

**LAND-ATMOSPHERE-ICE INTERACTIONS  
FLUX STUDY (LAI FLUX)**

**AFTER-OPERATIONS REPORT  
1994**



**Completed by:**

**Polar Ice Coring Office  
Logistics Department  
University of Alaska Fairbanks  
205 O'Neill Building  
Fairbanks, Alaska 99775-1710  
(907) 474-5585**

**PICO  
OR-95-03**

**March 1995**

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## PREFACE

The National Science Foundation tasked the Polar Ice Coring Office at the University of Alaska Fairbanks to support numerous scientists across the United States with the Land-Atmosphere-Ice Interactions (LAI) Flux Study. This included establishing a portable remote camp at Happy Valley, along with science support in Prudhoe Bay, in Barrow, and at Toolik Field Station.

This after-operations report will outline all science support activities for the LAII Flux Study including facilities, transportation, flying hour program, communications, food service, cargo and passenger movement, medical services, permitting activities, hazardous materials, and waste management.



*The LAII Happy Valley Camp approximately 80 miles south of Prudhoe Bay,  
Alaska (July 1994). (Photo by Sam Lamont)*

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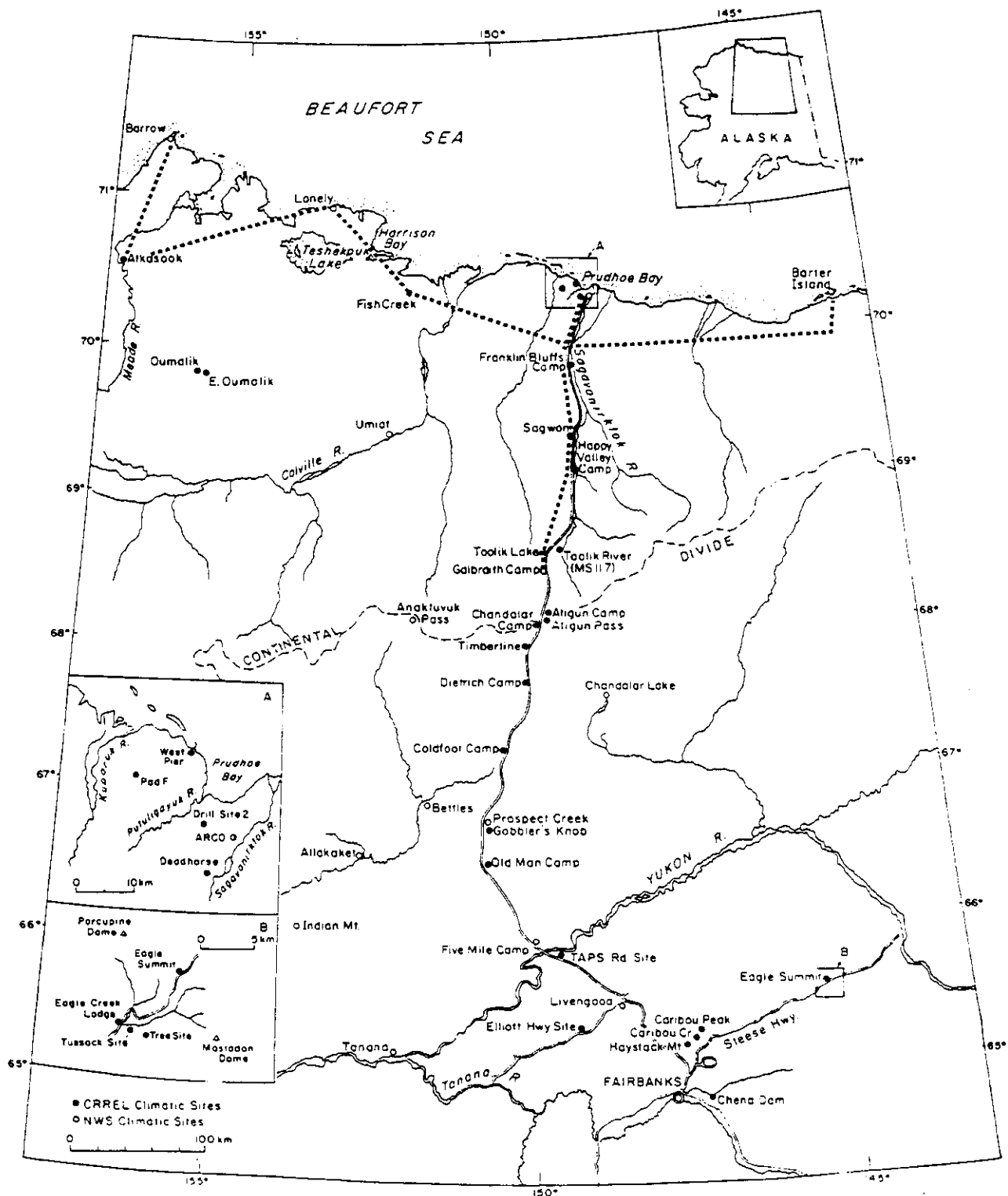
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## MISSION STATEMENT

The Polar Ice Coring Office is a National Science Foundation contract with the University of Alaska Fairbanks for the collection of cores for scientific study. This tasking has expanded to encompass all aspects of drilling (ice, soil, rock), logistics, and research and development, to meet the needs of the scientific community.

# NORTH SLOPE MAP



## HAPPY VALLEY CAMP

The LAII Happy Valley Camp is a portable facility designed to provide basic lab space, communications, berthing, food service, and aircraft support for up to 20 visiting scientists during the short Arctic summer. The camp can be transported and stored in two 45-foot vans and is transportable by aircraft.

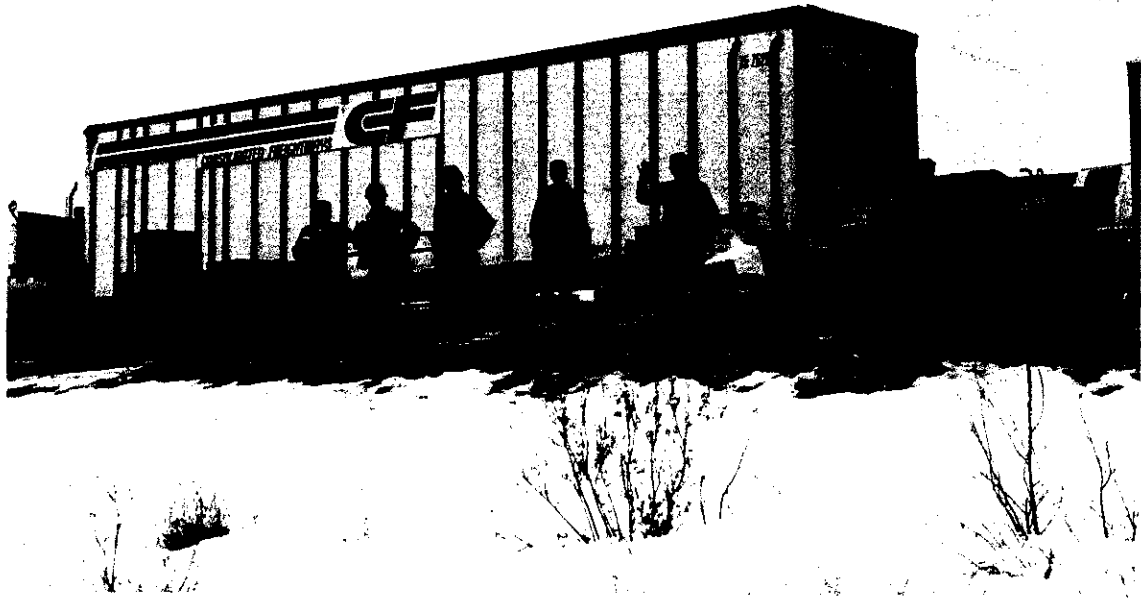
Currently the camp can be set up or taken down in five to ten days with a five-person crew. The variation in setup time is largely dependent on weather and terrain conditions. This was the first season of operation at Happy Valley, and the camp lived up to our expectations. Lessons learned this season should contribute to shorter setup time and even smoother operation during the next field season.

