KLUANE LAKE WATER QUALITY STUDY

A Water Quality Study under the Arctic Environmental Strategy

October 1993

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by

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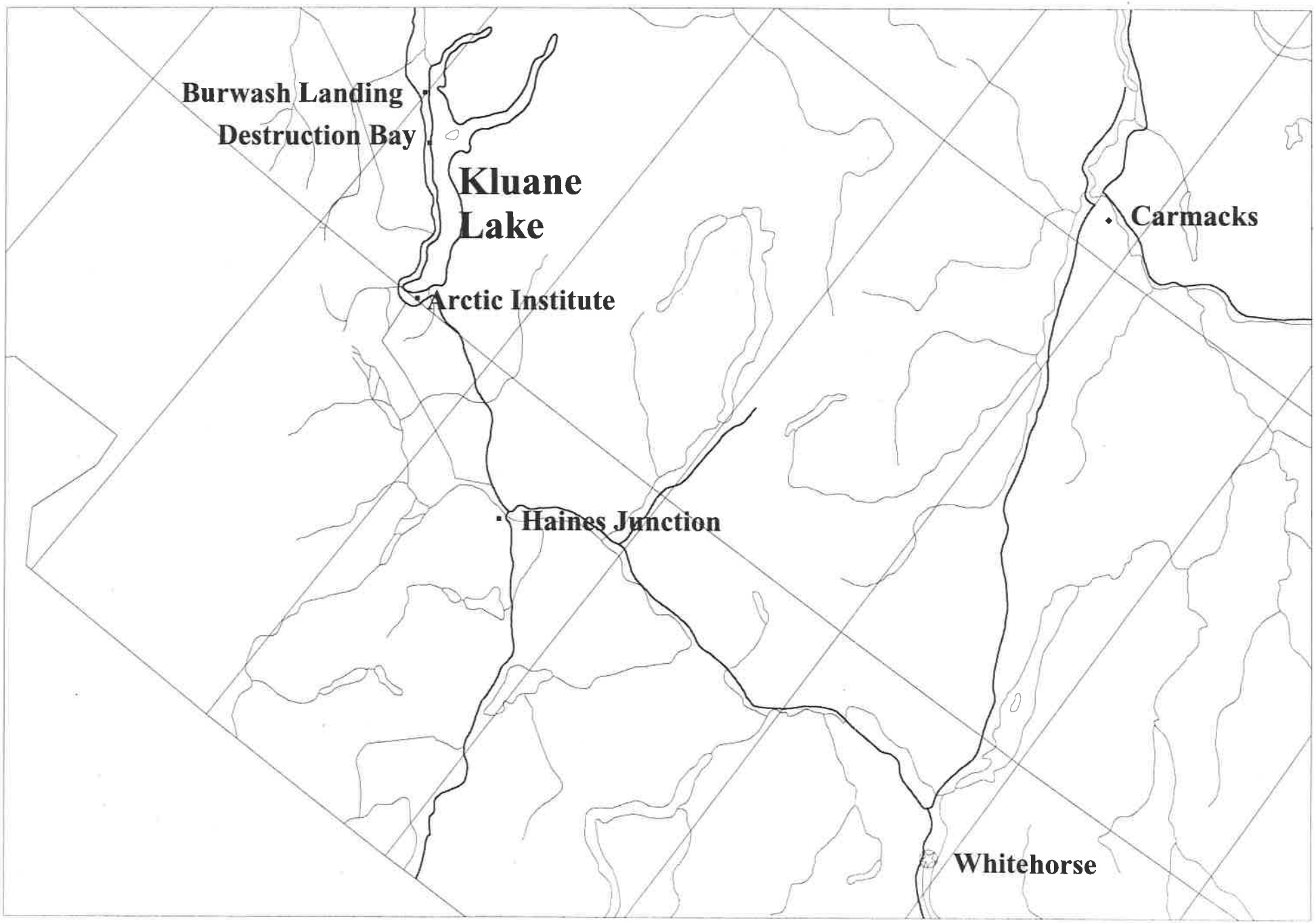
Burwash Landing
Destruction Bay
Kluane Lake
Arctic Institute
Carmacks
Haines Junction
Whitehorse

