

## Environmental Protection Internal Report

### REGIONAL WATER QUALITY MONITORING AND SURVEILLANCE PROGRAMME FOR 1992

### QUALITY ASSESSMENT OF GROUNDWATERS

June 1992

GW/92/001

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**NRA**

*National Rivers Authority  
South West Region*

**REGIONAL WATER QUALITY MONITORING AND SURVEILLANCE PROGRAMME, 1992**

**QUALITY ASSESSMENT OF GROUNDWATERS**

**TECHNICAL REPORT No. GW/92/001**

**SUMMARY**

Section 84(2) of the Water Resources Act 1991 places a duty on the NRA to monitor groundwater quality and extent of pollution in the region.

The elements of the 1992 monitoring programme designed to discharge this duty are as follows:-

1. Quarterly sampling of all public groundwater supply sources. This data will allow trends shown by historical monitoring of groundwaters found in the 'major' aquifers to be maintained.
2. A baseline survey of 250 groundwater sources from minor aquifers throughout the rest of the region.
3. Sampling of groundwaters around point pollution sources to be undertaken as part of wider investigations.

The determinands to be analysed are related to drinking water use.

This programme will provide data enabling 'nitrate vulnerable areas' to be designated prior to 31/12/93 as required by the EC Nitrate Directive (91/676/EEC).

**PROGRAMME SUMMARY**

No. of Sampling Locations	No. of Samples	No. of Determinands
393	565	26,234

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June 1991

ENVIRONMENT AGENCY



110039

QUALITY ASSESSMENT OF GROUNDWATERS, 1992

Responsible Officer : P Lucey

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## 1. Introduction to 1992 Programme

Section 84(2) of the Water Resources Act 1991 places a duty on the NRA to monitor groundwater quality and extent of pollution within the South West region.

Historically no systematic monitoring of groundwaters has ever been undertaken. Locally within the 'major' aquifers long historical analytical records are available for public supply sources. The programme is designed to build on this record. Elsewhere within the 'minor' aquifers the need is to establish baseline data. It is anticipated that the baseline programme of one sample per site will continue for several years leading to establishment of fixed routine sampling points.

Given limited in-house manpower resources, and having evaluated all options to discharge duties placed on the NRA to monitor groundwater quality, approval was sought to put the baseline survey work out to competitive tender. For the years 1992/3 this work has been awarded to Geotechnics Limited of Exeter.

## 2. Description of Programme

The purpose of the groundwater sampling programme is threefold:-

1. To discharge the duty placed on the NRA by Section 84(2) of the Water Resources Act 1991 to monitor groundwater pollution having regard to the EC Groundwater Directive (80/68/EEC), and in anticipation of the introduction of groundwater quality objectives under Section 84(1), to establish the general suitability of groundwaters in the region for potable and agricultural use.
2. To monitor groundwater nitrate concentrations so as to enable 'nitrate vulnerable areas' to be designated prior to 31/12/93 as required by the EC Nitrate Directive (91/676/EEC).
3. To provide input to wider investigations into groundwater quality around point sources of pollution.

The approach taken differs for 'major' and for 'minor' aquifers.

The major aquifer programme relates essentially to public supply sources for which there generally exists a long historical analytical record. The programme is designed to complement this data and allow long term water quality trends to be established. For 1992 it is programmed to sample 43 groundwater sources quarterly for a basic determinand suite (ARG S001) and once for an extended determinand suite related to drinking water use (ARG S002).

For the minor aquifers very little groundwater quality data exists and no long term records are available. For these aquifers the programme is designed to establish baseline conditions for an extensive determinand suite (related to drinking water use) and is linked to the collection of other information about the sample site location, construction and operation. It is anticipated that this baseline programme of one sample per site will continue for several years eventually leading to the establishment of fixed routine sampling points following detailed evaluation of the baseline data. Some 250 sites per year have been programmed for sampling during the years 1992 and 1993.

The data obtained as part of these programmes will allow 'nitrate vulnerable areas' to be designated in line with national NRA guidelines.

### 3. Programme Information

Numbers of:-

Sampling Points	Samples	Determinands
393	565	26,234

### 4. Endorsement

The contents of this programme have been agreed by the Water Quality Planner, Field Controller and Laboratory Controller.

