CANADA-NEWFOUNDLAND

WATER QUALITY MONITORING AGREEMENT

HUMBER RIVER BASIN SURVEY REPORT 1991

Surface Water Branch
Water Resources Division
Department of Environment and Lands
St. John's, Newfoundland

Water Quality Branch
Inland Waters Directorate
Environment Canada
Moncton, New Brunswick

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INTENSIVE SURVEY REPORT

1991

WRD-AR-MEB-93-186

Water Quality Section
Water Resources Management
Division. Department of
Environment and Lands. St. John's
Newfoundland

Monitoring & Evaluation Branch
Environmental Science Division
Environment Canada
Moncton, New Brunswick

Canada-Newfoundland Water Quality Monitoring Agreement

Humber River Basin Intensive Survey Report 1991

WRD-AR-MEB-93-186

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LETTER OF TRANSMITTAL

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Coordinating Committee
Canada-Newfoundland Water Quality Monitoring Agreement

Dear Member:

During the summer of 1991, the Humber River Basin Intensive Recurrent Survey was conducted under the Canada-Newfoundland Water Quality Monitoring Agreement. On behalf of the Technical Subcommittee members, it is my pleasure to submit to you the final report for this survey.

Yours truly,

Mr. Joseph Pomeroy
Aquatic Scientist

Technical Subcommittee Members:

Dr. John Kingston, Newfoundland Dept. of Environment & Lands
Mr. Harold Bailey, Monitoring & Evaluation Branch Environment Canada

EXECUTIVE SUMMARY

The Humber River Basin Intensive Recurrent Study was completed during the summer of 1991, as part of the Canada-Newfoundland Water Quality Monitoring Agreement. The objective of the survey was a minor assessment of the water quality from the undeveloped headwater to the heavily developed lower reaches of the Humber River Basin. This snapshot assessment was based on spatial variables measured in surface water, sediment and forage fish.

Results showed that the Humber River and Hughes Brook, which are located north of Humber Arm, dilute the anthropogenic inputs and indicate a relatively natural aquatic environment.

The Corner Brook watershed located to the south of the Humber Arm includes the centre of the City of Corner Brook. The headwaters appear natural and the lower sections have received minor impacts. The sediment in the lower section of Corner Brook has elevated concentrations of heavy metals but these were not detected in surface water. The input of bark leachate is degradation by natural processes which reduce organic variables to non-detectable concentrations. The input of sewage and coliform to Corner Brook occurs within metres of the Harbour.

Wild Cove Brook located on the north side of the Humber Arm is heavily impacted by a municipal landfill and a large bark composting and storage site. The leachate from both sources contributes elevated metals, carbon, and nutrients. The leachate was not chemically detectable in the Brook during the survey, but the associated elevated nutrients and minerals caused significant growths of fungi, algae, bacteria and annelid worms. The growth, low discharge and high temperatures in Wild Cove Brook often decreased dissolved oxygen concentrations below the water quality guidelines for the protection of freshwater aquatic life. Although the combined effects are detrimental to aquatic life, they are a natural response to the leachates and serve to degrade and consume the elevated input of organic matter. The leachate from the bark pile should decrease in strength after numerous years if the site ceases recieving bark.

The Humber Arm has been designated an Atlantic Coastal Action Program (ACAP) site under Environments Canada's Green Plan. ACAP provides a forum in which all interested parties can work with the various levels of government to mitigate the impact the Humber River and Arm receives.

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ABSTRACT

In September of 1991, the Humber River Basin was surveyed under the Canada-Newfoundland Water Quality Monitoring Agreement. The objective of the survey was to assess the aquatic environment in relation to the headwater quality and the Water Quality Guidelines. Analysis of surface water, and sediment indicated that the Humber River and Hughes Brook dilutes anthropogenic inputs and the aquatic environment has retained a natural quality. Corner Brook which flows through the City of Corner Brook has fairly natural headwaters; whereas, the lower sections have received the impact of urban developement. In the lower sections sediment samples contained elevated metal concentrations, and a sewage source is present at Bell's Brook tributary. A unique impact is softwood bark leachate. The leachate input on Corner Brook is minor and natural process appear to be degrading the leachate.

Wild Cove Brook has received the greatest impact because of a municipal landfill site and a large softwood bark compositing and storage site. Elevated metals were present in the sediment and major ions and nutrients were elevated in the surface water.

This bark pile is much larger than that on Corner Brook, and the aquatic growth of nuisance organisms is more concentrated. The growth combined with low discharge and high temperature often decreases dissolved oxygen concentrations below guidelines for the protection of aquatic life. The absence of bark-associated tannic and resin acids in the surface water is a result of natural degradation.

The Humber Arm has been designated an Atlantic Coastal Action Program (ACAP) site under Environment Canada's Green Plan. Through ACAP stakeholders will work together to develop a comprehensive environmental management plan for the Humber River and the Humber Arm. The information in this report will provide the stakeholder group an indication of the environmental quality of the major tributaries draining into the Humber Arm.

RÉSUMÉ

Le bassin hydrologique de la rivière Humber a été étudié durant le mois de septembre 1991 en vertu de l'Entente Canada/Terre-Neuve sur la surveillance de la qualité des eaux. L'étude a eu pour but d'évaluer le milieu aquatique en fonction de la qualité des eaux du cours supérieur et des normes canadiennes pour la qualité des eaux. L'analyse des eaux de surface et des sédiments a dévoilé que la rivière Humber et le ruisseau Hughes diluent les apports anthropogéniques et que l'environnement aquatique a conservé son état naturel. Le cours supérieur du ruisseau Corner possède, à toute fin pratique, une eau de qualité naturelle. Par contre, la partie aval, qui traverse la ville de Corner Brook, subit les effets du développement urbain. En aval se trouve un égout au tributaire Bell's Brook, et les échantillons de sédiment avaient des concentrations élevées de métaux. Une source de pollution peu ordinaire ayant un impact est celle des écoulements provenant des amoncellements d'écorce de bois mous. L'effet de ces écoulements sur le ruisseau Corner est minime et une dégradation naturelle des écoulements semble prendre place.

Le ruisseau Wild Cove a subit l'impact le plus important étant donné la proximité d'un site d'enfouissement sanitaire municipal et celle d'un grand amoncellement d'écorce de bois mous destiné au compostage. Des concentrations élevées de métaux ont été trouvées dans les sédiments tandis que les échantillons d'eau de surface ont démontré des concentrations élevées d'ions majeurs et d'éléments nutritifs. Cet amoncellement d'écorce est bien plus gros que celui situé au ruisseau Corner, et la population d'organismes aquatiques non désirables est bien plus élevée. Cette population surélevée alliée à un faible débit du cours d'eau et des températures élevées a souvent pour effet de réduire la quantité d'oxygène dissous à des concentrations inférieures à la recommandation établie pour la protection de la faune aquatique. L'absence d'acides tannique et résinique, provenant de l'écorce, dans les eaux de surface est le résultat d'une dégradation naturelle de ces substances.

Le bras Humber est un site désigné sous le Plan d'action écologique des régions côtières de l'atlantique (PAERCA) du Plan vert d'Environnement Canada. Ce programme regroupe plusieurs intervenants qui vont travailler ensemble au développement d'un plan complet de gestion de l'environnement de la rivière et du bras Humber. Les membres du programme trouveront donc dans notre rapport de l'information utile sur la qualité de l'environnement des principaux tributaires qui se jettent dans le bras Humber.

1. INTRODUCTION

1.1 Objectives:

In 1991, under the Canada-Newfoundland Water Quality Monitoring Agreement, the Humber River basin of western Newfoundland was assessed. Because of the various activities and demands directly linked to the waterbodies, this basin has been designated for monitoring under the Agreement. The surficial geology of the watershed provides ample nutrients for the growth of large tracts of forest. The harvestable forest in the area lead to the construction of the Corner Brook pulp and paper mill. The present total annunal cut available for the mill is 1109400 m^3 (Northland Associates Ltd, 1986). The power demand for the mill and the local area lead to the construction of the Grand Lake power plant, and the Corner Brook power plant. The water diverted from the Corner Brook Stream is used in the mill for production. The Corner Brook Stream also provides drinking water for the City of Corner Brook, and is used for recreational activites. Grand Lake is the municipal drinking water source for the Town of Deer Lake, and its perimeter provides residences for summer recreation. The most famous activity on the Humber River is salmon fishing. The large discharge of unobstructed natural water provides perfect spawning grounds for the Atlantic Salmon. These activities plus recent mining and aquaculture continue to made this basin an importnant economical resource.

The survey collected samples of surface water, sediment and biota. These matrices were analysed for physical parameters, major ions, nutrients, metals and trace organic compounds.

The Humber River basin includes the sub-basins "02YL" and "02YK". (Water Resource Branch, Fisheries and Environment Canada 1978). The headwaters are located in the south-east corner of Gros Morne National Park, and to the east and north of Grand Lake. The sub-basin line of the Humber River basin and the Exploits River basin is located approxiately between Grand Lake and Red Indian Lake. The outflow is at the Humber Arm estuary. Included in the survey were Grand Lake and Sandy Lake of the "02YK" sub-basin.

The major urban centres are Corner Brook, located near the estuary, and the municipality of Deer Lake located at the head of Deer Lake. Smaller communities are located throughout the basin. The Humber River valley is located in the physiographic region known as the Newfoundland Highlands, which are divided into the sub-regions: Blow Me Down Highlands and the Great Northern Highlands of the Long Range Mountains. Grand Lake and Sandy Lake are located in the Grand Lake Lowlands and the Atlantic Upland of the Topsail Uplands (Golder Associates 1983).

The Long Range Mountains rise abruptly from the Gulf of St. Lawrence (West Newfoundland Coastal Low lands) to elevations of 800 metres. The eastern drainage of these mountains is part of the Humber River watershed. Steep sided fjords and valleys are located throughout this area (Golder Associates 1983). The Humber Arm is a drowned glacial fjord measuring 24 km long, 2 km wide and 100 metres deep.

The Atlantic Uplands are a granitic plateau which creates the watershed boundary between the Humber River Valley and the Exploits River Valley. These uplands are barren to sparsely forested at elevation of 600 metres. The Grand Lake Lowlands are located along the Upper Humber River and form a flat valley which measures 50 km in length and 15 km width. The Deer Lake basin is located in this forested and boggy valley. (Golder Associates 1983).

The bedrock geology is composed of sedimentary, volcanic and granitic rock. Due to the tectonic development of western Newfoundland, major folding and faulting has created the southwest-northeast alignment of existing mountains and valleys. The northwest portion of the Long Range Mountains (headwaters of Upper Humber River) are composed of granitic strata of the Long Range Complex. This complex is the oldest rock strata of the area and forms the continental shelf. The highland between Grand Lake and the Lower Humber River are composed of a high grade metamorphic rock of the Continental Margin and Rift Facies sediments. These strata are of the Fleur de Lys Supergroup and are the oldest sedimentary strata within this area.

The geology between Rocky Harbour (Gros Morne National Park) and Corner Brook is composed of three groups. Between Gros Morne and Deer Lake is the Labrador Group. This group is composed of slate, phyllite, quartzite, sandstone and thin bedded carbonates. The Humber Arm Group runs between Rocky Harbour and Corner Brook. It is composed of shale, phyllite, greywacke, and lesser amounts of quartzite, sandstone and carbonates. The St. George Group is also located between Rocky Harbour and Corner Brook. It consists of limestone and dolostone. These minerals are easily weathered, and have created the rugged terrain, steep valleys and karsting (internal drainage).(Golder Associates 1983).

The Intermontane Trough Sediment is found in Deer Lake, Grand Lake, Sandy Lake and the Upper Humber River Valley. This sediment contains carboniferous strata composed of the lower Anguille Group (cemented sandstone and mudstone), and the overlying Deer Lake Group, (red and grey conglomerate, sandstone, siltstone, mudstone, oil shale, and minor coal beds). (Golder Associates 1983).

The surficial geology of the Humber River valley can be divided into four groups. The exposed bedrock, is found on the highlands of the Long Range Mountains and Topsail Uplands. Glacial till, which consist of thin surficial veneer and extensive moraine deposits, reflects the lithology of the underlying bedrock. The granitic and metamorphic terrain of the Long Range Mountains and Topsail Uplands contain till consisting of grey silty sand or sandy silt. The till from the Humber River Valley consist of red claying silt from the red siltstone bedrock. The third group is gravel and sand which are located in the streams and rivers valleys as a result of glacial outwash and fluvial accumulation. The major deposits are located in Deer Lake, Humber River Valley and Sandy Lake area. The fourth group is the peat deposits. These are common throughout the watershed and can be several metres in thickness. Extensive deposits are found on the Topsail Uplands west of Grand Lake, and in the flat terrain of Upper Humber River Valley. Lesser amounts of peat exist on the plateau of the Long Range Mountains as high peat moors and string bogs (Golder Associates 1983).

The drainage area of the Humber River watershed is approximately 7860 square kilometres. (Environment Canada 1992) The annual precipitation is between 943.5 to 1500 mm, with the Long Range Mountains recieving between 1100-1500 mm (Acres International 1990).

The Humber River tributaries; Wild Cove Brook, Hughes Brook and Corner Brook were also assessed in this survey. Corner Brook flows through the City of Corner Brook from the south, and Wild Cove and Hughes Brooks are located north of the Humber Arm.

This assessment will follow the Humber River and its tributaries from their headwaters to the Humber Arm.

To determine the temporal trends in surface water quality, long term data collected at certain stations since 1986 under the Canada-Newfoundland Water Quality Monitoring Agreement is interpreted.

2.0 **METHODOLOGY**

During a two-week period in September 1991, 34 stations were sampled for surface water, sediment and biota (forage fish). Stations are identified in Table 1, and on Maps 1 to 13.

Hydrological data stream flow (cms) from the Water Survey Division, Monitoring & Evaluation Branch, Environment Canada is available for the following hydrometric gauges:

1) Upper Humber River at Reidville, NF02YL001
2) Lower Humber River at Humber Village, NF02YL003

2.1 **Parameter and Analytical Methodology**

Surface water samples were hand collected and analysed for routine variables, trace organic compounds and coliform bacteria. The routine group were sent to the Monitoring & Evaluation Branch Analytical laboratory in Moncton. This group consisted of major ions, physical parameters, nutrients and total metals. Field variables consisting of pH, specific conductance, dissolved oxygen and temperature were measured at each site. The surface water organic group consisted of trace organic and bark-specific compounds. Organic compounds were analysed at the National Water Quality laboratory in Burlington, Ontario. Compounds included organochlorine pesticides (OC's), and polynuclear aromatic hydrocarbons (PAH). Those samples analysed for compounds specific to tree bark, and pulp production were sent to Environmental Protection in St. John's. Analysis consisted of tannins, resin acids and chlorinated phenols. Included with the analyses were quality control blank samples, spiked blank samples and spiked samples. Bacteriological samples were analysed for total and faecal coliforms at the Newfoundland Public Health Laboratory in St. John's.

Sediment samples were analysed at the National Water Quality Laboratory for trace organic compounds; (organochlorines and polynuclear aromatic hydrocarbons), and non-residual or total metals.

The biota sample consisted of non-sport forage fish, which are resident to a specific area. Numerous samples were planned for collection, but only one sample was analysed at the National Laboratory for extractable and total metals.

Analytical methodology are described in the Analytical Methods Manual (Environment Canada, 1979). Interlaboratory QA/QC practices are described in Agemian (1986).

2.2 FIELD METHODOLOGY

Routine water samples were collected as discrete or sequential triplicate hand grab samples in polyethylene or glass containers. Preparation of containers and sampling technique followed the protocol described in "Sampling for Water Quality" (Environment Canada, 1983). Bacterial coliform were collected as grab samples and containers were provided by the Newfoundland Public Health Laboratory in St. John's. Coliform analysis had to be completed within a 24-hour time period. Samples for trace organic compounds were preserved in the field and sent by ground transport to the National Laboratory in Burlington, Ontario.

Bottom sediments were collected with a 26 cm x 26 cm Ekman dredge sampler, and transferred to a plastic or stainless steel tray. The top 2 cm of sediment not in contact with the sampling dredge was removed with a stainless steel or plastic scoop, and placed in a similar bowl. Single and triplicate split samples were prepared by repeating this procedure, homogenizing the substrate, and dividing. Samples for trace organic compounds were placed in washed aluminum foil trays with aluminum foil covered cardboard covers. Metals and organic particulate samples were placed in polyethylene sediment jars.

The forage fish sample was collected using a small mesh net and an electrofisher. The sample was analyzed at the National Water Quality Laboratory.

Field quality assurance/quality control procedures were followed as outlined in Arseneault and Howell (1987).

3.0 RESULTS AND DISCUSSION

3.1 Humber River

3.1.1 Upper Humber River

The most northern surface water sample on the Humber River was collected 13 kilometres east of Gros Morne National Park boundary in the Silver Mountain Forest cutting area (Map 1). This area (Upper Humber-Main River) is leased by Corner Brook Pulp and Paper Limited (CBPP - Kruger Incorporated of Montreal) and contains a significant portion of their long term forest supply. Harvesting started in 1986 and up to the 1991 survey 866365 M^3 cords had been removed. Each year until 2011, 2 percent of this area will be harvested to provide 17.3 percent of the mill's supply. CBPP plans to harvest 4.2 million M^3 of wood over the next 20 to 30 years (Northland Associates 1986). In order to harvest this area, numerous roads have been constructed. One of the main roads follows the Humber River north of Birchy Lake (Map 2), to the boundary of Gros Morne National Park.

Site YL0055 was located upstream of a bridge which crosses a northern tributary (Map 1). The water quality (Table 2) indicates that the River has not received inpact from the forest harvest activity. The pH of 5.5 units and low specific conductance of 16 µSie/cm reflects the granitic bedrock and sparse till of this area. Alkalinity is 1.4 mg/L; whereas, water from areas south ranged up to 50 mg/L. The interspersed organic deposits contribute the 7.5 mg/L dissolved organic carbon (DOC) content which is a major cause of the 5.5 pH and 75 relative units of colour. This site has the highest DOC in the basin. The source of the 0.37 mg/l extractable iron is the gabbro, which is an igneous rock containing ferromagnesium.

The River flows south 20 kilometres before joining Adies River. This tributary originates in Adies Pond, a LRTAP (Long Range Transport of Atmospheric Pollutants) lake sample site. Above the confluence and the remains of a dam, is site YL0054 (Map 2). This area is in the lower section of CBPP harvest block, but major wood haul-roads are 4 to 5 *kilometres north*. (Northland Associates 1986)

The bedrock just north of this site changes to the Intermontane Trough sediments of the Deer Lake Group. This group is composed of sandstone, siltstone, mudstone, minor limestone, oil shale and coal. The surficial geology is clayey till of varying thickness. The presence of limestone elevates the calcium concentration from 0.61 mg/l at the headwater site to 3.1 mg/L. The associated carbonate increases the alkalinity from 1.4 to 10.7 mg/L, and pH rises nearly two units to 7.2 units. Specific conductance also doubled to 32 µSie/cm.

After merging with Adies River, the Humber River flows south approximately 28 kilometres to Little Falls (YL0011). This site is located on the western boundary of Sir Richard Squires Memorial Park upstream of the route 79 bridge. Approximately 7 kilometres of the Humber River is located in the Park. (Map 3). The bedrock is of the Deer Lake Group and the surficial geology is composed of large deposits of peat, till and moraine in variable thickness (Golder Associates 1983). The change in geology results in decreases in major ions, specific conductance (25 uSie/cm), and alkalinity (7.3 mg/l). The large peat deposits cause a higher DOC, lower pH and slight increase in colour (rel. units).

YL0011 is a long term collection site under the Canada-Newfoundland Water Quality Monitoring Agreement. (Table 4). The data shows that the impact on the water quality from the Park and above tributaries is nondetectable. Specific conductance fluctuates between 20 to 50 μSie/cm (Figure 1), and calcium and alkalinity peak during the winter when the input of ground water is high and surface runoff is low. DOC from the large peat deposits on the east boundary of the Park are a major influence on pH, and a correlation between the two is at $R = -0.458$. Nitrate and phosphorus concentrations rise in winter and decrease in the summer which coincides with the period of greatest plant nutrient uptake (Figure 3).

After Little Falls, the Humber River flows 13 kilometres south before it joins Junction Brook (YL0053)(Map 4). This Brook originates in Grand Lake, just north of the Humber Canal. Along this section of the River, developement is sparse ;although, farmland is present. The only populated area is the Village of Cormack which is removed some distance from the River.

The bedrock consists of the Deer Lake Group, and the surficial geology is composed of sandy gravels, silts, and large deposits of peat to the north. (Golder Associates 1983).

At Junction Brook (YL0053) the specific conductance is 250 uSie/cm as a result of elevated concentrations of calcium, magnesium, *sodium, chloride and sulphate (Table 2).* Associated with the increase in calcium is an increase in alkalinity to 49.5 mg/L and an increase in pH to 7.6 pH units. The 7.25 mg/L of silica indicates a significant ground water input.

From Junction Brook, the River flows south 12 kilometres to Deer Lake. This area has similar bedrock and surficial geology as the Junction Brook area, but with fewer peat deposits (Golder Associates 1983). The villages of Reidville, Nicholsville and two highway bridges are potential impacts to this section of the Humber River.

Site YL0017 was located above Deer Lake at the Nicholsville bridge (Map 4). The discharge of the Humber River for this site is from the gauge at Reidville (Figure 4). Data indicates that the volume fluxuated between 3.6 to 749 cms over a 6 year period, with a mean discharge of 49 cms. Because of the large discharge the input from the dammed Junction Brook and the local communities are slight. The elevated major ions from Junction Brook increase the specific conductance to 32 uSie/cm, and alkalinity to 9.5 mg/L (Tables 2). A surface water sample was analysed for organochlorine pesticides (OC's), polynuclear aromatic hydrocarbons (PAH's), and polychlorinated biphenyls (PCB's) (Table 5). Alpha and gamma hexachlorcyclohexane (OC's) were present at concentrations slightly above their analytical detection limits. These two pesticides are no longer used in Canada, but through atmospheric deposition they remain ubiquitous in Newfoundland (Roussel et al., 1990). Fluoranthene, a ubiquitous PAH was detected at its detection limit. The high molecular weight PAHs, like fluoranthene are products of fossil fuels combustion (CCREM 1987). The presence of polychlorinated biphenyls (PCBs) at 42.7 ng/L is suspected to be a contamination problem. A quality control blank sample was contaminated with PCBs, and a quality control triplicate sample (YL0050) contained PCBs between 19.0 and 97.6 ng/L (detection limit 9.0 ng/l). Because of these quality control checks the presence of PCB's at site YL0017 is expected to be false. PCBs usually originate from electrical transformers or from lubricants. The analysis of organic compounds and metals in sediment detected only grease and oil slightly above their detection limit (Table 6,7).

3.1.2 **Grand Lake**

Grand Lake flows into Deer Lake via the Humber Canal to the south of the Town of Deer Lake. The Lake originally flowed into the Humber River through Junction Brook, but when the Deer Lake Power Company Ltd. built the Grand Lake hydroelectric reservoir, the Humber Canal was constructed, and Junction Brook was dammed and diverted to the Canal. The Canal funnels the water to a set of penstocks which lead to the power plant at the northeast end of Deer Lake (Map 4). Grand Lake contains a watershed of 5030 km^2 (Acres International Limited, 1990), begining at Sandy Lake and continuing southwest 130 kilometres. Its southern perimeter is above the Town of Stephenville. To the northeast the bedrock consist of the granite complexes of the Topsail Granite Group, Wild Cove Pond Suite, and Gull Lake Igneous Suite. To the west near the Humber Canal, the bedrock consists of the Deer Lake Group, and to the south the Anguille Group. Surficial geology is exposed bedrock with deposits of till and peat. Large deposits of peat are located adjacent to the Humber Canal (Golder Associates 1983).

Site YK0022, the Humber Canal, is located above the penstock intakes (Map 4). The sample is a quality control triplicate, and results indicate a representative sample. The water quality is similar to the other two stations in the watershed except that pH is elevated to 7.1, conductance to 34 uSie/cm, and alkalinity to 10.1 mg/l (Table 2). The higher values are in response to the limestone in the Deer Lake Group bedrock.

Site YK0023 was located south of route 401-Main Brook Bridge in Sandy Lake (Map 5). The specific conductance of 23 uSie/cm is attributed to a leachate of sodium and chloride. The ratio of Cl:Na is 1.5 to 1 which suggest a road salt influence as opposed to a seasalt ratio of 1.8 :1. Because the collection site was adjacent to a bridge, the soil may be saturated with road salt, and provide a constant leachate of ions.

A surface water sample was collected at site YK0024, 0.5 Km below the penstocks outlet of Hinds Brook hydroplant, Grand Lake (Map 6). As a result of the exposed granite bedrock the surface water has a pH of 6.5 units, a specific conductance of 18 uSie/cm, and an alkalinity of 4.4 mg/L.

A long term sampling site at the Humber Canal has been in operation since 1989 under the Canada/ Newfoundland Water Quality Monitoring Agreement (Table 8). pH fluxuates between 6.2 and 7.3 units in response to the concentrations of DOC and alkalinity, and specific conductance ranges between 35 and 40 μSie/cm (Figure 5,6). The low consistant concentration of sulphate, sodium and chloride suggest the absence of seawater influences.

The water quality of the Grand Lake watershed does not appear to have been detrimentally impacted by cottages and roads. If aquaculture, cottages and recreational activities increase additional monitoring should be put in place to protect the present quality.

3.1.3 **Deer Lake**

The Upper Humber River and Humber Canal both flow into Deer Lake at the north end (Map 4). The Lake is 2 to 4 kilometres wide and 27 kilometres long. It begins at the Town of Deer Lake and flows into the Lower Humber River (Map 8). The bedrock in the Lake'a northern area is of the Deer Lake Group, and in the southern section is the the Fleur de Lys Continental Super-Group of the Margin and Rift Facies sediments. The latter bedrock extends south to the Village of Steady Brook. A semi-circular north to south bedrock divisional line can be drawn from Borne Bay, Gros Morne National Park, south of Deer Lake and south of the City of Corner Brook. The bedrock to the east of this line is of the Intermontane Trough Sediment and Granitic Complexes, and to the west is the Continental Margin and Rift Facies. The surficial geology of the highlands consist of exposed bedrock; whereas the valley consist of till, sand and gravel.

In Deer Lake, three samples were collected. Site YL0060, was below the penstocks in Deer Lake (Map 4), site YL0059, was collected in the middle of the Lake, north of Ninth Brook (Map 7), and site YK0058 which includes a sediment sample, was collected below South Brook Park (Map 8). The surface water chemistry of all three sites indicate a uniform water body with pH at 7.1, specific conductance at 32 uSie/cm, and alkalinity at 10 mg/L.(Table 2)

The sewage and wastewater from the Town of Deer Lake empties into Deer Lake, but the volume of output in relation to the Lake's volume, and Grand Lake's input is minor. Faecal coliform counts are diluted from 140/100mL at site YL0060 to L 10/100mL at the mid-lake site (Table 3), and the associated nutrient concentrations are low and similar to those found in Grand Lake.

A sediment sample was collected at site YL0058, south of South Brook Park near the South Brook Seaplane Base. The sample was collected approximately 0.5 kilometres west of the docking facility. The organic compound analysis of the triplicate sediment sample indicates a non-homogenized sample; although two of the samples have similar concentrations. The detected compounds were the high molecular weight PAH's phenanthrene, pyrene, and fluoranthene. These are produced from fossil fuel combustion. The concentration of each are 4 to 8 times the analytical detection limit (Table 6), but below the 2000 ng/g "lowest effect level" guidelines for 16 PAH compounds (Persaud et al., 1992). The metal analysis indicates a homogenized sample, with all concentrations except for mercury and arsenic below the "lowest effect level" guideline (Persaud et al., 1992). Arsenic is at the 6.0 mg/kg guideline and mercury is 0.01 mg/kg above the 0.02 mg/Kg.

3.1.4 Lower Humber River

The lower Humber River after leaving Deer Lake flows adjacent to the Trans Canada Highway and in close proxmity to numerous residences along the Highway and in the Towns of Pasadena and Steady Brook. The bedrock between Deer lake and the Village of Steady Brook is of the Fleur de Lys Super group. This group consists of mudstone, fine clay (pelitic), *sand-sedimentary rock* (prammitic), schist or coarse gravel, metamorphic rock in thin plates, and minor deposits of marbles and quartzite (Golder Associates 1983). From Steady Brook to the Humber Arm, the bedrock changes to the St. George's Group, which consist of the Continental Margin and Lift Facies Sediments. This group is similar to the Fleur de Lys Super group being composed of limestone, dolostone, shale and the metamorphic rock; phyllite (Golder Associates 1983). The surficial geology consist of a narrow band of sand and gravel, which runs parallel to the River and along side a band of till adjacent to the River. The till in the Humber Valley near Steady Brook has accumulated to a depth in excess of 120 metre. The surrounding area is exposed bedrock (Golder Associates 1993).

The lower Humber River was sampled at four locations. YL0064 was located above Deer Lake outlet (Map 8). Cottages were present in this area and an aquaculture project was being developed. Seven kilometres below the outlet site YL0012 was collected above the Humber Village Bridge (Map 9). The third site YL0063 was collected at Steady Brook (Map 9), and a fourth site at Shellbird Island, above the Humber Arm YL0061 (Map 10). At all these sites pH was 7.1, specific conductance was 37 µSie/cm and alkalinity was between 9.8 to 11.0 mg/L. The limestone deposits have a large influence on the chemistry and calcium is the dominant cation. Low concentrations of nutrients, heavy metals and coliform counts were also found. The discharge curve at Humber Village Bridge is shown in Figure 7. The average discharge is 238 cms, and the range is between 100 to 755 cms in the six year period. Lower discharges occur because a portion of the discharge can be regulated by the Grand Lake reservoir. Because of the normally large discharge the various inputs from the communities along the Lower Humber are diluted to nondetectable concentrations.

Steady Brook joins the Humber River adjacent to Steady Brook Village. This stream originates in Steady Brook Lake, which is located in the highlands south of the Humber River. The sample site was located on the Brook above the confluence with the River at an area used as a swimming pool, YL0062 (Map 9). At the time of collection, the dam which creates the swimming pool had been removed for the winter. The pH was 6.4 pH units, specific conductance was 25 uSie/cm, and alkalinity was 3.4 mg/l. The major ions are calcium and magnesium. Aluminum and iron concentrations were higher than those found in the lower Humber, but similar to those concentrations found in the Upper Humber River. DOC was also high at 6.8 mg/L, again similar to concentrations found in the Humber River headwaters. This Brook has no detectable influence on the chemistry of the Humber River.

A surface water sample was analysed for trace organic compounds at site YL0064; Deer Lake outlet, and at site YL0061; Shellbird Island (Table 5). Only the ubiquitous alpha and gamma-BHC were detected. The concentration of gamma-BHC was at the detection limit of 0.4 ng/L; whereas, alpha-BHC was found at 1.9 and 2.4 ng/L. The concentrations of alpha-BHC are comparable to those found in other areas of Newfoundland (Roussel <u>et. al.</u> 1990).

A sediment sample (YL0061) collected at Shellbird Island was analysed for trace organic compounds and metals. No elevated variable concentrations were detected.

Station YL0012, (Humber Village Bridge) is sampled under the Canada-Newfoundland Water Quality Monitoring Agreement (Table 9). Most variables at this site fluctuated within a narrow range. Specific conductance varies between 38 and 45 uSie/cm, and pH between 6.2 and 7.1 pH units (Figures 8,9). Sodium was present in a narrower range than chloride and the peaks occurred during high discharge period. The ratio Na:Cl is usually at or below a 1:1.5 ratio, which indicates roadsalt leachate. Throughout the Humber River the NaCl ratio has not indicated an ion source from sea mist. The absence of seasalt is likely the result of the westerly mountain range which would block the influence from the Gulf of St. Lawrence.

3.2 **Corner Brook**

Corner Brook flows through the midst of the City of Corner Brook. It originates in Corner Brook Lake which is 5.0 kilometres west of Grand Lake (Map 11). The Brook is sixteen kilometres in length and empties into the Humber Arm west of Corner Brook Pulp and Paper Mill (Map 10). Corner Brook Lake is a regulated reservoir for the Watson Brook-Corner Brook hydroelectric plant. The penstocks are located two kilometres above the plant adjacent to the Brook. This watershed also supplies drinking water for a portion of the City of Corner Brook. The reservoir is located at Trout Pond, south of Massey Drive (Map 10). Trout Pond receives water through a 2 kilometre pipeline upstream of the Trans Canada Highway in the undeveloped upper watershed. The Brook is also dammed by small containments at the swimming area in the Margaret Bowater Park above O'Connell Drive Bridge, and at Glen Mill pond 1 Km below the Park. At the Glen Mill dam water is piped to the mill for paper production. From this dam to the estuary most of the water in Corner Brook stream has been removed.

The bedrock of Corner Brook consists of the Fleur de Lys Complex, and St. Georges Group. The latter bedrock contains massive limestone deposits . The surficial geology adjacent to the Brook consists of variable thickness till. Exposed bedrock of the Fleur de Lys Super group is present in areas surrounding the watershed (Golder Associates 1983).

Ten sites were sampled on Corner Brook. The surface water data (Table 2), shows these stations can be divided into two groups. The first group consist of the three stations in the headwaters. The first sample was collected below a wood/concrete dam at Corner Brook Lake (YL0049) (Map 11). The second is located above the municipal drinking water intake pipe (YL0048), and the third above a small reservoir for the hydroplants penstocks (Map 10). The pH is 7.0 units, specific conductance is 34 uSie/cm and alkalinity is the lowest in this watershed ranging between 6.8 and 8.8 mg/L. Iron and aluminum concentrations are the highest in this watershed, and elevated DOC suggest the presence of peat deposits to the west.

The lower seven stations are located in the geology of the St. George Group. The water chemistry of this group is not similar, because of the diversion of water for the power plant. The chemistry of the lower two stations are similar to the headwater. At the hydro plant reservoir a large volume of the Brook is diverted to the hydro plant through penstocks. The remaining water follows the original streambed which contains large deposits of limestone, dolostone and shale. The five stations which have similar chemistry are; YL0046 above Massey Drive, YL0045 adjaecent the golf course, YL0044 below the golf course, YL0017 Watson's Brook, and site YL0042 in Bell's Brook.

These sites had a pH of 8.0 units, and a specific conductance of between 180 and 230 uSie/cm. Many variables are 5 to 10 times those of the headwaters. The concentrations of all ions increased, but calcium increased from 2.9-5.9 mg/L (headwater) to 25-40 mg/L, and alkalinity rose from 76.2 to 104.8 mg/L. Heavy metals, nutrients, and coliform counts were low, except at Bell's Brook where faecal coliform exceeded the 600/100mL count (table 3). This underground tributary is located in a development area 3 metres from a main street. Although sewage input was occuring, elevated nutrients and aesthetic problems were not present.

Sites YL0013, at the City's park, and site YL0041 above Bell's Brook have surface water characteristics similar to the headwaters. The differing quality is the result of outflow water from the hydroplant reentering the Brook, and diluting the chemical influence from the Brook's mid-section. Acidity increases from 8.0 to 7.5 pH units, specific conductance drops to 67-70 uSie/cm and alkalinity falls to 2.3 mg/L. Site YL0041 was collected as a quality control triplicate sample, and indicate a representative sample.

Surface water was analyzed for organic compounds at site YL0046 Massey Drive, YL0044 below the golf course, YL0013 at the Park, and site YL0041 above Bell's Brook. The data in Table 5 show the ubiquitous alpha-BHC at all sites, and at twice the 10 ng/L guideline for protection of aquatic life (CCREM, 1987) at YL0044. This pesticide is not used in Canada, and this concentration is three times the 8.61 ng/l found on the Humber River (Roussel et al., 1990). Percent recoveries of alpha-BHC were 59 percent, and the concentration at site YL0013, which is below site YL0044 dropped to 0.7 ng/L. The sharp decline in the compound between the sites would suggest an anomalous high value at YL0044. The high molecular weight PAHs, phenanthrene and fluoranthene were twice the detection limit at site YL0044. These PAHs are ubiquious products of fossil fuel combustion. Their presence is likely from the resuspension of contaminated sediment, because they rapidly absorb to substrates when in the water column (CCREM 1987).

Sediment samples from YL0013 and YL0041 (Table 6) indicate the presence of high weight PAHs at concentrations below the Ontario M.O.E. "lowest effect level" sediment guideline (Persaud et al., 1992). The data from YL0041 show a tighter group of concentrations because of a higher percentage of silt and clay, whereas YL0013 contained more sand. The higher concentration of PAHs at YL0041 is likely a result of increased fuel combustion from the main road and business which have accumulated over a period of time.

Metal analyses (Table 7) indicate a homogenized sample at both sites. The concentrations of copper, lead, and zinc at site YL0041 exceeded the "lowest effect level' sediment guidelines of 16 mg/kg, 31 mg/kg and 120 mg/kg (Persaud et al., 1992). The copper and lead concentrations were closer to the "severe effect levels" of 110 mg/kg and 850 mg/kg. Zinc which was slightly above the lower 120 mg/kg guideline was 7 times below the 820 mg/kg severe guideline.

The metal and trace organic compound concentrations indicate that the lower section has received inputs from urban runoff, and leachates. If no further input enters the Brook the concentrations of compounds should be reduced by the removal of sediment with high discharge and by the deposition of noncontaminated sediment.

A surface water sample from site YL0045 was analyzed for leachate compounds associated with a buried softwood bark pile at the golf course. Years ago the City of Corner Brook negotiated an agreement with Corner Brook Pulp and Paper to fill a ravine on the banks of Corner Brook with bark. The bark was then covered with topsoil to provide additional area for the golfcourse. As the bark decomposed, concentrated tannic and resin acids leached into the Brook creating a foul odour and killing the vegetation in its seepage corridor. In 1991 a heavy mold occurred and the public began to question its impact on the aquatic life and recreational areas.

Results from analysis for tannic acids, resin acids and phenolic compounds indicate only tannic acids were above the analytical detection limit (Table 10). The tannic acid concentration immediately below the bark pile leachate was the lowest of the survey; whereas, further down stream below the Park (YL0013), the highest concentration of 0.87 mg/L was recorded. Tannic acid occurs naturally, and its concentration in Corner Brook appears to be related to DOC.

The toxicity of the leachate killed the vegetation in its seepage corridor, but was neutralized as a result of the 96 mg/L alkalinity in the Brook. At the site opposite the leachate the dissolved oxygen was above 10 mg/L, and a large number of Brook trout were present. The oxygen concentration at the time of sampling maybe periodic and due to turbulence and reoxygenation from stream morphology. Detrimental conditions may exist during warmer temperatures and lower discharge.

Site YL0013, at Margaret Bowater Park is a water quality station for long term monitoring under the Canada-Newfoundland Water Quality Monitoring Agreement. The data collected since 1986 (Table 11) indicate a natural Brook with characteristics of the limestone bedrock. Specific conductance ranged between 55 and 180 uSie/cm. The low values occurred during high discharge (Figure 7). ph ranged between 6.5 to 8.2 units; although, the lower values are likely in error because the field pH measurements did not detect pH below 7.5

units (Figure 11). The lower values occurred at high discharge periods when the brook was influenced by low pH from the headwaters. The nutrients (Figure 12) appear to be increasing over the 5 year sampling period. The pattern of nitrate and phosphorus show a gradual increase in concentration and a increase in frequency and size of peaks. The source is likely from fertilizer runoff from the golf course and residences; although, exceptional growth of aquatic plants were not noted. Geological metals were elevated during high discharge (Table 11),and heavy metals were below the water quality guidelines.

3.3 **Hughes Brook**

Hughes Brook is located on the north side of Humber Arm (Map 12), and originates in Hughes Lake. (Table 12,13). It flows 12 kilometres from the headwaters to the Humber estuary. The headwaters are undeveloped except for a dirt road in the upper 7 kilometres. The mid-section is pasture and with dirt logging roads.

The headwaters flow over exposed Fleur de Lys Super Group bedrock. In the mid-section the bedrock changes to the St. Georges Group with surficial geology of sand, gravel, and minor deposits of till to the northwest corner (Golder Associates 1983).

Site YL0052 was located on a small tributary west of Hughes Lake. A pH of 8.0 is the same as that in the lower section. The specific conductance of 135 uSie/cm and alkalinity of 63.3 mg/L are half those concentrations of the lower sites because of a lower content of calcium and magnesium.

Site YL0051 is located 750 metres upstream from Hughes Brook on a small tributary used by a seasonal hatchery. The increase of calcium and magnesium in the bedrock causes conductivity to increase to 235 µSie/cm and alkalinity to 118.3 mg/L. All the other variables are similar to the above site.

After merging with this tributary, Hughes Brook flows 3 kilometres to the estuary. The last sample (YL0050) was collected below the highway 61 bridge. Above the bridge a salmon enhancement project is underway, and a fish fence is situated 20 metres above the sample site. This area is forested except for the salmon project building. pH is similar to the upper sites, specific conductance drops to 160 µSie/cm, and alkalinity drops to 74.8 mg/L. An analysis of the surface water for trace organic compounds detected only PCB's (Table 5). The presence of PCBs in the blank quality control sample identifies a contamination problem (Table 16). Because of the contamination, the presence of PCB's in other samples must be assumed to be from a similar source. The organic compounds and metals in sediment were all below detection limits and sediment guidelines (Table 6,7).

3.4 **Wild Cove Brook**

Wild Cove Brook is south of Hughes Brook (Map 12). It is smaller than Hughes watershed and originates from ground water three kilometres east of Wild Cove at the base of the mountains. Although the 1:50,000 topographic map for this area (EMR 1973) indicates a stream between Fox Bow lake and Wild Cove Brook, field observations found this to be an error. To the east of the Brook in the highlands is Wild Cove Lake which flows into the Humber River. The bedrock is from the St. Georges Group, and the highlands lie over the Fleur de Lys Super group. The surficial geology is composed of sand, gravel, and minor deposits of peat (Golder Associates 1983).

This watershed has received major environmental impacts. For numerous years, a municipal dump has been located within 0.5 kilometres north of the Brook. Logging has occurred above the headwater site and a recent storage and compositing site for tree bark is located opposite the landfill site (Map 12). The 15 metre thickbark pile began in 1988 as a storage site for Genesis Inc., which would use the bark to manufacture organic fertilizer (Beak Consultants Ltd 1993). As the bark accumulated water it began to decompose which resulted in leachate seeping into the Brook.

The headwater site, YL0065, is below the mountain range. The area is accessible by a dirt road which extends across the bark pile and into the small logging area behind Wild Cove Brook. The site is in a small wetland and the Brook is approximately one metre wide and 20 cms deep. The major impacts are below this site. Coliform, nutrients, metals, colour, and turbidity are low which suggest that the impact from the logging has not influenced the water. The ions from the St. George Group bedrock predominates the water chemistry with calcium reaching 39.8 mg/L and magnesium and potassium being slightly elevated (Table 2). These cations are responsible for the specific conductance of 290 uSie/cm, pH of 8.4 and alkalinity of 141.2 mg/L. There were no trace organic compounds present in the surface water (Table 5). An analysis for organic compounds associated with bark leachate detected only a low concentrations of tannic acids (Table 10). The source is expected to be the peat deposits.

A sediment sample was analyzed for trace organic compounds and metals. Analysis of organic compounds in sediment (Table 6) found oils and grease slightly above the 0.1 mg/kg detection limit. The source is likely petroleum in the leachate or a natural supply of mineral oils. The sediment analysis for metals (Table 7) found only arsenic above the "lowest effect level" guideline (Persaud et al., 1992). Concentrations were between 7.0 and 8.9 mg/kg, with the guideline being 6.0 mg/kg. The source may be historical because lead and copper concentrations were higher than other background sites.

Site YL0039 is below the municipal dump site, and above the bark pile leachate. The surface water chemistry (Table 2), indicates an increase in specific conductance from 290 to 315 uSie/cm, pH dropped to 7.9 units, and alkalinity dropped to 126.1 mg/L. A lower concentration of calcium and magnesium caused the alkalinity to decrease; whereas the increase in conductance was a result of a seven fold increase in potassium and nitrate, and a four fold increase in sodium and chloride.

The sodium and chloride concentrations are close to a ratio of 1:1.5, and associated with lower sulphate concentrations. This ratio indicates a road salt influence. The increase of potassium and also of nitrate is likely associated with leaching from the bark pile.

The water from this site has a colour of 25 relative units and turbidity increased one unit to 1.2 JTU. The elevated turbidity is probably a result of the DOC which increased from 1.8 to 4.9 mg/L and, a slight increase in geological metals. The DOC appears to be associated with the elevated tannic acids (Table 10). The resin acids were below the detection limit which indicates that these compounds are decomposed in the wetland. The absence of chlorinated phenols indicate that treated wood fibre is not present in the barkpile. A surface water sample for trace organic compounds detected PCB's slightly above the 9.0 ng/L detection limit (Table 5). Because PCB's were found in the blank quality control sample (Table 16) a contamination problem exist, and so the presence of PCB's in the field sample cannot be positively confirmed, and must be assumed to be from contamination (Section 4.2).

The leachate from the bark pile is dark green with a hydrogen sulfide odour and is pooled in a four metre wide interception ditch at the base of the pile (Beak Consultants Ltd 1993). The ditch was put in place to control runoff by allowing the leachate to seep through the wetland before entering the Brook. This measure did not work because passages from the ditch were eroded through the dyke.

A surface water sample (YL0040) was collected in the ditch. Certain variables were not analysed because of the sensitivity of most instruments to concentrated leachate. The sample contained extremely high concentrations of major ions which resulted in a specific conductance of 1600 μSie/cm (Table 2). The concentration of calcium was 230 mg/L, potassium 84 mg/L, chloride 110 mg/L and sodium 56.0 mg/L. The apparent colour was also extremely high at 380 relative units. The colour is attributed to the elevated iron content of 16 mg/L, and elevated tannic acids. Phosphorus was elevated to 14 mg/L, and the source is likely from the decomposition of bark. Zinc at 0.31mg/l was one order of magnitude above the 0.03 mg/L freshwater aquatic life guideline (CCREM 1987). Its abundance maybe from heavy equipment, debarking equipment, or galvanized surfaces. The analysis of bark related compounds found extremely high concentrations of tannic acid, dehydroabetic acid (resin acid), and 3 fatty acids; (linoleic, palmitic and steric acid), and 9060 mg/l of total phenol. Only a fraction of tannic acid was found outside the barkpile, and its source is likely from the wetland.