BACKGROUND

Kluane Lake is located in the southwest corner of the Yukon Territory and is a headwater lake of the Donjek River system. With an area of 393 km^2 and a volume of 13 km^3, it is the largest lake within the confines of the Territory. Kluane Lake is a productive fisheries habitat, particularly for lake whitefish and lake trout. The communities of Burwash Landing (population 83), Destruction Bay (population 46) and the Arctic Institute of North America (population varies), are located along the western shore of the Lake. Kluane First Nation, located in Burwash Landing, have operated a traditional subsistence fishery on the Lake and there are a few commercial operators using the resource. The primary recreational use of the Lake is for sport fishing. Several guided fishing charters operate on the Lake and an annual lake trout derby is run from Destruction Bay. Winter recreation included ice fishing and an annual ice race derby held at Burwash Landing. The Lake borders Kluane National Park and a number of private and government campgrounds are located on the western shore.

STUDY

A preliminary study conducted in 1990 by the University of Calgary and continued in 1991, investigated point-source pollution to Kluane Lake. Point-source pollution, has an identifiable source (eg. sewage lagoon) entering an aquatic system at an identifiable point (eg. a pipe into a lake or river). Non-point sources of pollution (eg. rainfall, seepage from septic tanks) were not considered for this study, as they can not be identified as having come from a given location and/or source. The lack of an identifiable source or a specific input location, makes sampling difficult and the result of any analysis questionable.

This preliminary research identified the Arctic Institute of North America camp, at the south end of the Lake in the vicinity of Silver City, as being the only known contributor of sewage to Kluane Lake. Input was through an indirect route, in which a sewage lagoon employed by the Institute, would occasionally discharge to a swampy area which drains into Kluane Lake. It was suspected at the time that the Bayshore Motel, Destruction Bay sewage lagoon, Cottonwood Creek Campground and the Burwash Landing Resort facilities discharged sewage on an irregular basis to the Lake, but the investigator could find no evidence at the time that this occurred.

During this period, the investigator became aware of anecdotal reports of an above average incidence of gastro-intestinal disease in the Burwash area. In a meeting with Kluane First Nation, the water from a community well in Burwash was described as the suspected source of gastro-intestinal problems that were chronic in the community.

Testing by Health and Welfare Canada and the investigator from the University of Calgary, indicated that the water quality from the well was within the standards set out in the *Guidelines for Canadian Drinking Water Quality*. A discussion with the local health professional and the Communicable Disease Unit in Whitehorse, indicated that the instance of

gastro-intestinal distress within the Burwash community was not out of proportion with the rest of the Territory.

Interviews in the Burwash area produced anecdotal information which suggested that drinking water was being obtained from both Kluane Lake and Halfbreed Creek and consumed without treatment. This is contrary to the recommendations of both Health and Welfare Canada and the Health Services Branch of the Yukon government. Samples taken from Kluane Lake below the community of Burwash contained *Giardia* cysts, while one sample taken from Halfbreed Creek did not.

Given the number of unresolved issues in the previous studies, the Kluane Lake area was investigated again in 1993, under the Arctic Environmental Strategy. In this survey, old sites were revisited and possible new sources were considered. The results of this study have ben compiled with photographic documentation to aid in their interpretation.

RESULTS

Arctic Institute of North America

The Institute has converted to the use of holding tanks, as a result of concern by the operators. They draw their water from a well.

Bayshore Motel

The Bayshore Motel draws water from Kluane Lake and discharges to a septic system located on the site. It has never discharged to the Lake.

