

Remote telemetry for environmental monitoring of
groundwater, ground gas and non-aqueous
phase liquids

REMOTE TELEMETRY FOR ENVIRONMENTAL MONITORING OF
GROUNDWATER, GROUND GAS AND NON-AQUEOUS PHASE LIQUIDS
GUIDANCE TO SUPPORT APPROPRIATE TECHNOLOGY SELECTION

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CONTENTS

	Page
Foreword	7
Acknowledgements	8
1 Introduction	9
1.1 Aim and remit	9
1.2 Intended audience	9
1.3 Value of remote monitoring and telemetry	10
1.4 Environmental media	10
1.5 Structure of this guidance	12
2 Overview of remote telemetry monitoring and sampling methods	13
2.1 Advances in science and technology	13
2.2 Elements of a remote telemetry monitoring and sampling system	15
2.3 Data collection platforms	16
2.4 Sensor, probe and sampling technologies	17
2.5 Which parameters can be monitored remotely?	18
2.6 Adherence to environmental monitoring and sampling protocols	19
2.7 Regulatory acceptance of remote telemetry monitoring and sampling	20
3 Step 1: Determining key system requirements	21
3.1 Introduction	21
3.2 Monitoring and/or sampling objectives	21
3.3 Data quality objectives	22
3.4 Key analytical parameters	23
3.5 Site location	24
3.6 Site setting	24
3.7 Site infrastructure	25
3.8 Operational constraints	25
3.9 Instrument considerations	26
3.10 Quality assurance (QA)/quality control (QC) protocols	27
4 Step 2: Selection of potential solutions	28
4.1 Technology identification flowchart	28
4.2 Monitoring environmental media	30
4.2.1 Water levels and NAPL presence/thickness	30
4.2.2 Liquid flow	33
4.2.3 Physical properties of liquid	35
4.2.4 Gas flow and pressure	37
4.3 Sampling environmental media	39
4.3.1 pH, REDOX and DO in water	39
4.3.2 Organic indicators in water	42
4.3.3 Organic materials	43
4.3.4 Gas composition	45
4.4 Data capture	49
4.5 Transmission of data	51
4.6 Control of equipment remotely	54
4.6.1 Modification of data logging parameters	54
4.6.2 Sending live control commands to a remote system	55

Contents continued

	Page
4.7 Telemetry system safety and security	57
4.7.1 Alarm condition handling by plant	57
4.7.2 Remote start	57
4.7.3 Procedure on restarting plant after alarm or unknown shutdown	57
4.7.4 Telemetry system security	57
4.7.5 Data security	58
4.7.6 Security of plant connected to telemetry systems	59
4.8 Conclusions.	60
5 Step 3: Comparison of potential technologies.	61
5.1 Assessment criteria	61
5.2 Comparing between the assessment criteria	62
5.2.1 Reliability and availability	62
5.2.2 Safety	62
5.2.3 Technical (applicability, accuracy, flexibility)	62
5.2.4 Installation costs.	63
5.2.5 Operational costs	63
5.2.6 Usability.	63
5.2.7 Data reliability	64
5.2.8 Sustainability	64
5.3 Technology comparison lookup tables	65
6 Conclusions	76
Annexes	
Annex A Available sensor technologies by application	77
Annex B Remote telemetry monitoring scenarios	79
Annex C Abbreviations	100
Annex D Glossary.	101
Annex E References.	103

