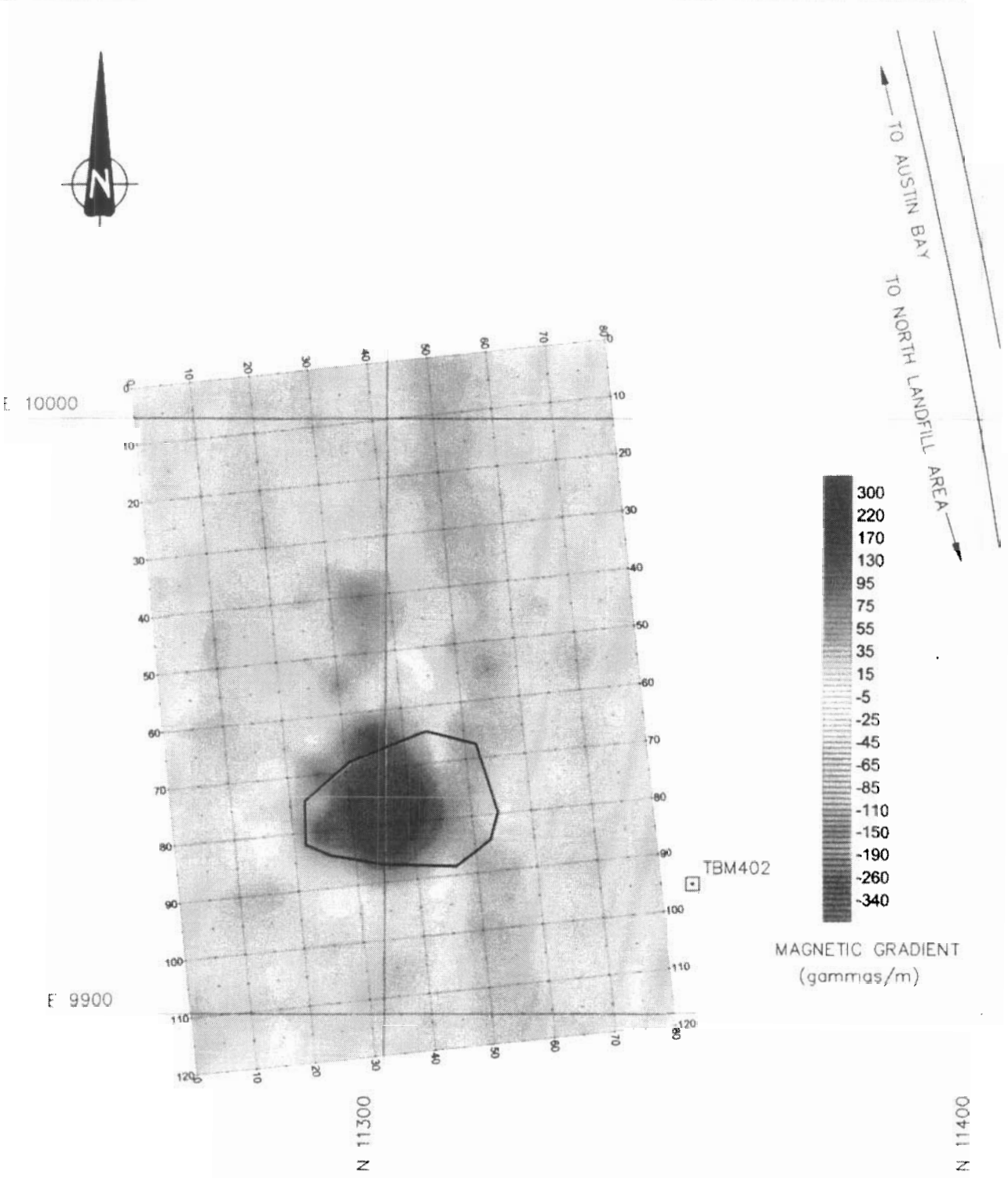


LEGEND:

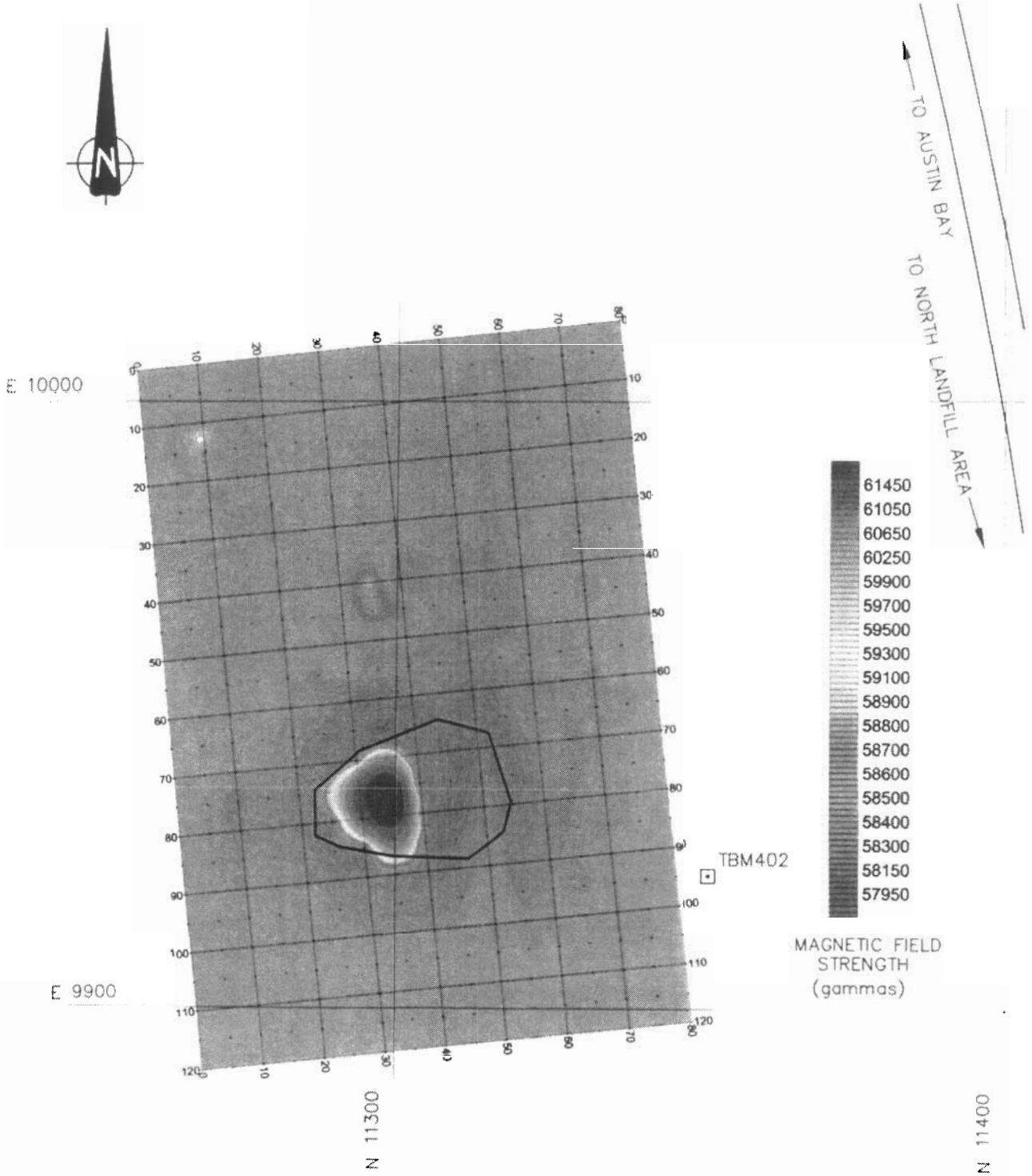
■ – TESTPIT LOCATIONS (1992)

⊡ – TEMPORARY BENCHMARK

0 50
metres

Figure 14
North Debris Area
Magnetometer Survey - Gradient

eba



LEGEND:

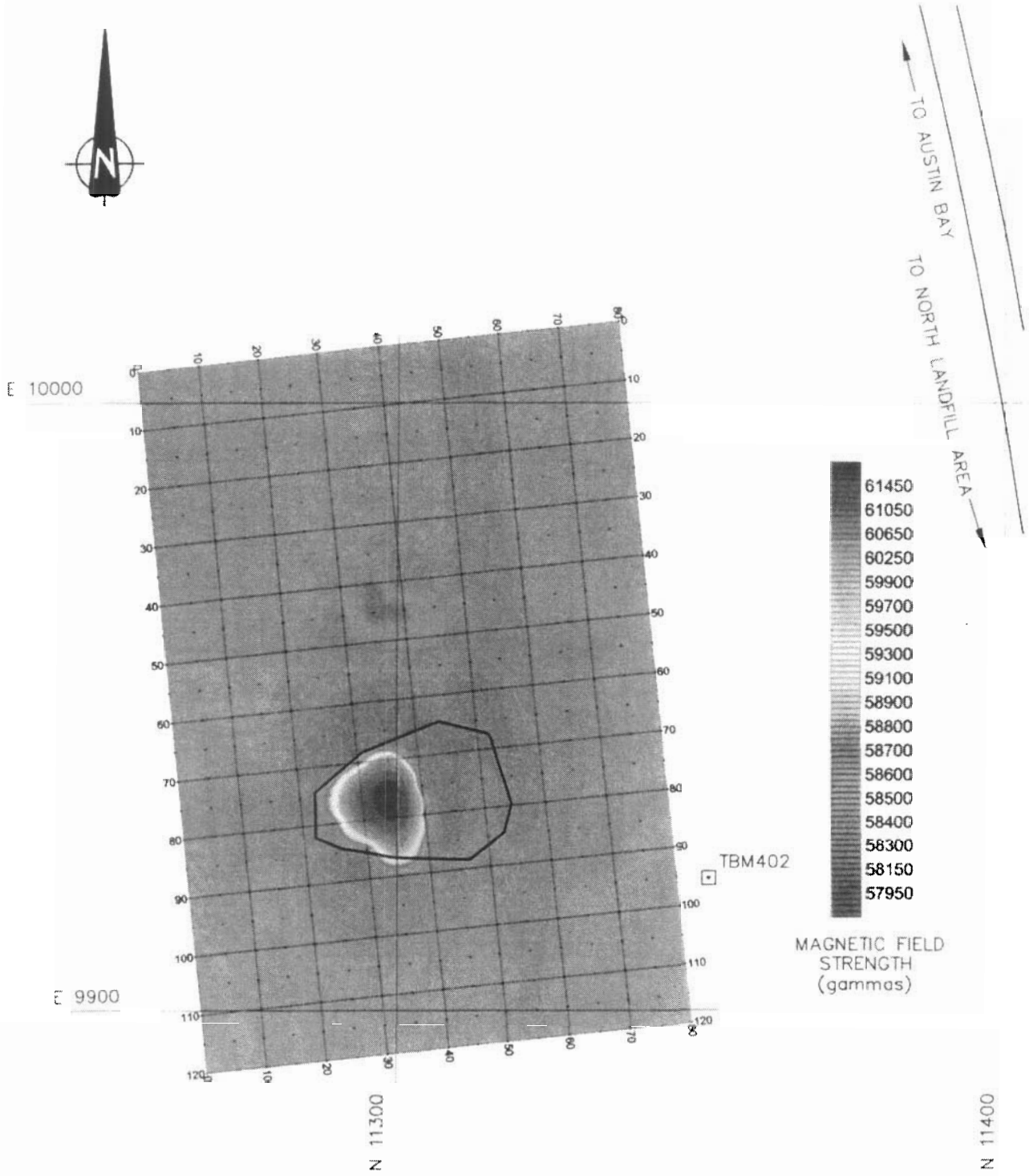
■ – TESTPIT LOCATIONS (1992)

