December 1, 2006
AMEC File: KX0439711

City of Quesnel
410 Kinchant Street
Quesnel, BC V2J 7J5

Attention: Mr. Jack Marsh

RE: WEST QUESNEL LAND STABILITY PROJECT
GEOTECHNICAL & HYDROGEOLOGICAL PROGRAMS
PROGRESS REPORT, 2006 & 2007 WORK PLAN

1.0 INTRODUCTION

This document presents a progress summary on activities completed in 2006 by AMEC Earth & Environmental (a division of AMEC Americas Limited) for the West Quesnel Land Stability Project, and updates the planned program and budget for 2007.

Previous studies and discussions with project team members (City of Quesnel, Urban Systems Ltd. and AMEC) have identified the need to reduce landslide ground movements in the West Quesnel area to manageable levels. Reducing groundwater pressures in the project area has been identified as the most cost effective means of achieving improvements in stability and corresponding reductions in ground movement. The City of Quesnel is pursuing a strategy of reducing groundwater levels in the study area via implementation of a comprehensive surface drainage management plan and a sub-surface dewatering plan. In order to determine the feasibility, further develop, and to implement these plans in a cost effective manner, additional geotechnical and hydrogeological characterization of the West Quesnel area is under way.

The main objective of the 2006-2007 geotechnical and hydrogeological program was to complete the previously suspended 2005 program (put on hold in July of 2005 pending funding approval) together with some enhanced investigation and analysis required to address issues raised by Dr. Morgenstern and the Ministry of Community Services. The scope for the 2006-2007 geotechnical and hydrogeological programs was presented in our previously submitted *2006-2007 Work Plan & Budget Estimate (March 2, 2006)* which should be read in conjunction with this progress report.

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2.0 WORK PLAN PROGRESS

To meet the project objectives, AMEC's 2006-2007 work plan consisted of the following major Tasks:

1. General Project Consultation/Management/Communications
2. Slope Inclinometer Measurements (currently suspended)
3. Completion of 2005 Field Investigation Program (currently suspended)
4. Enhanced Kinematic (GPS Movement) Monitoring
5. Enhanced Geotechnical and Hydrogeological Investigation
6. Analysis & Reporting
7. Trial Dewatering Program

Approval to proceed with Tasks 1 through 6 of the 2006-2007 work plan was granted by the City of Quesnel on April 4, 2006.

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Task 1 Project Consultation/Management/Communications

This task covers AMEC's time and expenses for ongoing annual consultation for the project, project management, attendance at project and public meetings, providing input into public consultation processes, assisting with funding requests to senior government, and providing advice to the City on various issues related to land stability in West Quesnel as they arise or on an as requested basis. The services under this task were provided basically on an as and when requested basis. Early in the year, AMEC staff attended project meetings in Quesnel and participated in teleconference discussions with senior government, and developed project work plans. We had allowed for attendance by key geotechnical and hydrogeological staff for at one formal public meeting, three project meetings, and one advisory committee meeting during 2006, however this was subject to change according to City of Quesnel and project team requirements. This task will be ongoing through 2007 and beyond.

Task 2 Slope Inclinometer Measurements

This task primarily covers field measurement of surviving and new slope inclinometer installations. In the year 2000, an initial seven slope inclinometers (SI-1 through SI-7) were installed. In the spring of 2005, AMEC supervised the drilling and installation of six more slope inclinometer casings (SI-8 through SI-13). As part of the 2006-2007 program (see Task 5 below) an additional two slope inclinometer installations were completed (SI-14 and SI-15). During 2006 AMEC staff revisited all slope inclinometer sites to determine which ones were still operational, and where previously not completed, conducted initial casing profile surveys.

Depending on the installation, between two and four measurement trips were completed. As of the date of this report, only one of the original seven slope inclinometer installations (SI-1) remains fully operational. The other six have either sheared off at depth or have become too tightly bent due to slide movements to permit future measurements. Of the six 2005 slope inclinometer installations, all but one remain operational. SI-10 was noted to be sheared at an approximate depth of 20 m when surveyed in May of 2006. The two 2006 slope inclinometer installations remain operational.

Several (SI-1, SI-9, SI-11, SI-12, SI-13) of the eight currently operational slope inclinometers showed small total displacements (typically in the range of 25 to 50 mm) at depths ranging from 15 to 70 m, consistent with landslide movement. SI-8, SI-14 and SI-15 do not yet show significant movement patterns. Interim data plots are appended. More detailed plots, presentation, and discussion of slope inclinometer data will be provided in future reporting. In the meantime, this data is being incorporated into subsurface mapping, slope stability and kinematic modeling of the study area.

As an adjunct to the slope inclinometer measurement field trips, manual monitoring of water levels at 17 non-automated piezometer instruments and observation wells was undertaken. Interim data plots are appended. The water level data is currently being compiled and will be incorporated into subsurface mapping, hydrogeological and slope stability models.

In 2007 and beyond, there will need to be additional measurements of the surviving slope inclinometer instrumentation. Likely between four and six measurement events per year need to be planned for.

Task 3 Completion of 2005 Field Investigation Program

From late May through early July of 2005, Geotech Drilling Services Ltd. was engaged to conduct borehole coring operations at six locations (BH-8 to BH-14) in close proximity to the slope inclinometers installed earlier in the year as part of Task 2. Some additional coring (BH 7) was also conducted next to an older slope inclinometer (SI-7, installed during previous phases of the project near the intersection of Pierce Street and Lewis Drive), for which there had been considerable past movement but no available subsurface information. Core retrieved from the drilling operation was kept in storage at AMEC pending funding approval for logging and lab testing activities.

Also in 2005, multiple vibrating wire piezometers were installed at each of the seven coring locations, however due to installation difficulties two of the sites were not completed. At the Pinchbeck Street location (BH-8), a section of steel drill casing could not be retrieved from the hole which resulted in the uppermost vibrating wire piezometer being trapped within the casing and being of marginal use. During withdrawal of the drill casing and grouting operations at the Patchett Street site (BH-9), the connecting wires for the vibrating wire piezometers were somehow caught or severed at depth, rendering them inoperable. Remaining piezometers, while confirmed operable at the time of installation were not monitored in 2005 due to project funding constraints.

Task 3 for 2006-2007 consisted of completion of the outstanding field and data collation program left over from 2005. Drilling and replacement of the damaged piezometers (at BH-8 and BH-9) was completed. In November, McElhanney Consultants conducted survey tie in of the completed drill and instrumentation locations in conjunction with Task 4 activities. The drill core in storage was logged, lab testing on select samples has been carried out, and draft borehole logs currently being prepared. Automated data loggers have been installed and initiated for the vibrating wire piezometers at five of the seven 2005 installation sites. Interim data plots of interpreted groundwater levels for 21 individual instruments are appended. Automated data logging equipment for the two remaining 2005 sites (BH-8 and BH-10) is currently on back order from the supplier and is scheduled for installation in early 2007. Installation of the automated telemetry (radio/cellular phone) system to remotely access the data loggers is also planned for early 2007 once the remaining two data loggers have been installed.

Task 4 Enhanced Kinematic (GPS Movement) Monitoring

Task 4 included the procurement, management and data presentation of semi-annual GPS measurements of 30 existing and approximately 20 new GPS movement hubs. During November of 2006 McElhanney Consultants installed and established the initial coordinates of the new GPS hubs at locations selected by AMEC, and also performed a re-survey of previously installed GPS hubs. The GPS survey data is currently being processed by McElhanney. Once AMEC has received this data, it will be incorporated with previous movement hub and slope inclinometer data to produce a brief update report of movements and an interpreted kinematics (movement modeling) map of the project area. The movement report will be issued in early 2007. Future rounds of GPS movement hub monitoring are planned for the late spring and late fall of 2007.

Task 5 Enhanced Geotechnical and Hydrogeological Investigation

In order to support requested modeling and analysis (water balance and kinematic modeling identified by Dr. Morgenstern), some additional sub-surface geotechnical, movement, and groundwater data is required over and above that envisioned in the original 2005 program. To help fill in the data gap, Task 5 of the 2006-2007 work plan consisted of three new investigation locations on the uppermost portion of the study area. At two locations (near the reservoir at the top/west end of Abbott Drive and in the undeveloped land northwest of the top/west end of Dodds Ave.), installation of slope inclinometers, and offset core drilling with multiple vibrating wire piezometer installations to a depth of approximately 100 m was planned. A third (approximately 225 m deep) drill hole was planned to be located at/or above the elevation of the adjacent diatomite mine and preferably cored through an undisturbed soil sequence located behind the main or back scarp of the West Quesnel landslide area. This hole was to be instrumented with multiple vibrating wire piezometers to determine the groundwater regime at the head of the landslide study area.

Despite some frustrating drill equipment availability issues, very difficult drilling conditions and some access issues that caused significant schedule delays, the planned drilling and instrumentation installation has been completed at the three sites. Slope inclinometers and multiple vibrating wire piezometers were installed at BH-14 and BH-15. Four vibrating wire piezometers were installed at BH-16. Automated data loggers have been installed and initiated for the vibrating wire piezometers at BH-14 and BH-15. Interim data plots of interpreted groundwater levels for 10 instruments are appended. Automated data logging equipment for the BH-16 site is currently on back order from the supplier and is scheduled for installation in early 2007. Installation of the automated telemetry (radio/cellular phone) system to remotely access the data logger is also planned for early 2007 once the data logger has been installed.

In November, McElhanney Consultants conducted survey tie in of the completed drill and instrumentation locations in conjunction with Task 3 and 4 activities.

Core from the drilling program is currently at AMEC's lab in Prince George. Core logging, lab testing and preparation of formal borehole logs have begun and will be completed early in 2007. In addition to the logging for the 2006 drilling, all borehole logs for previous stages of investigation (2000 to 2003) will be revisited and adjusted to reflect similar and consistent nomenclature.

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Task 6 Analysis & Reporting

Task 6 generally involves assembling all the data gathered by the 2005 and 2006 field investigation programs, adding that to previous investigation data and carrying out the necessary analysis and reporting functions. Specifically Task 6 activities include:

- develop/update the subsurface geological model of the study area
- develop/update the hydrogeological model of the study area
- complete the groundwater modeling portion of a water balance analysis
- develop/update the kinematic model of the landslide mass
- perform updated slope stability analyses of pre-existing, existing and potential future drainage remediation configurations for the landslide mass
- consider the cost effectiveness of surface versus sub-surface drainage options
- if favorable, identify targets and provide recommendations for a trial groundwater dewatering (depressurization) program
- provision of a summary report, 5 printed copies and 1 electronic (pdf) version

To date AMEC's project activities have concentrated on completion of field investigation programs (Tasks 2 through 5 above) which are necessary inputs to Task 6. Other required pre-requisites for completion of Task 6 include items to be provided by others including provision of a new topographic model of the study area, weather station data, and surface hydrology monitoring and modeling. AMEC has just received the completed LiDAR topographic modeling from Urban Systems, and are using this as the new basis for map based plotting and analysis. Weather and hydrology information has not yet been received. It is AMEC's intent to complete Task 6 within the first 3 to 4 months of 2007.

Task 7 Trial Dewatering Program

Task 7 is a trial dewatering program that would be implemented upon the successful completion of Task 6 and upon receiving appropriate funding and approval to proceed from the City of Quesnel. This task is tentatively planned for mid to late 2007, pending the technical outcome of Task 6. Below is a rough outline of what the trial dewatering program would consist of, as originally described in our proposed 2006-2007 work plan.

If data and analyses carried out in Tasks 2 through 6 are favorable, the logical follow-on to the foregoing work would be a trial dewatering program. This program would be aimed at confirming the efficacy of sub-surface dewatering and be used to develop the design and specifications for a full scale dewatering option. What follows is a description of a provisional trial program consisting of up to four trial pumping wells and pump test monitoring. However, the timing, final arrangement and costing of such a program would depend heavily on the substantive outcome of Tasks 1 to 6 and is subject to change. Please note that should trial dewatering wells be installed, it is anticipated that the pump testing will require 6 to 8 months to yield meaningful results that can be reported.

Following completion of Task 6, and stabilization of piezometer readings, AMEC would compile the additional subsurface information and identify four potential locations for trial dewatering (pumping) well installations. Pumping well locations would be selected based on the findings to date and in consideration of available infrastructure such as storm water collection systems and electrical power.

It is generally anticipated that some of the chosen well locations may be sited in close enough proximity to previously installed piezometer installations such that the vibrating wire instrumentation could be used for monitoring pumping well effectiveness. However, it is also anticipated that as part of the well installation task, the well drilling contractor will also install two separate observation wells, each using three vibrating wire piezometers.

The well drilling contractor would drill four 150 mm diameter wells to approximately 70 m below grade. Each well would initially be drilled to 10 m below grade using a 250 mm diameter casing. A 150 mm diameter casing would be lowered concentrically within the 250 mm diameter casing and drilled between 10 m and 70 m below grade. A 125 mm diameter PVC pipe slotted along a length to be determined based on observations of well stratigraphy will be installed in the completed, cased drill hole. The 150 mm diameter casing will be pulled back to expose the slotted section of PVC pipe. A bentonite-cement grout will be installed within the annular space to grade between the 250 mm diameter casing and the 150 mm diameter casing using a grout mixer and a tremie pipe. The 250 mm diameter casing will be removed from the borehole after grouting is complete. The purpose of the annular grout is to create an effective seal between the slotted PVC pipe and ground surface. The well seal is required to operate a vacuum-enhanced pumping system should such an option be attempted.

AMEC personnel would collect grab soil samples from disturbed drill cuttings at approximately 1.5 m intervals, and record subsurface stratigraphy and observations of groundwater seepage.

The pumping wells are planned to be completed with 0.5 hp submersible pumps. Assuming a stormwater collection system is available adjacent to each well, each pump can be completed with a high-low switch such that its operation is controlled by the water level in each well. Also, each well should be equipped with a system for recording when each pump turns on and off and the water level relative to a defined datum. If a stormwater collection system is available at each well, groundwater from each well can be pumped from the well directly into the stormwater collection system. If not available, suitable alternate surface pump discharge options would need to be explored, specifically ones that limit re-infiltration of the discharge water.

Following analysis of short term pump test results, it is anticipated that we will continue long term pumping and monitoring. The long term pumping is intended to last approximately 6 to 8 months and would be carried out concurrently at each of the completed well locations.

Each of the well and piezometer locations would be surveyed relative to a geodetic datum. The City of Quesnel would be responsible for completing each well with appropriate utility connections, subsurface concrete manholes large enough to accommodate pump systems, and electrical wiring to operate the pump. It is assumed that all pipes, connections and burial depths will be sufficient to handle the intended flow, and be suitably constructed to prevent the system from freezing during the winter.

The results of the trial dewatering program would be documented in a formal report. A key finding of the report will be a determination of the efficacy of a full scale sub-surface dewatering program and a general indication of what such a program should consist of. Five (5) copies of a draft version of the report will be issued. Following review and input from the project team, five (5) final printed copies and one (1) electronic (pdf) version of the report will be provided. Detailed design, cost estimating and implementation of the full scale dewatering program, if judged to be viable would be carried out in a future phase of this project.

3.0 SCHEDULE

The following is an update of the planned schedule for 2007 based on some necessary assumptions regarding the timing of funding procurement, authorization to proceed, data supply from others (weather, hydrological modeling) and subcontractor availability:

Task 1 General Project Consultation	ongoing
Task 2 Slope Inclinometer Measurements	Mar 07 – Nov 07
Task 3 Completion of 2005 Field Investigation Program	
- final piezometer data logger connection/activation/telemetry	Dec 06 – Jan 07
- finalize drill logs	Dec 06 – Jan 07
- piezometer monitoring	Dec 06 – Dec 07
Task 4 Enhanced Kinematic (GPS Movement) Monitoring	Jun 07 & Nov 07
Task 5 Enhanced Geotechnical and Hydrogeological Investigation	
- final piezometer data logger connection/activation/telemetry	Dec 06 – Jan 07
- piezometer monitoring	Dec 06 – Dec 07
- core logging	Jan 07
- lab testing	Jan 07
- finalize drill logs	Jan 07
Task 6 Analysis & Reporting	Jan 07 – Apr 07
Task 7 Trial Dewatering Program	May 07 – Jan 08

4.0 BUDGET UPDATE

Table 1 below presents a summary of 2006 project expenditures (inclusive of GST) to the end of November 2006, with a forecast total till the end of 2006. A spreadsheet containing further details of the expenditures is appended. Expenditures for Tasks 1 through 5 have been within the approved budgets. There have been no expenditures to date for Tasks 6 and 7.

Table 1
2006 Expenditures (incl. GST) - Geotechnical & Hydrogeological Programs
West Quesnel Land Stability Project

Task #	Project Task	Expended To End of Nov. 2006	Anticipated Expenditure in Dec. 2006	Total Estimated for 2006	Approved Budget
1	Project Consultation/Management	$15,423	$1,800	$17,223	$29,315
2	Slope Inclinometer Measurements	$25,276	$1,000	$26,276	$28,235
3	Completion of 2005 Field Program	$64,443	$2,000	$66,443	$109,981
4	Enhanced Kinematic Monitoring	$15,236	$1,000	$16,236	$53,728
5	Enhanced Geotech/Hydrogeology	$322,353	$1,000	$323,353	$346,587
6	Analysis & Reporting	$0	$0	$0	$62,835
7	Trial Dewatering Program	$0	$0	$0	$0
	Total	**$442,731**	**$6,800**	**$449,531**	**$630,681**

In order to synchronize anticipated expenditures for completion of various project tasks for 2007 with the City of Quesnel annual fiscal cycle, an updated estimate of costs, broken down by various project tasks and inclusive of GST is provided in Table 2, below. The estimate has also been prepared assuming that the majority of the field work components will take place during average weather (and/or mild winter conditions) that will not significantly hamper normal field drilling production rates or efficiency. Please note that the estimated cost for the Task 7 Trial Dewatering Program is highly provisional and will be revisited in detail following the completion of Task 6. It is also likely that some of the costs for the Task 7 item will spill over into early 2008.

Table 2
2007 Estimates (incl. GST) - Geotechnical & Hydrogeological Programs
West Quesnel Land Stability Project

Task #	Project Task	Estimated Cost (including GST)
1	Project Consultation/Management	$23,500
2	Slope Inclinometer Measurements	$30,000
3	Completion of 2005 Field Program	$45,000
4	Enhanced Kinematic Monitoring	$45,000
5	Enhanced Geotech/Hydrogeology	$45,000
6	Analysis & Reporting	$66,000
7	Trial Dewatering Program	$297,500
	Total	**$552,000**

AMEC charges a 10% mark-up for internal invoice processing of third party disbursements, therefore the cost estimate assumes that most major third party contractors and suppliers will contract directly with the City of Quesnel and the mark-up will not apply. Regardless, AMEC will still review each third party invoice and forward them to the City of Quesnel for direct remittance. AMEC charges a 6% mark-up on personnel time to cover the cost of office expenses (long distance telephone calls, photocopies, facsimiles, normal office supplies, computer time) directly attributable to the project and this has been included in the estimate. The estimate also assumes that the City of Quesnel will be separately responsible for supporting services including property/site access, traffic control, site clean up/material removal, utility connections and operating fees.

For tasks deferred until after 2007, a minimum 4% annual factor for inflation should be applied to the above estimate.

Thank you for the opportunity to provide this updated work plan and budget estimate to you. Should you have any questions require further information, please do not hesitate to contact the undersigned at (250) 564-3243.

Respectfully submitted,

AMEC Earth & Environmental
A division of AMEC Americas Limited

Nick C. Polysou, P.Eng.
Senior Associate, Geotechnical Engineer
Regional Manager, Central BC

Att.

West Quesnel Land Stability Project - AMEC 2006 Work Plan Budget Status (GST included)

as of Nov. 30, 2006

AMEC Project #	Task	Status	AMEC Invoiced	3rd Party Invoiced	Total Invoiced	Estimated Acrued*	Total Cost to Date	AMEC Estimate	Approved Budget	Budget Variance (-overrun)
KX0439711	Consultation / Management / Communications	ongoing - as requested	$13,622.57	$0.00	$13,622.57	*$1,800.00*	$15,422.57	$29,314.79	$29,314.79	$13,892.22
19-Apr-06	AMEC staff fees & expenses	invoice # 159598	$7,192.28							
11-May-06	AMEC staff fees & expenses	invoice # 159616	$919.14							
21-Jun-06	AMEC staff fees & expenses	invoice # 159663	$3,575.74							
29-Sep-06	AMEC staff fees & expenses	invoice # 159789	$391.86							
30-Nov-06	AMEC staff fees & expenses	invoice # 159915	$1,543.55							
	AMEC staff fees & expenses					$1,800.00				
KX0439712	Slope Inclinometer Monitoring	in progress (monitored May, August, November)	$24,275.73	$0.00	$24,275.73	*$1,000.00*	$25,275.73	$28,535.16	$28,535.16	$3,259.43
21-Jun-06	AMEC staff fees & expenses	invoice # 159664	$7,243.01							
29-Sep-06	AMEC staff fees & expenses	invoice # 159790	$5,680.78							
30-Nov-06	AMEC staff fees & expenses	invoice # 159916	$11,351.94							
	AMEC staff fees & expenses					$1,000.00				
KX0439713	Complete 2005 Field Investigation	drilling complete, log plotting/data loggers in progress	$41,721.63	$14,221.32	$55,942.95	*$8,500.00*	$64,442.95	$109,981.02	$109,981.02	$45,538.07
11-Feb-05	AMEC staff fees & expenses	invoice # 159617	$1,921.62							
21-Jun-06	AMEC staff fees & expenses	invoice # 159665	$13,743.90							
02-Aug-06	Geotech Drilling Services (BH-8, BH-9)	invoice # 2952		$14,221.32						
11-Aug-06	AMEC staff fees & expenses	invoice # 159733	$7,644.01							
08-Sep-06	AMEC staff fees & expenses	invoice # 159775	$9,696.25							
30-Nov-06	AMEC staff fees & expenses	invoice # 159917	$8,715.85							
	AMEC staff fees & expenses					$1,500.00				
	McElhanney					$7,000.00				
KX0439714	Enhanced Kinematic Modelling	New hubs set, Nov GPS measurements in progress	$2,235.51	$0.00	$2,235.51	*$13,000.00*	$15,235.51	$53,727.91	$53,729.91	$38,494.40
30-Jun-06	AMEC staff fees & expenses	invoice # 159674	$1,152.64							
30-Nov-06	AMEC staff fees & expenses	invoice # 159918	$1,082.87							
	AMEC staff fees & expenses									
	McElhanney					$13,000.00				
KX0439715	Enhanced Geo/hydrogeo Field Investigation	drilling complete, logging/data loggers in progress	$85,885.01	$234,468.13	$320,353.14	*$2,000.00*	$322,353.14	$346,586.91	$346,586.91	$24,233.77
11-May-06	AMEC staff fees & expenses	invoice # 159618	$998.10							
03-Jul-06	AMEC staff fees & expenses	invoice # 159688	$26,585.79							
31-Jul-06	AMEC staff fees & expenses	invoice # 159706	$15,968.18							
02-Aug-06	Geotech Drilling Services (BH-14, BH-15)	invoice # 2952		$101,435.04						
25-Aug-06	AMEC staff fees & expenses	invoice # 159746	$10,596.41							
29-Sep-06	AMEC staff fees & expenses	invoice # 159791	$994.92							
26-Oct-06	AMEC staff fees & expenses	invoice # 159866	$7,337.11							
14-Nov-06	All Haul (water BH-16)	invoice # 2364		$15,772.80						
30-Nov-06	AMEC staff fees & expenses	invoice # 159919	$23,404.50							
	AMEC staff fees & expenses					$2,000.00				
02-Nov-06	Geotech Drilling Services (BH-16)	invoice # 3113		$117,260.29						
KX0439716	Analysis / Reporting	Not Started, await hydrology data, logging	$0.00	$0.00	$0.00	*$0.00*	$0.00	$62,834.68	$62,834.68	$62,834.68
KX0439717	Trial Dewatering	Not Approved	$0.00	$0.00	$0.00	*$0.00*	$0.00	$286,200.00	$0.00	$0.00
			$167,740.45	$248,689.45	$416,429.90	$26,300.00	$442,729.90	$917,180.47	$630,982.47	$188,252.57

* work completed but not yet invoiced

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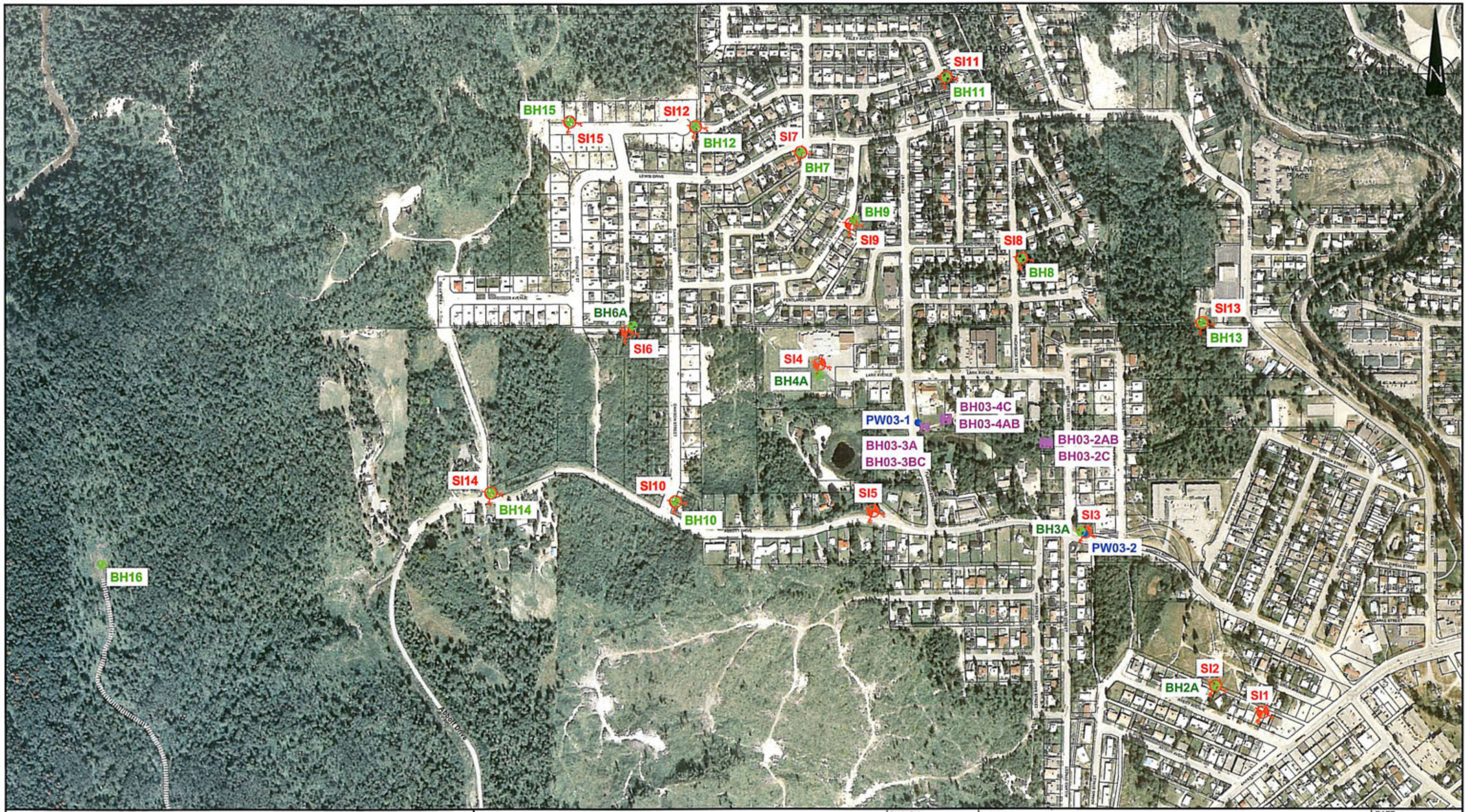
APPROX. BOREHOLE LOCATIONS



LEGEND:

- APPROXIMATE BOREHOLE/PIEZOMETER LOCATION
- APPROXIMATE SLOPE INCLINOMETER LOCATION
- APPROXIMATE PUMPING WELL LOCATION
- APPROXIMATE PIEZOMETER LOCATION FORTHE PUMPING WELL TESTING

NOTE: DIGITAL IMAGE IS SCANNED FROM BCC97136 NO.73 (1997)

0m 50 100 150 200m

1 : 6000

CLIENT: CITY OF QUESNEL

AMEC Earth & Environmental
3456 Opie Crescent
Prince George, BC, CANADA V2N 2P9
Tel. (250) 564-3243
Fax (250) 562-7045

DWN BY:	S.Ruiz
CHK'D BY:	N.Polysou
DATUM:	NAD83
PROJECTION:	UTM Zone 10
SCALE:	1:6000

TITLE: SITE PLAN

PROJECT: SLOPE STABILITY STUDY
WEST QUESNEL, BC

DRAFT

DATE:	DECEMBER 2006
PROJECT NO:	KX04397-14
REV. NO.:	A
FIGURE No.	FIGURE 1

L: DRAFTING–REPORTING–PROPOSALS Prince George (1290) KX04397(WestQuesnel) KX04397.14(Drafting) KX04397-14-hole locations.dwg – FIGURE1 – Dec. 04, 2006 10:12am – shelley.ruiz

This drawing was originally produced in colour.