Burwash Landing Resort

The Resort was found to have a defective septic system, located behind the Resort, which was actively discharging to Kluane Lake. While this discharge was at a low rate, it was in contravention of the Yukon Waters Act. Mr. Tony Polyck, of the Water Rights Section of the Northern Affairs Program, issued instructions to the owner of the Resort to rectify the situation. Under the direction of Mr. Allen Sales, of Health and Welfare Canada, a holding tank system (photo A) was installed by the Resort and the discharge to the Lake has ceased. Drinking water for the Resort is provided by a well located under the Resort.

Cottonwood Campground

Cottonwood Campground draws drinking water from wells located on the site and discharges to holding and septic systems located on the site. It has never discharged to Kluane Lake.

Destruction Bay Sewage Lagoon

The Destruction Bay Sewage lagoon receives sewage piped from Destruction Bay and hauled from Burwash Landing, Burwash Landing Resort, Cottonwood Campground and the Arctic Institute of North America. The lagoon has been modified over the years to control the annual discharge more effectively. The original discharge point and channel (photo B), which are located on the lake-side of the lagoons two cells, have been replaced with a discharge point on the highway-side of the second cell and two containment ponds (photo C and D), which act as additional cells. They could eventually discharge to a lowland area (photo E), which floods only in the spring, is a half kilometre from the lake and is separated from the lake by a natural berm of secondary beach (photo F and G). When the main lagoon was drained in September of 1993, the discharge did not extend beyond the second containment pond (photo H). It is unlikely that the lagoon, at it's present size, could produce enough discharge to flood the lowland area and certainly not enough to reach Kluane Lake.

Other

No other point-sources of pollution to Kluane Lake were found during the survey.

Burwash Landing Drinking Water

Currently the community of Burwash Landing obtains drinking water from two wells located within the community. One well serves the Elder's Residence and the other (photo I), is located west of the school. This well near the school has a pit privy (photo J) and, it has been suggested, a septic field located on either side of it. These septic facilities service two residences which were unoccupied during the time of the investigation, although anecdotal evidence suggests that they are occupied periodically. Water from the wells is distributed by a Band operated truck and disinfected with bleach added directly to the truck. Health and Welfare Canada samples the existing wells on a regular and has yet to find any contamination in either well. A third well (photo K) is located below the wash house, beside Kluane Lake. This is an infiltration well equipped with a chlorinator (photo L) which has been extensively damaged (photo M,N,O,P), and was not in service at the time of the investigation. This well has a pit privy (photo Q) located adjacent and above it. The wash house has it's own well.

Anecdotal evidence indicates that some members of the community continue to draw drinking water directly from Kluane Lake and Halfbreed Creek and that the chlorination of the truck haul water is inconsistent.

SUMMARY

There is currently no point-source pollution to Kluane Lake. All sites which previously discharged to the lake have since installed alternative systems or modified their existing system to eliminate any discharge of sewage to the Lake. The investigator is not aware of any new sources of discharge to the Kluane Lake which have arisen since the studies of 1990 and 1991.

The drinking water obtained from the wells, located within the community of Burwash Landing, pass tests for water quality recommended by the *Guidelines for Canadian Drinking Water Quality*. The quality of the water which was obtained from the now defunct infiltration well is unknown, but is presumed to have met the *Guidelines*.

RECOMMENDATIONS

While all the point-source inputs of sewage to Kluane Lake have been removed, future construction should be monitored to prevent this situation from recurring. The use of septic systems should be employed only in close association with officials from Health and Welfare Canada.

In Burwash Landing itself, the community should be cautious in the placement, selection and operation of sewage systems, to avoid contamination of their groundwater and well supply. The pit privy, located near the well by the school, should be removed and the existence of a possible adjacent septic system determined. The presence of permafrost throughout the area, makes the use of septic systems difficult and they should be avoided above and around the location of any wells. The use of chlorination, whether at the well head or in the truck hauling the water, should be emphasized to compensate for potential contamination during handling and the growth of bacteria during storage.