⊡ – TEMPORARY BENCHMARK

0 50
metres

Figure 15
North Debris Area
Magnetometer Survey - Top Sensor

1099SE10A.dwg



LEGEND:

■ – TESTPIT LOCATIONS (1992)

⊡ – TEMPORARY BENCHMARK

0 50
metres

Figure 16
North Debris Area
Magnetometer Survey - Bottom Sensor

Figure 17
Open Storage Building Pad
Magnetometer Gradiometer Survey

995E06A.dwg

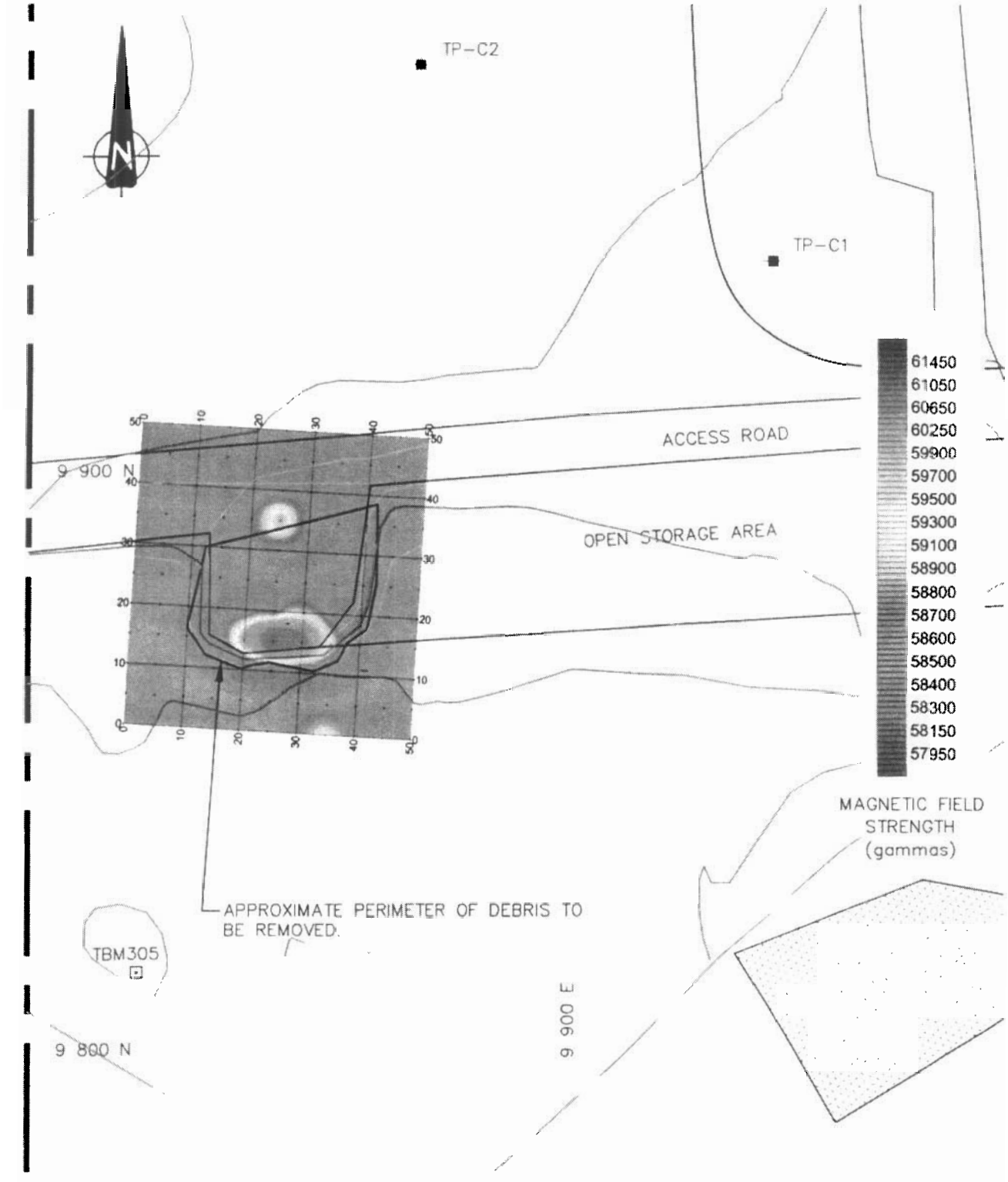
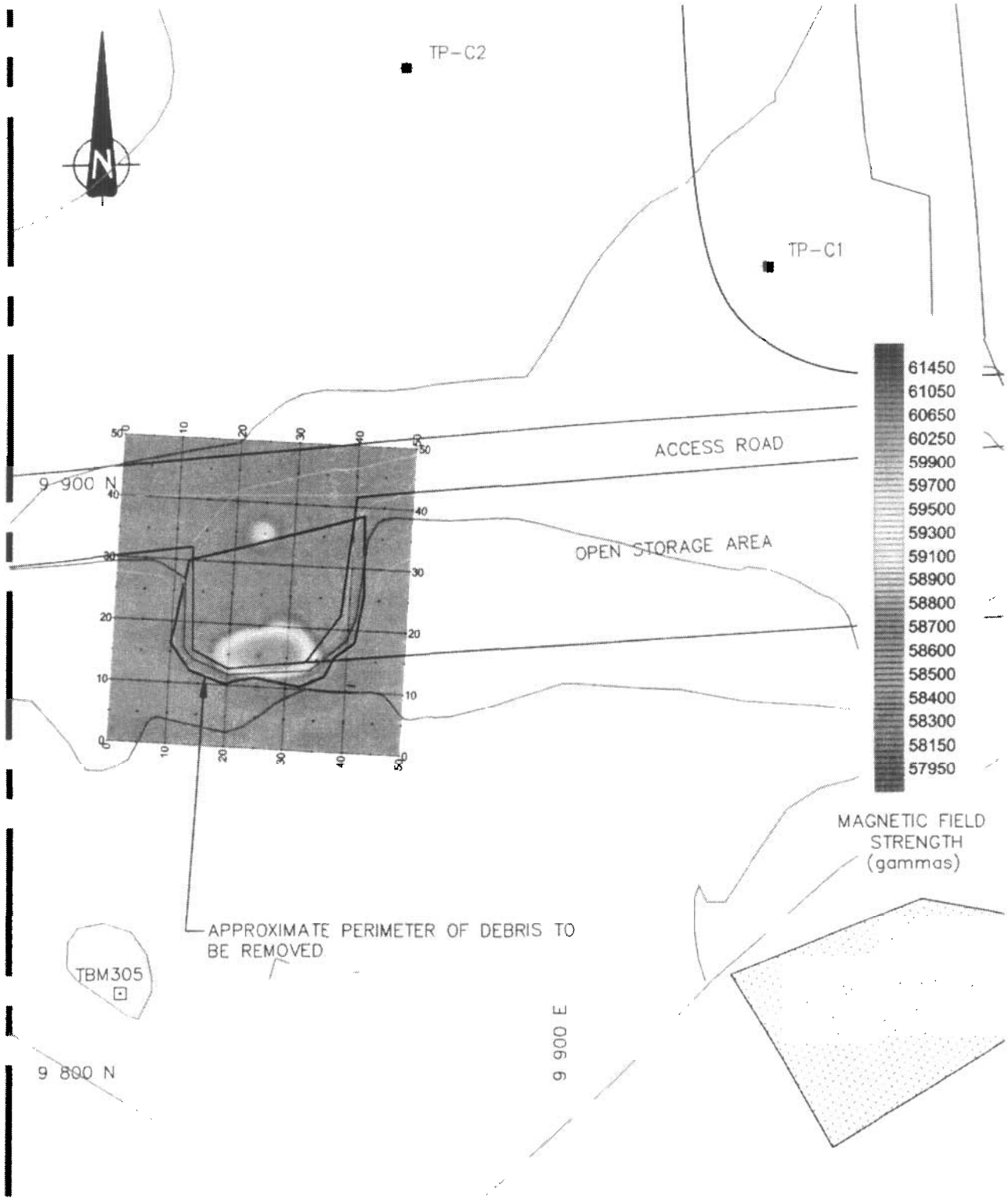


Figure 18
Open Storage Building Pad
Magnetometer Survey - Top Sensor



LEGEND:

■ – TESTPIT LOCATIONS (1992)

⊡ – TEMPORARY BENCHMARK

0 50
metres

Figure 19
Open Storage Building Pad
Magnetometer Survey - Bottom Sensor

APPENDIX A
GEOPHYSICAL SURVEY PROCEDURES

APPENDIX A

A.1 Magnetic Survey Procedure

Two separate systems were used to collect the magnetic data. A Geometrics G856 was used to collect background total magnetic field readings during the course of the survey and a Geometrics G858 was used to collect the field data at each landfill site.

The magnetic base station readings were collected at a location approximately halfway between the beach and the DEW Line buildings. The area was isolated from traffic and had no undesirable metallic debris that might influence the readings. The G856 was installed with a single sensor and then programmed to take a reading every 30 seconds. This data was logged automatically and latter used to correct the total field data collected over the landfills as well as providing a measure of quality control over the quality of the data collected.

The field data was collected using the G858. The unit was configured using two vertically displaced sensors with a one metre separation and was programmed to read every 0.1 seconds. This translated to a horizontal sampling resolution of approximately 1 reading every 8 cm along each profile line. All data collected was logged to an internal data logger with the GPS data being integrated into the same file. Each landfill site was then walked in the manner described in the previous section. A total of approximately 1 million sample points were collected for all sites.