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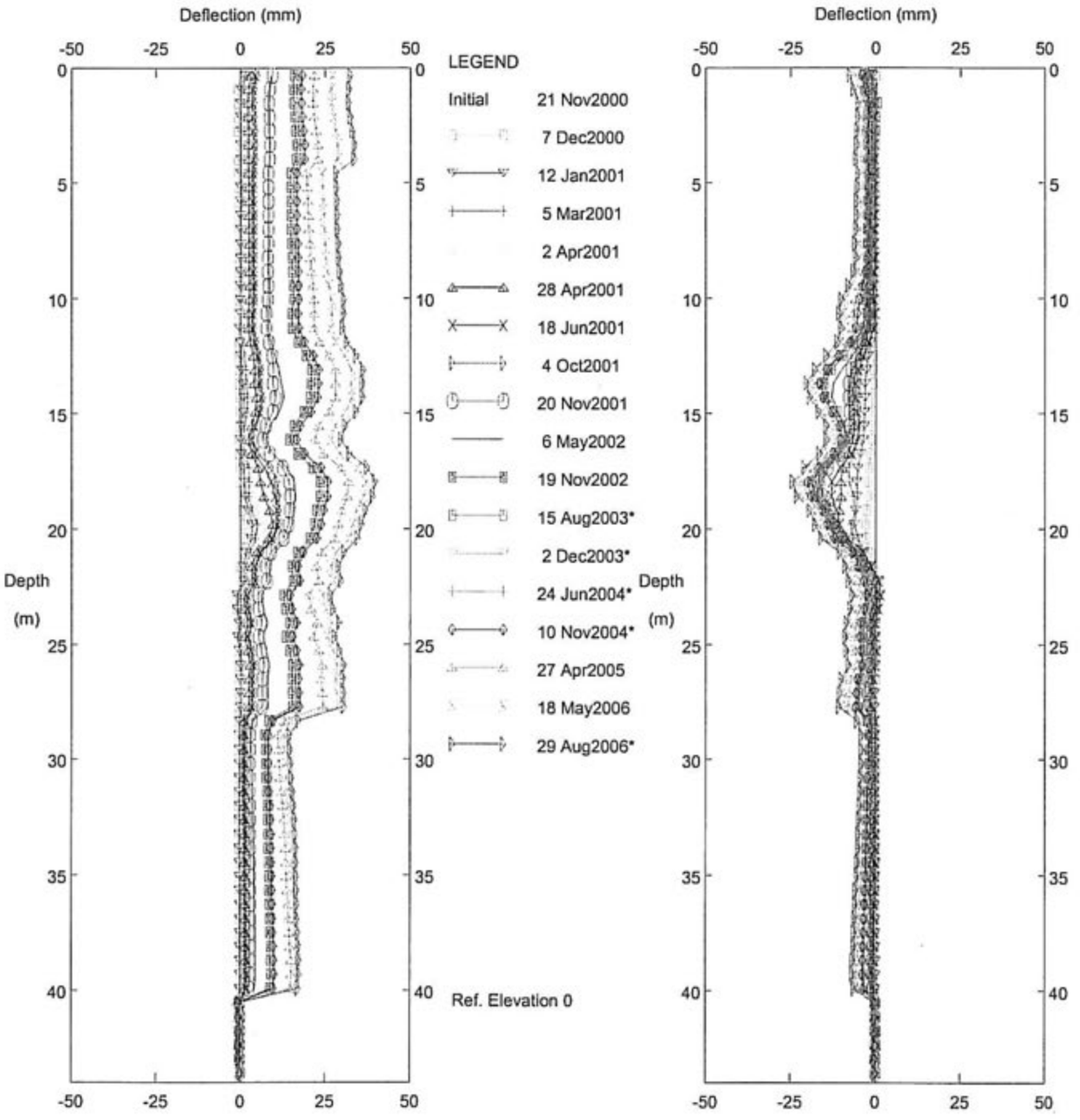
SLOPE INCLINOMETER DATA

AMEC Earth and Environmental - Pr. George

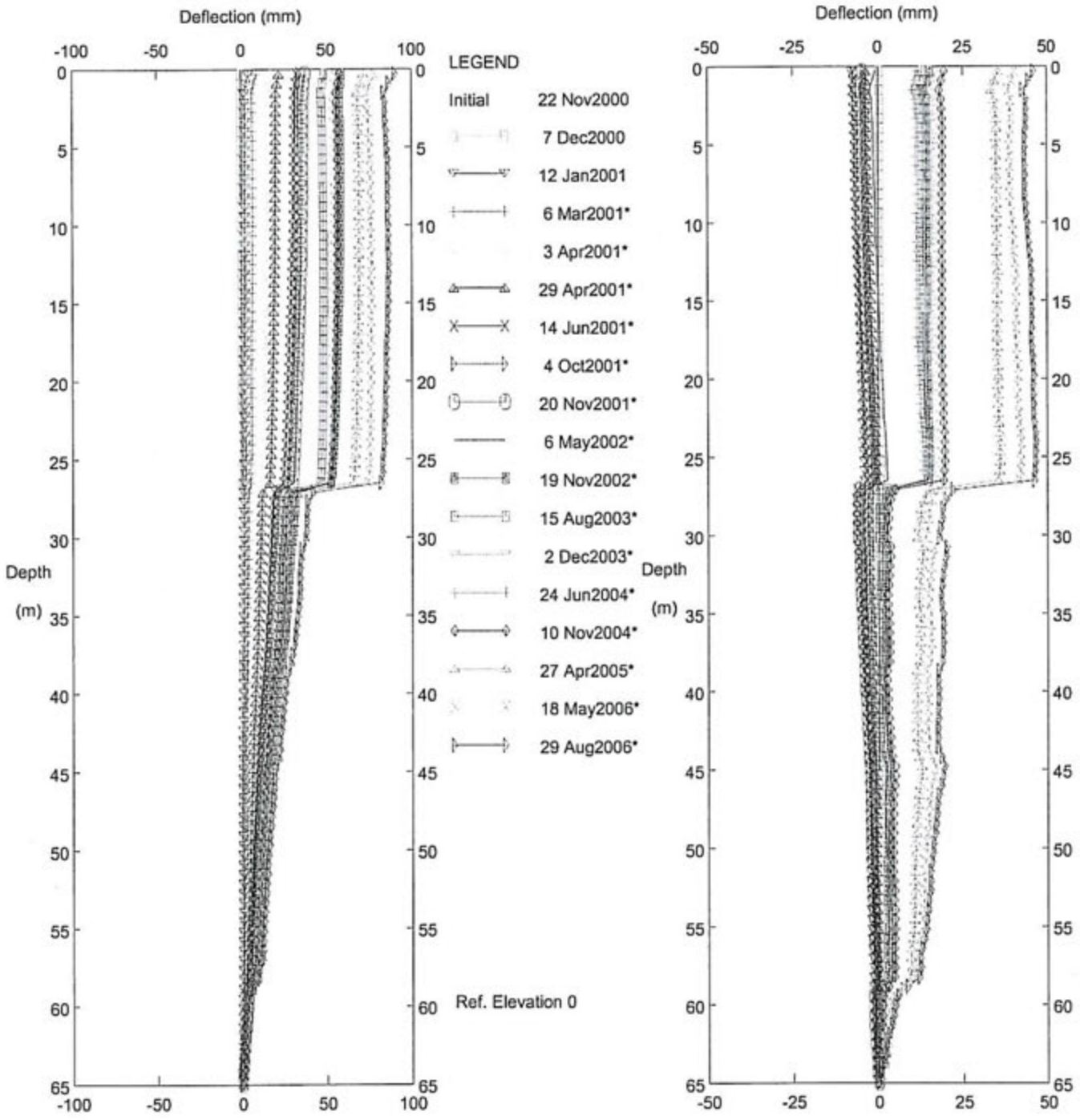


KX03904 W. Quesnel Stability Study, Inclinometer SI-1 Corr.

Lower Avery Lane

Sets marked * include zero shift and/or rotation corrections.

AMEC Earth and Environmental - Pr. George

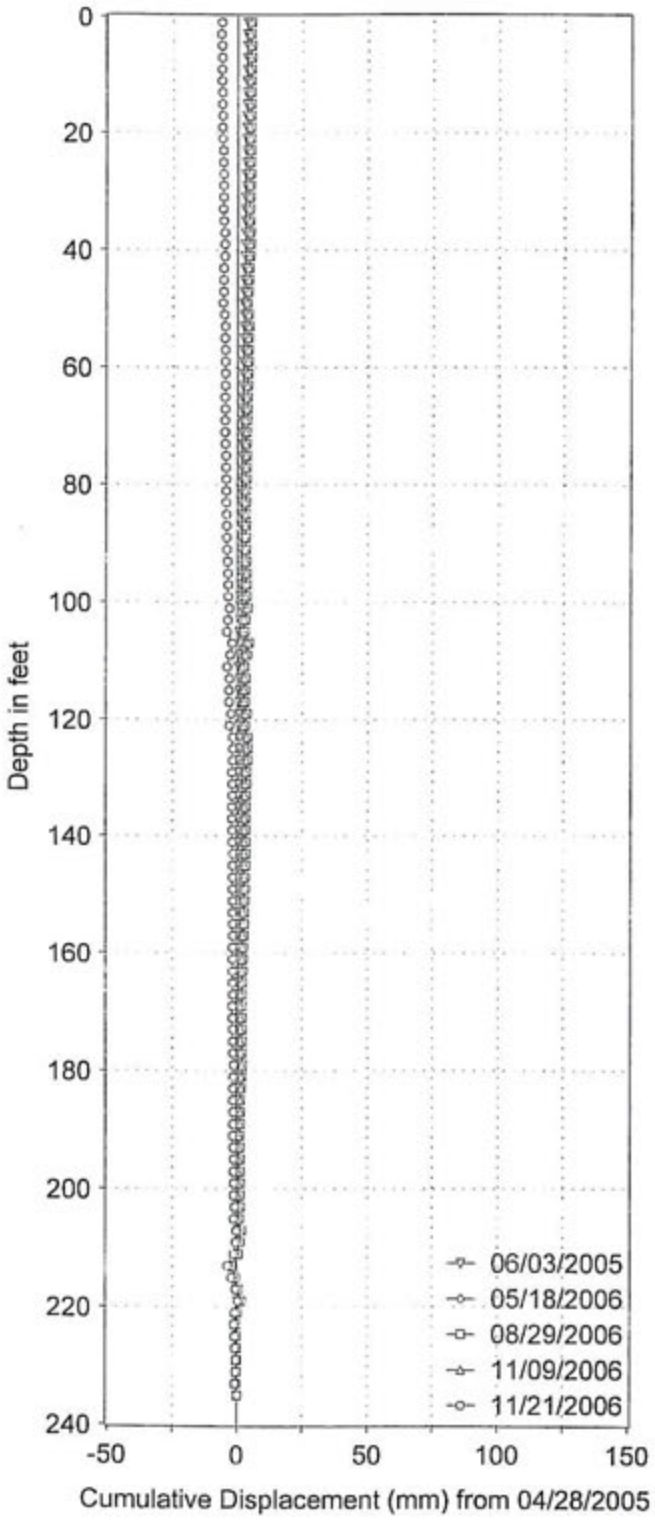


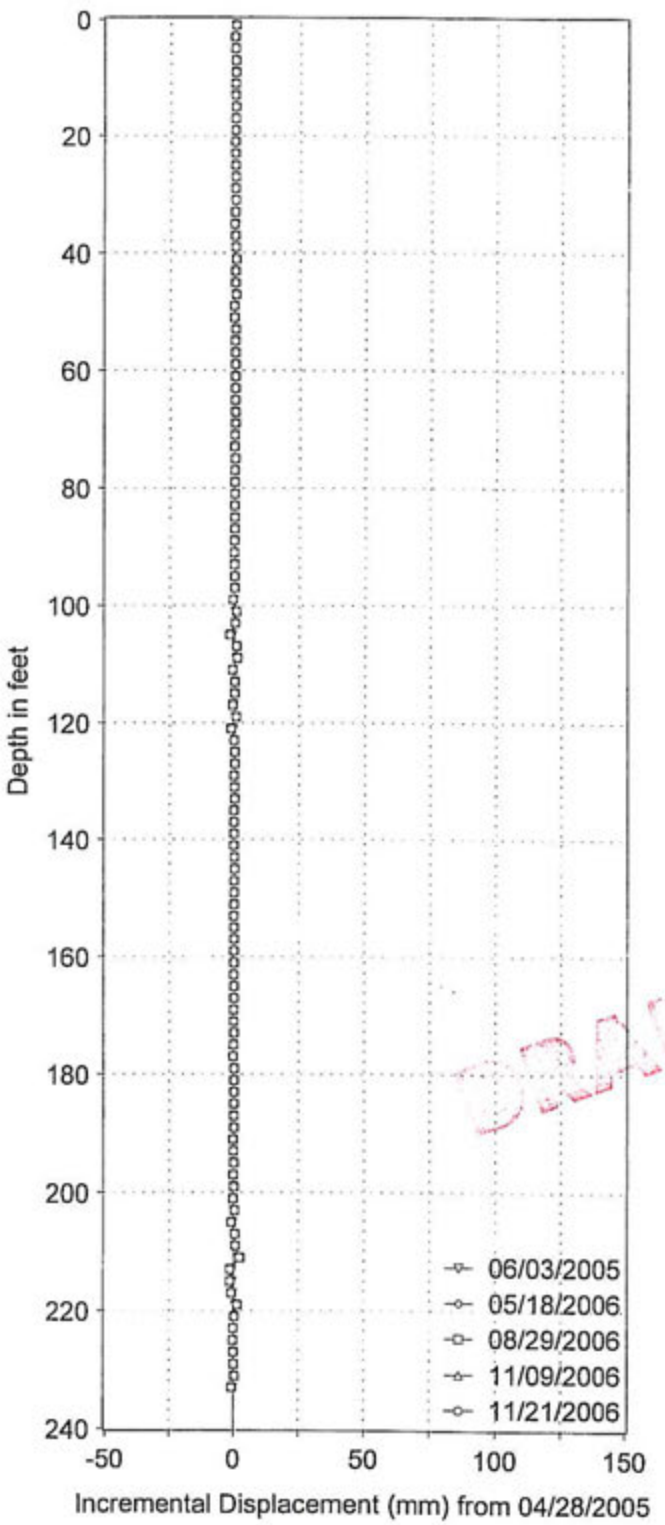
KX03904 W. Quesnel Stability Study, Inclinometer SI-7 Corr.

Pierce Crescent & Lewis Drive

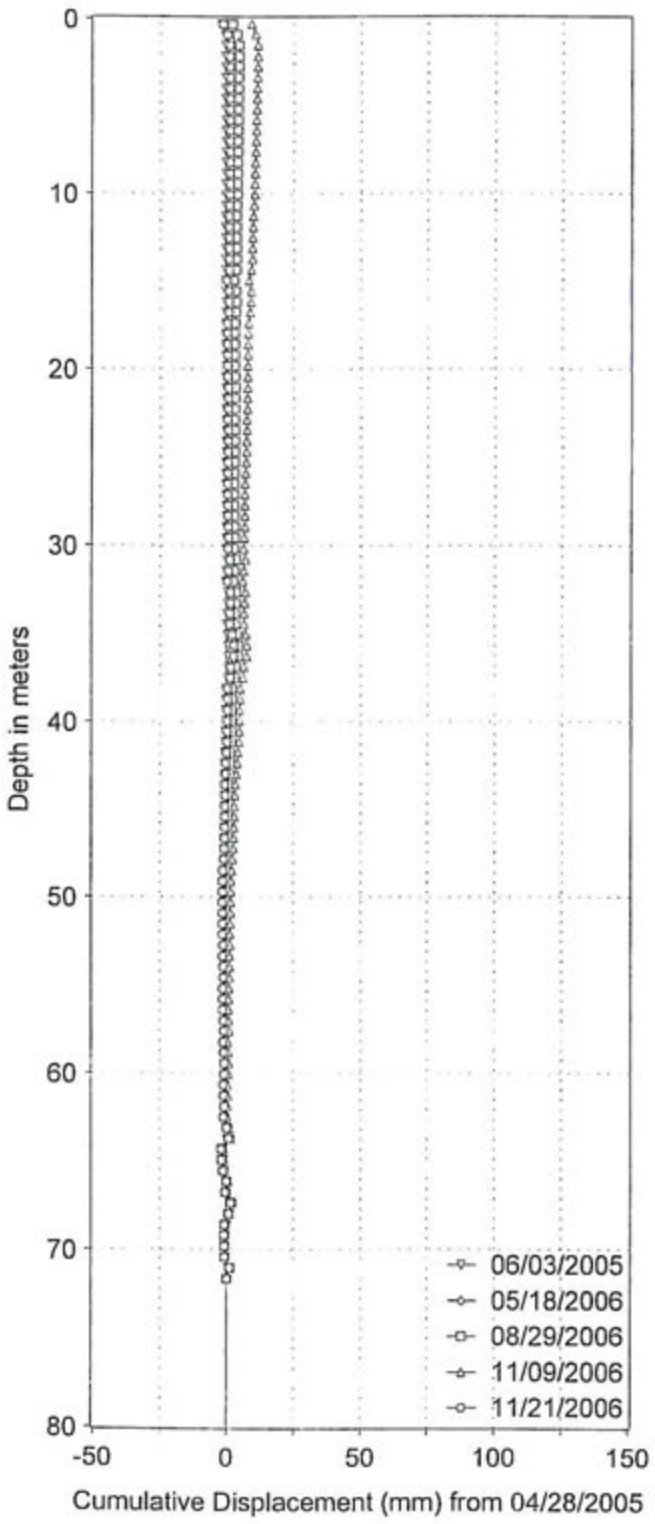
Sets marked * include zero shift and/or rotation corrections.

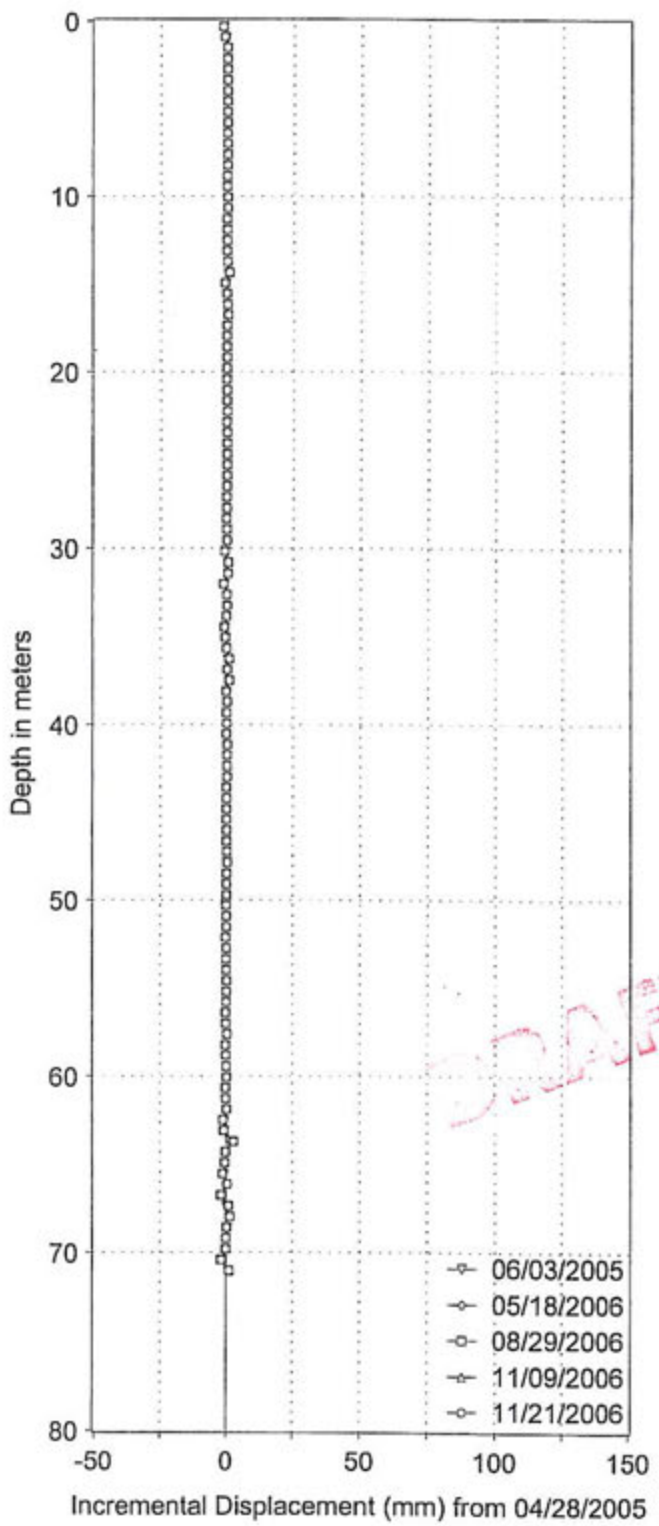
KX04397
WEST QUESNEL LAND STABILTY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-8