See Attachment A for the Happy Valley Camp layout.

### 1994 HVC Field Season Summary

May 19	Put-in crew arrives
May 20	Truck arrives with portable camp, construction begins
May 24	First scientists arrive
May 29	Construction crew departs
May 30	First filling of water storage tank, kitchen plumbing on-line
June 02	Camp completely operational
June 22	Helicopter arrives
June 25	7600-gallon fuel berm set up, 6000-gallon Jet A1 fuel tanker arrives, Toolik Field Station refueling berm established and supplied with Jet A1 fuel
Aug 05	Helicopter departs
Sept 03	Fuel tanker departs, last group of science personnel departs, packing begins
Sept 04	Pull-out crew arrives
Sept 05	Camp dismantling begins, packing continues, first 45-foot van arrives
Sept 08	Second 45-foot van arrives, both vans loaded and stored at Sag River DOT
Sept 09	Final cleanup of site
Sept 10	Final trash run to Deadhorse
Sept 11	Return to Fairbanks





*The put-in crew and the main part of the camp arrive at Happy Valley and begin camp setup (May 20, 1994). (Photo by Sam Lamont)*

## **Facilities**

### **Science Laboratory Weatherport:**

18' x 25' x 10' weatherport with a 7' x 9' x 7' vestibule on a portable wood floor system.

This insulated, heated area contained chairs, tables, lamps, plug strips, and uninterrupted power supply units (UPS). Researchers set up their instruments, computers, and other equipment for their lab activities. The lab weatherport functioned as an office, shop, lab, collection center, and data processing center for all research groups. See Attachment B.

### **Kitchen/Dining Weatherport:**

18' x 25' x 10' weatherport with a 7' x 9' x 7' vestibule on a portable wood floor system.

This insulated, heated building contained the kitchen, food service area, dining area, office/communications center, and potable water system. This unit also functioned as a central gathering place and warming shelter for participants. See Attachment C.

**Potable Water System:**

Stream water from Happy Valley Creek was pumped 150 feet to the kitchen weatherport. The camp water system was comprised of a 250-gallon storage tank, a shallow well pump, and demand hot-water heaters. The water was prefiltered with a 20-micron screen filter, chlorinated, then passed through a 10-micron sediment filter and a 5-micron charcoal filter. This system was approved by the Department of Environmental Conservation (DEC). See Attachments D and E.

The original potable water plan included an ultraviolet filter. Data on the effectiveness of this filter for eliminating giardia was inconclusive; therefore, we chose not to use it. DEC pointed out that the original drawing, which showed two holding tanks, had a plumbing loop that could allow for inadvertently bypassing the filtration system. We eliminated one holding tank and corrected the plumbing filtration loop.

Operating under a 500-gallon-per-day use permit, water consumption was closely monitored. The average usage for the 95-day field season was 98.7 gallons per day. Monthly water samples were sent to a laboratory in Fairbanks for analysis. All samples met or exceeded state standards for potable water.

**Berthing:**

Ten 8' x 8' and four 10' x 10' arctic oven tents provided berthing. The tents were set up and equipped with two cots and two insulated sleeping pads. One 10' x 10' tent was used for equipment storage. At peak loading, two people were required to share a tent. When loading permitted, individuals had their own tents. During camp setup and breakdown, PICO staff and visiting researchers were housed at the neighboring Arctic Wilderness Lodge.

**Food Storage Shelter:**

This 12' x 17' x 8' boonie barn frame and fabric structure with wooden floor system served as the food storage shelter. This unheated structure was used for all nonperishable food storage and housed a propane freezer.

**Bathhouse:**

This structure was an 8' x 8' x 8' knockdown, wood-framed building. This uninsulated structure was heated with a small electric heater, as needed. The bathhouse contained two lavatory sinks, a shower, utility sink, and wringer washing machine. See Attachment F.



*An aerial view of the Happy Valley Camp on July 4, 1994. (Photo by Sarah Hackney)*

**Generator Shed:**

8' x 8' x 8' knockdown, 3-sided, wood-framed shed

7' x 8' x 1' containment berm

2 ea. 6 kW gas-fired Onan generators

1 ea. 12.5 kW diesel-fired Lister generator

These generators were the heart of the camp. All three units were housed in the generator shed within a containment berm. The berm was sized by volume to hold 110 percent of the largest tank used to fuel the generators. A 6-kW unit was used during periods of low electrical demand, while the 12.5-kW Lister was used during peak periods. During the main body of the season, electrical power was generally available 24 hours a day. See Attachment G.

## **Waste Management**

### **Gray Water System:**

Gray water was filtered through a grease trap to a settling basin. The waste water was then pumped through a 20-micron "silver bullet"-type swimming pool filter. It then ran through 50 linear feet of 2" drain pipe to 10 linear feet of 2" perforated drain pipe. This pipe was buried 18 inches below the surface of the gravel pad. Initially the drain pipe was buried 6 inches; however, during periods of excessive rain, the effluent percolated to the surface. Burying the drain pipe to an 18-inch depth eliminated this problem. Problems were encountered with the 20-micron filter. It routinely became plugged with food particles and grease, requiring cleaning with very hot soapy water. In August, we received 200-micron filter cloth and began experimenting with this filter medium. We recommend the use of 200-micron filter cloth next season. Both the kitchen and the shower room were always supplied with biodegradable soaps.

### **Garbage Disposal:**

Two upright barrel stoves were constructed and used to incinerate all paper and wood scrap. These units burned quite hot, allowing for clean and thorough burning. At the end of the season, the ash was retrograded to Fairbanks for disposal. All plastic, metal, food scraps, etc., were double-bagged in plastic trash bags and taken out nightly. They were stored in either metal screw-top drums or heavy-gauge plastic overpack drums with screw-top lids. Approximately every two weeks, these drums were taken to the Service Area 10 disposal facility at Prudhoe Bay.

Used oil and petroleum products, as well as used absorbent pads, were kept in overpack drums inside of the fuel berms. Products that were accepted went to Service Area 10, and the products that were not accepted were transported to UAF for proper disposal.

### **Portable Toilets:**

Field portable toilets were supplied and serviced by local vendors.

