pub. Easement Defense Fund v. Andrus, 435 F. Supp. 664 (D. Alas. 1977).

Ownership and control of land under navigable waters. — The court takes judicial notice of the fact that Alaska lies westward of the 98th meridian. Thus, under federal law, ownership and control of the land under navigable waters is confirmed in the state. Alaska Pub. Easement Defense Fund v. Andrus, 435 F. Supp. 664 (D. Alas. 1977).

Ownership of ground and surface waters is to be determined according to state law. Under the Alaska Constitution and state law, the right to use such waterways is placed in the people of the state. Alaska Pub. Easement Defense Fund v. Andrus, 435 F. Supp. 664 (D. Alas. 1977).

Purpose of easement along courses of major waterways is to provide a place for docks, campsites and such facilities to service those who are properly using the public waters. This purpose is apparently accommodated by the reservation of site easements under the order of the Secretary of the Interior. Alaska Pub. Easement Defense Fund v. Andrus, 435 F. Supp. 664 (D. Alas. 1977).

Sec. 46.15.040 Right to appropriate. (a) A right to appropriate water can be acquired only as provided in this chapter. No right to the use of water either appropriated or unappropriated shall be acquired by adverse use or possession.

(b) A right to appropriate water shall be obtained by first making application to the commissioner for a permit to appropriate. The commissioner shall by regulation prescribe the form and contents of the application and the procedure for filing the application. If a permit is granted and the means of appropriation is constructed a certificate of appropriation may be obtained.

(c) All applications to the commissioner for a permit to appropriate water, filed subsequent to July 1, 1966, shall be considered as having been simultaneously filed with the Department of Fish and Game under AS 16 and the Department of Environmental Conservation under AS 46.03. (§ 1 ch 50 SLA 1966; am § 6 ch 104 SLA 1971; am § 51 ch 71 SLA 1972)

Legislative committee report. — For report on ch. 71, SLA 1972 (HCSSB 383 am H), see 1972 House Journal, p. 898.

Sec. 46.15.050. Priority. Priority of appropriation gives prior right. Priority of appropriation does not include the right to prevent changes in the condition of water occurrence, such as the increase or decrease of stream flow, or the lowering of a water table, artesian pressure, or water level, by later appropriators, if the prior appropriator can reasonably acquire his water under the changed conditions. (§ 1 ch 50 SLA 1966)

Sec. 46.15.060. Existing rights. A water right acquired by law before July 1, 1966 or a beneficial use of water on July 1, 1966, or made within five years before July 1, 1966, or made in conjunction with works under construction on July 1, 1966, under a lawful common law or customary appropriation or use, is a lawful appropriation under this chapter. The appropriation is subject to applicable provisions of this chapter and rules and regulations adopted under this chapter. (§ 1 ch 50 SLA 1966)

Sec. 46.15.065. Determination of existing rights. (a) A claimant of an existing right under AS 46.15.060 shall file a declaration of appropriation with the commissioner as set out in this section. The declaration shall be considered correct until a certificate of appropriation is issued or denied. Priority of such right dates from the day work was begun on the appropriation if due diligence was used in completing the work; otherwise, from the day water was applied for the beneficial use.

(b) The commissioner shall, as soon as practicable, determine the rights of persons owning existing appropriations. To accomplish this, the commissioner shall

(1) by order set a definite period for filing a declaration of appropriation within a specified area or from a specified source;

(2) publish notice of the order once a week for three weeks before the beginning of the period in a newspaper of general circulation in the affected area;

(3) give notice of the order by certified mail to any appropriator within the specified area or from the specified source who has requested mailed notice or of whom the commissioner can readily obtain knowledge including each owner of a recorded mining claim.

(c) The commissioner shall make such investigations as he considers necessary of rights asserted by declarations filed under this section and shall determine each existing appropriation and mail a summary of such determination to each person who has filed a declaration with respect to the specified area or source. Any person adversely affected by a determination may file with the commissioner a request for a hearing within 20 days of the date the notice is mailed. If a hearing is requested the commissioner shall send a notice of the time and place of the hearing to each person who has filed a declaration.

(d) If a hearing is not requested with respect to a determination, or if, after the hearing, the commissioner finds the determination to have been correctly made, he shall immediately issue a certificate of appropriation. If the commissioner finds the determination to be incorrect, he shall correct it and either issue a certificate of appropriation or refuse the certificate according to his findings.