The excessive aquatic growth below the outlet of the barkpile was first noticed in Wild Cove Brook in 1989. The interception ditch was dug by Genesis Inc. in the summer of 1990, and in November, 1991 Newfoundland Department of Environment and Lands ordered a halt to bark dumping at the site. The new location for temporary dumping was at the land fill on the northside of Wild Cove Brook (Beak Consultants Ltd, 1993). In 1992, Corner Brook Pulp and Paper hired Beak Consultants Limited of Montreal to conduct an assessment of the barkpile on Wild Cove Brook.

Beak Consultants identified the aquatic growth as a mixture of fungi, algae, bacteria and Annelid worms. The Annelid worms were identified as Tubifex oligochaetes. This worm is common in North America and thrives in streams with low DO and organic enriched sediment, typical of sewage-impacted rivers. The moulds were composed of different species of algae, fungi and bacteria which appear during a period of favorable conditions. The slime appearance was caused by the fungus Leptomitus lacteus or sewage mould. Its long white mycelium form white wooly masses. Mucorales fungus was the major species which covered the sediment. Its colour is white until spore production occurs, at which time it turns grey-brown. The slime appearance is also intensified - during summer by the algae: Chlorococcum, Cladophora, Chaetophora, Stigeoclonium and by the "slime forming" bacteria: Clostridia, Alcaligene, and Achromobacter. The associated odour was the result of both fungi and bacteria. Other fungi were Lenzites trabea and L. porea. Both are cellulose and lignin degrading fungus which use large quantities of oxygen and release gases. The bacterium was Desulfovibria, an anoerobic sulphate reducing species which derives oxygen from sulphate for organic material oxidation and release hydrogen sulphide. The tannins are degraded by the fungi Pencillium and Candida, and the bacterium Pseudononces. Some of the above species are indigenous whereas others have been introduced as a result of the bark pile.

Because of the growth during periods of high temperature and low discharge, the DO in Wild Cove is severely reduced. As the leachate continues to supply organic carbon, nutrients and minerals, the "blooms" and low DO will continue for a sigificant period of time. Beak Consultants Ltd (1993) concluded that the strength and toxicity of the leachate will decrease over time, but the period of time was not estimated.

Site YL0029 was collected 0.5 kilometre below the barkpile above a small pond on the upper side of route 61. In comparison to site YL0039, above the bark pile, the leachate appears to influence the following variables. Potassium increased from 2.8 to 3.4 mg/L as a result of the 84 mg/L in the ditch. Conductance increased from 315 to 340 µSie/cm, phosphorous increased one order of magnitude to 0.07 mg/L, colour increased from 25 to 60 relative units, and turbidity increased from 1.2 to 21 JT Units. The latter increases are the result of the mixing of leachate from the ditch. A surface water analysis for trace organic compounds (Table 4) detected only PCB's, but its presence is suspected to be the result of contamination (Section 4.3). The analysis for bark related compounds detected only tannic acid. Its concentration was similar to site YL0039 and it is suspected to be natural and associated with the DOC level. The absence of resin acids and phenols indicate their degradation in the ditch and wetland.

Site YL0029 is a long term surface water collection site under the Canada-Newfoundland Water Quality Monitoring Agreement. The site has been sampled on a monthly schedule since 1989 (Table 12). Data indicates that specific conductance flucuates between 320 and 560 usie/cm, in response to discharge (Humber River-Figure 7). The concentrations of calcium, magnesium, potassium, sodium, chloride, and bicarbonate are the major ions influencing specific conductance (Figure 14,15). During high discharge, alkalinity and pH levels drop, and turbidity increases. Phosphorus and nitrate usually peak in late fall and early spring, but the higher peaks in the latter sample period is expected to be the results of bark decomposition and high runoff (Figure 17). DO fluxuates between 1.2 and 13.5 mg/L in response to discharge, temperature, and vegetation decay. High temperatures compounded with low discharge decrease the oxygen solubility (Figure 18), and organic matter decay consumes available oxygen. Because this watershed experiences DO concentrations below the guideline for the protection of aquatic life (CCREM 1987), the presence of trout and forage fish were found below the highway, and above the leachate source. This indicates that these communities are responding to the conditions by staying in areas of more favorable conditions. Because the leachate will eventually increase the recovery of this area is doubtful, and the lower sections of the Brook may also become unable to support natural aquatic life.

The last site, YL0038 is located 500 metres above the Humber Arm and 300 metres below the road (Map 12). *The analysis for trace* organic compounds in sediment (Table 6), detected low concentrations of oils and grease, phenanthrene, pyrene, and fluoranthene. Sources are likely runoff and atmospheric input. The metal analysis in sediment (Table 7) found elevated concentrations of copper, lead, and zinc. Zinc concentrations of 118 and 123 mg/kg were above the "lowest effect level" sediment guideline for the protection of benthic communities (Persaud et al., 1992). The source is likely from the galvanized culvert under highway 61. Copper and lead concentrations were higher than those concentrations found in the headwaters. Their source is likely from surface runoff and leachate from the dumpsite.

Wild Cove Brook below the highway was electroseined by W. Collins of the Department of Fisheries and Oceans. Numerous trout between 5 and 15 centimetres were present, but only one sample of stickleback forage fish was analysed for extractable metals (Table 13). Arsenic at 0.19 mg/kg was twice the maxmium 0.067 mg/kg found in maritime rivers, and copper (0.99 mg/kg) was three times the concentrations found in Red Indian Lake, Exploits River. Zinc concentrations, (35.4 mg/kg) were also above those found in Red Indian Lake (6.0-12.0 mg/kg), and the Mira River in Nova Scotia (3.6-6.4 mg/kg)(Bailey 1988).

4.0 QUALITY CONTROL/QUALITY ASSURANCE

To establish a degree of credibility when producing environmental data, a project must include verifiable quality control/quality assurance procedures (QA/QC) for the field collection and laboratory analytical practices. As part of the Humber River Basin Recurrent Survey, the following QC procedures were used; triplicate, blank, organic and inorganic spiked samples for surface water, and triplicate samples for sediment. These procedures can indicate contamination, and/or the reliability of the sampling and analytical methods. The field quality control augments the laboratory practices of QA/QC which are routine in the National Water Quality Laboratory and at the Monitoring and Evaluation Branch Laboratory in Moncton.

4.1 Triplicate Samples

Sequential triplicate samples are three sets of samples from one location collected in sequence. The resulting data from this quality control procedure should indicate sampling representativeness, sample contamination, and data management problems. A general guideline, used by Roussel et al., (1991a), suggests that triplicate sample results should not vary by more than 10 percent. Table 14 lists the triplicate surface water sample results and tables 6 and 7 list the triplicate sediment results from the survey.

The above quality control procedure has produced acceptable results for all the surface water triplicate samples. Sediment triplicate samples are acceptable although certain variables contain concentrations outside the ten percent range. The objective of the triplicate samples is to identify concentrations which should be viewed with caution. The results are discussed in greater detail in the main text.

4.2 Blanks

At a selected number of stations, preservation blanks were prepared. These blanks consist of sample bottles filled with distilled water and transported to the field with the other bottles. These Q.C. samples should verify if bottles have been contaminated, and the cleanliness of bottles and preservative (Roussel, et al., 1991a). Tables 15 and 16 list the blank sample results. The data indicates that the sample bottles for the inorganic parameters were uncontaminated, and the blanks for the organic analysis indicated a PCB contamination problem This factor is discussed further in the text.

4.3 Surface Water Samples - Spiked Samples

One site was sampled for quality control organic and inorganic analysis. At the site blank samples, spiked samples, and natural samples were collected (Table 16). The blank samples consist of distilled laboratory water. They determine if the group of samples were contaminated prior or after sampling, and provide a quantifiable amount of organic compound if present. The spiked blank is similar to the distilled water blank, except that it has been "spiked", or has had added to it, 100 µL of prepared spiking solution (Table 18). Results represent the final quantity to be expected from a clean matrix sample after field and laboratory procedures. By using the calculation in Appendix 1, the percent recoveries of each organic compound contained in the spike can be calculated (Gaskin, 1988). The same procedure is also used with "field spikes". Duplicate water samples are collected and one is spiked with the same solution as used with the blanks, the other sample is left unspiked. By subtracting the recoveries of spiked field sample from natural field sample and dividing by a known concentration, percent recoveries can be calculated. The recoveries provide an indication of the degree of confidence which can be placed upon the organic quantities in natural field samples. If the percent recoveries are less than 100 the compound quantity is estimated low, and if the recoveries are above 100, the quantity is estimated high. According to Léger (1990), 100% recoveries indicate excellent performance, and values outside the 40 to 155% range should be considered abnormal for trace analyses and not used in interpretation.

Tables 16 list the results of the organic analysis of Q.C. samples. The compounds in the "blank" sample are expected to be less than the detection limit, if contamination has not occurred. The presence of only PCB's (polychlorinated biphenyls) indicates a contaminated sample. Because PCB's were in the blank, concentrations should be viewed with caution.

Table 17 lists the percent recoveries for compounds in spiked and unspiked samples. When spiking samples, the individual compounds which make up the "spike" should be present at a minimum concentration which is 10 times the detection limit of the analysing instrument (Léger 1990). If this concentration is not met, the recoveries are usually recorded as "less than detection limit" (L.D.). This report will use the notation "BDL", or "below detection limit" when the concentration of the spike is less than the instrument's detection limit (Table 17).

Most PAH's were present in unquantifiable concentrations, hence listed as "BDL". The higher molecular weight PAH's quantified ranged between 42.4 percent to 76.2 percent. These recoveries are acceptable.

The percent recoveries for organochlorine compounds ranged between 4.4 and 127.2 percent. Of these only six compounds were outside the acceptable range. Overall these were on the low recovery side.

The quality control samples have provided the degree of reliability of our data. The organochlorines can be considered reliable, although underestimated. The concentration of the polynuclear aromatic hydrocarbons (PAH's) were below the analysising instruments detection limit and were not quantified. No false positives were identified; therefore, the detected compounds can all be considered true positives.

The field and laboratory inorganic blanks and spikes were duplicated and only one set was carried to the field. This QA/QC sample set indicates that the inorganic variables analysed in surface water are representative of the site of collection, and no contamination occurred.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The 1991 Recurrent Survey assessed the Humber River Basin in western Newfoundland. Samples of surface water and sediment were analysed for organic and inorganic variables from the headwaters to the Humber Arm and estuary. Included in this survey were the watersheds of Corner Brook, Hughes Brook and Wild Cove Brook. The aquatic quality was compared primarily to guidelines for the protection of aquatic life (CCREM 1987), and to the guidelines for the protection of sediment quality (Persaud et al., 1992).

The Upper Humber is in a forested area presently being harvested. The impact of the harvest was not measurable because of the large dilution factor associated with the Humber River's discharge, and the few spatial samples collected in the main stem of the River. To adequately assess the impacts of the harvest a indepth survey of the small feeder streams in needed. In these streams quantities of water quality variables such as major ions, nutrients and sediment would be more representative of the true impact. The southern section of the Upper Humber has been developed by the Town of Deer Lake, and the construction of the Hinds Lake and Grand Lake hydropower reservoirs. The impact from the reservoirs, cottages, and the input of sewage from the Town of Deer lake is minimal due to the large quantity of water in this watershed. Future development and activity in this watershed should include additional water quality monitoring to ensure aquatic conditions do not deteriorate. A sediment sample collected off a float-plane base in lower Deer Lake contained organic compounds. The degree of impact by this operation cannot be based on one sample, but future surveys should be focus on this area to determine present concentrations, and identify mitigative measures. From Deer Lake to the Humber Arm the Humber River flows by small communities and adjacent to the Trans Canada Highway. This stretch of River is fast flowing and the impact appears insignificant.

Corner Brook flows through the centre The City of Corner Brook. This watershed has been developed in the lower reaches and the Brook has been diverted to provide for a hydroelectric power, production water for the mill, and to supply the City's drinking water reservoir. The major impact upon this watershed is in the lower section. Urban runoff and sewage input at Bell's Brook and along Corner Brook has lowered the quality of the small discharge draining into Humber Arm. Elevated heavy metals were found in the sediment of lower Corner Brook, but not in surface water. Leachate from a bark pile which borders the Brook appears to be degradated by natural processes and is creating only aesthetic problems during warmer months. This area should be monitored to assess future trends.

On the north side of the Humber Arm is Hughes Brook and Wild Cove Brook. Hughes Brook has minor development along its mid section, but the watershed remains natural. Wild Cove Brook is the smallest watershed in the survey and the impacts which include a municipal landfill, a softwood bark storage and composting site and a small logging operation in the headwaters are magnified by their large quantities and the low discharge.

Because of the leachate from the landfill and the bark pile, sections of Wild Cove Brook contain a nutrient and organic-rich aquatic environment. Annelid worms, fungi and bacteria thrive in the Brook immediately downstream of the leachate input. This results in high productivity and low dissolved oxygen which drops below guidelines during summer months. During periods of unfavorable conditions the movement of mobile aquatic life to upper and lower areas in the Brook which contain better quality is expected. The leachate from the bark pile and from the municipal dump is likely to increase in the future, and the quality of this watershed will deteriorate. It is not acceptable that this waterbody has been allowed to be degraded to its present state and measures must be put in place to improve the aquatic quality.

Future projects should concentrate on the Corner Brook and Wild Cove Brook watersheds, and the feeder streams in the upper Humber River. Studies should include an assessment of the aquatic environment above and below impacted areas to ascertain the impact of trace metals and organic compounds on various benthic community indices. These observations could then be compared to other similar unimpacted watersheds such as Hughes Brook.

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APPENDIX I

SPIKE RECOVERY:

To determine the degree of confidence that can be placed on analytical results, the effects and performance of the samples, spikes and instruments need to be known. To determine these variables, spike recovery:percentage needs to be calculated using the formula in Gaskin (1988):

$$\% \text{ recovery} = \frac{(C_F - C_B)}{C_A} \times 100$$

C_F = measure concentration in the spiked sample (field or blank)

C_B = average concentration in sample (field or blank)

C_A = known concentration of spike added to sample (field or blank)

This equation works on the principle that if the matrix effects are removed from the equation and the volume and concentration of the spiking solution added is known, the percent recovery of spiking solution can be calculated, eg:

$$\% \text{ recovery for field spike} = \frac{\text{field spike value} - \text{field value}}{\text{spike}} \times 100$$

This recovery provides the interpreter with a degree of confidence as to the level of a compound reported in an ambient field sample.

TABLE 1

List of Stations Sampled During the 1991 Humber River Survey

NF02YL0011	HUMBER RIVER AT LITTLE FALLS BRIDGE Type - 00 Latitude - 49 20 54 Longitude - 57 14 07 UTM Zone - 21 Northing 5466000.0 Easting 482900.0 Humber River at Little Falls Bridge, Route 222, Squires Memorial Provincial Park
NF02YL0012	HUMBER RIVER AT HUMBER VILLAGE BRIDGE Type - 00 Latitude - 48 59 01 Longitude - 57 45 40 UTM Zone - 21 Northing 5425699.5 Easting - 444300.5 Humber River at Humber Village Bridge
NF02YL0013	CORNER BROOK AT BRIDGE, O'CONNELL DRIVE Type - 00 Latitude - 48 56 40 Longitude - 57 56 12 UTM Zone - 21 Northing 5421500.0 Easting - 431400.0 Corner Brook at Bridge, O'Connell Drive, Corner Brook
NF02YL0017	UPPER HUMBER RIVER AT HWY 44 BRIDGE AT NICHOLSVILLE Type - 00 Latitude - 49 11 16 Longitude - 57 26 58 UTM Zone - 21 Northing 5448210.0 Easting 467230.0 Upper Humber River at Hwy 44 Bridge at Nicholsville
NF02YL0029	WILD COVE BROOK, AT CULVERT ROUTE 440 Type - 00 Latitude - 48 58 28 Longitude - 57 53 02 UTM Zone - 21 Northing 5424800.0 Easting 435300.0 Wild Cove Brook, at Culvert Route 440.
NF02YK0022	HUMBER CANAL, TOP OF MAIN DAM ROAD Type - 00 Latitude - 49 09 58 Longitude - 57 24 56 UTM Zone - 21 Northing 5445800.0 Easting 469700.0 Humber Canal, Top of Main Dam Road, Town of Deer Lake
NF02YL0038	WILD COVE BROOK ABOVE TIDAL INFLUENCE Type - 00 Latitude - 48 58 25 Longitude - 57 53 07 UTM Zone - 21 Northing 5424690.0 Easting - 435210.0 Wild Cove Brook above Tidal Influence
NF02YL0039	WILD COVE BROOK APPROX. 800 M UPSTREAM OF ROUTE 440 Type - 00 Latitude - 48 58 40 Longitude - 57 52 22 UTM Zone - 21 Northing 5425150.0 Easting 436125.0 Wild Cove Brook Approx. 800 m Upstream of Route 440

NF02YL0040 WILD COVE BROOK AT BARK PILE
Type - 00 Latitude - 48 58 29 Longitude - 57 52 39
UTM Zone - 21 Northing 5424800.0 Easting 435780.0
Wild Cove Brook at Centre of Ditch Surrounding Bark Pile

NF02YL0041 CORNER BROOK STREAM ABOVE TIDAL INFLUENCE
Type - 00 Latitude - 48 57 09 Longitude - 57 57 01
UTM Zone - 21 Northing 5422400.0 Easting 430425.0
Corner Brook Stream above Tidal Influence Directly Across from City Hall.

NF02YL0042 BELL'S BROOK ABOVE CONFLUENCE WITH STREAM
Type - 00 Latitude - 48 56 56 Longitude - 57 57 21
UTM Zone - 21 Northing 5422000.0 Easting 430000.0
Bell's Brook above Confluence with Corner Brook Stream

NF02YL0043 WATSONS BROOK AT CONFLUENCE WITH STREAM
Type - 00 Latitude - 48 56 29 Longitude - 57 55 50
UTM Zone - 21 Northing 5421140.0 Easting 431850.0
Watsons Brook at Confluence with Corner Brook Stream

NF02YL0044 CORNER BROOK STREAM ABOVE HYDRO PLANT
Type - 00 Latitude - 48 56 24 Longitude - 57 55 32
UTM Zone - 21 Northing 5421000.0 Easting - 432200.0
Corner Brook Stream above Hydro Plant

NF02YL0045 CORNER BROOK STREAM ABOVE GOLF COURSE
Type - 00 Latitude - 48 56 11 Longitude - 57 55 05
UTM Zone - 21 Northing 5420580.0 Easting 432760.0
Corner Brook Stream above Golf Course

NF02YL0046 CORNER BROOK STREAM ABOVE MASSEY DRIVE
Type - 00 Latitude - 48 56 02 Longitude - 57 54 38
UTM Zone - 21 Northing 5420300.0 Easting 433300.0
Corner Brook Stream above Massey Drive

NF02YL0047 CORNER BROOK STREAM AT THREE MILE DAM
Type - 00 Latitude - 48 55 23 Longitude - 57 53 52
UTM Zone - 21 Northing 5419090.0 Easting 434225.0
Corner Brook Stream at Three Mile Dam

NF02YL0048 CORNER BROOK STREAM ABOVE WATER SUPPLY INTAKE
Type - 00 Latitude - 48 54 40 Longitude - 57 52 28
UTM Zone - 21 Northing 5417750.0 Easting 435925.0
Corner Brook Stream above Corner Brook Water Supply Intake

NF02YL0049	CORNER BROOK STREAM BELOW OUTLET Type - 00 Latitude - 48 51 06 Longitude - 57 51 09 UTM Zone - 21 Northing 5411125.0 Easting 437450.0 Corner Brook Stream below Outlet of Corner Brook Lake
NF02YL0050	HUGHES BROOK ABOVE TIDAL INFLUENCE Type - 00 Latitude - 48 59 39 Longitude - 57 53 55 UTM Zone - 21 Northing 5427000.0 Easting 434245.0 Hughes Brook above Tidal Influence
NF02YL0051	TRIBUTARY OF HUGHES BROOK AT SALMON HATCHERY Type - 00 Latitude - 49 00 29 Longitude - 57 51 46 UTM Zone - 21 Northing 5428500.0 Easting 436900.0 A Tributary of Hughes Brook Adjacent Salmon Hatchery above Bridge
NF02YL0052	HUGHES BROOK ABOVE BRIDGE Type - 00 Latitude - 49 01 53 Longitude - 57 50 55 UTM Zone - 21 Northing 5431100.0 Easting 437950.0 A Tributary of Hughes Brook above Bridge
NF02YL0053	JUNCTION BROOK AT CONFLUENCE WITH UPPER HUMBER RIVER Type - 00 Latitude - 49 13 25 Longitude - 57 21 52 UTM Zone - 21 Northing 5452170.0 Easting 473450.0 Junction Brook at Confluence with Upper Humber River
NF02YL0054	UPPER HUMBER RIVER AT OLD DAM Type - 00 Latitude - 49 31 08 Longitude - 57 05 53 UTM Zone - 21 Northing 5484950.0 Easting 492900.0 Upper Humber River at Old Dam Upstream from Confluence with Adies River
NF02YL0055	UPPER HUMBER RIVER AT NEW BRIDGE Type - 00 Latitude - 49 38 20 Longitude - 57 15 09 UTM Zone - 21 Northing 5498300.0 Easting 481750.0 Upper Humber River at New Bridge Silver Mountain Forest Cutting Area
NF02YK0023	SANDY LAKE AT ROUTE 401 Type - 01 Latitude - 49 14 44 Longitude - 57 04 07 UTM Zone - 21 Northing 5454550.0 Easting 495000.0 Sandy lake at Intersection with Route 401 (Howley)
NF02YK0024	HINDS BROOK BELOW POWER HOUSE Type - 00 Latitude - 49 04 59 Longitude - 57 12 19 UTM Zone - 21 Northing 5436500.0 Easting 485000.0 Hinds Brook below Power House at Confluence with Grand Lake

NF02YL0058 DEER LAKE OFF SOUTH BROOK PARK
Type - 01 Latitude - 49 01 05 Longitude - 57 38 59
UTM Zone - 21 Northing 5429450.0 Easting 452490.0
Deer lake off South Brook Park

NF02YL0059 DEER LAKE AT PYNN'S BROOK
Type - 01 Latitude - 49 05 52 Longitude - 57 34 18
UTM Zone - 21 Northing 5438290.0 Easting 458250.0
Deer lake at Pynn's Brook

NF02YL0060 DEER LAKE AT SPILLWAY
Type - 01 Latlitude - 49 05 54 Longitude - 57 26 18
UTM Zone - 21 Northing 5438290.0 Easting 468000.0
Deer Lake at Spillway

NF02YL0061 LOWER HUMBER RIVER AT SHELLBIRD ISLAND
Type - 00 Latitude - 48 56 53 Longitude - 57 52 11
UTM Zone - 21 Northing 5421850.0 Easting 436300.0
Lower Humber River at Shellbird Island

NF02YL0062 STEADY BROOK AT SWIMMING POOL
Type - 00 Latitude - 48 56 54 Longitude - 57 49 40
UTM Zone - 21 Northing 5421850.0 Easting 439390.0
Steady Brook at Swimming Pool

NF02YL0064 LOWER HUMBER RIVER AT SPAWN AQUACULTURE SITE
Type - 00 Latitude - 49 00 43 Longitude - 57 41 42
UTM Zone - 21 Northing 5428810.0 Easting 449160.0
Lowr Humber River at Spawn Aquaculture Site (Boomsiding)

NF02YL0065 WILD COVE BROOK
Type - 00 Latitude - 48 58 55 Longitude - 57 51 15
UTM Zone - 21 Northing 5428810.0 Easting 449160.0
Headwaters of Wild Cove

TABLE 2
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF PHYSICAL VARIABLES
MAJOR IONS, METALS AND NUTRIENTS

STATION NUMBER	SAMPLE DATE	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	ALKALINITY GRAN MG/L	APPARENT COLOUR REL. UNITS	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED SODIUM MG/L
1 UPPER HUMBER										
2 NF02YL0055	16-SEP-91	5.5	16	0.5	1.4	75	0.61	0.34	0.14	1.6
3 NF02YL0054	16-SEP-91	7.2	32	0.5	10.7	60	3.10	0.94	0.17	1.8
4 NF02YL0011	15-SEP-91	6.9	25	0.5	7.3	65	2.50	0.65	0.19	1.9
5 NF02YL0053	16-SEP-91	7.6	290	0.5	49.5	40	36.00	3.60	0.49	20.4
6 NF02YL0017	16-SEP-91	6.8	32	0.5	9.5	65	3.40	0.79	0.19	2.3
7 GRAND LAKE										
8 NF02YK0024	16-SEP-91	6.5	18	0.5	4.4	30	1.50	0.36	0.20	1.3
9 NF02YK0023	16-SEP-91	6.5	23	0.5	4.7	40	1.60	0.61	0.27	2.0
10 NF02YK0022	16-SEP-91	7.1	33	0.2	9.6	20	3.50	0.71	0.27	2.1
11 NF02YK0022	16-SEP-91	7.1	34	0.2	10.1	20	3.50	0.71	0.32	2.1
12 NF02YK0022	16-SEP-91	7.1	34	0.2	9.9	20	3.50	0.71	0.25	2.0
13 DEER LAKE										
14 NF02YL0060	15-SEP-91	7.2	34	0.2	9.9	15	3.60	0.73	0.32	2.2
15 NF02YL0059	15-SEP-91	7.1	35	0.3	10.2	25	3.60	0.78	0.27	2.2
16 NF02YL0058	15-SEP-91	7.2	35	0.3	10.0	25	3.60	0.77	0.27	2.2
17 LOWER HUMBER										
18 NF02YL0064	15-SEP-91	7.1	35	0.3	9.9	25	3.60	0.78	0.27	2.2
19 NF02YL0012	15-SEP-91	7.1	35	0.3	9.8	25	3.70	0.78	0.29	2.3
20 NF02YL0063	15-SEP-91	7.2	35	0.3	10.2	30	3.60	0.77	0.25	2.2
21 NF02YL0062	14-SEP-91	6.4	24	0.4	3.4	40	1.80	0.46	0.22	2.2
22 NF02YL0061	14-SEP-91	7.1	36	0.3	10.5	25	3.70	0.80	0.23	2.3
23 NF02YL0061	14-SEP-91	7.2	36	0.3	10.5	25	3.70	0.80	0.29	2.3
24 NF02YL0061	14-SEP-91	7.2	37	0.3	11.0	30	3.60	0.78	0.22	2.2
25 CORNER BK										
26 NF02YL0049	13-SEP-91	7.0	30	0.3	6.8	25	2.90	0.51	0.36	2.1
27 NF02YL0048	13-SEP-91	7.1	34	0.4	8.8	35	3.70	0.60	0.37	2.1
28 NF02YL0047	13-SEP-91	7.4	50	0.4	17.5	25	5.90	1.00	0.49	2.5
29 NF02YL0046	13-SEP-91	8.0	180	0.2	76.2	15	25.70	3.90	0.43	7.6
30 NF02YL0045	09-SEP-91	8.2	220	0.2	92.8	15	32.00	4.80	0.51	9.5
31 NF02YL0044	09-SEP-91	8.0	230	0.3	96.7	15	33.00	5.10	0.71	9.8
32 NF02YL0043	09-SEP-91	8.3	190	0.3	91.4	30	33.00	3.70	0.31	5.1
33 NF02YL0013	09-SEP-91	7.6	70	0.3	27.1	30	9.90	1.50	0.53	3.1
34 NF02YL0042	11-SEP-91	8.1	300	0.4	104.8	20	40.00	4.50	0.69	20.3
35 NF02YL0041	11-SEP-91	7.5	67	0.4	23.0	25	8.60	1.30	0.42	3.6
36 NF02YL0041	11-SEP-91	7.4	68	0.4	22.9	25	8.60	1.30	0.40	3.6
37 NF02YL0041	11-SEP-91	7.5	70	0.4	23.8	35	8.50	1.30	0.38	3.6
38 HUGHES BK										
39 NF02YL0052	13-SEP-91	8.0	135	0.2	63.3	20	19.50	4.30	0.23	3.1
40 NF02YL0051	13-SEP-91	8.3	235	0.2	118.3	15	32.00	11.00	0.29	3.6
41 NF02YL0051	13-SEP-91	8.4	235	0.2	118.9	15	32.00	11.00	0.25	3.6
42 NF02YL0051	13-SEP-91	8.3	235	0.2	118.6	15	32.00	11.00	0.30	3.6
43 NF02YL0050	13-SEP-91	8.1	160	0.3	74.8	15	22.80	5.80	0.44	3.9
44 WILDCOVE BK										

TABLE 2
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF PHYSICAL VARIABLES
MAJOR IONS, METALS AND NUTRIENTS

STATION NUMBER	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	TOTAL PHOSPHORUS MG/L	EXTRACT COPPER MG/L	EXTRACT ZINC MG/L	EXTRACT CADMIUM MG/L	EXTRACT LEAD MG/L	EXTRACT ALUMINUM MG/L
1 UPPER HUMBER								
2 NF02YL0055	1.8	0.8	0.005	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.170
3 NF02YL0054	2.1	1.0	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.120
4 NF02YL0011	2.1	0.9	0.005	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.120
5 NF02YL0053	28.0	60.0	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.036
6 NF02YL0017	2.3	1.6	0.006	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.130
7 GRAND LAKE								
8 NF02YK0024	1.4	1.0	0.006	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.072
9 NF02YK0023	3.0	1.7	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.100
10 NF02YK0022	2.5	2.7	0.005	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.040
11 NF02YK0022	2.6	2.0	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.039
12 NF02YK0022	2.5	2.2		L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.037
13 DEER LAKE								
14 NF02YL0060	2.7	2.1	0.004	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.043
15 NF02YL0059	2.7	2.0	0.004	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.049
16 NF02YL0058	3.0	1.8	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.045
17 LOWER HUMBER								
18 NF02YL0064	3.0	2.2	0.008	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.051
19 NF02YL0012	3.0	1.8	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.050
20 NF02YL0063	2.9	2.2	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.055
21 NF02YL0062	2.7	2.2	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.110
22 NF02YL0061	2.8	2.2	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.058
23 NF02YL0061	3.0	1.8	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.058
24 NF02YL0061	2.8	1.9	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.055
25 CORNER BK								
26 NF02YL0049	3.0	2.2	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.073
27 NF02YL0048	3.0	2.0	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.470
28 NF02YL0047	3.5	2.3	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.090
29 NF02YL0046	12.0	3.8	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.038
30 NF02YL0045	15.5	5.3	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.035
31 NF02YL0044	15.0	5.2	0.004	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.035
32 NF02YL0043	5.6	3.6	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.012
33 NF02YL0013	3.9	2.5	0.010	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.070
34 NF02YL0042	27.0	14.0	0.008	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.026
35 NF02YL0041	4.7	2.7	0.003	L 0.0020	L 0.0100	L 0.0010	0.002	0.075
36 NF02YL0041	5.6	2.5	0.001	L 0.0020	L 0.0100	L 0.0010	0.002	0.076
37 NF02YL0041	4.8	2.7	0.001	L 0.0020	L 0.0100	L 0.0010	0.002	0.069
38 HUGHES BK								
39 NF02YL0052	4.1	3.7	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.018
40 NF02YL0051	5.3	4.7	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.013
41 NF02YL0051	4.5	4.5	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.012
42 NF02YL0051	5.1	4.0	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.010
43 NF02YL0050	5.9	3.8	L 0.0010	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.019
44 WILDCOVE BK								

TABLE 2
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF PHYSICAL VARIABLES
MAJOR IONS, METALS AND NUTRIENTS

STATION NUMBER		TOTAL ARSENIC MG/L	EXTRACT IRON MG/L		EXTRACT MANGANESE MG/L	DISS ORG CARBON MG/L		DISSOLVED NO3/NO2 MG/L	TOTAL NICKEL MG/L	REACT SILICA MG/L		EXTRACT MERCURY UG/L	TEMP FIELD CELSIUS	PH FIELD
1 UPPER HUMBER														
2 NF02YL0055	L	0.0005	0.370	L	0.0100	7.5	L	0.0100	0.18	0.90	L	0.0200	12.1	5.50
3 NF02YL0054	L	0.0005	0.340	L	0.0100	6.0	L	0.0100	0.17	1.90	L	0.0200	11.8	6.70
4 NF02YL0011	L	0.0005	0.340		0.02	7.6	L	0.0100	0.19	1.60	L	0.0200	14.1	6.80
5 NF02YL0053		0.0007	0.200		0.02	6.8	L	0.0100	0.13	7.25	L	0.0200	13.7	8.00
6 NF02YL0017	L	0.0005	0.340		0.01	6.9	L	0.0100	0.18	1.80	L	0.0200	12.9	6.80
7 GRAND LAKE														
8 NF02YK0024	L	0.0005	0.230		0.03	4.4		0.06	0.19	2.80	L	0.0200	12.3	6.50
9 NF02YK0023	L	0.0005	0.230		0.03	5.7		0.07	0.19	3.30	L	0.0200	12.9	6.60
10 NF02YK0022	L	0.0005	0.029	L	0.0100	2.9		0.08	0.20	3.00	L	0.0200	10.2	7.10
11 NF02YK0022	L	0.0005	0.029	L	0.0100	3.1		0.10	0.20	3.10	L	0.0200	10.2	7.10
12 NF02YK0022	L	0.0005	0.029		0.01	2.9		0.09	0.17	3.00		0.15		
13 DEER LAKE														
14 NF02YL0060	L	0.0005	0.033	L	0.0100	2.9		0.06	0.22	3.00	L	0.0200	10.3	7.10
15 NF02YL0059	L	0.0005	0.070		0.01	4.3		0.10	0.20	2.60	L	0.0200	12.8	7.00
16 NF02YL0058	L	0.0005	0.080	L	0.0100	3.6		0.08	0.21	2.60	L	0.0200	13.4	7.10
17 LOWER HUMBER														
18 NF02YL0064	L	0.0005	0.100	L	0.0100	3.9		0.09	0.20	2.60	L	0.0200	12.6	7.00
19 NF02YL0012	L	0.0005	0.050	L	0.0100	3.7		0.06	0.21	2.60	L	0.0200	12.4	7.00
20 NF02YL0063	L	0.0005	0.080	L	0.0100	3.8		0.09	0.21	2.60	L	0.0200	12.3	7.00
21 NF02YL0062	L	0.0005	0.200	L	0.0100	6.8	L	0.0100	0.15	1.60	L	0.0200	9.9	6.30
22 NF02YL0061	L	0.0005	0.100		0.01	3.9		0.09	0.20	2.50	L	0.0200	12.6	7.00
23 NF02YL0061	L	0.0005	0.060		0.01	4.2		0.07	0.20	2.50	L	0.0200	12.6	7.00
24 NF02YL0061	L	0.0005	0.060		0.01	4.1		0.06	0.18	2.50	L	0.0200	12.6	7.00
25 CORNER BK														
26 NF02YL0049	L	0.0005	0.030		0.01	3.5		0.10	0.21	1.80	L	0.0200	12.5	7.00
27 NF02YL0048	L	0.0005	0.510		0.05	3.9		0.10	0.20	1.80	L	0.0200	12.2	7.10
28 NF02YL0047	L	0.0005	0.070		0.01	3.7		0.10	0.20	1.90	L	0.0200	12.2	7.40
29 NF02YL0046	L	0.0005	0.021	L	0.0100	3.0		0.15	0.22	2.10	L	0.0200	10.2	8.10
30 NF02YL0045	L	0.0005	0.050	L	0.0100	2.7		0.10	0.20	2.40	L	0.0200	10.6	8.20
31 NF02YL0044	L	0.0005	0.050		0.03	2.9		0.06	0.18	2.50	L	0.0200	10.9	8.20
32 NF02YL0043	L	0.0005	0.050	L	0.0100	2.5		0.08	0.18	1.50	L	0.0200	10.1	8.10
33 NF02YL0013	L	0.0005	0.060	L	0.0100	3.9		0.05	0.19	1.90	L	0.0200	12.5	7.60
34 NF02YL0042	L	0.0005	0.090		0.01	4.5		0.08	0.24	2.40	L	0.0200	10.8	8.10
35 NF02YL0041	L	0.0005	0.080		0.01	3.8		0.10	0.21	1.90	L	0.0200	12.3	7.60
36 NF02YL0041	L	0.0005	0.070	L	0.0100	3.7		0.08	0.20	2.00	L	0.0200	12.3	7.60
37 NF02YL0041	L	0.0005	0.070		0.01	3.8		0.15	0.21	1.90	L	0.0200	12.3	7.60
38 HUGHES BK														
39 NF02YL0052	L	0.0005	0.035		0.02	3.5		0.08	0.15	2.00	L	0.0200	10.9	7.80
40 NF02YL0051	L	0.0005	0.013	L	0.0100	3.3		0.08	0.15	2.20	L	0.0200	9.7	8.20
41 NF02YL0051	L	0.0005	0.013		0.01	3.3		0.08	0.15	2.20	L	0.0200	9.7	8.20
42 NF02YL0051	L	0.0005	0.014	L	0.0100	3.2		0.08	0.14	2.20	L	0.0200	9.7	8.20
43 NF02YL0050	L	0.0005	0.050		0.01	3.0		0.07	0.17	2.20	L	0.0200	10.9	8.00
44 WILDCOVE BK														

TABLE 2
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF PHYSICAL VARIABLES
MAJOR IONS, METALS AND NUTRIENTS

STATION NUMBER	SAMPLE DATE	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	ALKALINITY GRAN MG/L	APPARENT COLOUR REL. UNITS	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED SODIUM MG/L
45 NF02YL0065	10-SEP-91	8.4	290	0.3	141.2	15	39.80	14.50	0.38	4.2
46 NF02YL0039	10-SEP-91	7.9	315	1.2	126.1	25	35.00	12.10	2.80	15.4
47 NF02YL0040	11-SEP-91		1600			380	230.00	30.00	84.00	56.0
48 NF02YL0029	10-SEP-91	8.2	335	21.0	129.3	60	37.00	12.30	3.40	18.0
49 NF02YL0029	09-SEP-91	8.0	340	17.0	130.7	30	37.00	12.30	3.50	18.2
50 NF02YL0029	10-SEP-91	7.8	340	21.0	131.7	70	37.00	12.30	3.50	18.0

STATION NUMBER	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	TOTAL PHOSPHORUS MG/L	EXTRACT COPPER MG/L	EXTRACT ZINC MG/L	EXTRACT CADMIUM MG/L	EXTRACT LEAD MG/L	EXTRACT ALUMINUM MG/L
45 NF02YL0065	6.5	7.2	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.035
46 NF02YL0039	26.0	6.2	0.006	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.036
47 NF02YL0040	110.0	27.0	14.000		0.31			0.033
48 NF02YL0029	28.0	6.2	0.070	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.700
49 NF02YL0029	31.0	6.7	0.055	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.500
50 NF02YL0029	28.0	6.6	0.070	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.470

STATION NUMBER	TOTAL ARSENIC MG/L	EXTRACT IRON MG/L	EXTRACT MANGANESE MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L	TOTAL NICKEL MG/L	REACT SILICA MG/L	EXTRACT MERCURY UG/L	TEMP FIELD CELSIUS	PH FIELD
45 NF02YL0065	L 0.0005	0.110	0.02	1.8	0.20	0.27	2.50	L 0.0200	8.4	7.80
46 NF02YL0039	L 0.0005	0.150	0.04	4.9	1.50	2.10	3.10	L 0.0200	8.6	7.97
47 NF02YL0040	0.0016	16.000	14.00		0.80		27.80			
48 NF02YL0029	L 0.0005	0.830	0.10	5.2	1.70	1.90	3.30	L 0.0200	8.6	7.64
49 NF02YL0029	L 0.0005	0.730	0.09	5.2	1.80	1.90	3.30	L 0.0200	8.6	7.62
50 NF02YL0029	L 0.0005	0.690	0.10	5.7	1.80	1.90	3.40	L 0.0200	8.6	7.62

STATION NUMBER	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L
45 NF02YL0065		10.2
46 NF02YL0039	330.0	10.7
47 NF02YL0040		
48 NF02YL0029	273.0	7.5
49 NF02YL0029	273.0	7.5
50 NF02YL0029	273.0	7.5

TABLE 2
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF PHYSICAL VARIABLES
MAJOR IONS, METALS AND NUTRIENTS

STATION NUMBER	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L
1 UPPER HUMBER		
2 NF02YL0055	15.0	10.1
3 NF02YL0054	36.2	10.5
4 NF02YL0011	26.1	9.6
5 NF02YL0053	303.0	10.4
6 NF02YL0017	34.7	9.9
7 GRAND LAKE		
8 NF02YK0024	20.5	8.7
9 NF02YK0023	24.3	9.4
10 NF02YK0022	40.3	10.7
11 NF02YK0022	40.3	10.7
12 NF02YK0022		
13 DEER LAKE		
14 NF02YL0060	37.4	10.9
15 NF02YL0059	36.0	9.8
16 NF02YL0058	36.8	9.9
17 LOWER HUMBER		
18 NF02YL0064	37.1	9.8
19 NF02YL0012	39.7	10.0
20 NF02YL0063	37.5	9.9
21 NF02YL0062	24.4	11.0
22 NF02YL0061	32.8	9.9
23 NF02YL0061	32.8	9.9
24 NF02YL0061	32.8	9.9
25 CORNER BK		
26 NF02YL0049	38.1	9.8
27 NF02YL0048	35.4	10.0
28 NF02YL0047	54.0	10.0
29 NF02YL0046	192.0	10.8
30 NF02YL0045	208.0	10.7
31 NF02YL0044	213.0	10.6
32 NF02YL0043	178.0	10.8
33 NF02YL0013	71.0	10.3
34 NF02YL0042	299.0	10.5
35 NF02YL0041	67.0	10.6
36 NF02YL0041	68.9	10.6
37 NF02YL0041	67.9	10.6
38 HUGHES BK		
39 NF02YL0052	143.0	9.8
40 NF02YL0051	235.0	11.2
41 NF02YL0051	241.0	11.2
42 NF02YL0051	241.0	11.2
43 NF02YL0050	166.2	10.6
44 WILDCOVE BK		

TABLE 3
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER COLIFORM BACTERIA CONCENTRATIONS
No./100ml

STATION NUMBER	SAMPLE DATE	TOTAL COLIFORM No./100ML	FECAL COLIFORM No./100ML
1 UPPER HUMBER			
2 NF02YL0055	16-SEP-91	40	L10
3 NF02YL0054	16-SEP-91	100	10
4 NF02YL0011	15-SEP-91	60	30
5 NF02YL0053	16-SEP-91	60	30
6 NF02YL0017	16-SEP-91	20	L10
7 GRAND LAKE			
8 NF02YK0024	16-SEP-91	L20	L10
9 NF02YK0023	16-SEP-91	L20	10
10 NF02YK0022	16-SEP-91	40	L10
11 DEER LAKE			
12 NF02YL0060	15-SEP-91	900	140
13 NF02YL0059	15-SEP-91	80	20
14 NF02YL0058	15-SEP-91	L20	L10
15 LOWER HUMBER			
16 NF02YL0064	15-SEP-91	L20	10
17 NF02YL0012	15-SEP-91	20	L10
18 NF02YL0063	15-SEP-91	20	10
19 NF02YL0062	15-SEP-91	20	10
20 NF02YL0061	15-SEP-91	40	L10
21 CORNER BK			
22 NF02YL0046	16-SEP-91	20	L10
23 NF02YL0044	16-SEP-91	L20	L10
24 NF02YL0013	16-SEP-91	L20	L10
25 NF02YL0042	16-SEP-91	G1600	G600
26 NF02YL0041	16-SEP-91	200	L10
27 HUGHES BK			
28 NF02YL0052	16-SEP-91	40	10
29 NF02YL0051	16-SEP-91	L20	L10
30 NF02YL0050	16-SEP-91	20	L10
31 WILDCOVE BK			
32 NF02YL0065	10-SEP-91	20	10
33 NF02YL0039	11-SEP-91	140	250
34 NF02YL0029	10-SEP-91	120	180