Photo A: Burwash Resort Holding Tank

Photo B: Destruction Bay Sewage Lagoon - Old Discharge

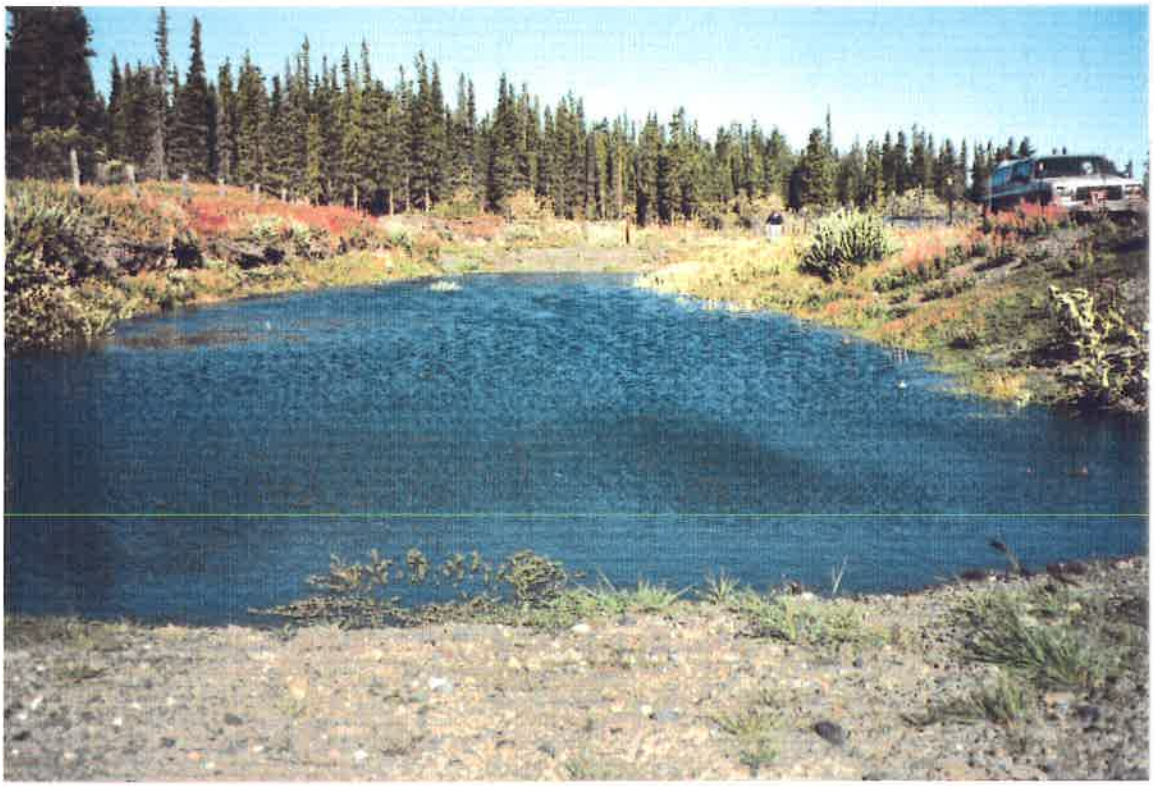

Photo C: Destruction Bay Sewage Lagoon - First Additional Containment Pond

Photo D: Destruction Bay Sewage Lagoon - Second Additional Containment Pond