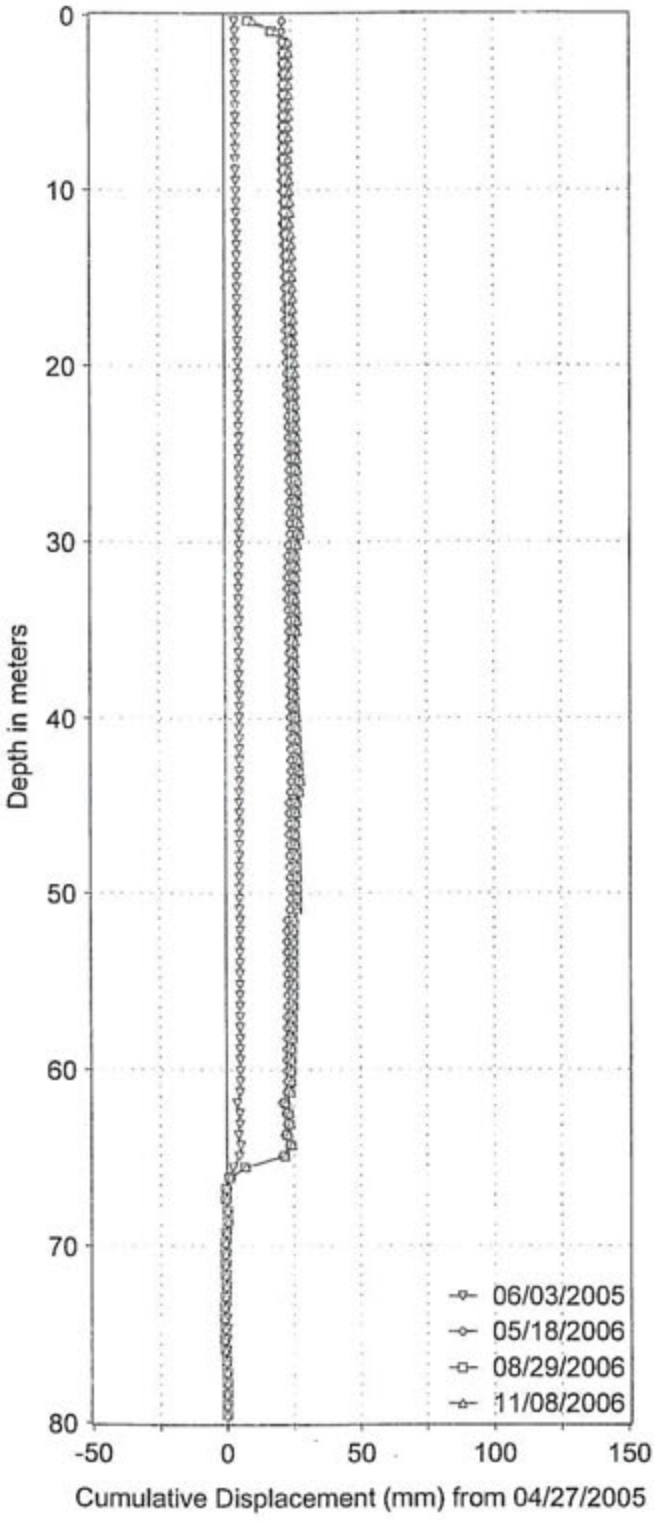


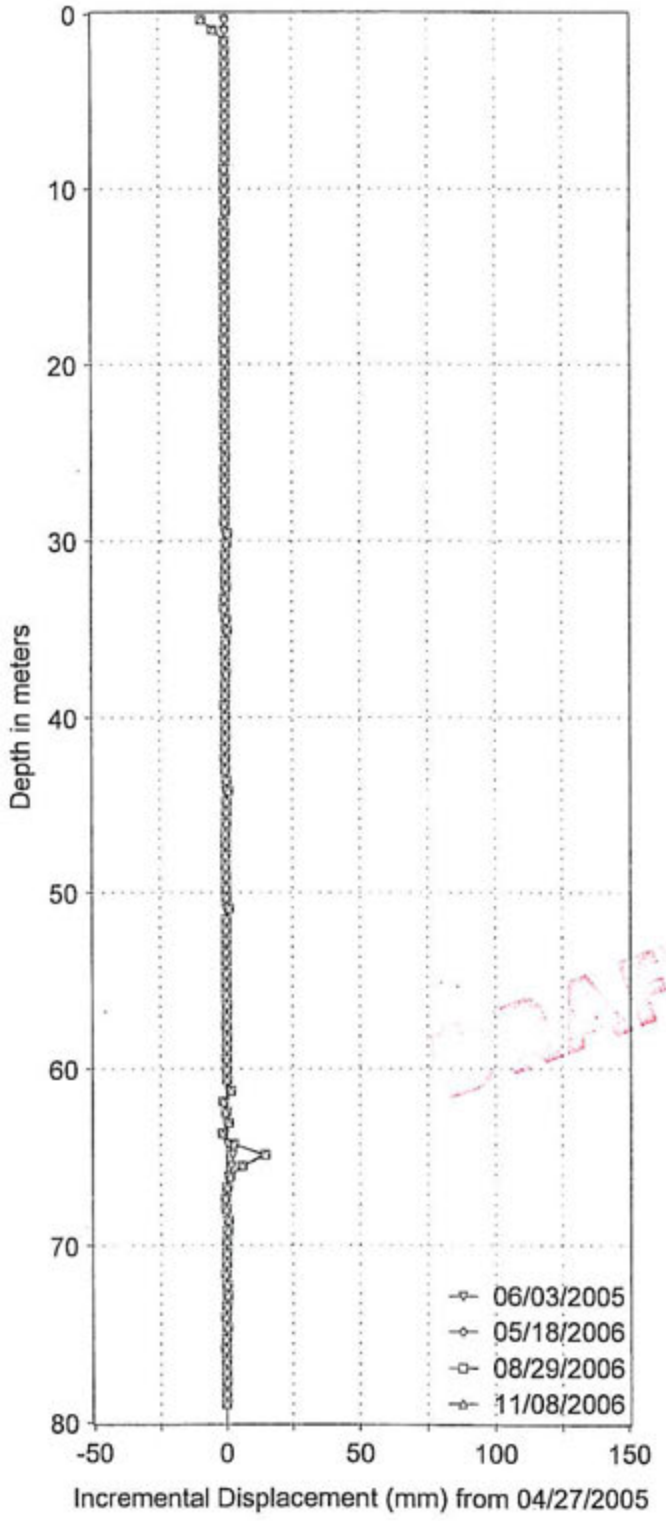
KX04397
WEST QUESNEL LAND STABILITY MONITORING
CUMMULATIVE & INCREMENTAL DISPLACEMENTS
SI-8





KX09397
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-9





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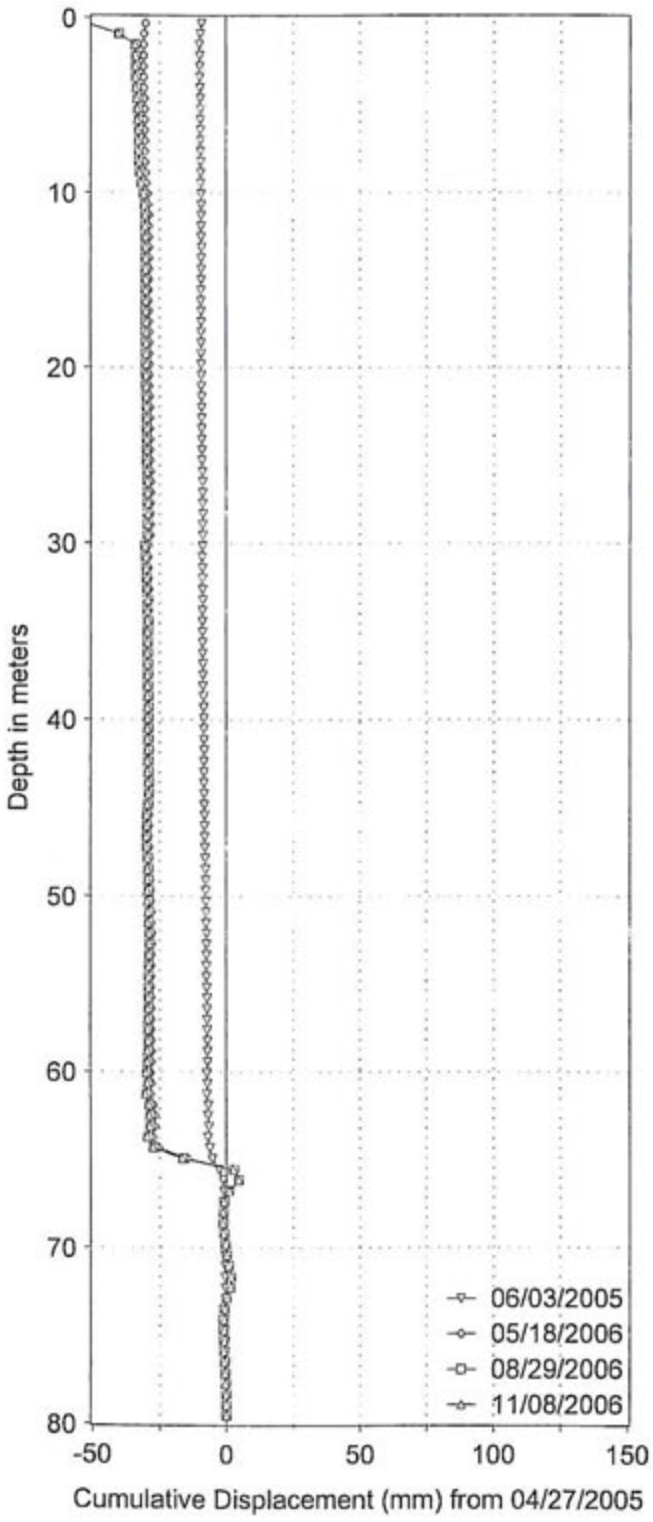
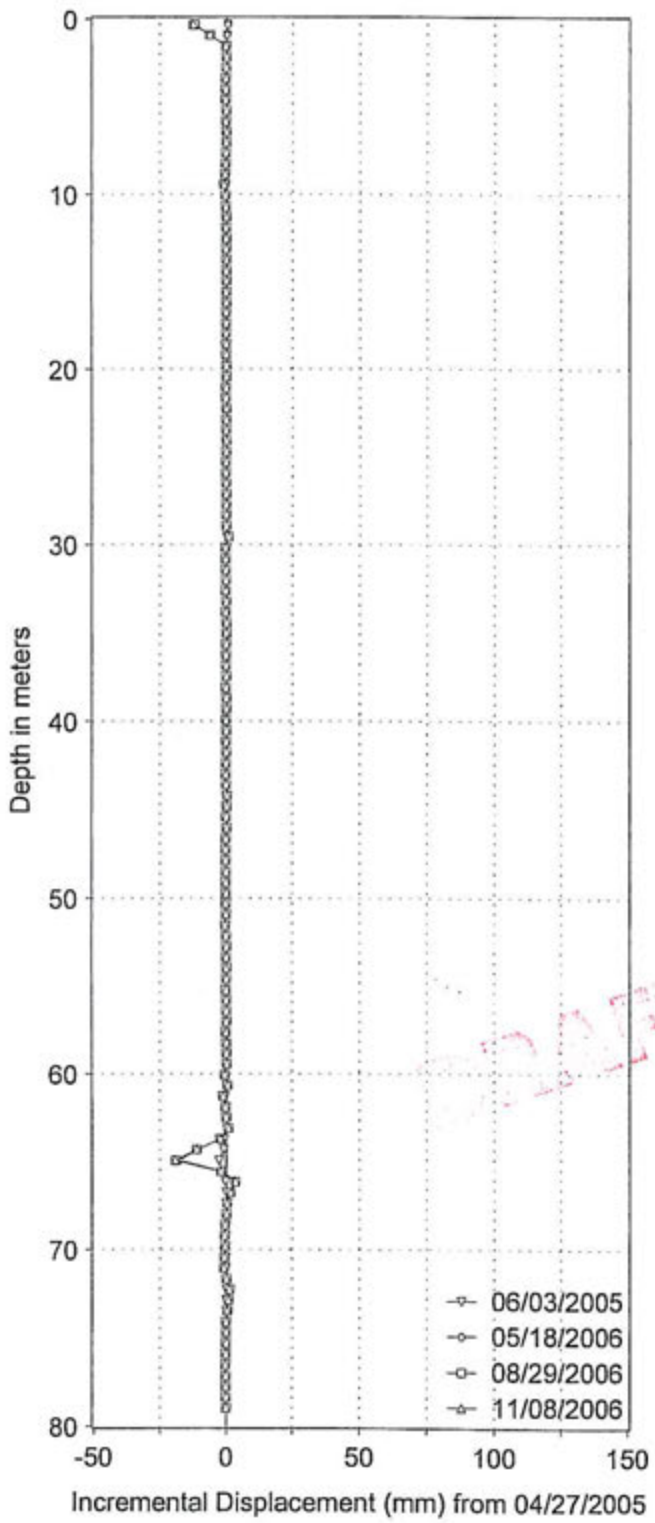
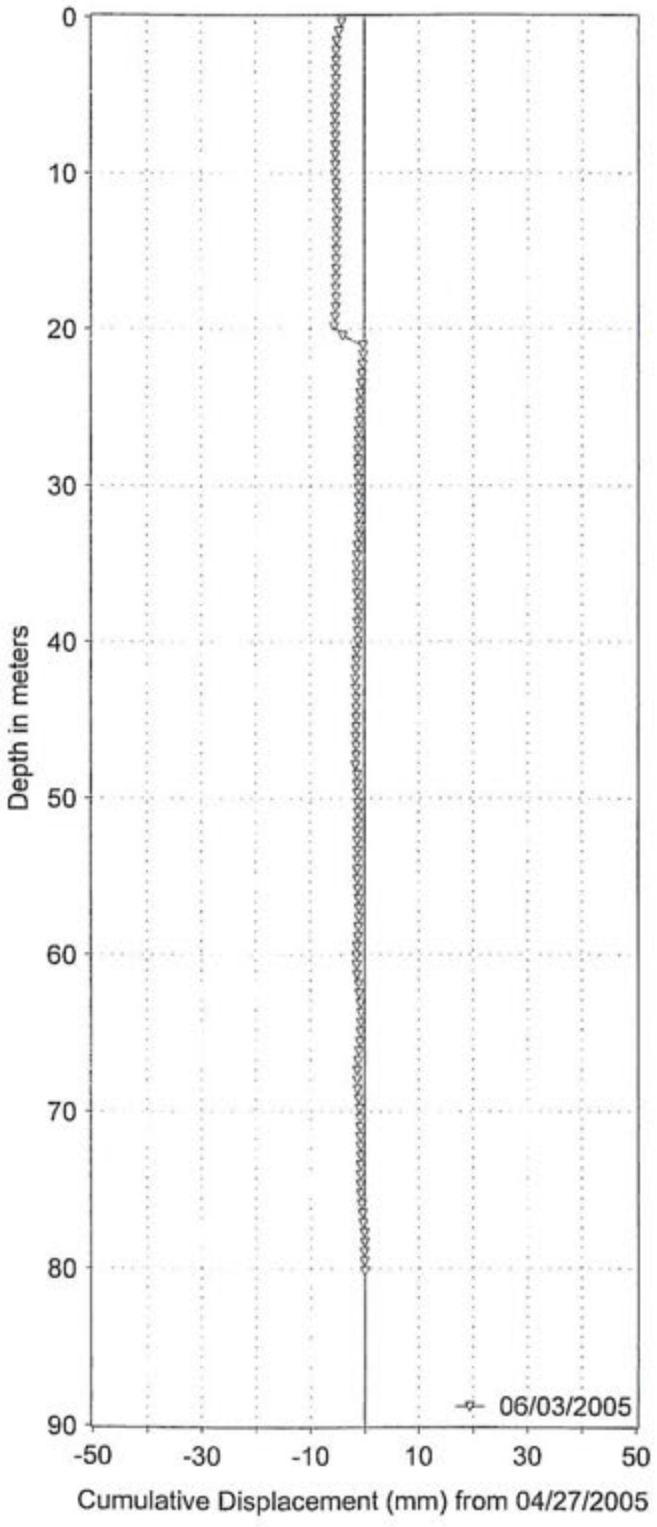
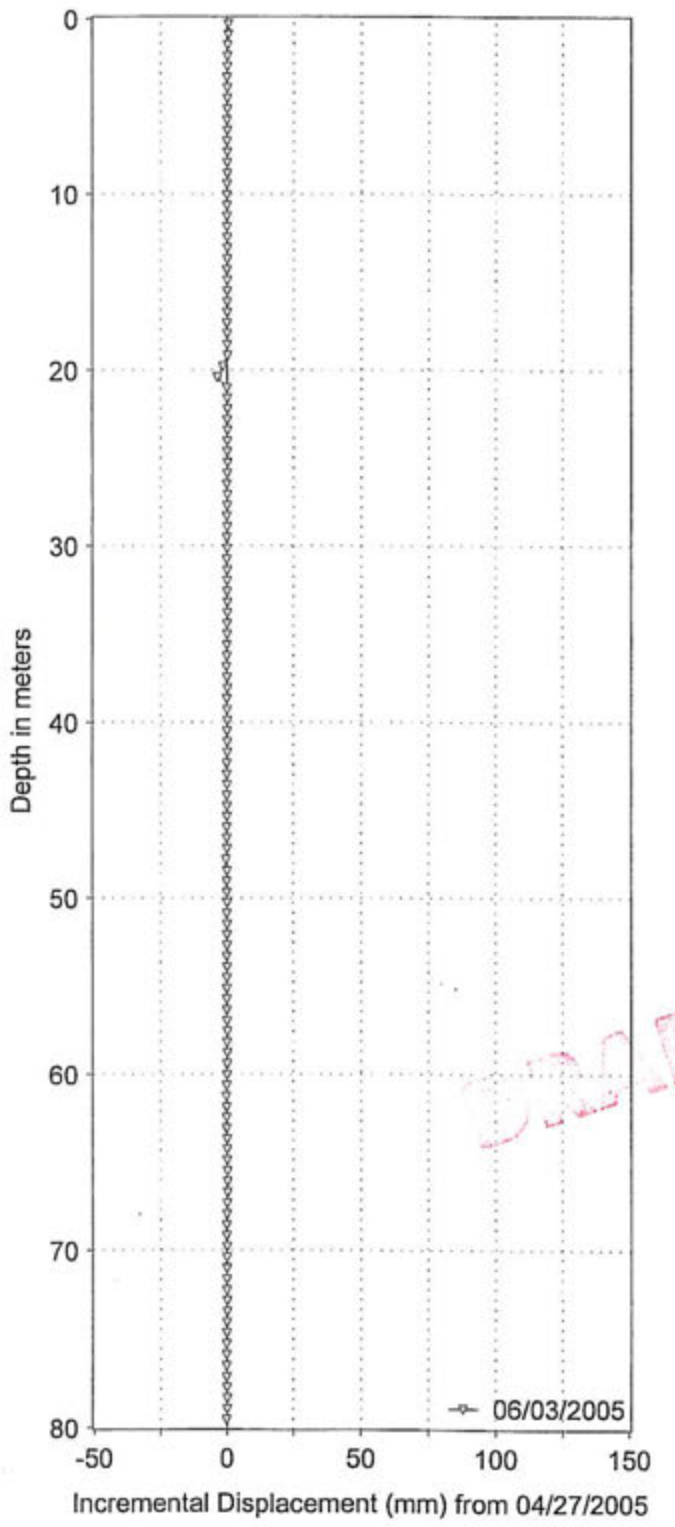
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-9





KX04397
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-10 SI sheared at 69' between 06/03/2005 and 05/19/2006





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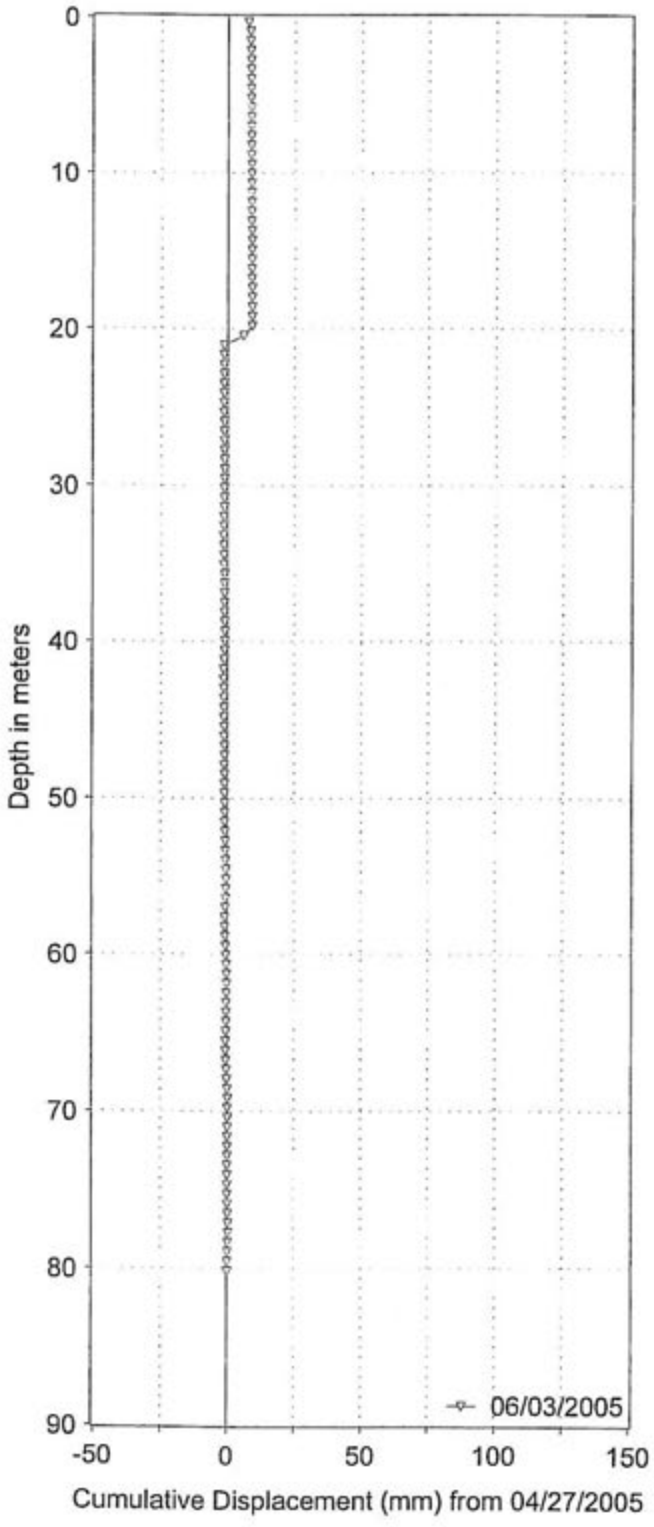
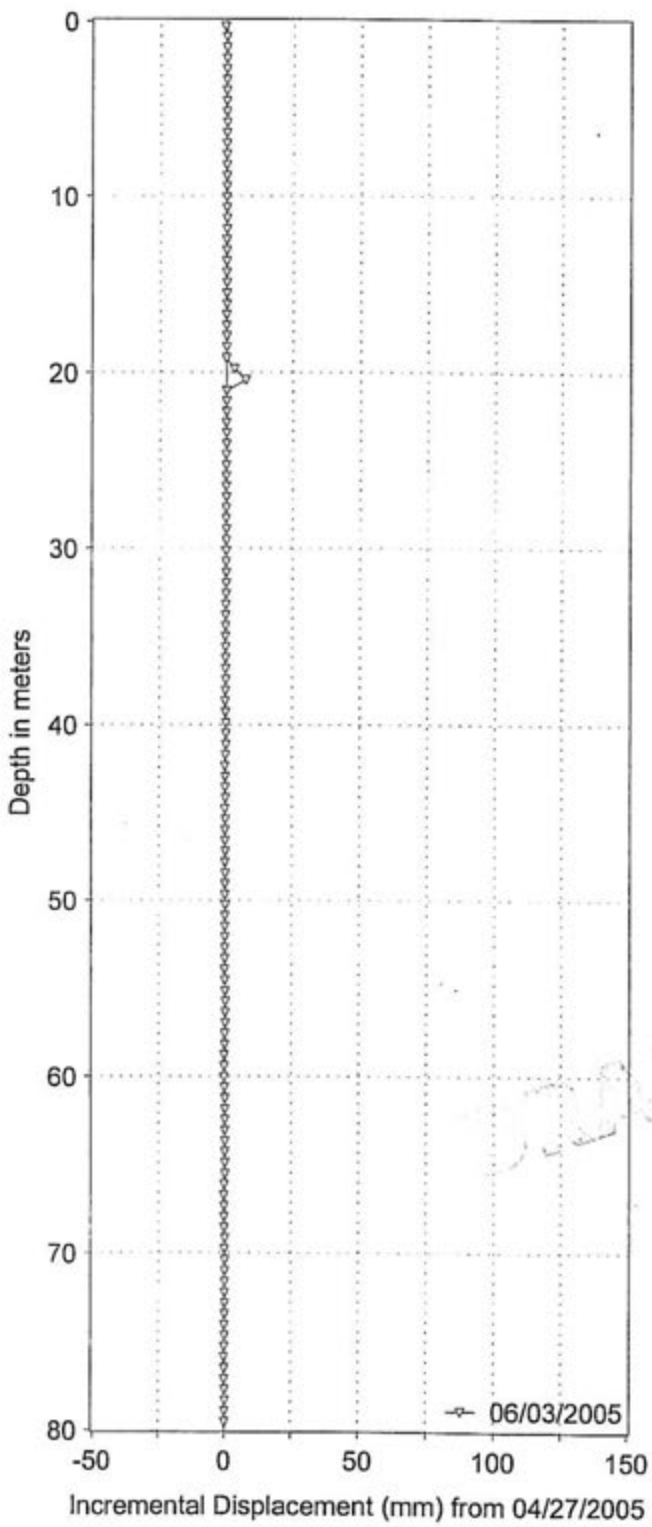
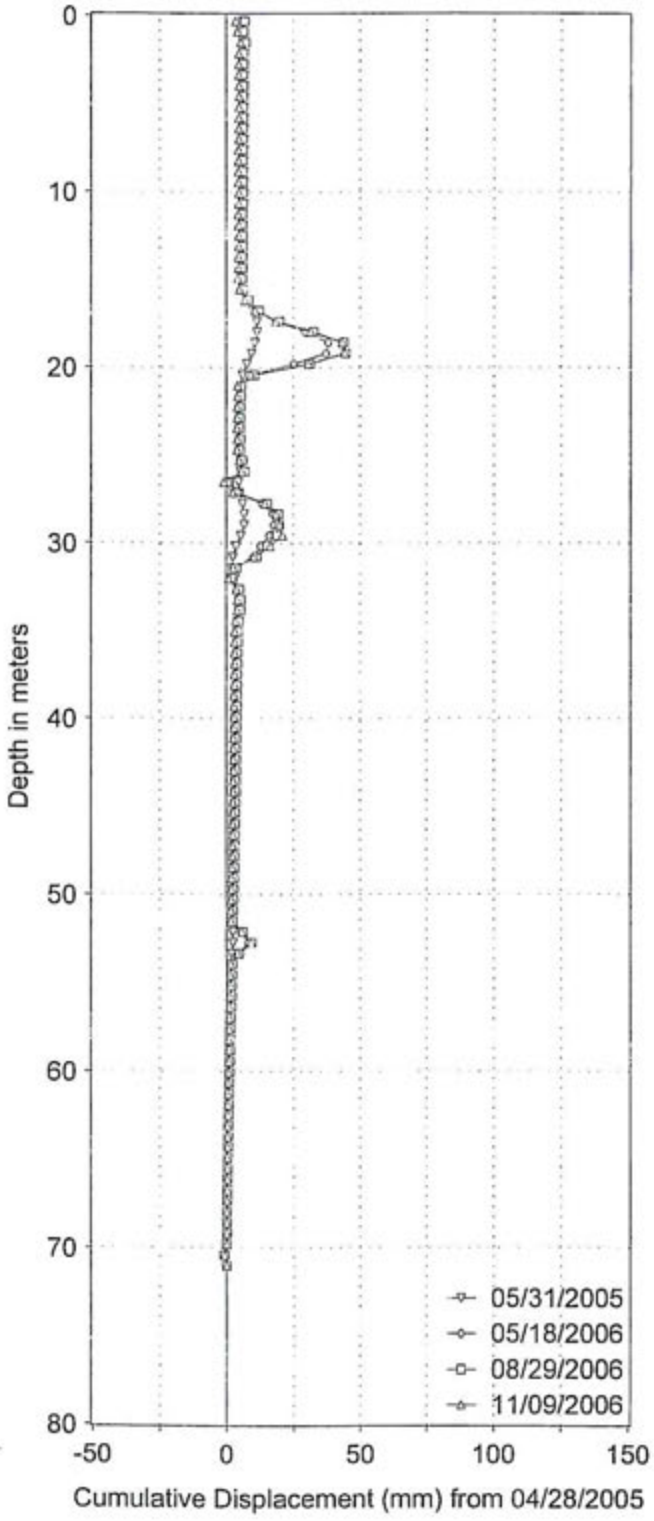
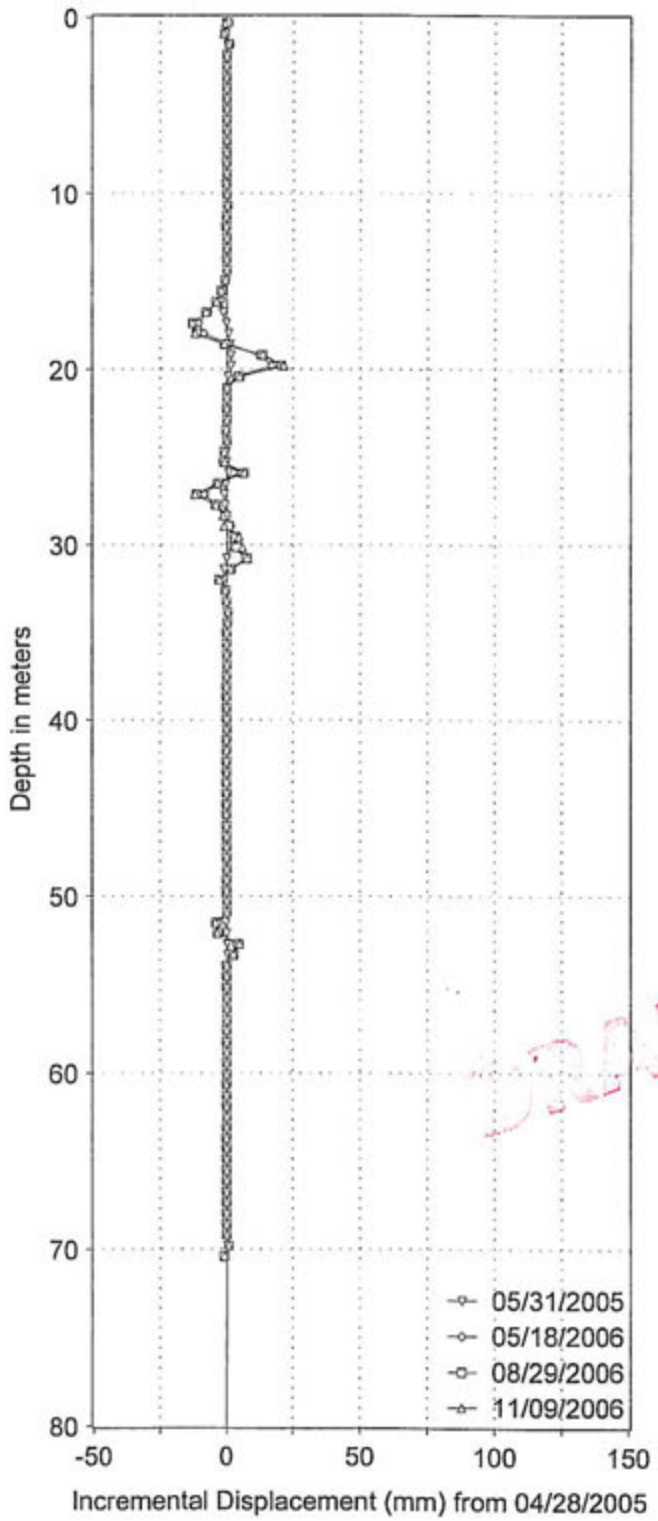
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-10 SI sheared at 69' between 06/03/2005 and 05/19/2006