(e) A person aggrieved by the action of the commissioner may appeal to the superior court within 30 days of the date on which that action is final. (§ 1 ch 50 SLA 1966)

Revisor's note. - This section formerly appeared as AS 46.15.135. It was renumbered by the revisor of statutes for more logical arrangement.

Sec. 46.15.070. Notices; objections [Renumbered].

Revisor's note. - This section now appears as AS 46.15.133. It was renumbered by the revisor of statutes for more logical arrangement.

Sec. 46.15.080. Criteria for issuance of permit. (a) The commissioner shall issue a permit if he finds that

(1) rights of a prior appropriator will not be unduly affected;

(2) the proposed means of diversion or construction are adequate;

(3) the proposed use of water is beneficial; and

(4) the proposed appropriation is in the public interest.

(b) In determining the public interest, the commissioner shall consider

(1) the benefit to the applicant resulting from the proposed appropriation;

(2) the effect of the economic activity resulting from the proposed appropriation;

(3) the effect on fish and game resources and on public recreational opportunities;

(4) the effect on public health;

(5) the effect of loss of alternate uses of water that might be made within a reasonable time if not precluded or hindered by the proposed appropriation;

(6) harm to other persons resulting from the proposed appropriation;

(7) the intent and ability of the applicant to complete the appropriation; and

(8) the effect upon access to navigable or public waters. (§ 1 ch 50 SLA 1966)

Sec. 46.15.090. Preference in granting permits. When there are competing applications for water from the same source, and the source is insufficient to supply all applicants, the commissioner shall give preference first to public water supply and then to the use which alone or in combination with other foreseeable uses will constitute the most beneficial use. (§ 1 ch 50 SLA 1966)

Sec. 46.15.100. Terms of permit. The commissioner may issue a permit for less than the amount of water requested, but in no case may he issue a permit for more water than can be beneficially used for the purposes stated in the application. He may require modification of plans and specifications for the appropriation. He may issue a permit subject to terms, conditions, restrictions, and limitations he considers necessary to protect the rights of others, and the public interest. However, the permit shall be subject to termination only as provided in this chapter. (§ 1 ch 50 SLA 1966)

Sec. 46.15.110. Time for construction and completion. A permit may place a time limit for beginning construction and perfecting appropriation. Reasonable extensions of time shall be permitted for good cause shown. (§ 1 ch 50 SLA 1966)

Sec. 46.15.120. Certificates. Upon completion of construction of the works and commencement of use of water, the permit holder shall notify the commissioner that he has perfected his appropriation. If the commissioner determines that the appropriation has been perfected in substantial accordance with the permit, he shall issue the permit holder a certificate of appropriation. The certificate shall set out any condition which the commissioner may prescribe by regulation, including conditions that are necessary to protect the prior rights of other persons and the public interest. (§ 1 ch 50 SLA 1966; am § 9 ch 175 SLA 1980)

Sec. 46.15.130. Priority. (a) Priority of appropriation made under this chapter dates from the filing of an application with the commissioner.

(b) Priority of appropriation perfected before July 1, 1966, shall be determined as provided in § 135 of this chapter. (§ 1 ch 50 SLA 1966)

Sec. 46.15.133. Notices; objections. (a) Upon receipt of an application, the commissioner shall prepare a notice containing the location and extent of the proposed appropriation, the name and address of the applicant and other information he considers pertinent. The notice shall state that within 15 days of publication or service of notice, persons may file with the director written objections, stating the name and address of the objector, and any facts tending to show that rights of the objector or the public interest would be adversely affected by the proposed appropriation.

(b) The commissioner shall publish the notice at the applicant's expense in one issue of a newspaper of general distribution in the area of the state in which the water is to be appropriated. The commissioner shall also have notice served personally or by certified mail upon an appropriator of water or applicant for or holder of a permit who, according to the records of the division of lands, may be affected by the proposed appropriation and may serve notice upon any governmental agency, political subdivision or person; notice shall also be served upon the Department of Fish and Game and the Department of Environmental Conservation.

(c) Within 15 days of publication or service of notice, an interested person may file an objection. The commissioner may hold hearings upon giving due notice and shall grant, deny, or condition the application in whole or in part within 30 days of receipt of the last objection or, if the commissioner elects to hold hearings, within 180 days of receipt of the last objection. Notice of the order or decision shall be served personally or mailed to any person who has filed an objection.

(d) If no objection is filed, the commissioner may proceed to make his determination upon the application.

(e) A person aggrieved by the action of the commissioner or by the failure of the commissioner to grant, deny, or condition an application in accordance with (c) of this section may appeal to the superior court.