## **Hazardous Materials**

The Field Operations Manager and the General Field Assistant were certified in the handling and transportation of hazardous materials. Shipment of hazardous materials by ground or air was done in accordance with current CFR 49 or IATA regulations. All hazardous material shipments were accompanied by the required documentation. An MSDS file was maintained at camp and the home office for all regulated and some unregulated materials. Any material that could not be properly disposed of at camp was



*The 6000-gallon tanker arrives at Happy Valley Camp with a season's supply of fuel for the helicopter (June 25, 1994). (Photo by Scott Jackson)*



*The 7600-gallon-capacity ATL inflatable fuel berm has only 6 parts. It can be set up in 60 to 90 minutes. A hand pump was used for volume filling and a 12-volt pump was used to top off the pontoons to the required p.s.i. pressure. (Photo by Scott Jackson)*

taken to Service Area 10 or to UAF Risk Management for proper disposal. Most of the hazardous materials at camp were POL products.

### **Fuel Berms:**

Six fuel berms were set up and maintained. All berms were sized to meet or exceed the 110-percent-capacity requirement of the Department of Environmental Conservation. The berms were:

- 7600-gallon inflatable tanker berm for Jet A1
- 500-gallon barrel berm
- 330-gallon, 20-mil fabric barrel berm
- 330-gallon, 20-mil fabric fuel tank berm
- 330-gallon, 20-mil fabric generator berm
- 900-gallon barrel berm (Toolik Field Station)

In addition, a second 500-gallon berm was in stock, and three 3½' x 3½' x 4' collapsible berms were constructed. The small berms were designed to hold a small generator and 20 gallons of fuel and were easily transportable via helicopter. With the exception of vehicle fueling, it was routine for all fuel transfers to take place inside of a berm. All of the fuel hoses used were retrofitted with automatic nozzles.

A 6000-gallon Jet A1 tanker was kept at camp to fuel the helicopter, and a temporary refueling berm was set up at Toolik Field Station during flight periods.

Bottled propane was used for cooking, water heating, and space heating.

## **Transportation**

### **Ground Transportation:**

Two extended-cab, 4x4, 3/4-ton pickups were rented for science and logistics support. Typical activities included fuel transfers, airport taxi, use by participants, expediting, trash hauling, and water hauling.

### **Helicopter Support:**

A helicopter was positioned at Happy Valley Camp from June 22 through August 5. This helicopter was a Jet Ranger II capable of hauling passengers and cargo.

The following is a schedule of helicopter use by principal investigators (PIs) throughout this field season:

<b>Principal Investigator</b>	<b>Hours Requested</b>	<b>Hours Used</b>	<b>Balance</b>
Chapin A-100	20	18.3	1.7
Hobbie A-1100	38	31.2	6.8
Kane A-115	7	7.9	<0.9>
Oechel	35	23.7	11.3
Walker	33	33.1	<0.1>
Reposition Hours	5	1.7	3.3
Sling Drums (0.2)			
Sling Load (0.6)			
PICO (0.9)			
<b>Total Program Hours</b>	<b>138</b>	<b>115.9</b>	<b>22.1</b>

#### **Commercial Airline Travel:**

The PICO office arranged for and coordinated commercial airline reservations on an as-requested basis.

#### **Communications**

Real-time communications to and from Arctic regions is vital to modern research and an asset to good science support. Communication in the Arctic is also expensive and problematic with no guarantees of 24-hour, uninterrupted contact with the rest of the world. Geographically, Happy Valley is at the bottom of a communication well that impedes even local communications. Trying to maintain a viable system required imagination, the latest technologies, patience, and diligence.

#### **Terrastar C - Portable Earth Station - Telex, E-Mail, Data Transfer:**

The Terrastar C was the most consistently dependable means of communication. It was used for routine messages and forwarding e-mail. Its usefulness was somewhat limited by the need to communicate directly with other portable earth stations.

#### **Terrastar M - Portable Earth Station - Voice, Fax:**

The Terrastar M offers the greatest potential for what we consider "normal" voice and fax communications in real time. This cutting-edge technology was both wonderful and frustrating. The voice worked well about 75 percent of the time, and the fax worked less than 10 percent of the time, despite a midseason software overhaul by the manufacturer. The system is so new that it still has software problems, especially in areas

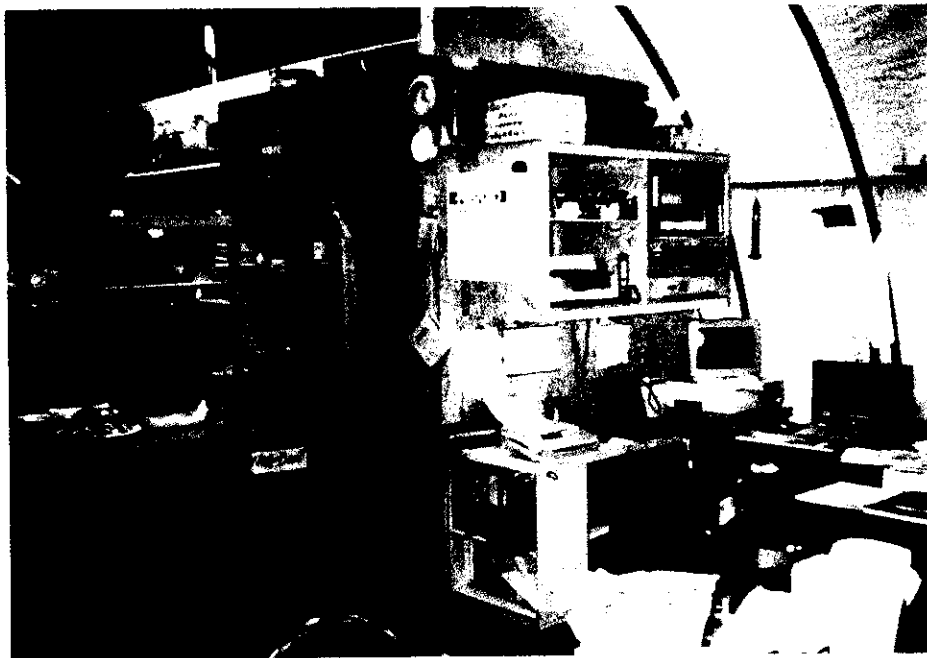
of marginal reception like the High Arctic. If promised upgrades are successful, this will be the workhorse of remote camp communication systems.

### **Cellular Phone:**

The cellular phone is relatively inexpensive, very portable with good range. This is great as long as you are near a cell transmitter. These phones were used routinely by teams working within range of a transmitter. Camp use required driving to a vantage point 15 miles north of camp to pick up the Prudhoe Bay transmitter.

### **VHF Radio:**

This system was used to communicate between base and the helicopter, and the helicopter and field parties. Range was often limited by geographic features.