A.2 Magnetic Theory

The theory behind magnetic or gradiometer data at its simplest level one is taking a point measurement of the Earth's total magnetic field strength at a specific location at an instant in time. The earth is surrounded by a magnetic field the strength of which varies by time and location. The variation in time (diurnal variations) are primarily caused by the influence of solar activity and are random in nature, but are at their highest level during periods of intense solar flaring (sunspot activity) and conversely are at their lowest level when the sun is quiet. Usually these variations are less that a few hundred gammas (nanoTesla, nT) in magnitude. Variations due to location on the earth's surface are solely a function of relative position with respect to the earth's magnetic poles. As the magnetic poles drift, so do the location readings. The earth's magnetic field varies by approximately 35,000 gammas from the magnetic poles to the equator.

The reason magnetic data is useful in locating objects such as buried steel tanks relies on the fact that within small areas the earth's background magnetic field can be distorted by the presence of magnetized rocks, soils, and ferrous (iron) objects. This is because these objects also generate an induced field and the background and induced fields will combine and produce resultant total field strength that is a summation of the two magnetic field vectors. By subtracting the earth's background magnetic field from field data and contouring the remainder, objects such as steel tanks can be detected. In general, the effect from natural materials such as rocks and soils is small over small areas and is usually less than 1 gamma/m. Concentrated ferrous debris however, can cause magnetic field distortions of up to 30,000 gammas/m.

A gradiometer differs from a magnetometer only in that two readings of the total magnetic field strength are taken, instead of one, at a specific location and time. As the two readings are taken at slightly different elevations, the difference between the two readings is a reflection of the vertical magnetic gradient at that location. This reading is sensitive to near surface ferrous objects and gradient anomalies can therefore interpreted as an indicator of potential targets.

This difference is plotted as contours on a grid system and provides a visual representation of the location and distribution of magnetic gradient anomalies.

Two different tools were used at this site. The first system, used to collect the magnetic base station data, was a proton precession magnetometer, the second, used to collect the landfill data, was a cesium vapour magnetometer. There are fundamental differences in how the two system measure the earth's magnetic field which make them better suited to the specific tasks that they were used for.

The proton precession magnetometers take advantage of the fact the molecules of hydrocarbon fluids behave as small magnets (dipoles) and therefore will align or polarize themselves with the lines of magnetic flux when exposed to a uniform magnetic field. In the sensor head this is achieved in a controlled fashion by means of an energized electric coil. When the uniform magnetic field is removed, the molecules will rotate (precess) from their polarized orientation in a circular fashion around the direction of the ambient or local magnetic field lines (similar to the way a spinning top will wobble in a circular fashion in the presence of a gravitation field). It turns out that the rate at which this precession occurs is proportional to the intensity of the ambient field. By measuring the rate (frequency) of precession and applying a well known atomic constant (the gyromagnetic ratio of the proton), one can calculate the total magnetic field strength at a specific point in time.

By using this technique to measure total magnetic field strength, measurements can be made utilizing an instrument with no moving parts to an accuracy of 0.1 nT (gammas). The disadvantage of this method is that adequate time has to be allowed for the sensor system to energize (polarize the molecules) and then relax the field and take the reading. This requires a minimum reading rate of no faster than 1 reading every 3 seconds. As the sensor has to be stationary during this period it is difficult to collect data at a high enough rate for real-time evaluation of the data. In addition the system stability and accuracy degrades in the presence of high magnetic gradients and background noise. If correctly tuned and setup however, proton precession magnetometers are ideal for monitoring background magnetic readings at a static location.

A cesium vapour magnetometer offers several advantages over the more traditional proton precession or flux-gate magnetometers, particularly for collecting field readings over large survey areas. These advantages include more stable readings in high field gradients, increased resolution, (0.01 nT) and high sampling rates.

This means that it is possible to use these devices as "real-time" detectors when seeking magnetic anomalies and it also allows data to be collected rapidly with high horizontal data resolutions while walking a site without having to stop at each reading location.

The theory behind how cesium vapour magnetometers work is based on quantum physics. Briefly, the sensor head measures the total magnetic field at a point in space at a reading interval of up to 10 times a second. It does this by shining circularly polarized light through a glass chamber (called an absorption cell) containing a small amount of cesium vapour in a partial vacuum. Cesium vapour is used because it only has one electron present in the atom's outermost electron shell and this simplifies the excitation effect being measured. This electron can exist in 9 different energy states in the presence of an external magnetic field. This effect is called Zeeman splitting. The energy differences from one Zeeman level to the next are approximately equal and are proportional to the strength of the ambient external magnetic field. By shining circularly polarized light generated by a cesium lamp through the absorption cell and measuring the Larmor frequency of an injected RF signal (called the H1 drive) required to reset photons within the absorption cell so that they can absorb that light, one can measure their changes in energy and hence the ambient magnetic field strength. The constant of proportionality between the Larmor frequency and the ambient magnetic field strength is 3.498572 Hz/nT. This value is valid for the full range of typically encountered magnetic field values (20K nT to 90K nT).

A.3 Survey Procedure

Two separate control points were established as GPS base station locations during the course of the surveys. The use of two locations with known locations in each grid system allowed accurate calculation of the transformation equations between the local and UTM. The two base station locations used minimized the risk of radio reception dropout problems between the base station transmitter and the roving receiver.

While collecting geophysical survey data at each site the survey procedure was as follows. The perimeter of the survey area was identified based on topographic and man made features and marker lathe placed as visual references. Data profiles were then collected by walking parallel lines at intervals of either 2.5 or 5 metres. To facilitate staying on line, a rope with 5 metre marks was placed at either end of the survey area and additional visual queries were used as required. The GPS location data was logged every two seconds from the roving unit and correction information was broadcast by the base station every 5 seconds. If a gap of greater than 30 seconds was detected between RTCM correction data packets, the roving GPS would cease to output GPS locations until the situation was rectified.

A.4 Data Processing

The Magnetic gradient data was processed on site to provide preliminary plots indicating the likely distribution of buried debris. These plots were then used as guides to relocate the anomalous areas using the G858 in detection mode and to place pin flags to outline these locations to facilitate sampling.

Once back in the office the data was reprocessed in more detail. The following steps were carried out for all data sets.

- The data was reviewed and all bad magnetic readings removed
- The GPS UTM data was reviewed and edited as necessary.
- The UTM data was converted into the local grid system.
- The magnetic data for each sensor was corrected for diurnal drift and micropulsations using the magnetic base station data yielding top and bottom total magnetic field plots.

The final results are summarized in a total of 9 figures comprising gradient and top and bottom total magnetic field plots for each of the four landfill areas surveyed.

APPENDIX B
PHOTOGRAPHS

Photo 1
PIN-3 Station Area, looking northwest. Burnt module train, sewage lagoon, warehouse, communication building, temporary camp.

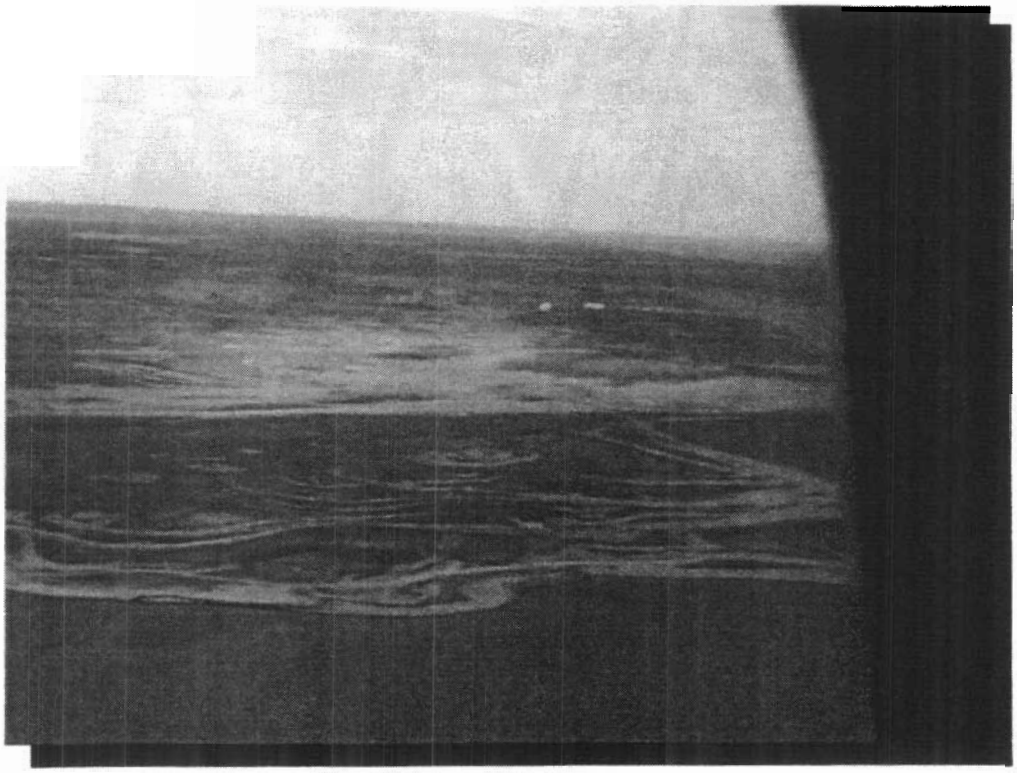


Photo 2
PIN-3 Station Area looking east. NWS and Main landfill in centre of photo.