KX04397
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-11





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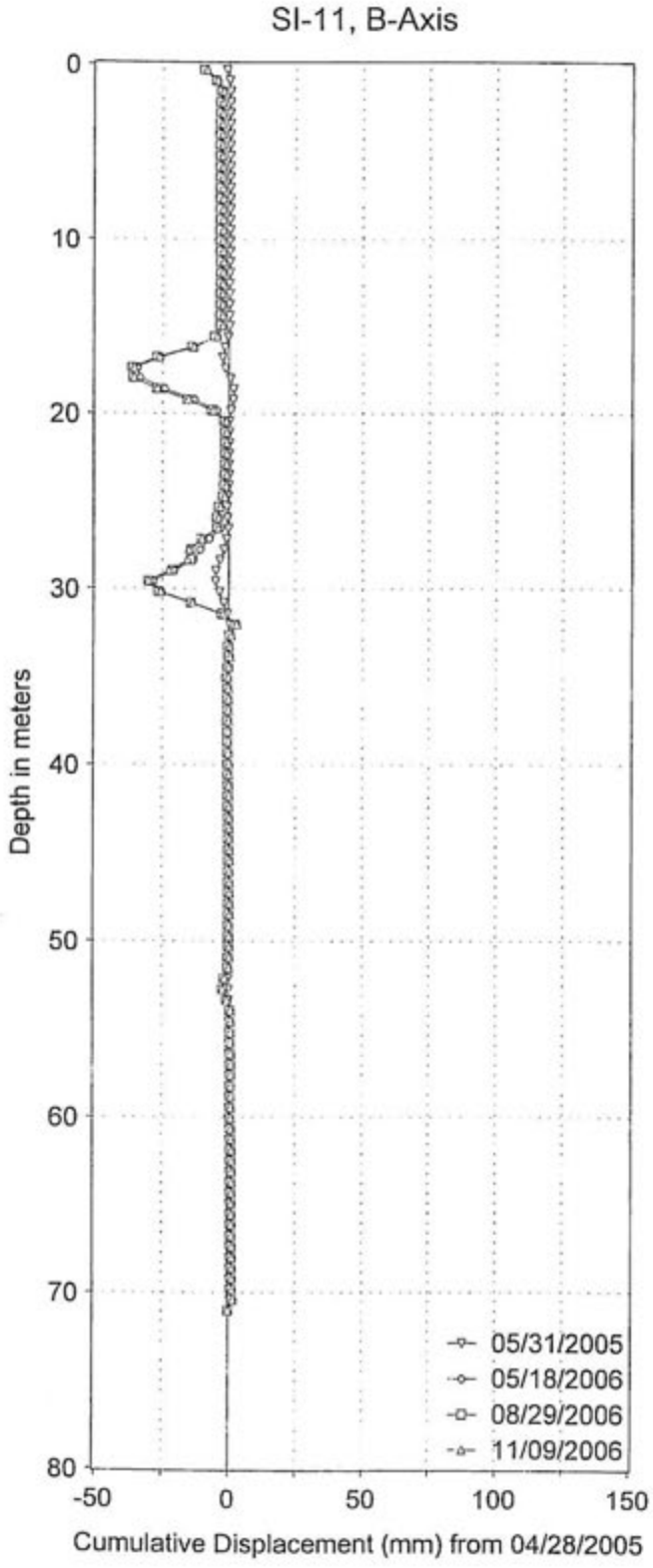
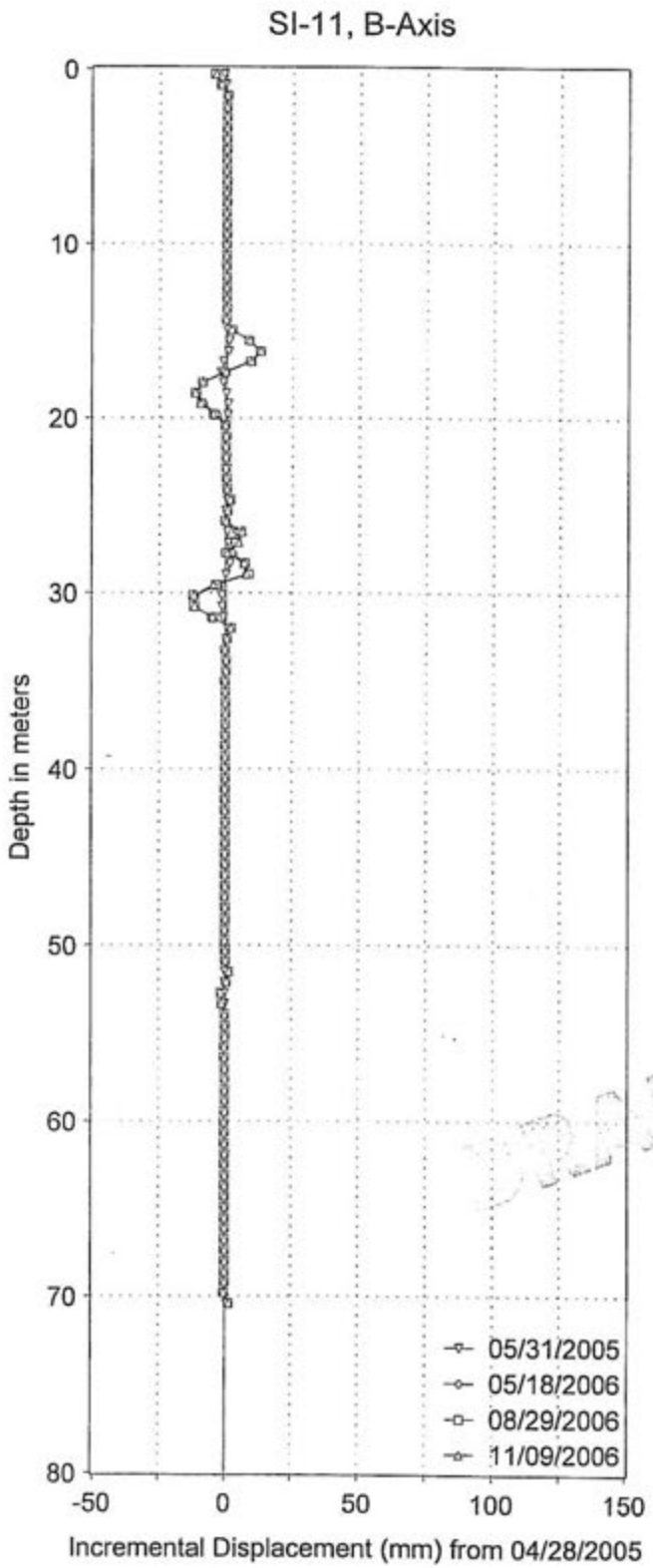
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-11





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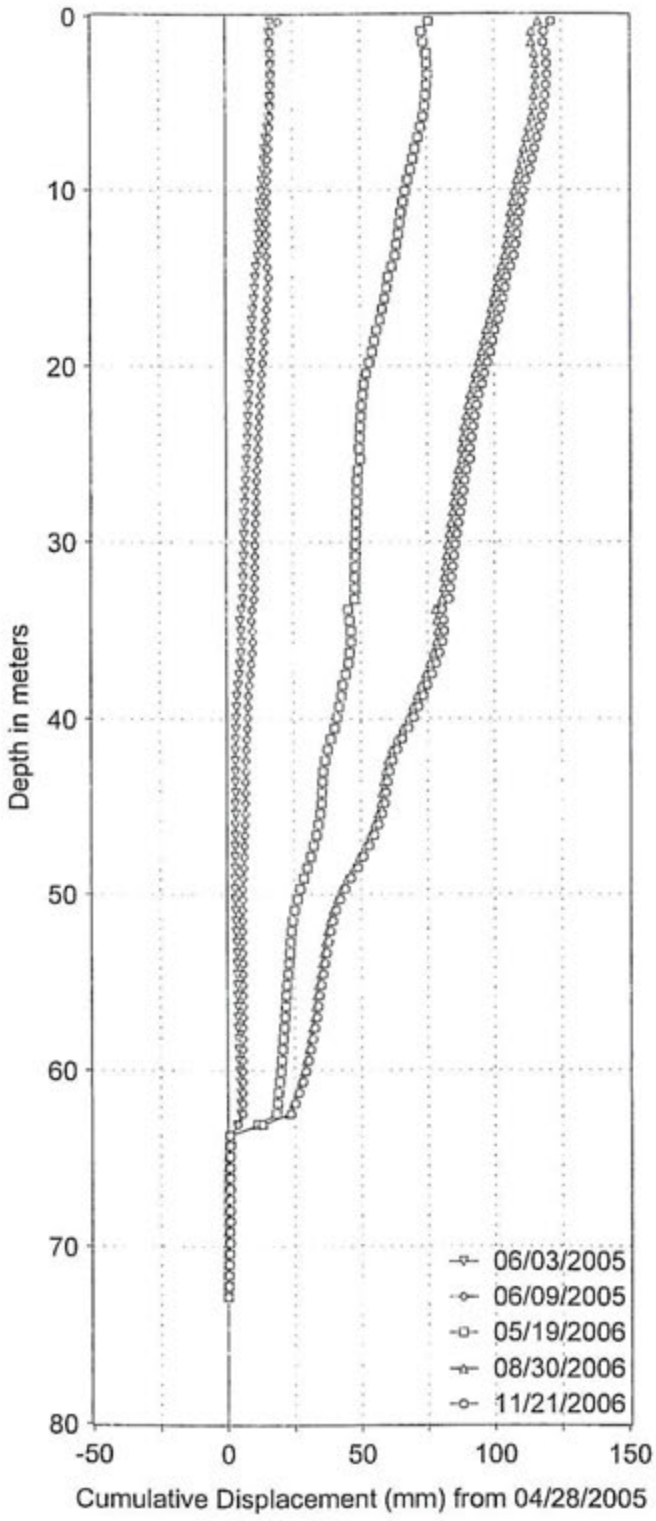
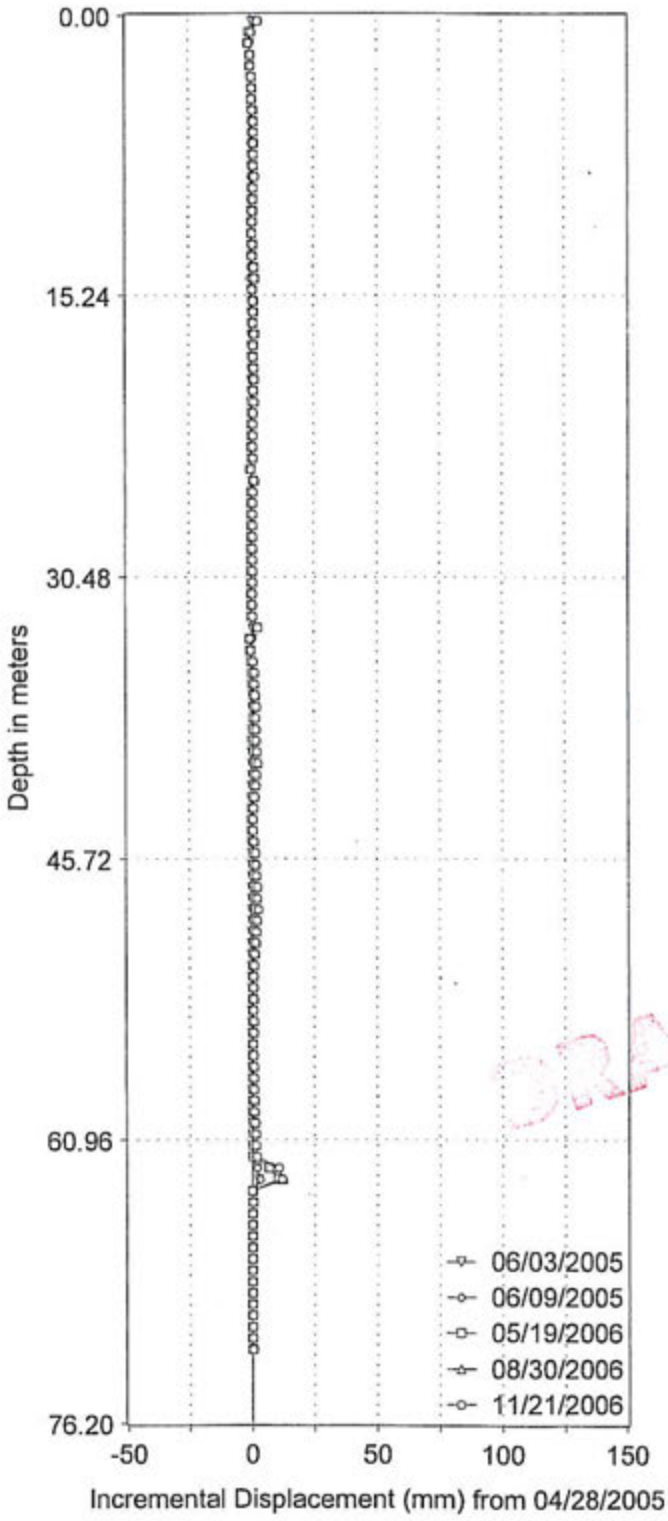
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-12





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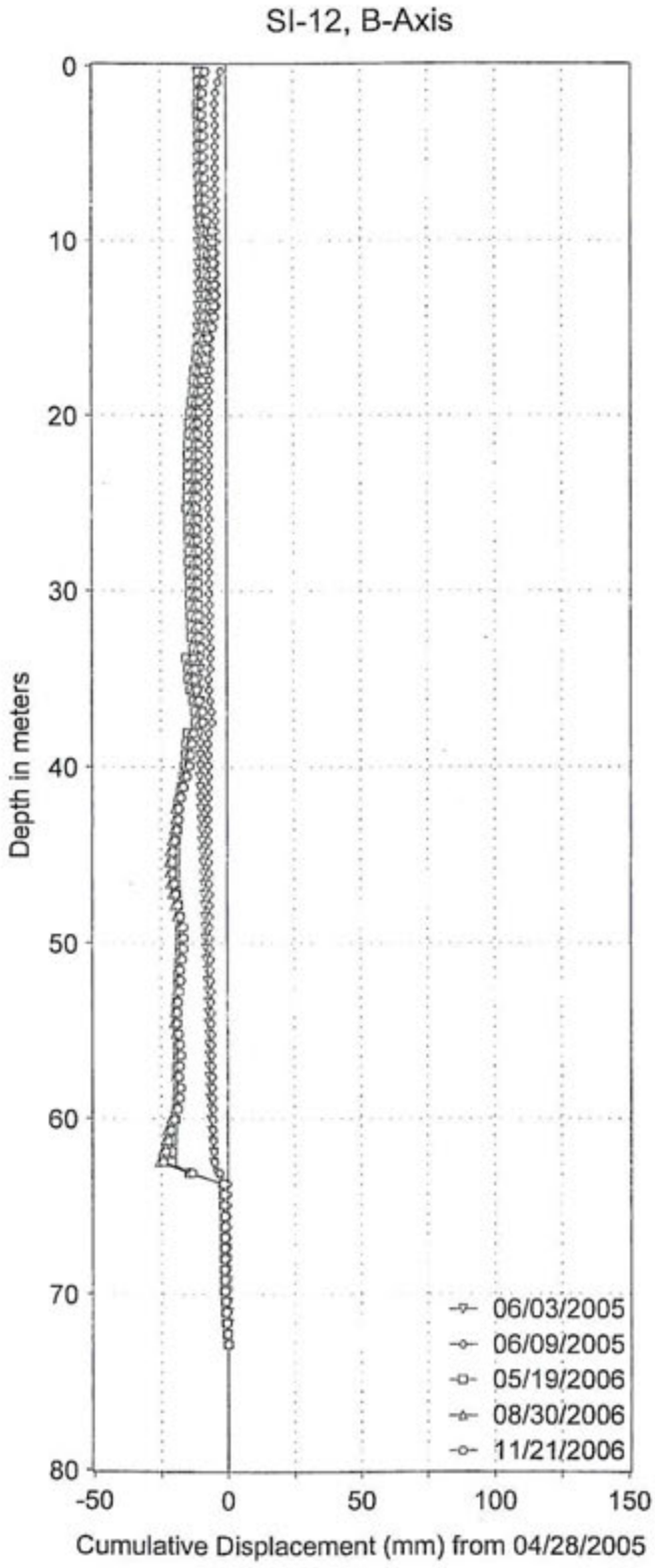
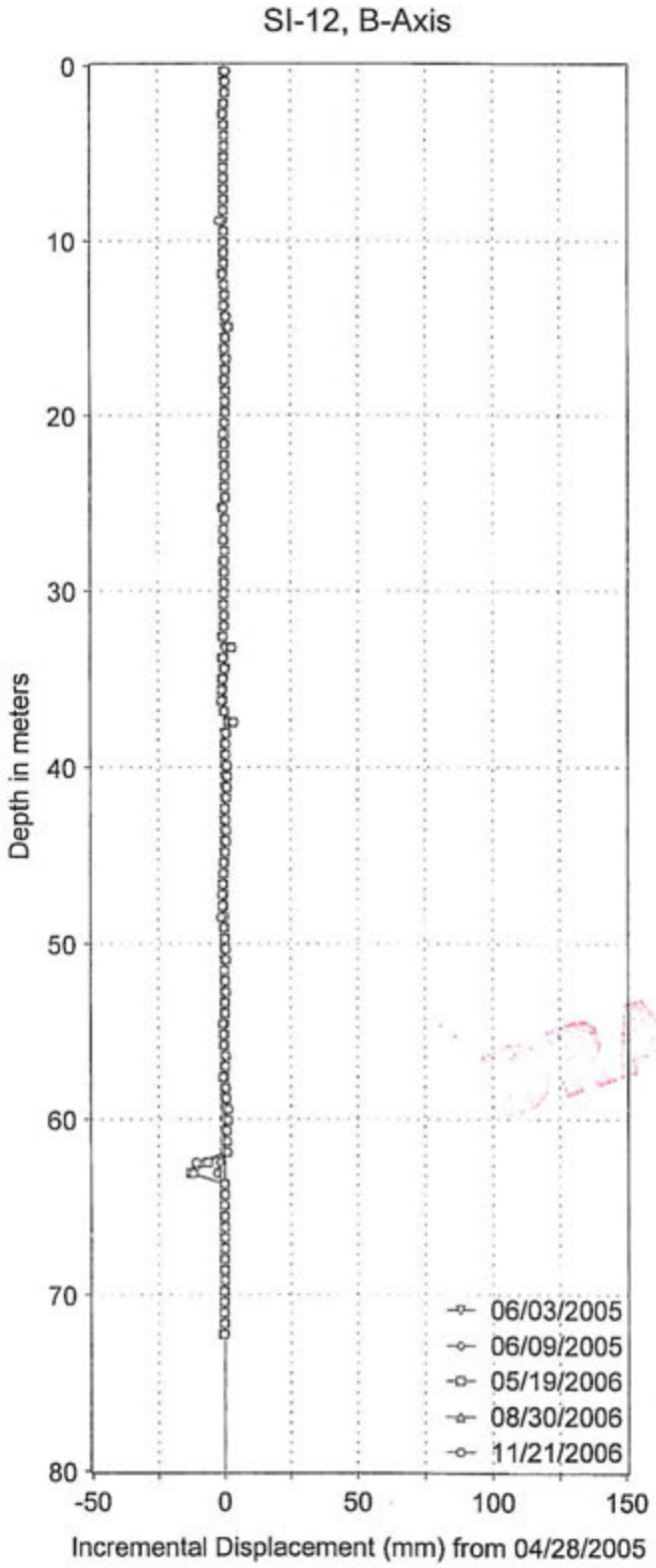
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-12





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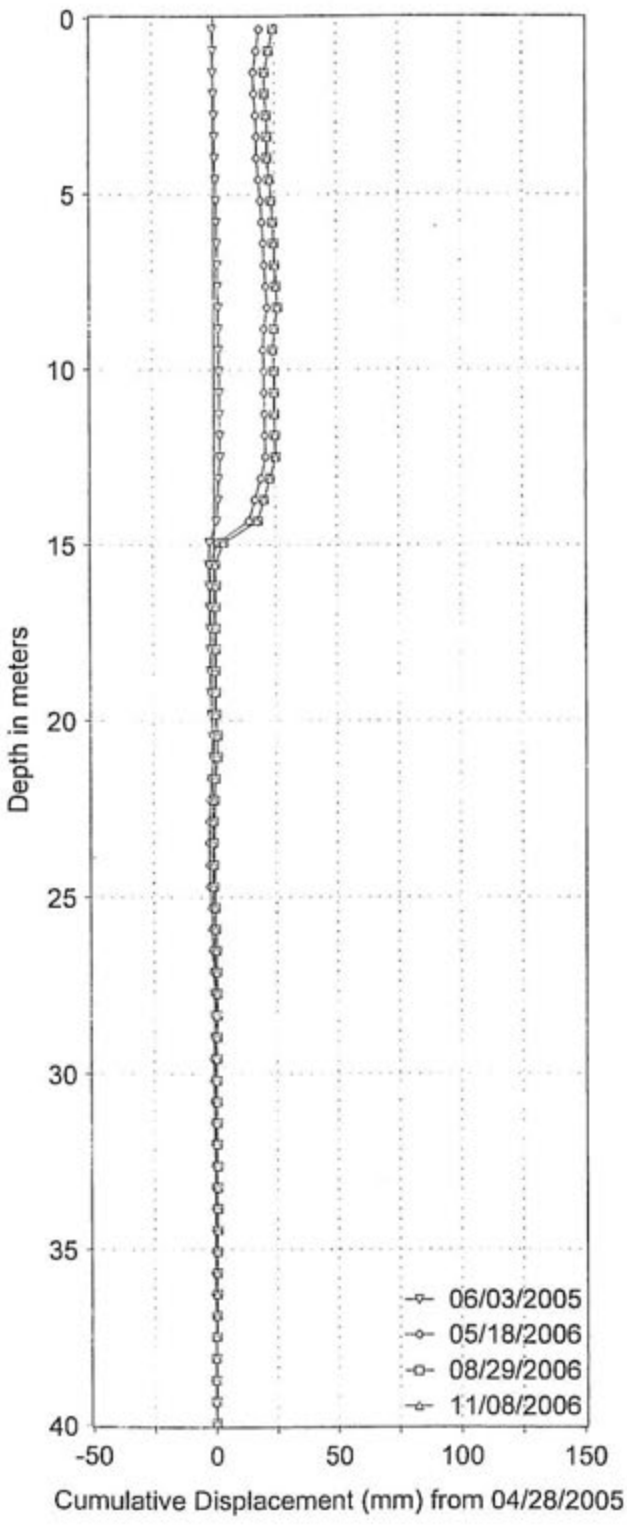
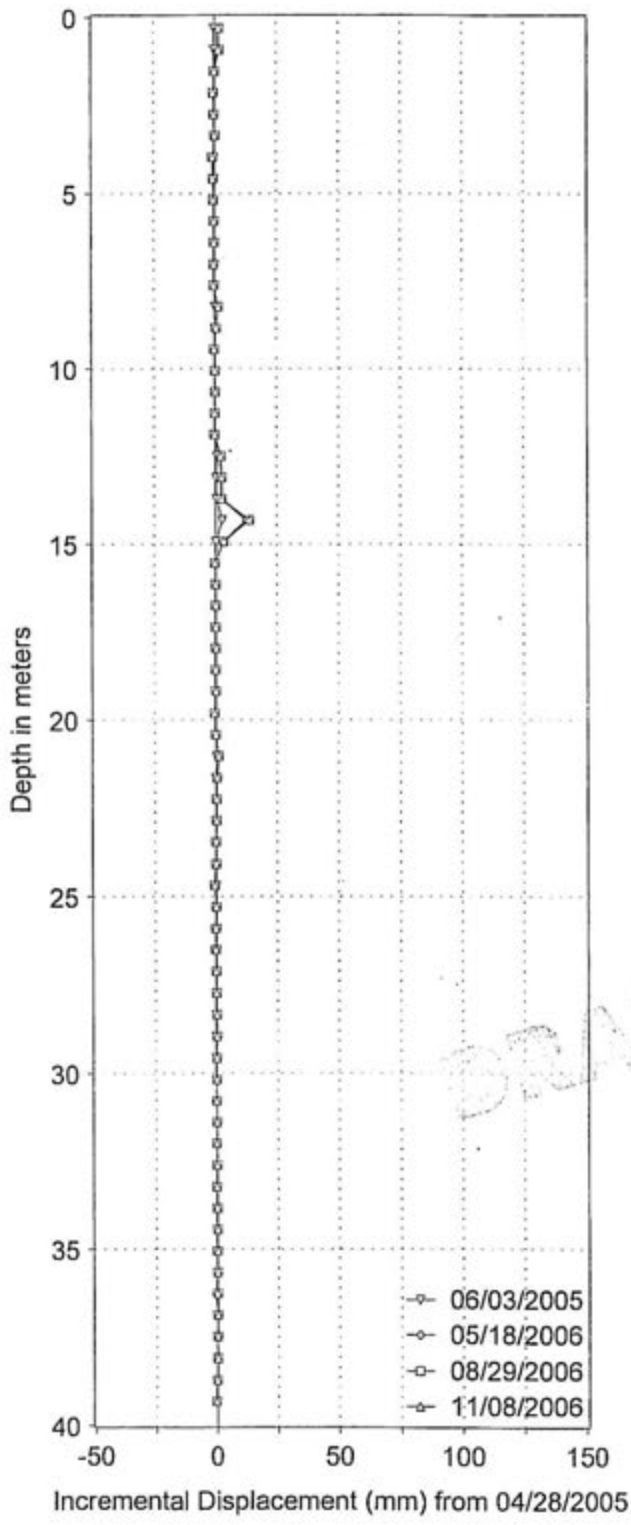
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-13