LIST OF FIGURES, TABLES, BOXES AND EXAMPLES

	Page
Figures	
Figure 1	Using the guidance: process flow 12
Figure 2	Schematic illustrating example data flows within a remote telemetry monitoring or sampling system 15
Figure 3	Schematic example of a DCP 16
Figure 4	Illustration of availability of sensors for monitoring different parameters remotely . . 19
Figure 5	Navigation flowchart for section 4 29
Figure 6	Potential source of security risks 58
Figure 7	Scoring colour code for assessment 62
Figure 8	Scoring colour code for Table 21 and 22 66
Figure 9	Scoring colour code for scenarios 1-4 79
Tables	
Table 1	Examples of surrogate measurement parameters 24
Table 2	Sensors/probes used for monitoring water or NAPL presence/thickness 30
Table 3	Techniques used for monitoring liquid flow in pipes 33
Table 4	Techniques used for monitoring water turbidity 35
Table 5	Technologies used for monitoring water temperature 36
Table 6	Technologies used for monitoring liquid conductivity 36
Table 7	Technologies used for monitoring gas flow and pressure in pipes 38
Table 8	Technologies used for monitoring gas flow and pressure in wells 38
Table 9	Technologies used for testing water pH 39
Table 10	Data quality information relating to commonly used pH and REDOX probes 40
Table 11	Technologies used to record DO in liquids 41
Table 12	Data quality information relating to commonly used DO sensors 42
Table 13	Data quality information relating to UV-VIS sensor 43
Table 14	Data quality information relating to commonly used techniques for recording gas composition 48
Table 15	Power supply options for remote telemetry monitoring or sampling 50
Table 16	Common industry-used standards for data capture 51
Table 17	Technology used to transmit data 52
Table 18	Comparison of different transmission technologies 53
Table 19	Telemetry security 59
Table 20	Technology assessment criteria 61
Table 21	Technology comparison matrix: data measurement 67
Table 22	Technology comparison matrix: data capture and transmission 74
Boxes	
Box 1	Intended audience for the guidance 10
Box 2	Examples of wider telemetry use and environmental applications 11
Box 3	A historical perspective: from the Napoleonic wars to the internet of things 13
Box 4	Useful definitions 17
Box 5	Core sensor, probing and sampling technologies 18
Box 6	Technology selection: determining key system requirements 21
Box 7	Health and safety considerations for remote monitoring systems 27
Box 8	Liquid flow in pipes: key considerations for measurement and technology selection . 34

List of figures, tables, boxes and examples (continued)

Page

Box 9	Conductivity analysis: key considerations for measurement and technology selection .	37
Box 10	Gas flow in pipes: key considerations for measurement and technology selection . .	37
Box 11	Complete remote telemetry monitoring or sampling systems straight 'off the shelf'? .	54
Box 12	Considerations for sustainable operations	65

Examples

Example 1	Remote real-time monitoring of subsurface landfill gas migration, Ireland (Fay et al, 2011).	22
Example 2	Continuous water quality monitoring – Silverstream Landfill, North Island, New Zealand (Geotechnics Ltd. 2009)	24
Example 3	Groundwater level monitoring – Fort Riley, Kansas, USA (US Geological Survey 1998).	26
Example 4	Groundwater level and quality monitoring – Guys Hospital Roman Boat, Southwark, London, UK (Example courtesy of Historic England, York Archaeological Trust and Van Walt)	32
Example 5	Field trial for automated monitoring of dissolved phase aromatic hydrocarbons in groundwater, Saudi Arabia (Saudi Aramco, 2013).	43
Example 6	Oil-in-water monitoring at Glendive Water Treatment Plant, Montana, USA – (Example courtesy of Modern Water PLC)	45
Example 7	Legal case in relation to offsite gas migration and a subsequent crop failure – Co. Westmeath, Ireland (courtesy of Ambisense and Fehily Timoney and Company). .	46
Example 8	Enhanced reductive dechlorination bioremediation of trichloroethene using molasses injection, UK	56

FOREWORD

Remote telemetry methods can improve the efficiency and quality of environmental data gathering. However, with the proliferation of the technology and its application, it is important to recognise the merits and suitability of each method to ensure value in the chosen application. Considerations include: investment and running costs, reliability, resilience, operator training, data accuracy, quality assurance (QA)/quality control (QC) requirements and data security. A number of technologies now exist which have been employed to monitor groundwater, ground gas and non-aqueous phase liquids (NAPLs) in a wide range of industries.

This guidance was commissioned by the Energy Institute (EI) to raise awareness of the applicability and value of remote telemetry technologies in environmental monitoring. It provides an independent review of remote telemetry monitoring methods worldwide, a general classification and description of general operating principles, methods and infrastructure arrangements as well as identification of key factors to consider when comparing and contrasting each technology. A flowchart guides the choice of generic methods including application recommendation for each.