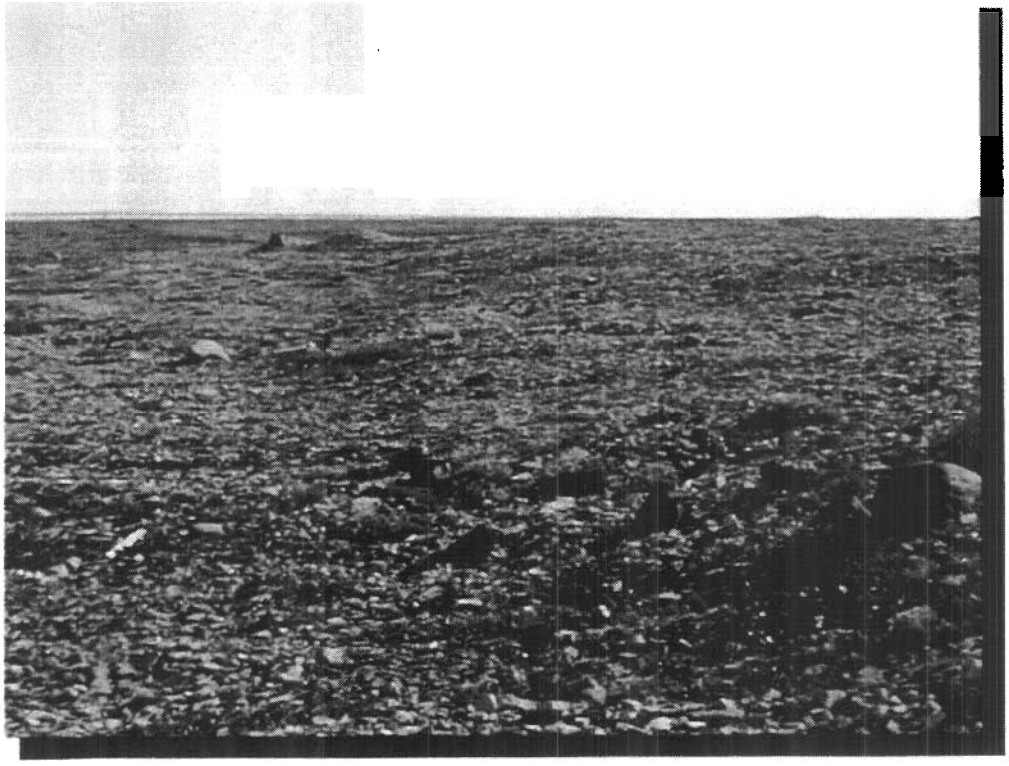


Photo 3
North Landfill - North toe - surface covered with litter.

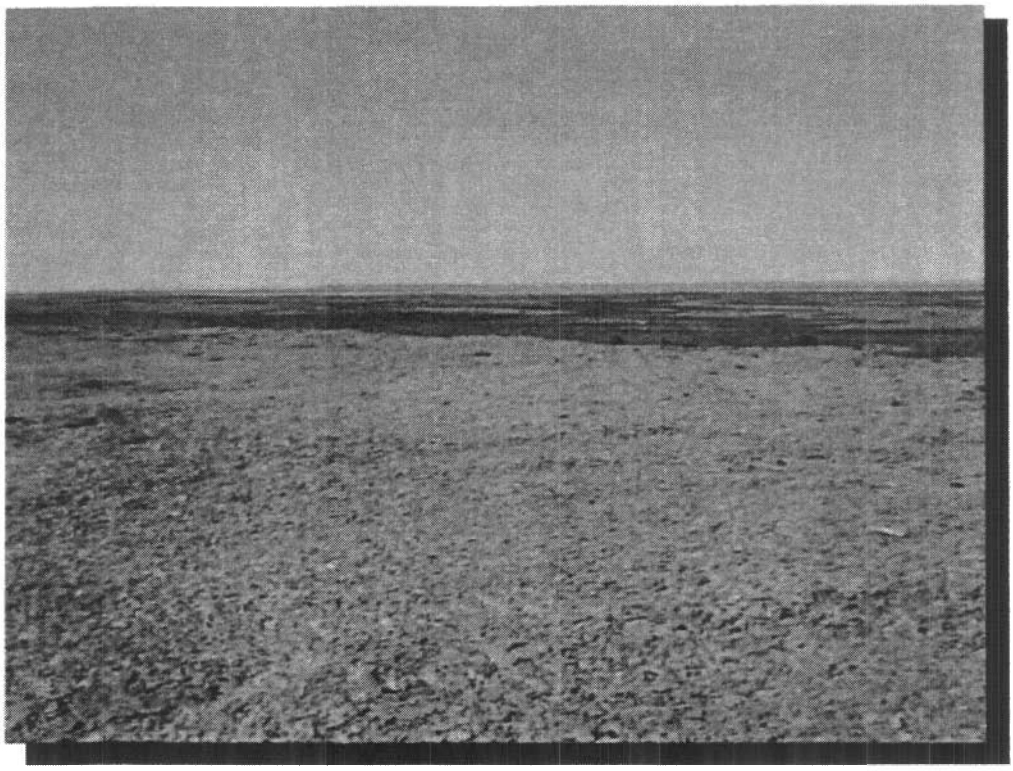


Photo 4
North Landfill - Top of landfill, area littered with tin cans, looking west.

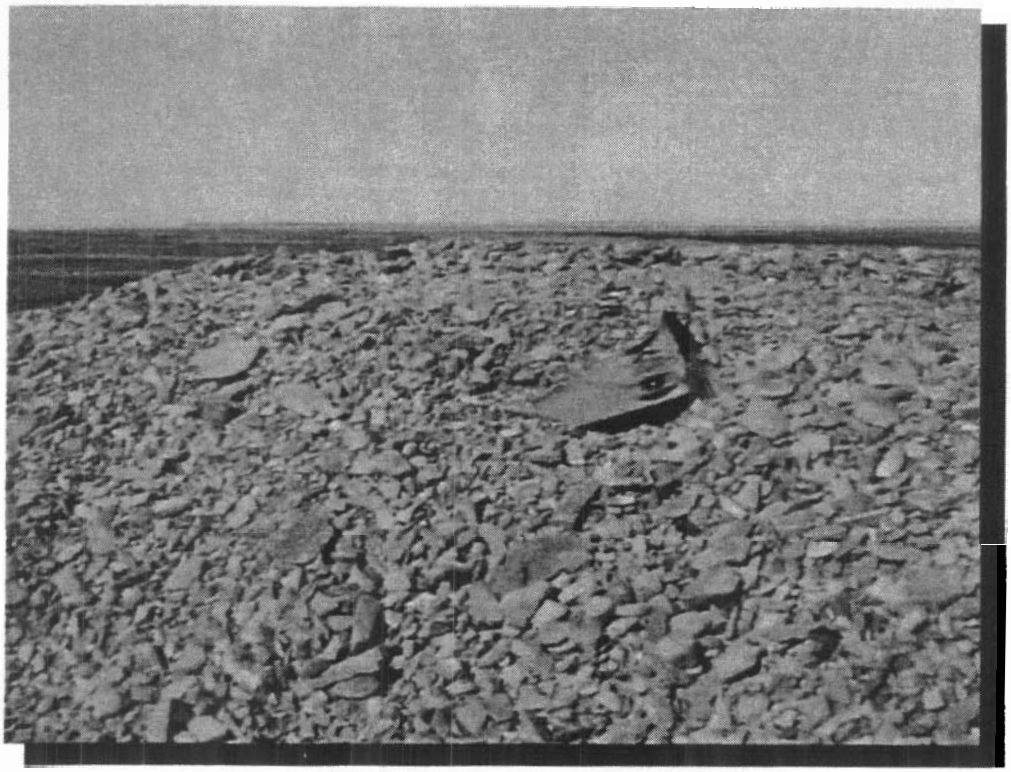


Photo 5
North Landfill - Buried equipment east of North Landfill.

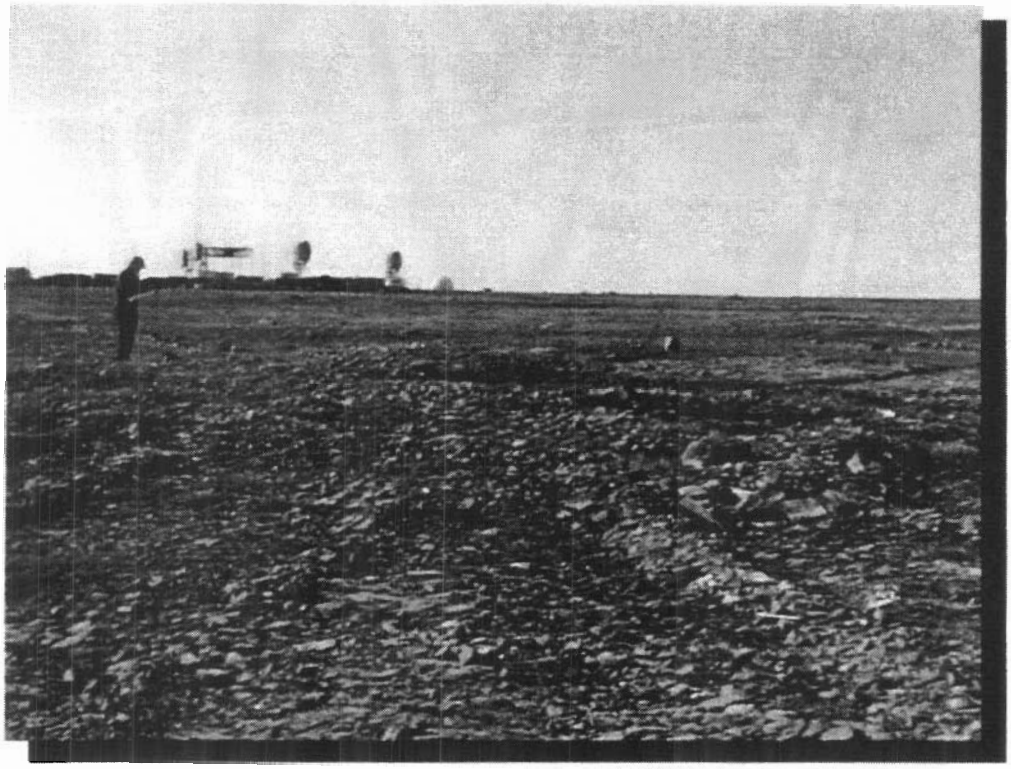


Photo 6
North Landfill - debris pile 100m south of North Landfill, domestic debris, litter.