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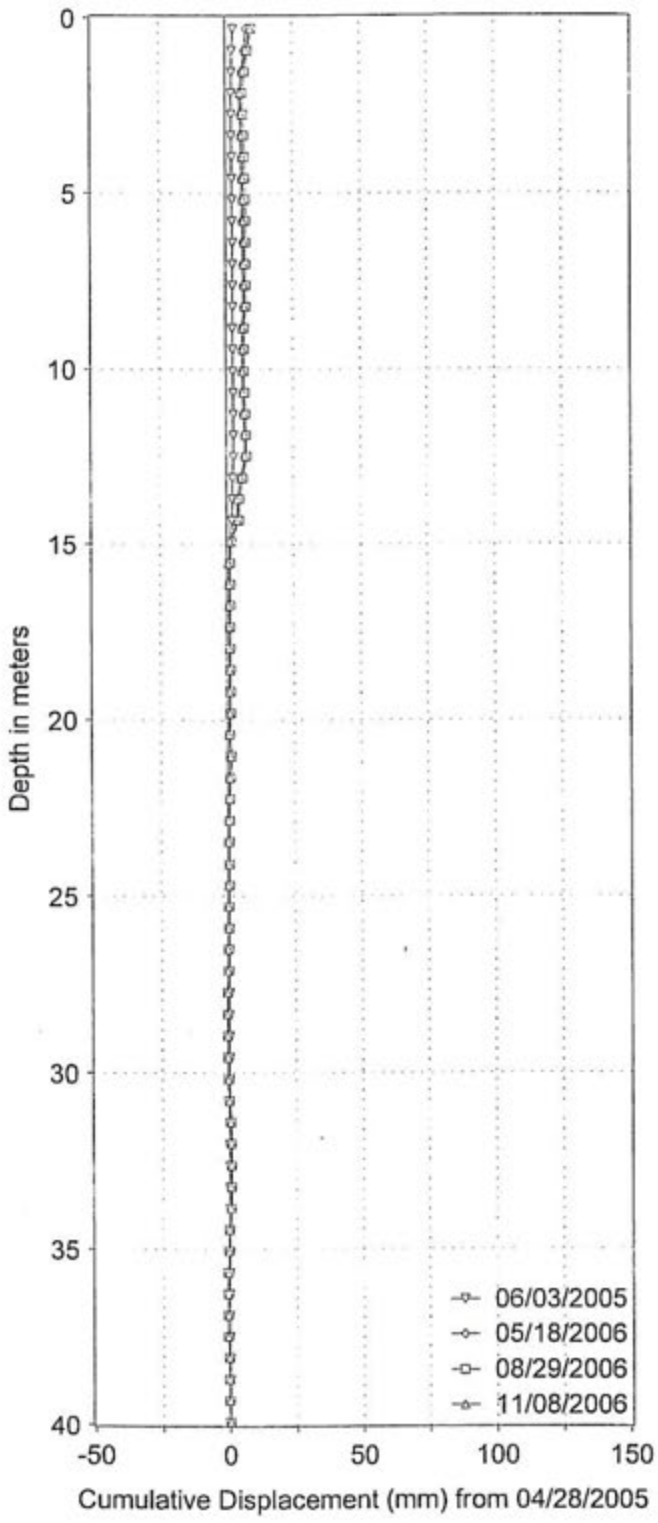
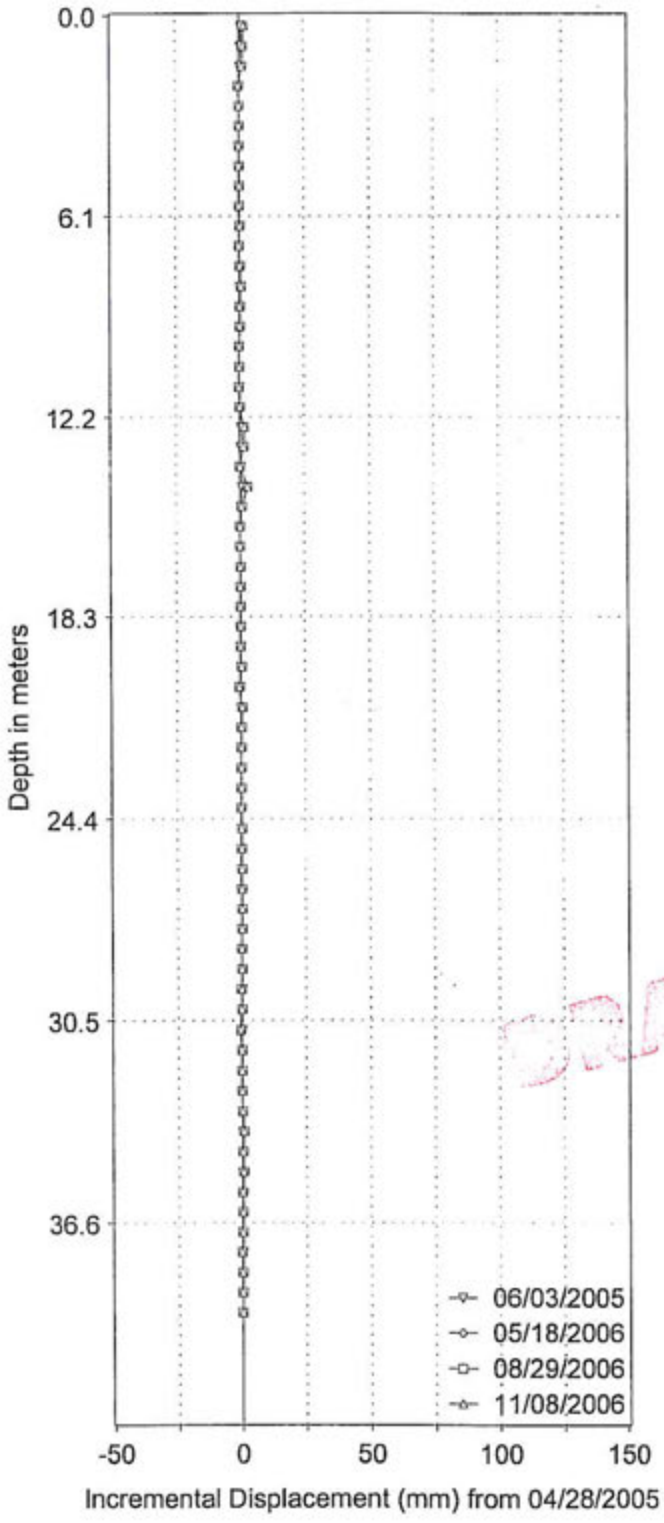
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-13





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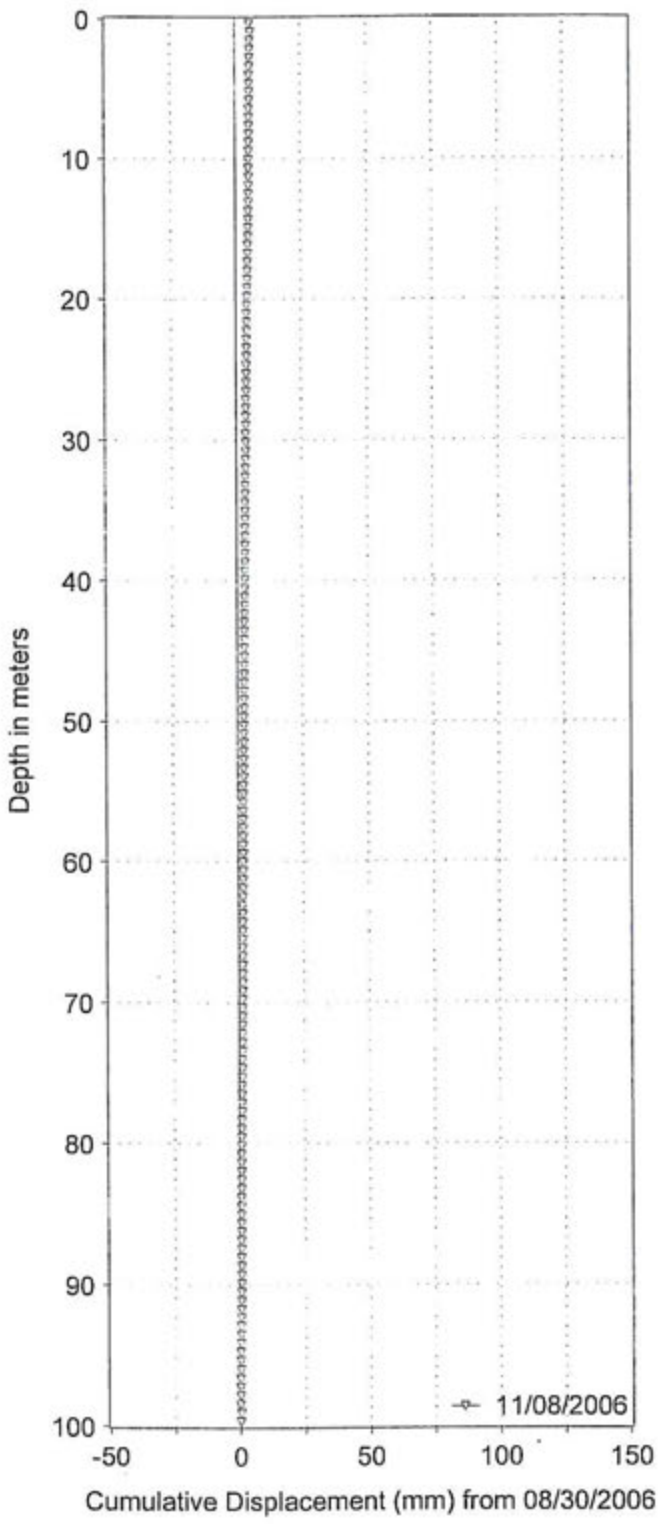
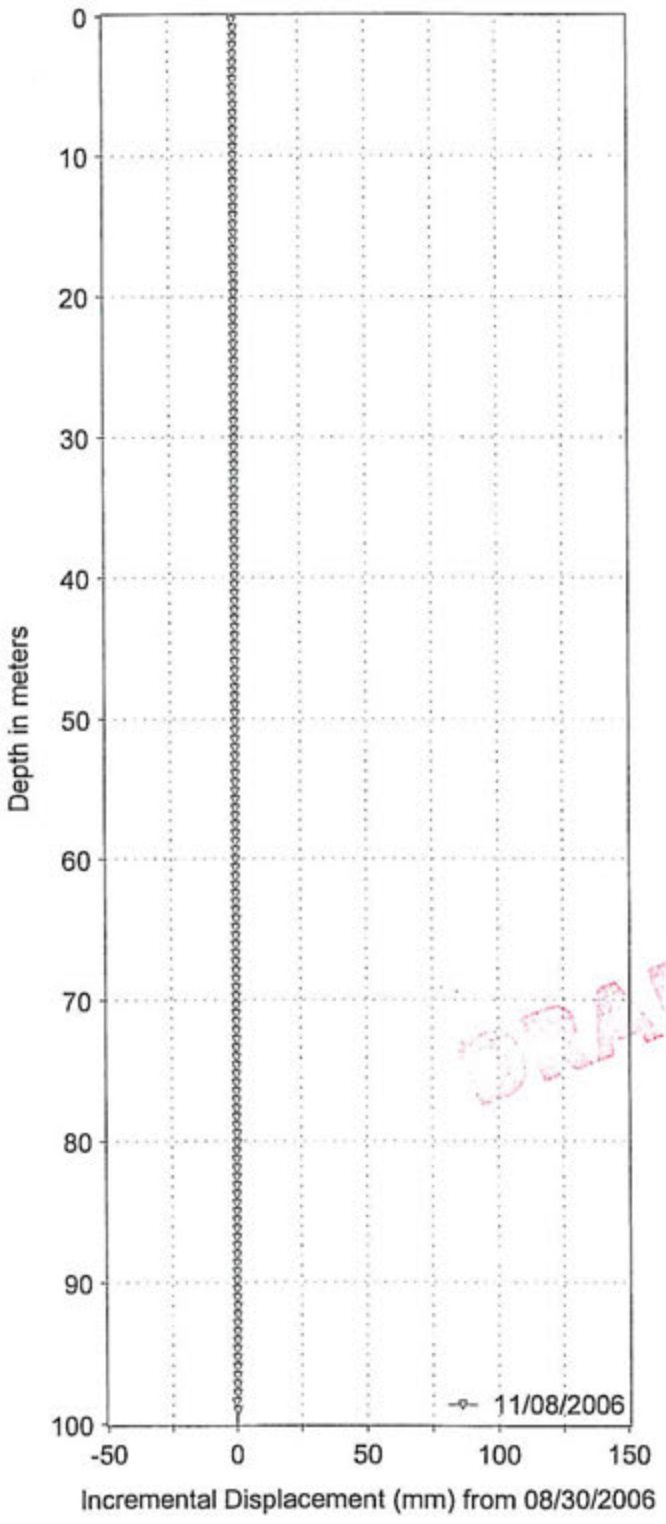
WEST QUESNEL STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-14 INITIAL READINGS





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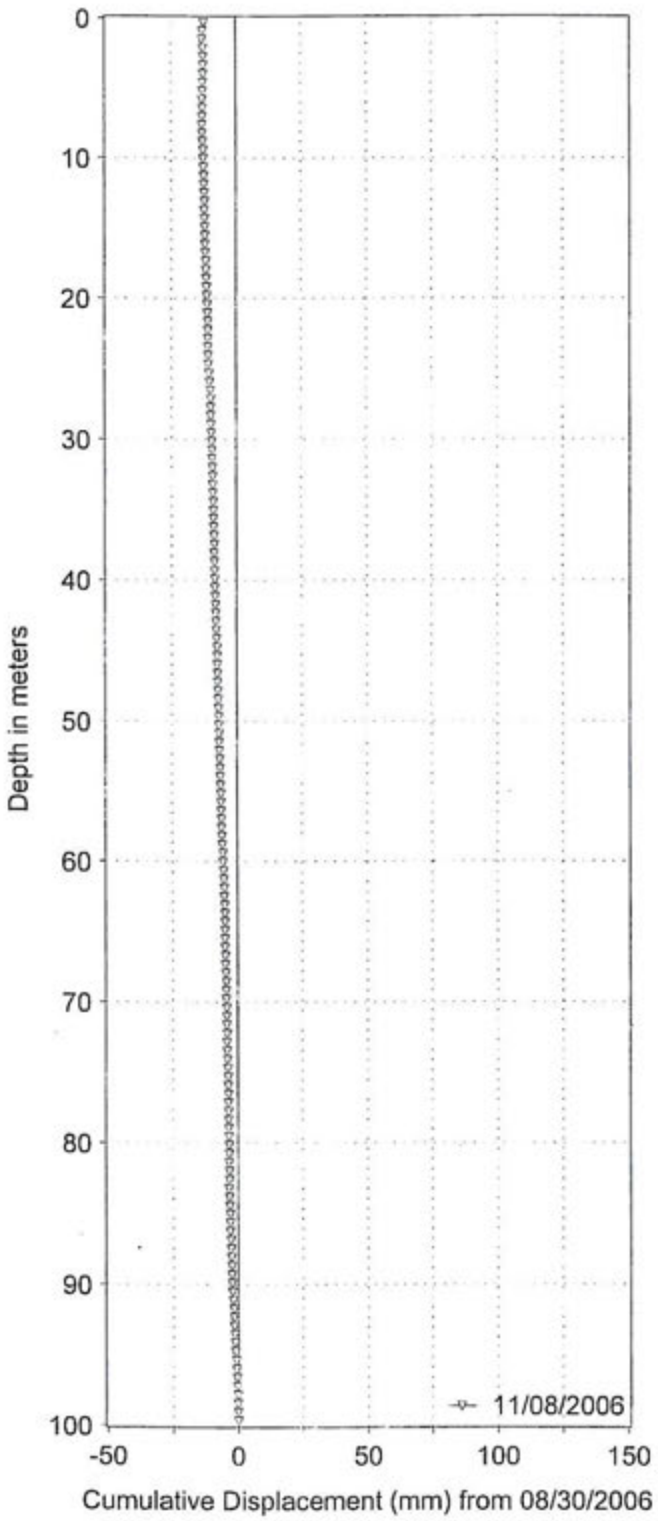
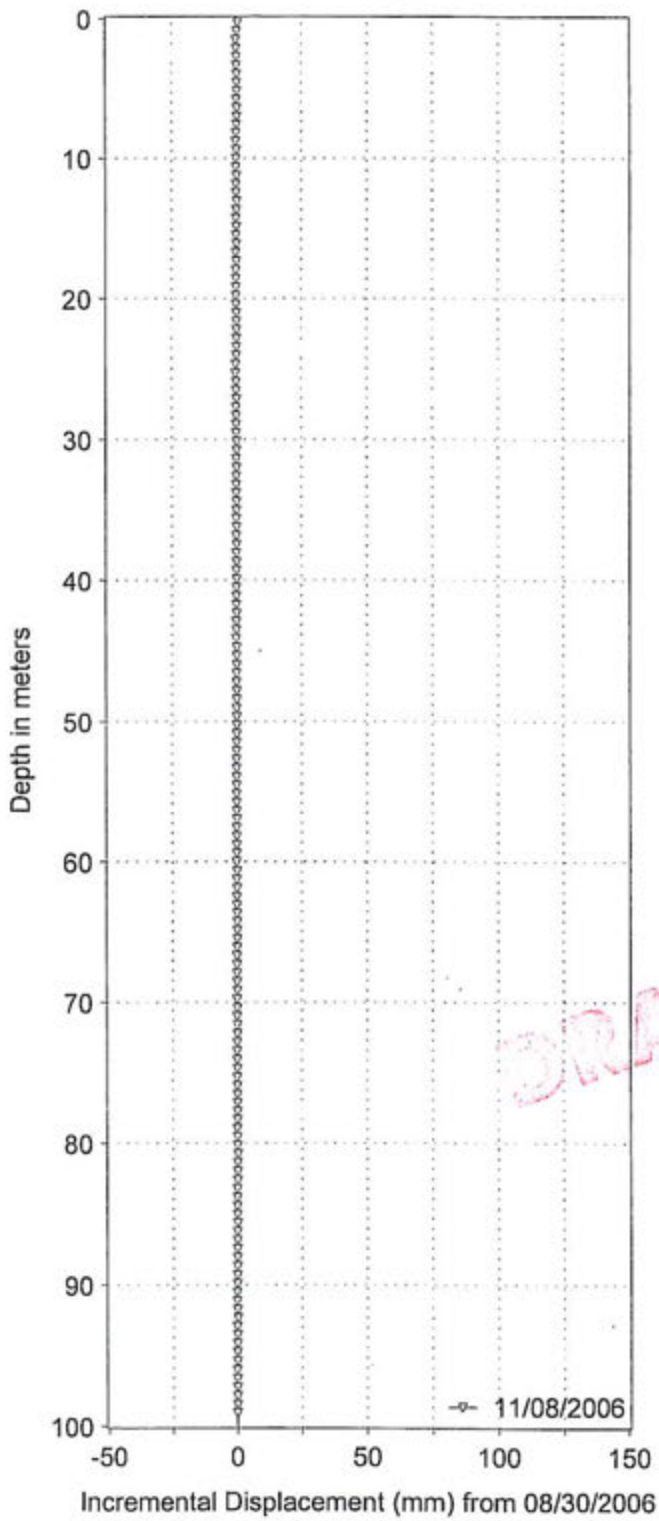
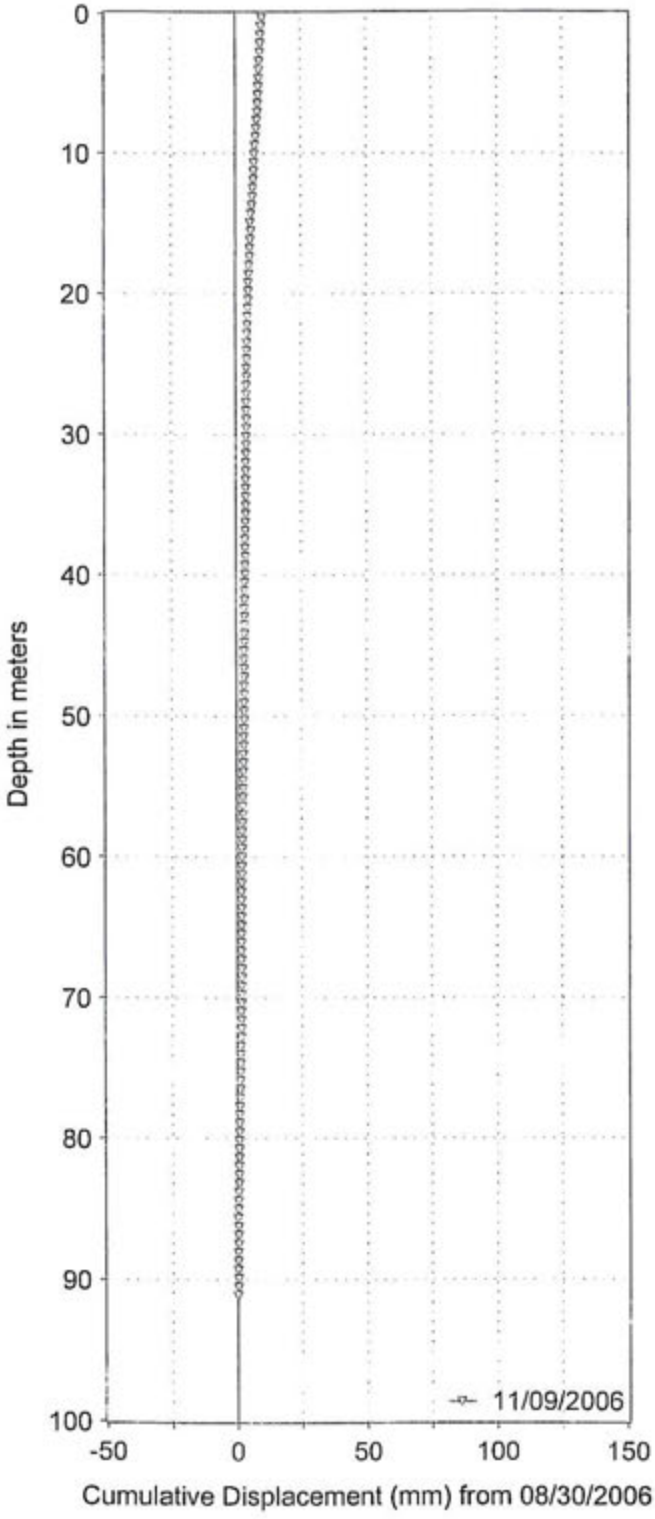
WEST QUESNEL STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACEMENTS
SI-14 INITIAL READINGS