(f) The commissioner may, by regulation, designate types of appropriations which are exempt from this section and provide simplified procedures for ruling on the applications. (§ 1 ch 50 SLA 1966; am § 6 ch 104 SLA 1971; am § 52 ch 71 SLA 1972; am §§ 5, 6 ch 84 SLA 1980)

Revisor's note. — This section formerly appeared as AS 46.15.070. It was renumbered by the revisor of statutes for more logical arrangement.

Effect of amendment. — The 1980 amendment, effective June 19, 1980, substituted "if the commissioner elects to hold hearings, within 180 days of receipt of the last objection" for "at the conclusion of the hearing" at the end of the second sentence of subsection (c), and inserted "or by the failure of the commissioner to grant, deny, or condition an application in accordance with (c) of this section" near the middle of subsection (e).

Sec. 46.15.135. Determination of existing rights [Renumbered].

Revisor's note. — This section now appears as AS 46.15.065. It was renumbered by the revisor of statutes for more logical arrangement.

Sec. 46.15.140. Abandonment, forfeiture, and reversion of appropriations. (a) The commissioner may declare an appropriation to be wholly or partially abandoned and revoke the certificate of appropriation if an appropriator, with intention to abandon, does not make beneficial use of all or a part of his appropriated water. An appropriation so forfeited and abandoned reverts to the state and the water becomes unappropriated water.

(b) The commissioner may declare an appropriation to be wholly or partially forfeited and shall revoke the certificate of appropriation if an appropriator voluntarily fails or neglects, without sufficient cause, to make use of all or a part of his appropriated water for a period of five successive years. (§ 1 ch 50 SLA 1966)

Sec. 46.15.145. Reservation of water. (a) The state, an agency or a political subdivision of the state, an agency of the United States or a person may apply to the commissioner to reserve sufficient water to maintain a specified instream flow or level of water at a specified point on a stream or body of water, or in a specified part of a stream, throughout a year or for specified times, for

(1) protection of fish and wildlife habitat, migration, and propagation;

(2) recreation and park purposes;

(3) navigation and transportation purposes; and

(4) sanitary and water quality purposes.

(b) Upon receiving an application for a reservation under this section, the commissioner shall proceed in accordance with AS 46.15.070.

(c) The commissioner shall issue a certificate reserving the water applied for under this section if he finds that

(1) the rights of prior appropriators will not be affected by the reservation;

(2) the applicant has demonstrated that a need exists for the reservation;

(3) there is unappropriated water in the stream or body of water sufficient for the reservation; and

4) the proposed reservation is in the public interest.

(d) After the issuance of a certificate reserving water, the water specified in the certificate shall be withdrawn from appropriation and the commissioner shall reject an application for a permit to appropriate the reserved water.

(e) A reservation under this section does not affect rights in existence on the date the certificate reserving water is issued.

(f) At least once each 10 years the commissioner shall review each reservation under this section to determine whether the purpose described in (a) of this section for which the certificate reserving water was issued and the findings described in (c) of this section still apply to the reservation. If the commissioner determines that the purpose or part or all of the findings no longer apply to the reservation, he may revoke or modify the certificate reserving the water in accordance with AS 46.15.140(b). (§ 7 ch 84 SLA 1980)

Effective date. — Section 12, ch. 84, SLA 1980, makes this section effective June 19, 1980, in accordance with AS 01.10.070(c).

Editor's note. — As to declaration of legislative policy, see § 1, ch. 175, SLA 1980, in Temporary and Special Acts and Resolves.

Sec. 46.15.147. Termination of permits. (a) If the commissioner has reason to believe that a person who holds an appropriation permit under this chapter is wilfully violating or has wilfully violated a term, condition, restriction or limitation of his permit, he may commence proceedings to terminate the appropriation permit under the Administrative Procedure Act (AS 44.62.330 — 44.62.630).

(b) When an appropriation permit is terminated under this section, the appropriation of water made by the permit reverts to the state and becomes unappropriated water. (§ 8 ch 175 SLA 1980)

Editor's note. — As originally enacted, this section was designated AS 46.15.145. However, since a section with that designation had already been enacted by SLA 1980, ch. 84, this section was redesignated AS 46.15.147.

Sec. 46.15.150. Preferred use. (a) An applicant who asserts and proves a preferred use shall be granted a permit and shall be granted preference over other appropriators. A preferred use of water is for a public water supply.

