METHOD STATEMENT

CLOSE INTERVAL POTENTIAL SURVEYS

GENERAL

Revision	**Date**	**Prepared By**	**Approved By**

Close Interval Potential Survey method statement	

BAC Corrosion Control Limited
Stafford Park 11
Telford
TF3 3AY
Tel: 01952 290321
Fax: 01952 290325
Email: engineering@bacgroup.com

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1 INTRODUCTION

This Method Statement covers describes the general technique of carrying out a close interval potential survey.

Close Interval Potential Surveys (CIPS) measure potentials along the entire length of the pipeline to determine any underprotected areas caused by coating defects, contact with other services or general lack of protection current.

Potential Gradient Survey to determine coating defect locations and severity of the defect.

Recorded Pearson Surveys to locate any coating defects, contact with other services and metallic objects left in the pipe trench

2 REFERENCE DOCUMENTS

2.1 Specifications

British Standard 7361: Part 1: 1991 The Code of Practice for Cathodic Protection for Land and Marine Applications.

Any Specifications or Codes of Practice operated by the Client.

2.2 Drawings

As required.

Detailed route maps will normally be provided by the client. Large scale maps are usually provided by BAC.

3 RESPONSIBLE PERSONS

Activities associated with conducting a soil resistivity survey shall be carried out by suitably experienced and trained personnel.

Technicians will respond to the appropriate Project Engineer.

Project Engineers will report to the Manager, Engineering Services

4 TEST EQUIPMENT

4.1 Calibration

Test equipment utilised during the survey shall be calibrated to National or International measurement standards

4.2 Equipment List

Datalogger comprising high impedance voltmeter with memory storage to record measurements. Alternatively measurements can be recorded manually.

Cable/wire on reels, suitable for maintaining an electrical connection to the structure while measuring the pipe soil potentials.

Pipe/Cable locator.

Backpack to carry equipment if necessary.

Copper|Copper Sulphate reference electrodes

Current interrupter (one for each cathodic protection power source)

General handtools

4.3 EQUIPMENT DESCRIPTION

The **BAC Surveyor** has been an industry standard for over 10 years and has been used successfully on 1,000's of kilometres of Close Interval Polarised Potential Surveys (CIPS) and Recorded Pearson Surveys throughout the World from arctic regions to desert and jungle locations.

Potential Gradient surveys are conducted by using two sets of half-cells with one set offset by approximately 10 metres either to the side of the pipeline or over the pipeline but behind the first set of half-cells.

Pearson surveys are conducted using Termain Recording Pearson Survey Equipment (not supplied as part of the **BAC *Surveyor Plus***)

The **BAC *Surveyor*** can provide the User with full flexibility together with exact measurement of "off" potentials eliminating most measurement errors

5 PROCEDURES

5.1 General

Many requirements of a particular survey will be specified by the client in the tender or contract documents. Refer to these documents before commencing any work, and make copies for use on site.

5.2 CLOSE INTERVAL POTENTIAL SURVEYS

5.2.1 SURVEY TYPES

Close interval potential surveys are used to measure the pipe/soil potential along a total route of a pipeline or any selected section. In order to achieve the best information of the protection status, it is necessary to obtaining readings that are free of measurement errors in order to ensure that the protection criteria set down in the various Company, National and International Standards are met.

There are a number of methods used to achieve this:

a) Close interval survey with "on" potentials – this will include IR drop measurement errors due to the flow of the cathodic protection current and measurement errors due to stray currents. In the case of sacrificial anode systems, this is the only survey that is feasible. Recording static potentials will enable stray current interaction to be considered.

b) Close interval survey with on/off potentials – all cathodic protection power sources affecting the section of pipeline being surveyed have to be interrupted simultaneously using synchronised timed interrupters to enable instant off potential measurements to be taken eliminating the IR drop error.

c) Close interval survey with on/off potentials and static potentials – this will eliminate both the IR drop error and will enable stray current interaction to be considered.