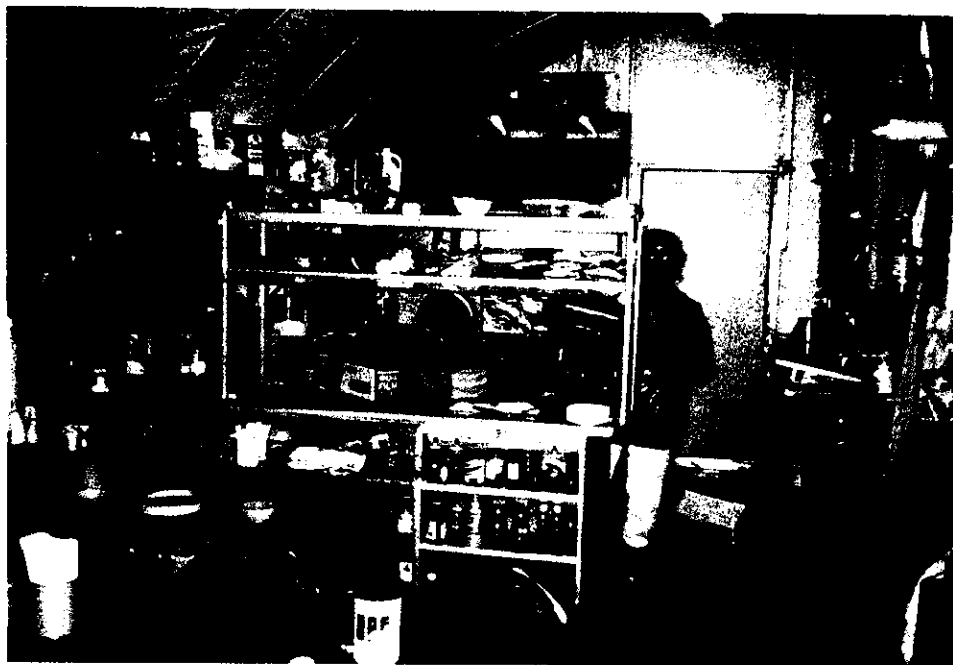


*The kitchen weatherport also housed the communications center which included telexes, computers, satellite telephone and fax, and VHF radio. These systems were used daily to coordinate camp activities and to help keep research projects on schedule.*  
*(Photo by Sam Lamont)*



## Food Service

A full-time cook prepared a hot breakfast, sack lunch, and dinner for all participants daily. Beverages and snacks were available 24 hours a day. The majority of dry goods were stockpiled during camp opening. Weekly supply runs provided all fresh foods, allowing for minimal cold-storage requirements.



*Sarah Hackney, the camp coordinator and cook, in the Happy Valley Camp kitchen and dining area. Sarah's consistently good cooking contributed to the great morale in camp.*  
*(Photo by Sam Lamont)*

## Cargo

Cargo was forwarded to field sites from Fairbanks via ground or air transportation. Commercial carriers serving the North Slope delivered resupply items two to three times a week. Special delivery of critical items was possible.

## Medical Services

First-responder needs were covered by camp staff with a local physician available for consultation 24 hours a day. Medical emergencies would be directed to the nearest Pump Station or to the oil field clinics at Prudhoe Bay. Communications from camp were available 24 hours a day. Transportation from camp was always available by either

truck, helicopter, or fixed-wing plane. In the case of an extreme emergency, a medevac patient would be flown to Prudhoe Bay or directly to Fairbanks, as needed. There were no medical emergencies reported at camp this season.

### **Permitting**

Permits were obtained from the following agencies:

1. State of Alaska, Department of Natural Resources
2. State of Alaska, Department of Environmental Conservation
3. State of Alaska, Department of Fish and Game
4. State of Alaska, Department of Transportation
5. Bureau of Land Management
6. North Slope Borough
7. Alyeska Pipeline Service Company

A permit activity completion report was submitted to all permitting agencies in October 1994. Please reference this completion report for a description of all permitting activities.

### **Wildlife Incidents**

On May 27, 1994, just prior to opening, a young bear visited the camp. As we drove into the camp, the bear ran off. It was seen several times throughout the season in the area; however, it was only seen in camp one time, in mid-July. During that visit, the bear was scared off with warning shots and capsicum spray. After camp closing, a mature bear apparently entered the camp area on two evenings: September 7 and 8. The main structures were already down and ready to be loaded for retrograde; therefore, no equipment was damaged by the bear.



*At the end of the season, the entire camp was inventoried, labeled, and neatly stored in two 45-foot trailer vans at the State of Alaska Sag River highway maintenance station near the Happy Valley site. (Photo by Sam Lamont)*

## **BARROW**

Science support in Barrow included securing housing, food services, transportation, and chartered aircraft coordination.

### **Facilities**

A contract was established with UIC NARL to provide wet-lab space through a two-year lease agreement. This wet lab included two double sinks and 24' x 18' of usable space.

### **Transportation**

A pickup truck was provided from June through August for local transportation use. Additionally, ATVs were provided on an as-requested basis.

### **Housing and Food Services**

The majority of housing and food services was provided by UIC NARL. This arrangement consisted of a flat daily fee, paid by PICO, which included housing and meals. During overflow periods, when UIC NARL was unavailable, users were housed at other locations.

### **Cargo**

Upon request, cargo was transported from Fairbanks to Barrow via air transportation.

### **Permitting**

All necessary permits were obtained, and a permit activity completion report was completed and submitted to all permitting agencies in October 1994. Please reference this completion report for a detailed description of all permitting activities.

Permits were obtained from the following agencies:

1. State of Alaska, Department of Natural Resources
2. State of Alaska, Department of Environmental Conservation
3. State of Alaska, Department of Fish and Game
4. State of Alaska, Department of Transportation
5. Bureau of Land Management
6. North Slope Borough
7. Alyeska Pipeline Service Company

## **PRUDHOE BAY**

Science support in Barrow included securing housing, food services, transportation, communications, and chartered aircraft coordination.

### **Housing and Food Services**

A contract was established with Service Area 10 and Prudhoe Bay Hotel to provide all housing and food services for a flat daily rate. In an effort to reduce costs, Dr. Walter C. Oechel's group agreed to stay in dormitory accommodations at Service Area 10. This provided a considerable cost savings to the overall program.

### **Transportation**

A Suburban was provided throughout the field season for Dr. Oechel's group. This vehicle was used for local transportation, in addition to shuttling between Happy Valley Camp and Prudhoe Bay.

### **Communications**

Two phone lines were established and cellular phones provided to the scientists for communications with oil field security and field parties. This eased the passage process with security during deployment and redeployment from the field sites. Additionally, it allowed a direct communications link amongst the rotating field parties and the PICO/UAF office.

### **Cargo**

Upon request, cargo was transported from Fairbanks to Prudhoe Bay via air and ground transportation. In addition, support was provided for transporting hazardous materials for PIs in the field.

### **Medical Services**

A verbal understanding existed with the BP Exploration North Slope Medical Facility to provide routine medical services and medevac support. Routine services would be provided at no charge, and any medevac would be on a charge-back basis.

## Permitting

Permits were obtained from the following agencies:

1. State of Alaska, Department of Natural Resources
2. State of Alaska, Department of Environmental Conservation
3. State of Alaska, Department of Fish and Game
4. State of Alaska, Department of Transportation
5. Bureau of Land Management
6. North Slope Borough
7. Alyeska Pipeline Service Company

A permit activity completion report was completed and submitted to all permitting agencies in October 1994. Please reference this completion report for a detailed description of all permitting activities.

## **TOOLIK FIELD STATION**

Science support at Toolik Field Station consisted of a helipad site with refueling capabilities for Jet A1 fuel; delivery and ongoing resupply of helicopter fuel; vehicle and manpower support; and coordination of air and ground travel.

### **Hazardous Materials**

A 500-gallon-capacity refueling site for Jet A1 fuel was set up and maintained throughout the season. This fuel site was contained in a 900-gallon-capacity fuel berm. Jet A1 fuel was the only classified material kept at the helipad. A spill response kit with an approved hazardous waste container was kept on site.