(b) To be entitled to a preference an applicant must show that his use will be prevented or substantially interfered with by a prior appropriation; the use is a preferred use; the applicant agrees to compensate a permit or certificate holder for the prior appropriation for any damages sustained by the preferred use, and other information which the commissioner requires by regulation. (§ 1 ch 50 SLA 1966)

Sec. 46.15.160. Transfer and change of appropriations. (a) The right to use water under an appropriation or permit shall be appurtenant to the land or place where it has been or is to be beneficially used, provided, that water supplied by one person to another person's property shall not be appurtenant to the property unless the parties so intend. An appurtenant water right shall pass with a conveyance of the land, or transfer, or by operation of law unless specifically exempted from the conveyance.

(b) With the permission of the commissioner, all or any part of an appropriation may be severed from the land to which it is appurtenant, may be sold, leased or transferred for other purposes or to other lands and be made appurtenant to other lands. A permit or certificate or a deed, lease, contract, assignment of permit or other instrument transferring an appropriation must be filed for record in the office of the commissioner and a certified copy of the instrument must be recorded in the recorder's office of the recording district in which the appropriation is located. (§ 1 ch 50 SLA 1966)

Sec. 46.15.170. Effect of recording. (a) A deed, lease, contract, assignment of permit or other instrument transferring an appropriation is void as against a subsequent innocent purchaser who in good faith paid a valuable consideration for the appropriation or any portion of it and whose instrument is first filed and recorded under § 160(b) of this chapter.

(b) A deed, lease, contract, assignment of permit or other instrument transferring an appropriation which is recorded under § 160(b) of this chapter is constructive notice of its contents to subsequent purchasers of the appropriation or any portion of it. An unrecorded instrument is valid between the parties to it and as against one who has actual notice of it. (§ 1 ch 50 SLA 1966)

Sec. 46.15.180. Crimes. A person who constructs works for an appropriation, or diverts, impounds, withdraws or uses a significant amount of water from any source without a permit or certificate of appropriation; or a person who violates an order of the commissioner to cease and desist from preventing any water from moving to a person having a prior right to use the same; or who disobeys an order of the commissioner requiring him to take steps to cause the water to so move; or who fails or refuses to install meters, gauges or other measuring devices or control works; or who violates an order establishing corrective control works; or who violates an order establishing corrective controls for an area or for a source of water, or who knowingly makes a false or misleading statement in a declaration of existing rights, is guilty of a misdemeanor. Crimes under this section are in addition to any other crimes provided by law. (§ 1 ch 50 SLA 1966)

Quoted in G & A Contractors, Inc. v Alaska Greenhouses, Inc., Sup. Ct. Op. No 987 (File No. 1763), 517 P.2d 1379 (1974).

Sec. 46.15.185. Appeals. Appeals to the superior court under this chapter are subject to the provisions of the Administrative Procedure Act, AS 44.62.560 — 44.62.570. (§ 1 ch 50 SLA 1966)

Article 3. Water Resources Board.

Sec. 46.15.190. The Water Resources Board. There is created the Water Resources Board composed of seven members having a general knowledge of the use and requirements for use of the waters of the state and the conservation and protection thereof, and the commissioner of environmental conservation or his designee shall serve as an additional, ex officio member serving without a vote. The commissioner of natural resources shall act as the executive secretary of the board, and shall provide clerical staff for the board. Members of the board are appointed by the governor, subject to confirmation by a majority of the members of the legislature in joint session. (§ 1 ch 50 SLA 1966; am § 1 ch 58 SLA 1972)

Sec. 46.15.200. Term of office. The term of office for members of the board is four years. The first members appointed serve as follows: two members serve for one year, three for two years and two for three years. If a vacancy occurs, the governor shall fill it by appointment for the unexpired term. The appointment shall be submitted to the legislature for confirmation at the next regular or special session. (§ 1 ch 50 SLA 1966)

Sec. 46.15.210. Duties of the board. The board shall inform and advise the governor on all matters relating to the use and appropriation of water in the state, including, but not limited to: the effect and adequacy of all state laws and regulations governing the establishment of water rights, the multi-purpose uses of water, the prevention of pollution and the protection of fish and game, studies of the state's water supplies and plans for future requirements, development of water resources, participation of local governmental units in the management of water resources, lands which are or may be needed for dams, reservoirs, flood dams, flood ways, canals or ditches for the impoundment, storage, flow and control of waters. (§ 1 ch 50 SLA 1966)

Sec. 46.15.220. Board meetings. The board shall hold one regular meeting annually at the state capital and one or more additional meetings at the time and place in the state the board selects for the transaction of business. (§ 1 ch 50 SLA 1966)

Sec. 46.15.230. Public meetings. The board may hold and conduct public meetings at any time or any place in the state in order to obtain public opinion on a water use problem or proposal and it may, by majority vote of all members, formally or informally delivered, authorize one or more of its members to hold and conduct a public meeting. (§ 1 ch 50 SLA 1966)

Sec. 46.15.240. Compensation of board members. Each member of the board is entitled to travel expenses and per diem as authorized for state boards by AS 39.20.180 while traveling to or from, or in attendance at, regular or special meetings or conferences authorized by the board. (§ 1 ch 50 SLA 1966)

Article 4. General Provisions.