5.3 SURVEY EQUIPMENT

Equipment required to carry out survey as c) above will comprise the following:

Quantity	Unit	Description
**	No	Synchronised Current Interrupter
2	No	Datalogger with battery chargers– one mobile, one static
2	No	Interface power unit with battery charger - one mobile, one static
2	No	Interface cables to connect Datalogger to Interface unit
1	No	$Cu/CuSO_4$ half cell static
1	Pair	$Cu/CuSO_4$ half cell fitted to poles
1	No	BACPAC comprising mounting frame for wire dispenser, distance measurer, Datalogger and Interface unit together with harness
**	No	Survey wire reels each comprising approx. 2 Km re-usable fine stranded PVC insulated stainless steel wire – minimum of two reels required
1	No	Wire re-winder for the recovery of the wire
1	Set	Connecting cables
1	Set	Survey Spares

** dependent on the number of cathodic protection installations and length of pipeline.

5.4 SETTING UP

To commence a CIPS survey, a degree of planning is required. Firstly landowners need to be notified that the survey is to take place over their land. A very brief outline of what may affect the landowner should be given with reassurance that no damage will be done to crops etc, e.g. trailing wires left out for a period of time that could affect livestock or farm operations or the carrying out of the survey.

The route of the pipeline should be studied to determine the location of test posts where electrical contact can be made to the pipeline. Full route drawings should be obtained and the location of all power sources and any bonds to other structures which may also have to be switched if there is current flow affecting the pipeline.

Having carried out the preliminaries, the survey commences with the installation of the GPS current interrupters into all the necessary power sources and bonds.

5.5 INSTALLING GPS CURRENT INTERRUPTERS

The current interrupters are normally installed into the negative lead of the power source. The set up of the Current interrupters is detailed in the Current Interrupter Operating Manual but briefly as follows

Set up switching programme and synchronise prior to installing the Current Interrupter

Always isolate the a.c. supply prior to installation or removal of the Current Interrupter.

Ensure connection leads between Current Interrupter and transformer rectifier are of sufficient cross-sectional area for the current being interrupted.

Ensure that the polarity is correct and connect Current Interrupter into T/R negative circuit - Positive to pipeline and Negative to T/R negative terminal.

Ensure that for continuous switching, the current rating is not exceeded.

5.6 SETTING UP SURVEYOR PLUS FOR STATIC RECORDING

At the location for the commencement of the survey the static recorder is normally installed at this test point. Alternatively it may be installed at one of the test points approximately central to the length to be surveyed that day so that it records a static data more relevant to the total days data depending upon the distance expected to be surveyed. The connections should be as shown in Figure 2.

To set up the static recorder the Datalogger should be connected to the interface unit

Switch on the interface unit and the Datalogger and synchronise to the master logger.

5.7 SETTING UP MOBILE SURVEYOR PLUS

Assemble the BACPac unit with the survey wire and fix the Datalogger and the Interface unit on the Framework. Connect up all the interconnecting cables and reference electrodes as indicated in Figure 1.

5.8 SURVEYING

When satisfied that all systems are operating and data is ready for recording, press **"L"** to start logging and proceed along the route of the pipeline with the two halfcell poles maintaining progress at approximately 1 m/sec ensuring there is always one halfcell in contact with the ground..

At any time during surveying, the input impedance may be changed, flag information and/or notes added or the data collected reviewed in the **ANALYSIS AND REPORTING** screens.

On completion of the survey Exit the programme and turn off.

If the survey is to last longer than 3 days, it will be necessary to resynchronise the static logger and timers every 3 days.

For more detailed information on setting up and operating the Datalogger, refer to the Technical and Operational Reference manual.

5.9 DOWNLOADING DATA

On completion of the survey the data should be downloaded to a laptop or PC for editing processing and evaluation of the Data as detailed in the Technical and Operational Reference manual.

5.10 PEARSON AND DCVG SURVEYS

When carrying out simultaneous Pearson or DCVG surveys with the CIPS survey, the equipment should be connected up as shown in Figures 2 & 3.

The relevant Ports should be set to **PEARSON** or **GRADIENT** and the survey continued generally as described above.

5.11 DOWNLOADING DATA

5.11.1 CONNECTIONS

On completion of the survey, the DataLogger should be connected to a PC or Portable Computer with the DataManager software loaded using the communications lead.