Photo E: Destruction Bay Sewage Lagoon - Lowland Discharge Site

Photo F: Destruction Bay Sewage Lagoon - View of Lowland Drainage at Lake

Photo G: Destruction Bay Sewage Lagoon - Secondary Beach at Kluane Lake

Photo H: Destruction Bay Sewage Lagoon - Level in Second Containment Pond

Photo I: Burwash Landing - Well Site near School

Photo J: Burwash Landing - View of Well Site near School including Pit Privy

Photo K: Burwash Landing - View of Third Well Site and Pit Privy

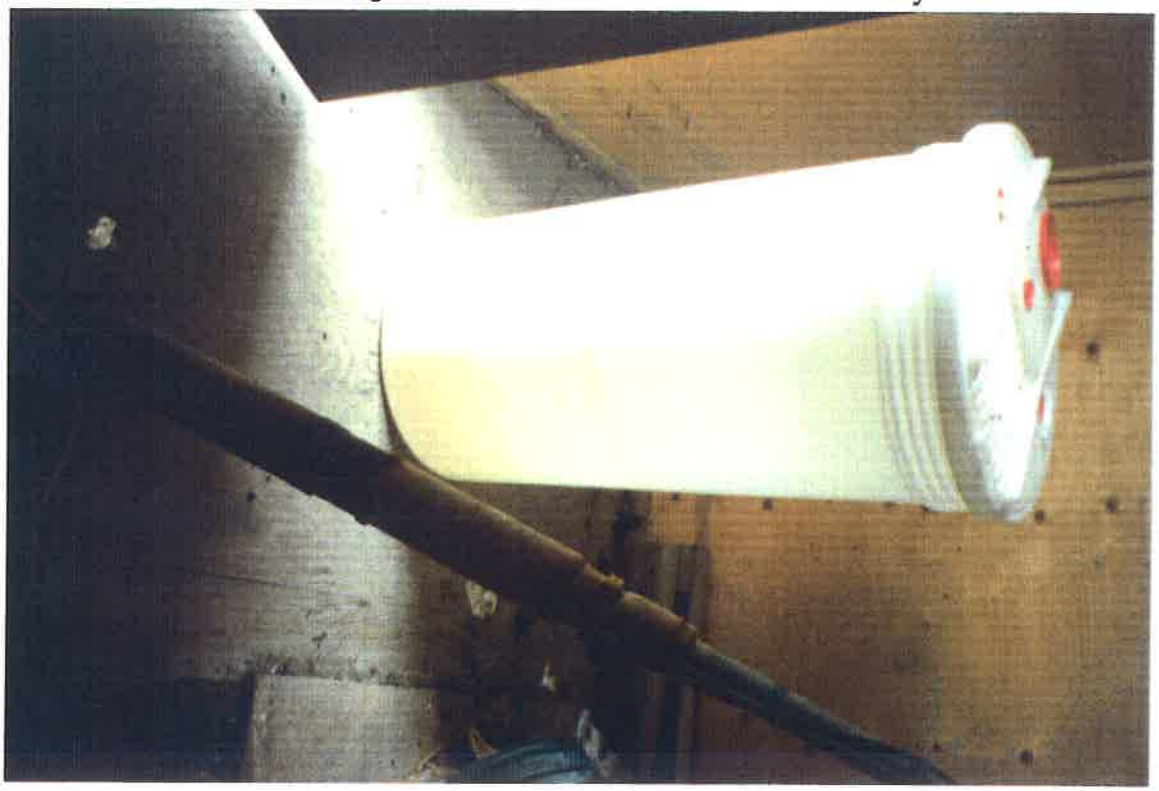