Section
250. Enforcement authority
260. Definitions
270. Short title

Sec. 46.15.250. Enforcement authority. The following persons are peace officers of the state and they shall enforce this chapter:

(1) a state employee authorized by the commissioner;

(2) a police officer of the state. (§ 1 ch 50 SLA 1966)

Sec. 46.15.260 Definitions. In this chapter, unless the context otherwise requires,

(1) "appropriate" means to divert, impound, or withdraw a quantity of water from a source of water, for a beneficial use or reserve water in accordance with AS 46.15.145;

(2) "appropriation" means the diversion, impounding or withdrawal of a quantity of water from a source of water for a beneficial use or the reservation of water in accordance with AS 46.15.145;

(3) "beneficial use" means a use of water for the benefit of the appropriator, other persons or the public, that is reasonable and consistent with the public interest, including, but not limited to, domestic, agricultural, irrigation, industrial, manufacturing, fish and shellfish processing, navigation and transportation, mining, power, public, sanitary, fish and wildlife, recreational uses, and maintenance of water quality;

(4) "source of water" means a substantial quantity of water capable of being put to beneficial use;

(5) "water" means all water of the state, surface and subsurface, occurring in a natural state, except mineral and medicinal water;

(6) "commissioner" means the commissioner of the Department of Natural Resources;

(7) "director" means the director of the Division of Lands, Department of Natural Resources;

(8) "person" includes an individual, partnership, association, public or private corporation, state agency, political subdivision of the state, and the United States. (§ 1 ch 50 SLA 1966)

(9) "mineral and medicinal water" means

(A) water of a hot spring or spring with curative properties which has been reserved by the federal government under Public Land Order No. 399; and

(B) geothermal fluid, as the term is defined in AS 41.06.060. (am §§3 — 10 ch 84 SLA 1980; am §§ 10, 11 ch 175 SLA 1980)

Effect of amendment. — The first 1980 amendment, effective June 19 1980, added "or to reserve water in accordance with AS 46.15.145" at the end of paragraph (1), added "or the reservation of water in accordance with AS 46.15.145" at the end of paragraph (2), inserted "fish and shellfish processing, navigation and transportation" near the middle of paragraph (3), and added "and maintenance of water quality" at the end of paragraph (3).

The second 1980 amendment substituted "subsurface" for "subsurfaces" near the middle of paragraph (5), and added paragraph (9).

As the rest of the section was not affected by the amendment, it is not set out.

Editor's note. — As to declaration of legislative policy, see § 1, ch. 175, SLA 1980, in Temporary and Special Acts and Resolves.

Sec. 46.15.270. Short title. This chapter may be cited as the Alaska Water Use Act. (§ 1 ch 50 SLA 1966)

Alaska Department of
NATURAL
RESOURCES

ESTHER WUNNICKE,
COMMISSIONER

Fact Sheet:
WATER RIGHTS IN ALASKA

SEPTEMBER 1985

WHAT ARE WATER RIGHTS?

A water right is a property right for the use of surface and subsurface waters by the public as provided by the Alaska Water Use Act (Alaska Statutes 46.15). This water right allows specified amounts of water from particular water sources to be diverted, impounded and withdrawn for specified uses. When a water right is granted, it becomes attached to the land where the water is being used for as long as you use it. If the land is sold, the water right goes with the land to the new owner, unless it is separated from the land with the approval of the Department of Natural Resources.

HOW DO I OBTAIN WATER RIGHTS?

To obtain water rights in Alaska you submit an Application for Water Rights to the Alaska Division of Land and Water Management. You are issued a permit to develop a water source and construct the means to use the water. Once you prove you are beneficially using the water, a certificate of appropriation is then issued. This is a legal document which conveys water rights once the water is being used. In Alaska, there are no automatic rights to ground water because of ownership of overlying land and there are no rights to surface waters because of ownership of adjoining or surrounding land. Use of water without a permit or certificate does not give the user defensible legal rights to the water, no matter how long the water use continues.