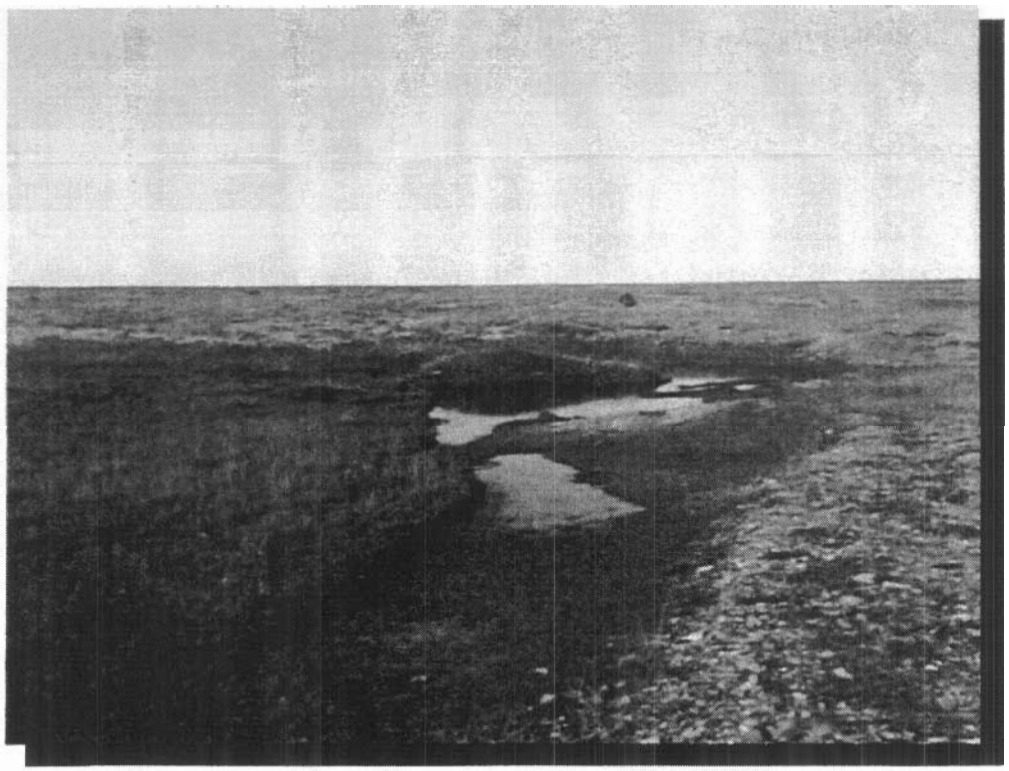


Photo 7
South Landfill - East - Pond at southwest corner, looking north.

Photo 8
South Landfill - East, Partially buried barrel on top of landfill, some subsidence on landfill surface.

Photo 9
Main Landfill - looking north.
Landfill in gravel area right of road.

Photo 10
Main Landfill - north end of landfill at Testpit TP-00-07.
Sand and gravel over bedrock.

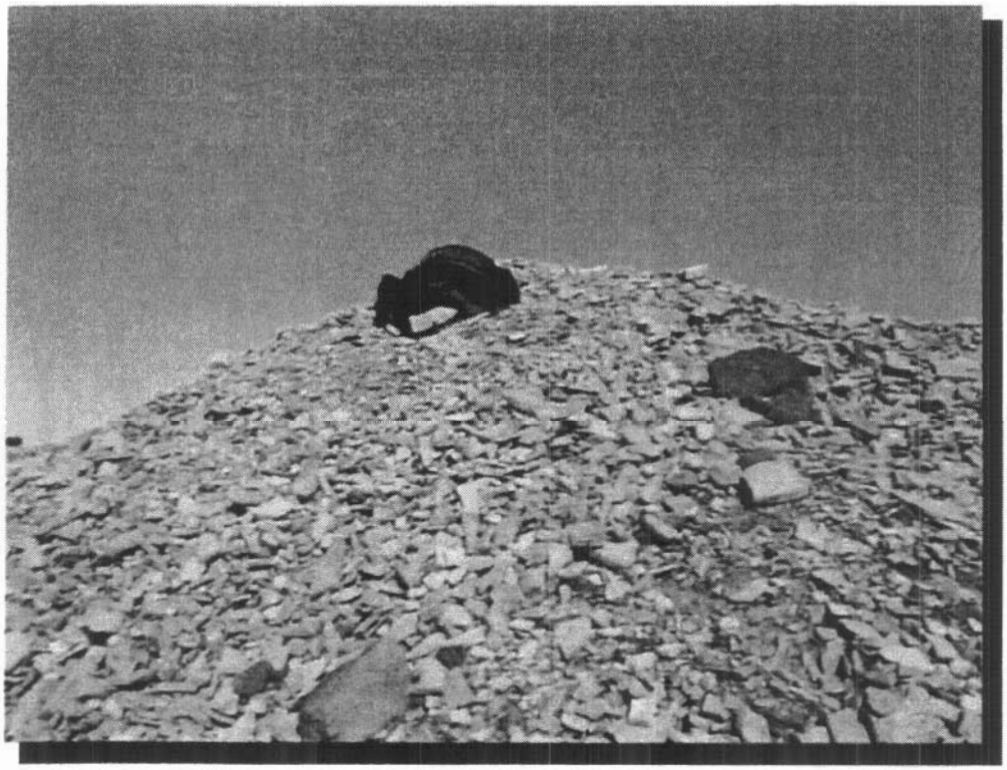


Photo 11
NWS Landfill - Equipment buried in mounds at southwest portion of landfill.

Photo 12
NWS Landfill - litter on top of landfill, partially buried debris, Testpit TP-00-20 in background.

Photo 13
Asbestos Landfill - small mound, west of station, looking east.

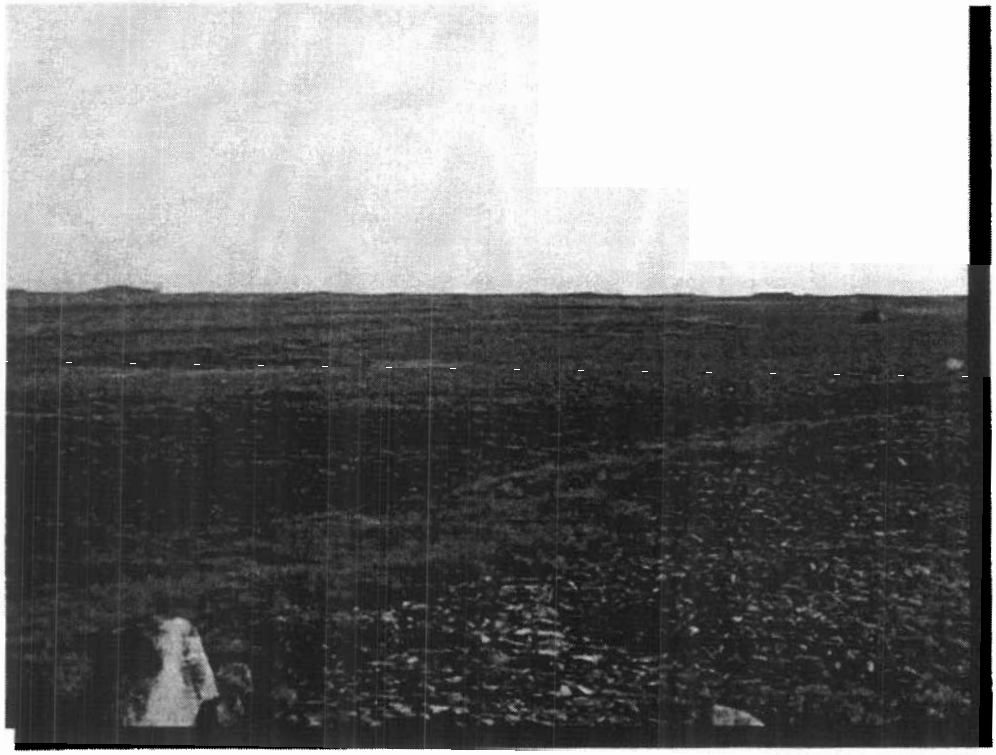


Photo 14
Proposed Pallet Line Landfill - looking southwest. Areas of vegetation between gravel beach ridges.

Photo 15
Proposed Pallet Line Landfill - looking east - Larger beach ridge along north side.

Photo 16
Proposed Airstrip Landfill - Looking north from testpit TP-00-36.

Photo 17
Proposed Airstrip Landfill - Toe of area, boulders at south side, tundra south of area.

Photo 18
Proposed Station Landfill - Looking north.
Scattered boulders, some vegetation.

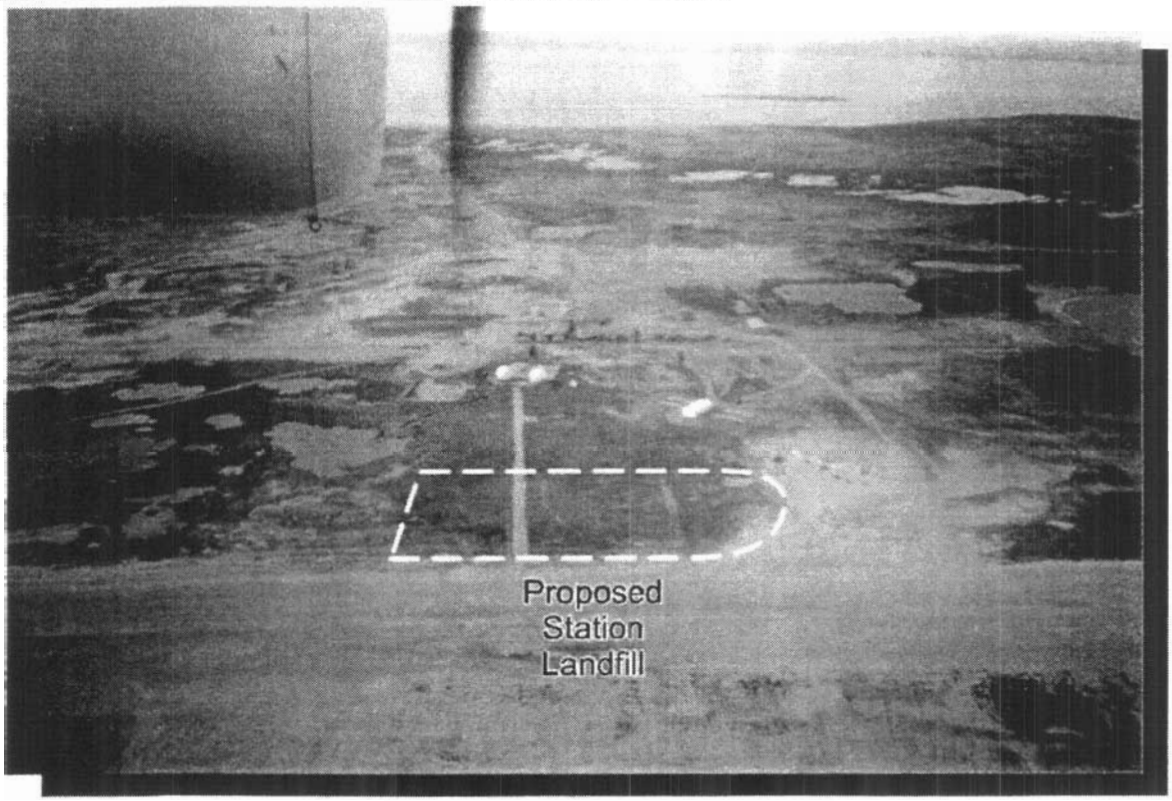


Photo 19
Proposed Station Landfill - looking north.

Photo 20
Proposed Landfarm Area - looking east from west side. Gravel beach ridges and some surface vegetation.

Photo 21
Proposed Landfarm Area - looking northeast from the west. Pallet line in distance.

Photo 22
North Debris Area - 2km north of station

Photo 23
Garage Debris - 100m north of garage. Buried and partially buried debris.