TABLE 4
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0011, LITTLE FALLS, HUMBER RIVER
DURING 1986 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
1	NF02YL0011	03-OCT-86	2.72	0.66	2.42	0.24	3.38	3.1	1.46	5.7
2	NF02YL0011	11-DEC-86	3.63	0.88	2.86	0.26	4.45	3.6	1.75	7.8
3	NF02YL0011	19-FEB-87	4.65	1.06	3.30	0.33	5.55	4.1	2.11	11.9
4	NF02YL0011	23-APR-87	1.73	0.57	2.95	0.37	5.43	3.5	1.65	1.7
5	NF02YL0011	17-JUN-87	1.90	0.53	2.00	0.19	3.70	2.0	1.40	4.2
6	NF02YL0011	17-JUN-87	1.80	0.52	2.34	0.25	3.52	2.3	1.30	4.4
7	NF02YL0011	18-AUG-87	4.82	1.06	3.53	0.35	5.37	3.2	2.88	13.4
8	NF02YL0011	18-AUG-87	4.61	1.07	3.50	0.34	5.28	3.2	2.94	13.0
9	NF02YL0011	18-AUG-87	4.61	1.06	3.49	0.34	5.43	3.2	2.95	14.2
10	NF02YL0011	13-OCT-87	2.71	0.69	2.76	0.29	4.11	4.5	2.26	4.5
11	NF02YL0011	10-DEC-87	2.83	0.80	2.72	0.20	4.22	4.8	2.43	6.0
12	NF02YL0011	25-FEB-88	4.81	1.10	3.35	0.30	4.01	3.7	1.99	12.2
13	NF02YL0011	26-APR-88	3.01	0.73	2.33	0.23	3.38	4.4	2.25	5.6
14	NF02YL0011	08-JUN-88	1.56	0.38	1.55	0.15	1.88	3.3	1.00	2.3
15	NF02YL0011	08-JUN-88	1.53	0.37	1.55	0.15	1.84	3.1	0.97	2.2
16	NF02YL0011	08-JUN-88	1.50	0.37	1.55	0.15	1.84	3.3	1.01	2.3
17	NF02YL0011	08-AUG-88	3.69	0.79	2.46	0.26	2.95	3.4	1.78	9.6
18	NF02YL0011	09-SEP-88	3.99	0.89	2.60	0.25	2.96	1.9	2.07	11.3
19	NF02YL0011	06-OCT-88	3.41	0.86	2.47	0.29	3.39	3.7	1.45	7.5
20	NF02YL0011	08-DEC-88	2.73	0.66	2.43	0.23	3.62	4.0	1.89	4.9
21	NF02YL0011	14-FEB-89	4.25	0.96	3.01	0.28	4.58	3.9	2.27	9.7
22	NF02YL0011	11-APR-89	2.09	0.59	2.20	0.32	3.20	4.3	2.25	3.8
23	NF02YL0011	08-JUN-89	1.57	0.40	1.81	0.22	2.42	2.5	1.21	3.9
24	NF02YL0011	08-JUN-89	1.57	0.40	1.83	0.22	2.37	2.4	1.20	3.0
25	NF02YL0011	08-JUN-89	1.56	0.40	1.83	0.22	2.32	2.4	1.15	3.2
26	NF02YL0011	02-AUG-89	3.56	0.79	2.62	0.26	3.49	3.0	1.87	10.0
27	NF02YL0011	11-OCT-89	2.69	0.67	2.12	0.30	3.10	4.4	1.74	3.6
28	NF02YL0011	13-DEC-89	3.54	0.79	2.49	0.23	3.65	4.2	2.32	9.5
29	NF02YL0011	28-FEB-90	4.20	1.10	3.39	0.32		4.3		8.7
30	NF02YL0011	19-APR-90	2.52	0.66	2.21	0.26	2.97	3.4	1.73	4.0
31	NF02YL0011	19-APR-90	2.52	0.66	2.21	0.25	2.99	3.1	1.73	3.7
32	NF02YL0011	19-APR-90	2.51	0.66	2.21	0.25	2.97	3.1	1.74	4.1
33	NF02YL0011	05-JUN-90	1.30	0.37	1.69	0.23	2.34	2.7	1.03	
34	NF02YL0011	10-AUG-90	2.07	0.52	1.87	0.22	2.23	2.8	1.21	5.8
35	NF02YL0011	02-OCT-90	3.41	0.80	2.29	0.25	2.61	4.1	1.49	7.7
36	NF02YL0011	05-DEC-90	2.44	0.65	2.16	0.20	3.08	4.0	1.61	5.5
37	NF02YL0011	07-FEB-91	4.44	1.00	2.99	0.32	4.43	3.6	2.29	11.6
38	NF02YL0011	19-APR-91	5.19	1.25	3.06	0.35	3.64	4.0	1.66	15.9
39	NF02YL0011	06-JUN-91	1.59	0.41	1.53	0.22	1.85	2.6	1.08	3.4
40	NF02YL0011	06-JUN-91	1.54	0.40	1.51	0.22	1.86	2.6	1.11	3.4
41	NF02YL0011	06-JUN-91	1.71	0.42	1.53	0.22	1.88	2.2	1.11	3.0

TABLE 4
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0011, LITTLE FALLS, HUMBER RIVER
DURING 1986 TO 1991

	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL UNITS	FIELD TEMP CELSIUS	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	DISSOLVED MERCURY UG/L	TOTAL PHOSPHORUS MG/L	TOTAL ALUMINUM MG/L
1	6.48	31.9	0.24	50	9.8	6.8	26.0	11.4	L 0.0200	0.0054	0.152
2	6.59	41.6	0.17	50	0.1	6.8	30.0	14.3	L 0.0200	0.0050	0.116
3	7.02	50.8	0.38	40	0.1	6.6	47.0		L 0.0200	0.0046	0.082
4	6.05	31.8	0.80	50	2.6	6.1	30.0	13.5	L 0.0200	0.0114	0.311
5	6.70	27.0	0.30	30	16.4	6.7	29.0	9.7	L 0.0200	0.0040	0.080
6	6.53	27.6	0.30	40	16.4	6.7	29.0	9.7	L 0.0200	0.0037	0.083
7	6.86	54.9	0.19	10	18.1	7.7	51.0	9.2	L 0.0200	0.0040	0.019
8	7.05	31.6	0.19	20	18.1	7.7	51.0	9.2	L 0.0200	0.0038	0.019
9	6.96	54.9	0.17	10	18.1	7.7	51.0	9.2	L 0.0200	0.0037	0.023
10	6.42	33.4	0.26	70	7.5	6.8	30.0	11.9	L 0.0200	0.0048	0.147
11	6.43	36.1	0.37	50	0.1	6.7	33.0	14.7	L 0.0100	0.0054	0.149
12	6.59	52.6	0.20	50	0.1	6.7	0.1		L 0.0100	0.0046	0.106
13	6.63	33.6	0.47	70	2.6	6.6	33.0	13.6		0.0053	0.135
14	6.20	19.2	0.43	60	8.1	6.3	21.0	12.0		0.0040	0.165
15	6.39	19.1	0.45	60	8.2	6.3	18.0	12.0		0.0070	0.161
16	6.32	19.0	0.57	60	8.2	6.3	18.0	12.0		0.0043	0.164
17	6.67	39.4	0.18	30	20.5	7.2	39.0	8.8		0.0026	0.065
18	6.71	40.8	0.38	30	14.5	7.3	41.0	10.3		0.0038	0.062
19	6.28	35.8	0.25	80	7.6	6.9	34.0	11.8		0.0084	0.185
20	6.42	31.8	1.50	40	0.1	6.6	31.6	14.4		0.0073	0.149
21	6.31	44.5	0.35	50	0.0	6.6	47.0			0.0038	0.121
22	6.13	27.8	0.55	60	0.0	6.1	28.0			0.0088	0.174
23	6.90	21.7	0.50	40	17.2	6.6	20.0	9.2		0.0036	0.112
24	6.58	21.7	0.50	40	17.2	6.6	20.0	9.2		0.0032	0.120
25	6.69	21.6	0.50	40	17.2	6.6	20.0	9.2		0.0039	0.107
26	7.40	40.1	0.18	10	19.4	7.3	45.0	9.2		0.0032	0.028
27	6.42	31.0	0.62	80	6.9	6.4	28.0	12.3		0.0090	0.278
28	6.66	38.6	0.45	60	0.1	6.8	39.0			0.0031	0.138
29	6.40	48.8	0.45	50	0.0	6.5	50.0			0.0063	0.126
30	6.30	30.4	0.35	70	0.0	6.3	31.0			0.0058	0.164
31	6.38	30.2	0.31	80	0.0	6.3	31.0			0.0060	0.158
32	6.35	30.3	0.27	80	0.0	6.3	31.0			0.0068	0.154
33	6.09	20.0	0.24	60	9.7	6.2	19.0	10.7		0.0054	0.158
34	6.44	25.1	0.68	60	21.7	7.0	24.0	8.5		0.0055	0.110
35	6.14	34.1	0.65	80	12.0	7.1	33.3	10.5		0.0045	0.151
36	7.05	29.6	0.70	80	0.0	6.4	33.4	14.5		0.0060	0.183
37	7.03	47.2	2.50	60	0.0	6.4	47.8			0.0157	0.283
38	6.74	51.5	0.39	80		6.8	47.3			0.0062	0.119
39	6.47	23.7	0.48	60	8.2	6.3	19.8	11.7		0.0209	0.146
40	6.46	20.3	0.48	50	8.2	6.3	19.8	11.7		0.0046	0.140
41	7.30	20.9	0.08	60	8.2	6.3	19.8	11.7		0.0051	0.143

TABLE 4
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0011, LITTLE FALLS, HUMBER RIVER
DURING 1986 TO 1991

	TOTAL BARIUM MG/L	TOTAL CADMIUM MG/L		TOTAL COBALT MG/L		TOTAL CHROMIUM MG/L		TOTAL COPPER MG/L		TOTAL IRON MG/L	TOTAL MANGANESE MG/L	TOTAL MOLYBDENUM MG/L		TOTAL NICKEL MG/L	
1	0.0086	L	0.0001	L	0.0001	L	0.0002	L	0.0002	0.3020	0.0122	L	0.0001		0.0003
2	0.0131	L	0.0001		0.0002	L	0.0002		0.0010	0.2700	0.0082	L	0.0001	L	0.0002
3	0.0150		0.0001	L	0.0001		0.0004		0.0024	0.3630	0.0075	L	0.0001		0.0006
4	0.0100	L	0.0001		0.0005	L	0.0002		0.0005	0.5270	0.0592	L	0.0001	L	0.0002
5		L	0.0010						0.0050	0.1700	0.0100				
6	0.0072	L	0.0001	L	0.0001		0.0005		0.0007	0.1530	0.0071	L	0.0001		0.0003
7	0.0132	L	0.0001	L	0.0001		0.0004		0.0011	0.0834	0.0037		0.0001		0.0003
8	0.0130	L	0.0001	L	0.0001		0.0004		0.0046	0.0792	0.0035	L	0.0001		0.0003
9	0.0130	L	0.0001	L	0.0001		0.0004		0.0022	0.0839	0.0035	L	0.0001		0.0004
10	0.0100	L	0.0001	L	0.0001	L	0.0002		0.0009	0.3120	0.0129	L	0.0001	L	0.0002
11	0.0113	L	0.0001	L	0.0001	L	0.0002	L	0.0002	0.2540	0.0160	L	0.0001		0.0002
12	0.0152		0.0001	L	0.0001		0.0002		0.0015	0.3380	0.0076	L	0.0001		0.0002
13	0.0105	L	0.0001	L	0.0001		0.0002		0.0005	0.2630	0.0125	L	0.0001	L	0.0002
14	0.0069	L	0.0001		0.0001		0.0003		0.0009	0.2670	0.0167	L	0.0001		0.0003
15	0.0067	L	0.0001		0.0001		0.0002		0.0007	0.2540	0.0159	L	0.0001		0.0003
16	0.0067	L	0.0001		0.0002	L	0.0002		0.0009	0.2710	0.0165	L	0.0001	L	0.0002
17	0.0115	L	0.0001	L	0.0001		0.0002		0.0009	0.1670	0.0060	L	0.0001		0.0004
18	0.0108	L	0.0001	L	0.0001	L	0.0002		0.0004	0.1940	0.0057	L	0.0001	L	0.0002
19	0.0119	L	0.0001		0.0001		0.0004		0.0005	0.3750	0.0414	L	0.0001		0.0004
20	0.0099	L	0.0001		0.0001		0.0002		0.0006	0.2720	0.0198	L	0.0001	L	0.0002
21	0.0146	L	0.0001	L	0.0001	L	0.0002		0.0004	0.4050	0.0079		0.0001	L	0.0002
22	0.0105	L	0.0001		0.0003		0.0002		0.0004	0.4670	0.0440	L	0.0001		0.0003
23	0.0069	L	0.0001	L	0.0001		0.0002		0.0006	0.1790	0.0098	L	0.0001	L	0.0002
24	0.0070	L	0.0001	L	0.0001		0.0003		0.0005	0.1840	0.0101	L	0.0001		0.0002
25	0.0066	L	0.0001		0.0002		0.0002		0.0010	0.1830	0.0098	L	0.0001		0.0002
26	0.0104	L	0.0001		0.0001	L	0.0002		0.0004	0.1160	0.0044	L	0.0001		0.0003
27	0.0128	L	0.0001		0.0002	L	0.0002		0.0003	0.6010	0.0745	L	0.0001	L	0.0002
28	0.0125	L	0.0001	L	0.0001		0.0002		0.0002	0.2810	0.0119	L	0.0001	L	0.0002
29	0.0152	L	0.0001		0.0001		0.0003		0.0004	0.3670	0.0092	L	0.0001		0.0002
30	0.0107	L	0.0001		0.0002		0.0002		0.0006	0.2870	0.0242	L	0.0001		0.0003
31	0.0105	L	0.0001	L	0.0001	L	0.0002	L	0.0002	0.2900	0.0253	L	0.0001	L	0.0002
32	0.0105	L	0.0001	L	0.0001		0.0002		0.0004	0.2760	0.0229	L	0.0001	L	0.0002
33	0.0065	L	0.0001		0.0002	L	0.0002		0.0002	0.2390	0.0205	L	0.0001	L	0.0002
34	0.0079	L	0.0001	L	0.0001	L	0.0002		0.0009	0.2700	0.0096	L	0.0001	L	0.0002
35	0.0127	L	0.0001		0.0001		0.0003		0.0004	0.3430	0.0161	L	0.0001		0.0003
36	0.0092	L	0.0001		0.0001		0.0003		0.0008	0.3040	0.0137	L	0.0001		0.0002
37	0.0181		0.0001		0.0004		0.0009		0.0009	0.8420	0.0785	L	0.0001		0.0004
38	0.0166	L	0.0001		0.0001		0.0002		0.0004	0.4530	0.0102	L	0.0001	L	0.0002
39	0.0070	L	0.0001		0.0001		0.0002		0.0005	0.2480	0.0159	L	0.0001		0.0002
40	0.0068	L	0.0001		0.0001	L	0.0002		0.0002	0.2440	0.0160	L	0.0001	L	0.0002
41	0.0070	L	0.0001		0.0001	L	0.0002		0.0003	0.2440	0.0159	L	0.0001	L	0.0002

TABLE 4
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0011, LITTLE FALLS, HUMBER RIVER
DURING 1986 TO 1991

		TOTAL LEAD MG/L	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L		TOTAL ZINC MG/L		BERYLLIUM MG/L		LITHIUM MG/L	DISS ORG CARBON MG/L		DISSOLVED NO3/NO2 MG/L	TOTAL DISS NITRO MG/L
1		0.0004	0.0163	0.0003		0.0005	L	0.0500		0.0001	6.6		0.006	0.143
2	L	0.0002	0.0201	0.0001		0.0010	L	0.0500		0.0002	5.9		0.012	0.130
3		0.0017	0.0242	0.0005		0.0017	L	0.0500		0.0004	5.1		0.089	0.231
4		0.0003	0.0094	0.0005		0.0033	L	0.0500		0.0004	6.5		0.026	0.163
5	L	0.0020			L	0.0100					4.1	L	0.0100	
6		0.0007	0.0114	0.0002		0.0009	L	0.0500		0.0002	4.3		0.012	0.134
7	L	0.0002	0.0328	0.0001		0.0002	L	0.0500		0.0003	2.5		0.005	0.137
8		0.0006	0.0325	0.0001	L	0.0002	L	0.0500		0.0003	2.5		0.006	0.126
9		0.0003	0.0324	0.0001		0.0003	L	0.0500		0.0003	2.2	L	0.0050	0.129
10		0.0003	0.0156	0.0002		0.0020	L	0.0500		0.0001	7.1		0.005	0.223
11		0.0003	0.0185	0.0003		0.0014	L	0.0500		0.0003	7.7		0.034	0.219
12		0.0003	0.0292	0.0003		0.0013	L	0.0500		0.0004	5.6		0.094	0.247
13		0.0004	0.0182	0.0003		0.0010	L	0.0500		0.0003	7.2		0.060	0.244
14	L	0.0002	0.0078	0.0004		0.0012	L	0.0500		0.0003	7.0		0.010	0.172
15		0.0005	0.0076	0.0003		0.0010	L	0.0500		0.0002	7.0		0.010	0.170
16		0.0002	0.0077	0.0002		0.0013	L	0.0500		0.0001	7.1		0.020	0.171
17	L	0.0002	0.0203	0.0002		0.0008	L	0.0500		0.0005	4.8	L	0.0100	0.183
18	L	0.0002	0.0241	0.0002		0.0004	L	0.0500		0.0002	5.7	L	0.0100	0.157
19		0.0005	0.0254	0.0005		0.0011	L	0.0500		0.0004	9.0		0.040	0.275
20	L	0.0002	0.0137	0.0002		0.0012	L	0.0500		0.0002	7.4		0.030	0.224
21	L	0.0002	0.0215	0.0001		0.0011	L	0.0500		0.0002	5.5		0.060	0.241
22	L	0.0002	0.0107	0.0005		0.0016	L	0.0500		0.0002	8.5		0.080	0.207
23	L	0.0002	0.0094	0.0002		0.0011	L	0.0500		0.0002	4.8		0.020	0.116
24		0.0002	0.0096	0.0003		0.0017	L	0.0500		0.0002	4.9		0.020	0.102
25	L	0.0002	0.0094	0.0003		0.0007	L	0.0500		0.0001	4.9		0.010	0.113
26	L	0.0002	0.0215	0.0002	L	0.0002	L	0.0500		0.0002	4.0	L	0.0100	0.087
27	L	0.0002	0.0149	0.0005		0.0021	L	0.0500		0.0002	11.2		0.040	0.148
28	L	0.0002	0.0197	0.0003		0.0009	L	0.0500		0.0003	7.3		0.050	0.155
29		0.0003	0.0242	0.0004		0.0012	L	0.0500		0.0003	6.0			0.273
30	L	0.0002	0.0163	0.0003		0.0014	L	0.0500		0.0002	7.2		0.050	0.235
31	L	0.0002	0.0164	0.0002		0.0014	L	0.0500		0.0002	7.4		0.060	0.268
32		0.0004	0.0162	0.0003		0.0015	L	0.0500		0.0004	7.6		0.050	0.242
33	L	0.0002	0.0066	0.0003		0.0009	L	0.0500		0.0001	5.2	L	0.0100	0.136
34	L	0.0002	0.0129	0.0003		0.0004	L	0.0500		0.0002	6.8	L	0.0100	0.146
35		0.0002	0.0228	0.0003		0.0008	L	0.0500		0.0003	9.7	L	0.0100	0.295
36	L	0.0002	0.0136	0.0003		0.0015	L	0.0500		0.0003	7.8		0.010	0.183
37		0.0008	0.0239	0.0010		0.0727	L	0.0500		0.0004	5.4		0.090	0.402
38	L	0.0002	0.0316	0.0003		0.0007	L	0.0500		0.0004	7.9		0.080	0.324
39		0.0003	0.0082	0.0003		0.0007	L	0.0500		0.0001	6.4		0.010	0.132
40	L	0.0002	0.0083	0.0003		0.0007	L	0.0500	L	0.0001	7.1		0.010	0.183
41	L	0.0002	0.0084	0.0003		0.0005	L	0.0500		0.0001	8.4		0.010	0.114

TABLE 4
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0011, LITTLE FALLS, HUMBER RIVER
DURING 1986 TO 1991

	REACT SILICA MG/L		TOTAL MERCURY UG/L		TOTAL ARSENIC MG/L		TOTAL SELENIUM MG/L
1							
2							
3							
4							
5	0.94						
6							
7	0.82						
8	0.83						
9	0.83						
10	1.92						
11	2.83						
12	3.77						
13	2.84	L	0.0100				
14	1.23	L	0.0100				
15	1.25	L	0.0100				
16	1.24		0.01				
17	0.65	L	0.0100				
18	0.99	L	0.0100				
19	2.03	L	0.0100				
20	2.50	L	0.0100				
21	3.68	L	0.0100				
22	2.67	L	0.0100				
23	0.98	L	0.0100				
24	0.99	L	0.0100				
25	0.98	L	0.0100				
26	0.67	L	0.0100				
27	2.49	L	0.0100				
28	3.15	L	0.0100				
29	3.98	L	0.0100				
30	2.85	L	0.0100		0.0002		0.0002
31	2.85	L	0.0100	L	0.0001		0.0001
32	2.86	L	0.0100	L	0.0001		0.0001
33	1.45	L	0.0100	L	0.0001	L	0.0001
34	0.76	L	0.0100	L	0.0001	L	0.0001
35	1.73	L	0.0100		0.0002		0.0002
36	2.60	L	0.0100		0.0001		0.0001
37	3.87	L	0.0100		0.0003		0.0001
38	4.40	L	0.0100		0.0003		0.0002
39	1.61		0.01		0.0004		0.0002
40	1.60		0.01		0.0001		0.0001
41	1.59	L	0.0100		0.0001		0.0002

TABLE 5
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF CHLORINATED HYDROCARBONS,
POLYNUCLEAR AROMATIC HYRDOCARBONS AND TOTAL POLYCHLORINATED
BIPHENYLS IN NG/L

STATION NUMBER	SAMPLE DATE	HEXACHLOROBENZENE NG/L	ALPHA BHC NG/L	GAMMA BHC NG/L	HEPTA CHLOR NG/L	ALDRIN NG/L	HEPTACHLOR EPOXIDE NG/L	GAMMA CHLORDANE NG/L
1 NF02YL0017	16-SEP-91	L 0.4000	0.8	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
2 NF02YL0030	16-SEP-91	L 0.4000	3.1	0.5	L 0.4000	L 0.4000	L 0.4000	L 0.4000
3 NF02YL0064	15-SEP-91	L 0.4000	1.9	0.4	L 0.4000	L 0.4000	L 0.4000	L 0.4000
4 NF02YL0061	14-SEP-91	L 0.4000	2.4	0.4	L 0.4000	L 0.4000	L 0.4000	L 0.4000
5 NF02YL0046	13-SEP-91	L 0.4000	0.4	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
6 NF02YL0044	11-SEP-91	L 0.4000	24.0	L 0.4000	L 0.4000	L 0.4000	L 0.4000	1.2
7 NF02YL0013	11-SEP-91	L 0.4000	0.7	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
8 NF02YL0041	11-SEP-91	0.4	1.0	0.5	L 0.4000	L 0.4000	L 0.4000	L 0.4000
9 NF02YL0050	13-SEP-91	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
10 NF02YL0050	13-SEP-91	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
11 NF02YL0050	13-SEP-91	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
12 NF02YL0065	10-SEP-91	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
13 NF02YL0039	11-SEP-91	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
14 NF02YL0029	10-SEP-91	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000

STATION NUMBER	ALPHA CHLORDANE NG/L	ALPHA-ENDOSULFAN NG/L	P,P'-DDE NG/L	DIELDRIN HEOD NG/L	ENDRIN NG/L	O,P'-DDT NG/L	P,P'-TDE NG/L	P,P'-DDT NG/L
1 NF02YL0017	L 0.4000	0.4	1.1	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
2 NF02YL0030	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
3 NF02YL0064	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
4 NF02YL0061	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
5 NF02YL0046	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
6 NF02YL0044	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
7 NF02YL0013	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
8 NF02YL0041	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	0.5	L 0.4000	L 0.4000
9 NF02YL0050	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
10 NF02YL0050	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
11 NF02YL0050	L 0.4000	L 0.4000	1.1	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
12 NF02YL0065	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
13 NF02YL0039	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000
14 NF02YL0029	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000	L 0.4000

TABLE 5
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF CHLORINATED HYDROCARBONS,
POLYNUCLEAR AROMATIC HYRDOCARBONS AND TOTAL POLYCHLORINATED
BIPHENYLS IN NG/L

STATION NUMBER	BETA-ENDOSULFAN NG/L	MIREX NG/L	P,P-METH OXYCHLOR NG/L	POLYCHLOR INATED BI PHENYL NG/L	INDENE NG/L	1234TETRA HYRONAPHT ALENE NG/L	2-METHYL NAPHTHA LENE NG/L	1-METHYL NAPHTHA LENE NG/L
1 NF02YL0017	L 0.4000	L 0.4000	0.5	42.7	L 10.0000	L 10.0000	L 10.0000	L 10.0000
2 NF02YL0030	L 0.4000	L 0.4000	L 0.4000	16.5	L 10.0000	L 10.0000	L 10.0000	L 10.0000
3 NF02YL0064	L 0.4000	L 0.4000	L 0.4000	26.6	L 10.0000	L 10.0000	L 10.0000	L 10.0000
4 NF02YL0061	L 0.4000	L 0.4000	L 0.4000	10.9	L 10.0000	L 10.0000	L 10.0000	L 10.0000
5 NF02YL0046	L 0.4000	L 0.4000	L 0.4000	13.8	L 10.0000	L 10.0000	L 10.0000	L 10.0000
6 NF02YL0044	L 0.4000	L 0.4000	L 0.4000	9.2	L 10.0000	L 10.0000	L 10.0000	L 10.0000
7 NF02YL0013	L 0.4000	L 0.4000	L 0.4000	15.5	L 10.0000	L 10.0000	11.9	L 10.0000
8 NF02YL0041	L 0.4000	L 0.4000	L 0.4000	82.6	L 10.0000	L 10.0000	L 10.0000	L 10.0000
9 NF02YL0050	L 0.4000	L 0.4000	L 0.4000	14.0	L 10.0000	L 10.0000	L 10.0000	L 10.0000
10 NF02YL0050	L 0.4000	L 0.4000	L 0.4000	L 9.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
11 NF02YL0050	L 0.4000	L 0.4000	L 0.4000	97.6	L 10.0000	L 10.0000	L 10.0000	L 10.0000
12 NF02YL0065	L 0.4000	L 0.4000	L 0.4000	13.9	L 10.0000	L 10.0000	L 10.0000	L 10.0000
13 NF02YL0039	L 0.4000	L 0.4000	L 0.4000	23.0	L 10.0000	L 10.0000	L 10.0000	L 10.0000
14 NF02YL0029	L 0.4000	L 0.4000	L 0.4000	29.9	L 10.0000	L 10.0000	L 10.0000	L 10.0000

STATION NUMBER	2-CHLORO NAPHTHA LENE NG/L	ACENAPHTH ALENE NG/L	ACENAPH THENE NG/L	FLUORENE NG/L	PHENAN THRENE NG/L	PYRENE NG/L	FLUOR ANTHENE NG/L	BENZO(B)FLUO RANTHENE NG/L
1 NF02YL0017	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	24.1	L 30.0000
2 NF02YL0030	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
3 NF02YL0064	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
4 NF02YL0061	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
5 NF02YL0046	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
6 NF02YL0044	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
7 NF02YL0013	L 10.0000	L 10.0000	L 10.0000	L 15.0000	34.3	L 15.0000	L 15.0000	L 30.0000
8 NF02YL0041	L 10.0000	L 10.0000	L 10.0000	L 15.0000	44.8	L 15.0000	29.6	L 30.0000
9 NF02YL0050	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
10 NF02YL0050	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
11 NF02YL0050	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	21.3	L 30.0000
12 NF02YL0065	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
13 NF02YL0039	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000
14 NF02YL0029	L 10.0000	L 10.0000	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000

TABLE 5
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF CHLORINATED HYDROCARBONS, POLYNUCLEAR AROMATIC HYRDOCARBONS AND TOTAL POLYCHLORINATED BIPHENYLS IN NG/L

STATION NUMBER		BENZO(K)FLUORANTHENE NG/L		BENZO(A) PYRENE NG/L		INDENO(1,2,3CD)PYRENE NG/L		BENZO(GHI) PERYLENE NG/L
1 NF02YL0017	L	30.0000	L	30.0000	L	30.0000	L	30.0000
2 NF02YL0030	L	30.0000	L	30.0000	L	30.0000	L	30.0000
3 NF02YL0064	L	30.0000	L	30.0000	L	30.0000	L	30.0000
4 NF02YL0061	L	30.0000	L	30.0000	L	30.0000	L	30.0000
5 NF02YL0046	L	30.0000	L	30.0000	L	30.0000	L	30.0000
6 NF02YL0044	L	30.0000	L	30.0000	L	30.0000	L	30.0000
7 NF02YL0013	L	30.0000	L	30.0000	L	30.0000	L	30.0000
8 NF02YL0041	L	30.0000	L	30.0000	L	30.0000	L	30.0000
9 NF02YL0050	L	30.0000	L	30.0000	L	30.0000	L	30.0000
10 NF02YL0050	L	30.0000	L	30.0000	L	30.0000	L	30.0000
11 NF02YL0050	L	30.0000	L	30.0000	L	30.0000	L	30.0000
12 NF02YL0065	L	30.0000	L	30.0000	L	30.0000	L	30.0000
13 NF02YL0039	L	30.0000	L	30.0000	L	30.0000	L	30.0000
14 NF02YL0029	L	30.0000	L	30.0000	L	30.0000	L	30.0000

TABLE 6
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS OF CHLORINATED HYDROCARBONS,
POLYNUCLEAR AROMATIC HYDROCARBONS AND POLYCHLORINATED
BIPHENYLS IN NG/G

STATION NUMBER	SAMPLE DATE	ENDRIN NG/G		O,P' DDT NG/G		P,P' TDE NG/G		P,P' DDT NG/G		BETA- ENDOSULFAN NG/G		MIREX NG/G		P,P' METHOXYCHLOR NG/G	
1 NF02YL0017	16-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
2 NF02YL0017	16-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
3 NF02YL0017	16-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
4															
5 NF02YL0058	15-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
6 NF02YL0058	15-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
7 NF02YL0058	15-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
8															
9 NF02YL0061	14-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
10 NF02YL0061	14-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
11 NF02YL0061	14-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
12															
13 NF02YL0013	09-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
14 NF02YL0013	09-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
15 NF02YL0013	09-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
16															
17 NF02YL0041	14-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
18 NF02YL0041	14-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
19 NF02YL0041	14-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
20															
21 NF02YL0050	13-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
22 NF02YL0050	13-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
23 NF02YL0050	13-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
24															
25 NF02YL0065	10-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
26 NF02YL0065	10-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
27 NF02YL0065	10-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
28															
29 NF02YL0038	11-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
30 NF02YL0038	11-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000
31 NF02YL0038	11-SEP-91	L	2.9000	L	7.0000	L	6.0000	L	7.5000	L	2.9000	L	4.3000	L	18.0000

TABLE 6
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS OF CHLORINATED HYDROCARBONS,
POLYNUCLEAR AROMATIC HYDROCARBONS AND POLYCHLORINATED
BIPHENYLS IN NG/G

STATION NUMBER	POLYCHLORINATED BI-PHENYL NG/G	OIL AND GREASE MG/KG	INDENE NG/G	1234TETRA HYDRONAPH THALENE NG/G	2 METHYL NAPHTHA LENE NG/G	1 METHYL NAPHTHA LENE NG/G	2 CHLORONAPH THALENE NG/G	ACENAPH THYLENE NG/G
1 NF02YL0017	L 77.0000	0.11	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
2 NF02YL0017	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
3 NF02YL0017	L 77.0000	0.13	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
4								
5 NF02YL0058	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
6 NF02YL0058	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
7 NF02YL0058	L 77.0000	0.25	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
8								
9 NF02YL0061	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
10 NF02YL0061	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
11 NF02YL0061	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
12								
13 NF02YL0013	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
14 NF02YL0013	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
15 NF02YL0013	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
16								
17 NF02YL0041	180.45	0.23	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
18 NF02YL0041	255.80	0.42	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
19 NF02YL0041	252.80	0.48	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
20								
21 NF02YL0050	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
22 NF02YL0050	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
23 NF02YL0050	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
24								
25 NF02YL0065	L 77.0000	0.17	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
26 NF02YL0065	L 77.0000	0.21	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
27 NF02YL0065	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
28								
29 NF02YL0038	L 77.0000	0.15	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
30 NF02YL0038	L 77.0000	0.37	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
31 NF02YL0038	L 77.0000	L 0.1000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000

TABLE 6
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS OF CHLORINATED HYDROCARBONS,
POLYNUCLEAR AROMATIC HYDROCARBONS AND POLYCHLORINATED
BIPHENYLS IN NG/G

STATION NUMBER	INDENO(123 CD) PYRENE NG/G	BENZO(GHI) PERYLENE NG/G	HEXACHLORO BENZENE NG/G	ALPHA BHC NG/G	GAMMA BHC NG/G	HEPTACHLOR NG/G	ALDRIN NG/G	HEPTACHLOR NG/G
1 NF02YL0017	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
2 NF02YL0017	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
3 NF02YL0017	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
4								
5 NF02YL0058	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
6 NF02YL0058	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
7 NF02YL0058	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
8								
9 NF02YL0061	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
10 NF02YL0061	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
11 NF02YL0061	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
12								
13 NF02YL0013	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
14 NF02YL0013	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
15 NF02YL0013	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
16								
17 NF02YL0041	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
18 NF02YL0041	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
19 NF02YL0041	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
20								
21 NF02YL0050	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
22 NF02YL0050	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
23 NF02YL0050	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
24								
25 NF02YL0065	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
26 NF02YL0065	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
27 NF02YL0065	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
28								
29 NF02YL0038	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
30 NF02YL0038	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000
31 NF02YL0038	L 30.0000	L 30.0000	L 6.3000	L 2.3000	L 2.9000	L 1.4000	L 1.6000	L 1.9000

TABLE 6
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS OF CHLORINATED HYDROCARBONS,
POLYNUCLEAR AROMATIC HYDROCARBONS AND POLYCHLORINATED
BIPHENYLS IN NG/G

STATION NUMBER	ACENAPH THENE NG/G	FLUORENE NG/G	PHENAN THRENE NG/G	PYRENE NG/G	FLUOR ANTHRENE NG/G	BENZO(B)FLU ORANTHENE NG/G	BENZO(K)FLU ORANTHENE NG/G	BENZO(A) PYRENE NG/G
1 NF02YL0017	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
2 NF02YL0017	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
3 NF02YL0017	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
4								
5 NF02YL0058	L 10.0000	L 15.0000	69.0	102.0	116.0	L 30.0000	L 30.0000	L 30.0000
6 NF02YL0058	L 10.0000	L 15.0000	68.6	76.8	78.8	L 30.0000	L 30.0000	L 30.0000
7 NF02YL0058	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
8								
9 NF02YL0061	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
10 NF02YL0061	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
11 NF02YL0061	L 10.0000	L 15.0000	L 15.0000	L 15.0000	43.6	L 30.0000	L 30.0000	L 30.0000
12								
13 NF02YL0013	L 10.0000	L 15.0000	420.0	629.0	761.0	122	L 30.0000	100.0
14 NF02YL0013	L 10.0000	L 15.0000	74.2	154.0	180.0	L 30.0000	L 30.0000	L 30.0000
15 NF02YL0013	L 10.0000	L 15.0000	28.6	58.8	65.2	L 30.0000	L 30.0000	L 30.0000
16								
17 NF02YL0041	14.2	L 15.0000	243.2	365.9	386.2	L 30.0000	41.3	L 30.0000
18 NF02YL0041	15.3	L 15.0000	336.3	561.2	556.7	L 30.0000	129.4	L 30.0000
19 NF02YL0041	12.2	L 15.0000	278.1	496.3	512.2	L 30.0000	37.2	30.4
20								
21 NF02YL0050	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
22 NF02YL0050	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
23 NF02YL0050	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
24								
25 NF02YL0065	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
26 NF02YL0065	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
27 NF02YL0065	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
28								
29 NF02YL0038	L 10.0000	L 15.0000	30.5	33.6	28.4	L 30.0000	L 30.0000	L 30.0000
30 NF02YL0038	L 10.0000	L 15.0000	L 15.0000	L 15.0000	L 15.0000	L 30.0000	L 30.0000	L 30.0000
31 NF02YL0038	L 10.0000	L 15.0000	L 15.0000	20.4	L 15.0000	L 30.0000	L 30.0000	L 30.0000

TABLE 6
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS OF CHLORINATED HYDROCARBONS, POLYNUCLEAR AROMATIC HYDROCARBONS AND POLYCHLORINATED BIPHENYLS IN NG/G

STATION NUMBER		GAMMA CHLORDANE NG/G		ALPHA CHLORDANE NG/G		ALPHA ENDOSULFAN NG/G		P,P DDE NG/G		DIELDRIN HEOD NG/G
1 NF02YL0017	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
2 NF02YL0017	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
3 NF02YL0017	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
4										
5 NF02YL0058	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
6 NF02YL0058	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
7 NF02YL0058	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
8										
9 NF02YL0061	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
10 NF02YL0061	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
11 NF02YL0061	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
12										
13 NF02YL0013	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
14 NF02YL0013	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
15 NF02YL0013	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
16										
17 NF02YL0041	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
18 NF02YL0041	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
19 NF02YL0041	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
20										
21 NF02YL0050	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
22 NF02YL0050	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
23 NF02YL0050	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
24										
25 NF02YL0065	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
26 NF02YL0065	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
27 NF02YL0065	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
28										
29 NF02YL0038	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
30 NF02YL0038	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000
31 NF02YL0038	L	1.5000	L	2.3000	L	1.4000	L	5.6000	L	3.2000

TABLE 7
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS NONRESIDUAL AND TOTAL METALS IN MG/KG

STATION NUMBER	SAMPLE DATE	NONRESID. ALUMINUM MG/KG	NONRESID. CADMIUM MG/KG	NONRESID. COBALT MG/KG	NONRESID. CHROMIUM MG/KG	NONRESID. COPPER MG/KG	NONRESID. IRON MG/KG	NONRESID. MANGANESE MG/KG	NONRESID. NICKEL MG/KG
1 NF02YL0017	16-SEP-91	2462.0	L 0.2000	1.15	2.22	4.84	3643	428	6.36
2 NF02YL0017	16-SEP-91	2440.0	L 0.2000	1.26	2.90	4.92	3542	423	6.71
3 NF02YL0017	16-SEP-91	2469.0	L 0.2000	1.43	2.90	4.75	3703	436	6.71
4									
5 NF02YL0058	15-SEP-91	2351.0	L 0.2000	1.84	2.98	5.85	4326	499	4.24
6 NF02YL0058	15-SEP-91	2466.0	L 0.2000	1.32	2.63	6.02	4286	497	4.49
7 NF02YL0058	15-SEP-91	2155.0	L 0.2000	1.44	2.51	5.93	4107	513	4.24
8									
9 NF02YL0061	14-SEP-91	2110.0	L 0.2000	1.67	2.04	5.36	3749	308	3.58
10 NF02YL0061	14-SEP-91	1967.0	L 0.2000	2.02	1.80	5.69	3908	316	3.58
11 NF02YL0061	14-SEP-91	1945.0	L 0.2000	1.32	2.16	5.11	3709	307	3.50
12									
13 NF02YL0013	09-SEP-91	3269.0	L 0.2000	4.67	4.29	7.01	6252	336	7.49
14 NF02YL0013	09-SEP-91	3180.0	L 0.2000	4.73	4.17	6.23	5990	347	7.66
15 NF02YL0013	09-SEP-91	3195.0	L 0.2000	4.86	4.41	6.31	6111	345	7.66
16									
17 NF02YL0041	14-SEP-91	2719.0	0.418	5.66	5.12	77.80	8736	786	7.79
18 NF02YL0041	14-SEP-91	2943.0	0.455	4.92	4.87	92.90	8685	797	8.01
19 NF02YL0041	14-SEP-91	3002.0	0.412	5.17	5.23	85.60	8886	846	8.18
20									
21 NF02YL0050	13-SEP-91	660.0	L 0.2000	1.60	1.10	3.01	1539	179	3.04
22 NF02YL0050	13-SEP-91	703.9	L 0.2000	1.26	1.10	2.57	1579	169	3.04
23 NF02YL0050	13-SEP-91	769.8	L 0.2000	1.43	1.10	2.66	1639	176	2.96
24									
25 NF02YL0065	10-SEP-91	3017.0	L 0.2000	4.24	2.56	11.10	9127	746	7.06
26 NF02YL0065	10-SEP-91	2987.0	L 0.2000	4.36	2.90	9.69	8503	678	6.19
27 NF02YL0065	10-SEP-91	2727.0	L 0.2000	3.91	2.98	8.82	8416	602	6.71
28									
29 NF02YL0038	11-SEP-91	2735.0	0.227	2.22	3.02	12.20	8181	268	7.49
30 NF02YL0038	11-SEP-91	2580.0	0.213	2.45	3.25	12.00	7638	256	6.71
31 NF02YL0038	11-SEP-91	2676.0	L 0.2000	2.05	3.13	12.30	7880	272	7.49

TABLE 7
HUMBER RIVER BASIN RECURRENT SURVEY 1991
SEDIMENT ANALYSIS NONRESIDUAL AND TOTAL METALS IN MG/KG

STATION NUMBER	NONRESID. LEAD MG/KG	NONRESID. ZINC MG/KG	TOTAL ARSENIC MG/KG		TOTAL SELENIUM MG/KG		TOTAL MERCURY MG/KG
1 NF02YL0017	4.63	16.20	5.3	L	0.2000		0.01
2 NF02YL0017	3.89	16.50	3.7	L	0.2000		0.01
3 NF02YL0017	4.21	16.50	3.2	L	0.2000		0.01
4							
5 NF02YL0058	7.23	19.40	6.3		0.2		0.03
6 NF02YL0058	6.94	18.60	6.3	L	0.2000		0.03
7 NF02YL0058	6.55	18.20	6.4		0.2		0.03
8							
9 NF02YL0061	3.79	17.00	2.5	L	0.2000	L	0.0100
10 NF02YL0061	3.79	17.30	2.6	L	0.2000	L	0.0100
11 NF02YL0061	3.10	18.50	2.2	L	0.2000	L	0.0100
12							
13 NF02YL0013	9.50	45.70	4.4		0.2		0.02
14 NF02YL0013	9.39	44.30	4.1		0.2		0.03
15 NF02YL0013	11.30	42.20	4.0		0.2		0.02
16							
17 NF02YL0041	148.00	165.00	6.5		0.3		0.09
18 NF02YL0041	151.00	167.00	5.4		0.3		0.07
19 NF02YL0041	155.00	165.00	5.4		0.3		0.07
20							
21 NF02YL0050	3.25	9.93	3.4	L	0.2000	L	0.0100
22 NF02YL0050	3.04	10.20	3.3	L	0.2000	L	0.0100
23 NF02YL0050	3.36	10.70	3.7	L	0.2000	L	0.0100
24							
25 NF02YL0065	13.80	20.40	8.9		0.8		0.03
26 NF02YL0065	11.80	19.50	7.9		0.9		0.04
27 NF02YL0065	11.30	18.10	7.0		0.7		0.03
28							
29 NF02YL0038	15.20	123.00	4.6		0.4		0.03
30 NF02YL0038	13.80	118.00	4.3		0.4		0.03
31 NF02YL0038	15.50	121.00	4.6		0.4		0.04

TABLE 8
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YK0022, HUMBER CANAL DURING 1989 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
1	NF02YK0022	11-APR-89	3.56	0.69	2.07	0.26	2.95	2.7	2.20	8.9
2	NF02YK0022	08-JUN-89	3.78	0.71	2.07	0.25	2.79	2.4	2.12	9.4
3	NF02YK0022	02-AUG-89	3.77	0.70	1.98	0.25	2.59	2.0	2.05	9.3
4	NF02YK0022	02-AUG-89	3.77	0.70	1.98	0.25	2.58	2.1	2.02	9.1
5	NF02YK0022	02-AUG-89	3.75	0.70	1.98	0.25	2.62	2.1	2.03	9.3
6	NF02YK0022	11-OCT-89	3.91	0.72	2.12	0.27	2.87	2.5	2.16	9.4
7	NF02YK0022	14-DEC-89	3.80	0.73	2.02	0.24	2.77	2.7	2.11	7.6
8	NF02YK0022	27-FEB-90	3.70	0.75	2.10	0.27		2.5		8.6
9	NF02YK0022	19-APR-90	3.23	0.73	2.15	0.25	2.79	2.2	1.89	7.2
10	NF02YK0022	05-JUN-90	3.67	0.73	2.00	0.24	2.65	2.5	1.97	8.6
11	NF02YK0022	05-JUN-90	3.69	0.73	1.98	0.25	2.67	1.8	1.92	8.4
12	NF02YK0022	05-JUN-90	3.68	0.74	2.00	0.25	2.68	2.2	1.92	8.7
13	NF02YK0022	10-AUG-90	3.67	0.73	2.00	0.24	2.51	2.3	1.94	8.9
14	NF02YK0022	02-OCT-90	3.87	0.76	2.03	0.25	2.68	2.4	2.11	8.9
15	NF02YK0022	05-DEC-90	3.89	0.76	2.02	0.23	2.62	2.3	2.02	9.5
16	NF02YK0022	07-FEB-91	3.79	0.75	2.05	0.24	2.68	2.4	2.18	9.2
17	NF02YK0022	19-APR-91	3.70	0.75	2.07	0.26	2.43	3.0	1.92	9.5
18	NF02YK0022	06-JUN-91	3.70	0.74	1.98	0.23	2.61	1.9	2.06	9.5
19	NF02YK0022	06-JUN-91	3.68	0.74	1.98	0.23	2.60	1.8	2.07	9.1
20	NF02YK0022	06-JUN-91	3.69	0.74	1.96	0.23	2.61	1.6	2.01	9.2

	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL UNITS	FIELD TEMP CELSIUS	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	TOTAL PHOSPHORUS MG/L	TOTAL ALUMINUM MG/L	TOTAL BARIUM MG/L
1	6.25	36.20	0.25	20	1.8	6.8	36.0	13.4	0.0024	0.063	0.0066
2	7.05	36.70	0.30	10	7.9	7.1	34.0	11.7	0.0015	0.057	0.0058
3	7.22	36.80	0.20	10	14.8	7.2	41.0	10.3	0.0018	0.056	0.0053
4	7.23	36.80	0.10	10	14.8	7.2	41.0	10.3	0.0015	0.058	0.0054
5	7.27	36.80	0.20	10	14.8	7.2	41.0	10.3	0.0019	0.058	0.0051
6	6.86	38.60	0.20	10	9.4	7.1	36.0	10.7	0.0027	0.067	0.0074
7	6.65	37.20	0.35	60	3.2	7.3	38.0	12.9	0.0015	0.051	0.0057
8	6.40	37.30	0.27	20	0.1	7.0	37.0	13.4	0.0045	0.066	0.0061
9	6.46	34.90	0.22	40	1.6	6.8	35.0	13.4	0.0037	0.110	0.0074
10	6.75	36.70	0.21	20	7.2	7.1	36.0	12.4	0.0013	0.073	0.0058
11	6.54	36.30	0.18	20	7.2	7.1	36.0	12.4	0.0019	0.065	0.0053
12	6.83	36.30	0.15	20	7.2	7.1	36.0	12.4	0.0013	0.058	0.0055
13	6.75	36.30	0.65	20	17.1	7.3	35.7	9.2	0.0034	0.061	0.0060
14	6.18	37.30	0.40	20	13.0	7.3	36.5	9.1	0.0007	0.078	0.0062
15	6.79	38.00	0.60	20	2.7	7.0	40.0	11.9	0.0026	0.064	0.0057
16	7.10	37.20	0.17	20	0.3	7.0	36.4	13.2	0.0008	0.053	0.0049
17	6.77	39.70	0.25	20	1.4	6.9	35.6	13.0	0.0030	0.066	0.0058
18	7.07	37.10	0.28	10	5.3	6.9	40.1	12.6	0.0028	0.064	0.0058
19	7.07	37.20	0.32	10	5.3	6.9	40.1	12.6	0.0020	0.060	0.0059
20	7.07	37.12	0.23	10	5.3	6.9	40.1	12.6	0.0022	0.064	0.0058