The guidance aims to assist a wide range of stakeholders, including industrial site operators, health, safety and environmental managers, regulatory authorities, environmental and non-governmental organisations as well as consultants.

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Technology in this area is changing and developing rather rapidly. The EI aims to monitor developments in this area to include updates in future editions. Suggested revisions are invited and should be submitted to the Technical Department, Energy Institute, 61 New Cavendish Street, London W1G 7AR.

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1 INTRODUCTION

1.1 AIM AND REMIT

Recent years have seen an increased focus on the importance of compliance with new or evolving environmental protection legislation, leading to ever greater collection of environmental data to help inform robust decision-making and monitor compliance. A natural progression has been the development of new methods and techniques that can be used to gather such information in the safest and most cost-effective manner. This includes collection of data using remote systems with the information transmitted back to the user without need to repeatedly visit a site. However, knowledge and understanding of available techniques and technologies for undertaking remote telemetry environmental monitoring is not widespread. This publication is intended to raise awareness of the applicability and value of remote telemetry technologies in environmental monitoring.

For the purposes of this publication, telemetry has been defined as:

'The automatic measurement and transmission of data, typically employed to collect information from remote or inaccessible locations.'

Remote monitoring has been defined as:

'A process by which automatic measurements are made remotely. Data may be transmitted via a telemetry system but could also be stored electronically and collected manually at the data gathering location.'

While there are many potential advantages in employing remote telemetry monitoring to obtain environmental data, there are a number of important criteria that should be evaluated before any system is employed, such that the advantages and potential disadvantages can be considered prior to implementation. The information presented in this publication is designed to support users in the selection of appropriate techniques and technologies based on their requirements, using a flowchart to aid the reader (section 2).

The remit of this publication is the monitoring of groundwater, ground gas and NAPLs by remote telemetry monitoring. While remote monitoring without use of telemetry may only store data *in situ* for future manual collection, it has also been included in this publication as a topic of potential interest to the readers.

The preparation of this publication included a literature review, engagement with suppliers of a wide range of remote telemetry monitoring technologies and liaison with consultants involved in the collection and transmission of environmental monitoring data.

1.2 INTENDED AUDIENCE

This publication has been developed to assist a wide range of stakeholders, including those listed in Box 1, regarding the selection of appropriate remote technologies for the monitoring of environmental parameters.

While the focus of this guidance is primarily on downstream activities onshore, the principles presented are also valid for other applications like onshore well pads and/or offshore operations.

Box 1: Intended audience for the guidance

- Industrial site operators
- Health, Safety and Environmental managers
- Regulatory authorities
- Environmental and non-governmental organisations
- Consultants

1.3 VALUE OF REMOTE MONITORING AND TELEMETRY

Remote monitoring and telemetry systems can provide significant benefits to monitoring projects which can include:

- reduced travel and associated reduction in risks to workers;
- likely reduction in data collection errors;
- consistency in form of data collected;
- potential to collect significantly more data in comparison to manual data collection in a more consistent form;
- instantaneous alerts where deviation in data observed, and
- potential for reduction in life cycle costs.

By increasing the level of automation there are significant benefits to be gained through the reduction of labour and travel costs, improved safety and ensuring a consistent standard of data quality.

While there are apparent benefits from use of remote telemetry techniques and technologies, these need to be balanced against the potential disadvantages. For example:

- Reliance needs to be placed on the reliability of the equipment, which may require routine maintenance visits.
- The equipment could be vulnerable to third party damage or theft.
- The increase in capital expenditure may outweigh the long-term savings in visiting site to collect environmental data, and needs consideration at an early stage in the selection process.
- The required technology may still be in its infancy, and thus difficult to purchase or rent.

Support in how to assess the potential advantages and disadvantages of different technologies is provided in sections 4 and 5.

1.4 ENVIRONMENTAL MEDIA

The primary focus of this publication is on the application of remote telemetry monitoring schemes for three types of environmental media. These are:

- groundwater;
- separate phase liquids (NAPL), and
- ground gases (sometimes known as soil vapour or soil gas).