Photo 24
Austin Bay Debris - Buried and partially debris covered with sand and gravel.

Photo 25
Mogas Debris - Partially buried timbers on south side of fill pad.

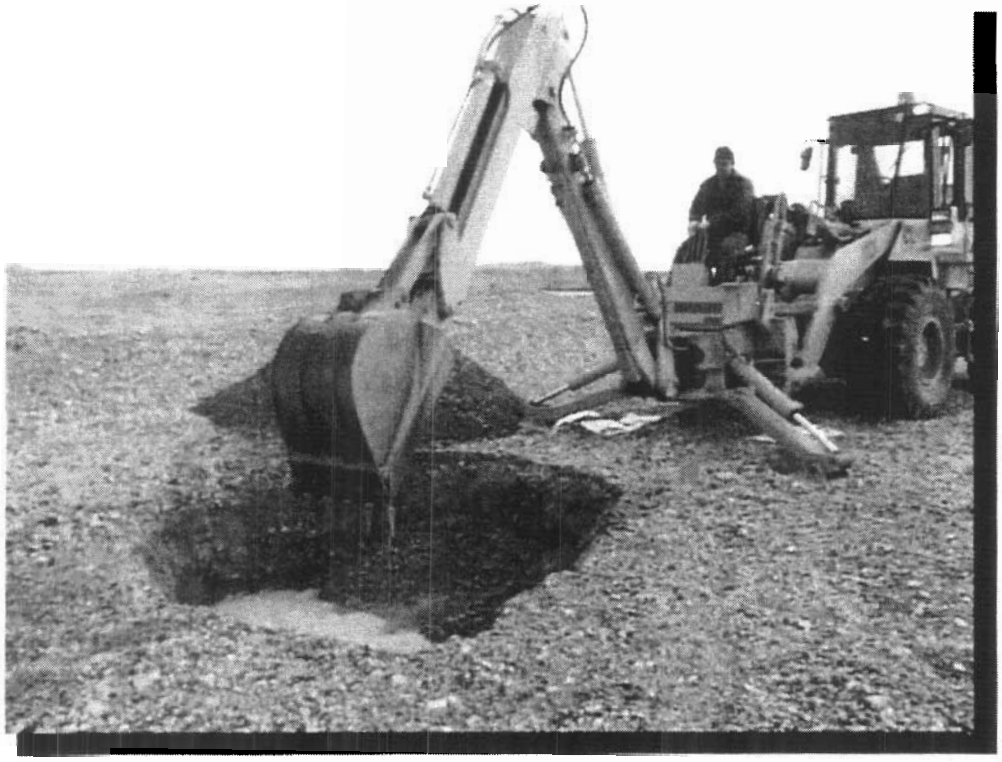


Photo 26
Borrow Area #1 - North East Airstrip.
Shallow groundwater.

Photo 27
Borrow Area #9 Marine Terrace

Photo 28
Borrow Area #4 Beach Ridges North NWS Landfill - Coarse gravel

Photo 29
Borrow Area #5 South East Airstrip

Photo 30
Borrow Area #6 Marine Terrace at northeast end of airstrip.

APPENDIX C
TESTPIT LOGS

PIN-3
TEST PIT LOGS

Test Pit	Depth (m)	Description
TP-00-01		**Main Landfill** - Toe
	0.0	Gravel, some sand, trace of cobbles, angular, moist
	0.6	Bedrock
	0.6	End of hole (Stopped due to refusal on rock)
TP-00-02		**Main Landfill** - Toe
	0.0	Gravel – sandy, trace of organics in top 100mm, angular, poorly graded, moist, brown
	0.5	Bedrock - platy
	0.5	End of hole (Stopped due to refusal on rock)
TP-00-03		**Main Landfill** – Toe, Undisturbed Area
	0.0	Peat – organics, moist
	0.05	Sand and Gravel – angular, moist, brown
	0.6	Bedrock - platy
	0.6	End of hole (Stopped due to refusal on rock)
		Sample at 0.3 metres
TP-00-04		**Main Landfill**
	0.0	Sand and Gravel – 50mm diameter, angular, poorly graded, damp, Brown
	0.4	Bedrock
	0.4	End of hole (Stopped due to refusal on rock)
TP-00-05		**Main Landfill**
	0.0	Sand and Gravel
	0.1	- debris, tin cans, rebar, plastic liner, glass
	0.2	End of hole
TP-00-06		**Main Landfill**
	0.0	Sand and Gravel – trace of organics in top 100mm, 50mm diameter
	1.5	End of hole
TP-00-07		**Main Landfill**
	0.0	Sand and Gravel – tin can on surface, trace of organics in top 100mm, angular, poorly graded
	0.3	- fabric
	1.2	Bedrock
	1.2	End of hole (Stopped due to refusal on rock)
		Water – trace at bottom
TP-00-08		**Main Landfill**
	0.0	Sand and Gravel – angular, poorly graded, moist
	1.2	Bedrock
	1.2	End of hole (Stopped due to refusal on rock)
		Samples at 0.3, 0.6 and 0.9 metres
TP-00-09		**Main Landfill**
	0.0	Gravel – sandy
	0.1	- debris, metal pipe, barrel, plastic, tin cans
	0.3	End of hole
TP-00-10		**Main Landfill** - 7m off of road
	0.0	Gravel – some sand, 100mm mat, angular, moist
	0.4	Bedrock
	0.4	End of hole (Stopped due to refusal on rock)

Test Pit	Depth (m)	Description
TP-00-11		**Main Landfill** - 5m off of edge of road
	0.0	Gravel – trace of sand, to 100mm diameter, angular
	0.1	- copper pipe
	0.2	End of hole
TP-00-12		**NWS Landfill** - Area A
	0.0	Gravel – some sand, to 100mm diameter, angular, moist
	0.3	Sand and Gravel (Fill) – to 75mm diameter, interbedded, angular, moist
	1.2	- wet, seepage
	1.4	End of hole (Stopped due to refusal on frozen ground or rock)
		Water – 1.2 metres at 5 minutes
		Samples at 0.3 and 0.7 metres
TP-00-13		**NWS Landfill** - bottom of Area A, top of Area B
	0.0	Gravel – sandy, trace of cobbles and boulders, angular, brown
	0.4	- seepage
	0.5	Silt – sandy, trace of gravel, low plastic
	1.3	Bedrock - competent
	1.3	End of hole (Stopped due to refusal on rock)
TP-00-14		**NWS Landfill** - Area D
	0.0	Sand and Gravel – trace of boulders
	0.3	- barrel filled with water
	0.4	End of hole
TP-00-15		**NWS Landfill** - Area D, 5m back from TP-00-14
	0.0	Sand and Gravel – trace of boulders, moist
	0.8	Silt – trace of gravel and clay, wet, low plastic, brown
	1.2	End of hole (Stopped due to refusal on rock)
		Sample at 0.9 metres
TP-00-16		**NWS Landfill** - Area E
	0.0	Peat – sandy, some gravel, moist, black
	0.2	Sand – gravelly, moist, brown
	0.5	End of hole (Stopped due to refusal on rock)
TP-00-17		**NWS Landfill** - Area E
	0.0	Gravel – trace of sand, angular
	0.2	Sand and Gravel – angular, moist, brown
	0.5	End of hole (Stopped due to refusal on rock)
TP-00-18		**NWS Landfill** - Area E, above barrel area
	0.0	Gravel – trace of sand, angular
	0.7	End of hole (Stopped due to refusal on rock)
TP-00-19		**NWS Landfill**
	0.0	Gravel – trace of sand and cobbles, to 75mm diameter, angular, moist, grey brown
	1.1	End of hole (Stopped due to refusal on frozen ground)
		Sample at 0.5 metres
TP-00-20		**NWS Landfill**
	0.0	Gravel – some sand, some organics in top 100mm, angular, moist, brown
	0.9	End of hole (Stopped due to refusal on rock)
TP-00-21		**NWS Landfill**
	0.0	Organics - some sand and gravel, moist, black
	0.1	Sand and Gravel – trace of cobbles, angular, brown
	0.4	End of hole (Stopped due to refusal on rock)

Test Pit	Depth (m)	Description
TP-00-22		**Austin Bay Debris Pile** - Top of pad
	0.0	Gravel – sandy, trace of organics in top 50mm, no visible debris,
	0.4	angular
		End of hole
TP-00-23		**South Landfill** - Toe
	0.0	Sand – trace of gravel and silt, organics and roots in top 100mm,
		wet, brown
	0.3	Sand – silty, trace of gravel, medium grained, organic smell, grey
		and black
	0.6	- seepage
	0.7	Sand and Silt – trace of gravel and clay, very wet, low plastic,
		orange
	1.2	End of hole
		Samples at 0.3, 0.6 and 0.9 metres
TP-00-24		**South Landfill**
	0.0	Sand – silty, trace of gravel, organics and rootlets in top 100mm,
		wet, brown grey
	0.1	- brown
	0.4	End of hole
TP-00-25		**South Landfill**
	0.0	Sand – silty, trace of organics and gravel, very wet, brown
	0.1	- some gravel
	0.3	- seepage
	0.6	End of hole
		Water at 0.5 metres at 5 minutes
		Sample at 0.3 metres
TP-00-26		**South Landfill**
	0.0	Sand – trace of silt and gravel, trace of organics in top 100mm, wet,
		brown
	0.4	- very wet, black
	0.5	- seepage
	0.6	Sand and Gravel – trace of silt, very wet
	0.75	Sand and Silt – trace of clay, no permafrost
	1.2	End of hole
		Samples at 0.3, 0.6 and 0.9 metres
TP-00-27		**Beach Landfill**
	0.0	Gravel – some sand, angular
	0.3	- boulder
	0.5	- seepage
	0.5	Sand – silty, some gravel
	1.4	- sloughing
	1.7	End of hole (Stopped due to refusal on frozen ground)
TP-00-28		**Beach Landfill**
	0.0	Sand and Gravel – trace of silt, angular, wet
	0.3	- seepage
	0.4	End of hole
TP-00-29		**South Beach Landfill**
	0.0	Sand – some gravel, angular, fine grained, poorly graded
	0.9	Gravel – some sand and clay, angular, very wet
	0.9	End of hole