TABLE 8

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YK0022, HUMBER CANAL DURING 1989 TO 1991

	TOTAL CADMIUM MG/L	TOTAL COBALT MG/L	TOTAL CHROMIUM MG/L	TOTAL COPPER MG/L	TOTAL IRON MG/L	TOTAL MANGANESE MG/L	TOTAL MOLYBDENUM MG/L	TOTAL NICKEL MG/L	TOTAL LEAD MG/L
1	L 0.0001	L 0.0001	L 0.0002	L 0.0002	0.0606	0.0138	L 0.0001	L 0.0002	L 0.0002
2	L 0.0001	L 0.0001	0.0002	0.0004	0.0309	0.0031	L 0.0001	L 0.0002	L 0.0002
3	L 0.0001	0.0001	L 0.0002	0.0005	0.0334	0.0038	L 0.0001	0.0004	L 0.0002
4	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0365	0.0040	L 0.0001	L 0.0002	L 0.0002
5	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0350	0.0039	L 0.0001	L 0.0002	L 0.0002
6	L 0.0001	L 0.0001	L 0.0002	0.0023	0.0709	0.0115	L 0.0001	L 0.0002	L 0.0002
7	L 0.0001	L 0.0001	0.0002	0.0003	0.0261	0.0024	L 0.0001	0.0004	L 0.0002
8	L 0.0001	L 0.0001	0.0003	0.0006	0.0587	0.0040	0.0002	0.0004	0.0007
9	L 0.0001	0.0001	0.0002	0.0003	0.1480	0.0224	L 0.0001	0.0004	L 0.0002
10	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0313	0.0038	L 0.0001	0.0023	L 0.0002
11	L 0.0001	0.0001	L 0.0002	0.0008	0.0616	0.0038	L 0.0001	0.0008	0.0003
12	L 0.0001	0.0002	L 0.0002	0.0004	0.0290	0.0038	L 0.0001	0.0009	L 0.0002
13	L 0.0001	0.0002	L 0.0002	0.0004	0.0461	0.0056	L 0.0001	L 0.0002	L 0.0002
14	L 0.0001	L 0.0001	0.0002	0.0006	0.0522	0.0054	0.0002	0.0002	L 0.0002
15	L 0.0001	L 0.0001	L 0.0002	0.0008	0.0453	0.0043	L 0.0001	L 0.0002	L 0.0002
16	L 0.0001	L 0.0001	0.0002	0.0004	0.0291	0.0017	L 0.0001	0.0002	L 0.0002
17	L 0.0001	0.0001	0.0002	0.0004	0.0533	0.0056	0.0001	0.0003	L 0.0002
18	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0412	0.0038	0.0001	0.0002	L 0.0002
19	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0330	0.0033	0.0001	L 0.0002	L 0.0002
20	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0400	0.0033	0.0001	0.0002	L 0.0002

	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L	TOTAL ZINC MG/L	BERYLLIUM MG/L	LITHIUM MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L	TOTAL DISS NITRO MG/L	REACT SILICA MG/L
1	0.0147	L 0.0001	L 0.0002	L 0.0500	L 0.0001	4.6	0.11	0.177	2.99
2	0.0145	0.0001	L 0.0002	L 0.0500	0.0003	3.7	0.12	0.172	3.10
3	0.0140	L 0.0001	0.0002	L 0.0500	0.0002	3.5	0.10	0.168	2.91
4	0.0143	L 0.0001	0.0003	L 0.0500	L 0.0001	3.3	0.10	0.176	2.91
5	0.0140	0.0001	L 0.0002	L 0.0500	0.0001	3.5	0.10	0.176	2.90
6	0.0171	L 0.0001	0.0004	L 0.0500	0.0002	4.7	0.10	0.165	2.83
7	0.0143	0.0002	L 0.0002	L 0.0500	0.0002	3.6	0.12	0.182	3.01
8	0.0139	0.0003	0.0003	L 0.0500	0.0002	3.3		0.232	3.16
9	0.0154	0.0002	0.0003	L 0.0500	0.0002	4.6	0.07	0.200	3.33
10	0.0145	0.0001	0.0041	L 0.0500	0.0001	3.4	0.07	0.171	2.93
11	0.0142	0.0001	0.0012	L 0.0500	0.0002	3.2	0.10	0.190	2.93
12	0.0143	L 0.0001	0.0014	L 0.0500	0.0001	3.3	0.09	0.203	2.95
13	0.0148	0.0001	L 0.0002	L 0.0500	0.0001	3.9	0.11	0.151	2.90
14	0.0157	0.0002	0.0003	L 0.0500	0.0002	4.2	0.09	0.211	2.99
15	0.0155	0.0001	0.0003	L 0.0500	0.0001	3.7	0.11	0.231	3.07
16	0.0142	0.0001	L 0.0002	L 0.0500	0.0002	3.4	0.14	0.165	3.07
17	0.0152	0.0002	L 0.0002	L 0.0500	0.0002	3.9	0.09	0.203	3.20
18	0.0151	0.0002	L 0.0002	L 0.0500	0.0001	5.3	0.11	0.169	3.02
19	0.0154	0.0002	L 0.0002	L 0.0500	0.0001	5.4	0.11	0.199	3.03
20	0.0151	0.0001	L 0.0002	L 0.0500	0.0001	5.6	0.11	0.205	3.01

TABLE 8

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YK0022, HUMBER CANAL DURING 1989 TO 1991

	TOTAL MERCURY UG/L		TOTAL ARSENIC MG/L		TOTAL SELENIUM MG/L	
1	L	0.0100				
2	L	0.0100				
3	L	0.0100				
4	L	0.0100				
5	L	0.0100				
6	L	0.0100				
7	L	0.0100				
8	L	0.0100				
9	L	0.0100	L	0.0001		0.0001
10	L	0.0100		0.0001	L	0.0001
11	L	0.0100		0.0001	L	0.0001
12	L	0.0100		0.0001	L	0.0001
13	L	0.0100	L	0.0001	L	0.0001
14	L	0.0100		0.0002		0.0002
15	L	0.0100	L	0.0001	L	0.0001
16	L	0.0100		0.0002		0.0001
17	L	0.0100		0.0001		0.0001
18	L	0.0100		0.0001		0.0001
19	L	0.0100		0.0001		0.0001
20	L	0.0100		0.0001		0.0001

TABLE 9

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS

AT SITE NF02YL0012, HUMBERVILLE, HUMBER RIVER DURING 1986 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
1	NF02YL0012	02-OCT-86	4.03	0.82	2.25	0.26	3.28	2.9	2.20	10.7
2	NF02YL0012	06-NOV-86	3.68	0.81	2.34	0.27	3.36	2.6	2.06	9.5
3	NF02YL0012	11-DEC-86	4.00	0.85	2.42	0.27	3.34	3.2	2.42	10.1
4	NF02YL0012	19-FEB-87	4.33	0.89	2.45	0.27	3.53	3.2	2.30	10.6
5	NF02YL0012	24-APR-87	4.22	0.85	2.47	0.29	3.63	3.0	2.17	11.0
6	NF02YL0012	17-JUN-87	3.60	0.83	2.20	0.23	3.90	2.6	1.90	8.5
7	NF02YL0012	17-JUN-87	3.62	0.81	2.56	0.29	4.02	2.7	2.07	8.8
8	NF02YL0012	18-AUG-87	3.89	0.80	2.39	0.28	3.50	2.7	2.07	10.9
9	NF02YL0012	18-AUG-87	3.93	0.80	2.39	0.28	3.46	2.7	2.04	10.2
10	NF02YL0012	18-AUG-87	3.93	0.80	2.38	0.28	3.53	2.7	2.11	9.3
11	NF02YL0012	13-OCT-87	3.96	0.82	2.51	0.28	3.66	3.2	2.23	9.3
12	NF02YL0012	09-NOV-87	3.96	0.84	2.55	0.27	3.85	3.4	2.30	9.4
13	NF02YL0012	11-DEC-87	4.02	0.90	2.56	0.27	3.90	3.4	2.47	9.5
14	NF02YL0012	25-FEB-88	4.24	0.92	2.61	0.27	3.70	2.7	1.97	10.4
15	NF02YL0012	26-APR-88	4.19	0.91	2.57	0.26	3.80	4.0	2.83	9.3
16	NF02YL0012	09-JUN-88	3.67	0.81	2.38	0.25	5.25	2.8	2.54	7.8
17	NF02YL0012	08-AUG-88	3.93	0.82	2.35	0.25	3.32	2.8	2.17	9.5
18	NF02YL0012	08-AUG-88	3.94	0.81	2.36	0.25	3.20	2.7	2.13	9.2
19	NF02YL0012	08-AUG-88	3.90	0.82	2.36	0.26	3.15	2.4	2.13	8.9
20	NF02YL0012	09-SEP-88	4.00	0.85	2.41	0.28	3.32	2.1	2.13	10.0
21	NF02YL0012	09-SEP-88	3.91	0.84	2.43	0.28	3.28	2.1	2.09	9.7
22	NF02YL0012	09-SEP-88	4.00	0.84	2.43	0.28	3.27	1.9	2.12	10.3
23	NF02YL0012	06-OCT-88	4.11	0.87	2.37	0.28	3.29	3.0	2.18	10.4
24	NF02YL0012	08-DEC-88	4.05	0.84	2.38	0.26	3.32	2.7	2.13	9.4
25	NF02YL0012	15-FEB-89	4.22	0.88	2.41	0.26	3.38	3.1	2.26	10.5
26	NF02YL0012	11-APR-89	4.30	0.85	2.50	0.26	3.80	2.7	2.48	10.5
27	NF02YL0012	08-JUN-89	3.69	0.76	2.35	0.26	3.37	3.2	0.36	9.5
28	NF02YL0012	02-AUG-89	3.78	0.75	2.25	0.27	2.95	2.4	2.07	9.4
29	NF02YL0012	02-AUG-89	3.81	0.76	2.22	0.26	3.02	2.1	2.13	9.1
30	NF02YL0012	02-AUG-89	3.80	0.76	2.25	0.26	3.04	2.5	2.16	9.1
31	NF02YL0012	12-OCT-89	4.01	0.79	2.30	0.26	3.09	2.7	2.25	9.9
32	NF02YL0012	13-DEC-89	4.04	0.82	2.35	0.28	3.31	3.3	2.20	9.6
33	NF02YL0012	27-FEB-90	4.20	0.92	2.58	0.27		3.4		9.3
34	NF02YL0012	27-FEB-90	4.30	0.90	2.58	0.27		3.3		9.5
35	NF02YL0012	27-FEB-90	4.20	0.90	2.55	0.27		3.2		9.0
36	NF02YL0012	20-APR-90	4.44	0.93	2.52	0.26	3.48	2.2	2.36	10.5
37	NF02YL0012	05-JUN-90	3.89	0.86	2.39	0.26	3.31	2.9	1.96	8.4
38	NF02YL0012	10-AUG-90	3.96	0.84	2.21	0.25	2.85	2.4	2.00	9.6
39	NF02YL0012	02-OCT-90	4.19	0.87	2.25	0.25	3.06	2.2	2.10	9.5
40	NF02YL0012	03-DEC-90	4.07	0.87	2.31	0.26	3.06	3.3	2.06	11.0
41	NF02YL0012	14-FEB-91	4.34	0.91	2.40	0.25	3.33	3.4	2.37	10.8
42	NF02YL0012	14-FEB-91	4.37	0.91	2.40	0.25	3.26	3.1	2.40	11.5
43	NF02YL0012	14-FEB-91	4.37	0.91	2.40	0.25	3.27	3.0	2.34	10.8
44	NF02YL0012	14-FEB-91	4.34	0.91	2.40	0.25	3.33	3.4	2.37	10.8
45	NF02YL0012	19-APR-91	4.37	0.93	2.50	0.32	3.34	3.7	2.21	10.8

TABLE 9
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0012, HUMBERVILLE, HUMBER RIVER DURING 1986 TO 1991

	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL UNITS	FIELD TEMP CELSIUS	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	DISSOLVED MERCURY UG/L	TOTAL PHOSPHORUS MG/L	TOTAL ALUMINUM MG/L
1	7.07	40.1	0.08	30	11.4	7.0	36.0	10.7	L 0.0200	0.0064	0.051
2	6.83	40.4	0.12	30	6.5	6.9	32.0	11.6	L 0.0200	0.0051	0.068
3	6.62	41.2	0.08	30	2.6	7.0		13.0	L 0.0200	0.0038	0.073
4	7.08	48.9	0.15	30	0.8	6.9	38.0	13.5	L 0.0200	0.0036	0.054
5	7.02	42.9	0.30	30	2.4	6.9	41.0	13.0	L 0.0200	0.0050	0.086
6	7.00	40.0	0.40	25	9.5	6.8	38.0	11.9	L 0.0200	0.0040	0.067
7	6.84	40.4	0.25	40	9.5	6.8	38.0	11.9	L 0.0200	0.0035	0.075
8	6.82	40.5	0.18	20	18.1	7.6	38.0	9.5	L 0.0200	0.0044	0.056
9	6.80	40.5	0.16	20	18.1	7.6	38.0	9.5	L 0.0200	0.0046	0.056
10	6.76	40.5	0.15	20	18.1	7.6	38.0	9.5	L 0.0200	0.0052	0.055
11	6.34	39.9	0.12	20	9.7	7.1	35.0	10.8	L 0.0200	0.0030	0.071
12	6.75	40.9	0.50	30	7.1	6.4	37.0	11.0	L 0.0100	0.0034	0.063
13	6.72	41.1	0.28	30	4.3	7.1	40.0	12.2	L 0.0100	0.0032	0.086
14	6.88	44.0	0.18	30	0.6	7.0	0.6	13.8	L 0.0100	0.0039	0.079
15	7.01	43.7	0.33	30	1.4	7.0	43.0	13.2		0.0038	0.072
16	6.84	38.0	0.36	40	6.2	6.9	39.0	12.1		0.0038	0.103
17	6.79	39.7	0.15	40	15.8	7.1	38.0	10.3		0.0038	0.067
18	6.70	39.8	0.13	40						0.0032	0.068
19	6.61	39.4	0.13	30						0.0032	0.067
20	6.73	40.4	0.18	30	14.4	7.2	41.0	10.1		0.0037	0.080
21	6.78	40.3	0.18	20	14.4	7.2	41.0	10.1		0.0035	0.070
22	6.70	40.5	0.23	30	14.4	7.2	41.0	10.1		0.0040	0.072
23	6.35	40.7	0.25	30	10.7	7.1	40.0	10.7		0.0065	0.184
24	6.81	40.2	1.00	30	5.0	7.0	40.8	12.0		0.0043	0.078
25	6.37	41.3	0.58	20	0.6	7.1	42.0	13.8		0.0032	0.070
26	6.51	42.8	0.25	20	1.3	6.9	43.0	13.5		0.0034	0.066
27	6.96	37.7	0.50	30	8.4	7.0	36.0	11.7		0.0032	0.085
28	7.13	38.6	0.46	30	16.4	7.2	46.0	9.8		0.0031	0.063
29	7.13	38.7	0.27	20	16.4	7.2	46.0	9.8		0.0024	0.062
30	7.13	38.7	0.27	20	16.4	7.2	46.0	9.8		0.0027	0.059
31	6.78	40.5	0.32	20	10.2	7.1	37.0	10.4		0.0037	0.069
32	6.61	41.4	0.20	30	3.2	7.2	41.0	12.7		0.0033	0.074
33	6.44	43.3	0.35	30	0.3	6.9	44.0	13.0		0.0066	0.130
34	6.46	43.4	0.39	30	0.3	6.9	44.0	13.0		0.0048	0.083
35	6.54	42.6	0.37	40	0.3	6.9	44.0	13.0		0.0043	0.079
36	6.61	44.6	0.21	30	1.2	7.0	48.0	13.2		0.0030	0.075
37	6.73	40.1	0.18	40	4.7	7.0	42.0	12.9		0.0040	0.091
38	6.80	39.4	0.53	30	16.4	7.2	42.7	9.4		0.0048	0.072
39	6.22	40.4	0.47	30	13.9	7.3	40.8	9.1		0.0026	0.080
40	7.10	40.6	0.55	40	4.9	6.9	34.4	11.3		0.0037	0.084
41	7.00	44.1	0.27	40	0.0	6.8	38.5	13.1		0.0023	0.069
42	7.04	42.7	0.28	30	0.0	6.8	38.5	13.1		0.0022	0.073
43	7.00	43.6	0.26	40	0.0	6.8	38.5	13.1		0.0030	0.073
44	7.00	44.1	0.27	40	0.0	6.8	38.5	13.1		0.0023	0.069
45	6.70	45.1	4.40	30	1.5	6.8	39.7	12.5		0.0051	0.069

TABLE 9
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0012, HUMBERVILLE, HUMBER RIVER DURING 1986 TO 1991

	TOTAL BARIUM MG/L		TOTAL CADMIUM MG/L		TOTAL COBALT MG/L		TOTAL CHROMIUM MG/L		TOTAL COPPER MG/L	TOTAL IRON MG/L	TOTAL MANGANESE MG/L		TOTAL MOLYBDENUM MG/L		TOTAL NICKEL MG/L
1	0.0076	L	0.0001	L	0.0001	L	0.0002	L	0.0002	0.0531	0.0048	L	0.0001		0.0002
2	0.0083	L	0.0001	L	0.0001		0.0002		0.0019	0.0706	0.0052	L	0.0001	L	0.0002
3	0.0081	L	0.0001	L	0.0001	L	0.0002		0.0015	0.0745	0.0047		0.0001	L	0.0002
4	0.0082	L	0.0001	L	0.0001		0.0012		0.0006	0.0524	0.0033	L	0.0001		0.0004
5	0.0086	L	0.0001		0.0002	L	0.0002		0.0006	0.0886	0.0093	L	0.0001	L	0.0002
6		L	0.0010					L	0.0020	0.0800	0.0100				
7	0.0084	L	0.0001	L	0.0001		0.0005		0.0047	0.0806	0.0082	L	0.0001		0.0003
8	0.0095	L	0.0001		0.0001		0.0004		0.0007	0.0417	0.0045	L	0.0001		0.0004
9	0.0092	L	0.0001	L	0.0001		0.0005		0.0052	0.0416	0.0046	L	0.0001		0.0006
10	0.0095	L	0.0001	L	0.0001		0.0004		0.0034	0.0421	0.0045	L	0.0001		0.0003
11	0.0080	L	0.0001	L	0.0001	L	0.0002		0.0003	0.1110	0.0082	L	0.0001	L	0.0002
12	0.0085	L	0.0001		0.0001		0.0003		0.0023	0.0621	0.0053	L	0.0001		0.0002
13	0.0089	L	0.0001	L	0.0001		0.0004	L	0.0002	0.0942	0.0068		0.0001		0.0005
14	0.0087	L	0.0001	L	0.0001		0.0005		0.0011	0.0756	0.0046	L	0.0001	L	0.0002
15	0.0086	L	0.0001		0.0001	L	0.0002		0.0007	0.0767	0.0049	L	0.0001	L	0.0002
16	0.0088	L	0.0001	L	0.0001	L	0.0002		0.0009	0.1130	0.0081	L	0.0001		0.0003
17	0.0080	L	0.0001	L	0.0001	L	0.0002		0.0008	0.0624	0.0046	L	0.0001	L	0.0002
18	0.0082	L	0.0001	L	0.0001	L	0.0002		0.0002	0.0642	0.0047	L	0.0001	L	0.0002
19	0.0080	L	0.0001	L	0.0001	L	0.0002		0.0006	0.0633	0.0046	L	0.0001		0.0003
20	0.0087	L	0.0001	L	0.0001	L	0.0002		0.0006	0.0698	0.0065	L	0.0001	L	0.0002
21	0.0085	L	0.0001	L	0.0001	L	0.0002		0.0008	0.0677	0.0065	L	0.0001	L	0.0002
22	0.0087	L	0.0001	L	0.0001	L	0.0002		0.0004	0.0702	0.0065	L	0.0001	L	0.0002
23	0.0091	L	0.0001		0.0001		0.0004		0.0007	0.2190	0.0103	L	0.0001		0.0005
24	0.0081	L	0.0001	L	0.0001		0.0003		0.0005	0.0878	0.0058	L	0.0001		0.0004
25	0.0079	L	0.0001	L	0.0001	L	0.0002		0.0003	0.0605	0.0030		0.0001	L	0.0002
26	0.0077	L	0.0001		0.0002	L	0.0002		0.0003	0.0667	0.0042	L	0.0001	L	0.0002
27	0.0083	L	0.0001		0.0002		0.0002		0.0004	0.0958	0.0075	L	0.0001		0.0002
28	0.0070	L	0.0001	L	0.0001		0.0008		0.0003	0.0630	0.0041	L	0.0001		0.0005
29	0.0070	L	0.0001	L	0.0001		0.0003		0.0005	0.0524	0.0040		0.0001		0.0003
30	0.0072	L	0.0001	L	0.0001	L	0.0002		0.0004	0.0524	0.0040	L	0.0001	L	0.0002
31	0.0079	L	0.0001		0.0001	L	0.0002	L	0.0002	0.0752	0.0055	L	0.0001	L	0.0002
32	0.0084	L	0.0001	L	0.0001	L	0.0002	L	0.0002	0.0833	0.0059	L	0.0001	L	0.0002
33	0.0094	L	0.0001		0.0001		0.0002		0.0004	0.1120	0.0089	L	0.0001		0.0004
34	0.0090	L	0.0001	L	0.0001		0.0011		0.0004	0.1110	0.0090	L	0.0001	L	0.0002
35	0.0088	L	0.0001	L	0.0001		0.0003		0.0005	0.1040	0.0089	L	0.0001		0.0005
36	0.0077	L	0.0001	L	0.0001	L	0.0002	L	0.0002	0.0610	0.0044	L	0.0001	L	0.0002
37	0.0081	L	0.0001		0.0002	L	0.0002		0.0003	0.0893	0.0101	L	0.0001	L	0.0002
38	0.0081	L	0.0001		0.0001	L	0.0002		0.0011	0.0655	0.0039	L	0.0001	L	0.0002
39	0.0092	L	0.0001	L	0.0001	L	0.0002		0.0007	0.0866	0.0057	L	0.0001		0.0002
40	0.0083	L	0.0001	L	0.0001	L	0.0002		0.0005	0.0961	0.0061	L	0.0001	L	0.0002
41	0.0075	L	0.0001	L	0.0001		0.0002		0.0004	0.0720	0.0049	L	0.0001	L	0.0002
42	0.0075	L	0.0001		0.0001		0.0002		0.0006	0.0727	0.0048	L	0.0001	L	0.0002
43	0.0137	L	0.0001	L	0.0001		0.0002		0.0004	0.0727	0.0049	L	0.0001	L	0.0002
44	0.0075	L	0.0001	L	0.0001		0.0002		0.0004	0.0720	0.0049	L	0.0001	L	0.0002
45	0.0083	L	0.0001	L	0.0001		0.0002		0.0004	0.0800	0.0052	L	0.0001	L	0.0002

TABLE 9

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS

AT SITE NF02YL0012, HUMBERVILLE, HUMBER RIVER DURING 1986 TO 1991

	TOTAL LEAD MG/L	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L	TOTAL ZINC MG/L	BERYLLIUM MG/L	LITHIUM MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L	TOTAL DISS NITRO MG/L
1	0.0006	0.0187	L 0.0001	0.0004	L 0.0500	L 0.0001	3.8	0.009	
2	0.0006	0.0199	0.0002	0.0010	L 0.0500	0.0002	4.1	0.005	0.124
3	L 0.0002	0.0196	L 0.0001	0.0007	L 0.0500	L 0.0001	4.0	0.007	0.124
4	0.0011	0.0205	0.0002	0.0014	L 0.0500	0.0002	4.0	0.128	0.203
5	L 0.0002	0.0208	L 0.0001	0.0009	L 0.0500	0.0002	3.5	0.102	0.213
6	L 0.0020			L 0.0100			4.7	0.040	
7	0.0006	0.0186	0.0002	0.0005	L 0.0500	0.0002	4.6	0.090	0.147
8	L 0.0002	0.0187	L 0.0001	L 0.0002	L 0.0500	0.0001	3.2	0.080	0.192
9	0.0007	0.0189	0.0002	L 0.0002	L 0.0500	0.0003	3.2	0.082	0.199
10	0.0004	0.0188	L 0.0001	L 0.0002	L 0.0500	0.0003	3.2	0.082	0.184
11	L 0.0002	0.0192	L 0.0001	0.0010	L 0.0500	L 0.0001	3.6	0.105	0.209
12	0.0005	0.0200	0.0003	0.0005	L 0.0500	0.0003	4.0	0.102	0.208
13	0.0008	0.0206	0.0004	0.0008	L 0.0500	0.0004	4.5	0.096	0.217
14	L 0.0002	0.0213	0.0002	0.0007	L 0.0500	0.0002	4.3	0.085	0.184
15	L 0.0002	0.0208	L 0.0001	0.0004	L 0.0500	L 0.0001	4.3	0.160	0.223
16	0.0004	0.0186	0.0002	0.0007	L 0.0500	0.0004	5.3	0.050	0.207
17	L 0.0002	0.0190	L 0.0001	L 0.0002	L 0.0500	0.0001	4.7	0.080	0.206
18	L 0.0002	0.0193	L 0.0001	L 0.0002	L 0.0500	0.0002	4.5	0.080	0.212
19	L 0.0002	0.0188	L 0.0001	L 0.0002	L 0.0500	0.0002	4.6	0.080	0.207
20	L 0.0002	0.0207	0.0002	0.0003	L 0.0500	0.0001	4.5	0.080	0.189
21	0.0002	0.0203	0.0001	0.0005	L 0.0500	0.0001	4.6	0.080	0.191
22	L 0.0002	0.0205	0.0001	0.0011	L 0.0500	0.0002	4.5	0.080	0.188
23	L 0.0002	0.0213	0.0004	0.0006	L 0.0500	0.0003	4.6	0.090	0.206
24	0.0003	0.0187	0.0002	0.0003	L 0.0500	0.0002	5.2	0.090	0.225
25	L 0.0002	0.0197	L 0.0001	0.0003	L 0.0500	0.0001	4.5	0.100	0.226
26	L 0.0002	0.0194	L 0.0001	0.0006	L 0.0500	0.0002	4.7	0.110	0.188
27	L 0.0002	0.0183	0.0002	L 0.0002	L 0.0500	0.0003	4.9	L 0.0100	0.160
28	0.0004	0.0185	L 0.0001	0.0002	L 0.0500	0.0001	4.2	0.080	0.166
29	0.0002	0.0185	0.0002	L 0.0002	L 0.0500	0.0002	4.3	0.090	0.162
30	L 0.0002	0.0182	L 0.0001	0.0002	L 0.0500	L 0.0001	4.4	0.090	0.159
31	L 0.0002	0.0195	L 0.0001	0.0003	L 0.0500	L 0.0001	4.4	0.100	0.161
32	L 0.0002	0.0198	L 0.0001	0.0003	L 0.0500	0.0001	4.9	0.110	0.236
33	L 0.0002	0.0207	0.0002	0.0005	L 0.0500	0.0002	4.4		0.248
34	0.0002	0.0206	0.0002	0.0005	L 0.0500	0.0002	4.6		0.275
35	0.0004	0.0202	0.0003	0.0005	L 0.0500	0.0003	4.4		0.234
36	L 0.0002	0.0203	L 0.0001	L 0.0002	L 0.0500	0.0002	4.1	0.100	0.220
37	L 0.0002	0.0194	0.0002	L 0.0002	L 0.0500	0.0002	4.7	0.060	0.182
38	0.0003	0.0204	0.0001	0.0004	L 0.0500	0.0004	4.9	0.090	0.161
39	L 0.0002	0.0209	0.0002	0.0005	L 0.0500	0.0002	4.7	0.080	0.218
40	L 0.0002	0.0209	0.0002	0.0005	L 0.0500	0.0002	5.4	0.090	0.201
41	L 0.0002	0.0203	0.0001	0.0003	L 0.0500	0.0001	4.8	0.130	0.215
42	L 0.0002	0.0202	0.0002	0.0004	L 0.0500	0.0002	4.8	0.130	0.213
43	L 0.0002	0.0206	0.0001	0.0003	L 0.0500	0.0002	4.9	0.130	0.217
44	L 0.0002	0.0203	0.0001	0.0003	L 0.0500	0.0001	4.8	0.130	0.215
45	L 0.0002	0.0215	0.0002	L 0.0002	L 0.0500	0.0002	4.7	0.100	0.257

TABLE 9

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0012, HUMBERVILLE, HUMBER RIVER DURING 1986 TO 1991

	REACT SILICA MG/L		TOTAL MERCURY UG/L		TOTAL ARSENIC MG/L		TOTAL SELENIUM MG/L
1							
2							
3							
4							
5							
6	2.72						
7							
8	2.46						
9	2.46						
10	2.46						
11	2.60						
12	2.63						
13	2.69						
14	2.85						
15	2.86	L	0.0100				
16	2.54	L	0.0100				
17	2.42	L	0.0100				
18	2.42	L	0.0100				
19	2.43	L	0.0100				
20	2.42	L	0.0100				
21	2.41	L	0.0100				
22	2.42	L	0.0100				
23	2.50	L	0.0100				
24	2.66	L	0.0100				
25	2.81	L	0.0100				
26	2.96	L	0.0100				
27	2.70	L	0.0100				
28	2.49	L	0.0100				
29	2.50	L	0.0100				
30	2.50	L	0.0100				
31	2.58	L	0.0100				
32	2.73	L	0.0100				
33	3.23	L	0.0100				
34	3.23	L	0.0100				
35	3.17	L	0.0100				
36	3.06	L	0.0100	L	0.0001		0.0001
37	2.77	L	0.0100		0.0001	L	0.0001
38	2.50	L	0.0100		0.0001	L	0.0001
39	2.56	L	0.0100		0.0002		0.0002
40	2.78	L	0.0100		0.0001		0.0001
41	3.10	L	0.0100		0.0002		0.0001
42	3.09	L	0.0100		0.0002		0.0001
43	3.11	L	0.0100		0.0002		0.0002
44	3.10	L	0.0100		0.0002		0.0001
45	3.14	L	0.0100		0.0002		0.0002

TABLE 9

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS

AT SITE NF02YL0012, HUMBERVILLE, HUMBER RIVER DURING 1986 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
46	NF02YL0012	06-JUN-91	4.12	0.87	2.34	0.25	3.21	2.1	2.19	9.6

	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL UNITS	FIELD TEMP CELSIUS	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	DISSOLVED MERCURY UG/L	TOTAL PHOSPHORUS MG/L	TOTAL ALUMINUM MG/L
46	7.07	42.1	0.60	40	5.7	6.8	41.9	12.2		0.0050	0.134

	TOTAL BARIUM MG/L	TOTAL CADMIUM MG/L	TOTAL COBALT MG/L	TOTAL CHROMIUM MG/L	TOTAL COPPER MG/L	TOTAL IRON MG/L	TOTAL MANGANESE MG/L	TOTAL MOLYBDENUM MG/L	TOTAL NICKEL MG/L
46	0.0089	L 0.0001	0.0001	0.0002	0.0005	0.1650	0.0171	0.0001	0.0002

	TOTAL LEAD MG/L	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L	TOTAL ZINC MG/L	BERYLLIUM MG/L	LITHIUM MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L	TOTAL DISS NITRO MG/L
46	L 0.0002	0.0222	0.0003	0.0004	L 0.0500	0.0003	7.6	0.100	0.229

	REACT SILICA MG/L	TOTAL MERCURY UG/L	TOTAL ARSENIC MG/L	TOTAL SELENIUM MG/L
46	2.76	L 0.0100	0.0001	0.0001

TABLE 10
HUMBER RIVER RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF TANNIC AND RESIN ACIDS,
AND CHLOROPHENOLS

STATION NUMBER	SAMPLE DATE	TANNIC ACID MG/L	LINOLEIC ACID UG/L	LINOLENIC ACID UG/L	PALMITIC ACID UG/L	STEARIC ACID UG/L	ISOPIMARIC ACID UG/L	DEHYROABIE-TIC ACID UG/L
1 WILDCOVE BK								
2 NF02YL0029	10-SEP-91	0.97	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
3 NF02YL0029	10-SEP-91	0.86	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
4 NF02YL0029	10-SEP-91							
5 NF02YL0039	10-SEP-91	0.54	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
6 NF02YL0065	10-SEP-91	0.21	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
7 NF02YL0040	11-SEP-91	97.00	409	L 10.0000	199	172	L 10.0000	115
8 CORNER BK								
9 NF02YL0041	11-SEP-91	0.82	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
10 NF02YL0041	11-SEP-91	0.77	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
11 NF02YL0041	11-SEP-91	0.84	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
12 NF02YL0013	11-SEP-91	0.87	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
13 NF02YL0044	11-SEP-91	0.46	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000
14 NF02YL0046	13-SEP-91	0.48	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000	L 10.0000

STATION NUMBER	ABIETIC ACID UG/L	CHLORODEHY DROABIETIC ACID UG/L	PHENOL UG/L	2,3 DICHLORO PHENOL UG/L	2,4 DICHLORO PHENOL UG/L	3,4 DICHLORO PHENOL UG/L	2,3,5, TRI CHLOROPHENOL UG/L
1 WILDCOVE BK							
2 NF02YL0029	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
3 NF02YL0029	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
4 NF02YL0029			L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
5 NF02YL0039	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
6 NF02YL0065	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
7 NF02YL0040	L 10.0000	L 10.0000	9060	L 5.0000	L 5.0000	L 5.0000	L 5.0000
8 CORNER BK							
9 NF02YL0041	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
10 NF02YL0041	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
11 NF02YL0041	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
12 NF02YL0013	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
13 NF02YL0044	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000
14 NF02YL0046	L 10.0000	L 10.0000	L 3.0000	L 5.0000	L 5.0000	L 5.0000	L 5.0000

TABLE 10
HUMBER RIVER RECURRENT SURVEY 1991
SURFACE WATER ANALYSIS OF TANNIC AND RESIN ACIDS,
AND CHLOROPHENOLS

STATION NUMBER	2,3,6 TRI CHLOROPHENOL UG/L		2,4,6 TRI CHLOROPHENOL UG/L		2,3,4,6 TETRA CHLOROPHENOL UG/L		PENTACHLORO PHENOL UG/L	
1 WILDCOVE BK								
2 NF02YL0029	L	5.0000	L	5.0000	L	5.0000	L	5.0000
3 NF02YL0029	L	5.0000	L	5.0000	L	5.0000	L	5.0000
4 NF02YL0029	L	5.0000	L	5.0000	L	5.0000	L	5.0000
5 NF02YL0039	L	5.0000	L	5.0000	L	5.0000	L	5.0000
6 NF02YL0065	L	5.0000	L	5.0000	L	5.0000	L	5.0000
7 NF02YL0040	L	5.0000	L	5.0000	L	5.0000	L	5.0000
8 CORNER BK								
9 NF02YL0041	L	5.0000	L	5.0000	L	5.0000	L	5.0000
10 NF02YL0041	L	5.0000	L	5.0000	L	5.0000	L	5.0000
11 NF02YL0041	L	5.0000	L	5.0000	L	5.0000	L	5.0000
12 NF02YL0013	L	5.0000	L	5.0000	L	5.0000	L	5.0000
13 NF02YL0044	L	5.0000	L	5.0000	L	5.0000	L	5.0000
14 NF02YL0046	L	5.0000	L	5.0000	L	5.0000	L	5.0000

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
1	NF02YL0013	17-OCT-86	14.90	2.30	3.65	0.39	5.30	3.5	2.84	42.9
2	NF02YL0013	24-NOV-86	11.80	1.85	3.32	0.36	5.62	3.6	2.78	32.2
3	NF02YL0013	24-NOV-86	11.50	1.86	3.31	0.36	5.48	3.5	2.58	31.8
4	NF02YL0013	24-NOV-86	11.60	1.85	3.32	0.36	5.54	3.4	2.53	31.5
5	NF02YL0013	23-DEC-86	12.30	1.94	3.59	0.37	5.92	3.6	2.90	34.6
6	NF02YL0013	27-JAN-87	8.76	1.40	3.00	0.39	5.14	3.4	3.22	22.7
7	NF02YL0013	27-FEB-87	8.64	1.37	2.99	0.38	5.13	3.4	2.61	22.4
8	NF02YL0013	26-MAR-87	13.90	2.00	11.50	0.43	20.60	4.7	3.97	32.2
9	NF02YL0013	24-APR-87	17.20	2.60	3.90	0.39	7.43	4.0	3.01	48.3
10	NF02YL0013	26-MAY-87	11.40	1.79	3.13	0.34	5.66	3.1	2.67	31.9
11	NF02YL0013	23-JUN-87	10.00	1.60	2.80	0.30	5.50	3.1	2.50	27.1
12	NF02YL0013	23-JUN-87	10.40	1.61	3.13	0.39	5.47	3.1	2.45	27.8
13	NF02YL0013	21-JUL-87	7.08	1.12	2.69	0.36	4.53	2.9	2.35	18.3
14	NF02YL0013	28-AUG-87	14.30	2.20	4.10	0.54	5.78	3.8	3.26	40.2
15	NF02YL0013	25-SEP-87	10.20	1.53	3.05	0.38	5.24	3.5	2.60	28.5
16	NF02YL0013	26-OCT-87	22.30	3.13	4.41	0.42	7.89	5.1	4.29	65.0
17	NF02YL0013	26-OCT-87	22.40	3.11	4.41	0.43	7.44	5.2	4.11	66.0
18	NF02YL0013	26-OCT-87	22.30	3.13	4.43	0.43	7.32	5.2	4.08	69.2
19	NF02YL0013	23-NOV-87	14.10	2.18	4.07	0.33	7.06	4.0	3.18	39.6
20	NF02YL0013	23-DEC-87	10.20	1.61	3.23	0.37	5.63	3.5	2.79	27.3
21	NF02YL0013	21-JAN-88	8.82	1.44	3.40	0.36	5.90	3.2	2.64	23.2
22	NF02YL0013	18-FEB-88	8.20	1.38	3.18	0.37	5.39	3.3	2.52	21.9
23	NF02YL0013	22-MAR-88	7.41	1.19	3.59	0.37	6.14	2.7	2.62	17.9
24	NF02YL0013	25-APR-88	11.30	1.78	4.72	0.38	7.85	4.3	2.91	28.6
25	NF02YL0013	20-MAY-88	13.60	2.00	3.11	0.32	5.16	2.6	2.72	34.0
26	NF02YL0013	20-JUN-88	8.40	1.30	2.90	0.37	4.70	2.9	2.43	21.8
27	NF02YL0013	28-JUL-88	10.10	1.56	2.93	0.32	4.87	2.5	2.49	27.8
28	NF02YL0013	23-AUG-88	15.10	2.20	3.83	0.44	5.53	3.6	2.75	39.4
29	NF02YL0013	22-SEP-88	17.60	2.50	4.03	0.44	6.32	3.1	2.99	51.0
30	NF02YL0013	22-SEP-88	17.40	2.60	4.05	0.44	6.48	3.1	3.03	51.3
31	NF02YL0013	22-SEP-88	17.40	2.60	4.05	0.44	6.28	3.1	2.97	49.9
32	NF02YL0013	20-OCT-88	9.34	1.40	2.85	0.41	4.65	3.1	2.50	24.4
33	NF02YL0013	18-NOV-88	16.70	2.50	4.19	0.53	6.77	3.4	3.21	44.1
34	NF02YL0013	19-DEC-88	12.20	1.92	3.63	0.40	6.10	3.4	2.88	36.9
35	NF02YL0013	26-JAN-89	9.64	1.52	3.32	0.40	5.58	3.2	2.68	24.9
36	NF02YL0013	27-FEB-89	15.20	2.30	4.83	0.41	8.19	5.0	3.17	41.2
37	NF02YL0013	28-MAR-89	6.47	1.06	3.20	0.38	5.66	3.0	2.56	17.0
38	NF02YL0013	25-APR-89	12.40	1.95	4.50	0.42	7.70	3.6	3.11	34.0
39	NF02YL0013	25-MAY-89	11.80	1.68	3.21	0.38	5.11	2.6	2.50	32.2
40	NF02YL0013	21-JUN-89	11.10	1.70	3.39	0.43	5.20	2.9	2.27	30.2
41	NF02YL0013	27-JUL-89	10.37	1.56	3.37	0.40	5.39	2.7	2.62	28.6
42	NF02YL0013	22-AUG-89	26.10	4.10	4.77	0.49	6.79	3.6	3.54	78.6
43	NF02YL0013	28-SEP-89	17.20	2.60	4.09	0.48	5.93	3.3	3.15	46.4
44	NF02YL0013	28-SEP-89	17.00	2.60	4.13	0.48	5.82	3.5	3.15	45.7
45	NF02YL0013	28-SEP-89	17.30	2.60	4.16	0.49	5.86	3.0	3.15	46.3

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL UNITS	FIELD TEMP CELSIUS	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	DISSOLVED MERCURY UG/L	TOTAL MERCURY UG/L	TOTAL PHOSPHORUS MG/L
1	7.59	113.1	0.14	20	6.6	7.6	93.0	11.7	L 0.0200		0.0021
2	7.54	93.2	0.13	20	0.3	7.5	70.0	14.3	L 0.0200		0.0032
3	7.60	92.8	0.13	20	0.3	7.5	70.0	14.3	L 0.0200		0.0020
4	7.56	92.9	0.14	20	0.3	7.5	70.0	14.3	L 0.0200		0.0023
5	7.41	98.6	0.10	10	0.1	7.6	90.0	13.3	L 0.0200		0.0017
6	7.60	72.5	0.15	20	0.1	7.4	69.0	14.4	L 0.0200		0.0029
7	7.53	72.5	0.12	20	0.1	7.3	70.0	14.1	L 0.0200		0.0029
8	7.16	149.7	0.15	20	0.7	7.5	146.0	14.3	L 0.0200		0.0072
9	7.75	130.3	0.56	40	3.0	7.6	126.0	13.1	L 0.0200		0.0054
10	7.37	93.1	0.16	20	6.8	7.6	87.0	11.6	L 0.0200		0.0026
11	7.70	81.0	0.30	15	12.2		75.0	10.7	L 0.0200		0.0030
12	7.37	82.7	0.18	20	12.2	7.6	75.0	10.7	L 0.0200		0.0019
13	6.89	60.6	0.23	10	14.6	7.7	58.0	9.8	L 0.0200		0.0020
14	7.79	108.0	0.23	20	13.2	8.1	102.0	10.2	L 0.0200		0.0025
15	7.38	81.2	0.15	20	10.5	7.7	77.0	10.9	L 0.0200		0.0018
16	7.32	158.0	0.80	30	7.4	8.1	149.0	11.8	L 0.0100		0.0031
17	7.47	157.0	0.80	30	7.4	8.1	149.0	11.8	L 0.0100		0.0036
18	7.60	158.0	1.00	40	7.4	8.1	149.0	11.8	L 0.0100		0.0032
19	6.78	109.0	0.15	30	3.1	7.7	102.0	13.3	L 0.0200		0.0037
20	6.51	80.4	0.80	20	0.1	7.5	80.0	14.8	L 0.0100		0.0025
21	7.04	77.6	0.74	20	0.1	7.4	75.0	13.9	L 0.0100		0.0023
22	7.34	72.8	0.12	20	0.1	7.4	0.1	14.8	L 0.0100		0.0029
23	7.22	67.9	0.50	20	0.2	7.3	65.0	14.4	L 0.0100		0.0029
24	7.33	95.1	0.23	20	5.1	7.6	93.0	12.3		L 0.0100	0.0035
25	7.58	96.4	0.20	30	6.2	7.7	96.0	12.0		L 0.0100	0.0030
26	7.20	69.8	0.24	20	15.0	7.7	67.0	9.7		L 0.0100	0.0017
27	6.97	80.4	0.18	20	16.7	7.8	79.0	9.7		L 0.0100	0.0020
28	7.86	111.0	0.20	40	12.5	7.7	114.0	10.3		L 0.0100	0.0031
29	7.22	129.0	0.13	20	14.5	8.0	129.0	10.0		L 0.0100	0.0020
30	7.29	129.0	0.12	10	14.5	8.0	129.0	10.0		L 0.0100	0.0020
31	7.17	129.0	0.13	20	14.5	8.0	129.0	10.0		L 0.0100	0.0022
32	7.18	73.4	0.18	10	8.0	7.6	75.0	11.6		L 0.0100	0.0032
33	7.53	162.0	0.20	50	4.7	7.8	125.0	12.7		L 0.0100	0.0204
34	7.60	97.3	0.00	L 5.0000	0.1	7.6	99.0	14.0		L 0.0100	0.0027
35	7.77	77.5	0.15	20	0.0	7.4	82.0	14.6		L 0.0100	0.0027
36	6.85	118.0	0.45	20	0.0	7.6	120.0	14.2		L 0.0100	0.0022
37	7.32	64.4	0.02	30	1.2	7.3	63.0			L 0.0100	0.0031
38	7.08	101.0	1.00	20	4.6	7.6	97.0	13.1		L 0.0100	0.0026
39	7.99	86.7	0.50	20	8.2	7.6	90.0	11.7		L 0.0100	0.0023
40	7.92	86.8	0.60	20	15.4	7.7	82.0	9.7		L 0.0100	0.0026
41	7.91	88.0	0.45	10	18.2	7.6	96.0	9.6		L 0.0100	0.0032
42	8.14	182.0	0.16	10	16.7	7.9	169.0	9.4		L 0.0100	0.0048
43	7.59	122.0	0.60	40	7.7	7.8	113.0	11.6		L 0.0100	0.0048
44	7.61	123.0	0.46	40	7.7	7.8	113.0	11.6		L 0.0100	0.0058
45	7.57	122.0	0.52	30	7.7	7.8	113.0	11.6		L 0.0100	0.0064