### **Transportation**

A Bell Jet Ranger was supplied for transporting researchers to and from remote sites and for aerial surveys. Two 3/4-ton extended-cab pickup trucks provided ground support. All these vehicles were deployed from the HVC.

### **Communications**

Hand-held radios were available for field party communications between parties and between parties and the helicopter. The helicopter, when in range, could communicate with the HVC base station. Phone and fax were available at Toolik Field Station.

### **Permitting**

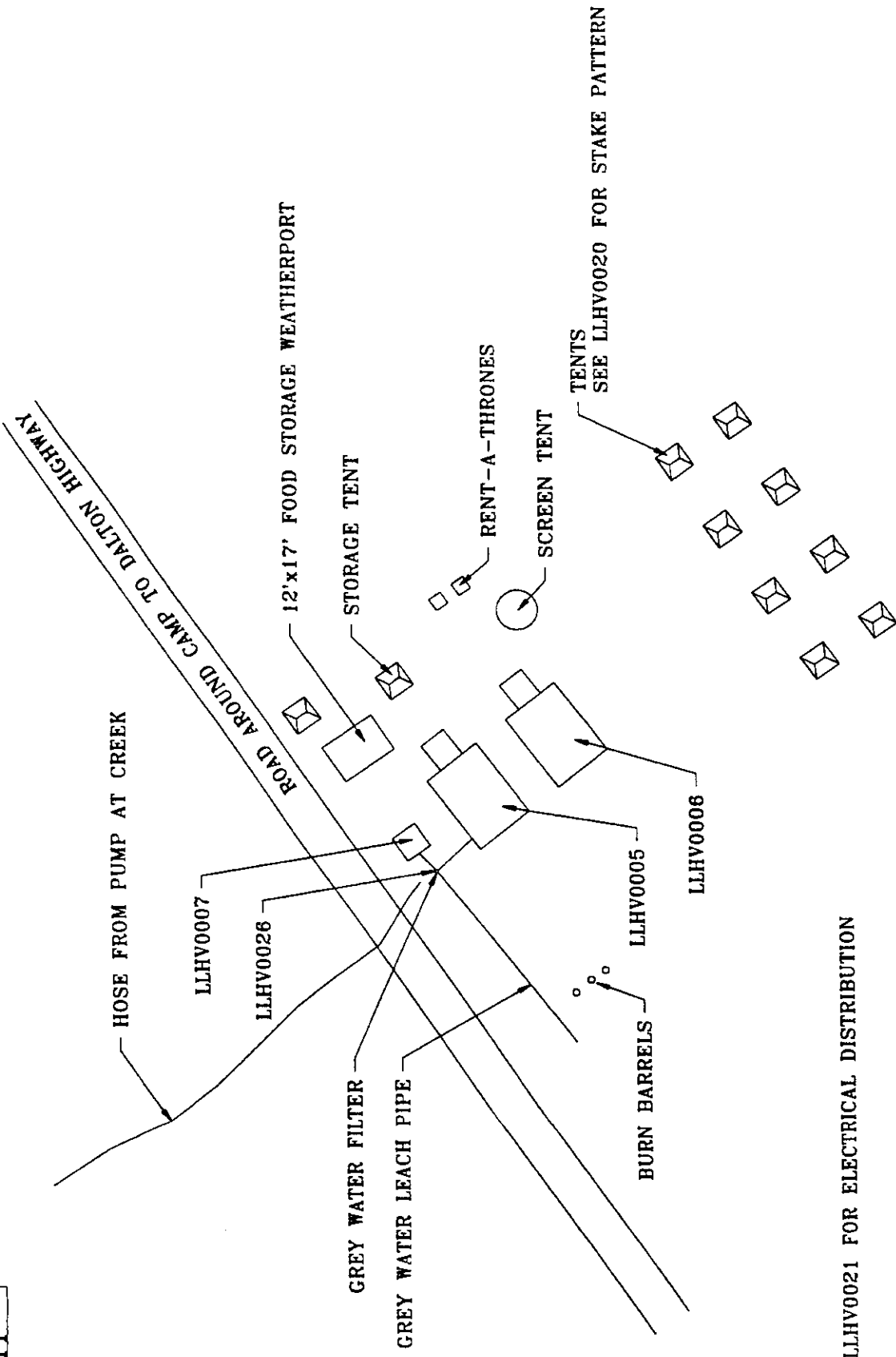
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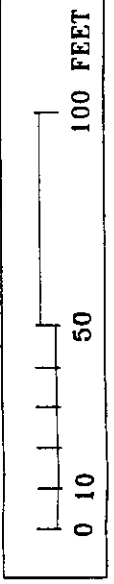
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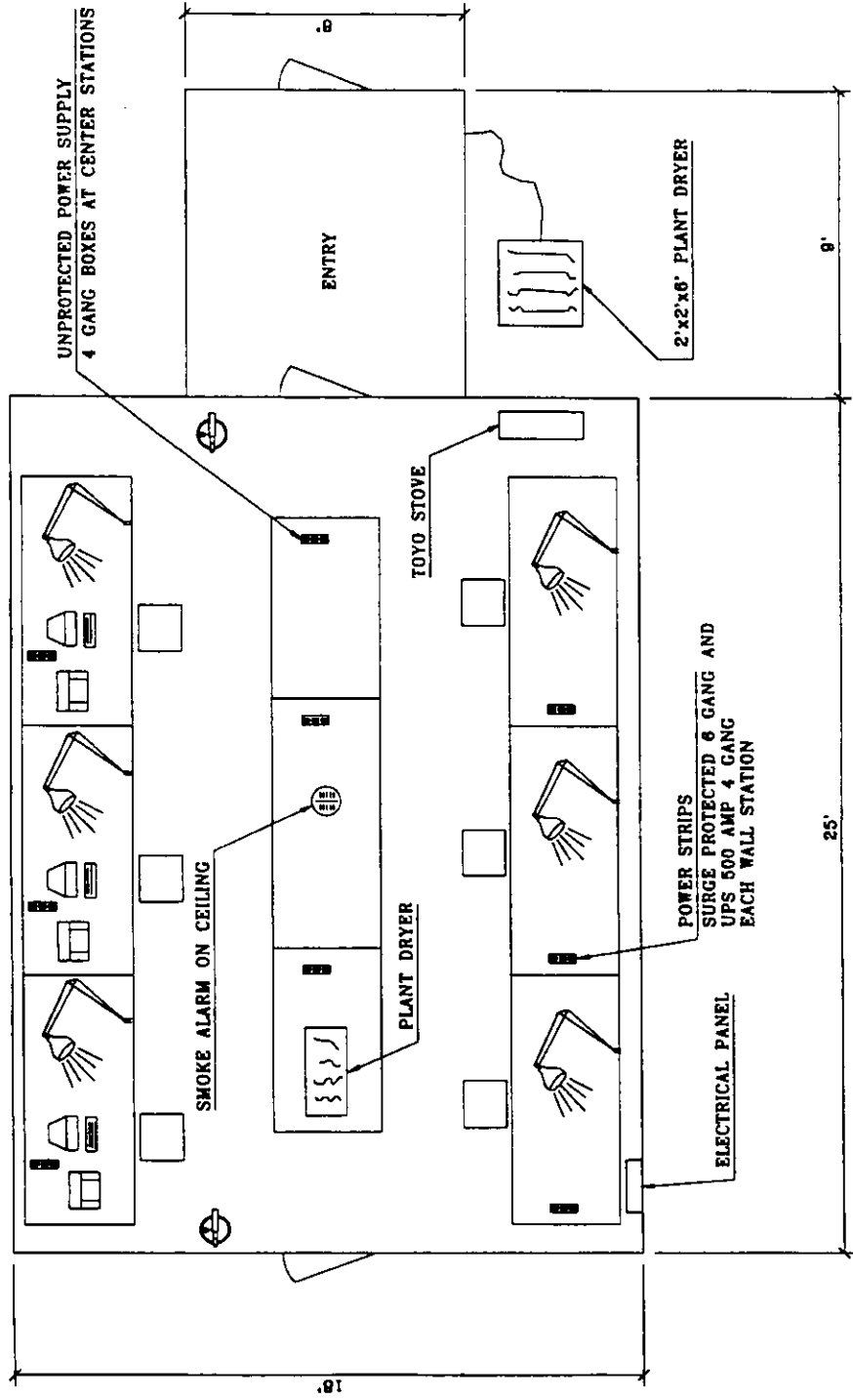