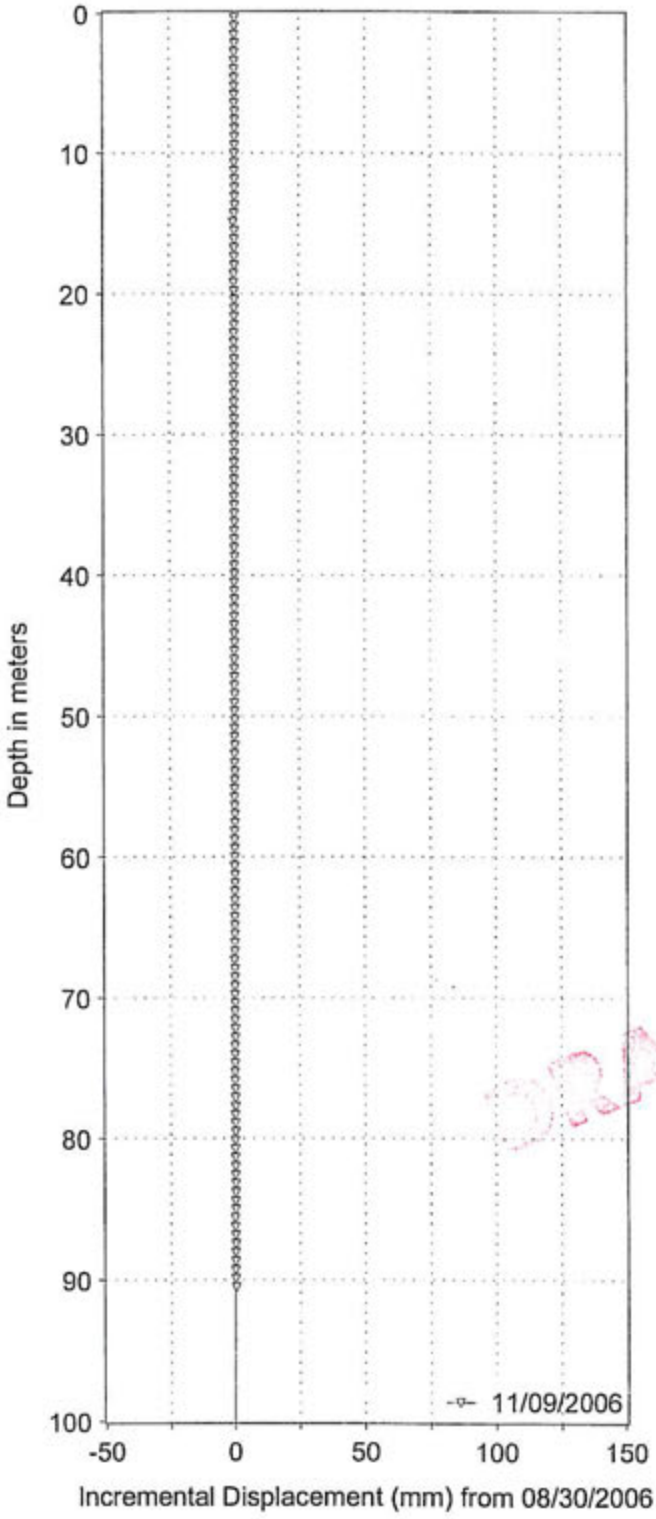




KX04397
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACMENTS
SI-15

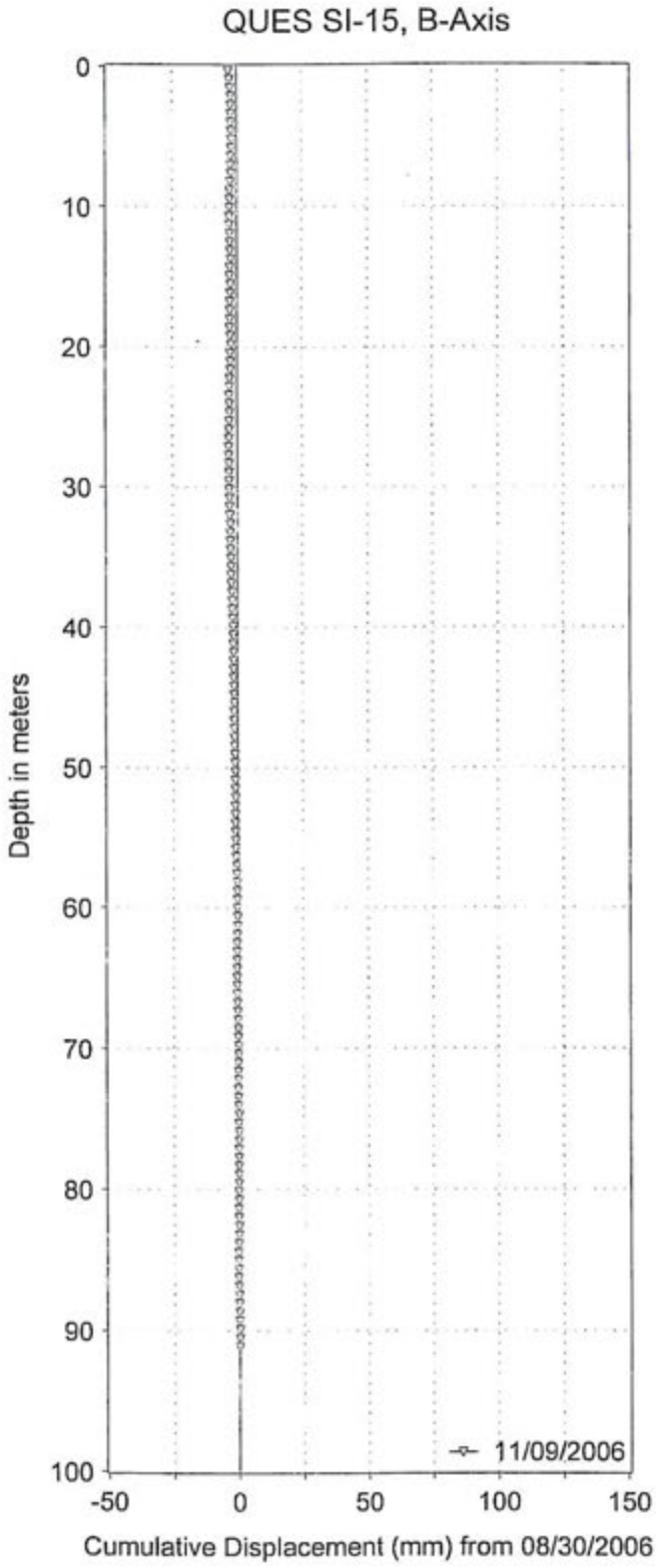
INITIAL READINGS

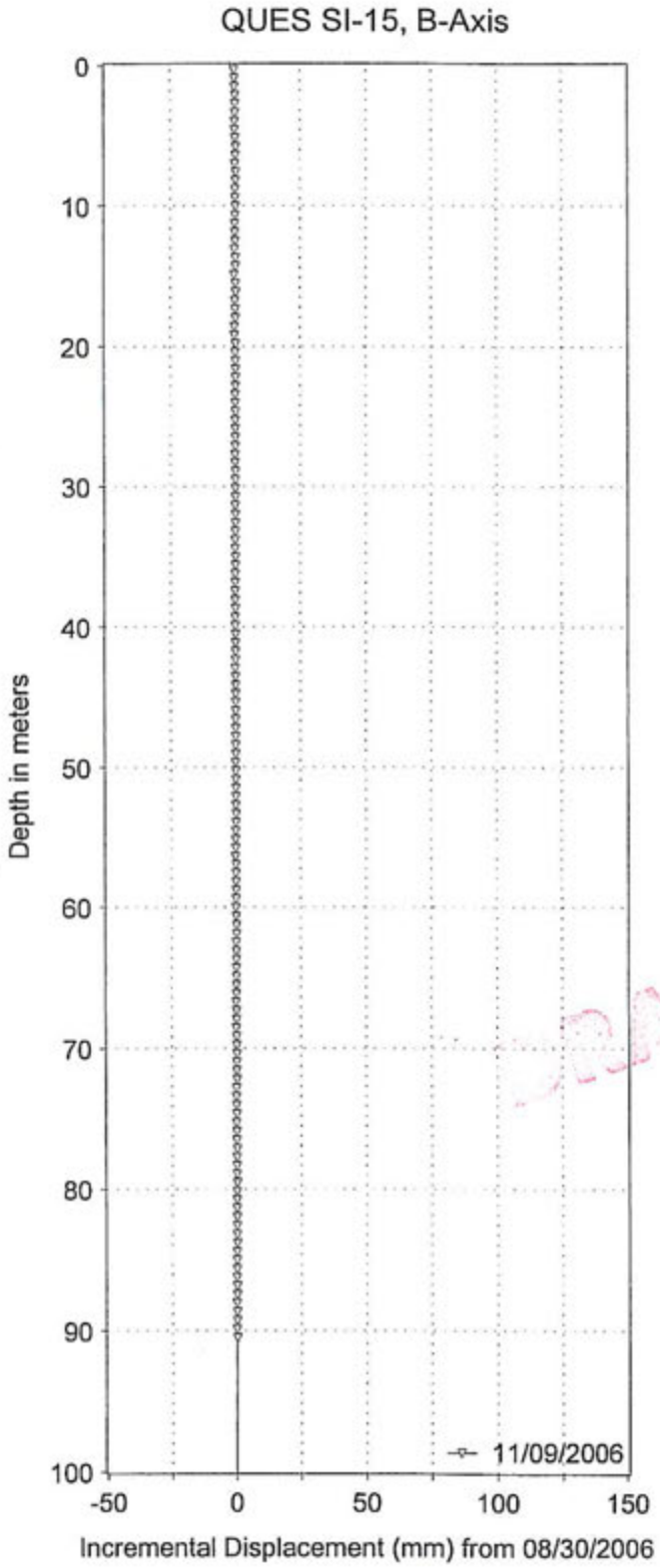




KX04397
WEST QUESNEL LAND STABILITY MONITORING
CUMULATIVE & INCREMENTAL DISPLACMENTS
SI-15

INITIAL READINGS

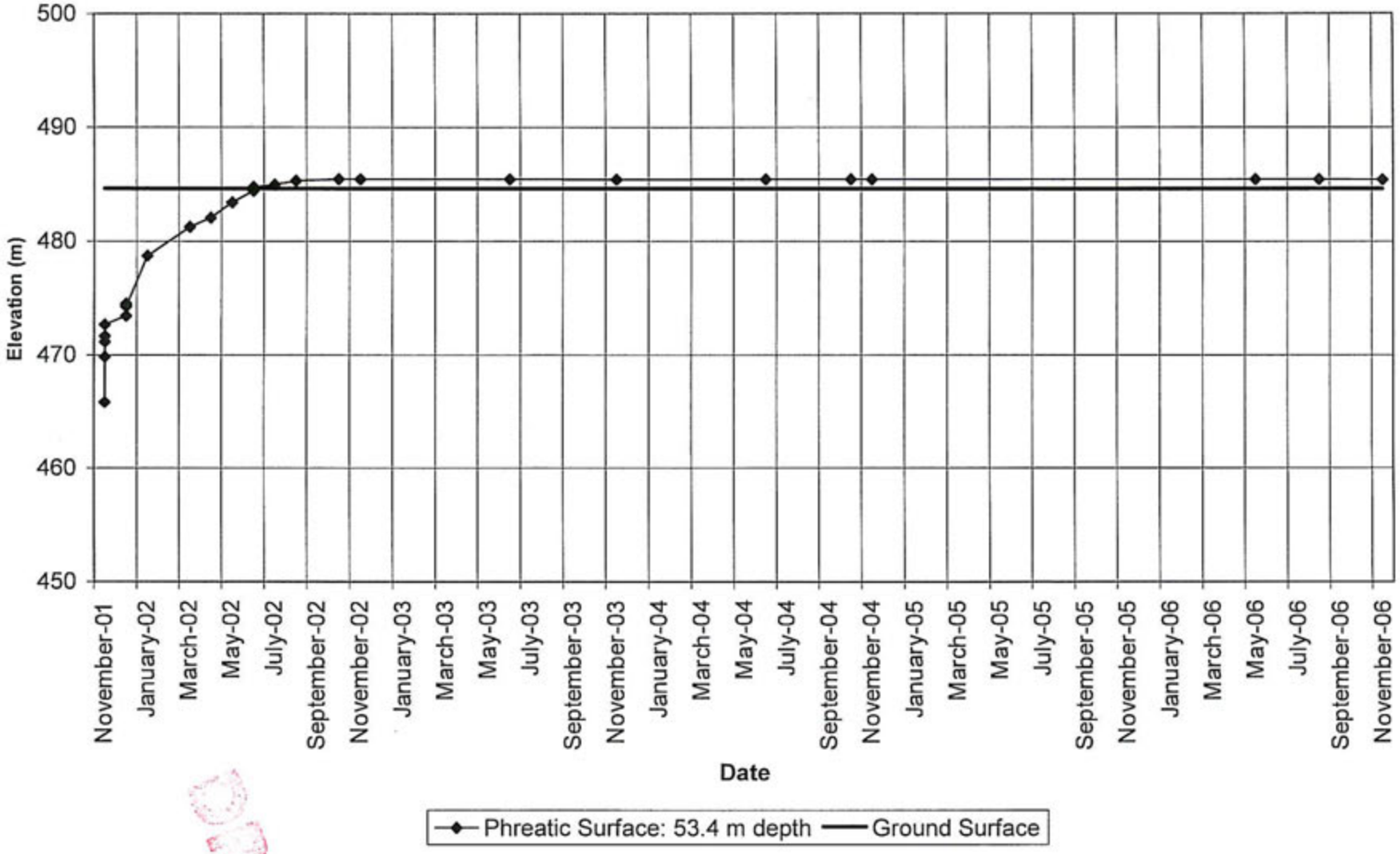




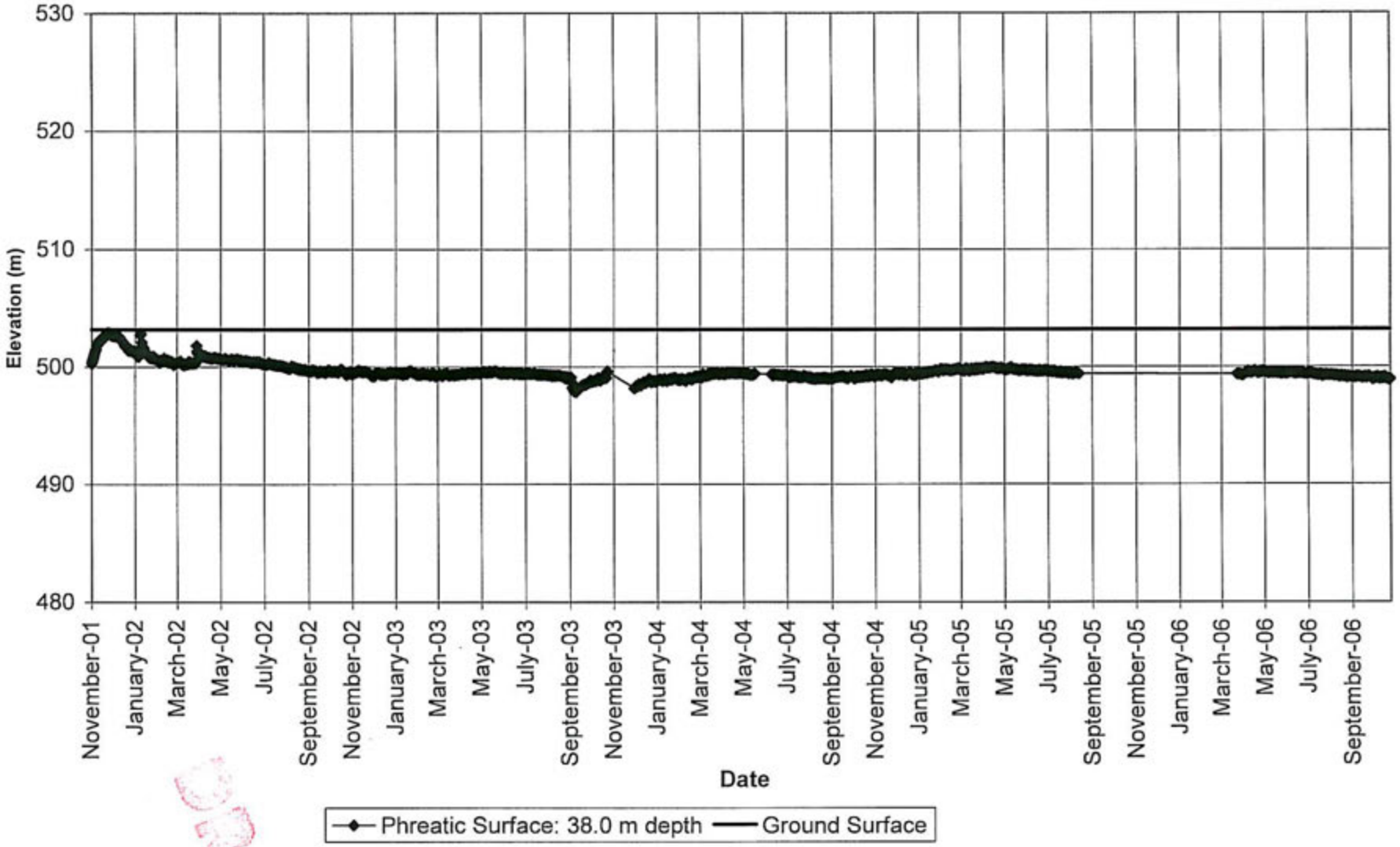
amec

GROUNDWATER DATA

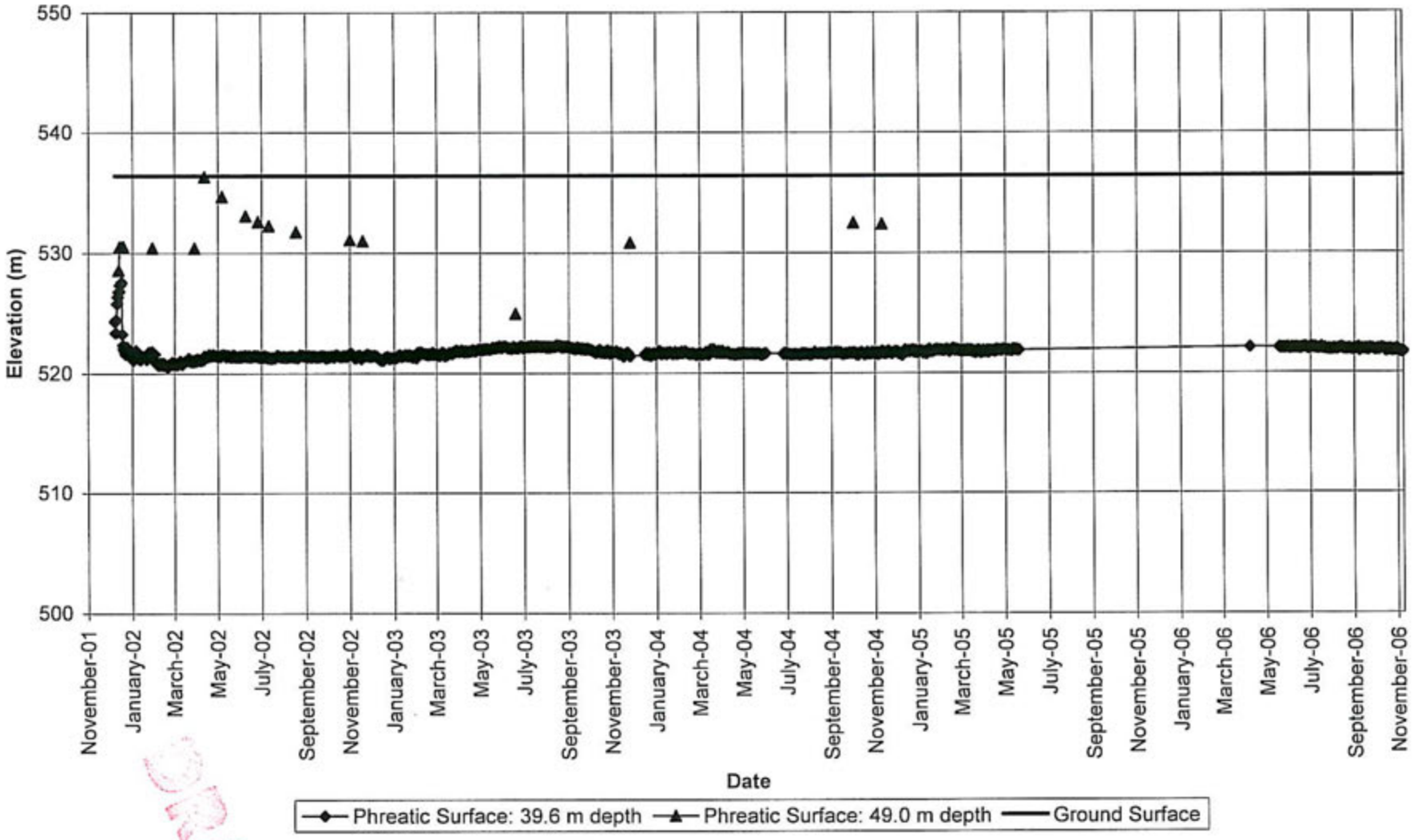
West Quesnel Stability Monitoring
Water Levels for Standpipe 2A

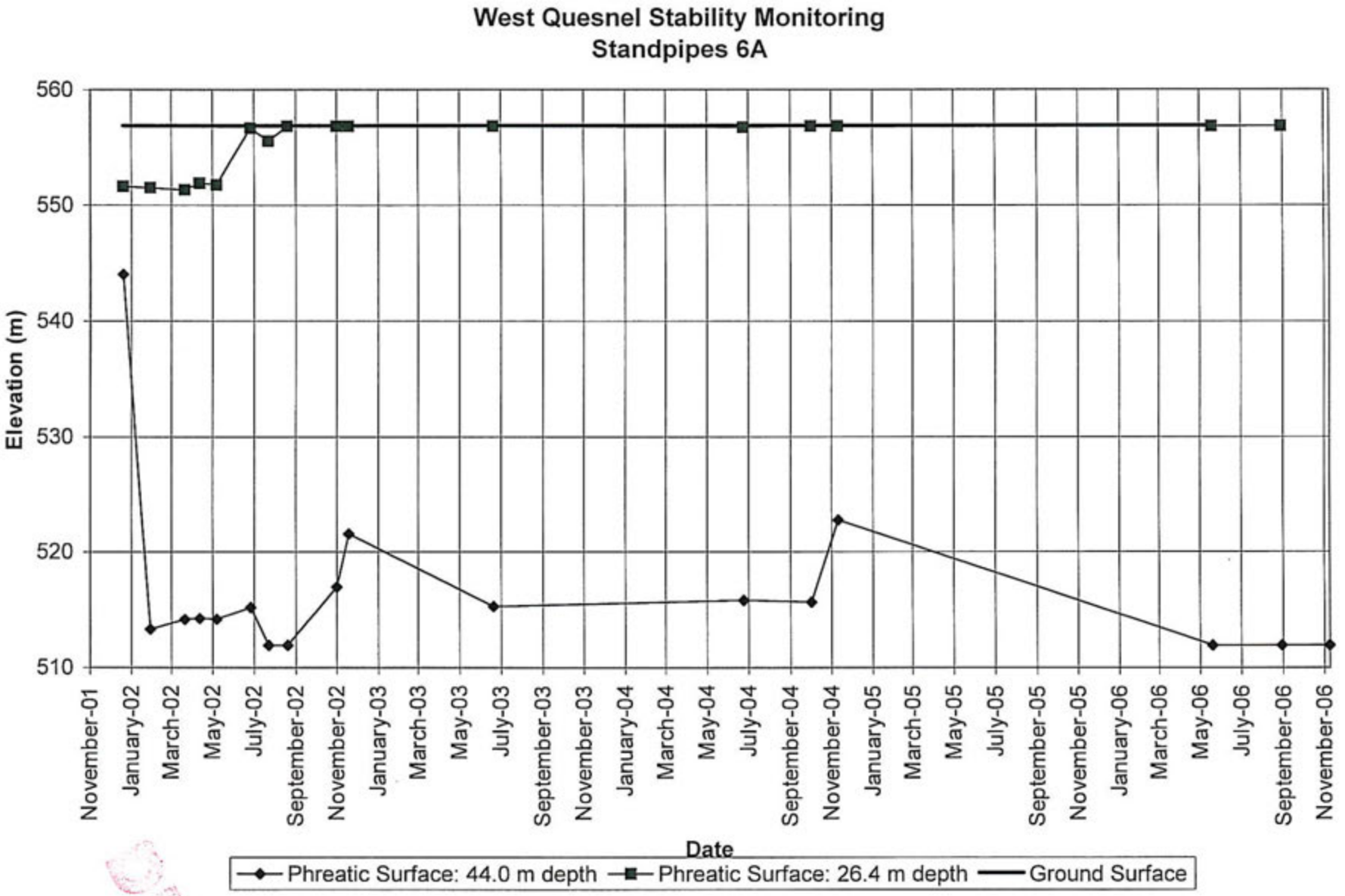


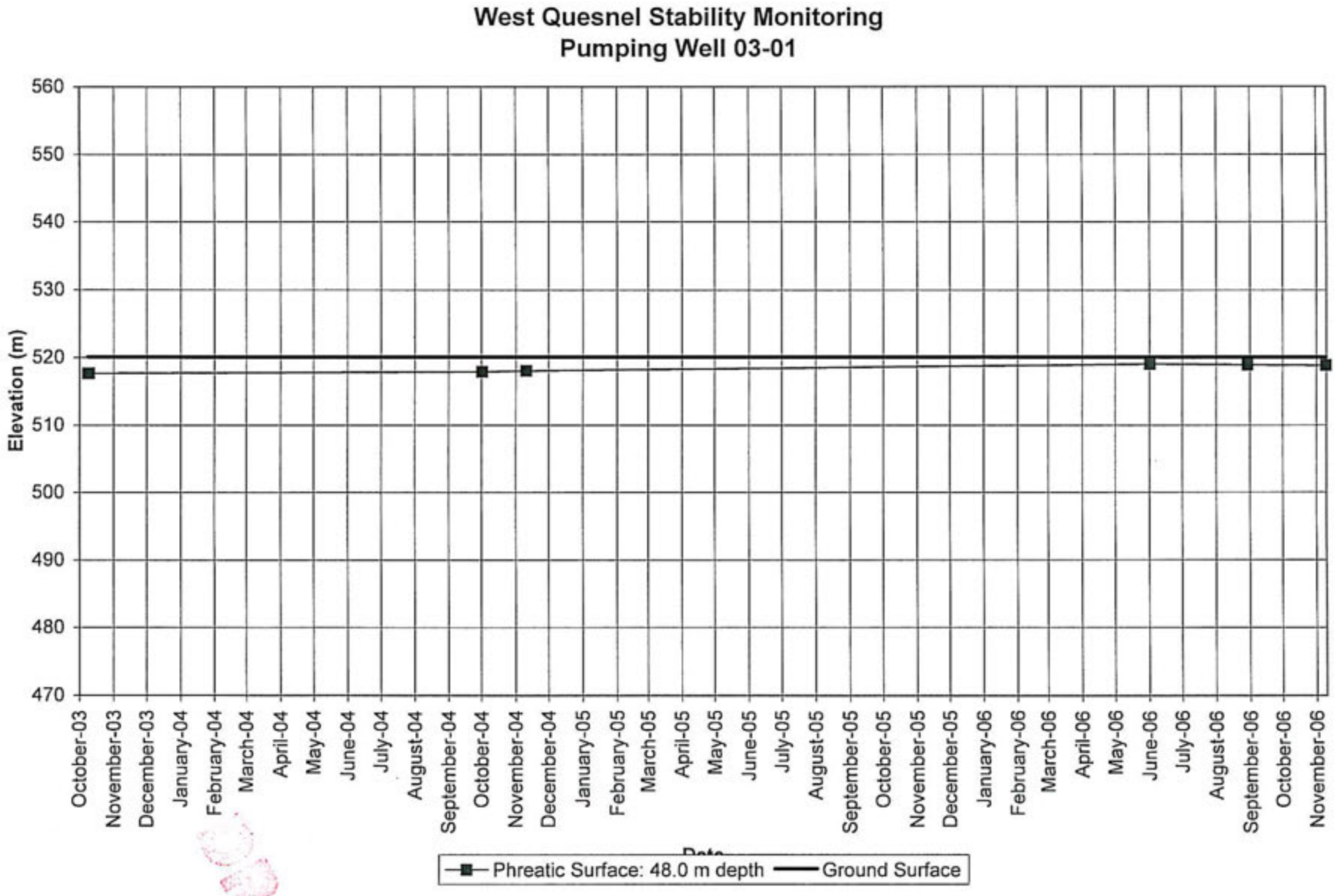
West Quesnel Stability Monitoring
Vibrating Wire Piezometer 3A