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	TOTAL ALUMINUM MG/L	TOTAL BARIUM MG/L	TOTAL CADMIUM MG/L	TOTAL COBALT MG/L	TOTAL CHROMIUM MG/L	TOTAL COPPER MG/L	TOTAL IRON MG/L	TOTAL MANGANESE MG/L	TOTAL MOLYBDENUM MG/L
1	0.070	0.0057	L 0.0001	0.0005	L 0.0002	L 0.0002	0.0511	0.0052	L 0.0001
2	0.072	0.0041	L 0.0001	0.0001	L 0.0002	0.0015	0.0491	0.0043	0.0002
3	0.074	0.0039	L 0.0001	L 0.0001	L 0.0002	0.0018	0.0505	0.0044	L 0.0001
4	0.074	0.0039	L 0.0001	0.0001	L 0.0002	0.0044	0.0513	0.0044	L 0.0001
5	0.067	0.0042	L 0.0001	0.0001	L 0.0002	0.0016	0.0421	0.0033	L 0.0001
6	0.076	0.0036	L 0.0001	L 0.0001	L 0.0002	0.0020	0.0506	0.0032	L 0.0001
7	0.094	0.0038	L 0.0001	L 0.0001	L 0.0002	0.0025	0.0451	0.0029	L 0.0001
8	0.070	0.0051	L 0.0001	L 0.0001	L 0.0002	0.0011	0.0603	0.0041	L 0.0001
9	0.114	0.0045	L 0.0001	0.0003	L 0.0002	0.0007	0.1170	0.0105	L 0.0001
10	0.080	0.0040	L 0.0001	L 0.0001	L 0.0002	0.0006	0.0586	0.0051	L 0.0001
11	0.058		L 0.0010			L 0.0020	0.0440	L 0.0100	
12	0.064	0.0039	L 0.0001	0.0001	0.0005	0.0008	0.0395	0.0043	L 0.0001
13	0.054	0.0197	L 0.0001	L 0.0001	0.0005	0.0052	0.0297	0.0037	L 0.0001
14	0.066	0.0046	0.0001	L 0.0001	L 0.0002	0.0050	0.0646	0.0062	0.0006
15	0.051	0.0042	L 0.0001	0.0002	L 0.0002	0.0005	0.0342	0.0045	L 0.0001
16	0.057	0.0053	0.0002	0.0002	0.0004	0.0007	0.0548	0.0073	0.0001
17	0.055	0.0052	L 0.0001	0.0002	L 0.0002	0.0007	0.0501	0.0085	L 0.0001
18	0.059	0.0053	L 0.0001	0.0003	0.0002	0.0006	0.0549	0.0074	L 0.0001
19	0.136	0.0041	L 0.0001	0.0001	L 0.0002	0.0011	0.1330	0.0132	L 0.0001
20	0.084	0.0039	L 0.0001	L 0.0001	L 0.0002	0.0010	0.0563	0.0086	0.0002
21	0.080	0.0038	L 0.0001	L 0.0001	L 0.0002	0.0007	0.0536	0.0042	L 0.0001
22	0.098	0.0038	L 0.0001	0.0001	L 0.0002	0.0026	0.0734	0.0072	L 0.0001
23	0.097	0.0036	L 0.0001	L 0.0001	L 0.0002	0.0006	0.0792	0.0078	L 0.0001
24	0.079	0.0040	L 0.0001	L 0.0001	L 0.0002	L 0.0002	0.0614	0.0071	L 0.0001
25	0.103	0.0043	L 0.0001	L 0.0001	L 0.0002	0.0013	0.0789	0.0099	L 0.0001
26	0.086	0.0033	L 0.0001	L 0.0001	L 0.0002	0.0042	0.0614	0.0063	L 0.0001
27	0.064	0.0040	L 0.0001	L 0.0001	L 0.0002	0.0005	0.0449	0.0112	L 0.0001
28	0.070	0.0047	L 0.0001	L 0.0001	L 0.0002	0.0006	0.0803	0.0115	L 0.0001
29	0.052	0.0050	L 0.0001	L 0.0001	L 0.0002	0.0003	0.0415	0.0085	L 0.0001
30	0.056	0.0070	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0416	0.0088	L 0.0001
31	0.058	0.0053	L 0.0001	L 0.0001	L 0.0002	0.0003	0.0434	0.0089	L 0.0001
32	0.102	0.0037	L 0.0001	0.0001	0.0003	0.0004	0.0741	0.0062	L 0.0001
33	0.821	0.0096	0.0001	0.0007	0.0010	0.0015	1.2500	0.0515	L 0.0001
34	0.084	0.0038	L 0.0001	0.0002	0.0002	0.0005	0.0639	0.0102	L 0.0001
35	0.123	0.0038	L 0.0001	L 0.0001	L 0.0002	0.0003	0.1050	0.0115	L 0.0001
36	0.089	0.0041	L 0.0001	L 0.0001	L 0.0002	0.0003	0.0869	0.0124	L 0.0001
37	0.094	0.0033	L 0.0001	L 0.0001	L 0.0002	0.0007	0.0755	0.0078	L 0.0001
38	0.087	0.0039	L 0.0001	L 0.0001	L 0.0002	0.0005	0.0747	0.0089	L 0.0001
39	0.096	0.0040	L 0.0001	L 0.0001	0.0005	0.0004	0.0754	0.0083	L 0.0001
40	0.084	0.0042	L 0.0001	L 0.0001	0.0002	0.0003	0.0806	0.0089	L 0.0001
41	0.063	0.0042	L 0.0001	L 0.0001	L 0.0002	0.0005	0.0377	0.0054	L 0.0001
42	0.070	0.0064	L 0.0001	L 0.0001	L 0.0002	0.0005	0.0835	0.0151	L 0.0001
43	0.148	0.0052	0.0001	0.0001	L 0.0002	0.0005	0.1800	0.0200	L 0.0001
44	0.157	0.0051	L 0.0001	0.0002	L 0.0002	0.0006	0.1900	0.0210	L 0.0001
45	0.161	0.0053	L 0.0001	0.0001	L 0.0002	0.0006	0.1960	0.0214	L 0.0001

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	TOTAL NICKEL MG/L	TOTAL LEAD MG/L	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L	TOTAL ZINC MG/L	BERYLLIUM MG/L	LITHIUM MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L
1	L 0.0002	0.0031	0.0296	L 0.0001	0.0023	L 0.0500	0.0001	3.4	0.014
2	L 0.0002	L 0.0002	0.0193	L 0.0001	0.0008	L 0.0500	0.0002	2.9	0.081
3	L 0.0002	L 0.0002	0.0194	L 0.0001	0.0010	L 0.0500	L 0.0001	2.9	0.071
4	L 0.0002	L 0.0002	0.0195	L 0.0001	0.0012	L 0.0500	L 0.0001	2.8	0.072
5	L 0.0002	L 0.0002	0.0208	L 0.0001	0.0010	L 0.0500	0.0002	2.8	0.108
6	0.0003	0.0007	0.0163	0.0002	0.0020	L 0.0500	0.0004	3.1	0.112
7	L 0.0002	L 0.0002	0.0165	L 0.0001	0.0009	L 0.0500	0.0002	3.2	0.103
8	L 0.0002	0.0008	0.0238	0.0002	0.0008	L 0.0500	0.0007	3.2	0.128
9	L 0.0002	L 0.0002	0.0237	0.0002	0.0014	L 0.0500	0.0002	3.8	0.140
10	L 0.0002	L 0.0002	0.0193	L 0.0001	0.0010	L 0.0500	0.0003	3.8	0.063
11		L 0.0020			L 0.0100			3.3	0.060
12	0.0004	0.0005	0.0186	0.0002	0.0005	L 0.0500	0.0004	3.3	0.079
13	0.0004	0.0003	0.0143	L 0.0001	0.0004	L 0.0500	0.0003	2.8	0.066
14	0.0003	0.0011	0.0246	0.0003	0.0004	L 0.0500	0.0004	3.9	0.051
15	0.0004	L 0.0002	0.0188	0.0002	0.0003	L 0.0500	0.0004	3.0	0.085
16	0.0004	0.0004	0.0353	0.0005	0.0008	L 0.0500	0.0007	4.2	0.140
17	L 0.0002	0.0003	0.0351	0.0003	0.0008	L 0.0500	0.0005	4.1	0.140
18	0.0002	0.0003	0.0355	0.0004	0.0009	L 0.0500	0.0005	4.3	0.140
19	L 0.0002	0.0007	0.0211	0.0002	0.0022	0.05	0.0005	4.6	0.138
20	L 0.0002	L 0.0002	0.0177	0.0001	0.0016	L 0.0500	0.0005	3.5	0.106
21	L 0.0002	0.0004	0.0170	0.0002	0.0010	L 0.0500	0.0006	3.7	0.097
22	0.0004	0.0006	0.0164	0.0004	0.0011	L 0.0500	0.0005	3.6	0.097
23	0.0003	L 0.0002	0.0144	0.0002	0.0011	L 0.0500	0.0003	3.8	0.097
24	L 0.0002	L 0.0002	0.0185	L 0.0001	0.0014	L 0.0500	L 0.0001	3.6	0.160
25	0.0003	0.0007	0.0200	0.0003	0.0012	L 0.0500	0.0003	4.4	0.070
26	L 0.0002	L 0.0002	0.0152	0.0001	0.0005	L 0.0500	0.0003	4.2	0.070
27	0.0003	L 0.0002	0.0176	L 0.0001	0.0003	L 0.0500	0.0004	3.5	0.070
28	L 0.0002	L 0.0002	0.0270	0.0002	0.0003	L 0.0500	0.0004	5.8	0.050
29	L 0.0002	L 0.0002	0.0280	L 0.0001	0.0003	L 0.0500	0.0003	3.5	0.100
30	0.0002	0.0004	0.0286	0.0002	0.0005	L 0.0500	0.0005	3.7	0.100
31	0.0002	0.0005	0.0287	0.0002	0.0004	L 0.0500	0.0004	3.4	0.100
32	0.0003	0.0003	0.0167	0.0003	0.0006	L 0.0500	0.0003	3.6	0.110
33	0.0013	0.0009	0.0267	0.0014	0.0044	L 0.0500	0.0011	6.9	0.120
34	0.0002	0.0005	0.0192	0.0002	0.0008	L 0.0500	0.0004	4.0	0.130
35	L 0.0002	L 0.0002	0.0167	0.0002	0.0008	L 0.0500	0.0004	3.7	0.120
36	L 0.0002	L 0.0002	0.0223	L 0.0001	0.0009	L 0.0500	0.0003	4.4	0.170
37	0.0002	L 0.0002	0.0130	0.0002	0.0012	L 0.0500	0.0003	3.9	0.120
38	0.0005	L 0.0002	0.0185	0.0002	0.0012	L 0.0500	0.0002	4.2	0.190
39	0.0003	0.0004	0.0195	0.0003	0.0022	L 0.0500	0.0004	3.9	0.100
40	L 0.0002	L 0.0002	0.0191	0.0003	0.0006	L 0.0500	0.0004	3.3	0.110
41	L 0.0002	L 0.0002	0.0191	0.0001	0.0003	L 0.0500	0.0003	3.7	0.070
42	L 0.0002	0.0003	0.0389	0.0002	0.0004	L 0.0500	L 0.0001	5.8	0.160
43	0.0005	L 0.0002	0.0281	0.0004	0.0011	L 0.0500	0.0004	7.7	0.070
44	0.0003	L 0.0002	0.0281	0.0003	0.0011	L 0.0500	0.0004	7.4	0.070
45	0.0003	L 0.0002	0.0283	0.0003	0.0012	L 0.0500	0.0004	7.7	0.070

TABLE 11

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	TOTAL DISS NITRO MG/L	REACT SILICA MG/L	TOTAL ARSENIC MG/L	TOTAL SELENIUM MG/L
1	0.103			
2	0.150			
3	0.123			
4	0.138			
5	0.179			
6	0.195			
7	0.183			
8	0.196			
9	0.263			
10	0.176			
11		1.97		
12	0.179			
13	0.153	1.75		
14	0.161	1.81		
15	0.171	1.81		
16	0.274	1.94		
17	0.270	1.96		
18	0.266	1.96		
19	0.248	1.83		
20	0.197	2.03		
21	0.202	1.99		
22	0.190	2.73		
23	0.216	2.00		
24	0.231	1.98		
25	0.158	1.69		
26	0.173	1.76		
27	0.175	1.65		
28	0.225	1.76		
29	0.204	1.86		
30	0.210	1.85		
31	0.198	1.86		
32	0.237	1.83		
33	0.293	1.86		
34	0.245	2.00		
35	0.222	2.07		
36	0.299	2.12		
37	0.188	2.07		
38	0.274	2.06		
39	0.169	1.74		
40	0.159	1.70		
41	0.144	1.27		
42	0.238	1.85		
43	0.142	1.85		
44	0.144	1.83		
45	0.152	1.83		

TABLE 11

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS

AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
46	NF02YL0013	26-OCT-89	10.90	1.63	3.05	0.39	4.55	3.1	2.72	29.9
47	NF02YL0013	29-NOV-89	12.30	1.90	4.20	0.40	6.71	3.3	2.93	33.7
48	NF02YL0013	21-DEC-89	9.22	1.49	3.53	0.40	5.69	2.4	2.58	25.0
49	NF02YL0013	21-DEC-89	9.22	1.49	3.53	0.40	5.69	2.4	2.58	25.0
50	NF02YL0013	16-JAN-90	8.70	1.42	3.08	0.36	5.15	2.7	2.62	23.3
51	NF02YL0013	26-FEB-90	6.60	1.10	2.79	0.38		3.3		15.8
52	NF02YL0013	26-APR-90	13.60	2.16	4.58	0.41	7.71	3.9	3.14	37.5
53	NF02YL0013	22-MAY-90	11.70	1.87	3.15	0.36	4.86	2.5	2.52	32.9
54	NF02YL0013	26-JUN-90	10.10	1.59	3.13	0.40	4.91	3.4	2.39	26.5
55	NF02YL0013	24-JUL-90	14.20	2.08	3.90	0.47	5.46	2.4	3.14	39.0
56	NF02YL0013	27-AUG-90	12.40	1.97	3.20	0.39	4.64	3.8	2.52	34.2
57	NF02YL0013	24-SEP-90	14.30	2.14	3.28	0.38	4.60	3.4	2.38	38.9
58	NF02YL0013	22-OCT-90	13.90	2.15	3.39	0.38	5.16	2.1	2.83	40.4
59	NF02YL0013	22-OCT-90	13.90	2.17	3.43	0.40	5.16	2.1	2.90	39.5
60	NF02YL0013	22-OCT-90	14.00	2.16	3.28	0.38	5.07	2.1	2.87	40.8
61	NF02YL0013	26-NOV-90	18.90	2.93	4.64	0.39	7.29	3.6	3.32	51.9
62	NF02YL0013	26-NOV-90	19.00	2.93	4.64	0.38	7.38	4.2	3.44	51.8
63	NF02YL0013	26-NOV-90	19.00	2.93	4.67	0.37	7.38	4.2	3.45	54.1
64	NF02YL0013	02-JAN-91	9.90	1.58	2.89	0.42	4.46	2.9	2.56	26.5
65	NF02YL0013	29-JAN-91	6.36	1.01	2.47	0.35	3.83	2.4	2.28	15.9
66	NF02YL0013	28-FEB-91	9.66	1.57	3.21	0.37	5.28	3.2	2.72	26.7
67	NF02YL0013	29-MAR-91	7.85	1.23	4.76	0.41	8.00	3.5	2.67	18.4
68	NF02YL0013	30-APR-91	13.60	2.18	4.22	0.44	7.15	1.9	2.87	37.0
69	NF02YL0013	24-MAY-91	12.40	2.02	3.06	0.38	4.86	2.7	2.57	35.3
70	NF02YL0013	17-JUN-91	13.20	2.05	3.45	0.36	5.07	2.7	2.77	40.8
71	NF02YL0013	25-JUL-91	11.50	1.85	3.36	0.41	4.99	2.2	2.47	33.3

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL UNITS	FIELD TEMP CELSIUS	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	DISSOLVED MERCURY UG/L		TOTAL MERCURY UG/L	TOTAL PHOSPHORUS MG/L
46	7.45	84.5	0.28	20	7.3	7.7	81.0	12.0		L	0.0100	0.0037
47	7.92	100.0	1.20	20	1.6	7.7	98.0	13.9		L	0.0100	0.0069
48	6.75	78.6	0.30	30	0.1	7.6	79.0	14.5		L	0.0100	0.0032
49	6.75	78.6	0.30	30	0.1	7.6	79.0	14.5		L	0.0100	0.0032
50	7.38	72.2	0.34	40	0.0	7.5	74.0	14.4		L	0.0100	0.0042
51	6.64	58.8	0.34	30	0.0	7.4	58.0	14.2		L	0.0100	0.0033
52	7.71	109.0	0.19	40	4.4	7.7	109.0	12.9		L	0.0100	0.0052
53	7.65	89.8	0.25	30	3.8	7.5	91.0	12.8		L	0.0100	0.0048
54	7.32	79.7	0.38	30	12.8	7.7	78.0	10.4		L	0.0100	0.0037
55	6.97	107.0	0.53	30	15.8	7.3	104.1	9.1		L	0.0100	0.0118
56	7.80	93.9	0.57	30	16.0	7.7	91.3	9.1		L	0.0100	0.0028
57	6.79	102.0	1.70	50	13.7	7.9	97.5	9.9		L	0.0100	0.0028
58	6.74	106.0	0.45	30	8.5	7.7	104.9	10.9		L	0.0100	0.0095
59	6.77	106.0	0.35	40	8.5	7.7	104.9	10.9		L	0.0100	0.0496
60	6.77	107.0	0.40	40	8.5	7.7	104.9	10.9		L	0.0100	0.0072
61	6.85	141.0	0.80	30	1.2	7.7	141.6	13.6		L	0.0100	0.0034
62	6.95	142.0	0.85	40	1.2	7.7	141.6	13.6		L	0.0100	0.0033
63	6.74	142.0	0.80	30	1.2	7.7	141.6	13.6		L	0.0100	0.0034
64	7.41	77.9	0.52	30	0.0	7.4	105.5			L	0.0100	0.0028
65	7.23	55.3	0.30	40	0.0	7.1	48.6	14.6		L	0.0100	0.0090
66	7.49	78.3	0.43	40	0.0	7.1	71.6	13.0		L	0.0100	0.0049
67	7.39	75.6	0.32	30	1.4	7.3	75.5	13.9		L	0.0100	0.0039
68	7.69	107.0	0.56	30	2.8	7.6	108.1	13.1		L	0.0100	0.0029
69	7.85	95.9	0.33	30	3.3	7.6	97.0	12.8		L	0.0100	0.0034
70	7.73	102.5	0.38	40	8.4	7.5	100.4	11.6		L	0.0100	0.0073
71	7.30	91.1	0.40	20	15.6	7.7	88.0	16.0		L	0.0100	0.0029

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	TOTAL ALUMINUM MG/L	TOTAL BARIUM MG/L	TOTAL CADMIUM MG/L	TOTAL COBALT MG/L	TOTAL CHROMIUM MG/L	TOTAL COPPER MG/L	TOTAL IRON MG/L	TOTAL MANGANESE MG/L	TOTAL MOLYBDENUM MG/L
46	0.092	0.0039	L 0.0001	0.0001	L 0.0002	0.0002	0.0785	0.0120	L 0.0001
47	0.251	0.0050	L 0.0001	L 0.0001	0.0004	0.0006	0.2920	0.0201	L 0.0001
48	0.086	0.0036	L 0.0001	0.0001	L 0.0002	0.0003	0.0686	0.0094	L 0.0001
49	0.086	0.0036	L 0.0001	0.0001	L 0.0002	0.0003	0.0686	0.0094	L 0.0001
50	0.090	0.0035	L 0.0001	L 0.0001	L 0.0002	0.0003	0.0748	0.0088	L 0.0001
51	0.098	0.0033	L 0.0001	0.0001	0.0003	0.0005	0.0773	0.0063	L 0.0001
52	0.092	0.0040	L 0.0001	0.0001	L 0.0002	0.0003	0.0793	0.0115	L 0.0001
53	0.091	0.0042	L 0.0001	0.0001	0.0002	0.0006	0.0764	0.0068	L 0.0001
54	0.096	0.0038	L 0.0001	0.0002	L 0.0002	0.0003	0.0637	0.0073	L 0.0001
55	0.118	0.0056	L 0.0001	L 0.0001	L 0.0002	0.0008	0.1390	0.0192	L 0.0001
56	0.079	0.0044	L 0.0001	L 0.0001	L 0.0002	0.0004	0.0720	0.0104	L 0.0001
57	0.124	0.0046	L 0.0001	0.0001	L 0.0002	0.0007	0.1480	0.0112	L 0.0001
58	0.097	0.0055	L 0.0001	L 0.0001	0.0003	0.0005	0.0729	0.0069	L 0.0001
59	0.150	0.0056	L 0.0001	L 0.0001	L 0.0002	0.0006	0.0817	0.0069	L 0.0001
60	0.115	0.0058	L 0.0001	L 0.0001	0.0003	0.0006	0.0684	0.0068	L 0.0001
61	0.103	0.0045	L 0.0001	L 0.0001	0.0007	0.0004	0.1070	0.0110	L 0.0001
62	0.102	0.0044	L 0.0001	L 0.0001	0.0002	0.0006	0.1050	0.0106	L 0.0001
63	0.111	0.0044	L 0.0001	0.0001	L 0.0002	0.0008	0.1060	0.0104	L 0.0001
64	0.107	0.0035	L 0.0001	L 0.0001	0.0002	0.0007	0.0951	0.0095	L 0.0001
65	0.268	0.0037	L 0.0001	0.0002	0.0004	0.0006	0.3950	0.0146	L 0.0001
66	0.125	0.0033	L 0.0001	0.0001	0.0002	0.0006	0.1230	0.0070	L 0.0001
67	0.130	0.0038	L 0.0001	0.0001	0.0002	0.0007	0.1260	0.0097	0.0002
68	0.126	0.0042	L 0.0001	0.0001	0.0002	0.0007	0.1440	0.0108	L 0.0001
69	0.161	0.0041	L 0.0001	0.0002	0.0002	0.0003	0.1750	0.0117	L 0.0001
70	0.113	0.0042	L 0.0001	0.0001	L 0.0002	0.0003	0.1030	0.0103	L 0.0001
71	0.072	0.0045	L 0.0001	L 0.0001	L 0.0002	0.0003	0.0448	0.0054	L 0.0001

TABLE 11
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	TOTAL NICKEL MG/L	TOTAL LEAD MG/L	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L	TOTAL ZINC MG/L	BERYLLIUM MG/L	LITHIUM MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L
46	0.0004	L 0.0002	0.0183	L 0.0001	0.0008	L 0.0500	0.0002	4.5	0.120
47	0.0007	L 0.0002	0.0199	0.0005	0.0015	L 0.0500	0.0005	4.6	0.140
48	L 0.0002	0.0002	0.0166	0.0001	0.0008	L 0.0500	0.0002	3.7	0.120
49	L 0.0002	0.0002	0.0166	0.0001	0.0008	L 0.0500	0.0002	3.7	0.120
50	0.0002	0.0003	0.0161	0.0002	0.0007	L 0.0500	0.0004	3.6	0.130
51	0.0005	0.0004	0.0137	0.0003	0.0008	L 0.0500	0.0004	4.0	
52	0.0002	L 0.0002	0.0200	0.0001	0.0010	L 0.0500	0.0003	4.0	0.190
53	0.0003	0.0003	0.0184	0.0003	0.0009	L 0.0500	0.0004	3.8	0.110
54	L 0.0002	L 0.0002	0.0177	L 0.0001	0.0004	L 0.0500	0.0003	3.6	0.080
55	L 0.0002	L 0.0002	0.0259	0.0002	0.0013	L 0.0500	0.0004	3.9	0.070
56	L 0.0002	L 0.0002	0.0225	0.0002	0.0003	L 0.0500	0.0004	4.4	0.082
57	L 0.0002	0.0003	0.0271	0.0003	0.0006	L 0.0500	0.0005	7.3	0.120
58	L 0.0002	L 0.0002	0.0239	0.0002	0.0009	L 0.0500	0.0004	4.9	0.120
59	0.0003	L 0.0002	0.0237	0.0003	0.0008	L 0.0500	0.0004	4.7	0.120
60	0.0003	L 0.0002	0.0237	0.0002	0.0008	L 0.0500	0.0004	5.2	0.140
61	0.0003	L 0.0002	0.0269	0.0002	0.0009	L 0.0500	0.0005	4.9	0.220
62	0.0004	L 0.0002	0.0276	0.0002	0.0013	L 0.0500	0.0004	5.0	0.240
63	0.0003	L 0.0002	0.0262	0.0002	0.0009	L 0.0500	0.0004	5.2	0.270
64	0.0003	L 0.0002	0.0172	0.0002	0.0010	L 0.0500	0.0003	4.3	0.140
65	0.0005	0.0004	0.0128	0.0005	0.0019	L 0.0500	0.0006	4.1	0.100
66	0.0002	L 0.0002	0.0170	0.0002	0.0007	L 0.0500	0.0004	4.7	0.150
67	0.0003	L 0.0002	0.0165	0.0002	0.0013	L 0.0500	0.0004	4.7	0.110
68	L 0.0002	0.0003	0.0207	0.0003	0.0012	L 0.0500	0.0003	4.4	0.200
69	0.0004	L 0.0002	0.0193	0.0003	0.0011	L 0.0500	0.0004	4.0	0.110
70	L 0.0002	L 0.0002	0.0221	0.0002	0.0004	L 0.0500	0.0003	15.0	0.090
71	L 0.0002	L 0.0002	0.0211	0.0001	0.0004	L 0.0500	0.0003	2.9	0.100

TABLE 11

LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0013, CORNER BROOK DURING 1986 TO 1991

	TOTAL DISS NITRO MG/L	REACT SILICA MG/L		TOTAL ARSENIC MG/L		TOTAL SELENIUM MG/L
46	0.182	1.93				
47	0.237	2.08				
48	0.211	2.00				
49	0.211	2.00				
50	0.201	1.99				
51	0.235	2.09				
52	0.280	1.93	L	0.0001		0.0001
53	0.206	1.77	L	0.0001		0.0002
54	0.212	1.76	L	0.0001	L	0.0001
55	0.210	1.71	L	0.0001	L	0.0001
56	0.183	1.85	L	0.0001	L	0.0001
57	0.224	1.76		0.0001		0.0001
58	0.254	1.98		0.0001		0.0001
59	0.250	1.99	L	0.0001		0.0001
60	0.269	1.99		0.0001		0.0002
61	0.299	2.02		0.0002		0.0001
62	0.292	2.01		0.0001		0.0001
63	0.025	2.03		0.0001		0.0001
64	0.248	1.99	L	0.0001	L	0.0001
65	0.283	2.00		0.0002		0.0001
66	0.247	2.14		0.0001		0.0001
67	0.209	2.04		0.0002		0.0001
68	0.344	2.06		0.0001		0.0002
69	0.219	1.78	L	0.0001	L	0.0001
70	0.209	1.69		0.0001		0.0001
71	0.178	1.71	L	0.0001		0.0003

TABLE 12
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0029, WILD COVE BROOK DURING 1989 TO 1991

	STATION NUMBER	SAMPLE DATE	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L	DISSOLVED SULPHATE MG/L-IC	TOTAL ALKALINITY MG/L
1	NF02YL0029	12-JAN-89	34.2	12.1	16.30	2.56	28.8	9.50	9.50	126.0
2	NF02YL0029	08-FEB-89	39.6	15.1	18.90	3.51	27.3	9.20	9.45	159.0
3	NF02YL0029	13-MAR-89	40.0	15.5	20.90	3.98	31.7	9.40	9.65	161.0
4	NF02YL0029	10-APR-89	32.4	10.3	21.08	4.01	33.6	15.40	15.60	112.0
5	NF02YL0029	03-MAY-89	30.9	9.5	15.80	2.88	23.1	8.90	8.68	112.0
6	NF02YL0029	03-MAY-89	30.9	9.6	15.70	2.90	22.7	9.00	8.51	112.0
7	NF02YL0029	03-MAY-89	30.9	9.6	15.90	2.88	22.6	9.10	8.51	111.0
8	NF02YL0029	14-JUN-89	39.7	14.5	18.90	3.25	28.2	7.84	7.21	151.0
9	NF02YL0029	21-JUL-89	45.1	16.3	15.80	2.70	21.7	7.33	6.33	179.0
10	NF02YL0029	07-AUG-89	36.0	10.5	17.80	2.33	26.2	9.48	7.81	123.0
11	NF02YL0029	07-SEP-89	43.8	15.2	21.40	3.77	30.4	6.40	6.65	170.0
12	NF02YL0029	05-OCT-89	37.7	12.2	18.80	2.70	28.9	7.20	6.41	139.0
13	NF02YL0029	08-NOV-89	37.0	12.2	17.90	3.11	25.9	9.00	8.51	133.0
14	NF02YL0029	07-DEC-89	40.7	15.1	24.40	4.77	37.2	9.90	10.40	156.0
15	NF02YL0029	08-JAN-90	39.6	14.6	21.91	3.86	32.7	8.40	7.87	154.0
16	NF02YL0029	13-FEB-90	43.1	15.5	26.30	5.43		9.40	9.88	165.0
17	NF02YL0029	06-MAR-90	47.2	17.8	27.50	5.75	31.6	7.50	9.29	181.0
18	NF02YL0029	02-APR-90	45.3	16.1	31.20	5.40	53.4	11.20	10.10	146.0
19	NF02YL0029	02-MAY-90	29.4	9.1	17.50	4.13	25.3	6.80	5.87	101.0
20	NF02YL0029	02-MAY-90	29.2	9.1	17.50	4.15	25.7	6.70	5.85	99.2
21	NF02YL0029	02-MAY-90	29.3	9.2	17.50	4.18	25.5	6.50	5.82	102.0
22	NF02YL0029	05-JUN-90	38.2	13.3	21.40	4.59		4.00	6.49	137.0
23	NF02YL0029	17-JUL-90	45.2	16.8	28.40	5.50	44.6	3.40	5.82	168.0
24	NF02YL0029	15-AUG-90	49.6	17.5	30.20	6.21	45.9	2.30	5.00	189.0
25	NF02YL0029	18-SEP-90	34.0	11.1	18.00	3.61	26.8	6.60	5.37	116.0
26	NF02YL0029	23-OCT-90	45.4	15.0	24.60	5.48	35.5	8.50	9.62	160.0
27	NF02YL0029	28-NOV-90	40.5	13.5	21.60	6.09	29.6	11.30	8.80	144.0
28	NF02YL0029	07-JAN-91	43.5	15.6	28.60	8.61	43.4	7.30	8.76	160.0
29	NF02YL0029	29-JAN-91	45.2	17.4	32.90	7.96	50.8	6.40	9.36	166.0
30	NF02YL0029	28-FEB-91	40.1	14.9	23.60	5.51	37.0	6.60	7.85	163.0
31	NF02YL0029	28-MAR-91	43.1	15.4	38.80	7.55	64.8	8.30	11.00	140.0
32	NF02YL0029	20-APR-91	35.0	12.2	30.30	6.16	46.5	7.80	8.87	116.0
33	NF02YL0029	24-MAY-91	38.9	13.1	19.00	6.12	28.1	5.60	6.73	153.0
34	NF02YL0029	24-MAY-91	38.8	13.0	19.00	6.33	28.6	6.80	6.80	155.0
35	NF02YL0029	24-MAY-91	38.3	13.0	19.30	6.33	28.5	5.30	6.73	151.0
36	NF02YL0029	12-JUN-91	39.0	13.2	24.40	6.99	34.3	5.50	7.01	163.0
37	NF02YL0029	29-JUL-91	49.1	17.4	32.30	7.49	46.5	2.70	6.03	171.0

TABLE 12
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS AT SITE NF02YL0029, WILD COVE BROOK DURING 1989 TO 1991

	REACT SILICA MG/L	LAB PH	LAB CONDUCT. USIE/CM	TURBIDITY JT UNITS	APPARENT COLOUR REL. UNITS	TEMP. INSITU CEL.	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L
1	3.21	8.16	347.0	1.00	10	0.0	7.8	358	13.1	4.6	0.780
2	4.16	7.91	416.0	0.60	10	0.1	7.9	415	13.5	4.0	0.850
3	4.19	8.03	462.0	1.20	10	0.2	8.0	443	12.8	4.1	0.860
4	2.50	7.53	357.0	1.00	20	2.1	7.8	361	13.3	6.5	0.680
5	2.31	8.00	310.0	15.00	30	5.5	7.8	306	12.0	6.9	0.820
6	2.30	8.06	311.0	28.00	30	5.5	7.8	306	12.0	6.7	0.820
7	2.30	8.01	312.0	23.00	40	5.5	7.8	306	12.0	6.6	0.890
8	2.92	8.31	396.0	1.50	10	8.4	8.2	376	12.3	5.3	1.170
9	4.03	8.21	404.0	1.40	10	13.1	8.1	466	10.6	4.9	0.120
10	3.66	7.82	335.0	2.10	80	13.8	7.9	376	9.5	13.4	0.170
11	3.77	8.33	429.0	0.55	L 5.0000	11.1	8.3	411	12.4	5.9	0.710
12	3.46	8.16	367.0	1.10	30	6.8	8.1	345	12.7	7.6	0.510
13	3.11	8.06	372.0	0.86	20	5.4	8.1	345	12.4	6.8	0.940
14	3.69	8.03	448.0	0.55	10	1.6	8.0	458	12.9	7.1	1.090
15	4.07	7.93	422.0	0.25	30	0.0	7.8	438	11.9	6.1	1.150
16	3.62	7.06	468.0	1.20	40	0.1	7.4	476	9.6	12.0	0.450
17	4.64	7.55	503.0	0.65	20	0.1	7.5	504	8.7	7.0	0.680
18	4.17	7.41	524.0	0.30	20	0.0	7.6	535	7.4	8.3	3.450
19	2.12	7.31	313.0	2.20	50	6.5	7.1	312	6.8	7.1	1.100
20	2.30	7.27	313.0	1.80	60	6.5	7.1	312	6.8	7.3	0.940
21	2.32	7.22	312.0	2.00	50	6.5	7.1	312	6.8	7.4	0.860
22	2.73	6.32	392.0	0.76	40	10.2		399	1.2	6.0	1.480
23	3.60	7.93	485.0	0.80	30	14.0	8.2	457	7.8	3.0	1.400
24	4.98	8.08	519.0	2.30	40	15.3	7.9	507	5.5	8.8	0.987
25	3.94	7.48	333.0	4.20	100	12.4	8.6	330	8.6	13.9	0.740
26	3.87	7.16	452.0	1.80	60	7.6	7.2	447	4.9	9.5	0.350
27	2.31	7.03	420.0	3.10	60	3.1	6.8	421	6.3	8.6	1.760
28	4.38	7.06	505.0	1.20	30	0.2	7.2	428		7.4	3.810
29	5.30	6.99	567.0	0.55	30	0.0	7.1	474	4.6	6.8	5.500
30	4.45	7.14	478.0	1.50	40	0.0	6.8	405	2.1	8.0	0.010
31	4.31	7.10	544.0	0.48	20	1.1	7.1	495	3.2	8.3	0.010
32	3.82	6.93	436.0	3.50	50	3.3	7.1	413	5.5	9.0	3.370
33	3.12	7.09	397.0	4.90	50	4.0	6.8	414	4.0	8.1	L 0.0100
34	3.12	6.96	398.0	4.60	30	4.0	6.8	414	4.0	9.2	L 0.0100
35	3.12	6.95	398.0	5.30	50	4.0	6.8	414	4.0	8.9	L 0.0100
36	3.43	7.10	443.9	3.00	40	9.5	7.2	436	1.5	9.9	3.920
37	5.09	7.67	555.0	1.50	40	15.4	7.4	540		8.8	5.940

TABLE 12
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0029, WILD COVE BROOK DURING 1989 TO 1991

	TOTAL PHOSPORUS MG/L	DISSOLVED NITROGEN MG/L	TOTAL ALUMINUM MG/L	TOTAL BARIUM MG/L	BERYLLIUM UG/L	TOTAL CADMIUM MG/L	TOTAL COLBALT MG/L	TOTAL CHROMIUM MG/L	TOTAL COPPER MG/L	TOTAL IRON MG/L
1	0.0045	1.830	0.088	0.0115	L 0.0500	L 0.0001	0.0001	0.0002	0.0004	0.1210
2	0.0036	2.537	0.040	0.0148	L 0.0500	L 0.0001	0.0001	L 0.0002	L 0.0002	0.0676
3	0.0034	3.190	0.068	0.0149	L 0.0500	L 0.0001	L 0.0001	0.0003	0.0006	0.0959
4	0.0089	2.865	0.172	0.0113	L 0.0500	L 0.0001	0.0003	0.0004	0.0019	0.2680
5	0.0102	1.828	0.356	0.0117	L 0.0500	L 0.0001	0.0004	0.0009	0.0007	0.4530
6	0.0117	1.700	0.393	0.0119	L 0.0500	L 0.0001	0.0005	0.0009	0.0010	0.4930
7	0.0124	1.925	0.370	0.0116	L 0.0500	0.0001	0.0004	0.0009	0.0008	0.4720
8	0.0034	1.284	0.107	0.0135	L 0.0500	L 0.0001	0.0002	0.0004	0.0006	0.1390
9	0.0062	0.195	0.202	0.0143	L 0.0500	L 0.0001	0.0002	0.0003	0.0002	0.2690
10	0.0098	0.315	0.320	0.0131	L 0.0500	L 0.0001	0.0003	0.0008	0.0009	0.4170
11	0.0045	0.876	0.110	0.0147	L 0.0500	L 0.0001	0.0002	0.0002	0.0003	0.1530
12	0.0045	0.794	0.128	0.0121	L 0.0500	L 0.0001	0.0003	L 0.0002	0.0009	0.1980
13	0.0035	1.615	0.059	0.0121	L 0.0500	L 0.0001	0.0003	L 0.0002	0.0005	0.0913
14	0.0056	3.506	0.031	0.0165	L 0.0500	0.0001	0.0003	0.0003	0.0004	0.0651
15	0.0094	2.881	0.067	0.0153	L 0.0500	L 0.0001	0.0002	0.0003	0.0004	0.0985
16	0.0580	2.052	0.023	0.0196	L 0.0500	0.0001	0.0003	0.0005	0.0006	0.2490
17	0.0432	2.710	0.036	0.0209	L 0.0500	L 0.0001	0.0004	0.0003	0.0003	0.2470
18	0.0247	4.372	0.028	0.0198	L 0.0500	L 0.0001	0.0007	L 0.0002	0.0007	0.1750
19	0.1274	0.898	0.214	0.0143	L 0.0500	L 0.0001	0.0007	0.0005	0.0006	0.4010
20	0.1234	0.876	0.216	0.0147	L 0.0500	L 0.0001	0.0005	0.0004	0.0005	0.4020
21	0.1361	1.085	0.199	0.0144	L 0.0500	L 0.0001	0.0005	L 0.0002	0.0003	0.3690
22	0.1018	2.507	0.055	0.0168	L 0.0500	L 0.0001	0.0004	L 0.0002	0.0003	0.2690
23	0.0651	2.474	0.049	0.0190	L 0.0500	L 0.0001	0.0003	0.0004	0.0005	0.1680
24	0.0692	1.790	0.102	0.0228	L 0.0500	0.0001	0.0004	L 0.0002	0.0009	0.3220
25	0.0438	0.804	0.345	0.0161	L 0.0500	L 0.0001	0.0004	0.0008	0.0012	0.5860
26	0.0884	0.915	0.069	0.0245	L 0.0500	L 0.0001	0.0004	0.0004	0.0004	0.5610
27	0.2247	2.248	0.086	0.0287	L 0.0500	L 0.0001	0.0005	0.0013	0.0003	0.7220
28	0.4890	4.286	0.074	0.0277	L 0.0500	0.0001	0.0004	0.0004	0.0007	0.7040
29	0.2464	7.703	0.031	0.0296	L 0.0500	0.0001	0.0004	0.0004	L 0.0002	0.6580
30		4.390	0.047	0.0216	L 0.0500	L 0.0001	0.0003	0.0003	0.0002	0.6010
31	0.0592	4.861	0.098	0.0272	L 0.0500	0.0001	0.0004	0.0005	0.0006	0.5950
32	0.0618	0.460	0.130	0.0229	L 0.0500	0.0001	0.0003	0.0005	0.0006	0.4680
33	0.2337	2.790	0.084	0.0299	L 0.0500	0.0002	0.0004	0.0005	L 0.0002	0.7210
34	0.1955	2.500	0.094	0.0304	L 0.0500	0.0001	0.0004	0.0004	L 0.0002	0.7650
35	0.1975	2.490	0.104	0.0309	L 0.0500	0.0001	0.0004	0.0004	0.0002	0.7720
36	0.3837	5.140	0.219	0.0303	L 0.0500	0.0001	0.0004	0.0004	0.0004	0.6450
37	0.2103	6.520	0.170	0.0327	L 0.0500	0.0001	0.0003	0.0005	0.0004	0.3210

TABLE 12
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0029, WILD COVE BROOK DURING 1989 TO 1991

	LITHIUM MG/L	TOTAL MANGANESE MG/L	TOTAL MOLYBDENUM MG/L	TOTAL NICKEL MG/L	TOTAL LEAD MG/L	TOTAL STRONTIUM MG/L	TOTAL VANADIUM MG/L	TOTAL ZINC MG/L	TOTAL MERCURY UG/L
1	0.0018	0.0081	0.0002	L 0.0002	L 0.0002	0.0587	0.0004	0.0006	L 0.0100
2	0.0022	0.0091	0.0002	L 0.0002	L 0.0002	0.0758	L 0.0001	0.0004	L 0.0100
3	0.0026	0.0082	0.0003	L 0.0002	0.0002	0.0762	0.0004	0.0004	L 0.0100
4	0.0019	0.0186	0.0002	0.0006	0.0010	0.0495	0.0006	0.0021	0.01
5	0.0020	0.0134	0.0002	0.0009	L 0.0002	0.0512	0.0009	0.0022	L 0.0100
6	0.0022	0.0139	0.0004	0.0011	0.0007	0.0520	0.0012	0.0023	L 0.0100
7	0.0020	0.0137	0.0004	0.0011	0.0010	0.0514	0.0011	0.0039	L 0.0100
8	0.0025	0.0104	0.0006	0.0003	0.0005	0.0745	0.0005	0.0004	0.02
9	0.0024	0.0371	0.0004	L 0.0002	L 0.0002	0.0873	0.0004	0.0021	L 0.0100
10	0.0021	0.0182	0.0004	0.0007	L 0.0002	0.0648	0.0011	0.0012	L 0.0100
11	0.0028	0.0173	0.0002	L 0.0002	L 0.0002	0.0822	0.0004	0.0004	L 0.0100
12	0.0018	0.0123	0.0002	L 0.0002	L 0.0002	0.0670	0.0004	0.0005	0.01
13	0.0018	0.0088	0.0001	L 0.0002	L 0.0002	0.0616	0.0003	0.0005	L 0.0100
14	0.0027	0.0685	0.0003	0.0002	L 0.0002	0.0754	0.0003	0.0005	L 0.0100
15	0.0025	0.0733	0.0003	0.0004	0.0003	0.0744	0.0003	0.0006	L 0.0100
16	0.0031	0.3750	0.0003	0.0006	L 0.0002	0.0829	0.0004	0.0075	L 0.0100
17	0.0033	0.2820	0.0002	L 0.0002	L 0.0002	0.0928	0.0002	0.0037	L 0.0100
18	0.0030	0.2180	0.0002	0.0004	L 0.0002	0.0845	0.0002	0.0023	L 0.0100
19	0.0020	0.2720	L 0.0001	0.0010	L 0.0002	0.0507	0.0008	0.0053	L 0.0100
20	0.0019	0.2760	L 0.0001	0.0006	L 0.0002	0.0522	0.0006	0.0052	L 0.0100
21	0.0016	0.2710	L 0.0001	0.0005	L 0.0002	0.0515	0.0004	0.0049	L 0.0100
22	0.0023	0.2050	L 0.0001	L 0.0002	L 0.0002	0.0681	0.0002	0.0010	L 0.0100
23	0.0038	0.0631	0.0004	0.0002	L 0.0002	0.0949	0.0005	0.0005	L 0.0100
24	0.0046	0.1390	0.0004	L 0.0002	L 0.0002	0.1100	0.0005	0.0007	L 0.0100
25	0.0028	0.0742	0.0001	0.0007	0.0010	0.0716	0.0013	0.0020	L 0.0100
26	0.0043	0.6480	L 0.0001	0.0004	L 0.0002	0.0856	0.0003	0.0029	L 0.0100
27	0.0038	0.7820	L 0.0001	0.0008	L 0.0002	0.0716	0.0005	0.0211	L 0.0100
28	0.0056	0.4820	L 0.0001	0.0003	L 0.0002	0.0870	0.0003	0.0119	L 0.0100
29	0.0072	0.4230	0.0002	0.0003	L 0.0002	0.1040	0.0002	0.0061	L 0.0100
30	0.0045	0.4050	L 0.0001	0.0002	L 0.0002	0.0804	0.0002	0.0044	L 0.0100
31	0.0064	0.4560	0.0019	0.0005	L 0.0002	0.0913	0.0004	0.0097	L 0.0100
32	0.0047	0.3290	0.0002	0.0007	L 0.0002	0.0737	0.0005	0.0090	L 0.0100
33	0.0035	0.6170	0.0002	0.0007	L 0.0002	0.0699	0.0003	0.0193	0.01
34	0.0035	0.6250	0.0001	0.0006	L 0.0002	0.0709	0.0002	0.0196	L 0.0100
35	0.0035	0.6290	L 0.0001	0.0007	L 0.0002	0.0721	0.0003	0.0199	L 0.0100
36	0.0049	0.3060	0.0002	0.0007	L 0.0002	0.0865	0.0007	0.0073	L 0.0100
37	0.0067	0.0774	0.0004	0.0006	L 0.0002	0.1130	0.0009	0.0029	L 0.0100

TABLE 12
LONGTERM SURFACE WATER PHYSICAL AND CHEMICAL ANALYSIS
AT SITE NF02YL0029, WILD COVE BROOK DURING 1989 TO 1991

		TOTAL ARSENIC MG/L		TOTAL SELENIUM MG/L
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18	L	0.0001	L	0.0001
19		0.0001	L	0.0001
20	L	0.0001	L	0.0001
21		0.0001	L	0.0001
22		0.0002	L	0.0001
23		0.0002		0.0001
24		0.0002	L	0.0001
25		0.0002		0.0001
26		0.0002		0.0002
27		0.0002		0.0002
28		0.0001		0.0001
29		0.0001		0.0001
30		0.0001		0.0001
31		0.0003		0.0001
32		0.0002		0.0002
33		0.0001		0.0001
34		0.0001		0.0001
35		0.0003		0.0001
36		0.0002		0.0002
37		0.0002		0.0004