**OPIC**  
 Polar Ice Coring Office  
 55 Field Station, University of Alaska, Fairbanks, Alaska 99775

**HAPPY VALLEY CAMP  
 LAYOUT OF MAIN CAMP**

K.G.B.  
 31 Jan. 95  
 NONE  
 LLHV0002

90000000



**P I C O**  
 Polar Ice Coring Office  
 1000 University Ave., Boulder, CO 80502

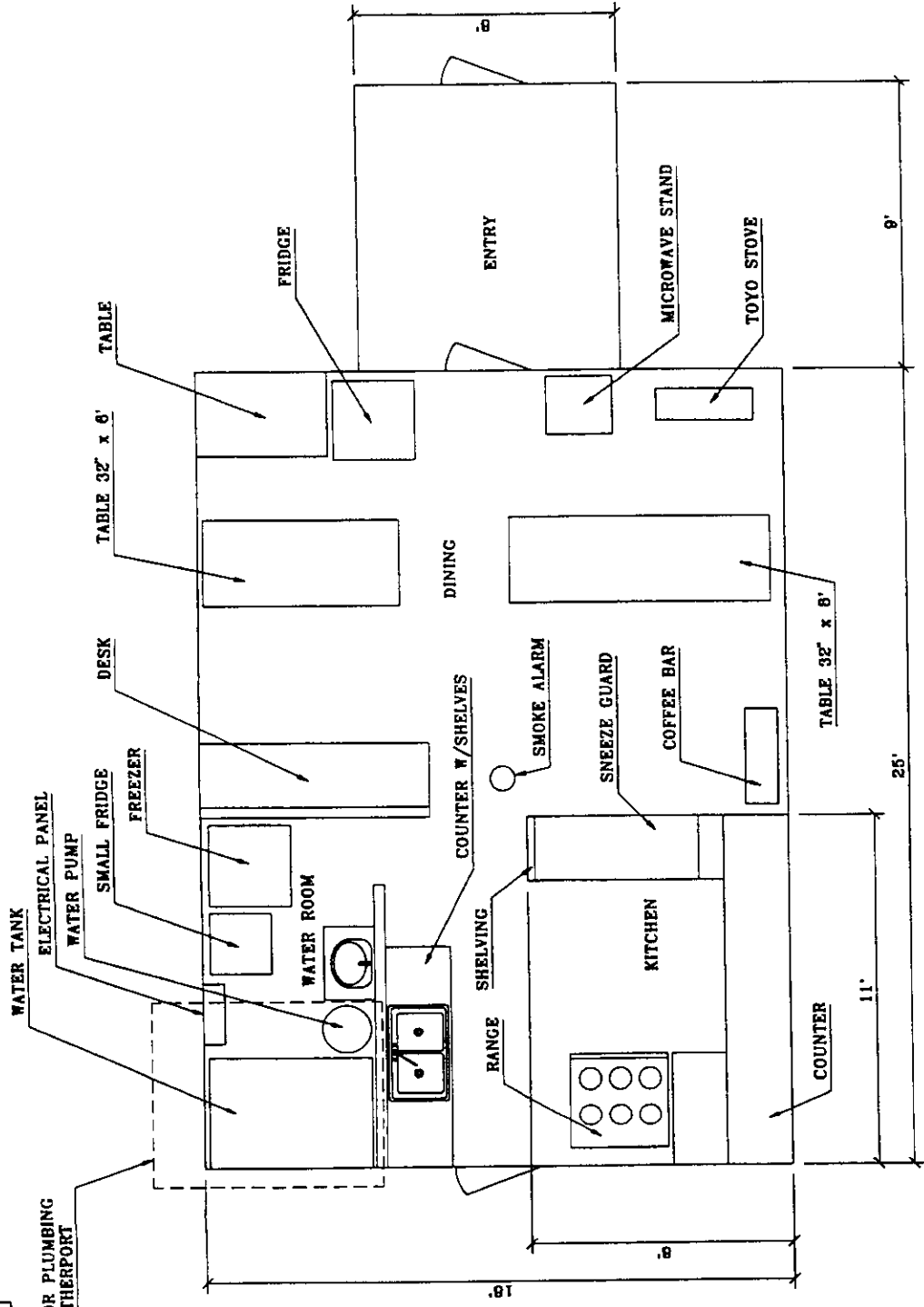
LAB SPACES  
 WEATHERPORT

K.G.B.  
 31 Jan 95  
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 1-1 LHV0006

- NOTES:
- 1: FOR FOUNDATION AND FLOOR FRAMING LAYOUT SEE DRAWINGS LLHV0003, LLHV0004
  - 2: 16 LINEAL FEET FLOURESCENT LAMPS TO BE MOUNTED OVER CENTER WORK SPACES AT CEILING FOR BUILDING LIGHTING
  - 3: ELECTRICAL LAYOUT SEE LLHV0024

5000A001

SEE LHV0022 FOR PLUMBING OF KITCHEN WEATHERPORT



**P I C O**  
 Polar Ice Cutting Office  
 85 Park Building, University of Alaska, Fairbanks, Alaska 99775

KITCHEN / GALLEY  
 WEATHERPORT

K.G.B.  
 31 Jan 95  
 NONE  
 LHV0005

- NOTES:
- 1: FOR FOUNDATION AND FLOOR FRAMING LAYOUT SEE DRAWINGS LHV0003, LHV0004
  - 2: FOR ELECTRICAL LAYOUT SEE LHV0023
  - 3: FOR SHELVING, COUNTER, SINK LAYOUT SEE LHV0025