Test Pit	Depth (m)	Description
TP-00-30		**South Beach Landfill** - in drainage channel below south landfill
	0.0	Sand – some gravel to 50mm diameter, wet
	0.3	- clayey, seepage
	0.3	End of hole
	0.5	Water – 0.3 metres at 5 minutes
TP-00-31		**Proposed Airstrip Landfill**
	0.0	Gravel – trace of sand and cobbles, angular, platy, dry, grey brown
	0.6	End of hole
		Sample at 0.4 metres
TP-00-32		**Proposed Airstrip Landfill**
	0.0	Sand and Gravel – angular, dry, grey brown
	0.15	End of hole (Stopped due to refusal on rock)
TP-00-33		**Proposed Airstrip Landfill**
	0.0	Sand and Gravel, trace of cobbles, angular, moist, brown
	0.6	End of hole (Stopped due to refusal on rock)
		Sample at 0.3 metres
TP-00-34		**Proposed Airstrip Landfill**
	0.0	Sand and Gravel, some silt, trace of organics in top 50mm, gravel to 100mm diameter, angular, well graded, moist
	0.5	- seepage
	0.6	End of hole
		Water – 0.5 metres at 5 minutes, 0.45 metres at 12 hours
		Sample at 0.1 to 0.4 metres
TP-00-35		**Proposed Airstrip Landfill**
	0.0	Gravel – some silt and sand, trace of organics in top 100mm, gravel to 100mm
	0.5	diameter, angular, moist, blackish brown
		End of hole
		Sample at 0.5 metres
TP-00-36		**Proposed Airstrip Landfill**
	0.0	Gravel – sandy, some silt, rootlets, trace of organics in top 200mm, angular, moist, blackish brown
	0.2	- brown
	0.75	Gravel – coarse grained sand
	0.75	- seepage
	1.2	End of hole (Stopped due to refusal on rock)
		Water – 0.75 metres at 10 minutes
		Sample at 0.5 metres
TP-00-37		**Proposed Airstrip Landfill**
	0.0	Sand and Gravel – trace of silt, cobbles and boulders
	0.6	Bedrock – shale, platy
	0.6	End of hole (Stopped due to refusal on rock)
		Sample at 0.5 metres
TP-00-38		**South East Airstrip Borrow**
	0.0	Sand and Gravel – trace of cobbles, to 100mm diameter, moist, Brown
	0.6	- interbedded coarse grained sand layers
	1.5	End of hole (Stopped due to refusal on rock)

Test Pit	Depth (m)	Description
TP-00-39		**South East Airstrip Borrow**
	0.0	Sand and Gravel – trace of cobbles, angular, medium grained, moist, brown
	0.9	Bedrock – platy
	0.9	End of hole (Stopped due to refusal on rock)
		Sample at 0.1 metres
TP-00-40		**South East Airstrip Borrow** – In top of are 20m south of
	0.0	Sand and Gravel – trace of cobbles, trace of organics in top 100mm, angular, moist, brown
	1.2	- seepage
	1.4	End of hole
		Water – 1.2 metres at 5 minutes
		Sample at 0.8 metres
TP-00-41		**South East Airstrip Borrow** – In lower portion of area
	0.0	Gravel – some sand, angular, dry to moist
	0.9	End of hole (Stopped due to refusal on rock)
TP-00-42		**South East Airstrip Borrow** – In lower beach ridge
	0.0	Peat – organics, wet
	0.1	Sand and Gravel – trace of cobbles
	0.6	Sand
	0.7	Gravel – trace of sand
	0.9	- fractured rock
	0.9	End of hole (Stopped due to refusal on rock)
		Water – 0.7 metres at 5 minutes
TP-00-43		**South East Airstrip Borrow** – Below beach ridges
	0.0	Peat – organics, trace of sand, moist, black
	0.15	Sand – trace of gravel
	0.4	- seepage
	0.5	End of hole
TP-00-44		**South East Airstrip Borrow** – Below beach ridges
	0.0	Peat – organics, trace of sand, moist, black
	0.15	Sand and Gravel – moist
	0.3	Sand – uniform, moist, grey brown
	0.4	Sand and Gravel
	0.5	End of hole
TP-00-45		**South East Airstrip Borrow** – Beach ridge east of airstrip
	0.0	Gravel – some sand, gravel to 100mm diameter, poorly graded,
	0.3	moist, brown
	1.0	- wet
	1.1	Bedrock – fractured
	1.1	End of hole (Stopped due to refusal on rock)
TP-00-46		**North East Airstrip Borrow** –Northeast end of airstrip
	0.0	Sand and Gravel – trace of silt, gravel to 100mm diameter, subangular, brown
	0.7	- seepage
	1.0	Gravel
	1.1	End of hole
		Samples 0.7 and 0.8 metres

Test Pit	Depth (m)	Description
TP-00-47		**North East Airstrip Borrow** – Side of excavated area
	0.0	Sand and Gravel – clean, coarse grained, gravel to 50mm diameter, dry, brown
	0.4	- trace of silt, medium grained
	1.0	End of hole
TP-00-48		**Borrow Area 1**
	0.0	Sand and Gravel – trace of silt, well graded, gravel to 50mm diameter, subangular, grey brown
	0.8	- seepage
	1.2	End of hole
		Sample at 0.5 metres
TP-00-49		**Borrow Area 1**
	0.0	Gravel – trace of sand and organics, angular
	0.1	Sand and Gravel – trace of silt, angular, well graded, gravel to 100mm diameter
	0.6	Sand – some gravel, trace of silt
	1.1	- seepage
	1.3	Bedrock - competent
	1.3	End of hole (Stopped due to refusal on rock)
		Water – 1.2 metres at 5 minutes
TP-00-50		**Proposed Airstrip Landfill**
	0.0	Sand and Gravel (Fill) – clean, well graded, gravel to 50mm diameter, subangular, grey brown
	0.5	End of hole
TP-00-51		**Proposed Airstrip Landfill**
	0.0	Peat – sandy, rootlets, moist, black
	0.1	Sand and Gravel – clean, well graded, subangular, gravel to 100mm diameter, grey brown
	0.3	End of hole
TP-00-52		**Proposed Airstrip Landfill**
	0.0	Sand and Gravel (fill) - clean, well graded, gravel to 50 mm diameter, subangular, grey, brown.
	0.5	End of hole
TP-00-53		**Proposed Airstrip Landfill**
	0.0	Peat – sandy, rootlets, moist, black
	0.1	Sand and Gravel – clean, well graded, subangular, gravel to 100mm diameter, grey brown
	0.5	End of hole
TP-00-54		**Proposed Landfill North of Pallet Line**
	0.0	Gravel – some coarse grained sand, angular, gravel to 100mm diameter, dry, grey brown
	0.1	- some medium grained sand
	0.4	End of hole
TP-00-55		**Borrow Area 1**
	0.0	Sand and Gravel – subangular, well graded, gravel to 50mm diameter, brown
	0.6	- hole sloughed in filled with water immediately
	1.5	End of hole
		Water – 0.5 metres at 5 minutes

Test Pit	Depth (m)	Description
TP-00-56		**Proposed Landfill North of Pallet Line**
	0.0	Fractured Bedrock – some organics, moist, black brown
	0.1	Bedrock
	0.1	End of hole (Stopped due to refusal on rock)
TP-00-57		**Proposed Landfill North of Pallet Line**
	0.0	Gravel – angular, gravel to 75mm diameter, dry, grey brown
	0.1	- some medium grained sand
	0.3	End of hole
TP-00-58		**Proposed Landfill North of Pallet Line**
	0.0	Gravel – angular, to 75mm diameter, dry, grey brown
	0.3	- some coarse grained sand
	0.4	End of hole
TP-00-59		**Proposed Landfill North of Pallet Line**
	0.0	Sand and Gravel – some organics, blackish brown
	0.1	Bedrock
	0.1	End of hole (Stopped due to refusal on rock)
TP-00-60		**Proposed Landfill North of Pallet Line**
	0.0	Sand and Gravel – some organics, blackish brown
	0.1	Bedrock
	0.1	End of hole (Stopped due to refusal on rock)
TP-00-61		**Proposed Landfill North of Pallet Line**
	0.0	Gravel – some medium grained sand, organics in top 50mm, poorly graded, angular
	0.2	End of hole
TP-00-62		**Proposed Landfill North of Pallet Line**
	0.0	Gravel – some coarse grained sand, angular, gravel to 100mm diameter, dry, grey brown
	0.1	- some medium grained sand
	0.4	End of hole
TP-00-63		**Proposed Landfill North of Pallet Line**
	0.0	Silt and Gravel – sandy, rock fragments
	0.15	Bedrock
	0.15	End of hole (Stopped due to refusal on rock)
TP-00-64		**Proposed Landfill North of Pallet Line**
	0.0	Silt – organics, roots, slate fragments
	0.2	- sandy, mixed with rock fragments
	0.35	End of hole (Stopped due to refusal on rock)
TP-00-65		**Proposed Landfill North of Pallet Line**
	0.0	Topsoil – grass, moss, fractured rock
	0.1	Bedrock – fractured slate, dry
	0.2	End of hole (Stopped due to auger refusal)
TP-00-66		**Proposed Landfill North of Pallet Line** – on a beach ridge
	0.0	Gravel – 2-50mm diameter, rounded to angular
	0.05	- cobbles, silt, well gravel, dry
	0.5	End of hole
TP-00-67		**Proposed Landfill North of Pallet Line** – Between 2 beach ridges
	0.0	Sand - silty
	0.1	Bedrock – fragments to 200mm diameter, weathered
	0.3	End of hole (Stopped due to refusal on rock)

Test Pit	Depth (m)	Description
TP-00-68		**Proposed Landfill North of Pallet Line** – On a low beach ridge
	0.0	Gravel – clean, angular, well graded
	0.1	- sandy
	0.4	Bedrock – fragments, angular, dry
	0.4	End of hole (Stopped due to refusal on rock)
TP-00-69		**Landfarm** – edge of a beach ridge
	0.0	Cobbles and Gravel – clean, angular, oblate
	0.2	Bedrock – slate fragments, mixed with organics, platy, moist
	0.2	End of hole (Stopped due to refusal on rock)
TP-00-70		**Proposed Landfill North of Pallet Line**
	0.0	Gravel – organics, well weathered slate
	0.25	Bedrock – slate, dry to damp
	0.25	End of hole (Stopped due to refusal on rock)
TP-00-71		**Proposed Landfill North of Pallet Line**
	0.0	Sand – gravelly, rock fragments, dry to moist
	0.1	Bedrock – fragmented, weathered
	0.1	End of hole (Stopped due to refusal on rock)
TP-00-72		**Landfarm**
	0.0	Sand – some oxidization, slightly rounded cobbles, trace of organics, fine to medium grained, moist
	0.2	Bedrock – fragmented, compacted
	0.3	End of hole (Stopped due to refusal on rock)
TP-00-73		**Landfarm**
	0.0	Gravel – 2-50mm diameter, rounded to angular
	0.05	- cobbles, silt, well gravel, dry
	0.5	End of hole
TP-00-74		**Landfarm**
	0.0	Peat – silty, organics, angular rock fragments, platy, moist
	0.3	Bedrock - fragments
	0.3	End of hole (Stopped due to refusal on rock)
TP-00-75		**Borrow #9, Marine Terrace**
	0.0	Sand and Gravel – trace of organic in top 100mm, wet, brown
	0.3	- very wet, seepage
	0.7	- black
	0.9	End of hole
		Water – 0.5 metres at 5 minutes
TP-00-76		**Borrow #9, Marine Terrace**
	0.0	Sand – trace of silt, fine grained, wet, brown
	0.2	- 25mm thick organic layer
	0.3	- seepage
	0.6	- clayey, grey
	0.9	Sand and Gravel
	1.0	End of hole
		Water at 0.6 metres at 5 minutes
TP-00-77		**Borrow behind Beach Landfill**
	0.0	Sand – silty, some gravel, trace of organics in top 100mm, moist, fine grained, brown
	0.6	- seepage
	0.7	- clayey, trace of gravel, very wet, non plastic
	1.1	End of hole
		Sample at 0.7 metres