Photo L: Burwash Landing - Tank from Chlorination System

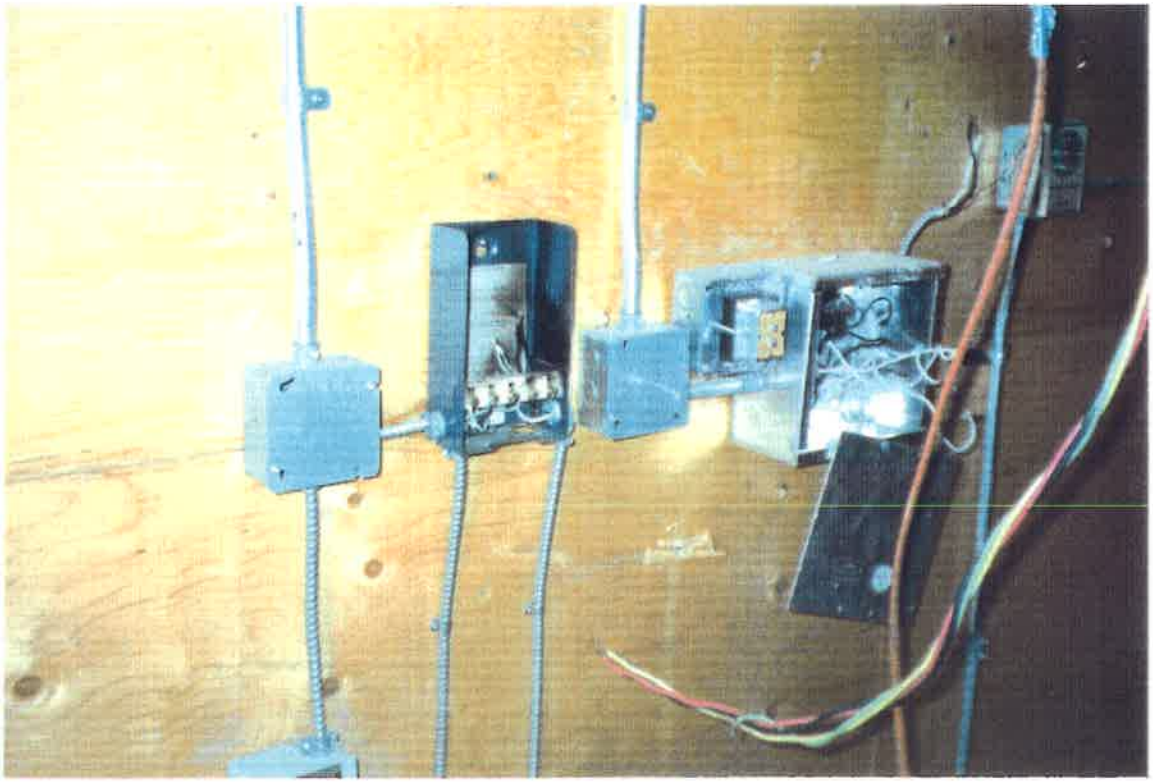

Photo M: Burwash Landing - Damaged Electrical Control Panel at Well

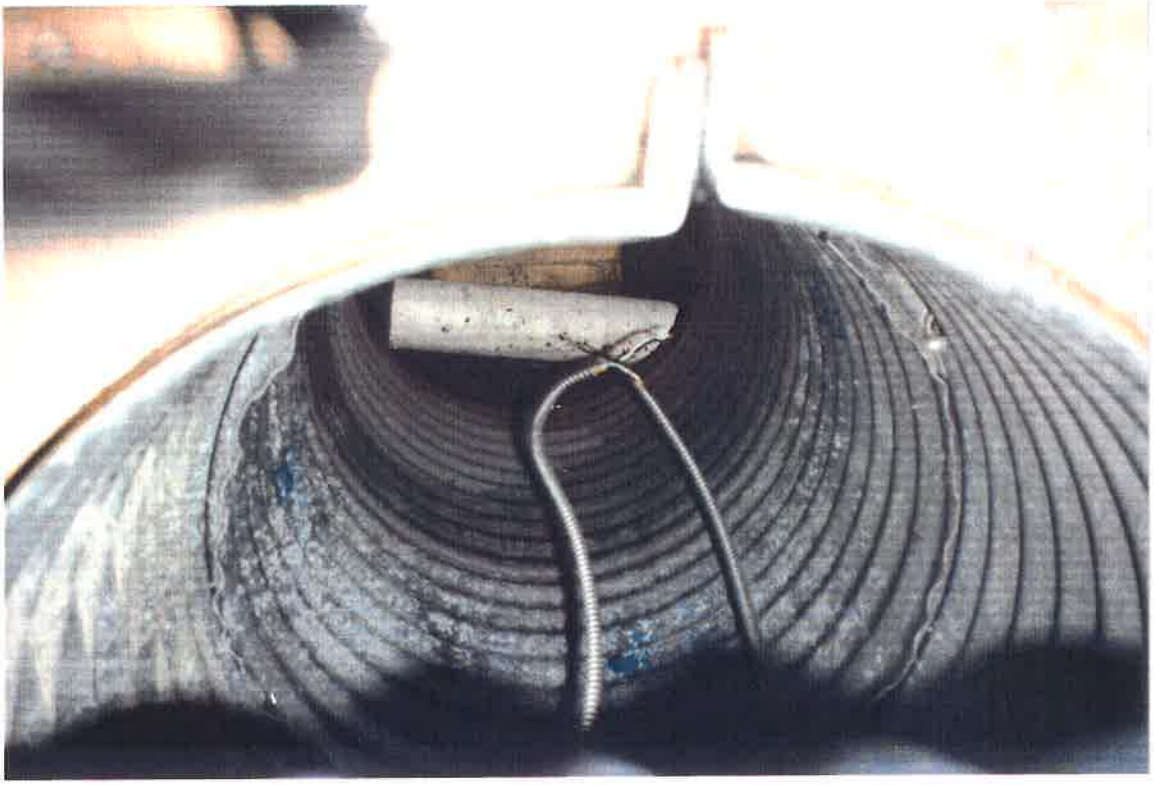

Photo N: Burwash Landing - View of Debris within Infiltration Well