TABLE 13
HUMBER RIVER BASIN RECURRENT SURVEY 1991
EXTRACTABLE METAL CONCENTRATIONS IN FORAGE FISH
MG/KG FROM SITE NF02YL0038, WILDCOVE BROOK

STATION NUMBER	SAMPLE DATE	EXTRACT ARSENIC MG/KG	TOTAL SELENIUM MG/KG	EXTRACT MERCURY MG/KG	EXTRACT CADMIUM MG/KG	EXTRACT CHROMIUM MG/KG	EXTRACT COPPER MG/KG	EXTRACT NICKEL MG/KG	EXTRACT LEAD MG/KG	EXTRACT ZINC MG/KG
1 NF02YL0038	11-SEP-91	0.19	0.23	0.04	L 0.0200	L 0.2000	0.99	0.1	L 0.1000	35.4

TABLE 14
HUMBER RIVER BASIN RECURRENT SURVEY 1991
QUALITY CONTROL SEQUENTIAL TRIPLICATE SURFACE
WATER ANALYSIS OF CHEMICAL AND PHYSICAL VARIABLES

STATION NUMBER	SAMPLE DATE	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	TOTAL ALKALINITY MG/L	APPARENT COLOUR REL UNITS	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L	DISSOLVED POTASSIUM MG/L	DISSOLVED SODIUM MG/L
1 NF02YL0041	11-SEP-91	7.5	70	0.4	23.8	35	8.5	1.30	0.38	3.6
2 NF02YL0041	11-SEP-91	7.4	68	0.4	22.9	25	8.6	1.30	0.40	3.6
3 NF02YL0041	11-SEP-91	7.5	67	0.4	23.0	25	8.6	1.30	0.42	3.6
4										
5 NF02YL0051	13-SEP-91	8.3	235	0.2	118.3	15	32.0	11.00	0.29	3.6
6 NF02YL0051	13-SEP-91	8.4	235	0.2	118.9	15	32.0	11.00	0.25	3.6
7 NF02YL0051	13-SEP-91	8.3	235	0.2	118.6	15	32.0	11.00	0.30	3.6
8										
9 NF02YL0061	14-SEP-91	7.2	37	0.3	11.0	30	3.6	0.78	0.22	2.2
10 NF02YL0061	14-SEP-91	7.1	36	0.3	10.5	25	3.7	0.80	0.23	2.3
11 NF02YL0061	14-SEP-91	7.2	36	0.3	10.5	25	3.7	0.80	0.29	2.3

STATION NUMBER	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L IC	TOTAL PHOSPHORUS MG/L	EXTRACT COPPER MG/L	EXTRACT ZINC MG/L	EXTRACT CADMIUM MG/L	EXTRACT LEAD MG/L	EXTRACT ALUMINUM MG/L
1 NF02YL0041	4.8	2.7	0.001	L 0.0020	L 0.0100	L 0.0010	0.002	0.069
2 NF02YL0041	5.6	2.5	0.001	L 0.0020	L 0.0100	L 0.0010	0.002	0.076
3 NF02YL0041	4.7	2.7	0.003	L 0.0020	L 0.0100	L 0.0010	0.002	0.075
4								
5 NF02YL0051	5.3	4.7	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.013
6 NF02YL0051	4.5	4.5	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.012
7 NF02YL0051	5.1	4.0	0.001	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.010
8								
9 NF02YL0061	2.8	1.9	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.055
10 NF02YL0061	2.8	2.2	0.002	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.058
11 NF02YL0061	3.0	1.8	0.003	L 0.0020	L 0.0100	L 0.0010	L 0.0020	0.058

TABLE 14
HUMBER RIVER BASIN RECURRENT SURVEY 1991
QUALITY CONTROL SEQUENTIAL TRIPLICATE SURFACE
WATER ANALYSIS OF CHEMICAL AND PHYSICAL VARIABLES

STATION NUMBER	TOTAL ARSENIC MG/L	EXTRACT IRON MG/L	EXTRACT MANGANESE MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L	TOTAL NITROGEN MG/L	SILICA REACT. MG/L	EXTRACT MERCURY UG/L	FIELD TEMPERATURE CELSIUS
1 NF02YL0041	L 0.0005	0.070	0.01	3.8	0.15	0.21	1.9	L 0.0200	12.3
2 NF02YL0041	L 0.0005	0.070	L 0.0100	3.7	0.08	0.20	2.0	L 0.0200	12.3
3 NF02YL0041	L 0.0005	0.080	0.01	3.8	0.10	0.21	1.9	L 0.0200	12.3
4									
5 NF02YL0051	L 0.0005	0.013	L 0.0100	3.3	0.08	0.15	2.2	L 0.0200	9.7
6 NF02YL0051	L 0.0005	0.013	0.01	3.3	0.08	0.15	2.2	L 0.0200	9.7
7 NF02YL0051	L 0.0005	0.014	L 0.0100	3.2	0.08	0.14	2.2	L 0.0200	9.7
8									
9 NF02YL0061	L 0.0005	0.060	0.01	4.1	0.06	0.18	2.5	L 0.0200	12.6
10 NF02YL0061	L 0.0005	0.100	0.01	3.9	0.09	0.20	2.5	L 0.0200	12.6
11 NF02YL0061	L 0.0005	0.060	0.01	4.2	0.07	0.20	2.5	L 0.0200	12.6

STATION NUMBER	FIELD PH	FIELD CONDUCT USIE/CM	DISSOLVED OXYGEN MG/L
1 NF02YL0041	7.6	67.9	10.6
2 NF02YL0041	7.6	68.9	10.6
3 NF02YL0041	7.6	67.0	10.6
4			
5 NF02YL0051	8.2	235.0	11.2
6 NF02YL0051	8.2	241.0	11.2
7 NF02YL0051	8.2	241.0	11.2
8			
9 NF02YL0061	7.0	32.8	9.9
10 NF02YL0061	7.0	32.8	9.9
11 NF02YL0061	7.0	32.8	9.9

TABLE 15
HUMBER RIVER BASIN RECURRENT SURVEY 1991
QUALITY CONTROL SPIKES AND BLANKS FOR SURFACE WATER
CHEMISTRY

F-FIELD L-LAD	STATION NUMBER	SAMPLE DATE	LAB PH	LAB CONDUCT USIE/CM	TURBIDITY JT UNITS	TOTAL ALKALINITY MG/L	APPARENT COLOUR REL UNITS	DISSOLVED CALCIUM MG/L	DISSOLVED MAGNESIUM MG/L
1 F BLANK	NF02YL0038	06-SEP-91	5.6	1	0.1	0.3	L 5.0000	L 0.1000	L 0.1000
2 L BLANK	NF02YL0038	06-SEP-91		1	0.1	1.5	L 5.0000	L 0.1000	L 0.1000
3 F SPIKE	NF02YL0038	06-SEP-91	4.3	55	0.1	-2.4	L 5.0000	0.74	1
4 L SPIKE	NF02YL0038	06-SEP-91	4.3	55	0.1	-2.9	L 5.0000	0.74	1

F-FIELD L-LAD	DISSOLVED POTASSIUM MG/L	DISSOLVED SODIUM MG/L	DISSOLVED CHLORIDE MG/L	DISSOLVED SULPHATE MG/L IC	EXTRACT COPPER MG/L	EXTRACT ZINC MG/L	EXTRACT CADMIUM MG/L	EXTRACT LEAD MG/L
1 F BLANK	L 0.1000	L 0.1000	0.8	0.5	L 0.0020	L 0.0100	L 0.0010	L 0.0020
2 L BLANK	L 0.1000	L 0.1000	L 0.5000	L 0.5000	L 0.0020	L 0.0100	L 0.0010	L 0.0020
3 F SPIKE	1.1	1.3	8.6	4.8	0.006	0.03	0.0045	0.005
4 L SPIKE	1.1	1.3	9.4	5.1	0.006	0.03	0.0045	0.006

F-FIELD L-LAD	EXTRACT ALUMINUM MG/L	TOTAL ARSENIC MG/L	EXTRACT IRON MG/L	EXTRACT MANGANESE MG/L	DISS ORG CARBON MG/L	DISSOLVED NO3/NO2 MG/L	TOTAL NITROGEN MG/L	SILICA REACT. MG/L
1 F BLANK	L 0.0100	L 0.0005	L 0.0020	L 0.0100	L 0.5000	0.03	L 0.0300	L 0.1000
2 L BLANK	L 0.0100	L 0.0005	0.003	L 0.0100	L 0.5000	L 0.0100	L 0.0300	L 0.1000
3 F SPIKE	0.020	L 0.0005	0.005	0.03	L 0.5000	0.10	0.15	0.19
4 L SPIKE	0.024	L 0.0005	0.006	0.02	L 0.5000	0.06	0.10	0.17

F-FIELD L-LAD	EXTRACT MERCURY UG/L
1 F BLANK	L 0.0200
2 L BLANK	L 0.0200
3 F SPIKE	0.10
4 L SPIKE	0.06

TABLE 16
HUMBER RIVER BASIN RECURRENT SURVEY 1991
QUALITY CONTROL SPIKES AND BLANKS FOR TRACE ORGANIC
COMPOUNDS IN SURFACE WATER

F-FIELD	STATION NUMBER	SAMPLE DATE		HEXACHLORO BENZENE NG/L		ALPHA BHC NG/L		GAMMA BHC NG/L		HEPTACHLOR NG/L		ALDRIN NG/L		HEPTACHLOR EPOXIDE NG/L
1 F SAMPLE	NF02YL0050	13-SEP-91	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
2 F SAMPLE	NF02YL0050	13-SEP-91	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
3 F SAMPLE	NF02YL0050	13-SEP-91	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
4 BLANK	NF02YL0050	13-SEP-91	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
5 F SPIKE	NF02YL0050	13-SEP-91		25.3		7.4		7.4		1.9		8.6		6.4

F-FIELD		GAMMA CHLORDANE NG/L		ALPHA CHLORDANE NG/L		ALPHA ENDOSULFAN NG/L		P,P DDE NG/L		HEOD DIELDRIN NG/L		ENDRIN NG/L		O,P DDT NG/L		P,P TDE NG/L
1 F SAMPLE	L	0.4000	L	0.4000	L	0.4000		1.1	L	0.4000	L	0.4000	L	0.4000	L	0.4000
2 F SAMPLE	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
3 F SAMPLE	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
4 BLANK	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	0.4000
5 F SPIKE		4.3		4.3		1.7		7.7		6.8		15.8		15.9		16.5

F-FIELD		P,P DDT NG/L		BETA ENDOSULFAN NG/L		MIREX NG/L		P,P-METH OXY-CHLOR NG/L		POLYCHLORI NATED BIPHENYLS NG/L		INDENE NG/L		1234 TETRA HYDRONAPHTHALENE NG/L
1 F SAMPLE	L	0.4000	L	0.4000	L	0.4000	L	0.4000		97.6	L	10.0000	L	10.0000
2 F SAMPLE	L	0.4000	L	0.4000	L	0.4000	L	0.4000		14.0	L	10.0000	L	10.0000
3 F SAMPLE	L	0.4000	L	0.4000	L	0.4000	L	0.4000	L	9.0000	L	10.0000	L	10.0000
4 BLANK	L	0.4000	L	0.4000	L	0.4000	L	0.4000		21.1	L	10.0000	L	10.0000
5 F SPIKE		23.1		1.1		14.6		38.1	L	9.0000	L	10.0000	L	10.0000

F-FIELD		2 METHYLNAPH TALENE NG/L		1 METHYLNAPH TALENE NG/L		B CHLORONAPH TALENE NG/L		ACENAPH THYLENE NG/L		ACENAPH THENE NG/L		FLUORENE NG/L		PHENAN THRENE NG/L		PYRENE NG/L
1 F SAMPLE	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	15.0000	L	15.0000	L	15.0000
2 F SAMPLE	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	15.0000	L	15.0000	L	15.0000
3 F SAMPLE	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	15.0000	L	15.0000	L	15.0000
4 BLANK	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	10.0000	L	15.0000	L	15.0000	L	15.0000
5 F SPIKE	L	10.0000	L	10.0000	L	10.0000	L	10.0000		23	L	15.0000		15.9	L	15.0000

TABLE 16
HUMBER RIVER BASIN RECURRENT SURVEY 1991
QUALITY CONTROL SPIKES AND BLANKS FOR TRACE ORGANIC
COMPOUNDS IN SURFACE WATER

F-FIELD		FLUOR ANTHRENE NG/L		BENZO(B)FLUOR ANTHENE NG/L		BENZO(K)FLUOR ANTHENE NG/L		BENZO(A)FLUOR ANTHENE NG/L		INDENO(123-CD)PYRENE NG/L		BENZO(GHI) PERYLENE NG/L
1 F SAMPLE		21.3	L	30.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000
2 F SAMPLE	L	15.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000
3 F SAMPLE	L	15.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000
4 BLANK	L	15.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000
5 F SPIKE	L	15.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000	L	30.0000

TABLE 17

HUMBER RIVER BASIN RECURRENT SURVEY 1991

QUALITY CONTROL PERCENT RECOVERIES FOR ANALYSIS OF TRACE ORGANIC COMPOUNDS IN SURFACE WATER FROM TABLE 16"

COMPOUND	NF02YL0050 SPIKED FIELD SAMPLE
1 HEPTACHLOR	15.2
2 ALPHA BHC	59.2
3 GAMMA BHC	59.2
4 ALDRIN	68.8
5 HEPTACHLOR EPOXIDE	51.2
6 ALPHA CHLORDANE	34.4
7 GAMMA CHLORDANE	34.4
8 ALPHA ENDOSULFAN	13.6
9 p,p'DDE	61.6
10 DIELDRIN	54.4
11 ENDRIN	126.4
12 o,p'DDT	127.2
13 p,p'TDE (p,p'DDD)	66
14 p,p'DDT	61.6
15 BETA-ENDOSULFAN	4.4
16 MIREX	38.9
17 METHOXYCHLOR	76.2
18 ACENAPHTHLENE	46
19 PHENANTHRENE	42.4
20 FLUORANTHENE	BDL
21 PYRENE	BDL
22 BENZO(B)FLUORANTHENE	BDL
23 BENZO(K)FLORANTHENE	BDL
24 BENZO(A)PYRENE	DBDL
25 BENZO(g,h,i)PERYLENE	80
26 INDENO(1,2,3-c,d)PYRENE	80
27 HEXACHLOROBENZENE	67.4

BDL = SPIKED BELOW DETECTION LIMIT

TABLE 18

Spiking Solution: Humber River Basin Survey 1991

	Concentration ng/uL
Heptachlor	0.5
α-BHC	0.5
Lindane (γ-BHC)	0.5
Aldrin	0.5
Heptachloroepoxide	0.5
α-chlordane	0.5
γ-chlordane	0.5
α-endosulfan	0.5
p,p'-DDE	0.5
Dieldrin	0.5
Endrin	1.0
o,p'-DDT	1.0
p,p'-TDE (p,p'-DDD)	1.0
p,p'-DDT	1.5
β-Endosulfan	1.0
Mirex	1.5
Methoxychlor	2.0
Acenaphthene	2.0
Phenanthrene	1.5
Fluoranthene	0.5
Pyrene	1.0
Benzo(b)fluoranthene	0.3
Benzo(k)	0.2
Benzo(a)pyrene	0.25
Benzo(g,h,i)perylene	1.5
Indeno(1,2,3,cd)pyrene	1.5
Hexachlorobenzene	1.5

FIGURE 1
THE TEMPORAL RELATIONSHIP OF SPECIFIC CONDUCTANCE AND SELECT MAJOR IONS AT LITTLE FALLS, HUMBER RIVER (NF02YL0011) DURING 1986 TO 1991

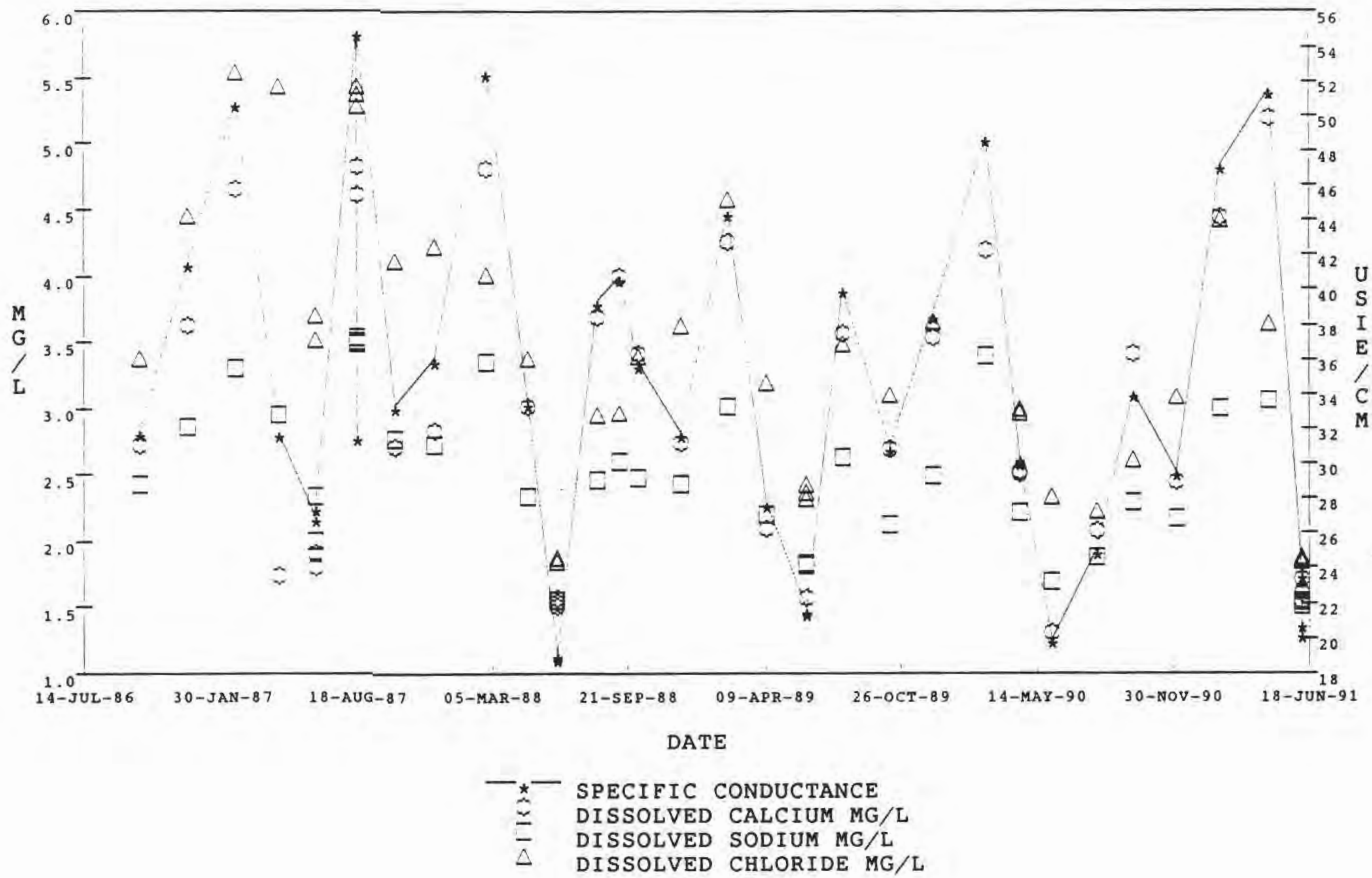


FIGURE 2
THE TEMPORAL RELATIONSHIP OF PH, ALKALINITY, AND MAJOR HYDROGEN DONATING COMPOUNDS AT LITTLE FALLS, UPPER HUMBER RIVER (NF02YL0011) DURING 1986 TO 1991

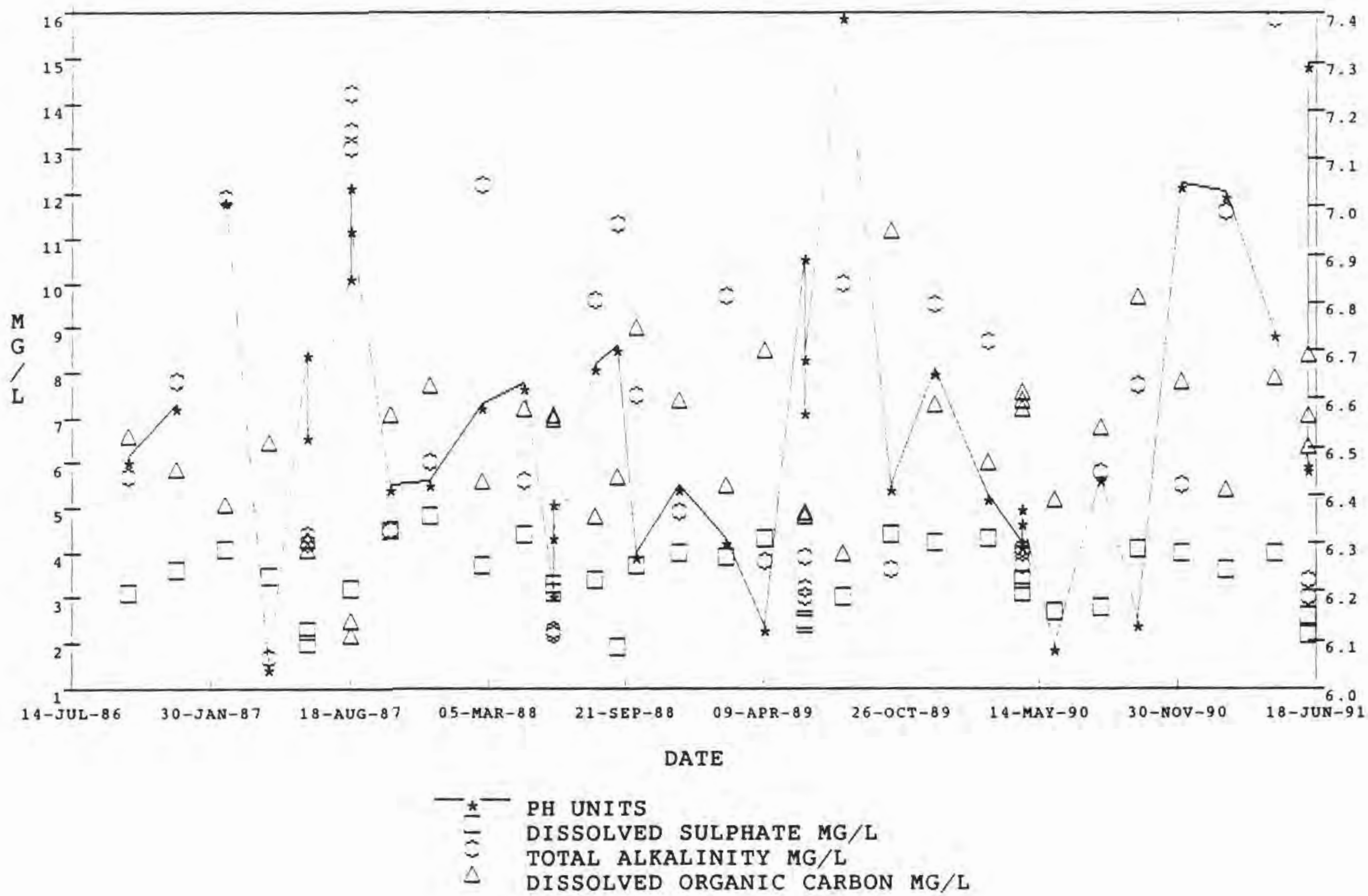


FIGURE 3
THE TEMPORAL PATTERN OF PHOSPHORUS AND NITROGEN AT LITTLE FALLS, UPPER HUMBER RIVER (NF02YL0011) DURING 1986 TO 1991

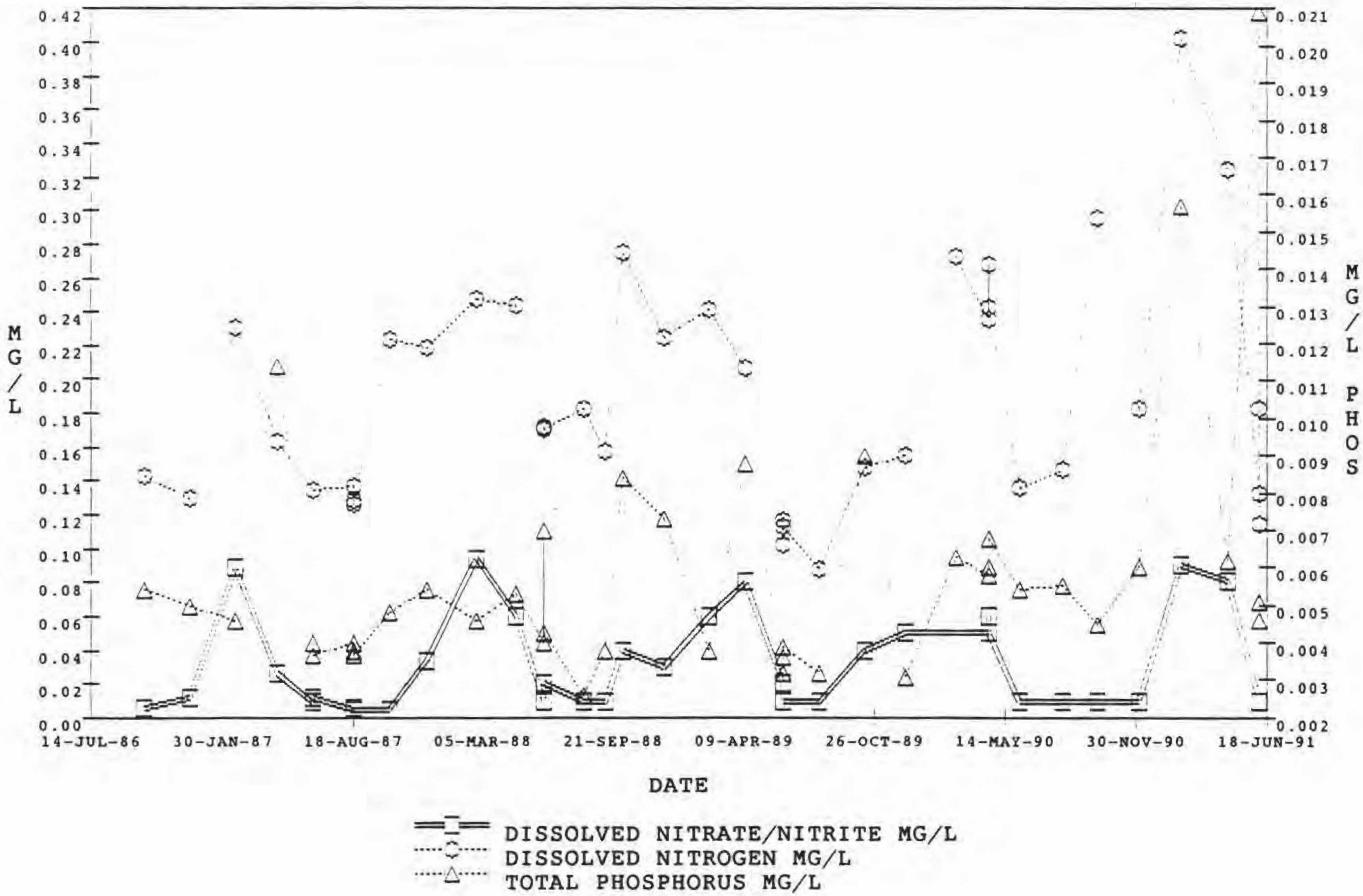


FIGURE 4
DISCHARGE CMS (CUBIC METRE PER SECOND) AT REIDVILLE, UPPER HUMBER RIVER (NFO2YLOO1) BETWEEN 1986 TO 1991

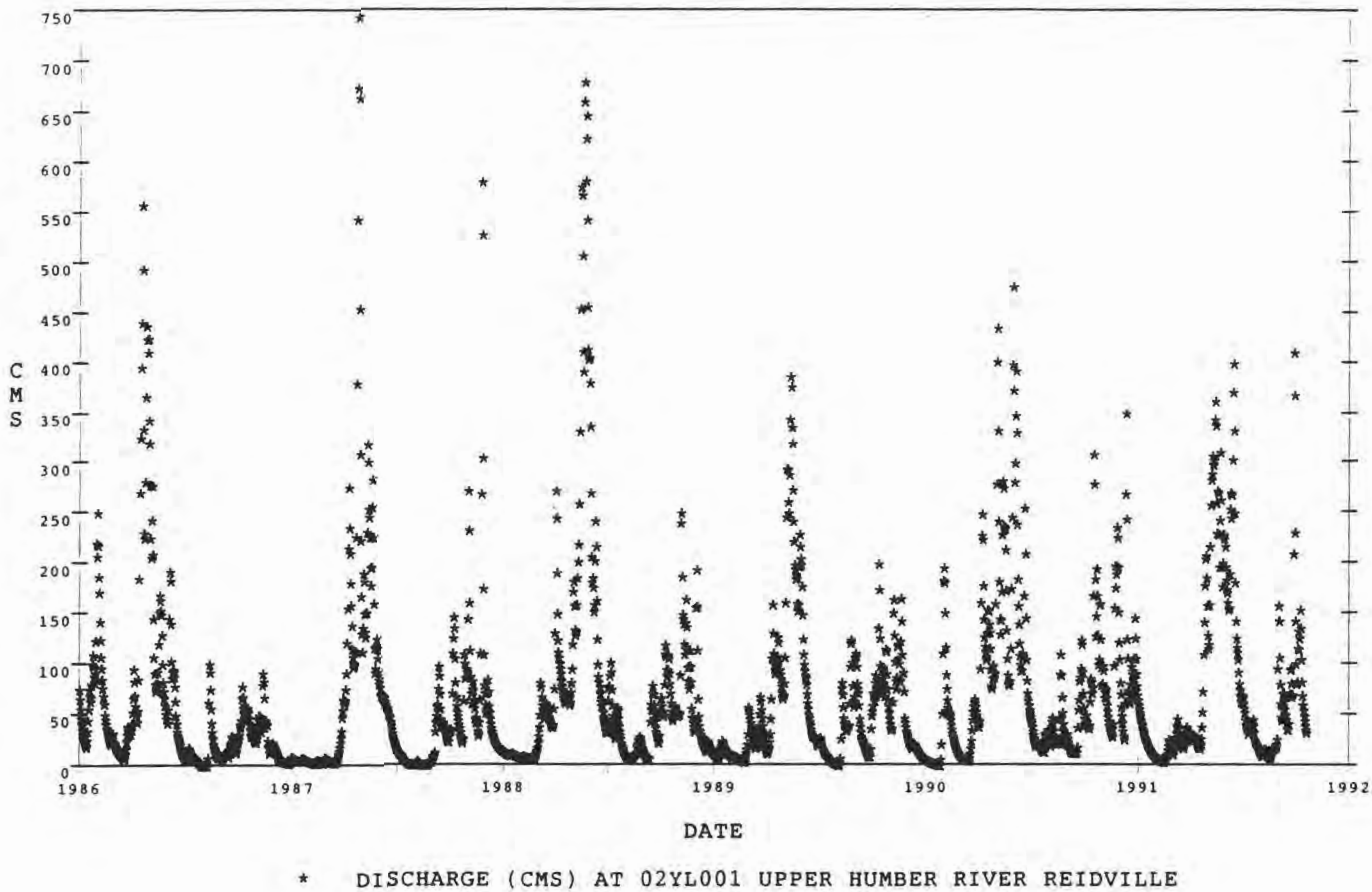


FIGURE 5

THE TEMPORAL RELATIONSHIP OF PH, ALKALINITY, AND MAJOR HYDROGEN DONATING COMPOUNDS AT HUMBER CANAL, GRAND LAKE (NF02YK0022) DURING 1989 TO 1991

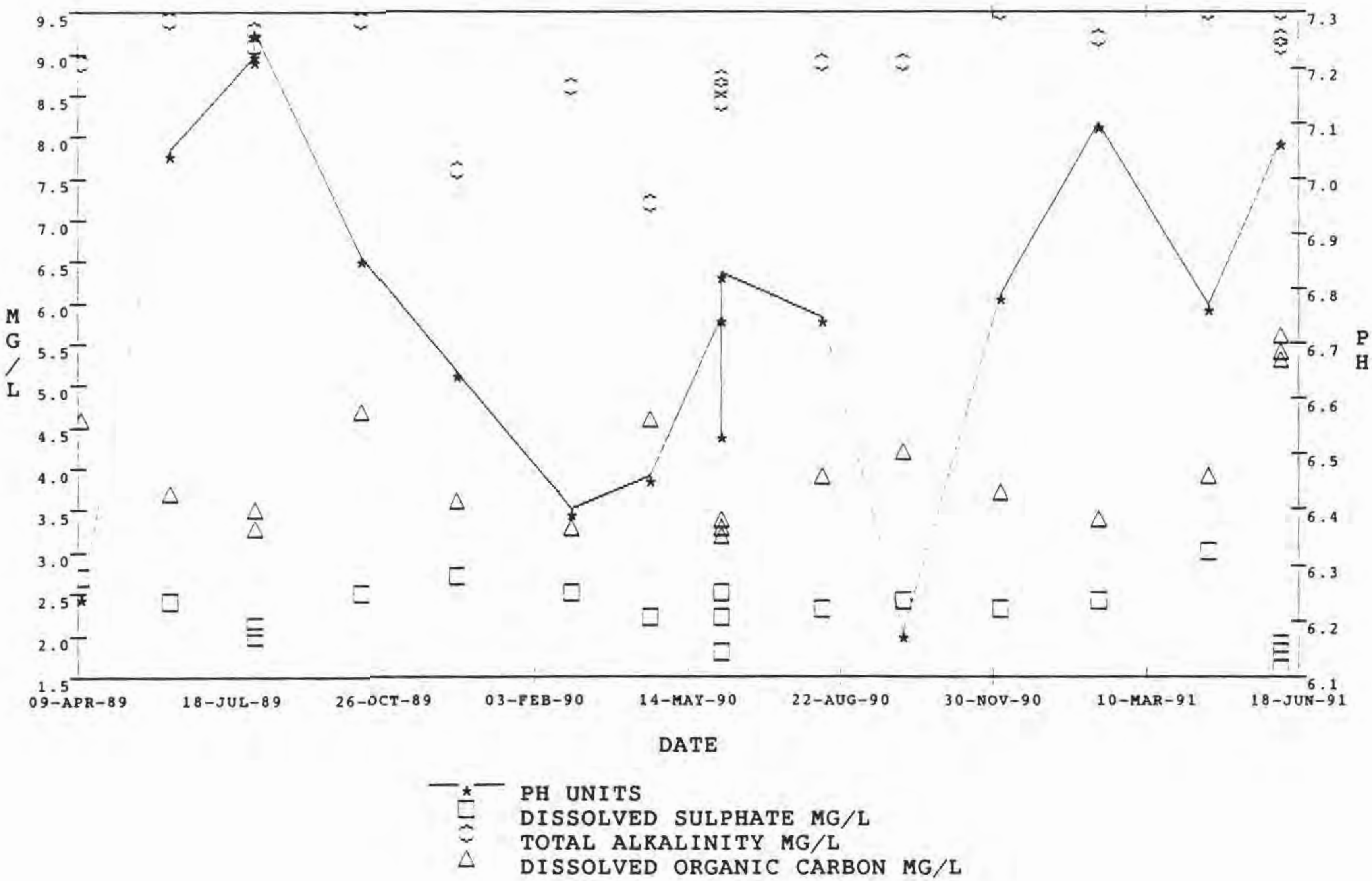


FIGURE 6
THE TEMPORAL RELATIONSHIP OF SPECIFIC CONDUCTANCE
AND SELECT MAJOR IONS AT HUMBER CANAL, GRAND LAKE (NF02YK0022)
DURING 1989 TO 1991

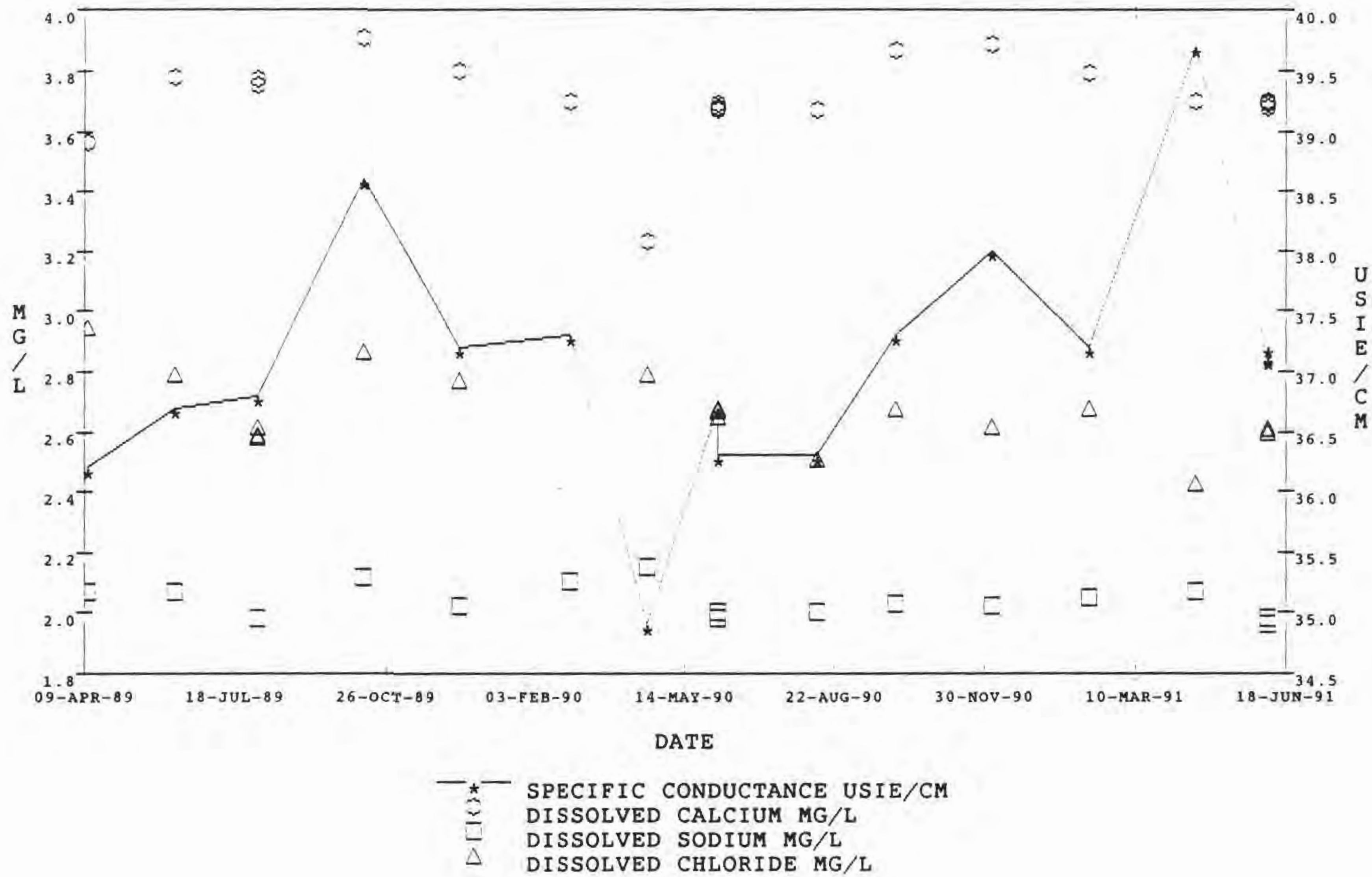
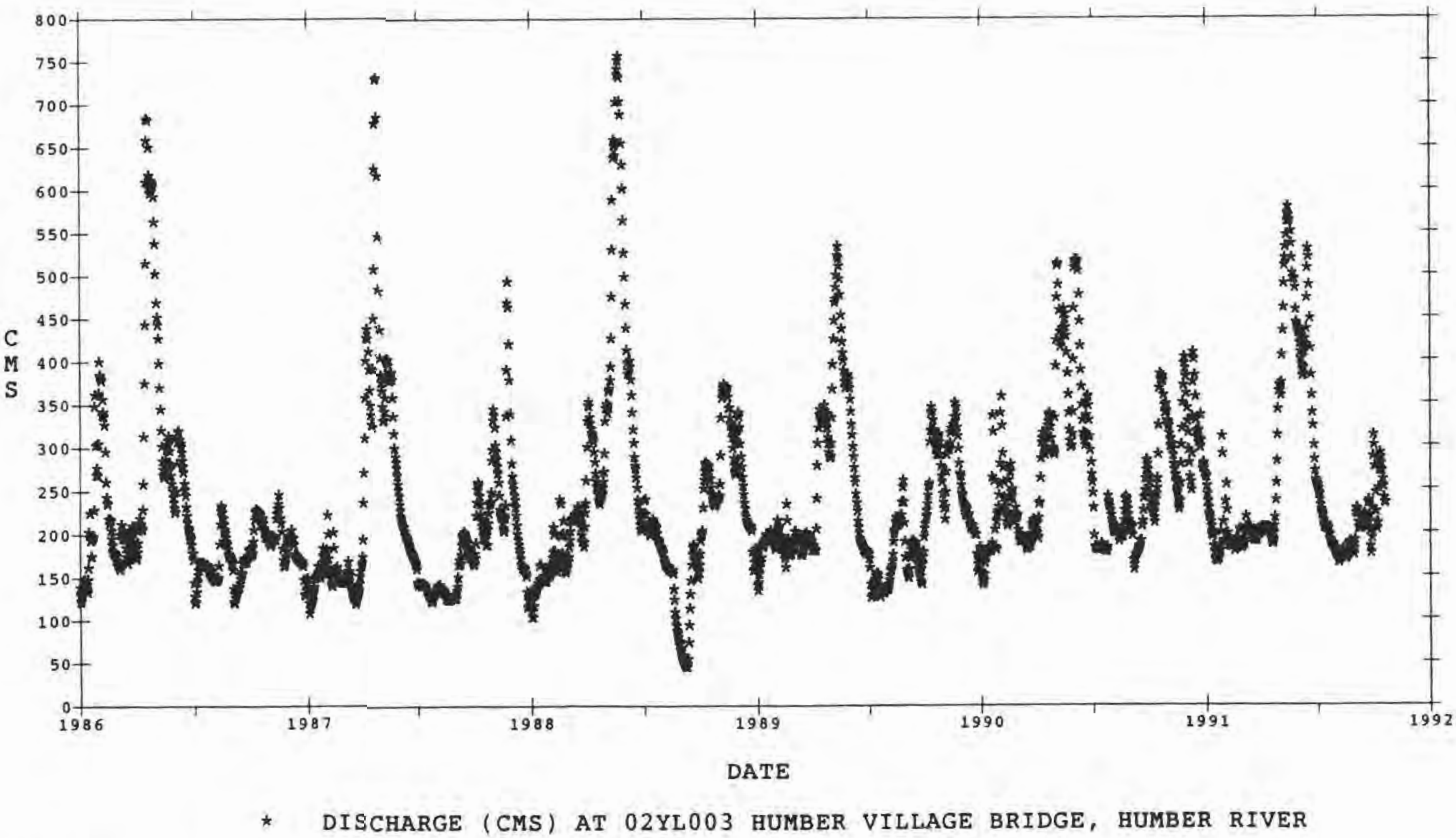


FIGURE 7
DISCHARGE CMS (CUBIC METRES PER SECOND) AT HUMBER VILLAGE
HUMBER RIVER (NF02YL003) BETWEEN 1986 TO 1991



SEPT. 1988 LOW DISCHARGE DUE TO GRAND LAKE SHUTDOWN

FIGURE 8
THE TEMPORAL RELATIONSHIP OF SPECIFIC CONDUCTANCE
AND SELECT MAJOR IONS AT HUMBER VILLAGE BRIDGE, HUMBER RIVER
(NF02YL0012) DURING 1986 TO 1991

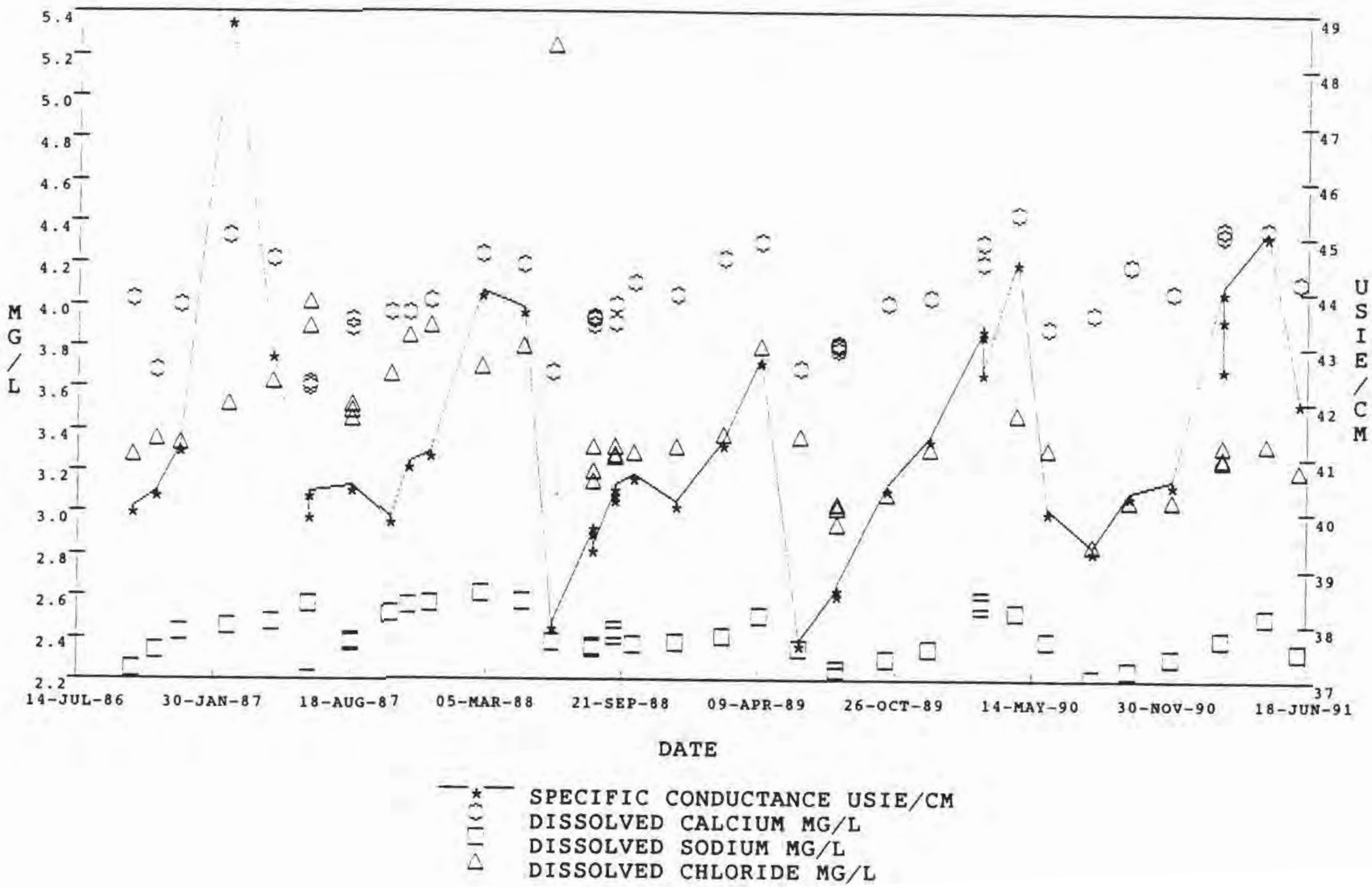


FIGURE 9
THE TEMPORAL RELATIONSHIP OF PH, ALKALINITY, AND MAJOR HYDROGEN DONATING COMPOUNDS AT HUMBER VILLAGE BRIDGE, HUMBER RIVER (NF02YL0012) DURING 1986 TO 1991