## 5. Schedule of Sampling and Analysis

### Public Supply Sources (Major aquifers)

Site	NGR	URN	Det. Group & Sample Freq.	
			ARG Freq	ARG Freq.
Wilmington 1	ST 2139 0033	GST20/100	ARG S001 4	ARG S002 1
Wilmington 2	ST 2133 0039	GST20/101	" "	" "
Hook	ST 3091 0561	GST30/100	" "	" "
Cotley	ST 3098 0551	GST30/101	" "	" "
Couchill	SY 2311 9078	GSY29/100	" "	" "
Holyford	SY 2359 9221	GSY29/101	" "	" "
Bovey Lane 1	SX 2282 8983	GSX28/100	" "	" "
Bovey Lane 2	SX 2282 8983	GSX28/101	" "	" "
Pinhay	SY 3102 9050	GSY39/100	" "	" "
Kersbrook	SY 0651 8303	GSY08/100	" "	" "
Greatwell 1	SY 1101 9550	GSY19/100	" "	" "
Greatwell 2	SY 1099 9554	GSY19/101	" "	" "
Greatwell 3	SY 1084 9557	GSY19/102	" "	" "
Greatwell 4B	SY 1146 9559	GSY19/103	" "	" "
Greatwell 5P	SY 1105 9512	GSY19/104	" "	" "
Colaton Raleigh 2	SY 0705 8775	GSY08/101	" "	" "
Colaton Raleigh 4	SY 0750 8795	GSY08/102	" "	" "
Harpford 6	SY 0912 9078	GSY09/100	" "	" "
Harpford 7	SY 0913 9063	GSY09/101	" "	" "
Harpford 8	SY 0934 9089	GSY09/102	" "	" "
Harpford 9P	SY 0932 9043	GSY09/103	" "	" "
Dotton 1	SY 0830 8826	GSY08/103	" "	" "
Dotton 2	SY 0831 8823	GSY08/104	" "	" "
Dotton 3	SY 0839 8832	GSY08/105	" "	" "
Dotton 4	SY 0867 8885	GSY08/106	" "	" "
Dotton 5	SY 0861 8910	GSY08/107	" "	" "
Dotton 7	SY 0797 8807	GSY08/108	" "	" "
Otterton 1A	SY 0872 8446	GSY08/109	" "	" "
Otterton 4	SY 0780 8464	GSY08/110	" "	" "
Aller Spring	SS 9670 1528	GSS91/100	" "	" "
Coleford	SS 7662 0134	GSS70/100	" "	" "
Knowle	SS 7724 0148	GSS70/101	" "	" "
Duckaller	SX 9549 8086	GSX98/100	" "	" "
Venbridge	SX 9532 8157	GSX98/101	" "	" "
Littlehempston Well	SX 8008 6167	GSX08/100	" "	" "
Littlehempston Bh.A	SX 8006 6126	GSX86/101	" "	" "
Littlehempston Bh.B	SX 8004 6122	GSX86/102	" "	" "
Littlehempston Bh.C	SX 8021 6220	GSX86/103	" "	" "
Trewollack	SW 8497 6120	GSW86/100	" "	" "
Boswyn Adit	SW 6605 3628	GSW63/104	" "	" "
Copper Hill Adit	SW 6590 3630	GSW63/103	" "	" "
Carvolth Adit	SW 6590 3630	GSW63/102	" "	" "
Cargenwyn Spring	SW 6559 3520	GSW63/101	" "	" "
Fortescue Shaft	SW 6690 3889	GSW63/100	" "	" "

Minor Aquifer Baseline Survey

Site	NGR	URN	Det. Group & ARG	Sample Freq. Frequency
To be completed as survey progresses. 250 sites across entire region with the exception of land underlain by major aquifers (Permian 'Brecchia' and Triassic sandstones of E. Devon)			ARG S002	1

Determinand Suites

ARG S001

Det. Code	Description	Units	Method Code	Method Description
61	pH	pH	1	SKALAR PH SYSTEM RIVERS - LOW LEVEL
62	CONDUCTIV	Microsiemens/cm	1	SKALAR PH SYSTEM RIVERS LOW LEVEL
76	Celsius		1	IN SITU
81	D.O.%	%	2	IN SITU
82	D.O.MG/L	mg/l	2	CALCULATION
99	C ORG TOT	mg/l	1	SKALAR ROUTINE
111	AMMONIA	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
116	T.O.N	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
117	NITRATE	mg/l	1	CALCULATED
118	NITRITE	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
172	CHLOR-ION	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
183	SULPHATE	mg/l	1	SKALAR ROUTINE
207	SODIUM	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
211	POTASSIUM	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
237	MG	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
241	CALCIUM	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
401	MANG DISS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
419	IRON DISS	mg/l	1	PERKIN ELMER 2100 ROUTINE - DISSOLVED
1181	WEATH TEMP	Misc	1	IN SITU
1183	WEATH PREC	Misc	1	IN SITU