With computers connected, start up both the Surveyor Plus DataManager and the Datalogger.

5.11.2 DOWNLOADING

Press the Communications Icon on the PC and select **DOWNLOAD DATA TO PC** on the Datalogger menu.

Select Files to be downloaded and continue.

After downloading the files to the PC, the data can then be processed as described in the DataManager section of the Manual.

5.12 ANALYSIS AND INTERPRETATION

By careful examination of the data collected presented in a graphical format, it is possible to determine the level of protection for the pipeline and also locate areas of underprotection due to coating defects, contact with other services and to determine areas requiring further investigation and repair. This analysis should be carried out by an experienced cathodic protection engineer.

6 HEALTH AND SAFETY

6.1 General

It is the intention of BAC that all test and inspection procedures are carried out in a safe manner in accordance with the Health and Safety At Work Act and any other relevant legislation.

If required by the Client, BAC personnel will attend any Site Safety Induction Courses before carrying out work on site.

6.2 Safety Handbook

It is the responsibility of all BAC personnel to be familiar with the latest revision of the Company's Safety Handbook. The Safety Handbook details the responsibility of the Company and the individual regarding Safety Regulations.

6.3 Risk Assessments

6.3.1 General Hazards

i) *Site safety.*
There can be assorted risks associated with working on any site and site regulations as laid down by the site owner/operator should be observed.

ii) *PPE*
The minimum personal protective equipment is as follows:

Approved safety helmet
Approved ear defenders/earplugs
Safety footwear
Eye protection
Gloves
Overalls

And any other equipment required by the site operator or deemed necessary by the task

6.3.2 Specific hazards applicable to Close Interval Potential Surveys

i) *Entering Farms and Farmland*
During a CIPS survey it may be necessary to cross farm land.

a) Take care if farm vehicles or machinery are operating nearby.
b) Be aware that the fields may have been sprayed with pesticides or other chemicals. (Prior to the survey commencing the client should liase with landowners to establish if this is the case. The client/landowner should provide CoSHH sheets relating to the chemicals used. Observe any precautions and recommendations contained on the CoSHH datasheet)
c) Take care when entering fields where animals are kept.
d) If crossing field boundaries always use a gate or stile if possible. Avoid climbing fences and walls. Avoid water filled ditches. Take special care if any fences are electrified. (Prior to the survey commencing the client should liase with

landowners to establish if this is the case and request that electric fences are switched off.)

ii) *Road traffic*.

If any test locations are located near a roadway, there is a risk of injury caused by moving vehicles. All personnel should wear suitable high visibility clothing and exercise increased care. If the pipeline crosses or travels along a road where traffic is, or is likely to be present, then great care should be taken and appropriate steps taken to manage the traffic hazard. Work should not be carried out in the roadway without applying the precautions laid down in the appropriate regulations and legislation pertaining to road works, traffic signs etc.

iii) *Trailing wire*.

During the survey, it will be necessary to leave a trailing wire unattended for some time. This may represent a hazard as follows:

a) Trip hazard to pedestrians. If crossing paths avoid laying the cable so that pedestrians may trip on it.

b) *Livestock may become entangled*. If farm animals are observed on the pipeline route, ensure that the wire is placed so as to avoid the possibility of the livestock straying into it.

c) Livestock may eat the wire. If the wire is on the ground, grazing animals may accidentally ingest some of the wire. As in b) above, place the wire so as to avoid this possibility.

d) Entanglement in farm machinery. While this presents little risk to personnel, damage may be caused to machinery. An additional hazard may arise if wire has to be removed from machinery. Never attempt to retrieve wire from any operational machinery, even at the insistence of the owner of the machinery.

iv) Rewinding trailing wire

There is a hazard from bare wire strands as it is being re-wound. Wear suitable gloves.

6.4 Control of Substances Hazardous to Health (C.O.S.H.H.)

Where applicable, substances hazardous to health shall be listed and itemised in the form of a register.

Health and Safety Data Sheets for all hazardous substances shall be kept in a file for reference.

Site personnel shall be issued with copies of Health and Safety Data Sheets relevant to their work activities.