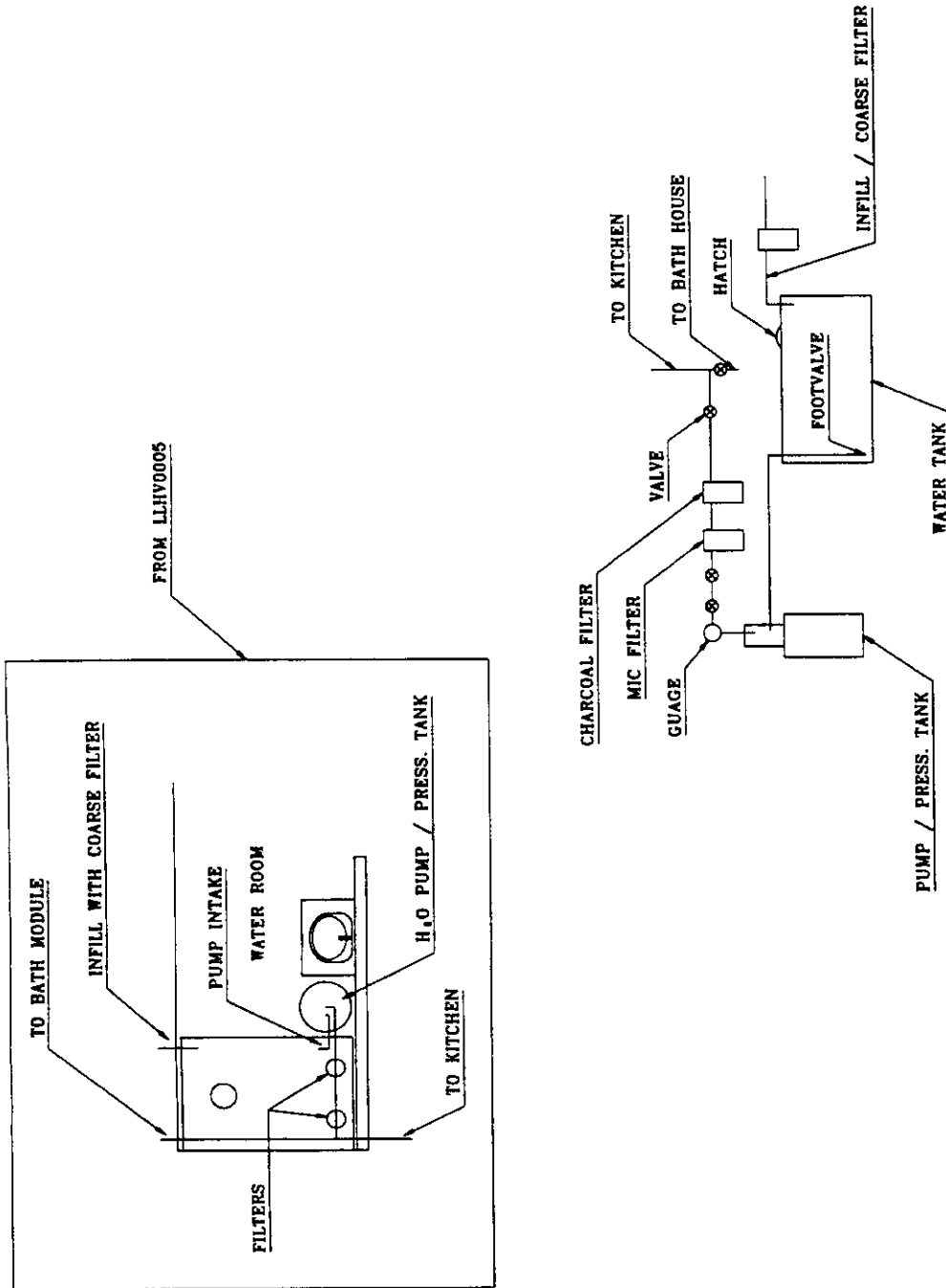
FOR THE USE OF THE ARCHITECT ONLY  
 NOT TO BE USED FOR CONSTRUCTION



FILTERS, PUMP, TANK  
WATER ROOM

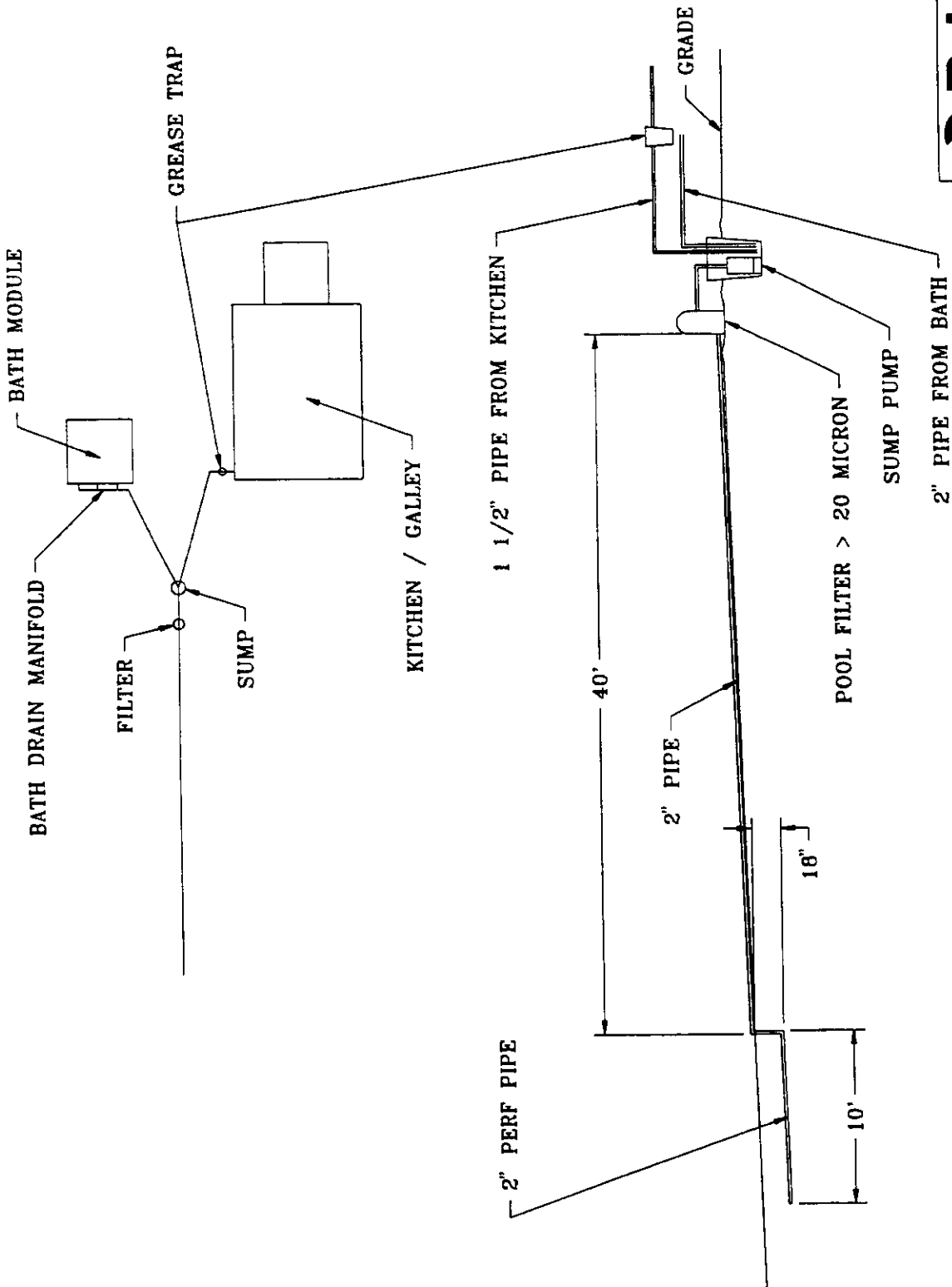
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LAIJ / HVC  
 GRAY WATER SYSTEM