WHAT COSTS ARE INVOLVED?

To insure that the public is notified of the proposed water use, you are required to pay the cost of legal advertisement in at least one issue of a local newspaper in the vicinity of the proposed appropriation. However, if the proposed use will not exceed 1,000 gallons of water per day in a single-family domestic household there is no requirement to publish an advertisement. If there are more potential users than the source of water can supply, the Department may require legal advertisement of all types of water rights applicants.

WHY SHOULD I APPLY FOR WATER RIGHTS?

1. If you have established water rights, you have a legal standing to assert those rights against conflicting uses of water with people who do not have water rights.
2. A person with established water rights has priority to the use of water over persons who later file for water rights from the same water source.
3. Anyone who constructs works for the taking of water (an appropriation), or uses a significant amount of water without a permit or certificate of appropriation is guilty of a misdemeanor. (Alaska Statutes 46.15.180)

A significant amount of water as defined by regulation (Alaska Administrative Code 11 AAC 93.970(14)) is the:

- use of 5,000 or more gallons of water in a day from a single source, or;
- the regular daily or recurring seasonal use of 500 or more gallons of water per day for 10 days or more per year from a single source, or;
- any water use that may affect the water rights of other users or the public interest.

4. By filing for water rights, you provide valuable information about water use and consumption in Alaska. This is essential in estimating the present uses of water, predicting future withdrawals, protecting the rights of prior appropriators, and providing for proper management for this important resource.

WHAT OTHER WATER RESOURCES PERMITS MIGHT BE NEEDED FROM THE DEPARTMENT OF NATURAL RESOURCES?

A certificate of approval is required if you want to construct or modify a dam of 10 feet or more in height, or if the storage capacity exceeds 50 acre-feet. A separate application form along with a sliding filing fee applies for various size dams as set forth in the regulations (11 AAC 93.200).

An application for reservation of water may be filed to maintain a specified flow or level of water in a water body at a specified point for specified times. By statute, an instream flow reservation can be made to ensure sufficient water is maintained for protection of fish and wildlife, recreation and park purposes, navigation or transportation purposes, and sanitary and water quality purposes.

HOW DO I OBTAIN AUTHORIZATION FOR SHORT-TERM WATER USE?

Temporary authorization may be required for significant short-term water uses such as construction projects. This authorization does not establish a water right but may help avoid problems with fisheries or existing water right holders. Applications should be made in the form of a letter request to the Department with an associated map showing the location of the water take point and location and amount of water use.

Further information about water rights and copies of the application forms may be obtained from one of the following offices. Applications for water rights must be submitted to a Division of Land and Water Management regional office.

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF LAND AND WATER MANAGEMENT

SOUTHEASTERN REGIONAL OFFICE
400 Willoughby Avenue
Suite 400
Juneau, Alaska 99801
465-3400

NORTHERN REGIONAL OFFICE
4420 Airport Way
Fairbanks, Alaska 99701
479-2243

SOUTHCENTRAL REGIONAL OFFICE
Frontier Building
3601 C Street, 10th Floor
Pouch 7-005
Anchorage, Alaska 99510
762-2277

Mat-Su Area Office
Central Plaza, Suite 202
Pouch 874008
Wasilla, Alaska 99687
376-4595

DIVISION OF FORESTRY

HAINES AREA OFFICE
Room 6, Gateway Building
Main Street
Post Office Box 263
Haines, Alaska 99827
766-2120

KETCHIKAN AREA OFFICE
318 NBA Building
Post Office Box 5220
Ketchikan, Alaska 99901
225-3070

PETERSBURG AREA OFFICE
Petersburg State Office Building
215 Sing Lee Alley
Box 1580
Petersburg, Alaska 99833
722-3236

DELTA AREA OFFICE
Mile 267.5 Richardson Highway
Post Office Box 1149
Delta Junction, Alaska 99737
895-4225

TOK AREA OFFICE
Mile 124.1 Glenn Highway
Post Office Box 10
Tok, Alaska 99780
883-5134

SOUTHWEST (McGRATH) AREA OFFICE
McGrath Airport
Box 130
McGrath, Alaska 99627
524-3010

KENAI PENINSULA AREA OFFICE
Mile 92.5 Sterling Highway
S.R.2, Box 107
Soldotna, Alaska 99669
262-7559

COPPER RIVER AREA OFFICE
Mile 110 Richardson Highway
Post Office Box 185
Glennallen, Alaska 99588
822-5534