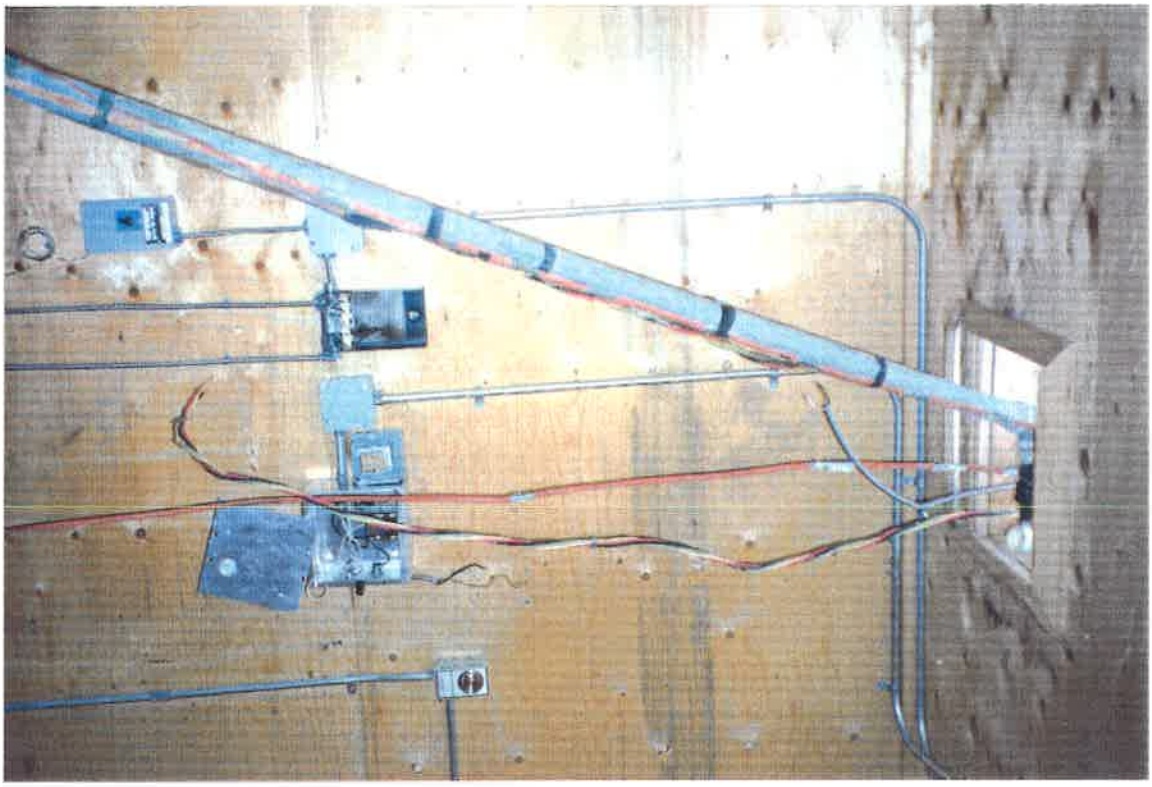

Photo O: Burwash Landing - Damaged Electrical Control Panel and Power Mast

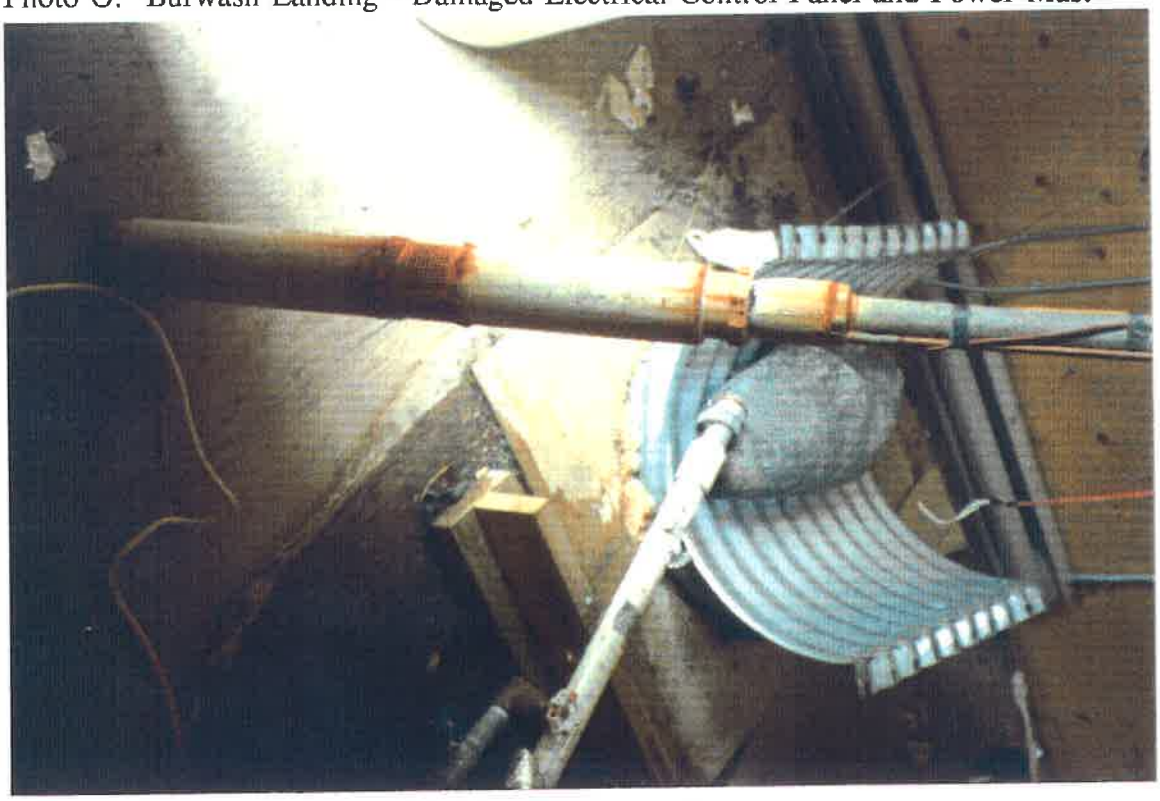

Photo P: Burwash Landing - Well Intake (removed)

Photo Q: Burwash Landing - Pit Privy Above and Adjacent to Infiltration Well