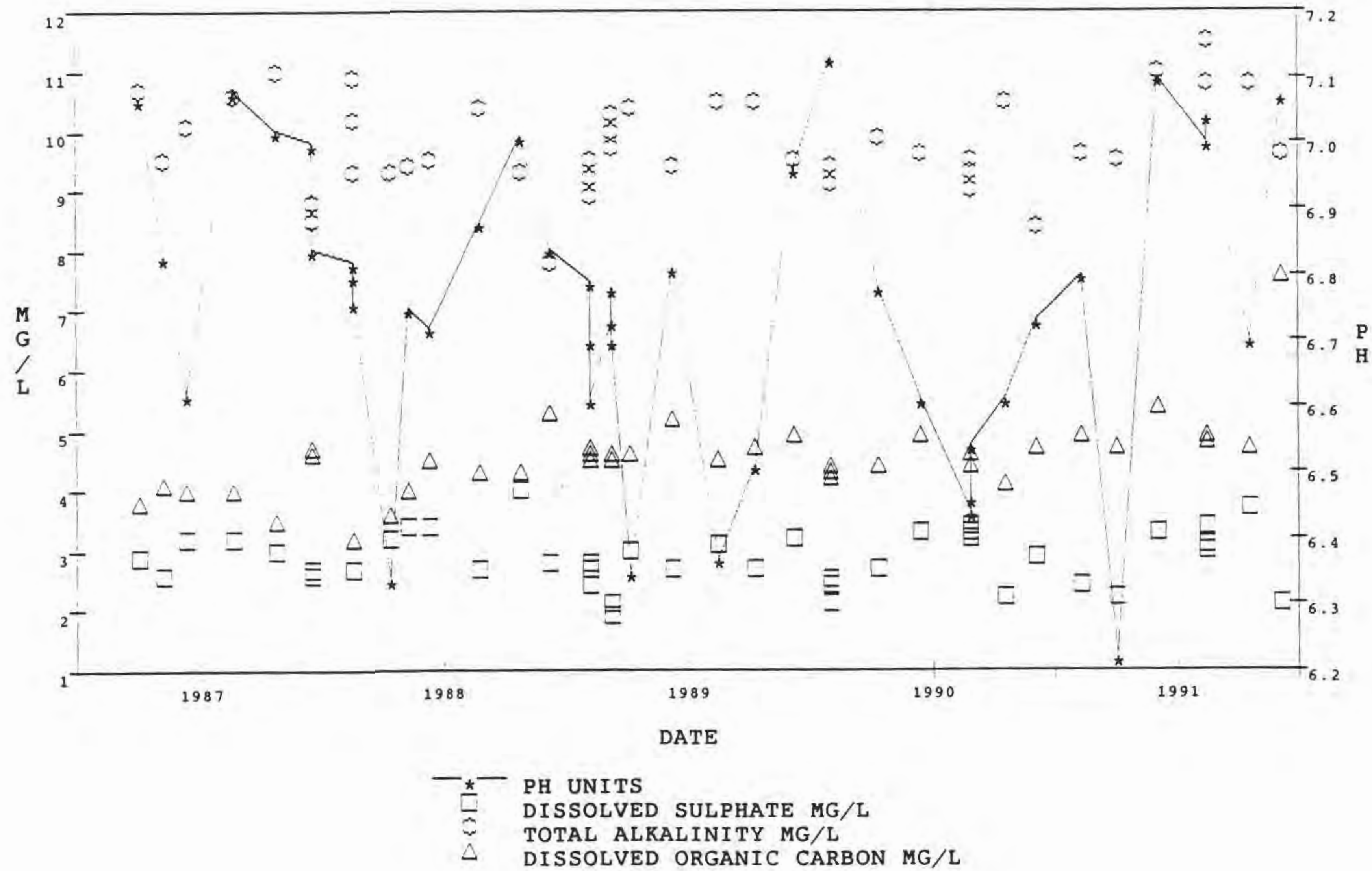


FIGURE 10
THE TEMPORAL RELATIONSHIP OF SPECIFIC CONDUCTANCE AND SELECT MAJOR IONS AT CORNER BROOK (NF02YL0013) DURING 1986 TO 1991

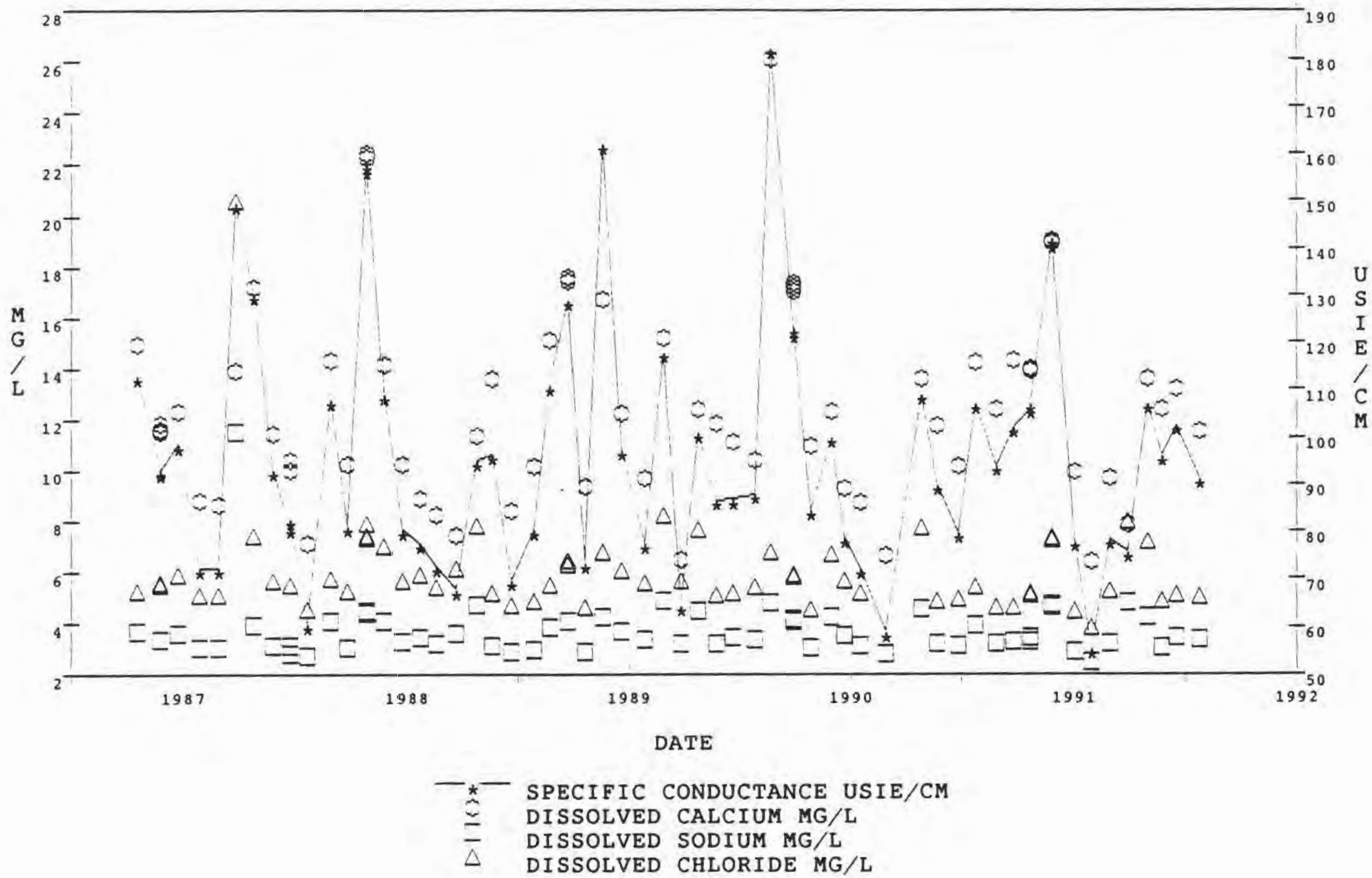


FIGURE 11
THE TEMPORAL RELATIONSHIP OF PH, ALKALINITY, AND MAJOR HYDROGEN DONATING COMPOUNDS AT CORNER BROOK (NF02YL0013) DURING 1986 TO 1991

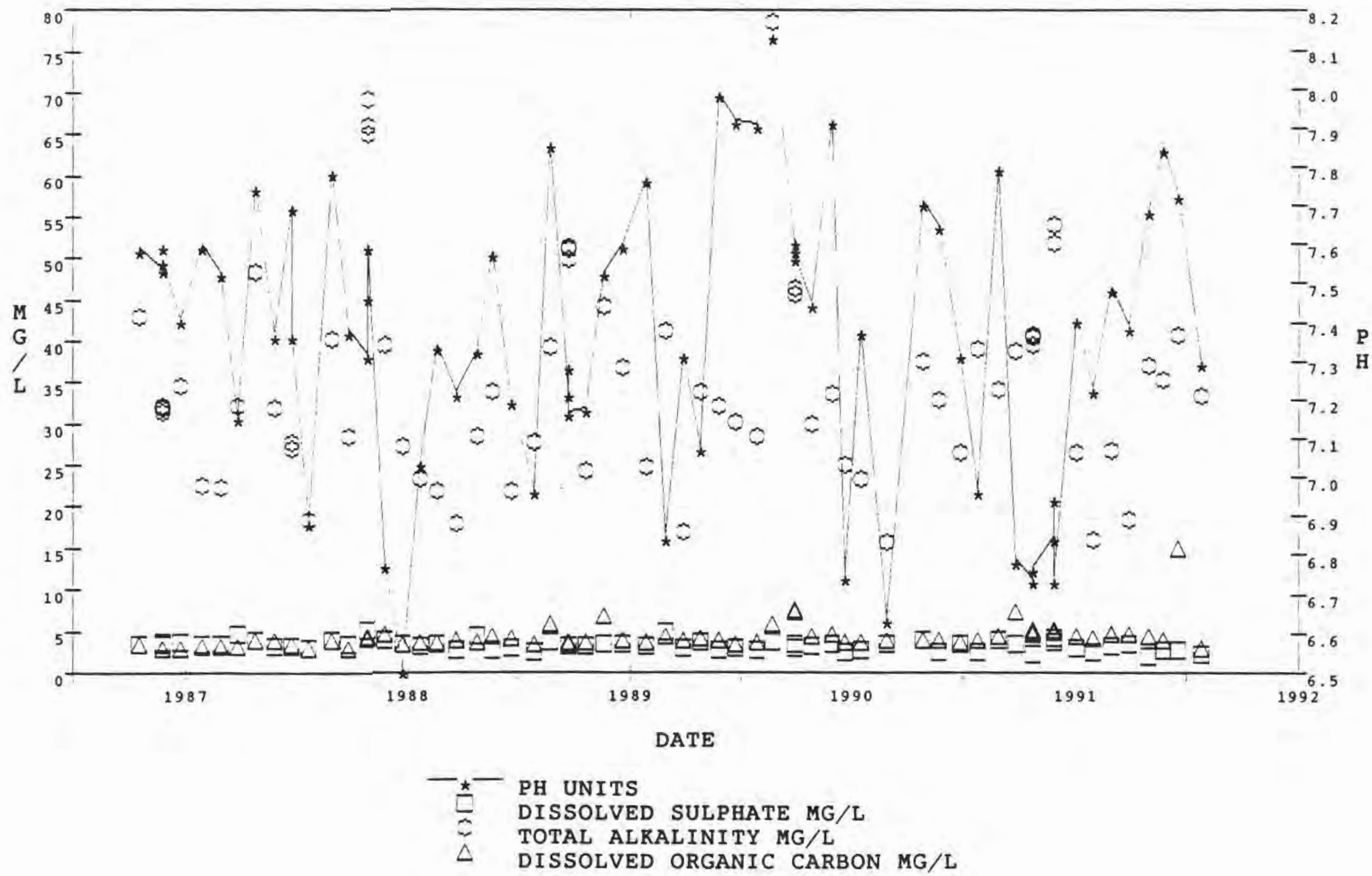


FIGURE 12

THE TEMPORAL PATTERN OF PHOSPHORUS AND NITROGEN AT CORNER BROOK (NF02YL0013) BETWEEN 1986 TO 1991

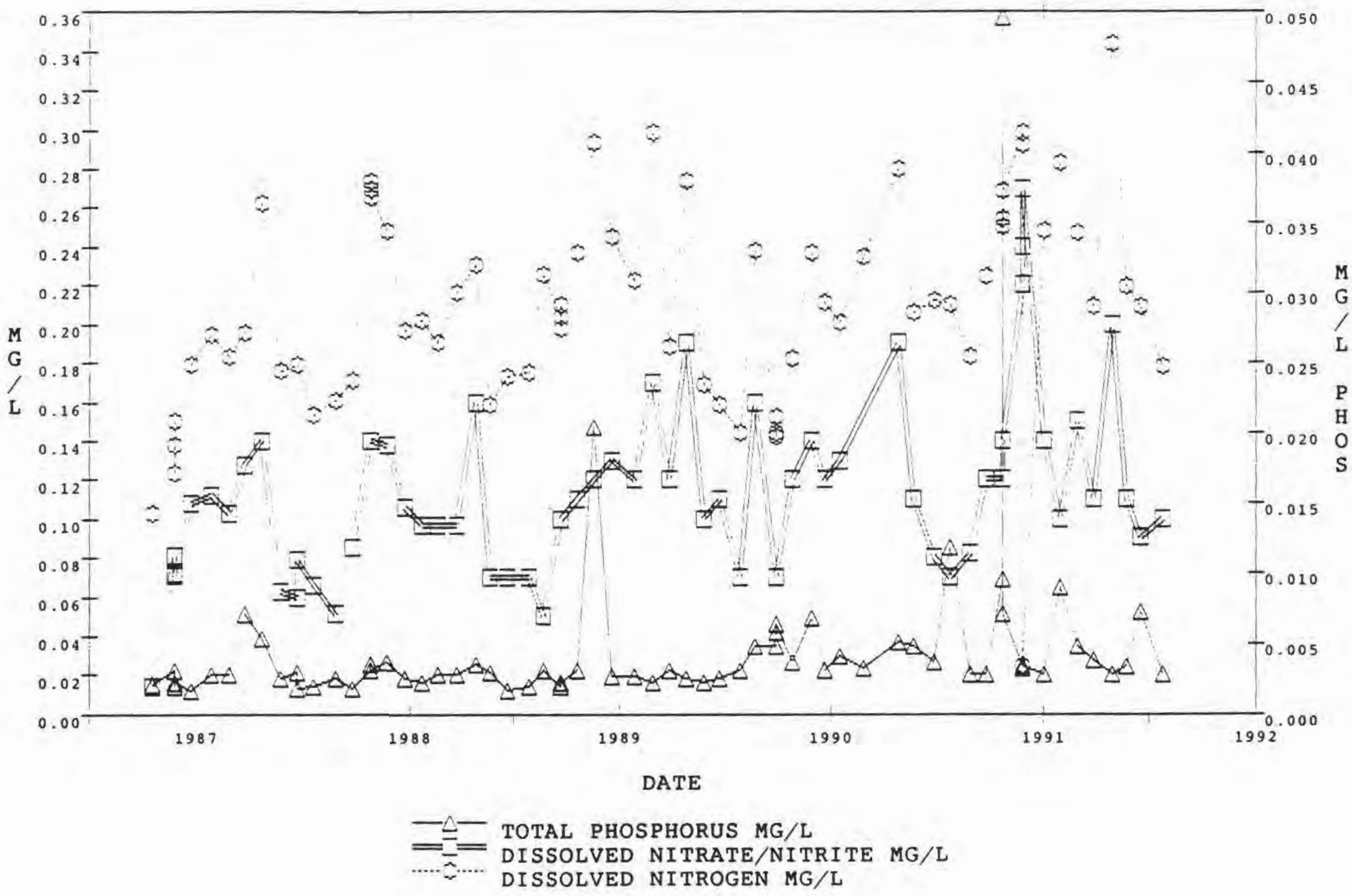


FIGURE 13
DISCHARGE CMS (CUBIC METRES PER SECOND) AT HUMBER VILLAGE
HUMBER RIVER (NF02YL003) BETWEEN 1988 TO 1991

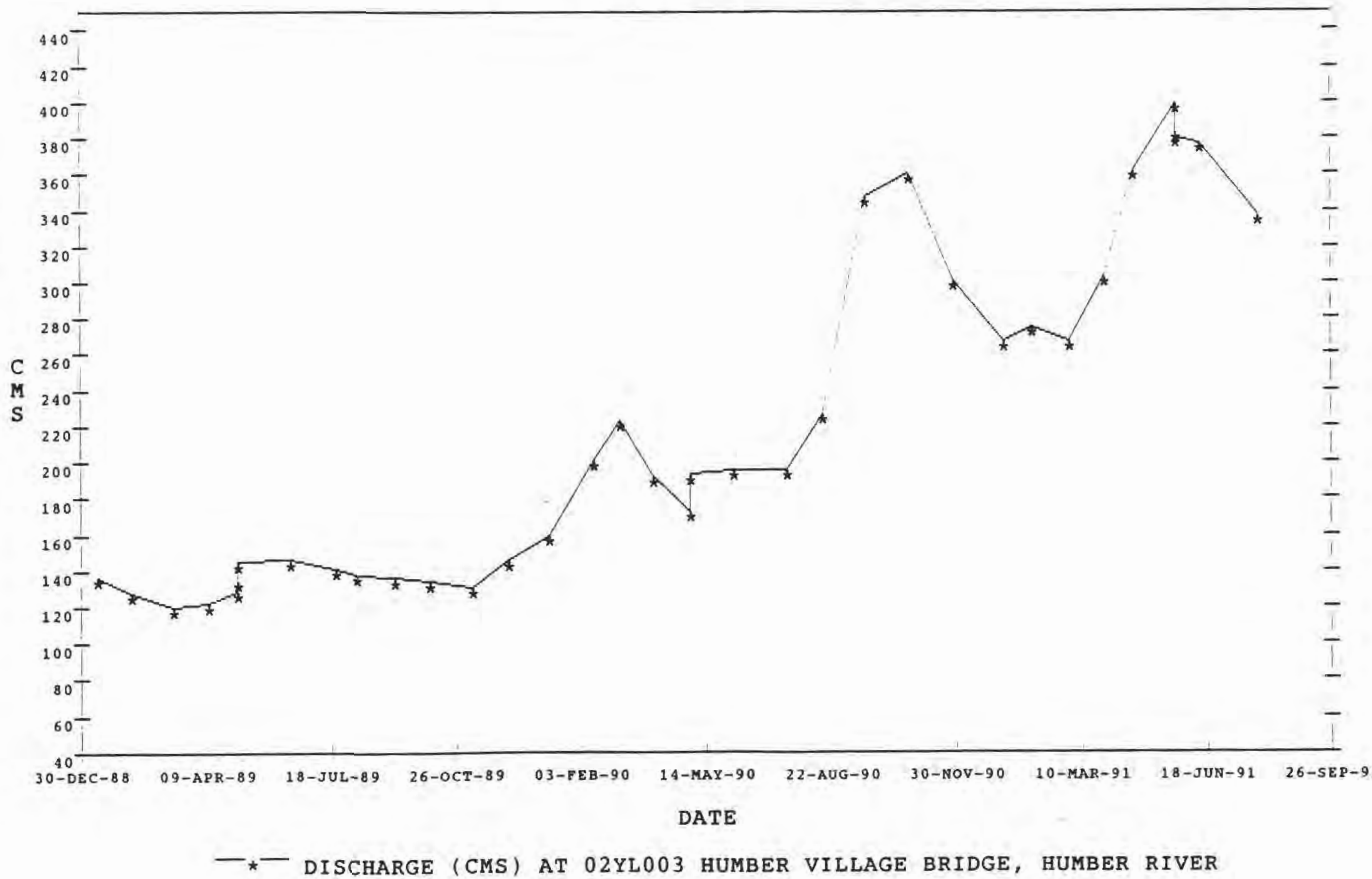


FIGURE 14
THE TEMPORAL RELATIONSHIP OF SPECIFIC CONDUCTANCE TO
DISSOLVED CALCIUM AND POTASSIUM IN WILDCOVE BROOK (NF02YL0029)
DURING 1988 TO 1991

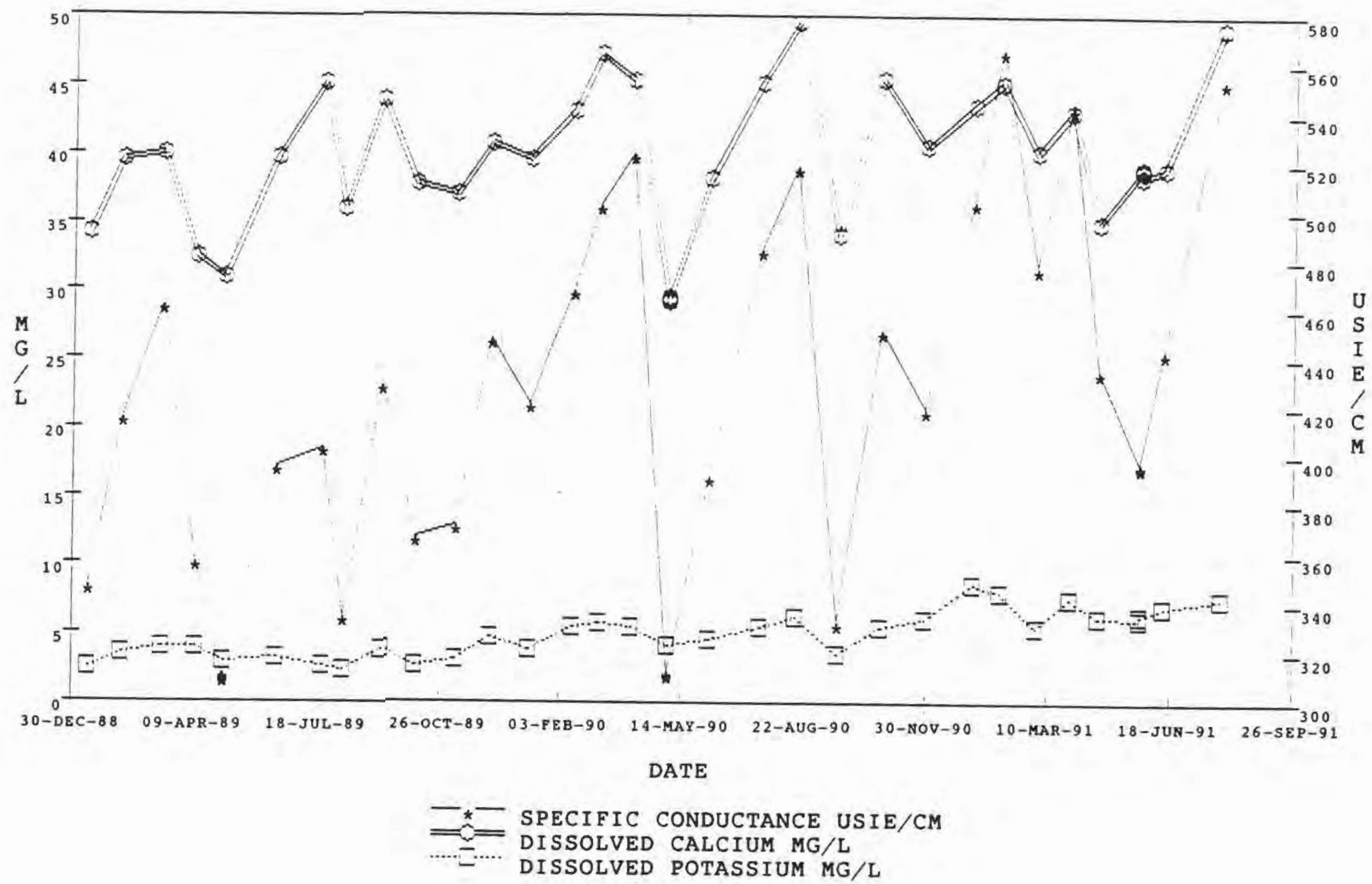


FIGURE 15
THE TEMPORAL RELATIONSHIP OF SPECIFIC CONDUCTANCE TO DISSOLVED SODIUM AND CHLORIDE IN WILDCOVE BROOK (NF02YL0029) DURING 1988 TO 1991

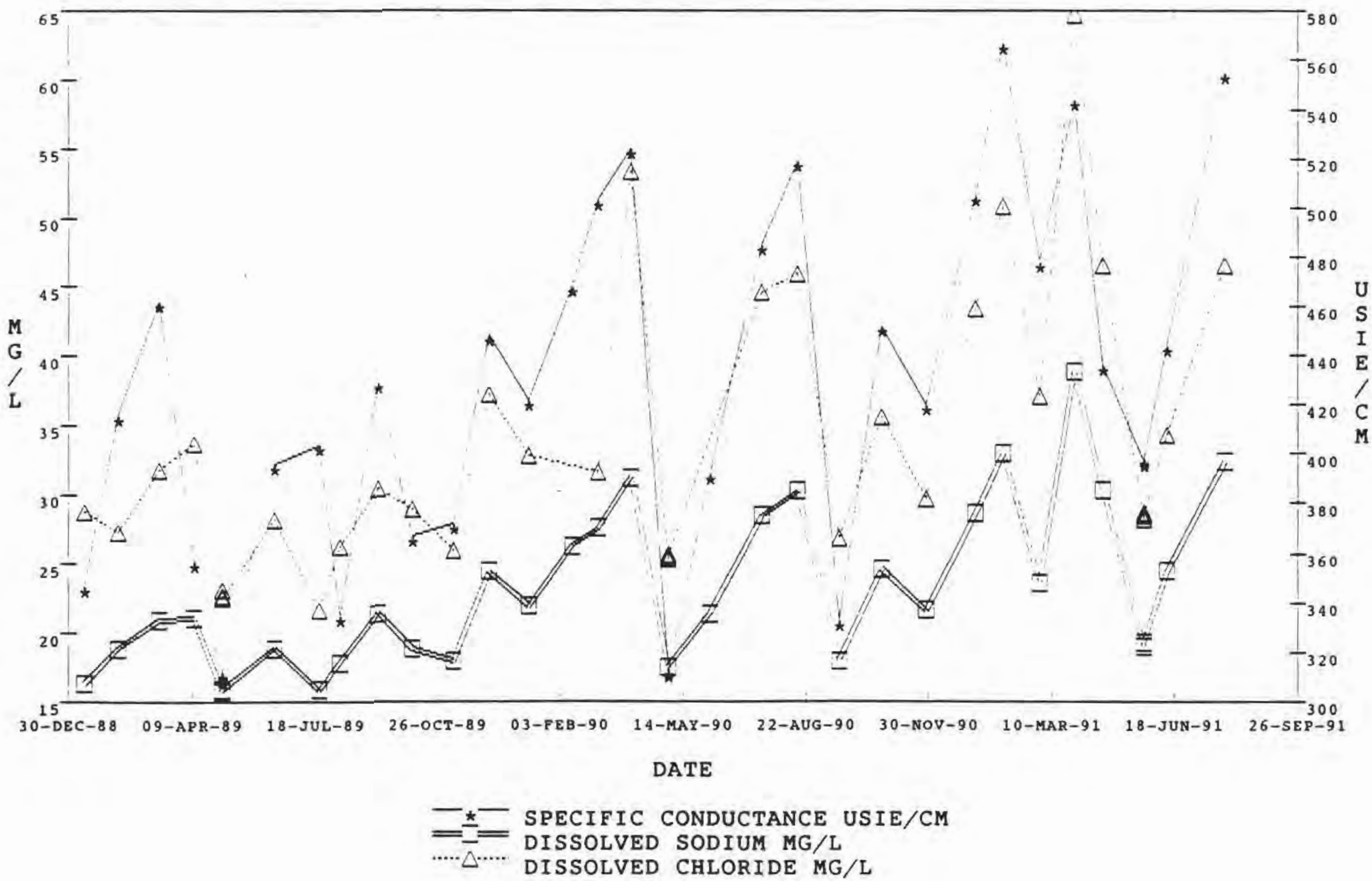


FIGURE 16
THE TEMPORAL RELATIONSHIP OF PH, ALKALINITY, AND MAJOR HYDROGEN DONATING COMPOUNDS AT WILDCOVE BROOK (NF02YL0029) DURING 1989 TO 1991

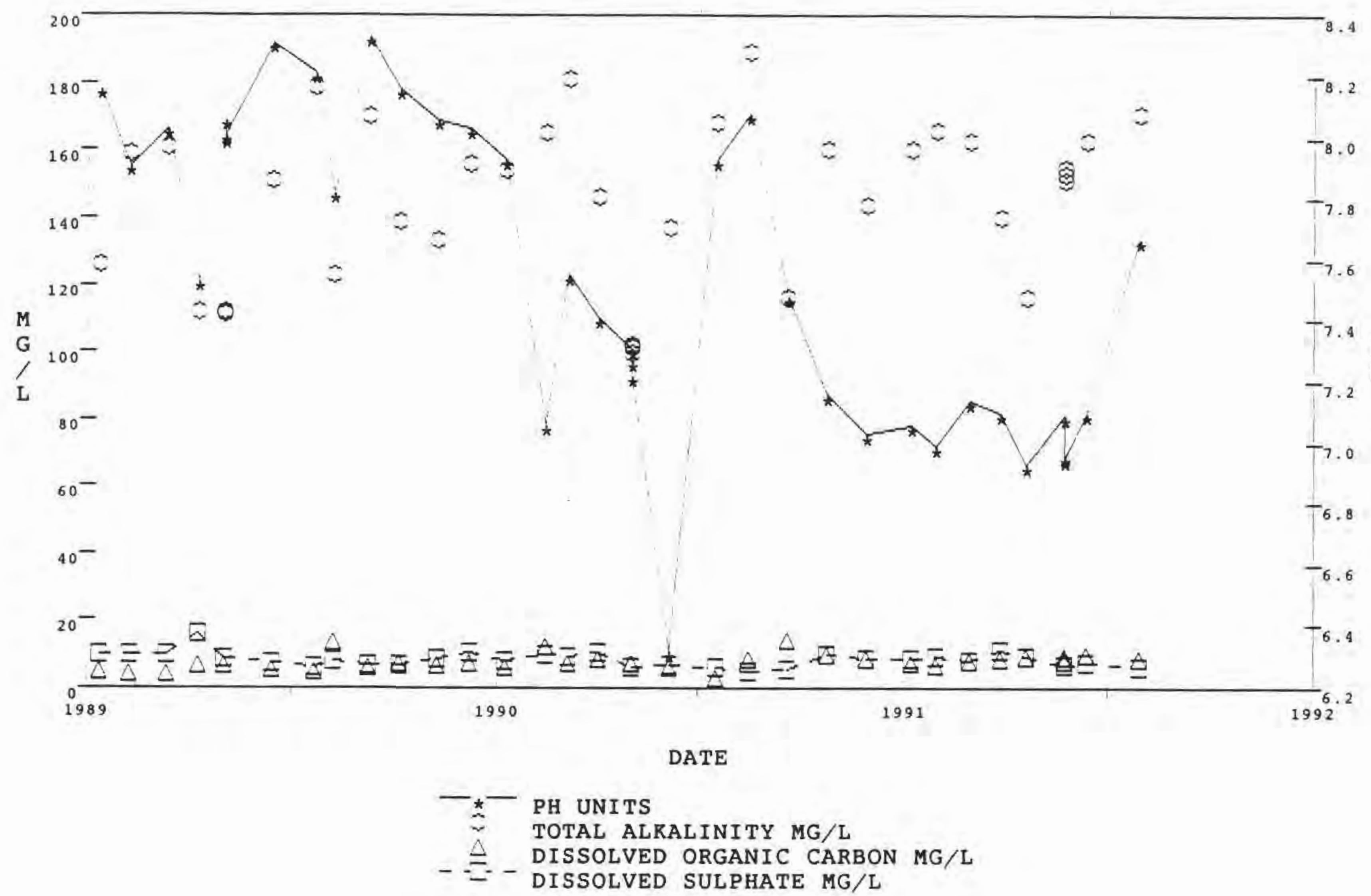


FIGURE 17
TEMPORAL PATTERN OF PHOSPHORUS AND NITROGEN AT WILDCOVE BROOK (NF02YL0029) BETWEEN 1988 TO 1991

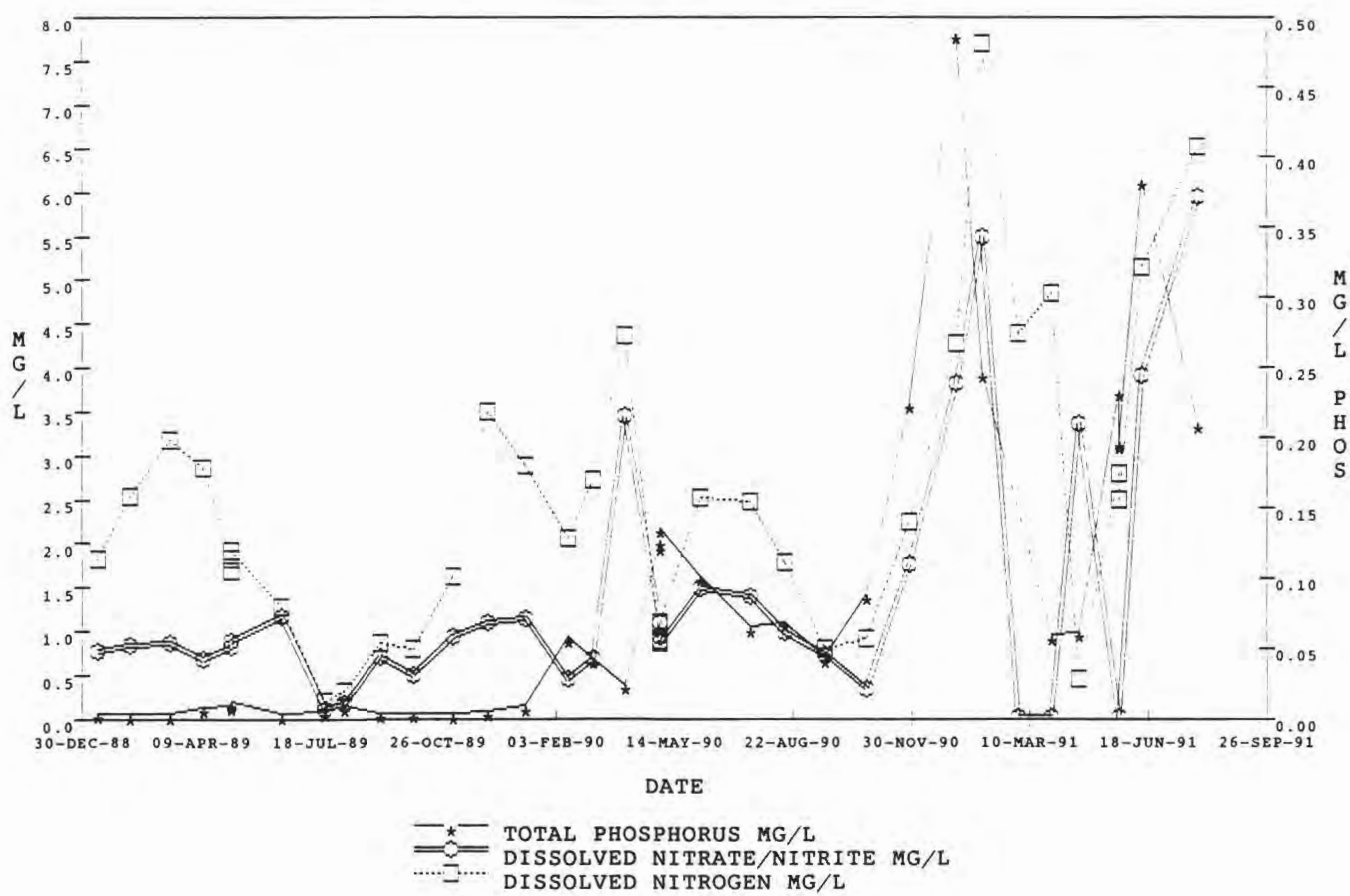


FIGURE 18
THE TEMPORAL RELATIONSHIP OF DISSOLVED OXYGEN TO DISCHARGE EVENTS AND TEMPERATURE IN WILDCOVE BROOK (NF02YL0029) BETWEEN 1989 TO 1991

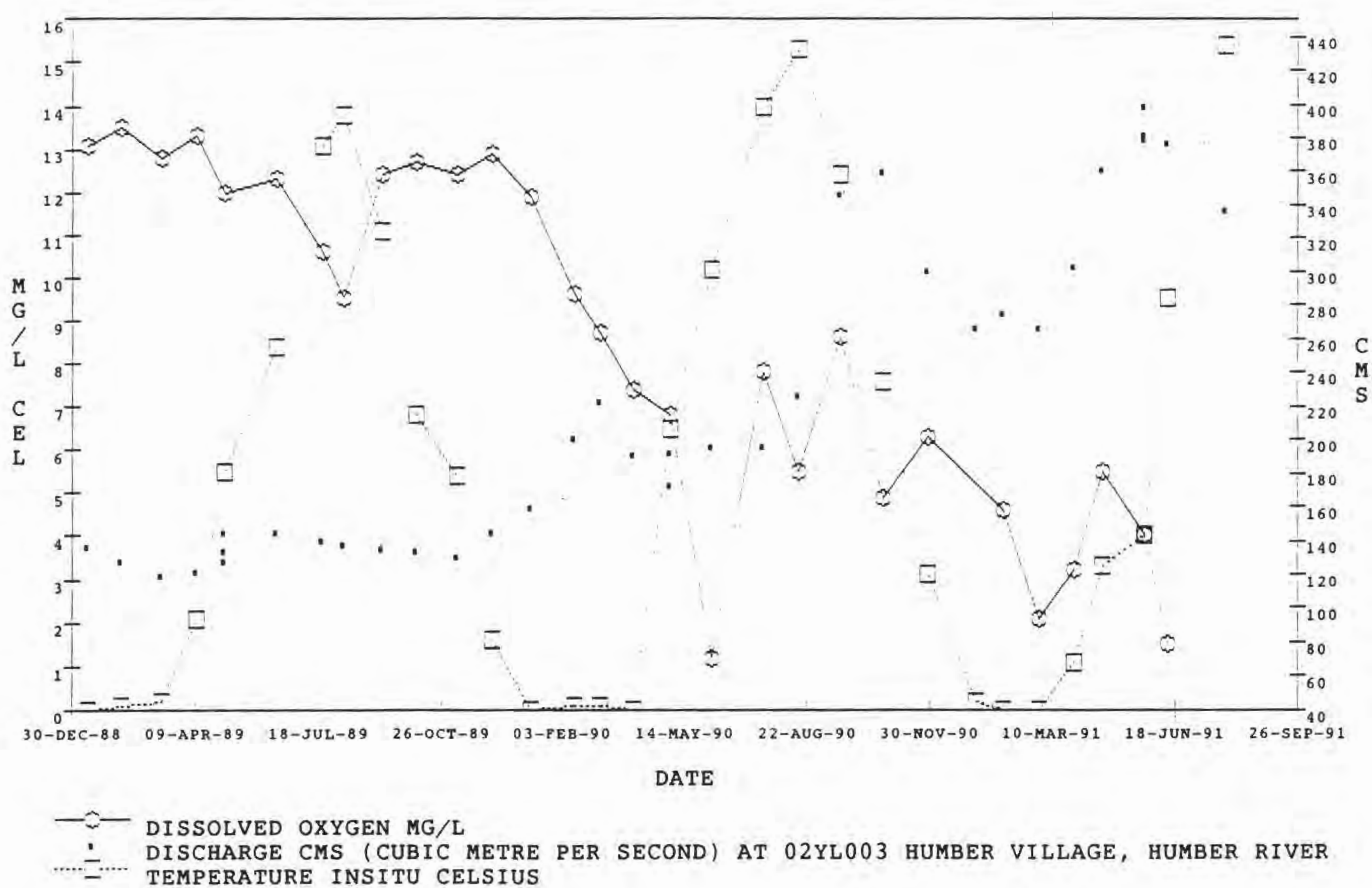
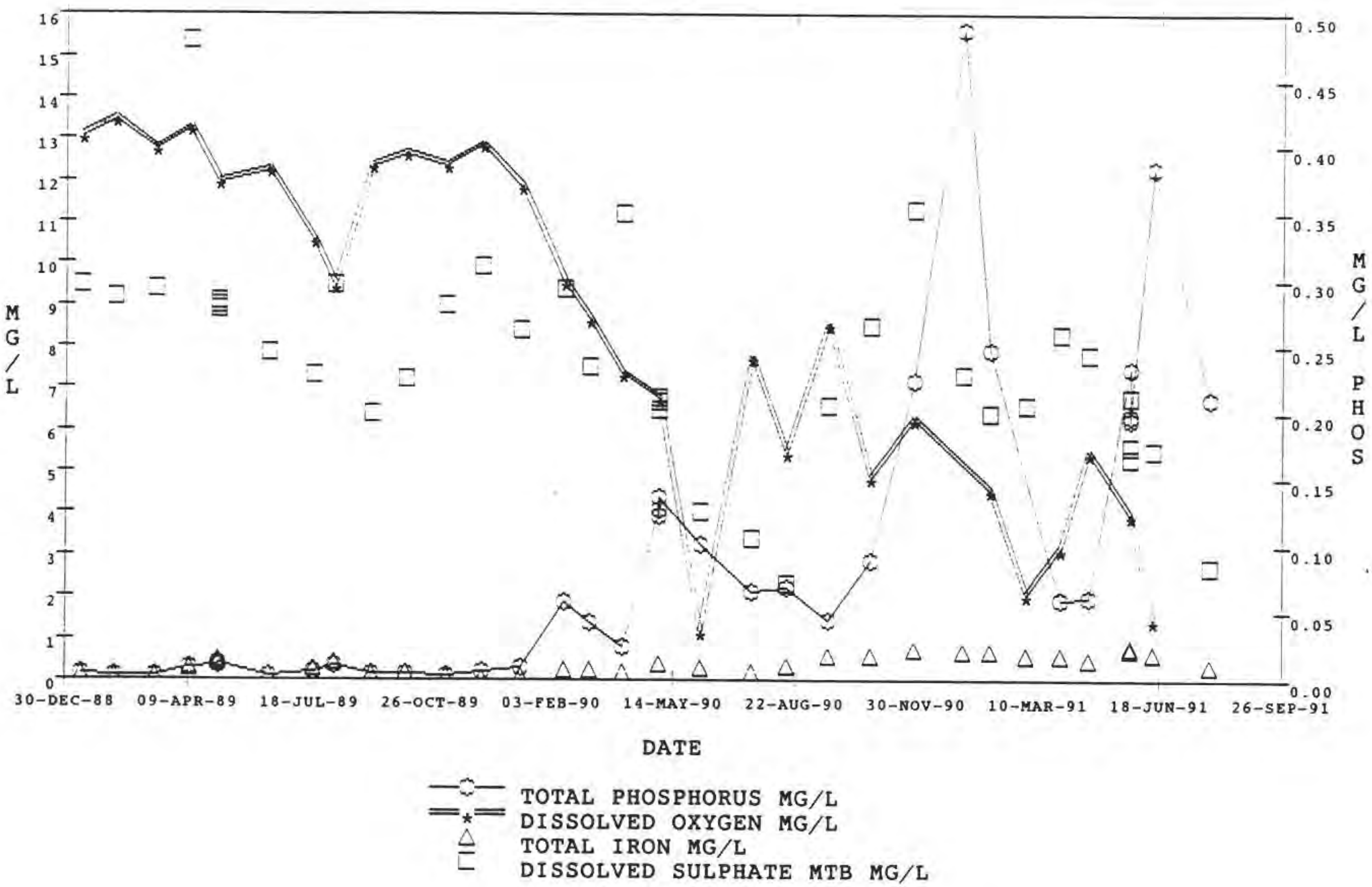
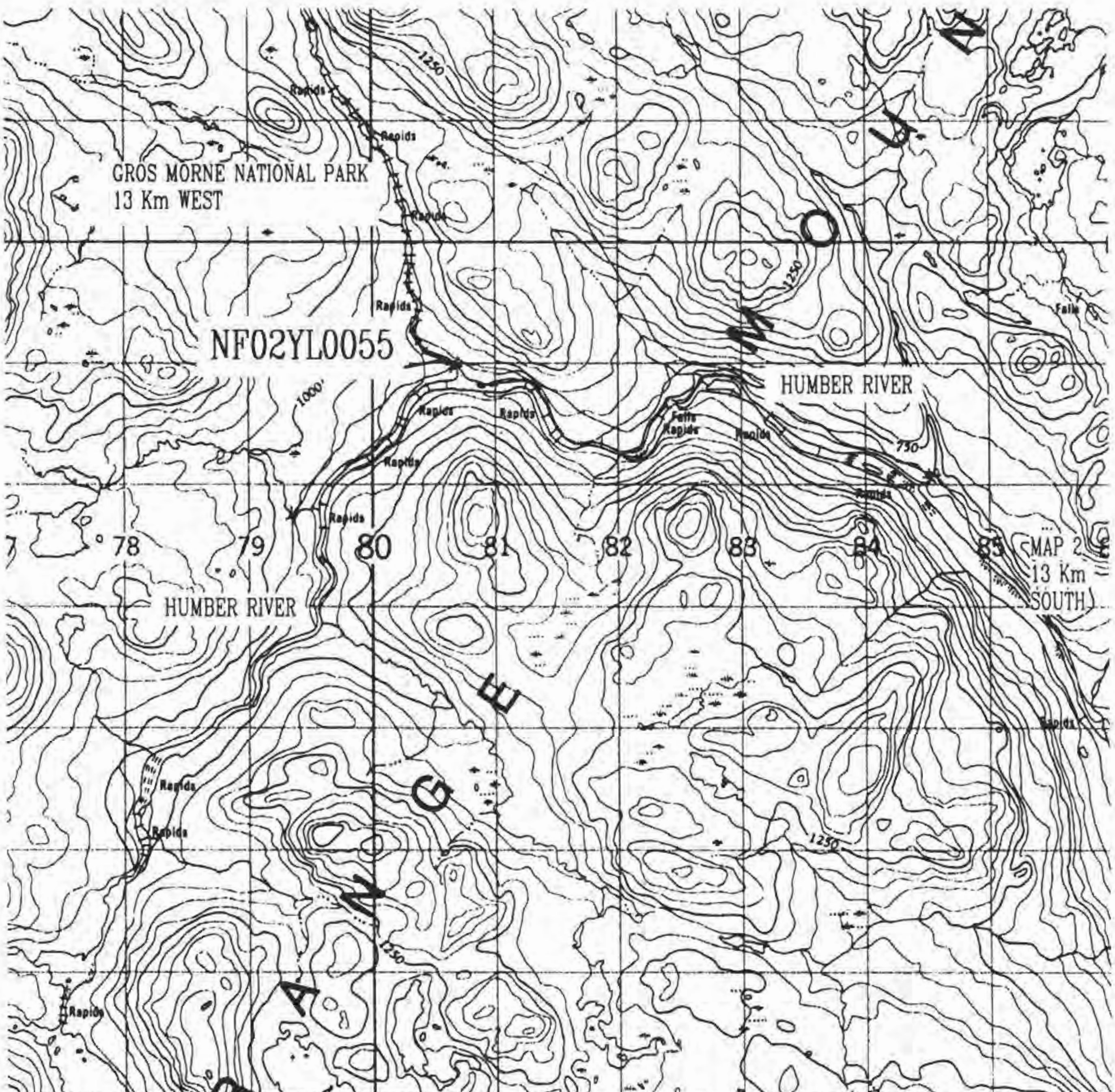