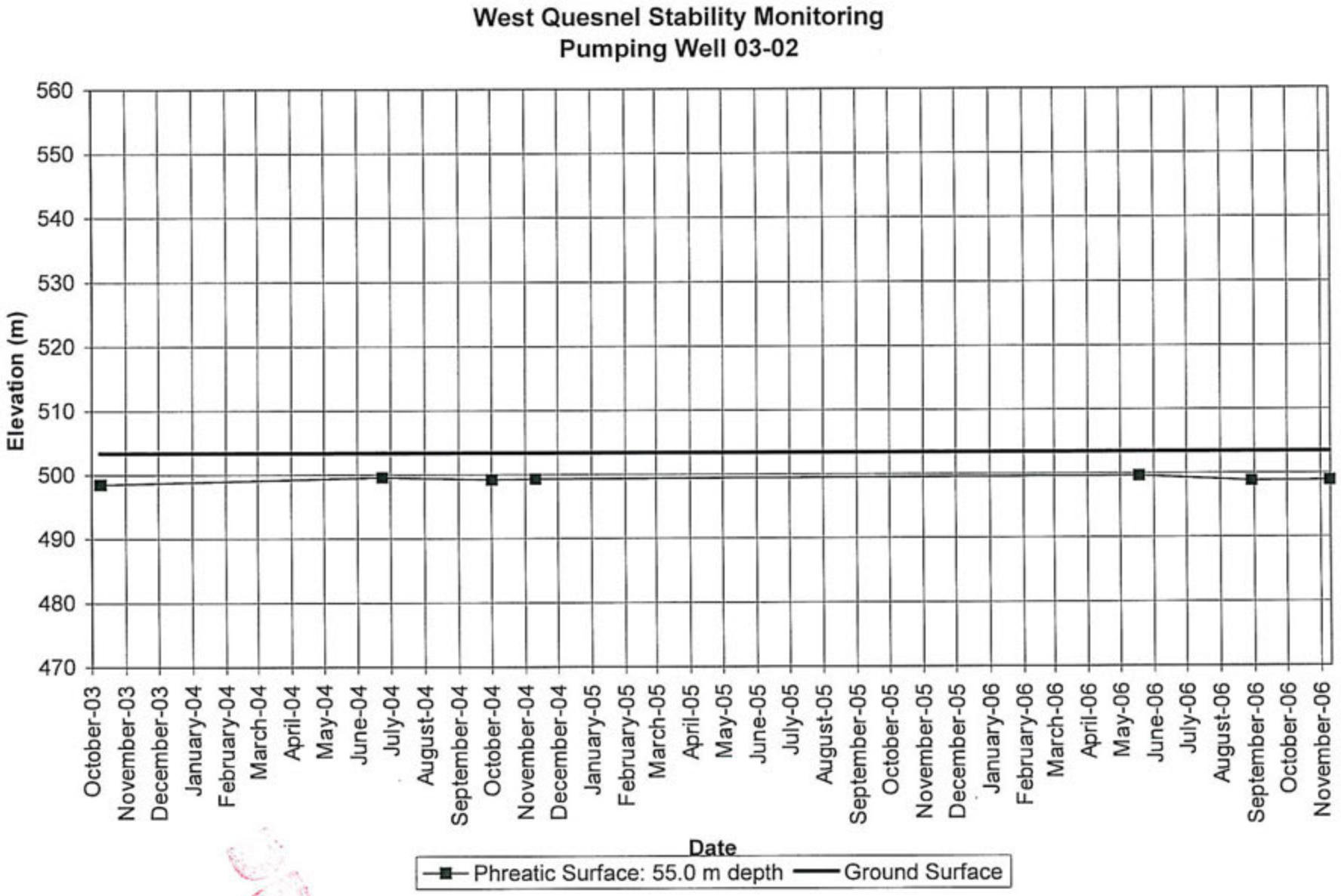


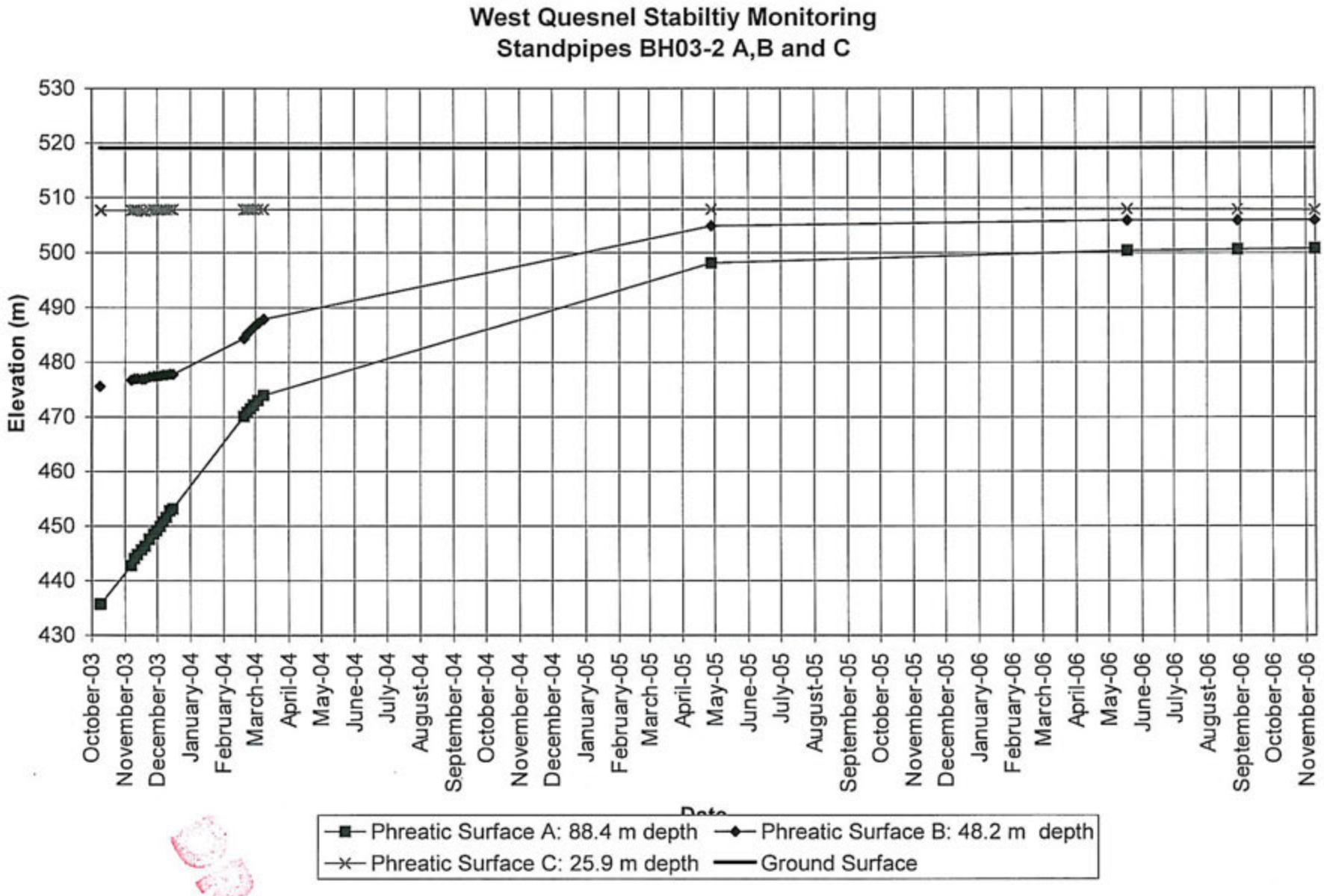
West Quesnel Stability Monitoring
Vibrating Wire Piezometer 4A



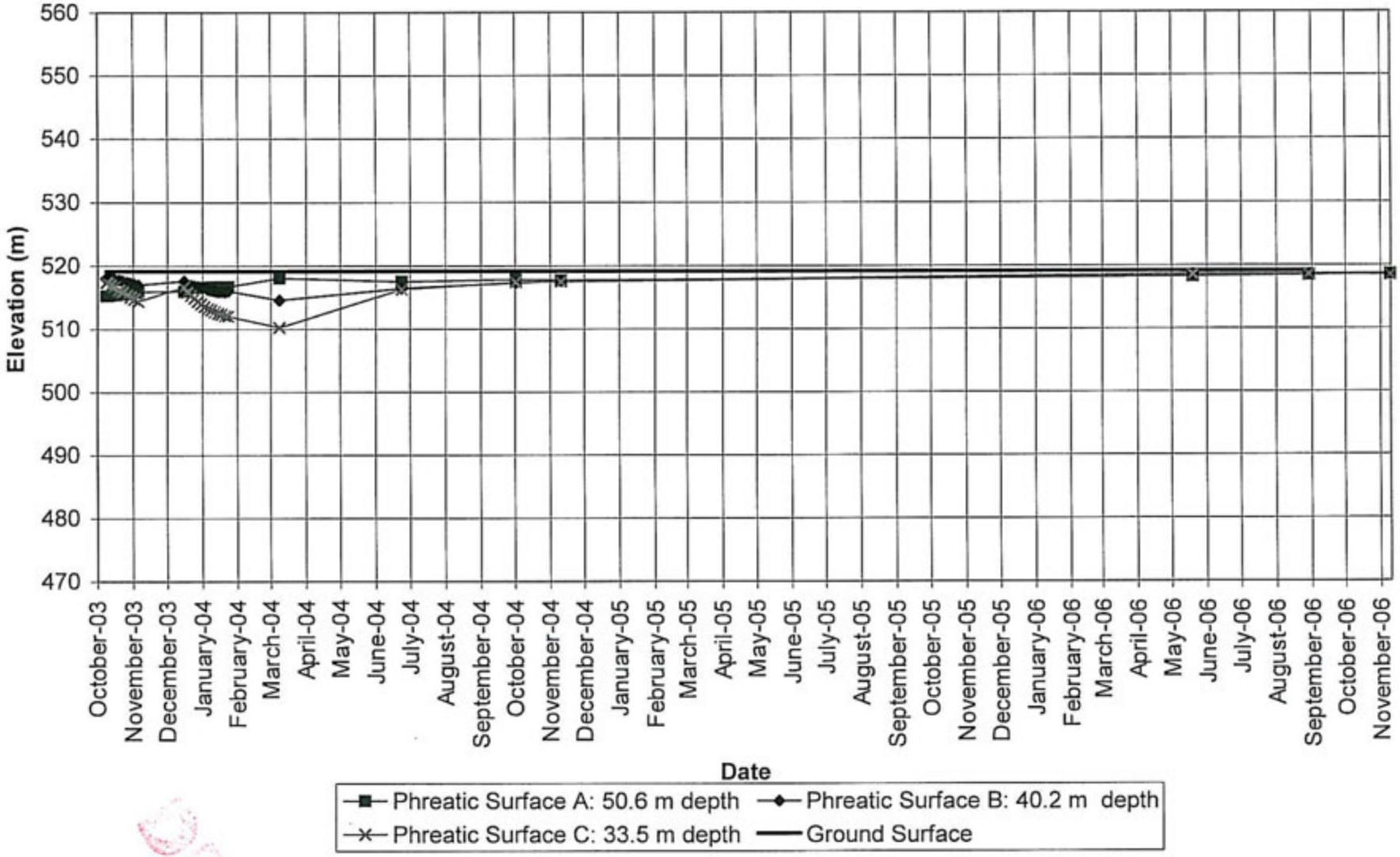

West Quesnel Stability Monitoring
Standpipes 6A
Elevation (m)
560
550
540
530
520
510
November-01
January-02
March-02
May-02
July-02
September-02
November-02
January-03
March-03
May-03
July-03
September-03
November-03
January-04
March-04
May-04
July-04
September-04
November-04
January-05
March-05
May-05
July-05
September-05
November-05
January-06
March-06
May-06
July-06
September-06
November-06
Date
Phreatic Surface: 44.0 m depth
Phreatic Surface: 26.4 m depth
Ground Surface


West Quesnel Stability Monitoring
Pumping Well 03-01
Elevation (m)
560
550
540
530
520
510
500
490
480
470
October-03
November-03
December-03
January-04
February-04
March-04
April-04
May-04
June-04
July-04
August-04
September-04
October-04
November-04
December-04
January-05
February-05
March-05
April-05
May-05
June-05
July-05
August-05
September-05
October-05
November-05
December-05
January-06
February-06
March-06
April-06
May-06
June-06
July-06
August-06
September-06
October-06
November-06
Phreatic Surface: 48.0 m depth
Ground Surface

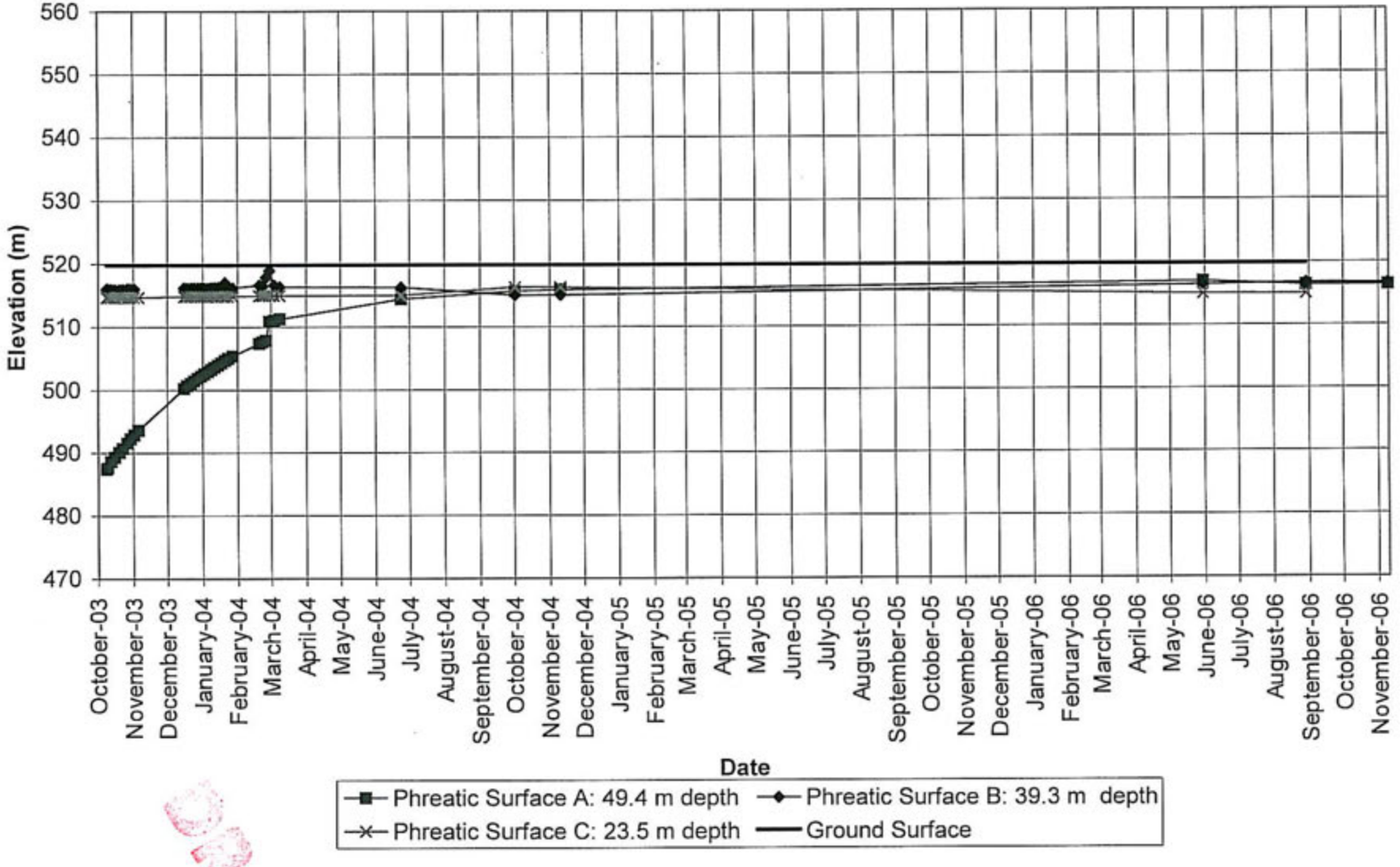

West Quesnel Stability Monitoring
Pumping Well 03-02
Elevation (m)
560
550
540
530
520
510
500
490
480
470
October-03
November-03
December-03
January-04
February-04
March-04
April-04
May-04
June-04
July-04
August-04
September-04
October-04
November-04
December-04
January-05
February-05
March-05
April-05
May-05
June-05
July-05
August-05
September-05
October-05
November-05
December-05
January-06
February-06
March-06
April-06
May-06
June-06
July-06
August-06
September-06
October-06
November-06
Date
Phreatic Surface: 55.0 m depth
Ground Surface


West Quesnel Stabiltiy Monitoring
Standpipes BH03-2 A,B and C
Elevation (m)
530
520
510
500
490
480
470
460
450
440
430
October-03
November-03
December-03
January-04
February-04
March-04
April-04
May-04
June-04
July-04
August-04
September-04
October-04
November-04
December-04
January-05
February-05
March-05
April-05
May-05
June-05
July-05
August-05
September-05
October-05
November-05
December-05
January-06
February-06
March-06
April-06
May-06
June-06
July-06
August-06
September-06
October-06
November-06
Phreatic Surface A: 88.4 m depth
Phreatic Surface B: 48.2 m depth
Phreatic Surface C: 25.9 m depth
Ground Surface

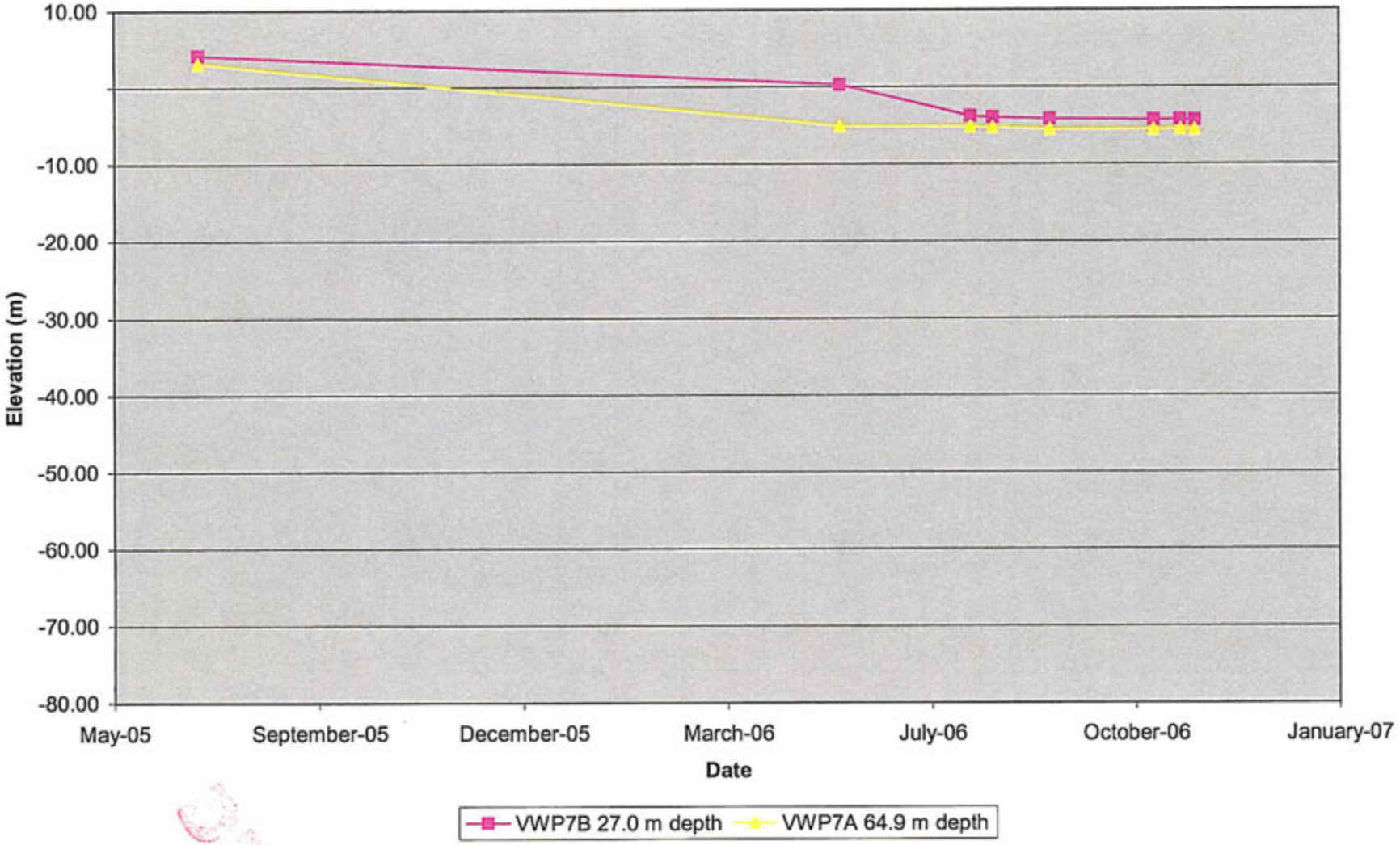
West Quesnel Stabiltiy Monitoring
Standpipes BH03-3 A, B and C



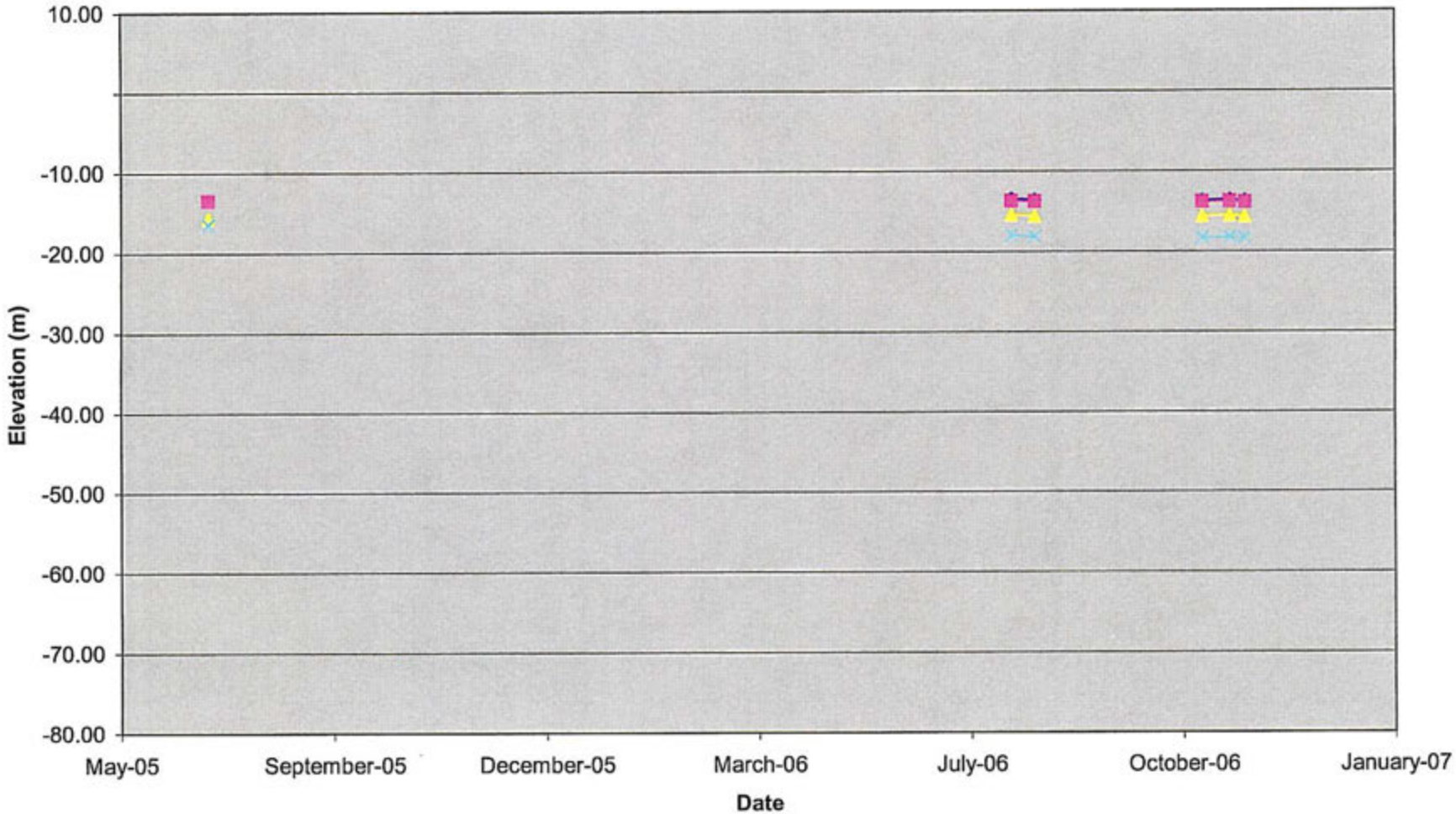
West Quesnel Stability Monitoring
Standpipes BH03-4 A, B, and C