ARG S002

Det. Code	Description	Units	Method Code	Method Description
61	pH	pH	1	SKALAR PH SYSTEM RIVERS - LOW LEVEL
62	CONDUCTIV	Microsiemens/cm	1	SKALAR PH SYSTEM RIVERS LOW LEVEL
76	TEMP	Celsius	1	IN SITU
81	D.O. %	%	2	IN SITU
82	D.O.MG/L	mg/l	2	CALCULATION
99	C ORG TOT	mg/l	1	SKALAR ROUTINE
106	CADMIUM D	ug/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
111	AMMONIA	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
116	T.O.N.	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
117	NITRATE	mg/l	1	CALCULATED
118	NITRITE	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
158	HARD TOTAL	mg/l	1	CALCULATION
172	CHLOR-ION	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
175	CYANIDE	mg/l	1	FIASTAR CYANIDES - TOTAL
177	FLUORIDE	mg/l	1	ORION RIVERS
182	SILICAT RD	mg/l	1	LACHAT NUTRIENTS NUTRIENTS-RIVERS - LOW LEVEL
183	SULPHATE	mg/l	1	SKALAR ROUTINE
207	SODIUM	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
211	POTASSIUM	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
213	COPPER DIS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
217	SILVER DIS	mg/l	1	PERKIN ELMER 2100 ROUTINE DISSOLVED
231	BERYLL DIS	mg/l	1	PERKIN ELMER ELAN GREY LIST DISSOLVED

237	MG	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
241	CALCIUM	mg/l	1	PERKIN ELMER 2100 ROUTINE - TOTAL
243	ZINC DISS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
255	BARIUM-DIS	mg/l	1	PERKIN ELMER ELAN GREY LIST DISSOLVED
267	MERC DISS	mg/l	1	PSA MERLIN DISSOLVED HIGH RANGE
281	BORON DISS	mg/l	1	PERKIN ELMER ELAN GREY LIST DISSOLVED
285	AL DISS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
326	LEAD DISS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
350	VANAD DISS	mg/l	1	PERKIN ELMER ELAN GREY LIST DISSOLVED
354	ARS DISS	mg/l	1	PERKIN ELMER 4100 HIGH RANGE - TRADES+POLLUTION
358	ANTIM-DISS	mg/l	1	PERKIN ELMER ELAN GREY LIST DISSOLVED
373	CHROM DISS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
377	SELEN DISS	mg/l	1	PERKIN ELMER 4100 ROUTINE
401	MANG DISS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
419	IRON DISS	mg/l	1	PERKIN ELMER 2100 ROUTINE - DISSOLVED
423	COBALT DIS	mg/l	1	PERKIN ELMER ELAN GREY LIST DISSOLVED
427	NICKEL DIS	mg/l	1	PERKIN ELMER ELAN ROUTINE DISSOLVED
718	BENZO-A-P	mg/l	1	HPLC POLYAROMATIC HYDROCARBONS
1049	CARBONTET	ug/l	1	PURGE + TRAP-GC VOLATILES
1181	WEATH TEMP	Misc	1	IN SITU
1183	WEATH PREC	Misc	1	IN SITU
3267	FLOW	Misc	1	IN SITU
3268	1,1,1-TCE	ug/l	1	PURGE + TRAP-GC VOLATILES
3272	1,2-DCE	ug/l	1	PURGE + TRAP-GC VOLATILES
3277	ATRAZINE	ng/l	1	NPD-GC LOW LEVEL OP/ON COMPOUNDS
3278	BENZO-B-FL	ng/l	1	HPLC POLYAROMATIC HYDROCARBONS
3279	BENZ-GHI-P	ng/l	1	HPLC POLYAROMATIC HYDROCARBONS

3280	BENZ-K-FL	ng/l	1	HPLC POLYAROMATIC HYDROCARBONS
3281	BENZ-Z-ATR	ng/l	1	HPLC POLYAROMATIC HYDROCARBONS
3309	FLUORANTH	ng/l	1	HPLC POLYAROMATIC HYDROCARBONS
3316	INDENO-1,2	ng/l	1	HPLC POLYAROMATIC HYDROCARBONS
3327	SIMAZINE	ng/l	2	NPD-GC LOW LEVEL OP/ON COMPOUNDS
3328	TCE	ug/l	1	PURGE & TRAP VOLATILES
3334	TRI-C-E	ug/l	1	PURGE & TRAP VOLATILES
3373	CHLOROFORM	ug/l	1	PURGE & TRAP VOLATILES
3429	PAH PREP	Misc	1	HPLC PAH PREP