FIGURE 19

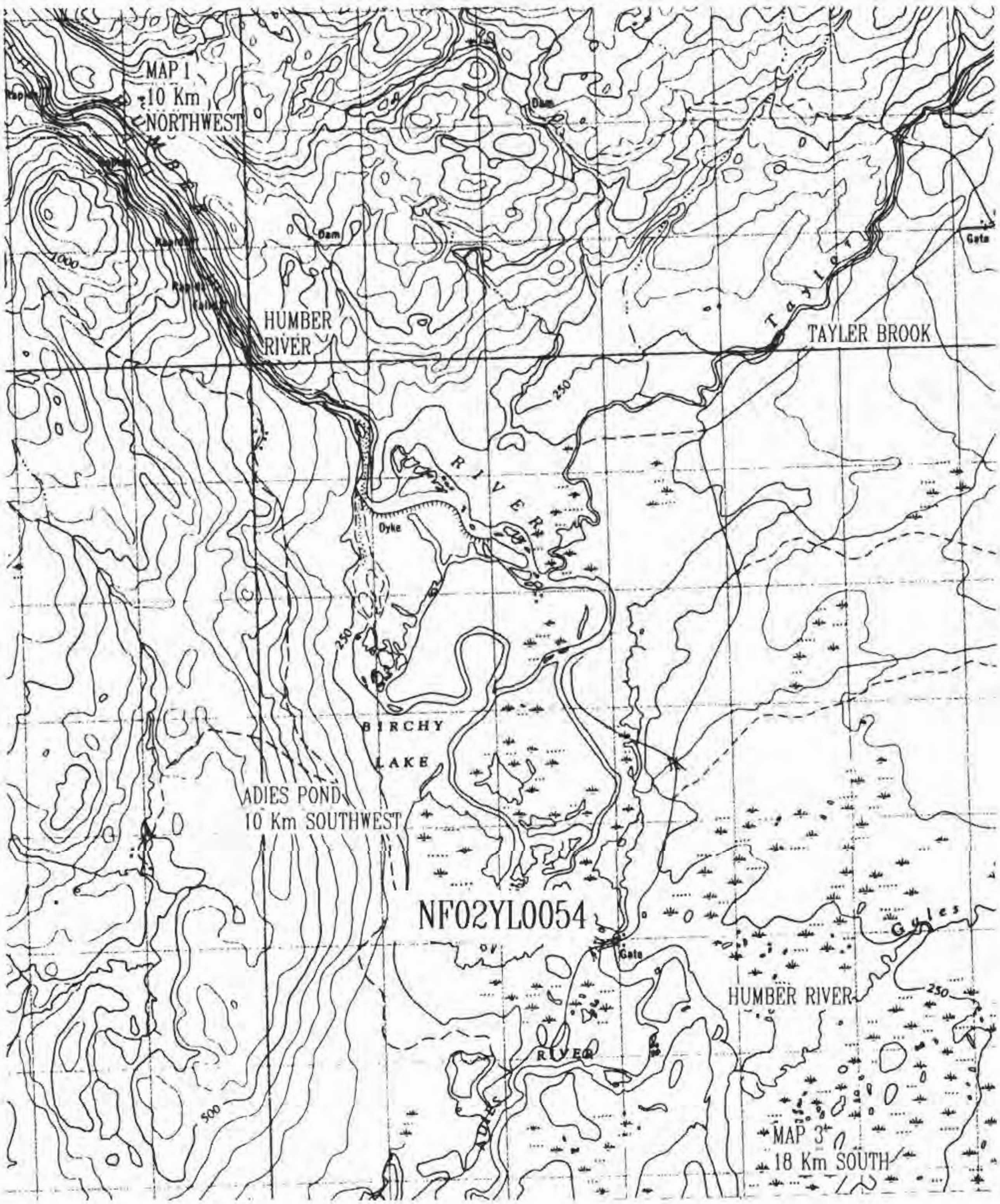
THE TEMPORAL RELATIONSHIP OF DISSOLVED OXYGEN TO PHOSPHORUS, IRON AND SULPHATE IN WILDCOVE BROOK (NF02YL0029) DURING 1989 TO 1991



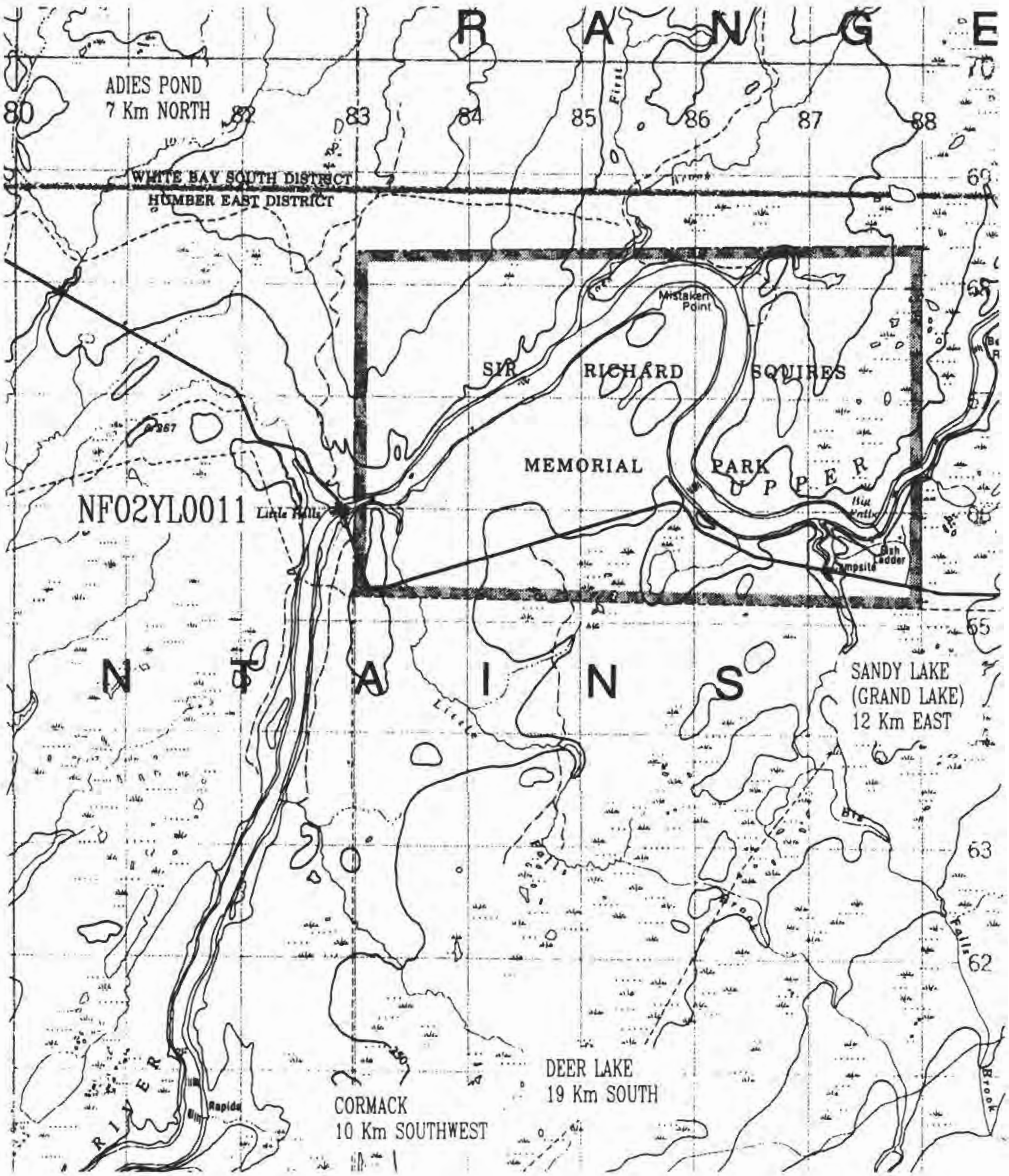
MAP 1: SILVER MOUNTAIN, UPPER HUMBER RIVER
from map 12h/11 1973
1:50000 EMR



MAP 2: BIRCHY LAKE UPPER HUMBER RIVER
from map 12h/11 1973
1:50000 EMR

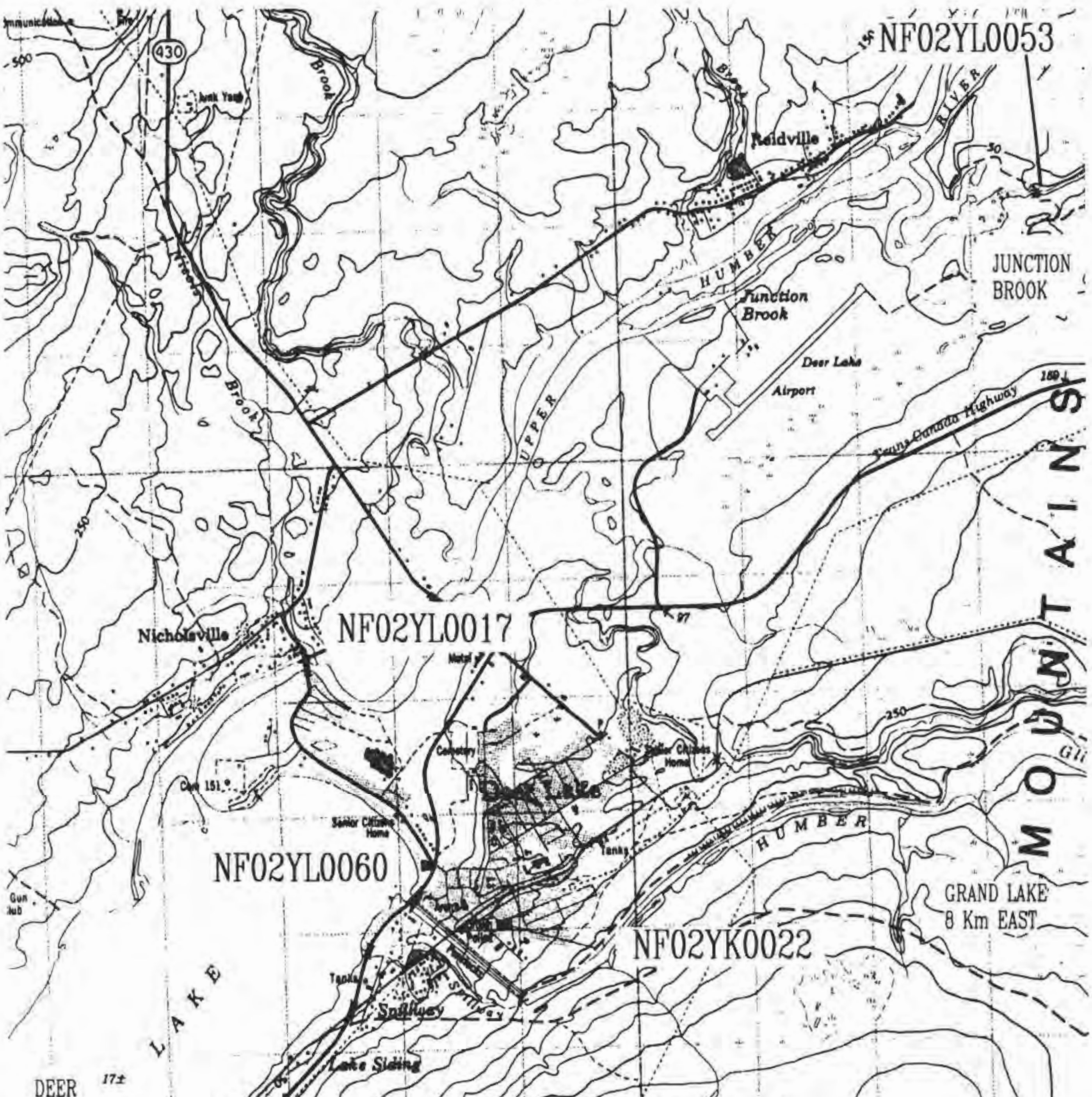


MAP 3
LITTLE FALLS, UPPER HUMBER RIVER
from map 12h/6 1973 1:50000 EMR

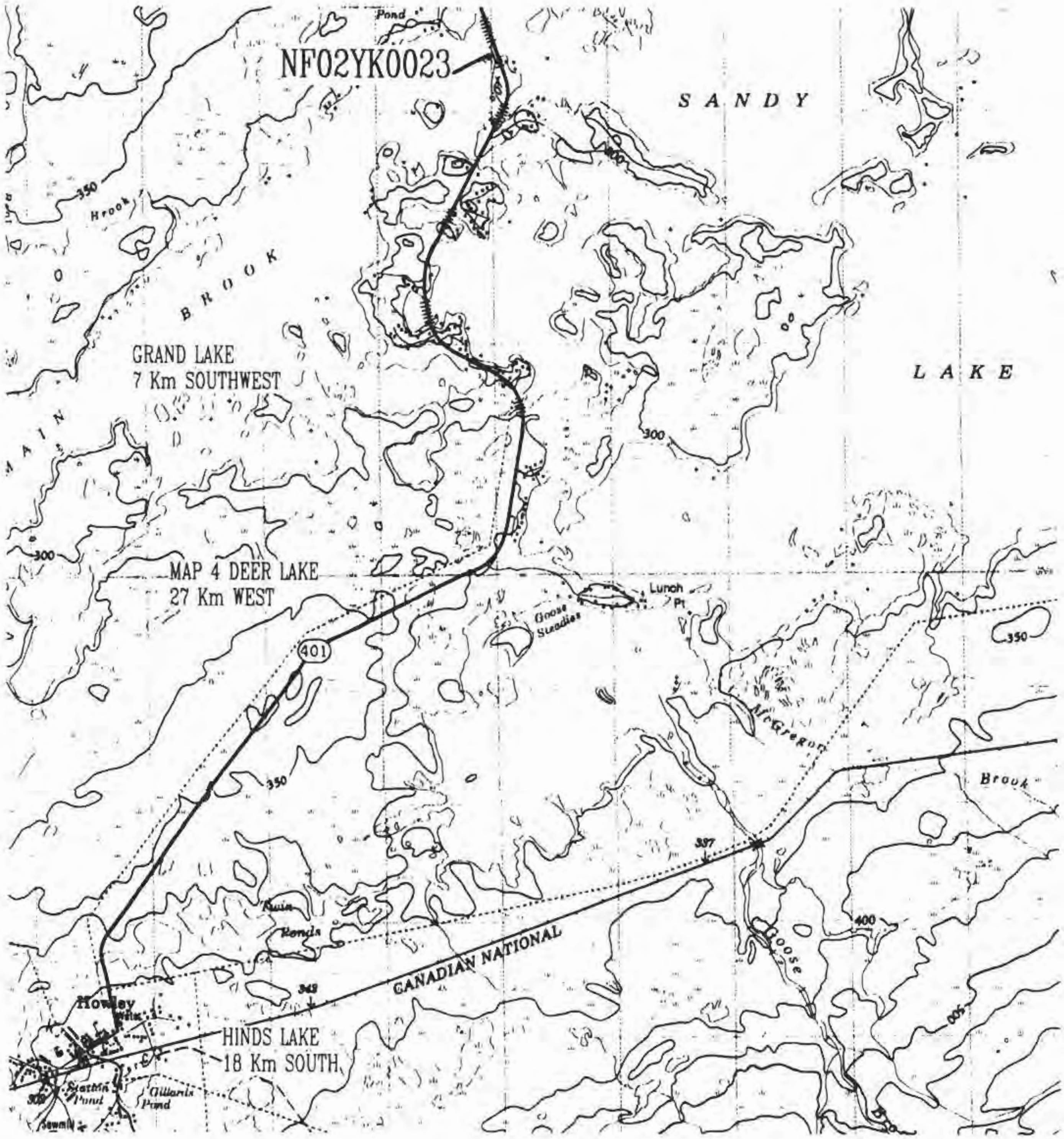


MAP 4: DEER LAKE, THE TOWN OF DEER LAKE, AND HUMBER CANAL from map 12h/3 1973

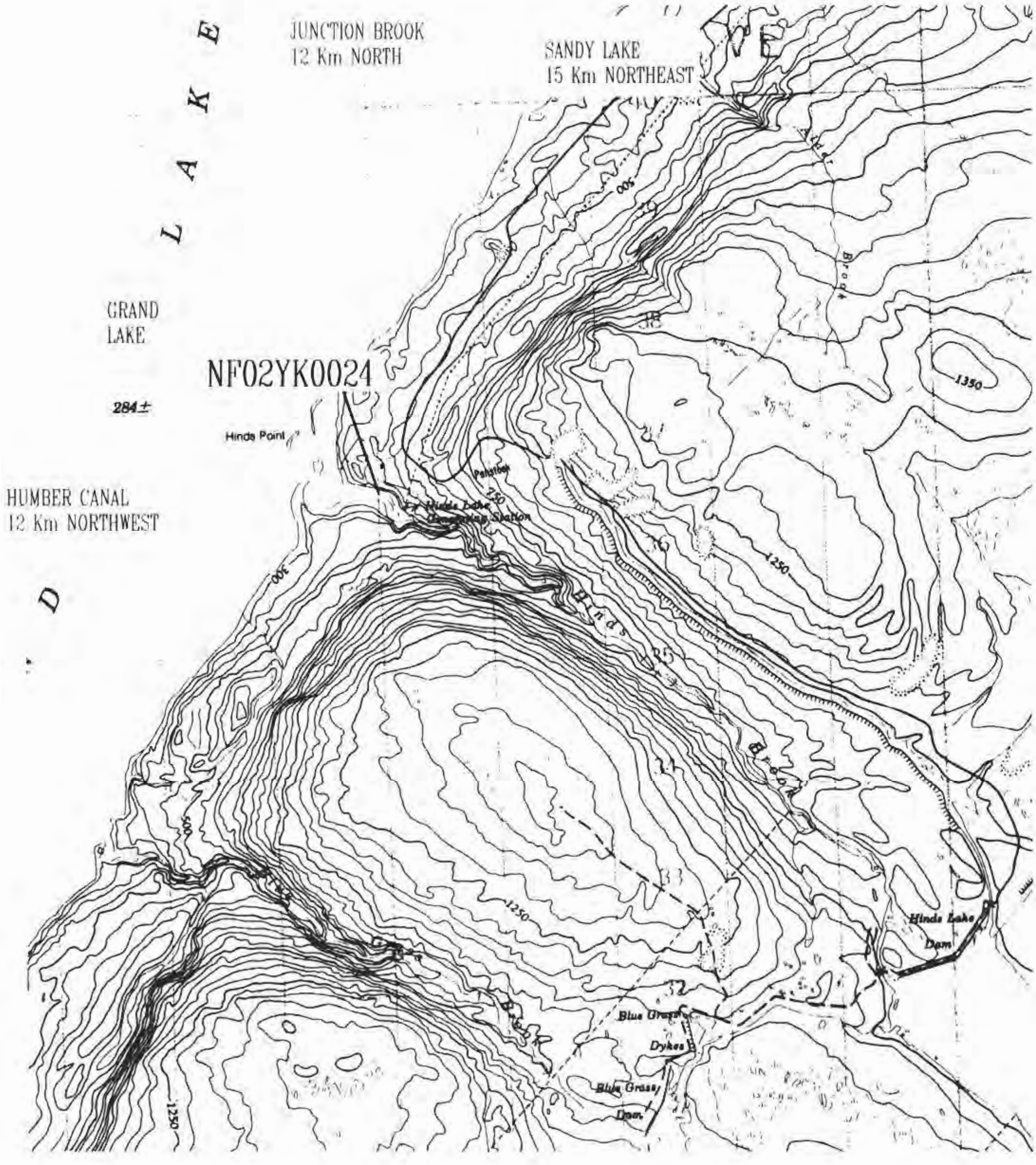
1:50000 EMR



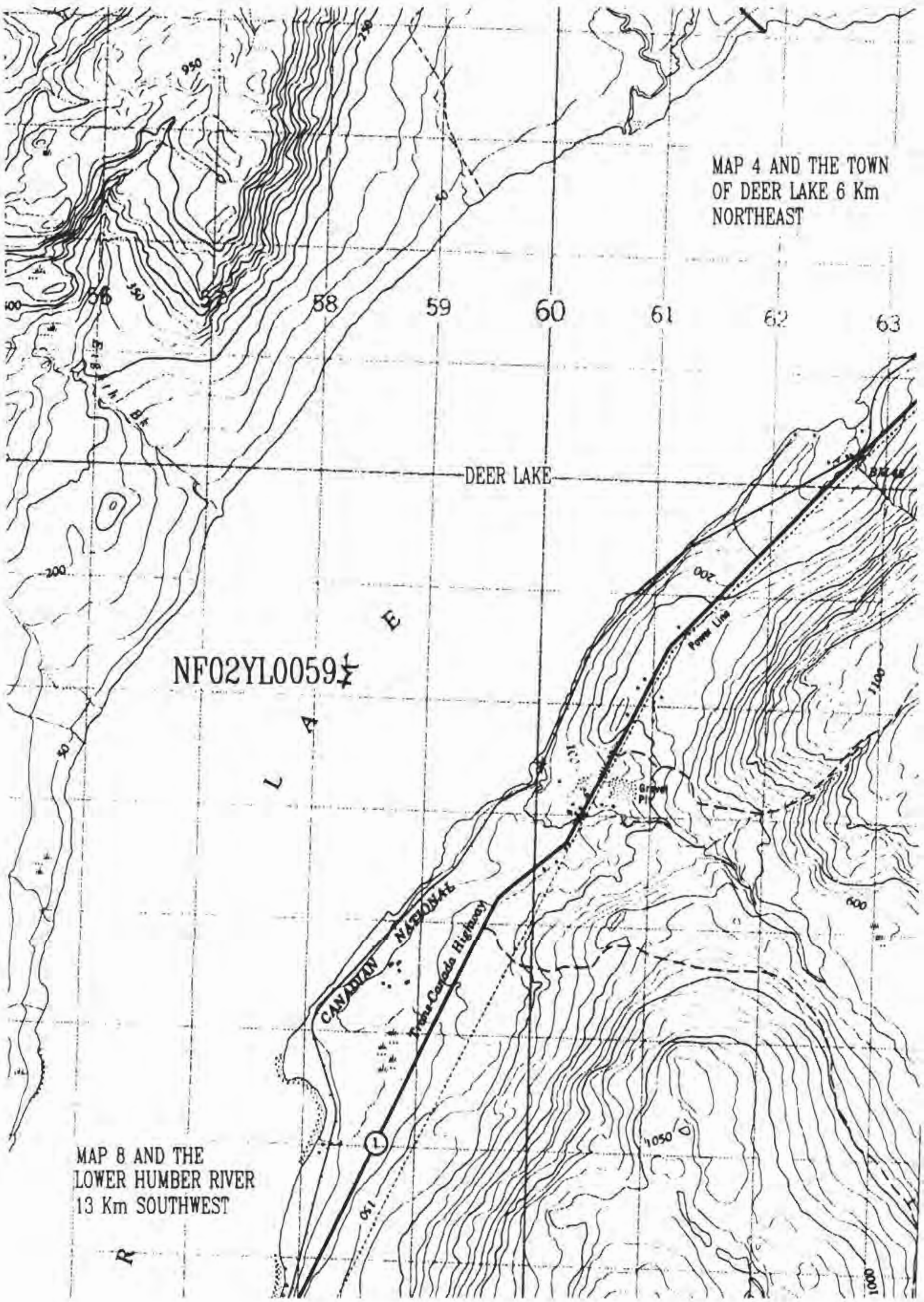
MAP 5: SANDY LAKE (NORTH GRAND LAKE)
from map 12h/3 1985
1:50000 EMR



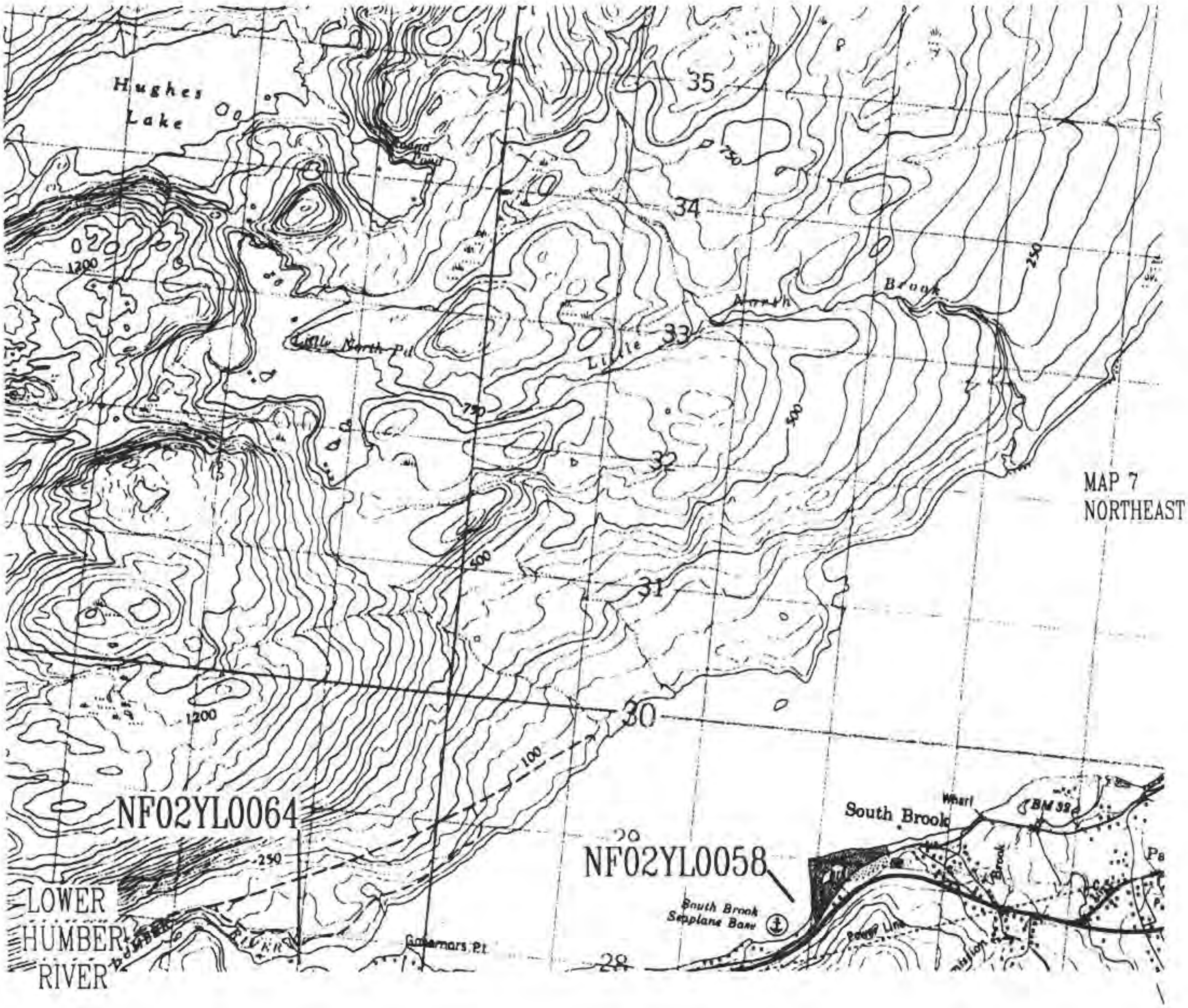
MAP 6
HINDS BROOK, GRAND LAKE
from map 12h/3 1984 1:50000 EMR



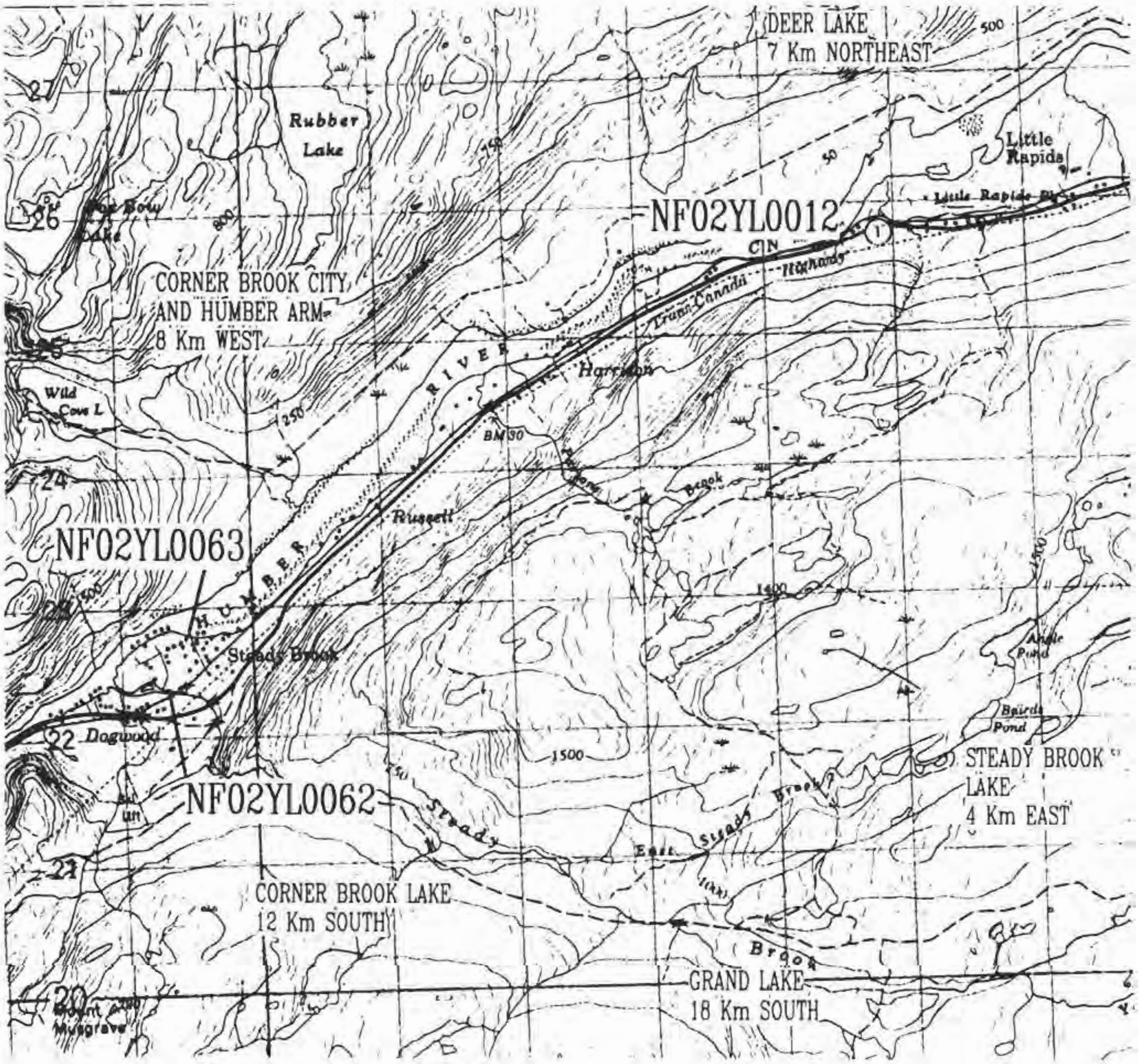
MAP 7: MIDSECTION OF DEER LAKE
from map 12h/4 1973
1:50000 EMR



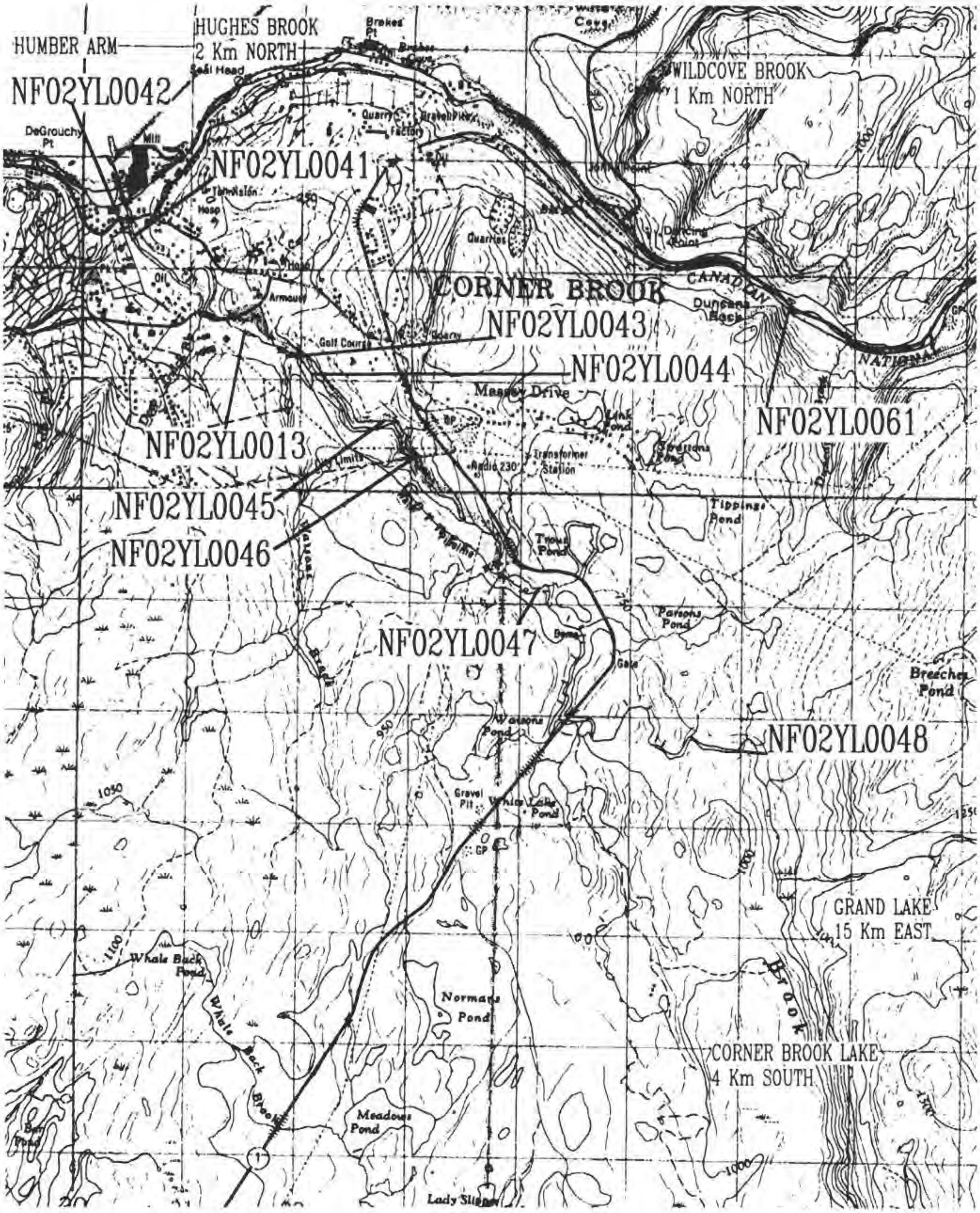
MAP 8: LOWER SECTION OF
DEER LAKE
from map 12h/4 1973 1:50000 EMR



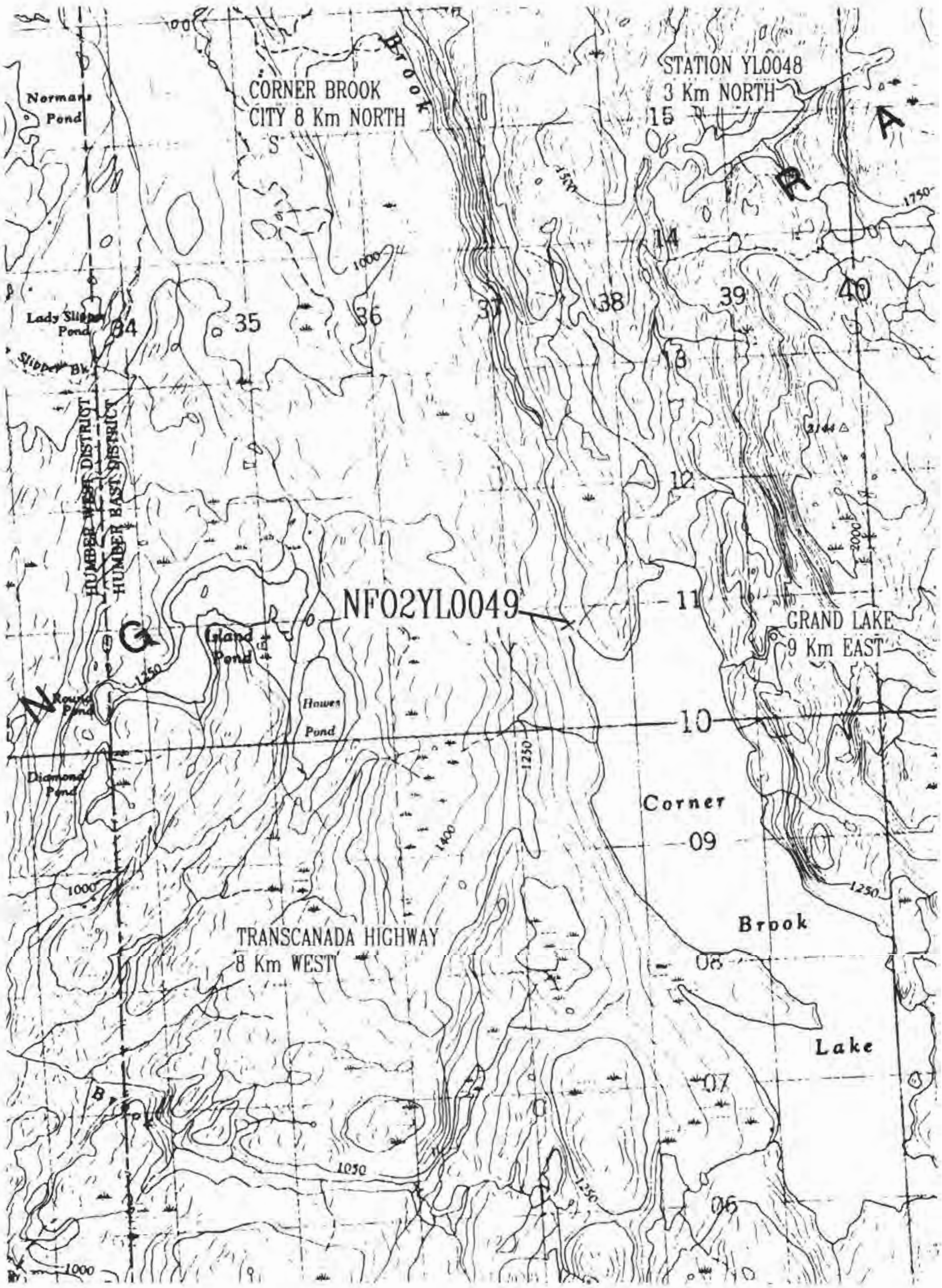
MAP 9: LOWER HUMBER RIVER–
HUMBER VILLAGE AND STEADY BROOK
from map 12a/13 1973
1:50000 EMR



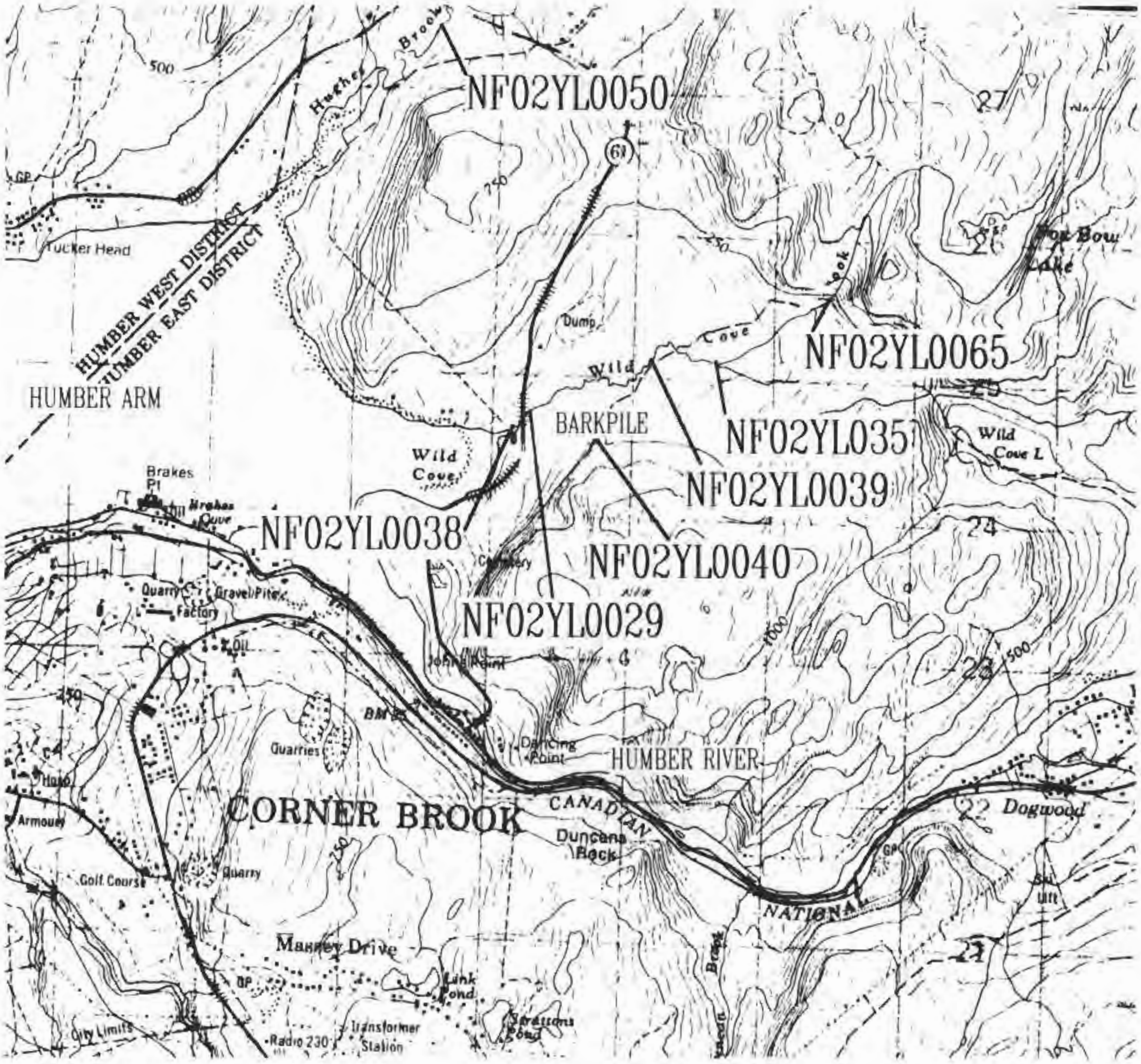
MAP 10: LOWER SECTION OF CORNER BROOK, INCLUDING CORNER BROOK CITY from map 12a/13 1973 1:50000 EMR



MAP 11: UPPER CORNER BROOK
from map 12a/13 1973 1:50000 EMR



MAP 12: WILD COVE BROOK AND THE LOWER SECTION OF HUGHES BROOK from map 12a/13 1973 1:50000 EMR



MAP 13: UPPER SECTION OF HUGHES BROOK
from map 12h/4 1973 1:50000 EMR