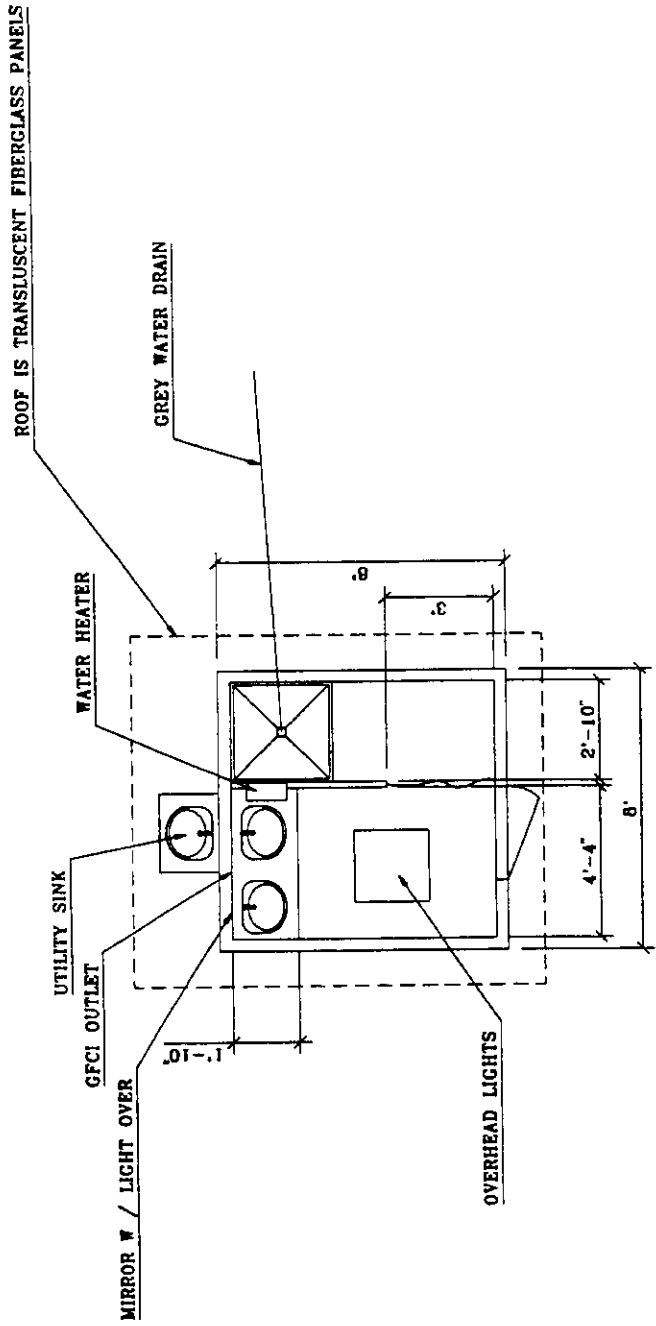
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LAII-HVC  
BATH MODULE

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31 Jan 95  
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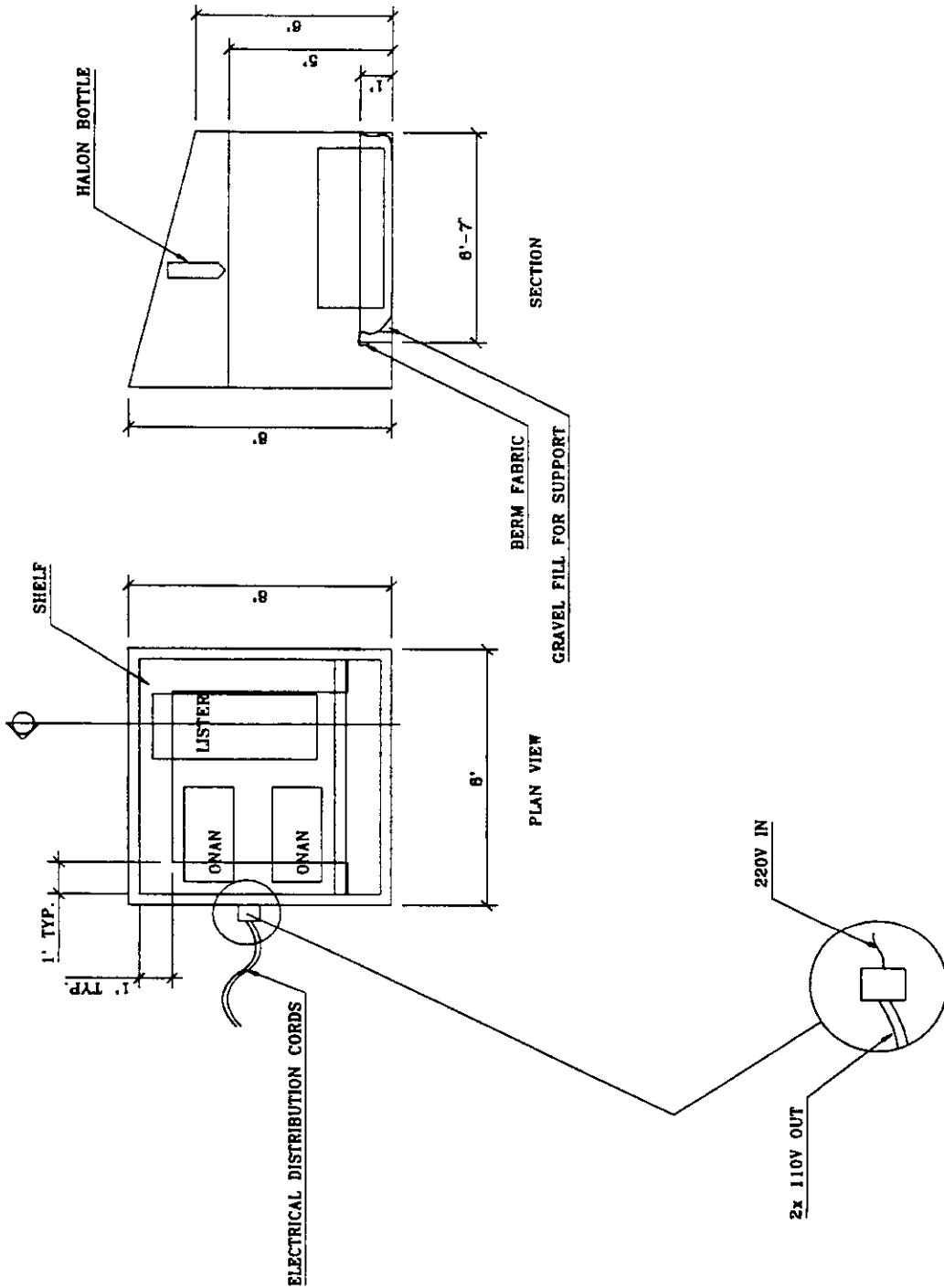
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LAII-HVC  
GENERATOR MODULE

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Feb. 95  
NONE  
LCHV0008



8000AHU

FOR THE USE OF THE CONTRACTOR