West Quesnel Stability Monitoring
Water Levels for BH-7

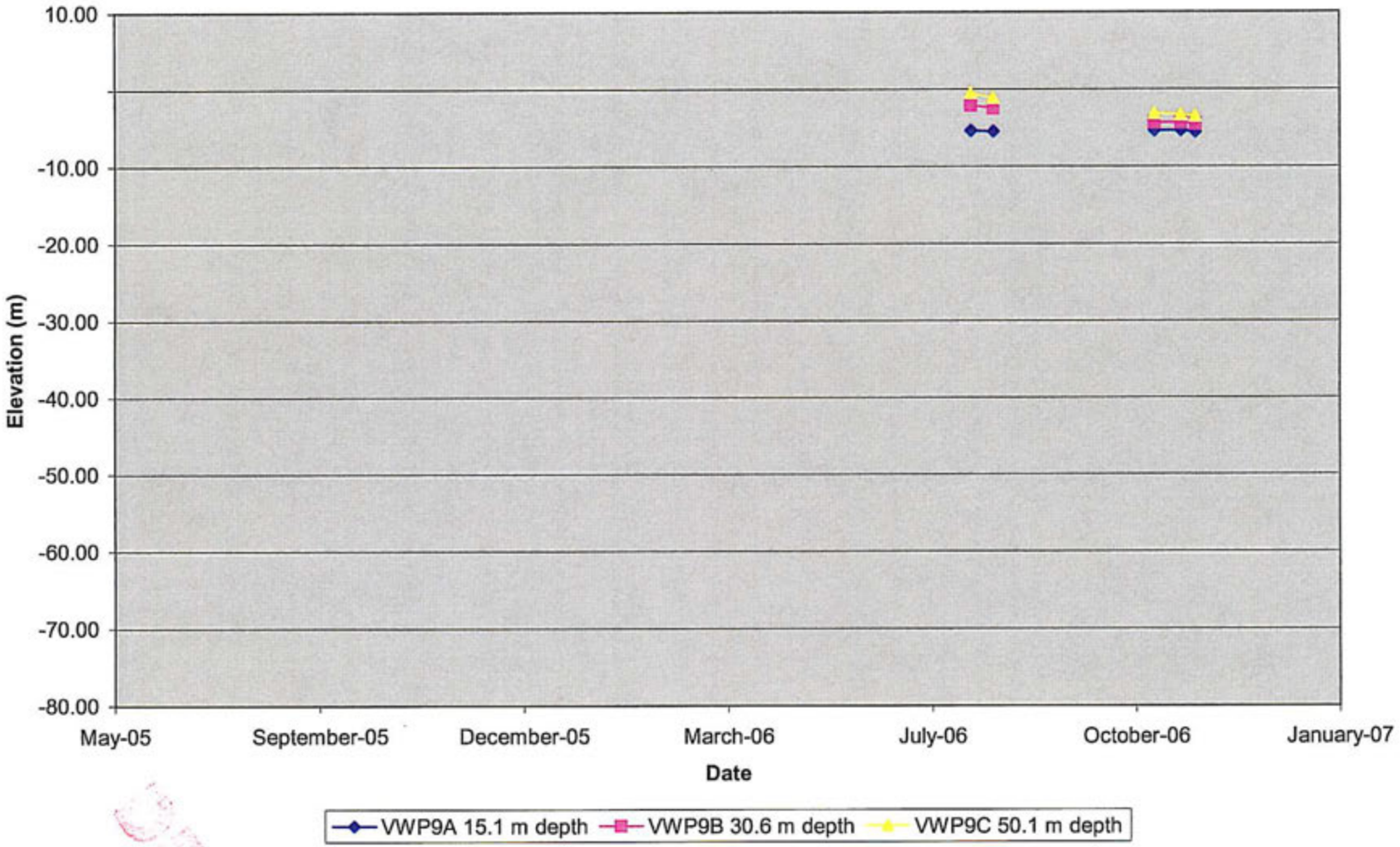


West Quesnel Stability Monitoring
Water Levels for BH-8

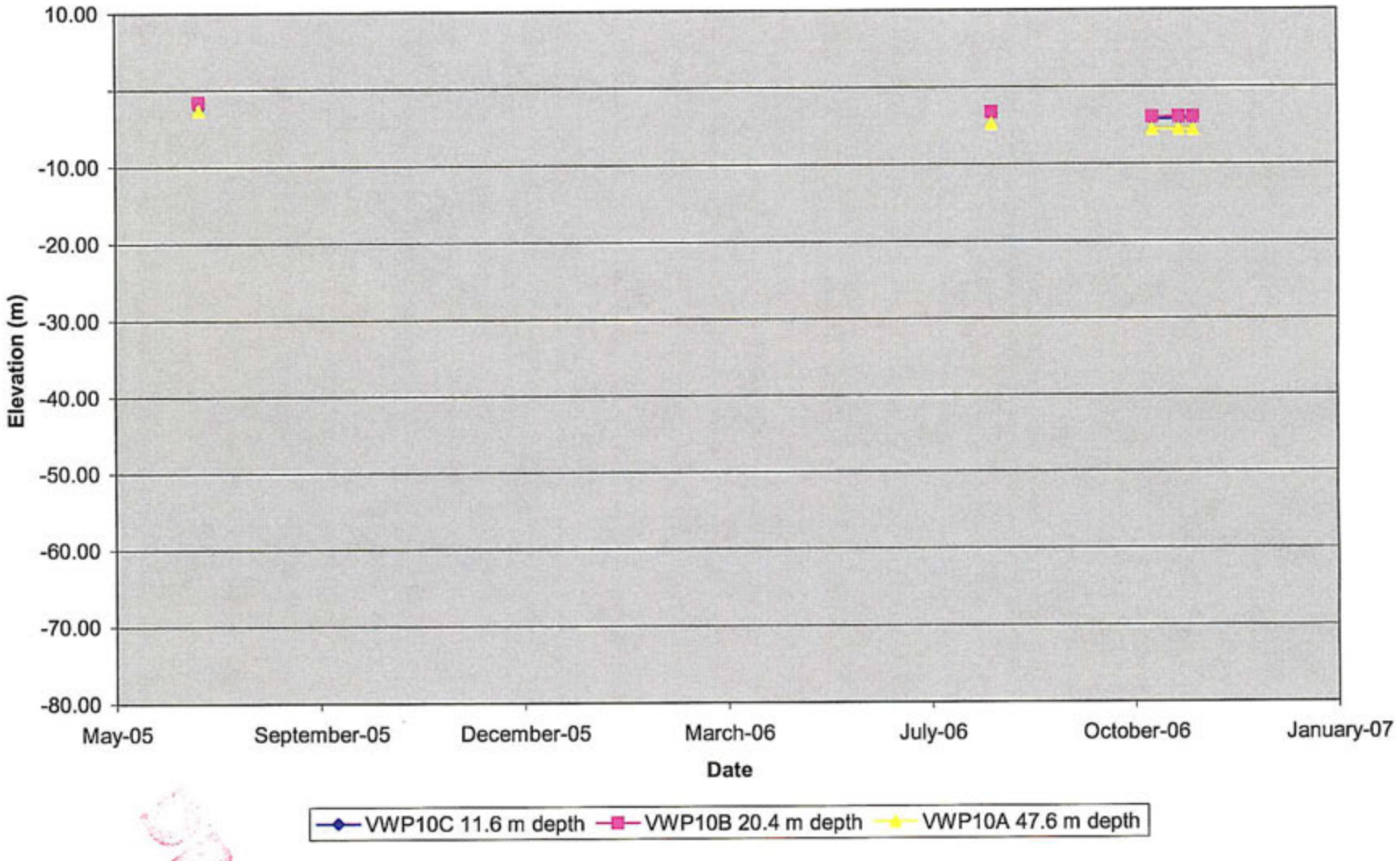


dry dry

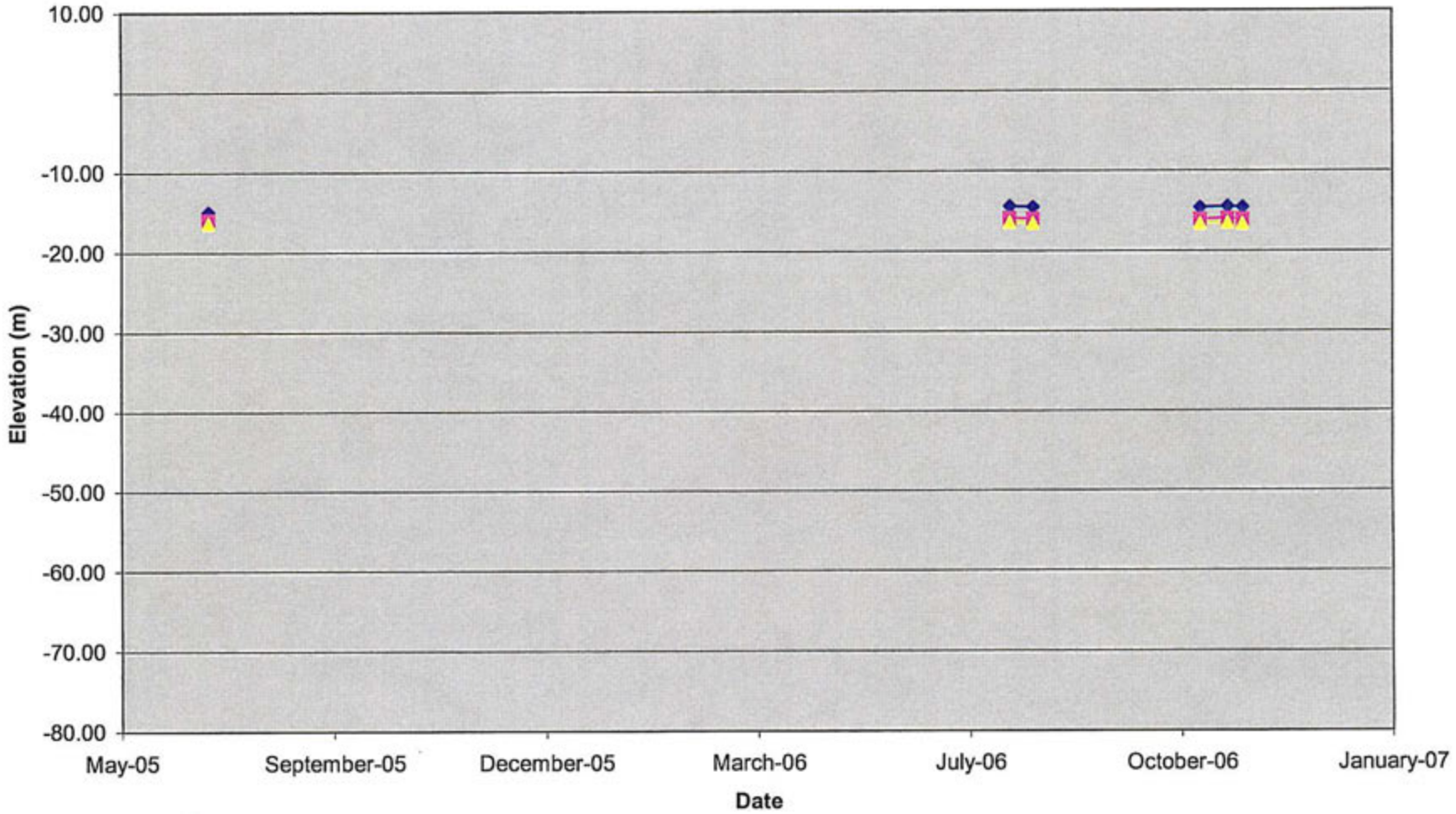
West Quesnel Stability Monitoring
Water Levels for BH-9



West Quesnel Stability Monitoring
Water Levels for BH-10

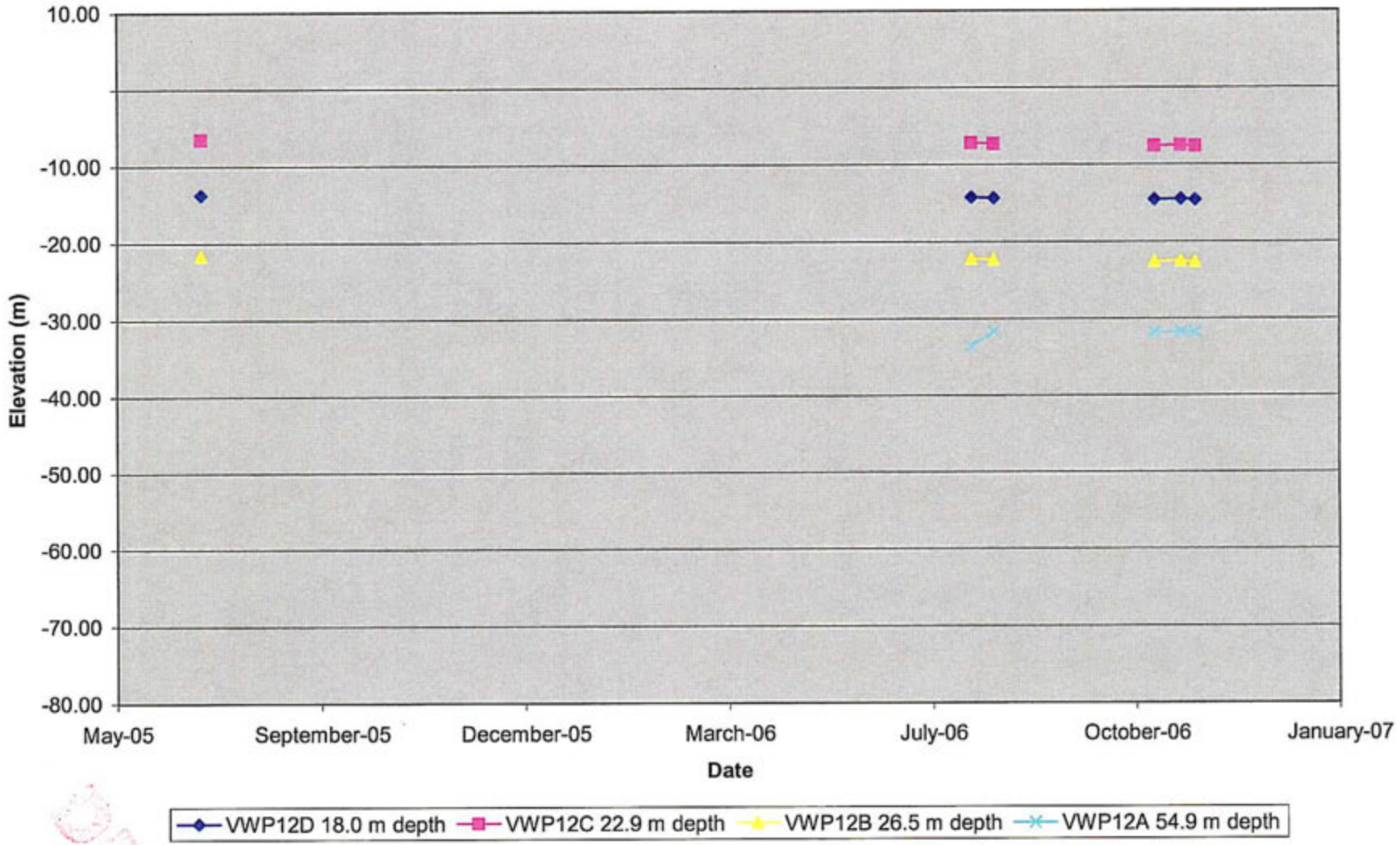


West Quesnel Stability Monitoring
Water Levels for BH-11

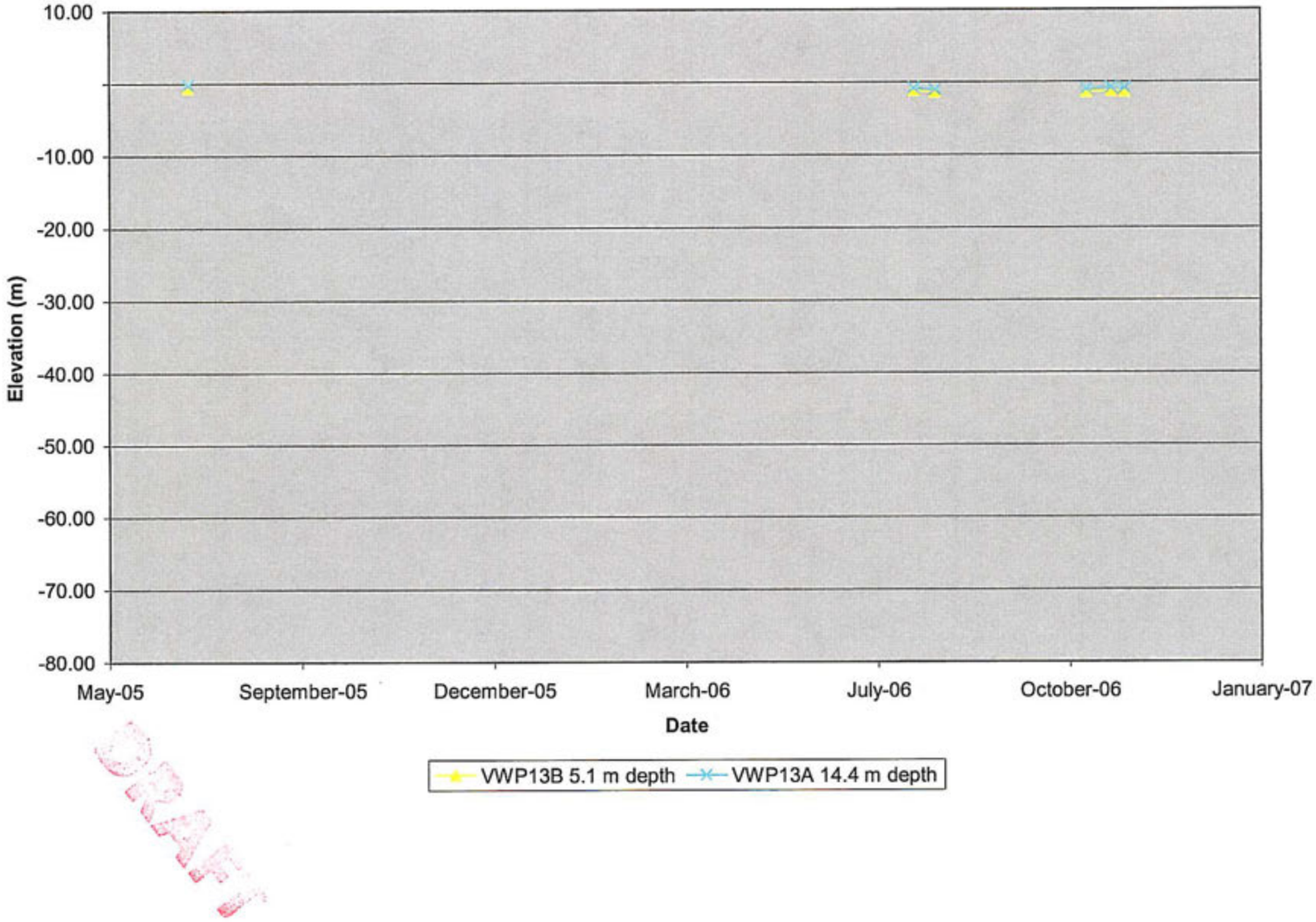


dry

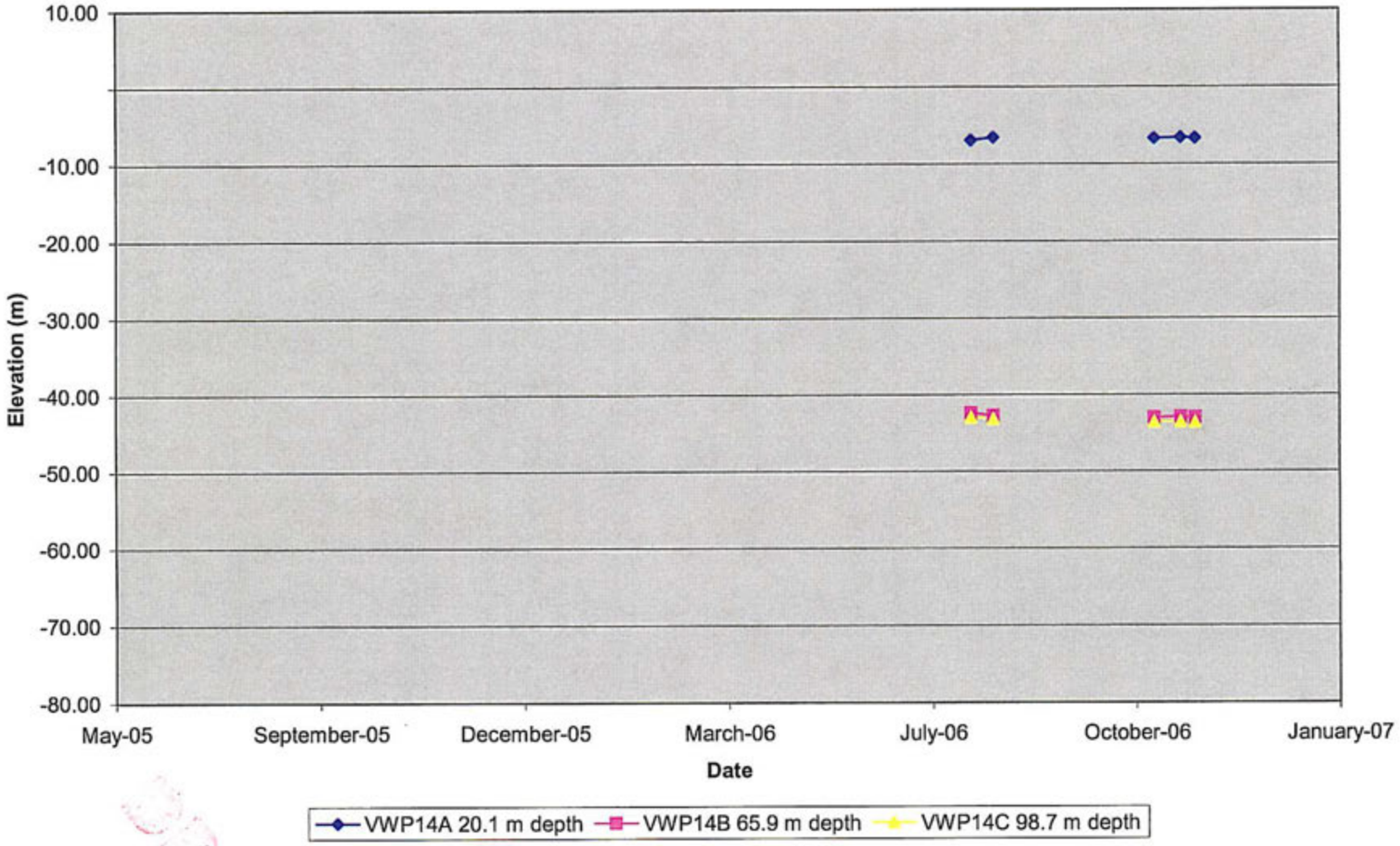
West Quesnel Stability Monitoring
Water Levels for BH-12



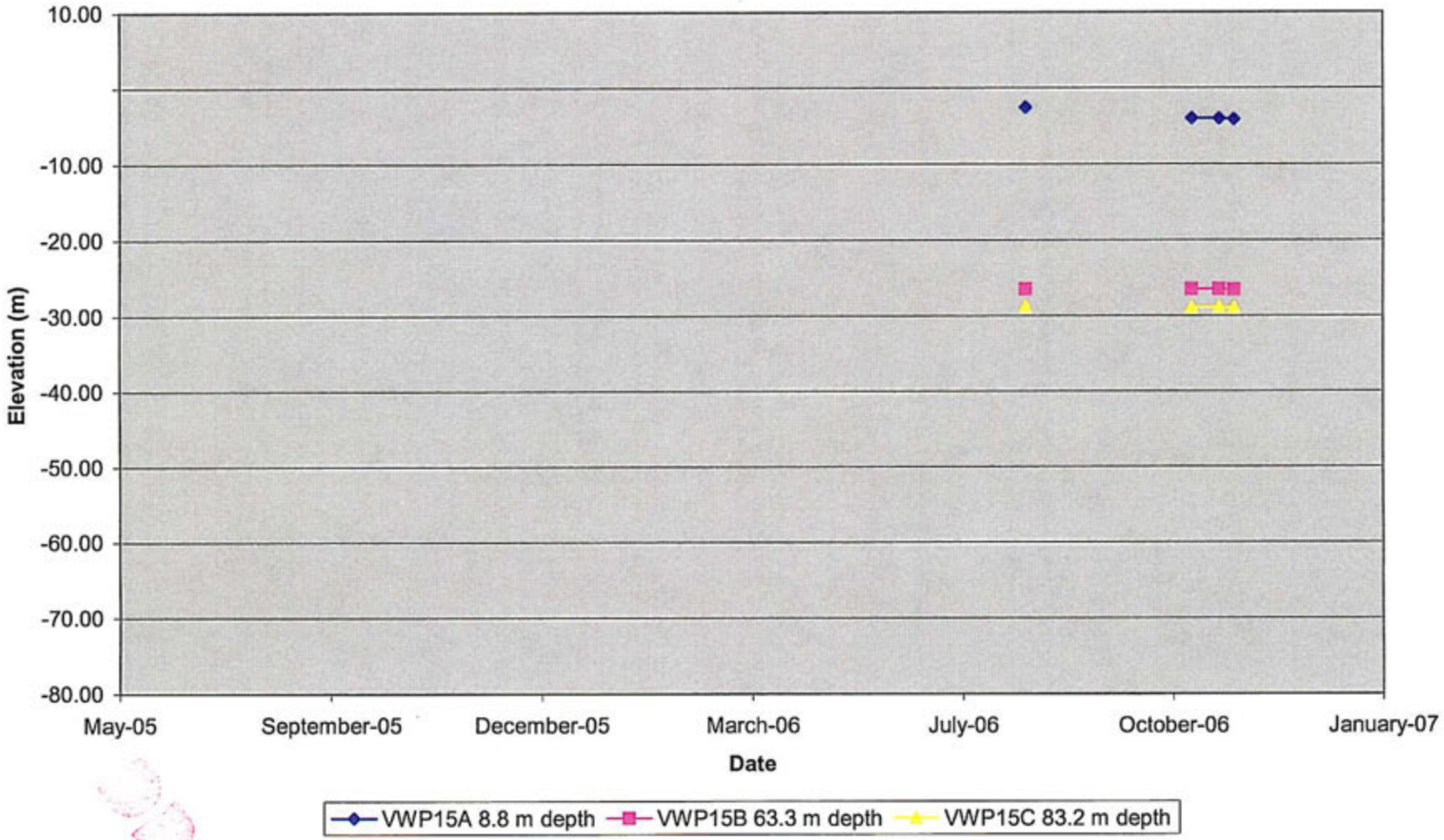
West Quesnel Stability Monitoring
Water Levels for BH-13



West Quesnel Stability Monitoring
Water Levels for BH-14



West Quesnel Stability Monitoring
Water Levels for BH-15



West Quesnel Stability Monitoring
Water Levels for BH-16