Test Pit	Depth (m)	Description
TP-00-78		**South Landfill** – 25m North
	0.0	Sand – trace of gravel, interbedded, fine grained, moist
	0.3	- very wet, seepage
	0.7	- clayey, trace of gravel, very wet
	1.1	End of hole
TP-00-79		**Between POL and Beach Landfills**
	0.0	Sand – some gravel trace of silt and gravel, fine grained, brown
	0.4	- organic odour, soft, black
	0.4	End of hole
		Sample at 0.9 metres
TP-00-80		**Proposed Station Landfill**
	0.0	Sand and Silt – gravel , cobbles, organics, moist
	0.3	Sand – trace of gravel, medium grained, uniform, moist
	0.5	Bedrock – or boulder
	0.5	End of hole (Stopped due to refusal on rock)
TP-00-81		**Proposed Station Landfill**
	0.0	Sand – 150 and 300mm thick cobble beds, shell fragments, trace of oxidization, well graded, moist, brown
	0.5	End of hole (Stopped due to refusal on rock)
TP-00-82		**Proposed Station Landfill**
	0.0	Sand and Gravel – grass cover, angular, moist, blackish brown
	0.3	End of hole (Stopped due to refusal on rock)
TP-00-83		**Proposed Station Landfill**
	0.0	Sand and Gravel – trace of organics, blackish brown
	0.1	End of hole (Stopped due to refusal on rock)
TP-00-84		**Proposed Station Landfill** – Edge of airstrip
	0.0	Sand and Gravel – trace of silt, well graded, angular, gravel to 75mm diameter, moist, brown
	0.5	End of hole
TP-00-85		**Proposed Station Landfill**
	0.0	Organics – sandy
	0.1	Sand – some platy bedrock fragments, fine to medium grained, Damp
	0.3	End of hole (Stopped due to refusal on rock)
TP-00-86		**Borrow Area 4**
	0.0	Gravel – some cobbles, angular, poorly graded, platy, dry, grey
	0.5	End of hole

APPENDIX D
GEOTECHNICAL LABORATORY ANALYSIS RESULTS

Table D1
Moisture & Salinity Contents from Testpit Samples

Testpit #	Depth	Moisture Content (%)	Salinity (parts per thousand, ppt)
3	0.3	2.3	
8	0.3	2.1	
8	0.6	3.0	
8	0.9	6.4	
12	0.3	2.3	
12	0.7	1.6	
15	0.9	8.7	
23	0.3	10.7	
23	0.6	8.3	
23	0.9	8.7	
25	0.3	24.2	
26	0.3	14.8	4
26	0.6	10.9	8
26	0.9	10.7	8
31	0.3	2.0	
33	0.2	2.0	
34	0.4	4.8	
35	0.5	5.9	
36	0.5	2.6	2
37	0.5	3.7	
38	1.3	1.6	0
39	0.7	2.7	25
40	0.8	2.4	0
43, 44	0.4	4.4	
46	0.8	7.8	4
48	0.5	1.1	29
77	0.8	9.2	6
79	0.4	5.2	5
104	0.4	17.4	
105	0.2	20.3	
108	0.3	16.0	
110	0.2	18.8	
115	0.4	22.2	
118	0.7	10.2	
119	0.9	11.4	

PROJECT: PIN-3 DLCU SITE INVESTIGATION	LOCATION: SEE SITE PLAN	BOREHOLE NO: UMA0102
CLIENT: DEFENCE CONSTRUCTION CANADA	DRILLING METHOD: HAND	PROJECT NO: 0171-095-75-01
PROJECT ENGINEER: RRM		ELEVATION:

SAMPLE TYPE: GRAB SAMPLE | SHELBY TUBE | SPT SAMPLE | A-CASING | NO RECOVERY | CORE SAMPLE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SIL 9 SAND

DEPTH(m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	PLASTIC / M.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	REMARKS	DEPTH(ft)
0.0	OL		TOPSOIL - sandy, orgainic rich, rootlets						0.0
	CB		COBBLES - flat, platey, up to 20 cm dia. oblique to angular - wet						
			END OF TEST PIT - refusal on cobbles						
1.0									2.0
									4.0
									6.0
2.0									

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COMPLETION DEPTH: 0.3 m
COMPLETE: 08/07/01

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PROJECT: PIN-3 DLCU SITE INVESTIGATION	LOCATION: SEE SITE PLAN	BOREHOLE NO: UMA0103
CLIENT: DEFENCE CONSTRUCTION CANADA	DRILLING METHOD: HAND	PROJECT NO: 0171-095-75-01
PROJECT ENGINEER: RRM		ELEVATION:

SAMPLE TYPE: GRAB SAMPLE | SHELBY TUBE | SPT SAMPLE | A-CASING | NO RECOVERY | CORE SAMPLE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SIL 9 SAND

DEPTH(m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	PLASTIC / M.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	REMARKS	DEPTH(ft)
0.0	OL		TOPSOIL - sandy, orgainic rich, rootlets						0.0
	GW		GRAVEL - well graded, cobbley (angular, platey) sandy, well draining, wet - saturated						
1.0			END OF TEST PIT - refusal on cobbles/fractured bedrock						2.0
									4.0
2.0									6.0

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01/08/29 10:31 AM (DRDREW)

PROJECT: PIN-3 DLCU SITE INVESTIGATION	LOCATION: SEE SITE PLAN	BOREHOLE NO: UMA0104
CLIENT: DEFENCE CONSTRUCTION CANADA	DRILLING METHOD: HAND	PROJECT NO: 0171-095-75-01
PROJECT ENGINEER: RRM		ELEVATION:

SAMPLE TYPE: GRAB SAMPLE | SHELBY TUBE | SPT SAMPLE | A-CASING | NO RECOVERY | CORE SAMPLE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SIL 9 SAND

DEPTH(m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	PLASTIC / M.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	REMARKS	DEPTH(ft)
0.0	OL		TOPSOIL - sandy, orgainic rich, rootlets						0.0
	SW		SAND - gravelly, trace fines, well graded, compact, wet to saturated, well draining						
▼			- saturated		1				▼
			- increased cobbles, platey, angular up to 5 cm dia.						2.0
			END OF TEST PIT - too much sloughing						
1.0									4.0
2.0									6.0

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REVIEWED BY: GJE
Fig. No:

COMPLETION DEPTH: 0.9 m
COMPLETE: 08/07/01

01/08/29 10:31AM (EN20EW)

PROJECT: PIN–3 DLCU SITE INVESTIGATION	LOCATION: SEE SITE PLAN	BOREHOLE NO: UMA0105
CLIENT: DEFENCE CONSTRUCTION CANADA	DRILLING METHOD: HAND	PROJECT NO: 0171–095–75–01
PROJECT ENGINEER: RRM		ELEVATION:

SAMPLE TYPE: GRAB SAMPLE | SHELBY TUBE | SPT SAMPLE | A–CASING | NO RECOVERY | CORE SAMPLE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SIL 9 SAND

DEPTH(m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	PLASTIC / M.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	REMARKS	DEPTH(ft)
0.0	OL	TOPSOIL – sandy, orgainic rich, rootlets						0.0
	SW	SAND – medium grained, cobbley (angular bedrock fragments up to 10 cm dia), trace fines, well graded, wet, oxidized – saturated		1				
		END OF TEST PIT – too much sloughing						
1.0								2.0
								4.0
								6.0
2.0								

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PROJECT: PIN-3 DLCU SITE INVESTIGATION	LOCATION: SEE SITE PLAN	BOREHOLE NO: UMA0106
CLIENT: DEFENCE CONSTRUCTION CANADA	DRILLING METHOD: HAND	PROJECT NO: 0171-095-75-01
PROJECT ENGINEER: RRM		ELEVATION:

SAMPLE TYPE: GRAB SAMPLE | SHELBY TUBE | SPT SAMPLE | A-CASING | NO RECOVERY | CORE SAMPLE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SIL 9 SAND

DEPTH(m)	USC	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	PLASTIC / M.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	REMARKS	DEPTH(ft)
0.0	OL	TOPSOIL – sandy, orgainic rich, rootlets						0.0
	GW	GRAVEL – sandy, trace fines, trace orgainics, well graded, moist to wet, dense, some rounded cobbles		1				
		FRACTURED BEDROCK – platey, angular cobbles up to 10 cm dia						
		END OF TEST PIT – refusal on cobbles						2.0
1.0								4.0
2.0								6.0

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COMPLETION DEPTH: 0.6 m
COMPLETE: 08/07/01
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PROJECT: PIN-3 DLCU SITE INVESTIGATION	LOCATION: SEE SITE PLAN	BOREHOLE NO: UMA0107
CLIENT: DEFENCE CONSTRUCTION CANADA	DRILLING METHOD: HAND	PROJECT NO: 0171-095-75-01
PROJECT ENGINEER: RRM		ELEVATION:

SAMPLE TYPE: GRAB SAMPLE | SHELBY TUBE | SPT SAMPLE | A-CASING | NO RECOVERY | CORE SAMPLE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SILICA SAND

DEPTH(m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	PLASTIC / M.C. / LIQUID (20 40 60 80)	WELL INSTALLATION	REMARKS	DEPTH(ft)
0.0	OL		TOPSOIL - sandy, orgainic rich, rootlets						0.0
	SW		SAND - trace gravel, trace fines, uniform, medium grained, moist to wet		1				
	GW		GRAVEL - some cobbles (platey, 5 cm dia. max) sandy, well graded,						
▼			END OF TEST PIT - saturated						2.0 ▼
1.0									4.0
									6.0
2.0									

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COMPLETE: 08/07/01

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